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V. PHILOSOPHICAL PROBLEMS SURROUNDING <TECHNOLOGY>

A. Philosophical problem: the x factor

For practical purposes, a philosophical problem can be understood as a label for the social relations that emerge as a result of contact with a certain type of <technology> and /or its technological expressions. A problem of this type might surface from looking at a technological issue from different perspectives. For example, what are the effects on religion in U.S. society as a result of the injection of the automobile? Recall Langdon Winner who said the car did not replace the horse; it replaced religion.

The historical perspective of the development of <technology> is a, more or less, linear epistemology. Likewise, the Enlightenment manufacturing of the very specific idea of modern technology can also be understood to project itself in a linear fashion; and both are marked by recognizing the causes and effects. In simple terms, the aforementioned approximations serve well to show us that 2 + 2 = 4 or that 2 + 2 = 4 because of certain factors or because certain elements were left out of the equation so as to not arrive at 5.

On the other hand, approaching <technology> from the vantage point of a problem can lead to avenues of analysis in all directions, drawing upon a wide range of interests across disciplinary lines. Philosophical problems are a form of friction, an analytical point of departure that permeates society beginning with the conceptual level. They can also trickle down to the empirical if the conditions are such which promote a dissemination of the problem, as a problem, and not as a need to be addressed with the same tools we have always used or as a social anomaly. The effects of a philosophical problem can be embedded in society both as material technology, as a perspective, an expectation and a way of being. In other words, philosophical problems ask us to question things such as identity, ontology, motive, and direction. Studying the issues raised by our current form of technology is an epistemology which reveals, or not, the possibility of a more diverse understanding of <technology>. Looking at technology from the context of a problem can also be put in algebraic terms: $3x + 4 = ?$. In these terms, the x is a factor hither not considered by powerful interests, historical narratives, etc; and the ? is the continuum of possible answers based on the many possible xs.

Technology is a major factor in our relation to the world and to others. That technology is our interface with the other is true to the extent that we find it difficult to critically analyze technology's role in our lives since we cannot "see" anything without technology. We might even find it difficult to identify the problem, let alone be objective about the issue. This section is devoted to exploring the nature of our relationship to technology and technology's role in the world. <Technology> and technological expressions are products of our social relations, but there are many perspectives and social relations that are neglected in the creation of them. The absence of these perspectives and social relations is a symptom of the philosophical problems that we have surrounding <technology>. A philosophy of technology, when the approach is made within the context of the problems we have encountered in the relationship between technology and society, can help us uncover spaces. These spaces are entities and social relations that could help us expand the scope of <technology> thus giving us a better dialogue with technology. On the other hand, this approach could also reveal that <technology> could be no other way and its expressions are nothing but the logical result of an inevitable conceptual formation of technology. The problems we have concerning technology are the natural and unavoidable result of this specific construction.

B. Purpose of philosophical questions

Technology is a form of knowledge which is the common denominator for many aspects of our lives and for many disciplines. Philosophical questions about technology lead to the creation of epistemologies that help us know the object of study better as well as to see it in a new light. A philosophical question is also the origin of a new epistemology on the topic as well as new sets of social relations.

Carl Mitcham and Robert Mackey remind us that technology creates all sorts of economic, social and environmental problems; but they are more concerned with the essential nature of technology which is at the root of these issues. Their opinion is well known in that the effects of technological production have caused unprecedented environmental and economical problems. They maintain that "technology has transformed regional into national and super-national economies, modified or destroyed social and political institutions, and been the direct cause of massive environmental deterioration" (1983, p. 1). What is not so widely understood is that the problems, technical or otherwise, are philosophical problems as well physical or empirical. In this sense, an epistemology based on problems can extend the issue of <technology> across disciplinary boundaries as well as ask us to exchange conceptual contexts in order to see the issue from a different perspective. For instance, a technician might incorporate questions related to psychology and come up with an answer that normally applies to ethics.

Technical problems are first order problems concerning, such as, what material to use or what is the most efficient procedure. Philosophical problems are second order questions, like what is technology? Or how does technological efficiency differ from economic efficiency? "Indeed answers to philosophical questions underlie economic or social analyses, in as much as analyses depend upon a correct understanding of the nature of technology". Philosophical problems don't necessarily depend on empirical information; rather they rest on reason and understanding (Mitcham & Mackey, 1983, p. 1). In short, an understanding of the nature of technology's existence in the world would help investigators better critically analyze the implications of technological choice, innovation, etc. as well as *see* the issue of technology as the vortex of a variety of issues.

Different authors raise diverse philosophical questions as regards to technology, and the different questions place <technology> in a different context, thus the concept of <technology> reflects the variety of components presented by these questions. In the introduction to *Philosophy and Technology* titled "Technology as a Philosophical Problem", Carl Mitcham and Robert Mackey write that technology is a type of knowledge as well as artifacts, revealing that technology's place in the world is so intricately involved that it may exist as merely a form of epistemology. They argue that technology can be a form of epistemology which is distinguished from other forms of behavior or knowledge. "From this perspective technology is viewed as practical activity, a way of acting, or action—all of which, as distinguished from mere behavior, involve some belief or knowledge" (1983, p. 6). If technology is a form of knowledge or type of activity then it automatically presupposes certain perspectives, values and social relations. Knowledge as a practice becomes a form of technology. Knowing the world through technology is an epistemology. Finally, problems surrounding technology can be discussed from their incipience, meaning that we can analyze how we *think* about technology in addition to the choices behind material questions.

Technology, then, is the manifestation of practical knowledge. This knowledge, according to Mitcham and Mackey, includes the practical knowledge of skills and know how. There is belief incorporated into technology as the tool is expected to fulfill the activity. Philosophical problems of technology will highlight the nature of the relationship between the tool, society and the person. For instance, what is the nature of <efficiency> as applied to engineering compared to with that of invention? Is there belief without understanding the nature of the application of the concept? Is <efficiency> a tool or is it knowledge? So, does technology reveal types of activities or is it the essence of all of our activities?

From an anthropological perspective, Mitcham and Mackey cite Jarvie who feels that technology includes all human activities. He asks:

> if technology is coextensive with man's attempts to relate to the world, then religion and politics, as well as engineering and science, have their technical aspects—so that, presumably, an analysis of technology will disclose the true technological character of what we previously thought to be non technological activity. This, in turn, reveals the general technological nature of man (1983, p. 6).

Technology is our interface with the other. If man's general nature is technological when dealing with the outside, then what aspects of man are not being exploited in the development of our technological expressions? This suggests the need to explore the diverse potential of the concept of <technology>.

There is almost a redundant relationship at work here, a vicious cycle. Technology is man's attempt to relate to the world such that social relations, spiritual and empirical activities have their technical aspects; therefore, we employ a philosophy of technology to show us the technical aspects of what we thought was non technological. The result is that the nature of man is highly technological when technology should be highly human in nature.

I am concerned with the idea of man as an entity with a very diverse and complex ontology. If an exhaustive approach is taken, the many components of man could be used toward creating the conditions and social relations for a smoother and more complete dialogue with technology. If technological expressions reveal the nature of man, then are they revealing all that they could? In addition, a better understanding of the nature of technology, meaning a more profound understanding of its position in the world, might help us understand better the choice of technological expressions. The recognition of more influences and choices would promote the ideal of critical reflection.

A third approach more directly involves the relationship between society and technology. There are historical implications here as well since the thread of history is often woven after the fact with technological issues in mind. With this approach issues of "the type of world" we have created are raised or basically how technology affects the general historic period. Can we escape the current mode of life? If this is so, then how? Nevertheless, Mitcham and Mackey argue that the answer lies in the definition of technology, or its nature, since one's opinion of technology alludes to possible exit strategies (1983, p. 7). This suggests that <technology> as a means of reacting to our environment and to others is the only way out of undesirable situations, but the issues of diversifying alternatives and increasing social relations remain. By this I mean that the concept <technology> should stand; it just needs to be sufficiently expanded and diversified so as to allow its traditional understanding to exist alongside others. As Mitcham and Mackey argue, <technology> should be a common ground for perspectives and not a space for their exclusion.

C. Technological laws of operation

A technological application needs laws of operation, especially when an epistemology has been chosen, a philosophical problem, which could lead to multiple conclusions. Laws of operation can take many forms. One such law of operation is trial and error, given the context and specific aims or goals. Studying the ends of technology, as the point of departure for analyzing the philosophical problems surrounding technology, can help us distinguish boundaries between concepts, practices and the social relations that give rise to their existence as well as uncover social relations previously not considered.

Distinguishing boundaries can lead to a more holistic concept of technology, therefore a better dialogue.

In addition, boundary maintenance promotes critical reflection as the ideal of comparison is encouraged to exist. Ironically, a barrier can also show us choices whereas a traditional understanding of a barrier is the very exclusion of choice. Here, the philosophical problem involves the separation of theory from practice and the separation of means and ends—a stepping back from context and then starting over in order to include as many variables as possible. This practice is not it action but in analysis of action. We start from the ends pursued and then go from there.

To understand the nature of technology also includes the exercise of separating it from what it is not, such as distinguishing science from applied science. Technology, for James K. Feibleman, is the actual skills needed to put theory into practical use. It is trial and error; it is context. According to Feibleman, it is important to distinguish science and technology since their boundary gets obscured due to the popular theory that all science eventually is applicable. Also, given that social and political conditions crystallize around technological realities, technology's role is of even greater importance in that it conducts social relations. The result is that technology is merely the attempt to satisfy the practical need of science whose purpose is to know and to do in a general sense without necessarily referring to empirical conditions. The empirical and practical side comes when there is contact with real social situations and technology is the manifestation of this tangible relationship (1972, p. 36). The practical application of technology, thus, incorporates both pure and applied sciences. For Feibleman then, technology is a field whose result is recognized by artifacts; but it is also one that comes to represent a common ground for a number of factors including pure science and social relations. To define something, much like creating a barrier, is to show what and how something is the case. It is also a way to blur boundaries.

Technology has a way of obscuring boundaries between applied and pure science, but its presence can also play a part in determining social and political factors. For this reason, Feibleman argues that we should analyze the ends of technological application since it emerges from the overall context which determines the form. <Technology> has social elements and political content. For example, the technological fact of rocketry altered science and its objectives and President Kennedy made the objectives well known to all by announcing that the US would put a man on the moon before 1970. This is basically an ideological end, propaganda. To some, even to the scientific community within the US, this was an absurd goal—not for its difficulty but for the fact that it had little scientific value, even though its political implications were well understood (1983). So in this case the ends embodied much more than technological goals. They implied political and economic goals as well, suggesting that the concept of <technology> should be broadened to include them.

So, once the distinction between science and technology is clarified, the concept of technology can be challenged to the point of accommodating the influences and effects that surround it in society. Would not an operation organized around the principles of scientific value have turned out differently? Perhaps the Apollo program would have had less imperialistic overtones? If one stops to think about it, the ends that were pursued were anything but rational and efficient. But, there is the sense that if a certain type of organization has the technological capacity to accomplish something, it will be pursued. The project was undertaken simply because it could be achieved and it was a necessary propaganda weapon against the Soviets. The point is, though, it was a technological achievement with many social and political implications. Science per se does not carry such baggage, but the concept of <technology> does. A different context, in the holistic sense, will result in different technological forms; therefore, the forms are far from necessary results. Plus, maintaining the difference promotes a better form of critical reflection. A project could be one that expands <technology> to include such real, potential and imaginary perspectives on technological applications, again those real, potential and actual.

Just as one end can be distinguished from another based on ideological or political motives, "Feibleman argues that pure science and applied science should be distinguished on the basis of ends pursued". Beyond this there is technology which is the actual way of operating—the trial and error of empirical participation derived from scientific knowledge. Science is the background to applied science which could take any such form whereas technology is the actual form taken. So does a technical activity have its own structure and aims different from science? (Mitcham, 1983, pp. 1-2) Feiblemen would argue that it does since technology is what is actually done (materially and theoretically with all of its social implications included) to fulfill the activity proven to be possible by science.

Technology can be understood as the concrete and practical knowledge derived from experience; therefore, we prioritize this type of knowledge over others. The ideals mentioned above are closely related to modern technology in terms of Feibleman's understanding of technology. "It is more apt to develop empirical laws than theoretical laws [whereby]....conception of the ideal is evidently of the utmost practicality and cannot be escaped in applied formulations" (1983, p. 40). Even though scientists work with the ideal, this ideal is not a universal field with which to exercise pure science, and the empirical environment must be given due consideration. The context will always preclude the possibility of universality.

Regarding the above axiom, the scientist becomes a technologist in order to realize his relationship to the actual world. "The environment with which a society reacts is the available environment, not the entire or total environment; and the available environment is that part of the environment which is placed within reach of the society by way of knowledge and techniques" (Feibleman, 1983, p. 41). However, applied science is affecting the culture with greater and greater influence as a cross-field fertilization of applied sciences exists.

Feibleman finishes with saying that "the shortest route to an effective practice lies indirectly through the understanding of nature. If there exists a human purpose of a practical kind, then the quickest as well as the most efficient method of achieving it is to apply the relevant natural laws of science to it" (Mitcham & Mackey, 1983, p. 2). He says this because all pure science eventually becomes applicable, so we must find the right laws in order to construct the appropriate technological expressions. Can technology be used as a criterion for pure science? No, science needs elbow room apart from socially contagious conditions such as the Cold War which monopolized our intellectual resources and directed them away from other activities at many levels of our experience. <Technology>, though, needs to be expanded to include contextual components so as to reflect the actualities which it will encounter once it is empirically applied. Such a conceptual expansion encourages critical reflection because novel perspectives are created and would participate given the emergence of new social, practical and historical elements. It would be better for science to be able to sit and meditate in the ivory tower without an intrusion by technology and its social accoutrements. So, even as practice divides us, separating applied science from science per se shows a potentially unifying quality which is the understanding of nature separate from social settings.

Mitcham and Mackey opine on Feibleman's essay "Pure Science, Applied Science and Technology: an attempt at definitions", and they agree with Feibleman that technology is skills or techniques as applied to artifacts; however, they are critical of the limitations of this definition and they say that, "Feibleman never furnishes clear conceptual distinctions between techniques of acting and skills of making, nor between technological and other types of making skills" (Mitcham & Mackey, 1983, p. 2). In other words, they claim that Feiblemen does not make distinctions between types of techniques at the individual level versus those of the conceptual level for each type of activity.

However, Feibleman is making a general and conceptual analysis of the practical side of technology, and he is concerned with contextual elements which could be construed as making the distinction between the types of activities that Mitcham and Mackey are talking about. Nevertheless, Feibleman is concerned with the ends of technological expressions which serve as an ordering mechanism of many, seen and unforeseen, social relations. When it comes to a particular technological expression, the presence of a certain artifact acts as a force upon our daily lives as well as, a magnet of social relations, politics and further technological pursuits. If we focus on the ends and their subsequent context, then the choice of technological innovation and application becomes questionable and far from a priori. Could this not be a strategy to expand the scope of <technology> for the purposes of a smoother dialogue with technology? Yes, because new perspectives are encouraged to participate given the contextual elements which surface in application, and the main point here is the increase of perspectives is a step toward more critical reflection.

To discuss the above issue of analyzing the ends pursued, perhaps the development of the atomic bomb is the quintessential example. The development and use of the atomic bomb achieved many objectives in its efficient execution of a number of goals. These goals were accomplished in large part by subsuming the boundaries between fields of technological application all under the rubric of *modus* operandi that James K. Feibleman uses to describe this collective activity. This is "represented by the scientist with an interest in the solution of the problems presented by the task of getting from theory to practice....A good example of the modus operandi level is furnished by the activities of the scientists concerned with making the first atomic bomb" (1972, pp. 38-39). Since technology incorporates science, applied science and social contexts, then perhaps studying the ultimate ends of technological application is a good way to understand technology's nature as a thing separate from science as well as its overarching influence as a concept which influences society in a universal manner. A better understanding of the nature of technology would shed light on the kind of society we have established as well as to help us understand the complexity of the implications surrounding technological choice. For a better analysis of technological choice, we need to see the perspectives that have been ignored in traditional epistemologies. This is done by maintaining a separation of means/ends, pure science and its application. Preserving a conceptual separation is one way to promote critical reflection.

The monumental achievement of the first atomic explosion started from the knowledge that neutrons could split the nuclei of an atom. Einstein had produced the relevant theory, but it was "Meitner and others who worked out the method of getting from relative quantum mechanics to bombs which could be made to explode by atomic bombs" (Feibleman, 1972, p. 39). The disciplinary boundary blurring included a grouping of pure science, applied science and technology all under the actual deployment of the atomic bomb is only the surface of a polemic that included military, scientific, academic, and foreign policy interests. Achieving the bottom line, like Feibleman's idea of initiating analysis with the ends pursued, will inevitably lead to cross field investigation and application, the expanding market would demand it, which is the nature of the technological research that large corporations like Dupont, G. E., Eastman Kodak and Bell Telephone would pursue. Specifically:

> The applied science in such an institution is directed toward eventual technological improvement, the range of applied science and technology being

> employed as a series of connecting links to tie up pure science with manufactures. Universities and foundation laboratories often serve the same purpose, but with the emphasis shifted toward the theoretical end of the scientific spectrum (1972, p. 41).

Feibleman wrote that what we saw with the atomic bomb was the epitome of cross field application, but when we add the moral, political and long term historical ramifications, the technological implications of such an endeavour become much more profound in the effects upon our conceptual understanding. Our ends are more and more influenced by technological realities and less by scientific aims, and it is a mistake to continue to allow technological innovation to ignore pure science and social effects. Technology, through the pursuit of our ends, has too much influence on science. Keep science, as Feiblemen argues, in the ivory tower away from the grit of technological ends.

We should establish rules for analyzing the ends of our technological pursuits. As Feiblemen demonstrated, technological ends determine the technological expression, and the rules which are used for analyzing the ends should be somewhat objective. Objectivity can be achieved either through a process of separation or extreme democratization whereby the participation of as many perspectives and social relations is encouraged. A shift in perspective is being called for here. The atomic bomb shows us what happens when <technology> is goal oriented. What if <technology> were reconstructed so as to make it energy oriented, meaning that there is much energy among the many disciplines but the goal is up for grabs.

D. Technology as one of many types of knowledges

It helps to see technology as one type of knowledge in order that we preserve the possibility of diversifying our knowledge of it as one of many kinds of *knowledges*. Having such an outlook is to promote critical reflection. Technological progress is our lens to seeing types of knowledge as they are applied to the larger narrative of progress. There is a relation between technology as a form of knowledge with others, and technology is not in any way primary in this relationship. Technological expressions are the manifestation of certain values: x expression= x value; y expression = y value and so on. I am talking about a shift in the paradigm of progress. This is a new way to see empirical activity, from a technologically based one to one that stems from the total potential of what is human. Within the concept of <progress> there are many types of *knowledges*, and maintaining this realization is a way to promote critical reflection where many forms of knowledge compete. The key to a more complex idea of technology is with humanity as a resource which must not be stymied by technological values.

Henryk Skolimnowski does not feel that technology is as pervasive in our lives as do many authors in terms of it being the dominant epistemology in our negotiation with the world. Epistemologically, he states that technology should be analyzed in comparison to other forms of knowledge. He argues that technology is one form of knowledge, an epistemology among others; and, the key to understanding this particular form of knowledge is through technological progress which is the standard of revealing forms of knowledge. Progress through technology, it must be noted, is that which society sees as being the manifestation of certain practical values—praxiology. For this reason, there is no need to prioritize technological knowledge, since its nature is not univocal; rather it is the manifestation of many values depending on the context. Progress is progress as such and not total progress.

Approaching the issue within the context of progress omits large scale social implications, real or not; and Skolimnowski is skeptical of the permeation of technological values in all activities; rather he merely claims that certain technological expressions are the manifestation of certain values while others exhibit other such values. He writes that "the evidence that technology pervades the totality of the human experience is rather slim" (1983, p. 42). He focuses on the practical realities of success and failure in a socio-historical setting, and he prefers a philosophy of technology, "that is, with the analysis of the epistemological status of technology. Technology is merely a form of human knowledge. Epistemology investigates the validity of all human knowledge, its conditions, and its nature. Therefore it is the business of epistemology to investigate the peculiarities of technology and its relation to other forms of human knowledge" (p. 43).

He criticizes the social perspectives which actually help perpetuate the reified status of technology even though a technological philosophy is useful in alerting us to the dangers of technology gone mad. In opposition to a philosophy of technology he writes that the technological philosophy:

> belongs to the realm of sociology, broadly conceived, or social philosophy, and is concerned primarily with the future of human society. Those who prophesy that our civilization will be devoured by the Moloch of technology are expanding a certain vision of the world, are viewing the world through technological lenses, are attempting to establish a new kind of monism, the technological monism, in which the technological order is shown to be the prime mover and ultimate justification of other orders—moral, aesthetic, cognitive, social and political. The articulation of this technological philosophy is perhaps most important from a social point of view—as a way of alerting us to the dangers of technological tyranny. However, for the time being, this technological monism, or whatever name is given to this socio-historical prophesy, is but a prophesy (Skolimnowski, 1983, p. 42).

The real issue may be why we demonstrate this tendency to think of technology in such a way; nevertheless, Skolimnowski advocates for a philosophy of technology which "aims at the investigation of the nature of the structure of technology, conceived as a branch of human learning and analyzed for its cognitive content". Skolimnowski is concerned with a form of epistemology [the philosophy of technology] which investigates the peculiarities of technology in its relation to other forms of human knowledge. The idea of technological progress, for Skolimnowski, is the groundwork for such an epistemology because it is the meeting ground for technical developments and the values and norms behind its existence. Human learning is bound to be a much more complex process with many more components than we are aware; therefore, uncovering the branches of human learning would be a strategy toward expanding the scope of <technology>. Thinking of <technology> as merely a branch of human learning promotes critical reflection in that technology can compete with other branches. Putting technological knowledge up against other forms of knowledge, by way of a competition if you will, is a project that can be instigated in Academia.

Skolimnowski argues that one cannot analyze things in purely technological categories. Our hope of technological progress, he writes, is practically the main inspiration to scientific knowledge; therefore progress is a way to know the world. This puts technology at the level with other forms of human knowledge but through different means. "Problems thus are investigated not with an eye to increasing knowledge (as it is for science) but with an eye to a solution of a technical problem" (1983, p. 43). It is the approach to solving technological problems that has helped solve scientific ones. Science is the servant to technology.

So for him, <technology> is a loosely connected set of instrumental means based on social interests in the pursuit of effectiveness, but it is an approach beginning with the universal idea of progress, however only contextually applied and appreciated. Also, if technology is a branch of knowledge among others, and if technological monism is merely a prophesy, then perhaps this is a way to contextualize technology with the intention of maintaining or increasing control over it—to diversify it. Perhaps by facilitating the contact among forms of knowledge, the diversification of <technology> and its expressions will be achieved. Perhaps more importantly <technology> will be strengthened by its competition with other forms of human knowledge and critical reflection is sharpened as elements apart from material production and efficiency are considered. <Progress> is potentially more complex than the measurement of mere material considerations. Traditionally progress is a linear path, clearly marked toward an unknown but better future. What if we thought of the issue in terms of an algebraic equation? As things are now, the variables multiplied onto progress, however, are few, relatively speaking. But if all aspects of society were considered to be variables in our understanding of technology, then progress would reflect such unlimited possibilities. For instance, technology multiplied by artistic reaction would give us what new added dimension of progress?

Technology is far more than a technical phenomenon since even aspects of aesthetics can be considered functional, depending on the social context. "The social context, the economic structure of a society, the existing social mores and aesthetic predilections—all have their imprint on the technological phenomenon and, to a certain extent, determine its character" (Skolimnowski,1983, p. 49). Technological progress is different today than it was 2000 years ago and we cannot look at purely technical categories. For instance, the Romans built bridges that were very utilitarian and could endure a much greater weight than necessary, whereas today we build them with aesthetic purposes in mind and to only withstand a little more weight than necessary. Bridges constitute part of the personality of a city or community. They in fact have personalities and they serve as points of identification. They are often the very identity of a place, the Golden Gate Bridge in San Francisco for instance. So, it is often the case that an object cannot be judged by any one value in relation to its function. A shift in purpose is a project as well as a means to expand <technology>.

Skolimnowski understands the above relationship as a praxiology which couples efficiency with another value depending on the particular application of the technology. Praxiology "is a general theory of efficient action for all activities we choose to analyze. Praxiology analyzes action from the point of view of efficiency. Praxiology is a normative discipline; it establishes values, practical values, and assesses our action in terms of these values" (1983, p. 46). According to Skolimnowski's analysis, the problem at hand will determine which values are to be simply applied and which ones are to be prioritized, but they all will answer the question of instrumentality. For example the value of "accuracy is the most instrumental for surveying" (p. 47). Again, certain technological expressions are the result of certain values, but the prominence we give to pragmatism serves to limit critical reflection as other values and perspectives are not allowed to give due influence.

Regardless of the function, however, the essence of technological production, (efficiency) directs the production of the artifacts; but efficiency can be further reduced to other values depending on the historical circumstance and or social context. These can be cost, productivity, speed, comfort, and quantitative values to name a few (Skolimnowski, 1983). Skolimnowski concludes by admonishing us that the technological phenomenon is far too complex to be analyzed in terms of a single entity. Thinking through technology, though considering the practical context implies an understanding of the values of each field plus the economic and social values involved in its emergence. In our time he says that the construction of bridges is the juxtaposition of values such as minimum durability and aesthetics. So effectiveness can incorporate many factors, thus diversifying our idea of technological progress. A liberated understanding of effectiveness would generate a disagreement as one society or culture to the next might not agree on the idea of durability, for instance. This calls for the need for a more general or universal approach to the concept of <technology> in order to promote the kind of conceptual flexibility to account for local conditions. Conceptual flexibility leads to more profound critical reflection as new perspectives emerge from the expanded consideration of elements of <technology> in addition to values such as pragmatism and efficiency.

Nevertheless there is some degree of continuity in technological production over the years and through various social settings, and technological expression is the big looser in that a certain influences are denied. Skolimnowski states that "it is a peculiarity of technological progress that it provides the means of producing better objects of the same kind" (1983 p.44). Here he is suggesting that there could be other "kinds" of technological expressions. There is value in recognizing technology through the success of the artifacts because this approach can expose a crucial element that is the organizing principle of many factors, both technical and social. It is the common ground. This is due to what Skolimnowski says about better objects of the same kind which could be more durable, reliable, sensitive or faster in function. These characteristics can be social norms or politically inspired interests, whatever. What is important is that their choice by social negotiation or emergence from a technological frame of mind is representative of a <technology> which incorporates numerous factors. As implied above, one way to avoid simply "producing better objects of the same kind" would be to diversify or expand our values and concepts that serve as the foundation of <technology>. For instance if <efficiency> is the concept in question, then its limitations would be highlighted if new perspectives were invited to challenge its interpretation thereby calling into question many technological expressions.

These factors suggest that the structure of thinking in technology is "far more complex than the methodologist is prepared to admit" (Skolimnowski, 1983, p. 49). Finally, what a society considers to be a better object of the same kind can be highly diverse, and the recognition of these varied perspectives would expand the range of <technology>. For instance, a better bridge today could incorporate a relationship to the artistic world, earthquake standards of durability and economic considerations as the bridge might be a source of revenue through tolls or a tourist attraction. Now security would entail considerations of terrorism as well as simple material durability. A bridge can also be a socially recognized white elephant whose purposes are obscured for political reasons or fabricated for the same. Praxiology in this sense reflects social circumstances and it is not necessarily a form of knowledge. Praxiology is a set of values that are neither fixed nor exhaustive. There is potential change here, and the idea of change can be interpreted to mean many things including the definition of change as well as the paradigm of technological expressions.

Skolimnowski is concerned with such paradigms since true change is not merely the production of better objects of the same kind. Skolimnwoski feels that our idea of change is "curiously superficial and tenuous. Within the scope of our empiricist epistemology (bearing our concept of progress), the concept of change is conceived as linear, homogeneous, almost mechanical. In actuality, if change is to be conceived in such a way as to bring about qualitative progress, it must be comprehended as dynamic and nonlinear" (1979, p. 325). Skolimnowski goes on to say that, "in order to improve our tactics of living, in order to redirect the course of technology so that it provides new tactics of living, we must create a new kind of knowledge, a new discipline within which we can effectively rethink our present dilemmas" (pp. 328-329). This is a philosophy of technology that is not only technological in terms of a limited set of values; rather its societal implications are far more divers. Once <technology> is expanded to include other elements from society, then it can be conceived as a paradigm of man which is highly complex and non linear. The inclusion of the many perspectives which would result from such a reconstruction would reveal the dynamic potential of technology and thus make it better equipped to deal with the complex problems of the human experience. Rethinking a dilemma, drawing upon our other forms of knowledge, could result in a different paradigm of technological production and change.

Part of having a limited concept of <technology> involves a dearth in critical analysis of its expressions. We do not question technological change to the extent of our full potential partly because it is identified with progress but also because it is the mechanism of so many social relationships. In other words, since technology is the foundation of so many social relations, we have a difficult time being critical of technological application and change in general. To question technological change would mean to question our paradigm of negotiation with the world. Again, this is like trying to analyze the bridge of one's glasses while wearing them; they are too close to see.

Real change is not linear. It is characterized as dynamic and complex phenomenon in the Western world. "Paths converging on technology include such concepts as progress, nature, invention, rationality and efficiency. [It] is the philosophy of our culture" (Skolimnowski, 1979, p. 327). A philosophy of technology is a philosophy of man similar to José Ortega y Gasset who opines that technology is "the system of activities through which man endeavors to realize the extra natural program, that is himself" (p. 328). <Technology> is the open horizon that is a fertile ground for humanity to cultivate its complete potential experience.

An approach to technology as a philosophy of man will enable us to rethink our experience. The philosophy of technology must not be limited to scientific and technological rationality. As things are now, Skolimnowski feels that this conceptual mix will still be influenced by scientific and technological rationality, but only partly, where there are other influences to be tapped. "This conceptual matrix, however, is a part of the Western world view shaped by scientific and technological rationality" (1979, p. 329). If <technology> merely participates with other world views, then perhaps it can, if given the right circumstances, be influenced by them in a positive way that would reflect in material production. This is expanding upon our resources as <technology> is at the vortex of the many aspects of our lives as well as disciplines and manners of thinking.

Our negotiations with the world are too dependent upon quantitative and instrumental values and we are not using the full resource of man to influence technology. In contrast a "philosophy of technology conceived as a philosophy of man insists that technology is subject to the human imperative rather than man subject to the technological imperative" (Skolimnowski, 1979, p. 335). The root of man's diversity is from his spirituality and sensibility, says Skolimnowski. It is concerned with unity, coherence and sanity rather than just material progress.

This is a shift is the paradigm of technological expressions. Using spirituality and sensibility is also a way to promote critical reflection as the ideal of comparison is encouraged through the juxtaposition of many more values along with the ones that are traditionally considered technological. Humanity should be the measuring stick and inspiration for technology and not the other way around. Now, the key is to encourage the social relations which give rise to sensibility and spirituality so that they can be used to broaden our idea of <technology>. Concepts guide our thinking, and if a concept such as technology is expanded to give shelter to new perspectives and social relations this would diversify technological expressions and promote critical reflection.

As things are now, we have a limited conceptual foundation of <technology>. In fact many political and social decisions are made based on a purposive understanding of technology. According to Skolimnowski, the phenomenon of technology could be more complex and more extensive than a mere type of knowledge; therefore we should be flexible too in our analyses (1979, p. 328). Skolimnowski's view of technology is similar to Heidegger's in that we are distancing ourselves from the nature of things and converting them to mere objects for our use. Skolimnowski's says that the technological rationality has shaped the Western World and it has dictated that "what matters is not how one fashions things, but what one does with them. Always it is a matter of purposive activity, never of things". This seems to be a limited approach. "The present order of Western man, out of which we have grown our ways of life, is based to a large degree on quantitative instrumental values. In terms of these values most, if not all, social and political assessments are made" (p. 332). Here we see how our social relations are, to a large degree, determined by technological values. This is a severe limitation on humanity and technological expression. Devoid of a sufficient amount of human values to which the technological phenomenon is cosmically resistant, then is <technology> itself deficient? The present order of Western man is not necessarily the only form of knowledge. Shifting our focus away from purpose towards ontological approaches might result in a favorable diversification of technological expressions.

For Skolimnowski there is no general approximation to technology; however, he concedes that technology can be termed the "pursuit of technical efficiency" (Mitcham, 1994, p. 153). Efficiency can be applied diversely to the many levels and applications of technology throughout the many areas in which it participates in society, hence his conclusion that a philosophy of technology is a philosophy of man. He feels that technology, "contains within itself a metaphysics, an epistemology, and an ethics" (Skolimnowski, 1979, p. 328), but this potential comes from what is man and not technology itself. It is because of these qualities that Skolimnowski concludes that technology "has been endowed with more than merely instrumental functions: it was conceived as an instrument of liberation, as the vehicle of freedom, as a Noah's arch of hope, of prosperity, and of progress" (p. 331). Hope is a nebulous concept; and any such entity can give it shape—be it love, physical satisfaction or technological innovation. In other words, hope can project in all directions. It is a complex expectation. Again, it would appear that Skolimnowski, like other authors, is not advocating that we abandon technology as the vehicle for change or betterment. Skolimnowski would argue that we should look to ourselves to make technology better. Technology, then, is his suggested path to a better world, but we are far from knowing its full potential until we tap the full human potential.

Is this a form of determinism? If we passively encourage the tendency for technology to influence humanity and not the other way around, then technological determinism can take the form of a kind of hope, and hope has been known to drive civilizations. This notion is not only shared by technicians. It is maintained by Nobel Prize winners. "Technology has become our physical and mental crutch to such a pervasive and perverse degree that even if we realize it devastates our natural and human habitat, our immediate reaction is to think about another technology which will mend it all" (Skolimnowski, 1979, p. 332). Why do we have this tendency? Who knows, but the tendency is there, and it has the effect of blocking other forms of negotiating the world.

As long as our desires for freedom, if you will, are based on a quantitative instrumental basis then we would not be allowing our full potential to flourish. Skolimnowski asks us to look at the big picture and:

> conceive it comprehensively and meet the challenge of our times by rethinking the basic presuppositions, assumptions and modes of thinking of which it is at least a part. [In sum] it is a philosophy of technology that is subject to human imperative rather than man subject to the technological imperative. It insists that man respects the delicate balances of nature and permits only an

> instrumentation of the world that enhances these balances without undermining them. It insists that man's knowledge is not pitted against the rest of creation, and that knowledge is not power to control and manipulate, but rather to understand and to mesh into the larger scheme of things. Progress does not mean the extinction of other creatures...but rather the enhancement of man's diversity (1979, p. 335).

For <progress> to be so redefined, the concept needs refueling. It needs to be open to the perspectives and social relations which have the structure to insert ideas of harmony and understanding into <technology>.

So for Skolimnowski, technology is a vast and highly complex phenomenon that is being limited in its application by our own subscription to its fundamental ideals. We should rethink its relation to the whole of humanity in order to diversify our relation to it as well as its technological expressions. Such a comprehensive understanding of technology suggests new types of technologies not yet implemented. There is hope for technology, as well—hope that it will reflect a philosophy of man. Man and technology have grown up, evolved, together and the association between the two is entirely appropriate.

If the essence of technology is man, then technology should reflect all that is man. Rethinking <technology> in such a way will result in different technological expressions. If we continue to think of technology as a certain way of being in the world, stemming from a limited set of values, then this blocks potentially inviting and attractive influences from having a positive influence on technological expressions. Technology could be so diverse, but if we continue to assume that it is the manifestation of instrumental reason, as the ultimate form of reason, then technological innovation will reflect this.

There is no one form of technology as an epistemology or as a type of knowledge. There are many praxiologies, depending on the social context; therefore we should study how technology is practiced in order to understand its nature in our society. Finally, by understanding technology as only one form of knowledge we leave ourselves the option of diversifying this form of knowledge by contact with others. For Skolimnowski, it is not that technological values permeate all of society; it is that technological expressions represent certain human values but not all of them or always the appropriate ones. Opening up <technology> to the other forms of knowledge will have a positive effect upon the concept and technological expressions. Here again, we see untapped potentials, the mining of which could be a project.

E. Technology and democracy reciprocate to create new technologies

The potential of technological production is so great that it could resemble the image of man in a more holistic sense. Similar to Skolimnowski, the total image of man could then be reflected in technological expressions. C.B. Macpherson's approach is almost the other side of the coin from Skolimnowski's. Other technologies would result based on a different vision.

There is a contradictory atmosphere in the relationship between technological potential and the ontological understanding of man. A problem in the relationship of technology and democratic society is that there are two conflicting views of man whereby the theory of democracy is far behind technological production due to its antiquated understanding of man. C.B. Macpherson claims that if we focus on the potential of the "technological revolution" as opposed to the scientific and industrial revolutions with its ability to reflect the true nature of man, then perhaps there would be a reciprocal relationship between democracy and technological production. If not technological production, as it stands now, is likely to stymie our democratic essence; and, if society is inhibited by a retarded understanding of democracy, then technology will suffer as well.

<Technology> needs to see man as a resource as well as the benefactor of technological evolution.

The first understanding of man has him as an infinite consumer and appropriator of material utilities in order to overcome scarcity; the second has him as one who enjoys and exerts his full capacities as a human. Notice how the latter is not hampered by any contextual restraints. The technological revolution, argues C.B. Macpherson, can facilitate a shift from the older understanding of man to the more ontologically diverse one. "The technological revolution has raised productivity to a level which could release human energy from the material productive process, if the market economy were changed and the liberal ontology were replaced by a democratic theory of man as an exerter and enjoyer of his human capacities" (Mitcham & Mackey, 1983, p. 12). In other words, the potential of technological production is so great that it could resemble the image of man as exerter and enjoyer of his human capacities. The relationship between our understanding of man and our actual technological potential could be more reciprocal and complimentary.

Under the older version of man we have superfluous productivity in that we are producing more of the same. This is a crisis in that we are not in control over our technological means; what controls technological means is the idea that we must keep producing to overcome scarcity—a limited contextualization of technological production. Scarcity is no longer, necessarily, the inspiration for technological production; nevertheless technological production continues under this paradigm. C.B. Macpherson argues man's democratic essence is hampered by the understanding of man as a pure consumer and appropriator of material commodities to overcome scarcity.

The concepts of technology and democracy can be mutually beneficial. If man's ontology were understood from the diverse potential of humanity, then technology could reflect this shift, manifesting as a fully democratic version of man. Technology is a product of humanity, suggesting that it could represent the versatile relationship between our total relationship to nature, as well as other humans.

The concept of man as an infinite consumer "was fitting, even necessary, for the development of the capitalist market society"; but the other, man as "an enjoyer and exerter of his uniquely human attributes or capacities...began to challenge the market view in the mid nineteenth century and soon became an integral part of the justifying theory of liberal democracy" (Macpherson, 1983, p. 161). In other words, democracy's potential can match that of technological change. Machpherson claims that we can empower democracy, as applied to all social relations and not just the political realm, if its conceptual constitution is as potentially diverse as that of the technological revolution. This operation will, in turn, have a reciprocal and positive effect upon technological production. He claims:

> the technological revolution [will] make it possible to move away from this unstable theoretical position....Technology will make possible the realization of the more democratic concept of man's essence; but that technological change in our lifetime, if left to operate within the present social structure and guided only by our present ambivalent ontology, without a conscious reformulation of the concept of man's essence appropriate to the new possibilities, is as likely to prevent as to promote the realization of liberal-democratic ends.

If we focus on man's potential for new possibilities, rather than on mere consumptive properties, then technological change will promote this new image of man in return. Man's ontological potential should stimulate the potential complexities of technological change. Technology can either be guided by the limited and less diverse understanding of man or it can be guided by the more varied understanding of man as the potential inspiration for infinite expression. Technological production has the potential to make this happen; it only needs to be given the blueprint from which to operate. This blueprint is man's total democratic essence.

Macpherson writes that the two concepts of man do not have to be contradictory in a capitalist society. "For it can be held that the maximization of utilities is a means to, rather than being opposed to the maximization of human powers". Capitalism works by allowing a few individuals the unlimited appropriation of material goods thereby inhibiting, "an effective equal right of individuals to exert, enjoy, and develop their powers" (1983, p. 168). This is competition, the "invisible hand" and social Darwinism all at once; it is also technological progress based on strength or the need to overpower nature and other men in the effort to overcome scarcity. The traditional justification for capitalism, however, will aggravate weakness. Nevertheless, with increased technological production and an overall increased democratic awareness we may overcome this aggravated weakness. The older idea to overcome scarcity, the market concept which encourages competition, "is incompatible with the equality of individual right to make the most of oneself which is now being demanded by the increasingly democratic temper of the world as a whole" (p. 169). The change in vision, as regards to the democratic climate throughout the world, will result in a change in the understanding of man and, then, technology will follow suit. An increased democratic awareness would have an analogous affect upon technological production.

Similar to Skolimnowski, Macpherson's idea of a technological revolution is not the repetition of older technologies with greater efficiency. It is "the discovery and application of new sources of energy, and new methods of control of the application of energy and of communication in the widest sense: cybernation and all that" (1983, p. 169). This type of revolution will discard the old market concept of man and replace it with a morally preferable one whereby man is conscious of our multifarious presence and responsibility in the world. It is now technically possible to change the market concept of man which will in turn diversify technological production. Whereas scarcity was suffice to stimulate technological production in the past and satisfy our puerile understanding of democracy and man, today we should look to ideas of increased freedom for further inspiration. This calls to mind the energy put toward the construction of the atomic bomb; this energy could have taken any form, and to re-channel it is the manifestation of a project that would have origins in a positive partnership between Government and Industry.

A limited understanding of a market society will affect technological production; therefore, a different understanding of the social relations which constitute our realms of production will affect technological expression. Likewise, a limited understanding of democracy would have a stymieing effect upon our understanding of <technology>, and vice versa; but an increased awareness of our democratic essence would have a positive effect on <technology> and its expressions. "New sources of energy" come from newly the generated perspectives which emerge from a more complex understanding of man. Established concepts affect how we think which, in turn, affect the form of our technological expressions; and, as Macpherson has established, some concepts actually restrict the flowering of our potential. Such a limited idea of <technology> would be similarly debilitating.

F. Technology and humanism

In analyzing technology, we should look to our concept of man for the resources of diversification. <Technology> could reflect the whole of man. <Technology> could also help us improve our ways of knowing the whole of man. Like Macpherson, Richard M. Weaver claims that the totality of man is the key to an epistemology regarding our relationship to technology. To further understand the nature of technology, Weaver reminds us of the classical trend which studied man in general, humanism, as compared to the more modern emphasis on sciences and the physical world. Weaver is of the opinion that the latter constitutes an epistemological limitation. Humanism is concerned with the betterment of man's condition and it appears that this query has been around since the foundations of the Western world. "Humanism studies man as expressed through his whole nature, including his motivation; and that is why it seems to some now as it seemed to Socrates ...to have a prior place in the course of inquiry" (1983, p. 138).

Given the venerability of this issue, Weaver argues that we should question the original motives of technological application since humanism (man's relation to others and his environment) is an art and technology is increasingly called upon to help us negotiate the world and our fellow humans. In particular, Weaver says, we should be critical of war as a major inspiration for technological change. Such a perspective will justify questioning the long term price we pay for war's necessary technological development. By prioritizing a humanist approach as opposed to one characteristic of the natural sciences, we can be more critical of technological choice. In other words, the idea of choice would be expanded.

Modern man, he says, is not critical of technological output such that we are not questioning the initial or essential motivations and inspirations. This is due in part to our initial understanding of science as a kind of champion against nature—a champion in the medieval sense. It is because of this conception of science that science is naturally inspired by bellicose motives. Weaver feels that "science in its nature is not contemplative but aggressive. Bacon's statement that knowledge is power...is one of the most dubious aphorisms handed down. It leaves hanging in the air the whole question of power for what" (1983, p. 138). Such an aggressive image of science, argues Weaver, sets up a fragile, or at least limited, existence between men as well as between man and nature. Science and technology as such have a specific type of being. So, there is morality or a determining presence within the machine in that "it does have a being. And being itself may be thought of as a kind of force" (p. 139). The type of being will have a corresponding effect upon social relations, thus another type will result in different effects upon social relations. Also the presence of a technology is a standing temptation to use it, and Weaver is concerned with *the type* of technology (which he normally considers aggressive) we have as being deflectors of specifically human activities. Can <power> be so liberally interpreted so that it sheds its bellicose interpretations and is understood to be an idea of liberation?

So, how do we live smartly and critically in a world with science and technology? As such, science answers this conflict by creating more and more cures; but this technique, no matter how you spin it, is a manifestation of our means. "Perhaps our error is the ignoring of the first and final causes, which cannot be studied without some conception of the whole of man" (Weaver, 1983, p. 140). We cannot look to technology as the inspiration since these local expressions cannot capture the whole of man. Technological achievements can not be used as the standard because these are concrete expressions of local conditions and not normative or legislative (p. 141). We must look to <man> as the fountain for inspiration in order to make technological expression more universal and therefore increase its validity in terms of legislation, regulation and application.

Weaver questions whether or not we are able to maintain human relations in any way effective in an age of technology as compared with the past or within a technological civilization whereby the specific technologies are not motivated by aggression. Science portrays the world as an enemy which must be conquered if we are to enjoy a comfortable lifestyle, so each element of nature, down to the last atom, is attacked and the product of this relationship is the result of this aggressive behavior toward the earth.

When all you have is a hammer, everything looks like a nail. Whether or not we question the final form of a technology, recall that "its [technology's] simple being is a standing temptation to use it. The fact that it is there seems to induce us to find additional opportunities for its use" (Weaver, 1983, p. 140). To combat this, Weaver advocates that we draw upon our own humanism in order to shape technologies such that they reflect harmony and not aggression, a return to humanism as "an ultimate source of value and judgment, one of whose prescriptions is that we retain the image in which we were made" (p. 142). A critical attitude toward technology, using the totality of man as the yardstick, would elevate technology to this level of diversity and not just with the more traditional aggressive quality of our existence. Like Macpherson, Weaver is talking about shifting the focus in our approach to the problems related to technology. For him technology is appropriately the concern of the humanities. A broadened understanding of man would increase the validity of the technological yardstick.

Weaver is not against technology, only its limited sources of inspiration. We must participate with it, and humanism represents a higher standard from which technology can be challenged to divert us away from aggressive motivations. Technology's outward expression might be diversified to reflect the complexity of humanity. Aggression has become an unavoidable element in our human relations; however, if we question the initial causes of a technology, then perhaps by balancing the relations to the self, the world and to others we will find the standard by which to question technology. This, he implies, is the best way to live with science. The adhering to the human standard is an art which could potentially bind us all, and living with technology can't be judged on cultural standards or other material technologies.

The gun cannot tell us whom to shoot, but perhaps if we prioritize our humanity in the process of technological development as well as its application, then we might have all together different technologies which would provide us the means of being able to ignore the possibility of whom to shoot. The type of technology we have depends on how we choose to see it. We must recognize science as an entity which is heavily influenced by the role we give it, implying that we could assign it different roles. If a concept is to be expanded or reinterpreted then the social relations and values which give rise to these new perspectives need to be cultivated.

G. Technology and politics: technology as a political tool and target

<Technology> becomes strategies of social relations. For instance, a form of technology is a form of a political vehicle, suggesting that technological expressions become political ends, but whose? The philosophical inquiry here revolves around Rotenstreich's proposal that politics caters to technology, resulting in that technology becomes the standard or guide for social relations.

As Weaver shows us that "man" is a political concept from which we can find new inspiration for technological expression and that this technological expression can, in turn, help us discover our democratic nature, Nathan Rotenstreich looks at the mechanisms behind the relationship between man, politics and technology. Basically, he discusses the relationship between the operation of politics and technology. Politics, says Rotenstreich, "represents the set of means by which man puts to use the forces inherent in his social organization...Technology, on the other hand, represents the means by which man puts the forces and laws of nature to use, in view of improving his lot or modifying it as may be agreeable to him" (1983, p. 151). Technology is a form of political expression.

Technology influences politics in two ways: 1)directly, technology reorganizes the political forces in that the political machine depends on technology in the form of organizational expertise and bureaucracy; and 2)indirectly, technology becomes a political asset either through control of its production or competition for the participation with technology. This relation can be explained better with the example of the use of television ads for a presidential campaign. The television is a bridge between special interests and the masses because it is a medium that is widely used and available, plus the message that the television carries represents those who control its programming. If politics is the means by which man organizes society and technology is one of those means, the query that Rotenstreich raises is which men and their interests will organize nature for other men. A type of politics corresponds to a type of technology.

Politics relates nicely to technology in that one of the guiding purposes of technology is man's desire for comfort, and one of the aims of politics is to provide the conditions which promote this or facilitates access to convenience. The purpose of technology is to make man more comfortable, and people participate in this process either by controlling technological production or buying certain types of technological products. "The achievements of technology make the aspiration to comfort possible; they make it profitable, and are the cause of its persistence. Technological achievements give rise to ideals related to further achievements of the same sort, and then proceed to sharpen and focus the needs which these achievements can satisfy". The problem here is that certain people will control technological production through the government and social processes. In the reality of a technological civilization, this does not only "imply the control of the means of production, but also participation in the control of the means of improving human existence" (Rotenstreich, 1983, p. 152). Participation in technological production is indirect, but we are aspiring to a type of convenience characterized by achievements of the same sort promoted by those who control the means of improving human existence.

Participation, however, can be so diversified by the cultivation of new values and social relations so as provide us with a new relationship with technology. A more open and liberal dialogue with technology should result in the liberation of technological expressions; but as things are now we have a limited relationship with technology.

We are satisfied that we are participating if we can have a share of the technology in our home, let's say. There is some control here on the part of the individual; however, in such a world where participation is limited to buying, then "the achievements of technology indirectly influence the demands of man and, insofar as its aim is the satisfaction of human demands, the world of politics as well" (Rotenstreich, 1983, p. 152). Politics, thus, merely needs to create the conditions to bring about the realization of the human demands of comfort—to allow demands to freely surface. This seems to be a superficial relationship where the nature of our problems goes far beyond the satisfaction of immediate needs.

Just as technology can be enriched by humanity, technology itself can direct the operations of humanity in terms of the political organizations that take shape due to the effects and advantages of technology. Technology can be thought of as the result of our desire for comfort; and the role of politics is to make these comforts available to all in a manner judged to be fair by the society. Comfort becomes participation with technological achievements and it defines political participation and action. Are there not other forms? Rotenstreich hints at this very allusion created by the technological achievement. What would we do in a situation that is not conditioned for the presence of technology if all of our means of dealing with society are based on technology?

If our "satisfaction lies in the fact of sharing and in partaking of the technological determinants", then we can say that, "technological reality influences ideals, determines them, and fashions them in the image of technology" (Rotenstreich, 1983, p. 152). Expectations are objectified, and politics takes shape in direct response to these expectations. We have a technologically charged version of politics. In our ever-increasing means to elevate our standard of living, we have allowed our interest in the liberation of man to wane. This, says Rotenstreich, is practically unavoidable since technological innovation breeds ideas of constant change and progress to which we lend our faith so easily since they are related to our comfort. The pursuit of these ideals deflects us from achieving other social ends. Therefore Rotenstreich believes that politics has made it quite obvious that technology is the standard of society, so our relationship with nature affects our relationship with other men. As the manifestation of control, <technology> is a model for politics whereby the model of domination is dispersed throughout society.

Yes, we are more comfortable thanks to the efforts we have applied towards technological production, and this seems to be agreeable to everyone. There are many participants, though some people are mere recipients, but our participation with the world is narrowed in the sense that it is much less sophisticated and complex. In other words, this arrangement is less liberal because our aspirations are uniformed or prescribed by the technological criteria. There is a double edged sword:

> Technology's indirect influence on politics is double: 1) it has widened the scope of politics, by increasing the number of participants in a sphere destined to improve man's existence; 2) it has narrowed its scope, by concentrating man's interest on the demand to improve his life and by giving him a yardstick according to which everything is to be evaluated by technological criteria (Rotenstreich, 1983, p. 153).

The question becomes: who possesses the yardstick and how well can we use the yardstick?

So, according to Rotenstreich, if man is worthy, technology is a life giver, if he is not it is poison (recall the Talmud). Technology adds an egalitarian element to our political organization and its responsibility to the public, but this is a skewed relationship. The criterion becomes comfort which is a limitation upon technological production:

> [the technological civilization] surrounds man with a multitude of devices, and through them creates a way of life that man must accept because of its presence. It abolishes habits and ways of life rooted in history or the mores and introduces a

style of uniformity. This style of uniformity creates an outward human equality. ..[Humanity has] a common relation to one system of instruments (1983, p. 153).

We should be conscious, according to Rotenstreich, of the relation between technology and politics in that our form of politics is able to influence technology and convert it to ends favorable to a few, for instance.

Rotenstreich is implying that we should be looking for ways to avoid uniformity since such standardization is a way to harness social groups for political purposes. Without a more liberal dialogue with technology, one that encourages the importation of new values, then we are not only limiting technology, both as a concept and as material production, but we are dulling the ideal of critical reflection. Again, technology is the looser in this scenario in that it should look to humanity to diversify technological expressions.

<Technology> and politics could be mutually reinforcing which could either be detrimental or beneficial to technological expressions and to our image of man. Due to the example that the relationship between technology and nature has given us, politics now is based on the idea of ruler-ruled in that it has assumed the role of technology as the entity which rules over nature. In turn, power relations within politics affect types of technological choice. This idea lends itself easily to technology so that technology becomes the domination of nature and others. The object of our existence is to obtain that which gives us the power to be rulers. The domination of nature and others is an end where it should be a means only. Technology is a means that could positively influence politics and our lives, but it has become an end. "Its (technology's) very existence represents progress, the betterment of man's way of life, the domination of nature, and other such assets that can be perceived as aims instead of being considered as means" (Rotenstreich, 1983, p. 158). Domination becomes a standard for social relations as technology's essence spills over into

other aspects of society. If there were a channel for mutual influence, then humanity and technology would not be limited by a few values.

Nevertheless, technology, as the domination of nature, served as a model for man and social relations. "In other words, had man not based his life upon the categories of ruler and ruled, the ruled could not have become ruler. The relation of domination can only occur within a system where this relation is at all possible—that is an authoritarian system, in general. In this politics has influenced technology and not the other way around" (Rotenstreich, 1983, p. 158). Politics is this system of domination. In short, that technology has become the end and the means comes from our form of life modeled on the idea of ruler-ruled. Perhaps this is most obvious in the area of foreign policy whereby the element above is seen as the preservation of power in the international scene. Technology is considered as an aspect of power which preserves the interests of the nation. "A policy which is alert to the means for protecting its existence, and develops both power and authority, automatically becomes sensitive to the technology which provides man with means of subsistence and means for the increase of his power" (p. 159). Could this reciprocal relationship come to have a positive effect on <technology> or technological expression?

A fatalistic two-way street has developed: politics is now in the service of technology. Both of these entities have been thought of as means, now the means are tied inextricably with the ends. "The fateful question, for man and not only for politics, is whether this is the only way to nurture the progress of technology; whether it is necessary that the authoritarian drive and it alone should feed technology" (Rotenstreich, 1983, p. 159). No, authoritarian tendencies should not drive technology. When the other is considered to be a submissive lamb or the enemy, then the authoritative entity is not taking advantage of the other as a resource, thereby limiting technological expression. Humanity is the source of technological diversity.

If technology is based on power it will seek areas that support power, says Rotenstreich. "The technological phenomenon is a revelation of man's capacity, and not only a manifestation of man's drive for domination. Can there be a use of technology and its development that would not be based upon man's will to dominate nature, which overflows and suffuses the realm of the relations between man and his fellow man—but rather a technology that will manifest in man's internal creative capacity?" (1983, p. 160). Recall the interdisciplinary energy applied toward the atomic bomb. This could have been applied to another area of production entirely. Such a reorganization based on new influences could be the foundation of a social project—one designed to encourage ideals that support the sustaining of relations and creativity. Like Weaver and Skolimnowski, Rotenstreich is implying that technology could be limited by a limited understanding of man's potential ontology.

It would appear that Rotenstreich is asking about the possibilities of changing the technological paradigm since he says that technological production is an indication of man's *capacity* for domination and not only a manifestation of our penchant for domination. Our capacities are great and many, in other words. Viewing technology as an expression of human creativity assumes human nature to actually be creative. Human nature has the power to affect technological production. Rotenstreich asks if technology contains a self producing element or if "the reproduction of technology presupposes a human productivity which can among other channels have also the technological ones, but need not have it or need not be confined to it" (1983 p. 160). It would appear that Rotenstreich favors the model of technology as capable of answering to the totality of human experience since he suggests that technology as a means and ends was taken from a political system of social relations based on ruler-ruled. Are there other forms of technology which could emerge that are based on distinct social relations and, if so what forms of technology would be most favorable?

If the kind of technology we have affects our relations with each other, through politics, then a more reflexive concept of technology would be more agreeable to the relations established by society. If we are conditioned by technology, as Rotenstreich believes we are, then perhaps technology would be enriched by the limitless *ways* in which humans may be conditioned. In addition, a more flexible interpretation of technology, one that is not totally geared toward domination, might prepare us for diverse experiences.

H. Man separate from nature; man apart of nature

The essence of man's existence is something distinct from his technological experience. This relationship lies in thinking of the spirit of man and society as an organism and not as an organization. An organism is free to operate based on its own constitution and the various potentialities which comprise the whole. One can understand this by thinking of man as having a spirit which is free to fulfill many objectives. An organization operates under a mechanism imposed upon from the outside which is to effectively discourage a certain amount of the liberal qualities within the spirit of man.

Above, we discussed the importance of man as a potential to affect technological expression; but what is the ontology of man in a technologically tinged world? What is his role, in the larger sense, in the approach to problems? Nicholas Berdyaev would argue that one means of doing this is by way of the spirit as an essence separate from empirically clouded and technologically cluttered social relations. These days, we have the tendency to believe that there will always be a technological solution to whatever problem we encounter in the future. In fact, there is very little that we cannot imagine due to our faith in technology. Technology is like a religious manifestation. We put our hopes in technology when technology should look to humanity as an infinite resource for the diverse and complex development of technological expressions.

This sentiment is at the heart of Berdyaev's article, "Man and Machine", and he labels this faith as technique, and for him technique is understood as efficiency. "Technique seeks to attain in everything the greatest results with the minimum expenditure of power" (1983, p. 203). It is a way of attaining, a means toward anything from spiritual fortification to military efficiency. Part of the problem is that technique is man's last love "for the sake of which he is prepared to change his very image". Since the fracture of religious belief and the shattered liberalism of the nineteenth century, "civilized man's sole strong belief is in the might of technical science and its capacity for infinite development". Just as once man used to program the direction of his life based on religion or tradition, now this role has been taken over by technology.

Technique is a means that has become an end, and the ends, argues Berdyaev, should belong to the spirit. "There can be no technical ends in life, only technical means: the ends of life belong to another sphere, to that of the spirit. Very often the aims of life are superseded by its means, which then usurp so important a place in human life as completely to eliminate its ultimate object from man's consciousness" (1983, p. 203). He is asking whether technique has influenced us to the extent that we cannot choose our aims apart from those established or fabricated by technique. Technology should resort to man's spirit for inspiration much like culture per se is the result of liberated inspirations and perspectives. The idea of beginning with the spirit to create new ends is a project.

But our ends are not inspired by our spirit. The problem is that we are all too influenced by our many technical weapons, but these are tools for specific ends. Crucial to the thesis to his argument is his criticism of the label of man as a tool using animal. The tool is not the aim but it has become such. It is the means to an achievement of an aim that might or should have little to do with the means. We are too bound to our means (Berdyaev, 1983). The essence of who we are is tinged by an understanding that we are tool users; therefore to be human is to use tools. Our identity is marked by the end of using the tool. It is not necessarily related to other aims, such as those related to the purpose of the tool.

Culture is not limited to such material manifestations; it is not bound to means. Culture contains tangible, natural-organic elements, material ones, and invisible technologies. Nevertheless, "without technique culture is impossible; its very growth is dependent upon it, yet a final victory of technique, the advent of a technical age, brings the destruction of culture" (Berdyaev, 1983, p. 204). Culture is a work in progress, and technique has been pivotal in the development of many of our cultural institutions, but an institution as defined by technique is not the ultimate form of that institution, argues Berdyaev. Technique will one day destroy culture because culture is understood as a natural organic entity, and the dependence upon technique, a purposive entity, will one day cause the collapse of culture as Berdyaev understands it. On the one hand, culture is a system of symbols that analogously relates to the natural world. There is a system of connection between cultural representation and the cosmos. "Technique knows no symbols; it is realistic, reflects nothing, creates only new actualities; it is plainly visible in its entirety, and divorces man from nature and other worlds" (1983, pp. 204-205). Technique is an organization of the life world from which it separates us, but our spirit is a strong influence that could alter this course. Conceived of as a spirit, humankind *participates* with the entirety and not just controls it—a project. Recall the Romantic response, mentioned above, to the Enlightenment whereby nature was not understood as a thing to be dominated rather as an organism in which man participates.

Our world is no longer characterized as an organism, but an organization. The former is a world of generation and the latter is one of construction where the purpose of the object depends on man and not the organism as a whole (Berdyaev, 1983). This constitutes an alienation from the natural world. Concepts are loyal to the mechanism of organization. In this case the mechanism is an anthropomorphic vision of the cosmos and not one where parts are seen as components of the whole. Conceptual construction reflects this view of the world.

Technique destroys the earth-centered form of belief where we are an element but one with an inherent purpose related to the whole of nature. We think in terms of construction and not growth. It separates us from other forms of knowledge. "Technique destroys ancient bodies and the new ones it creates do not resemble organic bodies; they are organized bodies" (Berdyaev, 1983, p. 205). That techniques have become ends shows that our existence is one divorced from other possible ones since technique leads to further technique. If technique remained a means, then it could lead to a variety of ends. The mere knowing that a body is an *organized* body is a step towards understanding the ontology of the thing as well as the maker. The aforementioned epistemology is an exercise in knowing what something is not. This is a means of approaching the essence of man since it reveals his subjective manifestations as well as concealing others.

However, if we are aware of our subjective assertions, then we are recognizing other attributes that may not have been considered or that need nurturing which is to promote critical reflection. Technique:

> creates grave dangers for the emotional aspects of life and the autonomy of the person. On the other hand, however, technical civilization 'demands an intensification of spirituality'. When man has the power to destroy the world, 'then everything depends upon his spiritual and moral standards'. Thus technical

civilization calls for a spiritual renewal to control the dehumanizing powers of technology (Mitcham, & Mackey, 1983, pp. 15-16).

The dehumanization of society is the result and technology is the means to that end, but we cannot look to technology to overturn this, says Berdyaev. Again, we must look to man.

On the other hand, technique can be considered "spiritual" much like the transcendental side of man. Technique could be understood as a latent force. Technique has come to represent spiritual qualities in that through its technological expressions we now have the potential to destroy like no other force since the black plague. Technique has elevated us, but again this is organized activity towards a specific end without the other ends in mind. What are the means to maximize this force?

One way to accomplish the above would be to shift the degree to which technology's paradigmatic foundations from a preference of quantity to one more characterized by quality. Man is responsible for the machine, and man is more than a creator of technological expressions as things classified as quantified regulators of social relations. Technique is characteristic of a world where the mechanism behind organization has taken over the ontology of organisms, and it has created capitalism and the society within which it lives and, in turn, organizes men.

Berdyaev argues that society should not organize men, but the other way around. "Here man is taken not as an individual but as a social being with a social vocation to fulfill, since only then has he an active and creative vocation" (1983, p. 212). To escape this situation, man must look inward, to himself. The machine has replaced qualitative characteristics with quantified ones, but it is the qualitative ones that unite the various elements with cultures. If man is liberated from the machine as it is so configured now, as an effective means toward ends that are confused with the means, then perhaps a new source of inspiration will be uncovered; but again, man is responsible for this. It is a privilege and a duty:

> Man alone is to blame for the awful power that threatens him; it is not the machine which has despirtualized him—he did it himself. The problem has to be transferred from the outward to the inward. A limitation of the power of technique and machinery over human life is a mission of the spirit; therefore man has to intensify his own spirituality. The machine can become, in human hands, a great asset for the conquest of nature on the sole condition that man himself becomes a free spirit (pp. 212-213).

At this stage in our development when man is, "conquering irrational social forces; he establishes an organized society and a developed technique, but again becomes enslaved, this time by the machine into which society and himself are becoming transformed" (p. 213). The enslavement causes a certain level of irritation within men as the whole of his potential is not called to the fore in technological innovation, choice, etc. Man, he says, must place himself above the mechanism of organization. The components which are being organized should be given priority over their organization, he argues. Man becoming a free spirit is a project.

If we loose our dependency on the machine, both it and humanity will experience a liberation different from the type of liberation which a machine could provide. However, it could be argued that quantitative ends unite us in a way which is far more universal. Can <technology> benefit from an increased understanding of our potential ontology, including our transcendental existence? Berdyaev thinks the answer to this is affirmative since a heightened awareness of our potential will result in more diverse technology expressions. For him it is almost an imperative as the machine is transforming us and not the other way around. He is making a claim for critical reflection whereby mans qualitative potentials become liberated and are encouraged to emerge and compete for influence upon technology. To encourage these potentials their corresponding social relations and values need to be uncovered throughout society—a project.

I. For technological expressions, conventions are not legislative

Recall Weaver who claims that social conventions regarding the appropriateness of technological expressions, as we have come to recognize them, are not legislative in terms of society as a whole; therefore we need a general concept of man to serve as a more valid standard. Similar to this is Mario Bunge's approximation to technology which is theoretical in place of empirical with the end of obtaining an objective form of analysis of the relationship between society and technology in general.

Technology needs to be recognized at its conceptual and abstract level in order that we may find truth in technological application apart from a limited set of values. An increased awareness of this will help us be better judges of practice and choices between technological expressions. Technology is, as such, a system of rules, and rules are within the appropriate realm of conceptual and theoretical approximations. Rules are like meta-technologies. Rules of behavior are social relations. They can have different faces, which include technological expressions, in many different environments; but they are consistent at the core. The only difference lies within the form of the outward expressions—the details determined by context.

Mario Bunge argues that the origin of a philosophy of technology is within a kind of operational theory which incorporates scientific theory and applied science. Once it is established, the philosophy of technology will be the result of an evolution from the application of scientific laws to their adapted applications to local conditions. This process will involve many social systems and relations; therefore the philosophy of technology is partly about the proper contextualization of social systems and relations. This procedure is both a theoretical and practical activity which considers both scientific theory and local conditions. Also, Bunge feels that further blurring between the realms of pure knowledge and action will not help in improving the rationality of our actions. According to him:

> modern technology develops when the rules of pre-scientific crafts are replaced by the grounded rules of technological theories. Rules are grounded, he says, when based on scientific laws which explain or account for their effectiveness. By explaining the effectiveness of rules, technological theories are the foundation for a system of rules prescribing the course of optimal practical action (Mitcham & Mackey, 1983, pp. 3-4).

Modern technology is a system of rational rules grounded in scientific law whose application is unlimited in terms of the manner by which something is fulfilled. Bunge's argument is that technological forecast could be more effective in terms of the complex relationship to the world. It could be more holistic and significant if practical knowledge were attributed with qualities of truth in general in terms of scientific laws as opposed to social rules of technological theory.

However, this theory must be further dissected in order to account for that variety of experience. The division is between substantive theories and operative ones. The former is the application of preexisting scientific theory such as flight as applied to airplanes. The latter are independent of scientific theories such as "the way that a theory of airline management analyzes personnel and machine interactions. While not directly based on pre-existing scientific theories, these technological theories nevertheless employ the scientific method" (Mitcham, & Mackey, 1983, p. 4). Bunge asks how these actions relate to science and how they affect our notions of scientific prediction and technological forecast. He questions the nature of the relationship between technology and science by wanting to see technology as more scientific in terms of basing action on laws characterized by objectivity and universality rather than social conventions.

Within the arbitrariness of application, however, there is the question of whether something should be done. "The applications of theory to practical goals pose considerable and largely neglected philosophical problems. Three such problems—the one of the validating force of action, the relation between rule and law, and the effects of technological forecast on human behavior" (Bunge, 1983, p. 62) are all dealt with by Bunge. Scientific theories are about what is while technological theories incorporate far more, including what should be done in a given circumstance. Technological theories are more complex at the practical level but less profound at the conceptual level than scientific theories. This is because technological theories may serve one man while be useless for the next at the practical level. Also, technological theories, as they mix with practical contexts, touch on aspects of our lives that are subjective or whose effects are not measurable.

According to Bunge practical decisions are made, not based on scientific theory but on technological knowledge. For example, an act may be considered rational if "1) it is maximally adequate to a preset goal and 2) both the goal and the means to implement it have been chosen or made deliberately employing the best available relevant knowledge". For Bunge it is crucial to have a clear distinction between actions (#1 and #2) and goals. In other words, the aforementioned acts must not be goals, but tools applied toward goals. In addition, they are also not based on habit or superstition (1983, p. 62). Decisions are made with tools and these tools are technologies, not general theories.

There is a feedback mechanism built in to this relationship. For example, according to Mario Bunge, the "practical man is one who acts in obedience to decisions taken in the light of the best technological knowledge—not scientific knowledge...and such a technological knowledge is, made up of theories, grounded rules, and data, is in turn an outcome of the application of the method of science to practical problems" (1983, p. 62). It would appear that Bunge is trying to uncover the general and common theories which we utilize to make practical decisions in order that we may have a standard that is applicable to many different contexts and social relations.

In addition, by stripping the theories of their empirical implications we could then direct our technological expressions toward new empirical manifestations that are representations of the same theories—like going back to the essence and starting over. Again, the conceptual separation of scientific and technological knowledge is an exercise in critical reflection in that we are encouraged to keep them separate thus allowing for a heightened sense of comparison. Standards are thus more complexly analyzed. When two realms of judgment are preserved separately we automatically are left with more perspectives which can be applied toward the complexification of technology. We can judge technological expressions with a more liberal eye.

Technological theories employ the method of science but they are not necessarily scientific in the sense that technological theories are based on practical goals and do not have a cognitive aim in mind. If:

> looked at from a practical angle, technological theories are richer than the theories of science in that—far from being limited to accounting for what may or does, did, or will happen regardless of what the decision maker does—they are concerned with finding out what ought to be done in order bring about, prevent, or just change the pace of events or their course in a pre-assigned way (1983, p. 63).

Conceptually speaking technological theories are less involved, profound or less ontologically concrete as the practical man is not concerned with how the action will affect things in general, only the immediate realm in terms of the successful realization of a specific action. Within the phrase "what ought to be done" is the idea of bringing in new perspectives so that we may really know if something ought to be done. Science is about can or can't be done; technology is a much more fertile ground in that its flexibility allows for new angles on can or can't.

If one bites into an apple expecting an orange, the orange will be judged to be a very bad apple; but if our expectations are more accurately calibrated then our judgment of their implications will be more useful. This is why science and technology cannot be confused in analytical situations. In other words, when dealing with technological issues we are concerned with what should be done in a very narrow set of circumstances. As a project the incorporation of more complex, long term and holistic elements into <technology> might result in technological expressions that are less offensive to fewer aspects of society.

The need to fully understand the distinction between scientific theories and technological theories is part of Bunge's main argument. Simultaneously we may have conceptual ignorance but with practical success. Ideally, Bunge argues that we need both conceptual knowledge and practical knowledge. Scientific knowledge is not necessarily concerned with whether something works in a given situation. This is where technological theories come in which take into account the local conditions and practical know-how available to bring about a logical and efficient execution of an activity.

The goal of technology is action not knowledge. Action has more immediate social effects than does knowledge. Practical theories have little to do, necessarily, with substantive theories. The difference between scientific knowledge and instrumental knowledge accounts for practical knowledge but theoretical ignorance and vice versa. This phenomenon has existed for millennia (Bunge, 1983, p. 67). The problem comes when we apply technological theories, which are only applicable in a limited arena and are prone to error, to our negotiation with the world and to social organizations. Local and practical knowledge mixes or clashes with established practices from other realms resulting in no clear theoretical background for their use. If technological and scientific knowledge are contained within the same conceptual entity, then we are denied the benefit of two realms: the scientific and technological. But if they are separate, critical reflection is promoted since perspectives are multiplied. This can be understood by thinking about the amount of potential angles there are within a circle. With each bisection, you are creating another angle—a perspective.

Both theoretical and practical knowledge have a place in truth. Also they feed off each other, making it important to heighten the conditions which generate them. Conceptual knowledge will make practice more universally efficient, and practice as such will aid the process of theory making, thereby creating theories which are more applicable across social boundaries. The gulf between the two extremes of speculative theory and blind action is not bridged by "proclaiming their unity but by multiplying their contacts and by helping the process whereby the crafts are given a technological basis, and technology is entirely converted into applied science" (Bunge, 1983, p. 68). As applied science, technology becomes a bridge or a web of connections to a myriad of social relations rather than a divide. Multiplying their contacts, however, requires analysis that could be considered archeological since this degree of dialogue demands one to uncover the social relations which reveal these contacts. In any event this multiplication is like the creation of perspectives for the purposes of promoting critical reflection.

A link between theory and practice (a social relation), be it for material production or social action, is seen in the creation of technological rules. "A rule prescribes a course of action...More explicitly: a rule is an instruction to perform an infinite number of acts in a given order and with a given aim". Within the sphere of "an infinite number of acts" are know-how, traditions, conventions, rules of thumb, and social agreements (Bunge, 1983, p.

68). The differences between laws and rules are many. For instance a law is descriptive whereas a rule is normative. A law will tell one that something is more or less true while a rule will indicate the effectiveness of an action. However, a technological rule is grounded on any number of laws. "A rule is grounded only if it is based on a set of law formulas capable of accounting for its effectiveness" and effectiveness requires a high percentage of cases of success. Again, to help this process it would be better if we knew why a rule is effective—the bridge to the law (conceptual and theoretical). Modern technology is the result of the attempt to ground our normative rules and the transformation of law formulas into effective technological rules. The general terms of "effective" and "practical" are bones of the skeleton which constitutes the rule that can then be applied to different situations. One needs now to find the other bones for more diverse technological expressions or a more profound understanding of <technology>. Such an archeological exercise would be approaching truth and not relative truth.

Empirically speaking it is important because it could help us predict. There is no direct path from success in practice to truth nor vice versa which highlights the need to entertain the idea of technological laws. "In other words, the roads from success to truth are infinitely many and consequently theoretically useless...that is no bunch of effective rules suggests a true theory. On the other hand, the roads from truth to success are limited in number, hence feasible" (Bunge, 1983, p. 71). Technology starts with normative rules and ends up with theory and since technology is a success in practice there are other success, real or not yet in existence, which could also lead to truth. Practical circumstances are many and are thus not criteria for truth. A rule incorporates many laws; therefore, forecast will be improved if technological theories were more conceived as rules.

A technological forecast is a step closer to experience than a technological rule. One who gives a technological forecast is an active participant in real events. The forecast is more complex but at the same time more conservative than scientific prediction since it must take into consideration far more elements and contextual incidents. It is more complex in that it incorporates: "(1) the conceptual level..., (2) the psychological level...and (3) the social level: the actions actually performed on the basis of the knowledge and in the service of extra-scientific goals". On the other hand a technological forecast is more conservative in the sense that "it is used for controlling things or men by changing the course of events perhaps to the point of stopping them all together, or for forcing the predicted course even if unpredictable events should interfere with it" (Bunge, 1983, p. 73). By the nature of its application in conjunction with human action, a technological forecast must be more conservative because real consequences and invested interests are involved. It cannot afford the whim of fancy. The advantages of a technological forecast are that the analysis of it can be done at the levels of the conceptual, the psychological and the social. It is a dissection of many ideas of a larger system into smaller systems for either analysis or troubleshooting for technological application. Perhaps such a technique would have a positive effect on production.

Just as a technological rule is not a law but merely a rule existing along side others, real and potential, a technological forecast can also co-exist with other such forecasts. This is due to the three reasons mentioned in the previous paragraph. A technological forecast is appropriate since technological application is conceived with the intention of predicting, controlling, altering or stopping a phenomenon, but how this is achieved is not formulaic; rather it is based on subjective elements. Likewise, a technological forecast is not based on a set of given conditions which determine, for example, that the course of something will be altered, but rather how it will happen can be a combination of any number of things which could be different based on many factors which change over time. In addition, since a technological forecast is concerned with the standardization of action and reliability of results rather than pure advancement of knowledge, it can slow the pace of science. What is wanted of technology, its desideratum of reliability, speed, accuracy, efficiency, etc, is not always attainable, "because of the complexity of the systems it handles and the imperfect control of their variables—a control that can be achieved only in the artificial conditions offered by a laboratory" (Bunge, 1983, p. 76). Again, it would seem that a closer unification of the science and technology would help technology per se.

A scientist tests material in order to apply knowledge to his/her system of interest. A technologist tests in order to "give his rules and plans a quick and inexpensive preliminary test for effectiveness". This could lead to unforeseen results and then it is back to the drawing board. Errors are implicit in the actions of a technologist. "Hence the philosopher of technology, just as the philosopher of science, should be confident in the possibility of progress as well as in the necessity of error" (Bunge, 1983, p. 76). Error, then, in embedded within our use of technological rules and forecasts. This is just as true for operational as well as substantive technological theories. Perhaps, Bunge is admonishing us from a blind faith in our technological form of life negotiations. Adding an element of the awareness of error and its necessity to our understanding of technology is to see <technology> differently. Errors mark the boundaries between systems per se and social relations showing that a technologist has passed into another realm. In this sense, science seems to be characterized as having a linear progression while technology could have a multidirectional and multilevel form of progression.

Now what are the philosophical implications of the previous review of Bunge's article "Toward a Philosophy of Technology"? A philosophy of technology is important and necessary because technology has a soul, and it is susceptible to philosophical reasoning. In his words, 1) "technology is permeated with some of the philosophy it has inherited from pure science…2)…Technology puts forth a number of philosophically significant theories...such as pragmatism...3) Far from being ethically neutral, like pure science, technology is involved with ethics and wavers between good and evil" (1979, p. 262). In the article, "Philosophical Inputs and Outputs of Technology", Mario Bunge's thesis is that "technology has a philosophical input and a philosophical output and, moreover, part of the latter controls the former. If this is true, then technology is not cut off from culture nor is it a detachable part of culture; technology is instead a major organ of contemporary culture". Bunge feels that the philosopher should pay close attention to technology for these reasons. Also the philosophy of technology should be related to that of science but remain distinct to it. The concept of <technology>, likewise, needs to be understood for its potential diversity in order that we may be better equipped to gage technological expressions.

Bunge argues that it is not necessary to look for the philosophical problems related to technology through the products of technology. "We must search for philosophy among the ideas of technology—in technological research and in the planning of research and development", since philosophical components are found almost everywhere, he says, where there is mature thinking (1979, p. 263). So if there are philosophical issues within technological thinking, what else does technology entail? From within the process of technology, we should search for unifying ideals. Bunge takes "technology to be that field of research and action that aims at the control or transformation of reality whether natural or social" (p. 263-264). These are the unifying essences of technology according to Bunge, his concept of <technology>. <Technology> is the common ground for a multitude of social relations and perspectives where critical reflection is unavoidably present in this level of diversity.

A fundamental difference between science and technology is that "science elicits changes in order to know, technology knows in order to elicit changes" (Bunge, 1979, p.

264), but technology does contain an important conceptual and theoretical element. Recall that a technological theory is also much more complex but also more conservative, meaning safe. It is understood to incorporate material, social, conceptual and more general activities such as information theory and control theory. Technology as a concept is very broadly applicable, and the above occurs in the technological process which could be a more practical term given the complexity of the concept. The technological process proceeds as follows: scientific and technological research, development, which involves policies and decisions, production and practice and finally the product which includes issues of quality and cost control. All of this is feedback to all previous stages. Technology is not alien to theory, "nor is it an application of pure science; it has a creative component, which is particularly visible in the design of technological policies and in technological research" (p. 264). These are the conceptual components of a technological theory which, if recognized, encourage critical reflection.

Bunge's main argument is that "the conceptual side of technology is neglected or even ignored by those who equate technology with its practice or even with its material outputs" (1979, p. 266). We ignore the conceptual richness of technology by constantly recognizing technology in practical settings. Part of the reason for this is that technology has no clear border with its environment and neighbors. For instance there can be no technology without modern culture and civilization, so distinguishing the technological and cultural can be difficult. Also, "technology is not a final product, either; it shades into technical practice...Things are not completely pure in or around technology; besides its artistic and philosophical components, one occasionally finds traces of pseudoscience and pseudo-technology" (p. 267). Here again we see one making attempts at uncovering connections which could be applied toward the expansion of <technology>.

For Bunge, technology participates with many aspects of our culture, but characteristic of this participation is technology's pragmatic relationship to the world and truth. Also, "technology shares with pure science a number of epistemological assumptions: 1) there is an external world; 2) the external world can be known, if only partially; 3) every piece of knowledge of the external world can be improved upon if only we care to". The problem with technology is that its criticism is "tempered and distorted by a strong instrumentalist or pragmatist attitude" (1979, p. 268). This suggests that there is a limitation placed upon technology. A shift in attitude would result in different technologies. A way to break the hold that these values have upon technological expressions is to encourage the other elements within <technology> such as its philosophically and socially charged components.

Technology plays a big role in society, but the nature of its role is very specific or limited if you will. For example, the nature of technological research is useful truth, or that which can be applied to a real problem at hand. The object of study:

> is an intermediate goal, something to be achieved only in order to be used as a means for attaining a practical goal.... Because of his pragmatic attitude, the technologist will tend to disregard any sector of nature that is not or does not promise to become a resource. For the same reason he is prone to push aside any sector of culture unlikely to be instrumental for achieving his goals (Bunge, 1979 pp. 268-269).

Here is the role of the philosopher of technology. The technologist's concept of truth is tinged with adequacy and useful results; and the technologist is mainly concerned with maximizing, not only efficiency, but *his* efficiency regardless of philosophical leanings. He is opportunistic. To get beyond such subjectivity, the investigator can look to the values and start over from them in the analysis of a technological problem.

Values constitute a meta-level of existence. Technology shares with science certain metaphysical hypotheses. The world is composed of things, as well as ideas and shades. Things get together in systems and some systems are quite distinct from others, otherwise separating things from their systems would be difficult. All things, facts and processes fit into objective stable patterns. Nothing comes out of nothing, and nothing becomes nothingness. Determination is often multiple and probabilistic rather than simple or linear. Technological outputs are also some additional metaphysical things. For instance, technology can help man alter or destroy certain processes. And because artifacts are under our control by mechanisms that did not evolve spontaneously, "they constitute a distinct ontic level characterized by properties and laws of its own—hence the need for elaborating a technological ontology besides the ontology of natural and or social science" (Bunge, 1979, p. 271). Here again is the role of a philosophy of technology. It is the proper place for a philosophy of technology to analyze the ontological distinction of fabricated actions and phenomenon as opposed to those with natural origins.

A major difference between the scientist and the technologist lies in the object of study. "To the scientist all concrete objects are equally worthy of study and devoid of value. Not so for the technologist...The value orientation of technology gives the philosopher a splendid opportunity to analyze the valuation process in concrete cases rather than setting up a priori (or else conventional) value tables" (Bunge, 1979, p. 272). Values are another indication of context and social relations. They mark boundaries as well as cross them thereby creating new realms which the technologist considers while the scientist does not. Values highlight new realms; therefore, the recognition of new values multiplies perspective and encourages critical reflection. The result of which would be more complex technological expressions as they would inevitably reflect the new values.

Speaking of realms Bunge says that technology contains philosophical ideas such as the scientific method, and it is a producer of them—metaphysical ideals such as models of efficiency. "In addition it can inspire or suggest interesting new developments in the philosophy of action, in particular ethics, legal philosophy, and the philosophy of history" (1979, p. 273). As to the last, Bunge demonstrates that, with some approaches, history has been mathematized. For example, history is cleansed of unnecessary details as chronologies and statistics are interjected. The finding of historical trends through socio-political trajectories or even technological developments is also a technological adaptation of history. All of these, however, have in common that they are intended to maximize expected results. The instrumentality of technology has even lent a pragmatic air to the philosophy of history. In other words the aspect of instrumentality has given real purpose to historical investigation in that knowledge of the past will lend itself to decisions in the future. Here there is real pragmatic value in producing statistics, collecting variables, etc which in turn maximize their expected utility in future decisions. For Bunge technology is recognized as a phenomenon of action characteristic of usefulness, pragmatism, instrumentality and opportunism (1979). It is rule based, not law based, and we can see how such types of activities affect human behavior in general.

Rule based implies the implementation of values; however, For Bunge, technology even has a role in the formation of values and their administration throughout society. Technology is highly instrumental and its essence carries with it a practical end related to the needs of humanity. Therefore an ethics, tinged with *technologicalness*, will have an appendage that explains why one should or should not do something. For example, the command "do X" is without a practical relation to man's needs; whereas "do X in order to get Y" has a practical relationship to the world. Technology has given us a philosophy of pragmatism. This is an indication of how technology affects human behavior in as far as "what ought to be done" is concerned. "In sum, technology suggests that we replace every authoritarian set of imperatives with a grounded set of rules—rules based on laws and value judgments. In this way, whatever was implicit or even concealed can be analyzed, criticized, reconstructed, and systematized" (1979, p. 275). In this sense technology can reflect a model for ethics as well as *be the* model for a different ethics. Remember that technological rules are by nature more conservative due to their need to reflect, as accurately as possible, the many social components and exigencies that are involved in a technological application; therefore, this is asking us to find as many social components as possible which would legitimize the technological rule. Searching for social components is the same as cultivating perspective, the result of which is a heightened sense of critical reflection. Ethics, in order to be a legitimate epistemology, must not necessarily prioritize certain social relations to the exclusion of others. Ethics does not have a legislative pattern of social convention from which to draw.

Science, on the other hand, has little to do with ethics. It is comfortably situated in its ivory tower. It is unavoidable that there would be an ethical code which enjoys at least some degree of contact and consideration concerning technological application. In fact ethical codes and technological expressions are both technologies and therefore the result of social conventions and relations. In as far as external controls are concerned there is a built-in ethical code determined by society which is applied to technology, at least in theory. This is not the case with science. In technology, "not only some of the means and ways of knowing many be impure, but also the entire technological process may be morally objectionable for aiming exclusively evil practical goals" (Bunge, 1979, p. 276). A technological object may be inherently evil or the use of a banal object may be evil. Technology has moral commitments one way or the other, and it is the job of the philosophy of technology to attach ethical awareness to the process of technology.

Technology also has its own ethics, not necessarily the same as ethics per se. For instance, man is separate and more valuable than nature and he has a right to subdue nature to which he has no responsibility. The ultimate task of technology is the complete exploitation of natural and human resources and morals are considered an epistemic obstacle, thus to be avoided (Bunge, 1979). These maxims are not justified by technology itself, rather they justify a certain form of technology—that of instrumentalism and exploitation. Recently we have come to distrust these maxims because they condone the dark side of technology. "If we wish to keep most of modern technology while minimizing its evil components and negative side effects, we must design and enforce an ethical code for technology that covers every technological process and its repercussions at both the individual and social levels" (p. 278). The idea here is that a different code of ethics would result in a different technology. Given that 1) <technology> is at the nexus of various social relations and 2) the realization of a material technology can create ripple effects in other areas of society, we should be able to see alter our understanding of technology is potentially far more complex than meets the eye. Again, <technology> is the common ground for many forms of social relations.

Technology, he feels, needs to be concerned with the long term affects, prescribing the course of both the best and most practical action. In this sense technology has a lot to benefit from science. An action may benefit the agent but detrimental to others which is why he feels that praxiology and ethics should be considered in tandem. Technology is much more. It goes beyond immediate affects. Perhaps a more diverse ethical orientation will result in different technological forms; however, ethical decisions need a diverse pool of social relations from which to draw in order to avoid prejudice and to be free of power play.

Bunge writes that technology is a central component to our culture which interacts with all other components, including philosophy. "Technology forms an essential part of modern culture. Indeed, it is often held that technology is alien or even inimical to culture". The technologist should be included along side other types of scholars. To not do so would have unfavorable consequences, "for it perpetuates the training of scholars with a traditional (pre-industrial) cast of mind and conceptual equipment, contemptuous and afraid of whatever they do not understand about modern life". So if the technologist is trained like other scholars, then perhaps we will have a different <technology>. "Instead of being an isolated component (of our culture), technology interacts strongly with every other branch of culture" (1979, p. 279). The authorities in government and education have sidelined technology as distant from the core of intellectual culture. "We cannot ignore the organic integration of technology with the rest of modern culture. We cannot afford to ignore the nature of technology, let alone despise it, if we want to gain full control over technology in order to check its dark side" (p. 280). Its dark side relates to its limited ethical foundations in terms of its opposition to nature rather than a connection to it and other men. Technology's dark side also implies a set of components within <technology> which could be used as a point on the line of a positive connection resulting in more favorable technological expressions. A bad element cannot be ignored as in a different set of social relations it could be used to construct a positive connection that could improve the concept of technology as well as our dialogue with it.

If we continue with our limited understanding of <technology>, as an entity employed for organizational purposes, we are not fully appreciating its widespread and complex presence in our society. We are blinded by its effects and potential since we are a selfish animal and that technology satisfies this particular trait. It seems that Bunge is advocating that we explore the conceptual base of technology in order that we may have a rule of analyzing its moral implications as well as its overall presence in our society as a cultural catalyst. This way there can be objective truth in practice. If we had a different ethics of technology, one that is less instrumental in the process, then we would have a different <technology> as our judgment of technological expressions would reflect the complexity derived from a more diverse ethical base.

J. Technology is a conceptual building block

The aporia of <technology> is an entity conceived as a pure means. It is not art. <Technology> is an idea founded on intention, but its application has no predetermined material form thereby leaving it open to revolutionary possibilities. A technological expression is defined by its end as a tool let's say, but this does not mean that the presupposed end of the tool is alien to human intention. Earlier it was mentioned how for Maurice Richter, technology has a very specific definition. It is a means (tools, practices and traditions) to predetermined and socially desired ends. Also, Bunge's definition is consistent with this in that goals need to be distinct from means. Similarly, Richter's definition keeps technology from being an art or an end in itself. This is a general concept whose criteria do not exclude the consideration of the local context and the possibility that in one setting something could be considered technological while in another not. "Technology encompasses tools and practices deliberately employed as natural (rather than supernatural) means for attaining clearly identifiable ends" (1982, p. 8). Understood this way, science, even, can be considered as a type of technology:

> Our present definition of technology as encompassing certain tools and practices enables us to recognize science-as-a-search-for-knowledge as a kind of practice included within the technology category, except when science is undertaken only for its own sake. This definition excludes anything that is an end in itself rather than

> a means to an end. For example, anything that is artistic rather than functional would be considered non-technological.

By maintaining that technology is a means to an end and not an end in itself, Richter is keeping human intentions well within the range of the above definition. Human intention is the key to his understanding of technology. Compared to Feibleman's definition which "makes no exception for phenomena that perform useful or even essential functions if these functions remain unknown to relevant participants and thus do not constitute means in relation to ends", intention is crucial to Richter's understanding of technology.

In addition to including science within the scope of technology, Richter considers that organizations of people, like bureaucracies and corporations, and even traditions can be technologies. In a way:

> Human organizations may be used as tools just as material objects are. An army may be a tool in the hands of a general or a ruler, just as a sword or a gun is a tool in the hands of a soldier....Lewis Mumford has suggested that machines in which the component parts consisted of people were the first machines to emerge in history and that they served as prototypes for the construction of machines composed of inanimate objects (1982, p. 11).

Richter keeps the human intentions within the scope of his understanding of technology and preserves the practical side to technology. Within such an understanding, even traditions can be considered as technologies.

The US Constitution is an example of an organized technology that has become, in many ways, a tradition. The organizational element of the Constitution is its focus on decentralization of government and the overlapping of government branches which can exercise influence within the realms of the other branches. The Constitution has become a tradition in that other national and state governments as well as universities have used it as a model when establishing their parameters of authority. In other words, the Constitution has come to be valued for its principles and ideas that can be emulated in other social bodies.

Technology, as Richter understands it, is not bound to the use of materials without any insertion of human intention, plus certain practices can cease to be fully technological as we saw with the US Constitution, but the element of human intention remains. Richter's wide yet specific interpretation of technology, however, has a common denominator-the human intentions as they relate to practical ends. The idea of human intention as a foundation of <technology> excludes accidents and maintains technology as a means and asks us to forecast technological innovation to include possible results, unwanted and unpredicted. <Technology> is not art, as Richter understands it. It is not an end. Such a shift in focus should alter the ultimate use to which we put technology. When considering the essence of technology, Richter is arguing that its ultimate ends are neither predetermined nor are the social relations which surround them predictable. Despite the social relations, the element of human intention is stable, admonishing us of the flexibility of our relations in the face of our intentions. Human intention is a powerful mechanism for the creation of a project since the social relations have the potential to adapt to the intentions. We can be as bold as possible when proposing something and still have the confidence that the social relations will modify themselves. The three writers mentioned in this section are consistent in their search for general principles upon which to base analysis of technology. In sum, Richter's definition of technology is wide open to potentially revolutionary possibilities in the production of technological expressions.

K. Technology as the primary element of social relations

This would include knowledge as effective truth. Problems, defined by context, are the point of departure for understanding technology. Knowledge is a form of technology.

Technology is two things, at least. It is knowledge of truth as well as truths since technological truth is context specific. Similar to Richter's intentional understanding of technology is Jarvie's interpretation of technology in "The Social Character of Technological Problems", with one difference. Jarvie's definition includes all human activities (Mitcham, & Mackey, 1983) and is oriented toward the "means for socially set purposes" (Mitcham, 1994, p. 153). The thesis of Jarvie's article is that technological progress can be based on any number of factors which do not always have to be related to traditional aims, such as efficiency, as is Skolimnowski's argument whereby different aims are based on different values. For instance speed rather than durability may be the inspiration behind bridge building in a certain context (Jarvie, 1983). In addition technology is the result of human nature to empower ourselves over the environment, and its progress depends on the ultimate goal in conjunction with local and historical conditions.

Jarvie argues that there is no single underlying ideal for technological progress, or more specifically, efficiency is not always the aim. He says that "the characteristics of a technological artifact are determined by historically defined problems rather than by some universal principle; and it is this problem that is posed to the technologist which determines the character of the thinking involved in the production of the artifact" (Mitcham, & Mackey, 1983, p. 3). Knowing how a producer is thinking within a historical context will help an investigator in the philosophy of technology understand the nature of the artifact's place in the world. It will also benefit in our understanding of know-how per se as applied to specific artifacts. This is the problem. We need a more objective criterion for analyzing technology which could come from knowing more about the thought process of the producers and users of a technology. How feasible is it to interchange contexts in order to pick and choose values with the hope of them affecting technological expression?

Epistemologically, Jarvie puts knowing-how at the level of knowing-that since the former tells us how things function in the real world. Know-how is a form of knowledge, a form of knowing that. "Know-how tells us that something works as it does" (Mitcham & Mackey, 1983, p. 3). In fact, since knowing *that* is a form of power over the environment, it is a form of technology. Technology is our means of coping with the environment and knowledge is a means to increase our power over the environment; therefore, all knowledge is technological. "If the term technology denotes practical knowledge in this expanded sense (including knowing that), it then becomes 'coterminous with our attempts to come to terms with our world—that is, our culture and our society—and as such it contains within it both pure tools and all knowledge" (Mitcham, & Mackey, 1983, p. 3). All of this can be grouped within the larger category of know-how which can be thought of an objective category for judging technological progress. The category of expectation that Jarvie spotlights is effective, not to be confused with efficiency since the former is context specific. Again, we have another objective element for the criterion of technology.

The idea of effective, unlike efficiency as we know it, includes many exchangeable values as they become ephemeral depending on the specific context, like a language game; whereas efficiency is more of a value in itself. Efficiency is an attempt at something legislative for action when this is not feasible. Technology can be understood as a paradigm which guides activity pursuant to effectiveness, and not just efficiency, in a socially specific environment. In his article, "Technology and the Structure of Knowledge", I.C. Jarvie argues that it is important to recognize that on the one hand "technology is only a part of the logical structure of our knowledge; and that from another angle the whole of our knowledge can be regarded as a substructure, as included under technology" (1983, p. 54). Jarvie feels that antiquated ideas about identifying technology with machines and plain snobbery have prevented us from admitting that knowledge, anthropologically speaking, is a substructure of technology. The only difference is aim. Technological knowledge is founded on effectiveness in a given setting whereas pure knowledge is founded on truth. In short, it is by way of technological knowledge that we negotiate the world, but this is done within the parameters of social norms. In fact, "much of what counts as a problem in technology will depend on the society" (p. 59). This encourages us to be more flexible in situations of technological application.

Therefore, knowledge within the scope of technology is about effectiveness, not truth. "What [Jarvie] suggests is that knowledge of effectiveness is knowledge of truth, even if it is on a different logical level. It is, so to speak, true knowledge of what is effective. It is not true knowledge of why it is effective; it does not explain anything" (Jarvie, 1983, p. 55). Something is true for that set of circumstances. Effectiveness is not uniformly applicable throughout different societies. It is socially, culturally and geographically specific. Even though we may not know why, we know that a certain statement is valid or not simply be observing if a technology works. Technological knowledge is qualitative. Effectiveness like <technology> is a concept without end, but this factor should not deter us from exploring and uncovering the elements which constitute its ever-changing ontology. The discovery of these new elements makes effectiveness a richer concept; analogously the same could be done for technology.

The reality of the situation, for practical purposes, is that scientific truth is secondary to technological effectiveness. This is so because societal demands are the inspiration for technological solutions and science is more detached from the conditions of daily life; science merely operates by telling us what is possible. There is much less immediacy in the pursuit of scientific knowledge than for technology. "Society sets the outer limits on the kinds of solutions that can be seriously entertained, and closely scrutinizes those that are tried. There seems to be an inescapably social element in technology. Science only sets the outer limits to the problems that can be tackled" (Jarvie, 1983, p. 60). Science, then, acts after society has determined the problem, and problems can be uncovered with the multiplication of social relations that give rise to their existence. Creating problems, or raising the issues, could be the starting point for a project which could be carried out within Academia.

Technology's privileged position and powerful influence are often unnoticed. Jarvie alludes to the subtle and cryptic power of technology when he says that people treat it like the step brother to science and identify it with dirty image of the factory. This misconception has blinded us to technology's power and wide spread importance. The age of machinery has afforded humanity with an unimaginable wealth of money and material goods; however, "it also blinded everyone to the continuity of this development with other kinds of attempts to change the environment" (1983, p. 60). But the machine age is coming to an end, and the ages of biochemical and thermonuclear are upon us; thus "our technological breakthroughs now get consolidated and implemented at an accelerating rate, and our curricula will find it hard to keep up as long as they are machine oriented". This type of diversification in practice can confound our academic analysis of technological choice. This is about changing paradigms. Academically speaking, if we put technological truth on a level comparable to its potential effects in society then we will be more critical to its application. A machine, in the traditional sense, is one way to conceptualize <technology>. Jarvie is implying that a new understanding of <machine> would be more appropriate, one that contains an important element of integration.

Now that we have passed from the machine age, we should be aware of what the nuclear age will bring as it becomes integrated with other technologies and social relations. As technologies converge, which is happening more and more, it is more realistic and practical to consider knowledge as a part of technology in general and not vice versa. This is because a philosophy of technology includes many particular technological applications. A philosophy of technology is about consequences, both unpredictable and unimagined. Technological knowledge includes all of the above technical paradigms and these are converging with the result of enormous technological innovations. In addition to this, new social relations are forming.

Nevertheless, the final form of technological output is heavily influenced by the specific societies. Technology, for Jarvie, incorporates knowledge of all types and this should be remembered especially since most interventions with the environment will require further technological solutions (1983). The problem then becomes that our societies are determining the type of knowledge applied *as technology*, and the ontology of knowledge is not uniform it is context specific, suggesting that there is room to diversify <technology> as material output. The direction and face of our society will determine the knowledge applied to the problems we generate suggesting that if society were restructured our knowledge would reflect this change. For example, Jarvie argues that the slaughter of the buffalo on the American plains was a technological solution created by the policy makers of the day obsessed with *Manifest Destiny*. This policy then created the need to have more technological solutions, like herding the Natives on to reservations and teaching them how to farm. So applied to this case a society that had been more morally or environmentally focused would have reached different conclusions—different technological expressions as well as an expanded scope of <technology> thereby lubricating dialogue with technology. The point is that new forms of knowledge could coexist with the ones that are already in place. Manifest Destiny was a project that was so effective that the US doubled in size and it encouraged intervention in other parts of the world. Other policies could be developed with just as much success but by less offensive means. Manifest Destiny was a paradigm through which to judge and manipulate the physical surroundings of the North American continent. It was a project that emerged out of Romanticism, Progress, Capitalism and a government willing to bend over backwards for its realization. Other such projects could come out of the combined efforts of Academia, Government and Industry.

Jarvie characterizes the peculiarity of our knowledge of nature as an anthropological issue since it is founded on effective knowledge of specific situations, though not omitting the historical relevance of individual cases. “Thought of in reference to man’s nature, all knowledge is a means of increasing his power over the environment” (1983, p. 60). Tools, he says, are not knowledge. A formula (X) is a tool to advance the production of the atom bomb, let’s say. Technology is a means as a form of knowledge. Society and social relations determine the ends. Jarvie concludes by saying that technology “is coterminous with our attempt to come to terms with our world” (p. 61). In this sense, knowledge also, being a thing and a tool is part of our technological knowledge. This knowledge is founded on effectiveness which is a socially accepted norm and would therefore be indiscriminately applied to the world as a whole, though in different forms. “Coming to terms with our world” is not an a priori activity. It can take many forms.

The power of technology lies with its tight and inevitable connection to our particular set of social relations. There is a logical relation between the type of social relations we have and the type of technological expressions we make. Take the example of the slaughter of the buffalo. Today that idea seems ludicrous, but then it was effective, thus good and lucratively rewarded. It was considered the execution of true knowledge since it was both effective and it was the natural spawning of a certain set of social relations. This encourages us to question the existing social relations when the use of technological expressions is at stake. We should put the social relations that are behind technological expressions under the microscope. Social relations are not pure. This is an axiom that is normally realized in hind sight. We should feel encouraged to look for additional social relations, as perspectives. How we think is reflected in the production of our technological expressions. A new concept of an idea or additional perspectives to our traditional way of thinking should diversify our expressions.

L. Technology as the means to a plurality of possibility

The world is or exists as a form of technological representation. By this logic, various technological representations would result in various worlds. Many technologies could provide us with many worlds. Peter-Paul Verbeek comments on Don Ihde's analysis of the role of technology in human experience to find out "how do technological artifacts affect people's existence and their relations with the world" (2001, p. 119). Much of Verbeek's article is concerned with Ihde's understanding of technology's role in our interpretation of the world which contrasts with that of Heidegger's. Ihde's analysis is in large part a response to the idea of phenomenology which involves how a thing is disclosed or revealed to us in our experience with the world. Obviously, the world is experienced through humans, and to relate to the world is the same as to interpret it. They (experience, relations and interpretations) are synonymous, resulting in that the subject and object cannot be considered independently of one another. "In the phenomenological perspective, there is no such thing as a thing-in-itself. If we experience things, we experience things-for-us, that is things as they are revealed to us. Humans have no direct access to reality" (p. 121).

In this sense, the world becomes a type of world as determined by its relation to us. For Martin Heidegger, modern technology is the background which determines being and:

> humans have only limited ways to determine how their world is disclosed, for that disclosure always happens against the background of a particular and historical meaning of being. This background is not produced by humans, but is

> something in which they always already find themselves...According to Heidegger, modern technology must be understood not as the sum total of technological devices, but as the ways in which our present day epoch disclosed the world ...and what counts as reality is that which can be made and manipulated (Verbeek, 2001, p. 122).

Technology, then, is merely a way in which the world is made known to us. The problem that Ihde has with the Heideggarian understanding of phenomenology is that it constitutes only one way in which reality can be revealed. Technology has become a means of negotiation whose particular relationship with the world discloses meaning.

For Heidegger, "the most distinctive and essential feature of the technological way of world-disclosure is that it involves a forgetting of the moment of transcendence, which is indissolubly related to the being of beings" (Verbeek, 2001, p. 121). Technology involves nothing which transcends beyond a tool's ability to manipulate nature for our use. "Heidegger, therefore, thinks of technology as a way—but only one way—in which reality can be disclosed". Ihde breaks from this form of phenomenology. Instead of reducing technology to *the* technological form of world disclosure that makes them possible, characterized by intentionality and instrumentality, "Ihde asks what form of world disclosure is made possible by technological artifacts" (p. 123). This states that technology does not merely reveal *the* technological world-form; rather, technology reveals new *worlds*, plural—in short more and different technologies is synonymous with more and different worlds. Rather than being one way by which the world is disclosed, technology is that which makes many interpretations of the world possible. The forms of world disclosure come about, according to Ihde, in the three ways that we relate to technology: directly as a form of mediation of reality, by way of alterity, and as background. Technology, in a sense, duplicates the world. The world becomes revealed by x, y, and z technologies and not just as the technological world as Heidegger would have it.

In the first, technology is a form of mediation. The artifact presents the world to us and does not call attention to itself. This leaves the option open for many interpretations, and it promotes free will. For example, I do not look at my eye glasses. I look at the world through them. In Heidegger's world, a tree is forced to show itself as firewood or wooden planks; but for Ihde, a tree is seen as a myriad of interpretations.

In alterity situations, humans have more of a relationship to the actual technology, as in a thermometer. The technology embodies a form of reality, but it still must be interpreted by humans. Finally in background relations, the technology "shapes the context of our experience in a way that is not consciously experienced" (Verbeek, 2001, p. 132). The experience of reality, however, is still open to many possible interpretations by the human subject, and technologies are the vehicles.

> The insight that technologies can play a mediating role in our experience, in which certain aspects of the world are strengthened and others are weakened, therefore points to the need to nuance the classical, Heideggarian thought that technology consists of a specific, and reduced interpretation of the world. According to Heidegger, technology is characterized as a standing reserve or as a storehouse of goods that lie ready for human manipulation. This interpretation allows the world to appear only in a very limited respect under the guise of control and domination (p. 129).

This is a too limited application for technology which constitutes many ways of seeing the world (technologies can bring forth many worlds) and not the one Heidegger shows. In short, Ihde reminds us that "technology can even allow the world to manifest itself in new ways" (p. 129). This obviously includes existing technologies, but it could also include forms of technological expressions as yet undiscovered.

In terms of the relationship between technology and culture, Ihde believes that "technologies do not exist in themselves, but only as related to humans and to culture, for humans are always and only involved with technology in a cultural context" (Verbeek, 2001, p. 133). This is in response to Borgmann's analysis of two approaches to the philosophy of technology. The first is the instrumentalist approach which argues that the tool is neutral and is to be judged only by its use. The other school is that of substantivism which says that technology is not neutral and it can alter culture drastically. Ihde feels that this distinction is too simplistic.

Ihde attacks both of these approaches for being incomplete in that praxis has not been given proper consideration. He highlights the phenomenon of the successful technological transfer between drastically distinct cultural settings where a thing can have the same substance but different uses and still be stable. For example, a tin can is a tin can in one cultural setting while it is a protective helmet in another. Technologies exist in as far as they relate to humans in a cultural context (2001). The point is that the cultural setting has a great deal to do with the actual use of the artifact, and the context can give emphasis to the substantive effect or it can highlight the neutrality of technology. The context provides meaning to a technological expression; therefore, a new context would give a different meaning—a project.

There is no essence to a technology, only applications depending on the context and social relations that they incorporate. Technologies only exist in use and time. A technology can be "stable" in many different forms at the same time. Often times the context defines a technology much better and quicker than its designer. This relates to "Feenberg's analysis of the introduction of multi-stability of technologies. What these technologies really are cannot be determined with finality" (Verbeek, 2001, p. 135). Ihde reminds us that the cultural setting and social environment can contribute to the technology's flexibility and capacity to be adapted to local conditions. He concludes that, "human ends, therefore, can be realized in many different ways, depending on the cultural context in which they play a role. Different cultural contexts, different ways of seeing, thus can lead to the development of different technologies". If there is no essence to technology, then we must balance its established contextual understanding with a variety of perspectives and social relations. This would serve to legitimize its essence as open, liberal, universal and without localized prejudices.

This is not to suggest that a technology does not possess a certain degree of its own intentionality. Technologies can have a role of their own. "Technology, according to Ihde, possesses a certain robustness and therefore is as little neutral as it is determining...that because technologies provide a framework for human actions, they have a certain influence on those actions" (Verbeek, 2001, p. 136). For example, Verbeek points out the varying effects of using a pen, typewriter, and a word processor. The former allows more thought while the latter two are fast enough so that written language can reflect spoken language. They also have politics, and they have a script in terms of their substantive constitution.

Also, increased cultural contact more and more affects our interpretation of a technology's use. Technology has forced upon us the idea that we must have multiple ways of seeing the world. "Technology has transformed our culture into what [Ihde] calls a pluriculture" (Verbeek, 2001, p. 137. We are in contact with many cultures. This phenomenon produces an effect Ihde calls "decisional burdens". In addition, these choices lead to contingency choices. "In a life world that cannot be engaged from a single way of seeing, interpretations are no longer self-evident; there are always several ways of seeing, without any one being a priori more adequate that the others" (Ihde, 2001, p. 138). Technological expression, argues Ihde, brings out these interpretations of the world.

Does technology change culture or is it multi-stable? Technologies, says Ihde, can change cultures in as far as the technologies' intentionalities are interwoven into the culture. And Ihde feels that "technologies are eminently able to do so, even though their role always depends on the specific context in which they function...Technologies can influence culture precisely because they are interwoven with culture" (2001, p. 138-139). In contrast to Heidegger, Ellul's (victory of Technique) and Marcuse's (analytic atrophy), Ihde writes that:

> technological culture does not develop in the direction of one-dementionality, calculability, and uniformity, but rather in the direction of plurality. Technology does not create one single way of disclosing reality—the technological way of revealing—rather it fosters the proliferation of different ways of seeing within our culture. That is not to deny that important aspects of reality remain invisible within an exclusively technological way of thinking, only to say that it is a gross misunderstanding to claim that technological culture holds our entire culture in its clutches (pp. 144-145).

Rather than determining a technological world, technology is the path to many worlds which do not necessarily have to be technological. Ihde sees a potential within a particular technology. For instance a microscope can reveal one way of seeing the world—closer. This is not to say that it is the only way or that technology itself reveals the one technological view of the world. An object can exist for us in many forms, and these many forms come to use depending of different technologies. We need technologies to uncover the world; and a particular technology is determined by a culture; therefore, a specific technology can manifest as the representation of a culture. For Heidegger, technology was the product of a way of seeing the world. Technology, according to Ihde however, prescribes many ways of seeing the world within a culture. Technologies lead to worlds. So, technology can be determinative but only in so far as a particular culture will let itself be determined that way. The potential of technology is culturally specific; therefore, <technology> could be approached as a thing infinitely potent. Technology can create the conditions for new perspectives which is also to give legitimacy and credit to the social relations behind such perspectives. Recall the example I presented earlier about the concept of ownership and how different were its manifestations depending from which perspective it was analyzed.

M. Hierarchical technologies versus organic technologies

Mumford is concerned with the question of whether new types of technologies can emerge in a world where there is one dominant paradigm of technological activity. This tension is seen through the competition of hierarchical technologies versus organic technologies which reflect our symbol making potential. Changing the essence of <technology> to match our diverse aspirations and potential is possible. Technology could reflect a glorification of free will and autonomous being.

Lewis Mumford is also a proponent of plurality, but his idea of plurality is more of a hope of plurality since he fosters a belief that we have not fully appreciated the human possibilities and the original nature of man. He feels that since the 19^{th} century, when the advent of mechanical inventions changed our very conception of human potential and technical limitations, we have over valued scientific and technological progress and ends in themselves. Specifically he questions the logic of the image of man as a tool-using animal and feels that it is our ability to create linguistic and social organizations which distinguishes us from the other animals. For Mumford, unlike Jarvie, technology is not the true nature of man since technology itself is not a unified whole that incorporates all human experience which is more recognized for our ability to create symbolic expressions. There are kinds of technology, and that only one, "biotechnics, is truly in harmony with this creative life" (1983).

"Technics and the Nature of Man" is an anthropological approach to the deterministic features that we attribute to technology. Similar to Ihde, Mumford writes that technology manifests as the representation of one form of interpreting the world when there are others, but only one model persists today and has ancient origins stemming from a particular way of understanding of who we are. When man is primarily a thinking animal and creator of symbols, why does modern technology continue to regard man as a tool-maker? The answer goes back 5000 years when life oriented biotechnics were replaced by a systematic organization of labor. Biotechnics, he argues, was more in tune with the total nature of man. "Monotecnics [is] the systematic organization of work through the exploitation of physical energies, cosmic and human, apart from the processes of growth and reproduction for one over-riding purpose—the pursuit of power" (Mitcham, & Mackey, 1983, pp. 4-5). This organization was the fore-runner of modern, specialized machines and systems, both isolated and interconnected.

Mumford refers to this organization as a Mega-machine. The relationships within the mega-machine suppress those areas of man that are not consistent with organized labor and they transfer the heart of human activity from the human and organic environment to the mega-machine. "The possibility of liberation for self-rewarding, educative, and mind-forming work begins with a rejection of the theory which justifies monotechnics—the idea of man as essentially a tool-making and –using animal" (Mitcham, & Mackey, 1983, p. 5). The mega-machine is against man's potential, but Mumford states that "mind-forming" work could be an indispensable counterbalance to total automation. This states that Mumford does not wish to replace the type of technology we have today, but rather to compliment it. The additional type would be characteristic of a technology which combines play and work rather than separating them, for instance (Mumford, 1983). So, Mumford's doubt lies in the nature of technology, but more specifically in the nature of the type of technology we have when there have been and could be others. Does this type jibe with the nature of man as a symbol creator? Mumford does not think so; we need to think of man in a much more holistic manner.

It seems that <technology> can reflect changes in the abstract, or changes from another realm. If we change our idea of ourselves, then perhaps the result will be different types of technological expressions. In other words, if we think of humans as not only tool-users then perhaps our technological output will reflect this. The recognition of humans as symbol makers, for example, is a project which could begin in academic environments.

Again, for Lewis Mumford the problem of the relation between man and technology is that we assume man is primarily a tool maker. Lewis Mumford's idea of a machine is a force which acts against society, upon society, whereas Ellul's technique (which we will see following) incorporates man and society to the machine. Modern technology can also, according to Lewis Mumford, be spoken of as an efficient machine which is the conversion of human activity toward to the ends of one purpose, the mega-machine; but it is this purpose which distinguishes Mumford's argument from Ellul's. Mumford's idea must only be thought of as a machine with a specified end which suppresses areas of the social setting in the process of achieving that end. His idea is the magnet orders society pursuant to the desires of the magnet—one goal. Ellul, on the other hand, sees the many social components as having a technical influence or orientations.

The mega machine, like the technical phenomenon, must then be evaluated in terms of what it excludes, like morals and aesthetics (Mitcham, 1994). He uses the example of an army or the construction of the Great Wall of China, activities which by simple demand put aside other human activities for the unified objective. The construction of the Great Wall of China and a battle campaign in a war are machines, and they exclude by necessity the emergence of other social values. They are left aside by necessity so that the goal may be obtained. Mumford's machine consolidates necessity while Ellul's *technique* incorporates all social activity within the standards of efficiency.

Such activities, according to Mumford, serve to inhibit man's endeavors in that they don't mirror our pluralistic nature. Mumford advocates that man is a thinking man and not a tool maker. Mumford denies the priority of tool making in describing our nature. We run the risk of becoming servants to the machine if we limit our experience to the making of tools; and, according to Mumford, the machine represents a limitation as it is not the making of tools but the mind which is the basis of our experience with nature and each other. The mind is before the actual thought of tool making. Interpretation, like language, is how we really experience the world (Mitcham, 1994). He comments from an anthropological point of view that we are often erroneously led to believe that we are primarily tool makers due to the durability of these artifacts over written or spoken records. We are tool makers simply because the tools have survived for analysis (Scharff, & Dusek, 2005, p. 342).

To recognize man as a tool maker is to separate him from his environment and potential environments as well as the many levels that this relation could represent. If man were recognized for his mind, then an association with his total surroundings would be much more visible. Mumford uses the term polytechnics to describe the many possible expressions that technology can take as opposed to monotechnics which is a unified and exclusive of local conditions. Polytechnics represents:

> a kind of technology that is in harmony with the polymorphous needs and aspirations of life, and it functions in a democratic manner to realize a diversity

> of human potentials. In contrast, monotechnics or authoritarian technics is based upon scientific intelligence and quantified production, directed mainly toward economic expansion, material repletion, and military superiority—in short, toward power (Mitcham, 1994, p. 42).

Modern Technology is a primary example of mono-technology and it is very exclusive of other forms, and therefore non neutral. Mumford maintains that:

> technology in the narrow sense of tool making and using has not been the main agent in human development, not even in technology itself. All human technical achievements are 'less for the purpose of increasing food supply or controlling nature than for utilizing his own immense organic resources...to fulfill more adequately his superorganic demands and aspirations (p. 43).

Mumford says that we are limiting our experience if we stick to technological forms that are characterized as monotechnics, and "technology is thus to be promoted when it contributes to and enhances what he calls this personal aspect of existence, not when it restricts and narrows human life with a focus on power" (p. 44). Polytechnics seems to be an approach that would promote the recognition of a greater number of and more complex social relations whereas monotechnics is much more single focused and therefore less complex. Monotechnics alienates production from the most valuable resource within humanity, our humanity and our complexity.

The megamachine is primarily an organization of human activity toward a single goal which serves to promote a hierarchy, and it homogenizes the types of social relations involved in the activity. About five thousand years ago work began to be organized to such an extent that work per se on a certain task, let's say brick making, consumed the entire day and the completion of a certain goal, toward which the bricks would be put to use, let's say a pyramid, took a lifetime. This is the fore runner of modern technology. "That was the fundamental departure which, during the last few centuries, has led to the increasing mechanization and automation of all production" (Mumford, 2005, p. 348). We can see the analogy between the construction of the pyramids with the sacrifices that we make to the monopolistic corporations or to wars on terror.

Another common thread to modern times is the use of power to achieve a common goal. What is the real difference, if any, between the construction of the great pyramids and the destruction of Hiroshima? Mumford asks. The former was a construction based on violence and coercion and the later was a construction (the bomb) to be used toward violence. They are the mirror image of one another. "Is this association of inordinate power and productivity with equally inordinate violence and destruction a purely accidental?" (2005, p. 349). Let us compare then and now.

Why were the megamachines so successful? First, the task of building a pyramid derived its authority from cosmic sources: math and astronomy. Second, the megamachines offset the long and mindless activity of daily labor with social programs like flood control and common defense. Man, though coerced, was able to sacrifice a more holistic relationship to nature and his own life for the benefits of the megamachine. Man was subdued by the long hours which served to promote stability.

Modern technology owes its origin to the megamachine. The original controllers of the megamachine had delusions of omnipotence and divinity, and their deaths represented a passing of the torch. This is still true and the torch was passed as the megamachines evolved into technological systems. "The nuclear age conceptions of absolute power, infallible computerized intelligence, limitless expanding productivity, all culminating in a system of total control exercised by a military-scientific-industrial elite, correspond to the Bronze Age conception of Divine Kingship". This consolidated power becomes justified in destroying the symbiotic cooperation between "communities essential to man's survival and development" (Mumford, 2005, p. 350-351). Incidentally, this was written before Eisenhower first used the term "military-industrial-complex" and before C.Wright Mills coined the phrase "the power elite". Mumford is referring to a paradigm of technological production which has survived to this day. How can we shift this paradigm or make it flexible so as to tolerate other paradigms in conjunction? Mumford would say that it is the image of ourselves which would be the initial step toward this.

The ends of both the megamachine and the equivalent of the military-industrial-complex are mad, says Mumford. It is mad for humans to be subjected to laboring toward a single purpose. "Autonomy, self-direction, and self-fulfillment are the proper ends of organisms; and further technical development must aim at reestablishing this vital harmony at every stage of human growth by giving play to every part of the human personality, not merely to those that server the scientific and technical requirements of the megamachine" (Mumford, 2005, p. 351). What type of technology can we expect if we shifted from thinking of ourselves as tool makers to mind users? If we are not only tool-makers, though we have evolved in conjunction with the tool, this does not constitute our totality. Also, a "tool" does not have to be only instrumental, as we understand the term, and <technology> would have to follow a different, or various, lead. So, it would appear that the nature of technology, according to Mumford, is one based on our misperceptions of its nature and our own. If we see ourselves as symbol makers then a technology which incorporates, let's say, both labor and leisure will surface. In any event, Mumford proposes alternatives: 1) an alternative way to perceive who we are (symbol makers) and 2) a different foundation for technology (biotechnics).

Perhaps it would be helpful to think of a productive entity whose purpose is not so big and obvious, like the Great Wall of China, the pyramids or the atomic bomb. What if a team of people were asked to come together and create a harmonious and functioning community out of one previously characterized as violent and self destructive? The goal here is not so clear; therefore, each individual would have to be asked to contribute in complex ways to the solution of a problem.

N. Technology as a paradigm but also as the means to plurality

Like Mumford, the heart of Ellul's arguments is the existence of certain types of paradigms; however, he is concerned with a single paradigm which spans civilizations and all social relations. Large scale social relations and their contexts have determined the conditions which allowed Technique to surface as our dominant form of organization. Technique is a meta-technology, but it is also the key to more plural technologies

Jacques Ellul, similar to Mumford, is also concerned with the real possibility that our technological means have become ends on a grand scale, becoming evident throughout society and even civilizations. Technology interacts with the other components of the social system such that they become tinged with a technological essence. Commenting on Ellul's essay, "The Technological Order", Carl Mitcham and Robert Mackey write that technique, along with all its advantages and consequences, determines the context in which we live. Technique is also the result of the social conditions that have developed over the last 300 years. Mitcham and Mackey refer to technology as a religion and a form of cosmos, thus giving us an idea how prevalent it is in our society. "The technological society is created when technique becomes its central component; technique defines our epoch the way Catholicism defined the Middle Age....Technology has acquired the power to determine the ideas, beliefs, and myths of modern man to such an extent that all activities are now situated within a technical context. The technological milieu has replaced the former natural milieu" (1983, p. 5). Determine, perhaps, is a strong word as it carries implications of agency; however, if we consider the decisions we make, both in the long and short term, are made with certain values and expectations in mind that are considered technological.

For example, were our decisions not made in such a way, they would not be considered rational. We do not operate on the basis of instinct; rather, we have created a form of negotiation heavily, if not entirely, influenced by technological rationalism. What were the social conditions which led to the technological milieu?

The technological milieu can be understood in terms of a criterion of expectation, a system of values that fulfills the role today that Christianity occupied in the past. "For Ellul, then, modern technology is not an isolated factor in society, but a total attitude or comprehensive way of being in the world....The technological reality has something of the status of an organic whole. It lives off individuals in society the way any complex organism is nourished by the cells of which it is composed" (Mitcham, & Mackey, 1983, p. 5). Ellul labels our total relationship to society through technology as *Technique*. Technique is similar to a web-like environment which is the modern equivalent to the old natural milieu. In other words, he believes that technology is the "defining characteristic of thought and modern action in modern society" (p. 2).

For instance, Ellul puts the philosophical problem generated by technology in terms of a technological world that is comparable to the way that the church dominated the ideology in medieval times. "Because of the unprecedented proliferation of techniques in modern times, both in number and in kind, technology has acquired the power to determine the ideas, beliefs, and myths of modern man to such an extent that all activities are now situated within a technical context" (Mitcham & Mackey, 1983, p 5). Our actions and thoughts are tinged with the ideology of technique. This is not the natural result of human nature; rather it is the result of specific social circumstances: war and the growth of the importance of commerce and market economies.

Technology itself can be understood as the conjunction of the machine at the level of the real and Technique at the level of the abstract. For example, in "The Technological

Order", Ellul writes that technology is the force behind the standardization of our society "through rational efficient action" (Mitcham, 1994, p. 153). It is an active ingredient in many of our social relations to the extent that "the organization of an office and the construction of an aircraft have certain identical features. This identity is the primary mark of that thoroughgoing unity which makes the technical phenomenon a single essence despite the extreme diversity of its appearances" (Ellul, 1983, p. 95). To explore the unifying essence of technology is to focus on how it participates at all levels of our social system, and it plays a causal role in many aspects of our lives.

Ellul advocates that modern technology is not isolated within society; rather it is a comprehensive sense of being in the world. In this sense Ellul is concerned with the effect of technique on social relationships since it is not an isolated factor within society. Technique evolves within society by solving problems and creating new ones. Technique, in fact, is a system of means which is so interconnected with the rest of society that the means have become ends. Given that, Ellul asks two questions: (1) "Is man able to remain master in a world of means? and (2) Can a new civilization emerge which would include technique as only one element among others dealing with these questions?" (Mitcham & Mackey, 1983, p. 4).

Ellul believes that freedom is not a predetermined state; rather it is dynamic and continually won. In fact, he feels that we are most enslaved when we feel comfortable in a state of alleged freedom (1964). This suggests that man will one day become unsatisfied with his obligations to technique and he will look for alternatives to exist along side of technique; but, given that technique feeds off society and is perpetuated by social relations, it seems logical that humanity, through technique, is not an isolated factor within society. We will look for new social relations that enable man to remain master and to entertain the idea of new civilizations, if humanity so chooses.

Technique creates dilemmas or tensions, but Ellul is very optimistic about the tensions created by technique since he feels that technique itself will one day be able to do away with such problems as pollution and over crowding. So, where is the inspiration for the evolution of technique? More technical solutions would, of course, perpetuate the system of solutions that caused the problem in the first place; but we are better off with more technical solutions than less. So, the inspiration for the evolution of technique is here, already within society, participating. We are not loosing morality with technique; rather we are obtaining new values from technique that are rendering the traditional values obsolete. Civilization is not sterile as a result of technique; rather its possibilities for artistic expression have increased exponentially. Finally, technique has not eliminated our instinctively human powers and values. Technique will not eclipse our human potential. On the contrary, it will increase our exposure to it. Technique does not have to repress our instinct to rebel; rather, our inner tensions are incorporated into technique which is then influenced by them (1983).

For its part, technique can promote the tensions by opposition or by establishing the infrastructure to diffuse them throughout society. Also, technique, rather than expelling religion and aesthetic eroticism, incorporates them and gives them a place. It can also be said that these categories adapt to technique. "It is very likely that a superior conception of the technological society will result in the integration of these instinctive, creative and vital forces" (Ellul, 1983, p. 88). Integration is the operative word here, and a form of technique, not necessarily the form we have now, has the power to bring together our collective inspirations and potentials in order to diversify technological production. Instinctive, creative and vital forces come from the cultivation of new social relations and perspectives. There is hope in technique in the manner by which we choose to integrate the many aspects of our lives to it.

It would seem that a feasible way to uncover a "superior conception of the technological society" would be to reveal more numerous and more complex social relations that could participate in this endeavor. But how can we become masters of the discovery of these social relations, both real and not yet in existence, if our behavior is so influenced by the technological society?

The problem with the question, raised above concerning the issue of whether man can remain master in a world of means, is that while man is the master of his means, humanity is ever more an object of technique—pedagogical, psychological and intellectual techniques. If man is to remain master in a technological society, then he is capable of guiding the direction of the evolution of technique. So far, this has been difficult since technique is a corpus of values and social relations. So, how can we exercise power over technique as a nursery of values? Ellul says that "to accomplish this would mean that all men adopt the same values and behavior," (1983, p. 90), in order to remain the master of our means and to control the values which justify technique. This would seem to be a Herculean task; however, the primary reason why <technology> is the way it is now is due to the standardization social relations on a global scale which had the effect of eliminating certain values while promoting others. War and commerce, according to Ellul, can be considered as titles for the types of social conditions which have had the ability to filter values and expectations. One manner to make ourselves masters in a world of means would be to ask what values are behind the conditions which move our society such as <war> and <commerce>, then endeavor to promote other values alongside these. In turn this exercise would challenge technology as that which is between us and all social relations, thereby facilitating the dialogue. Values can be generated in the promotion of certain types of Industry or through laws, for example.

As to the second question raised above, whether a new civilization can emerge with technique as one element among others, this will also be difficult since material things are priority in a technological society whereby man himself becomes a material object, an objectified entity. Technical growth leads to greater power, but absolute power is the loss of values that does not feed the power structure. Technique frees us from some things while establishing other obstacles to freedom. However, Ellul reminds us, we cannot go back. "Nostalgia has no survival value in the modern world and can only be considered a flight into dreamland" (1983, p. 91). Ellul is very realistic about the effects of technique. This is the world we live in, so we must accept it and work with what we have. So, how to do this?

What is interesting about the debate over the question of whether a new civilization can emerge is that despite the fatalistic implications of a technological society, there is much hope even though this hope manifests in varied forms. There are some, politicians, scientists and technicians, who feel that the problem will solve itself. Marxists, for example, feel that the problem will right itself, that the benefits of technique will one day include a solution to technique's direction with man at the helm. "Technique will be that of guaranteeing such material development as allows the intellectual and spiritual maturation of what has been up to now only potentially present in human nature" (Ellul, 1983, p. 93). The other group, those who feel that man must guard against being objectified by technique, are equally optimistic. They advocate an international body of philosopher-scientists, a supreme court. A second group promotes the development of the soul to catch up to the possibilities of the body. "Technique will never render services proportionate to its powers unless humanity, which has bent it earthward, succeeds by its means in reforming itself and looking heavenwards" (p. 93). Another example suggests that technique is evil because man has turned away from God. So, perhaps technique can provide us with such technologies as to provide us with the conceptual space which allows us interpretational flexibility and reflection. In any event the above approaches are consistent in that they are alluding to a potential shift in the paradigm which directs all social relations. The question is whether this will happen naturally through the evolution of social relations or whether it will need a helping hand.

A final example stems from the socializing potential of technique in generating a new vision of man. "Thanks to technique, there is socialization, the progressive concentration on a planetary scale of disseminated spiritual personalities into a suprapersonal unity". Man has become Christ in this technical evolution. All of the above suggestions, says Ellul, are not practical. The further that technology advances, "the more the social problem of mastering this progress becomes one of ethical and spiritual kind" the more man dominates the material world, the problem is less within the human realm and "becomes one of knowing which man or group will exploit technical means, and what will be the enabling moral and spiritual qualities" (1983, pp. 94-95). This suggests that paradigm shifts can be given a helping hand.

Ellul lays out five conditions which he feels will enable man to extricate himself from the problem posed by technique which will, in turn, benefit mankind. 1) "Technique has established stricter and stricter domination over the human being". Freedom is at stake, and there needs to be a universal consciousness of this problem. 2) Technique must be de-mythified. Technique is only an ensemble of material objects and the systems which produce, support and consume them. "This means that all men must be shown that technique is nothing more than a complex of material objects, procedures, and combinations". If we worship technique, we cannot master it. 3) In our interaction with technique, we must detach ourselves from it. "Man must be capable of questioning at every step his use of his technical goods, able to refuse them and to force them to submit to determining factors other than the technical". 4) There needs to be a true philosophy that is not referential to technique—an "authentic philosophy of real meaning would bring us to precisely that possibility of mediation between man and the technical phenomenon without which any legitimate attitude is inconceivable" 5). The last condition is the most challenging. We must direct our efforts to the technicians themselves. However, "to get them to engage in the dialogue or to question their own creation is an almost superhuman task" (1983, pp. 95- 97). The context of this dialogue, according to Ellul, must be the permanent relationship between man's condition and Technique's pretensions. Man's condition, Ellul explains, must be cultivated and liberated in order to calibrate perspectives and social relations toward combating technique. The end result, however, could be that technique itself will benefit from the new resources and perspectives. It would seem appropriate that #4, at least, could be given origins in Academia while #5 could not be considered without the approval of Industry.

The above five conditions suggest that a different society, one whose social relations are not dominated by war and commerce, will be able to alter and control technology's course. In addition, a technology that is able to solve its own problems seems to be a more advanced version of technology. Technology is what a society thinks it is and can do; therefore, a new concept of <technology> could have positive results on both technological change and society. Ellul says that we will escape technological determinism, but I think that this approach will liberate technology in a way capable of such diversification that it will be able to solve problems without creating new ones. Nevertheless, universal consciousness of technique, its components and its effects will liberate society thereby promoting the conditions for the exercise of free will. When the means become the ends, it is almost natural for one solution to create a problem, or at least a "situation", since means are entities whose components are turned outward or aimed at something else. By definition, a means is a tool which is put toward the realization something else, but what? Seeing this element within our social relations is a step toward a different society.

Why is it important to see the effects of technique in terms of its relation to and product of society? The answer lies in the conditions, effects and circumstances surrounding technological progress. For example, all technical progress is at a cost, more problems are raised than a technological solution addresses, there are bad effects that are inseparable from the supposed good, and there are always unforeseeable effects to technological progress (Ellul, 1983). Ellul considers progress to be something analogous to a grand narrative, and our form of progress is characterized by Technique, technology, etc. Our being in the world is a technological form of being.

Technology, as a sense of being, is capable of establishing itself in the thoughts of the individual members of society who erroneously believe that they have power over it. Technology embodies the fundamental character of modern, contemporary life whose mold, much like feudalism, exists before analysis. Politics, for example, is not defined by technology but defined through its relationship to it (1983). In this sense, we see how Technique is both the means and the ends, as the goals achieved by politics are measured by and for technical ones. However, this also suggests that technique, being a construct of society, is a welcoming entity and would be open to the possibility of fundamental change through a re-conception with origins in society. It could also be reconfigured to address the diverse needs that already exist within us as well as those created by the adverse effects of technology. Different social conditions and the increased acknowledgement of more diverse social relations, needs and aspirations would result in a different <technology>. This contact of perspective promotes critical reflection.

The formulation of our institutions, according to Ellul, is a historical phenomenon rather than the accurate expression of human nature. That being said, he feels that all activities are within the technological realm. In order to topple this relationship Ellul feels that "a great modification of the whole of man" would be insufficient since the problem is historical and global (1983). He alludes to the evolution of the historical process as a real possibility in that there have been three such categories: the natural, the social, and now the technological. Could there not be another category waiting in the wings to alter the course of technique? The answer to this, I think, is yes since Ellul alludes to the roots of social change that already exist in our society. Cultivating these roots will require a shift in perspective, to the degree of a shift in historical focus, to accomplish the domination of technique.

So, the nature of technology, for Ellul, is based on the social conditions we have created which give rise to certain types of technical rationalities to be applied at the level of the entire society. To overcome any determining features of this society, it is up to us to alter our historical vision of ourselves and begin to regard the technological society as one which consists in mere machines to which we are the masters. To do this it is necessary to be able to see technique and the type of social relations which it forms for what it is so as to alter its course. The main point, however, which remains is to alter the way we see ourselves. A concept of how we see ourselves can be reconfigured in Academia. Recall the aphorism *history is written by the winners*. This phrase suggests a myth that is created by the more powerful perspective in order to justify the current situation. This same process could be done in our treatment of technology within the historical narrative. New social relations could be emphasized that are not necessarily related to technique.

O. Conclusions

A concept can be opened up to different types of social relations. If a concept is to be expanded or reinterpreted then the social relations and values which give rise to these new perspectives need to be cultivated. We have seen in the previous section that

<technology> is limited, either from not recognizing our potential or by applying only a few values and interests to the concept.

New social relations, as identified by their corresponding philosophical problem, can be used as a resource for the further diversification of <technology>. The whole of humanity has far greater potential than what the technological expressions have to show for it. Exploring the philosophical implications of technology helps one orient technology within the whole of our society. Society per se is a resource, and an emphasis on the tensions caused by our relationship to technology is a means to highlight certain areas (perspectives and social relations) that reveal technology in a different light.

The types of problems are varied and complex, thus their recognition is a way to encourage more angles and perspectives in our dialogue with technology. Philosophical problems further show how <technology> constitutes a nexus of numerous social relations, both real and ones not yet considered, or even future ones. Understanding the nature of technology as a phenomenon has meant that we see it as the result of who we are, how we solve problems and what is the result (technological expressions) of our social relations. In a word, insights into the nature of technology's presence in our society help us understand the degree to which technology is deterministic as well as to what extent it can be the servant of our multiple needs. Uncovering the nature of the philosophical problems presented by technology's participation in our society sheds light on the specific force which technology projects upon our society. The philosophical problem of technology is about its essence and how this affects society.

Epistemologically, studying the essence of technology has taken many shapes in an academic setting. For instance we have the opposing viewpoints of social constructivism and technological determinism. Technological determinism is not necessarily about agency. It is about the amount of investment we have in its advantages, rationality, and expectations—all of which give technology the appearance of having autonomous status. In sum, the minimum is to be able to recognize the paradigms behind technological expressions. Such paradigms are, in effect, the component parts of our concept of <technology>. Seeing that a paradigm operates as such is not the same as merely seeing that it operates which is a step toward seeing how we operate with the hope that we could operate, through technological expressions, in a different manner. This would be kin to a deaf person knowing how he/she sounds when talking, thus providing him/her with the incentive to alter the manner by which he/she communicates.

The main advantage of an epistemology that begins the study of technology from philosophical problems is that it totally mixes up the context, and it does this at so many levels by exchanging elements from one area of society to another much like trading ways of seeing simply to see the effect—trouble shooting. It is a given that <technology> is our interface with the world, but the problem comes when this way excludes other ways. <Technology> is the result of social relations, but are all relations given equal consideration? If they were, we would see that <technology> is more malleable in its applications as technological expressions, and a multiplicity of interpretations of technological concepts would emerge thus promoting critical reflection. <Technology> is not only practice, and to see it as such is a problem; therefore, to see it as much more would promote critical reflection resulting in the creation of less tension throughout society.

Something else that promotes critical reflection is the practice of one area or discipline asking questions that are normally associated with another. This seems to be an easy project to instill throughout society since it would address a wider variety of needs, and our society is partly driven by the satisfaction of needs. Needs, however, have become uniformized and we are producing more of the same—*same song, different tune*. The major problem is that the operations of our institutions are channeled to meet the needs of a certain type of <technology>, and the full resources of these institutions are not being utilized. If they were, more critical reflection would be generated.

As things are now, <technology> is the essence of a limited form of practice which is not conducing to a high level of critical reflection. If the totality of human experience were utilized, then there would not only be a more diverse idea of <technology> but there would be more diverse and appropriate technological expressions. Ironically, the explosion of technological production can help us liberate man to be able to express his totality. Perhaps to accomplish this, it would be best to begin by applying the epistemology of humanism to the study of technology since it would be applying new elements to old technological questions thereby promoting an enhanced degree of critical reflection.

The problem remains that <technology> determines social relations as those defined by negotiations of a purposive nature. This refers to seeing something or interacting with it from the point of view of finding its purpose. The purpose has already been pre-modified to mean its role as a tool, let's say, or something to be used to later make a tool. But the answer to this could be rearranging our idea of <technology> to mean that which sustains relationships and does not determine or exclude them. The problem goes even deeper in that it affects how we interpret. <Technology> determines symbolic value, and we cannot see past the aporia of <purpose>, or other such related values, when engaged in interpretation. For example, the idea of <effective> has emerged as a dominant value that usually corresponds to an object's <purpose>. There are other values that could have easily been used, and we will see where these are when we look at social constructivism. What about a project trickling down from academia whereby <purpose> and <effective> are devalued and an objects sense of being is encouraged to emerge from its symbolic existence?

By thinking of technology as a philosophical problem we are encouraging the multiplicity of contact since the concept becomes a fertile ground for the intersection of a number of disciplines and perspectives. <Technology> is a way of thinking, implying that there are certain values and social relations which form it as a concept. This means that <technology> is not limited to practice and material production. By considering technology for its organizational or conceptual origins, we are presented with new questions, and the combination of these new contexts and new queries is the promotion of critical reflection which could diversify our technological expressions. This is putting oneself in the shoes of another but also to be using the other's methodology in construction one's own interpretation. When contact is promoted, so is critical reflection. <Technology>, thus, can be a conceptual forum, a congress, if you will, which serves as the common ground for any number of perspectives and disciplines.

<Technology> conceptualized as such a forum could serve to promote the idea of many technologies, many ways of thinking which later manifest as technological expressions. Having one dominant tendency in the development of our technology is a problem. The solution would be a project based on the promotion of numerous types of technologies. The mere existence of a variety of technologies, much like Mumford's idea of polytechnics, would promote critical reflection. Again the problem has been that our form of <technology> has standardized social relations, thus restricting critical reflection; but if all social relations were encouraged to surface and influence our experience, then <technology> would in turn become more diversified. So, this degree of emergence must be encouraged.

Established concepts affect the path of our cognition which, in turn, manifests as technological expressions. These same concepts contain certain values and perspectives which preclude the influence of others. Understood this way, <technology> cannot reflect the totality of humanity. There is no essence to <technology>; therefore it is by nature diverse, and previously unused perspectives, by right, should be uncovered. Humanity is the source of inspiration, but not all of its components are encouraged to have a positive influence on technological expressions. In order for these lost components and sources of inspiration to be reflected in the production of technological expression, there needs be a project which promotes the social relations, values and perspectives that could give rise to these lost components.

Concepts are the essence of social relations. For example <organization> has no real interpretation unless and until it is vested with empirical conditions. <Organization> has no universal means of application; its form depends on many factors. The Enlightenment was one form of organization as was Mumford's megamachine. We have seen that <organization> can reflect different social relations and have different results entirely. <Technology> as a meta-concept can be affected a type of organization, depending on the social relations which give rise to the form. Philosophical problems provide insight to new ways of being with technology. Where there is tension, there is also the means by which the tension can be alleviated. Recognizing tension is also to recognize the social relations which correspond to it. These social relations can be applied to the expansion of <technology>. A conceptual reconstruction, as we have seen, can be a remedy toward ameliorating a tension in society. A concept is the mental configuration of how we think about something; this could be the cause for friction. For instance, thinking of Nature as an organism in stead of an organization could be a way to re-approach the issue of technology as it is our primary means to deal with Nature.

VI. TECHNOLOGICAL DETERMINISM

Introduction

The term "determinism" will be taken in this chapter to mean the necessary relation between one type of society and its corresponding form of <technology>. Concepts affect how we think and act, but their construction comes from empirical negotiation, meaning that the element of agency is ultimately with us. This chapter demonstrates that, due to the historical circumstances <technology> has been encouraged to develop along a certain path to the exclusion of others. In turn, society perpetuates a certain form of <technology>, thereby further excluding the development of other values and expectations that could have been included in the construction of the concept.

Many of the authors in this section, especially those associated with the Frankfurt School, are Postmodernists. By this I mean that they are challenging the idea that Modernity was good per se. The idea of technological determinism can be understood as a starting point from which to question the motives and results of Modernity. The Enlightenment did not liberate us in every sense of the word; it tied us to other ideals and expectations such as consumerism and hyper-competition. In addition we see that <efficiency> has become a certain type of efficiency. Nor is <progress> a neutral concept; it is the result of a certain vision of nature which humanity exploits for purposes of mastery over itself and others. In short, this section shows us the dirty side of Modernity. The <technology> that has emerged contemporary with Modernity does not necessarily determine society; rather, <technology> is the result of the type of society which surfaced as a result of its coexistence with the times (Modernity); and, in turn, the development of society has reflected that type of technology. In short, the post modern reaction to Modernity can be summarized by the idea that the ideals of Modernity are fabricated and fictitious, but their effects are quite real. Some of these effects are analyzed through the idea of determinism, but that is primarily because determinism, at least for my purposes, is a lens through which we can critically view our relationship to technology.

So, agency is a tricky term, especially when discussing technological determinism. However, agency is more of a result of the interaction of two entities--<technology> and the type of society. There is a two-way street in that societies evolve in a way that reinforces a certain form of <technology>. That certain forms of technology determine is not in doubt, but determinism is a belief in the perpetuation of a type of society to the exclusion of others. <Technology> and society feed each other; hence, the difference between one form of <technology> and another is closely related to historical circumstances. For example, conventions, values and expectations within a society are heavily influenced by the components of a certain form of <technology>; and the practice of these values, etc. is a way to perpetuate that form of <technology>. In lay terms, we are in bed with our favorite form of <technology>.

We maintain a high level of expectation on the part of technological development by believing in technology and its corresponding type of progress. We don't encourage the tendency to question progress's more or less linear and value laden path. Also, there is the idea that once the geniis are out of the bottle we cannot put them back in which is a form of determinism. For example, politics will not ignore the media, the television and the internet. If this were the case, the stubborn political institution would be considered ignorant and behind the times. The same goes for business. So, there is technological determinism; but what I believe to be at stake is the type of determinism stemming from a type of <technology>. This relationship is the result of historical circumstance and not necessarily any internal logic of <technology>.

The purpose of this section is to explore the possibility that a deeper understanding of technological determinism could help uncover potentially positive influences on technology that reside throughout society as untapped values, social relations and perspectives. At the very least it presents us with social relations, favorable or not, which might not have been considered in our dialogue with technology or which could be used toward the expansion of the concept of <technology>.

Despite the more recent rejection of technological determinism as an epistemology toward social and technological development, largely due to social theories developed in the 70s and 80s by the social constructivists (discussed below), there are some valuable foundations to the argument that technology, at least to some extent, shapes society. "Technology matters. It matters not just to the material condition of our lives and to our biological and physical environment—that much is obvious—but to the way we live together socially" (MacKinzie & Wajcman, 1999, p. 4). It can be argued that our social relations are more and more determined by a technological element; and determinism, as an academic approach, encourages us to be on the lookout for these situations and their effects.

With a perspective alerted to the effects of determinism, we could perhaps understand better what are the nature and foundations of the social relations between technology and our society. In addition we could know better what <technology> is by what we give credit to it for doing or not doing. Once our understanding of <technology> expands in terms of an increased awareness of what we have thought about its power, then the aspects of society and social relations that are either excluded or forgotten will be, in some way, highlighted and marked as future resources to be used toward the concept of <technology>.

At the theoretical or conceptual level, determinism alerts us to the possible effects of technological change, both unwanted and unpredicted. Determinism also alerts us to unknown effects in the sense that recognizing change is one thing, but recognizing types of change is quite another. At the level of the empirical, on the other hand, there are certain technologies which do seem to play an active role in social shaping. For instance technologies, such as the internet, almost create social groups that could not have or did not exist before this innovation. Despite the fatalistic strain of determinism, "these newly created, or newly reinforced, groups can in their turn influence technological development" (MacKinzie & Wajcman, 1999, p. 24). These groups are also the meat of social relations, and their emergence and consideration in our dialogue with technology would serve to expand the scope of our idea of <technology>. Could there not be technological expressions produced specifically for the purposes of creating social groups or opening space for new perspectives?

As a tool for investigation, determinism is like the devil's advocate. It compels us to question whether or not something was technologically determined and if we should reconsider our relation to it as a result. As an academic approach it asks us to be critical of technology and technological change. This criticism can also be used to highlight realms within our society which could, in turn, have a positive effect on technological development in that critical reflection is encouraged.

A. Historically: the various approaches over the years

The technological determinists advocate that industrial society developed inexorably from a collection of a few inventions during the industrial revolution. From this there resulted increased material wealth but also the degradation of labor as there was a separation of the worker from the means of production. "Sacrificing creative and interesting work was seen as the necessary price to be paid for the material wealth generated by modern industry". Efficiency of production "inevitably subordinates workers' agency to the momentum of the machine" (MacKinzie & Wajcman, 1999, p. 143). Knowing that a certain element or value is missing or being pushed aside is a way of seeing a concept better for what it is as well as what it is not. It can also be argued that this was a natural reaction to industry; however, it can also be argued that the evolution of a type of industry lead to this result where another type of technology would have spawned another type of industry. <Technology>, as we know it (methods required by capitalism), led to the type of social relations we have.

<Efficiency> is not limited to production. Efficiency understood by this limited application rules out the possibility that a worker can be efficiently doing many more things at the same time while working. For example he could be 1) encouraging tradition, 2) expressing his identity and 3) diversifying production all at the same time. Efficiency could be understood to be killing many birds with one stone; but the social relations that promote this interpretation of efficiency need to be cultivated.

Karl Marx "attributed social change primarily to transformations in the forces of production, which he took to be synonymous with technology". Seen this way, technology was the agent of industrialization and social change. "The development of technology and productivity is the motor force of history; new machinery and equipment revolutionize production and transform society...Productive methods of capitalism form the basis for socialism, and technology itself is beyond class struggle" (MacKinzie, & Wajcman, 1999, p. 144). One manifestation of technology, then, is as a rational purpose in the formation of society and among the capital labor relations.

Today, as we move from the world of industrialization to one characterized as post industrial society, the foundations of technological determinism have changed as well, but they are still lingering in the jargon of many individuals. The belief is now that information, consumption, culture, and lifestyle are the organizing principles and not production as it once was. Nevertheless, technological determinists feel that technology still plays a central role in the economy and society. Determinists still concentrate on the phenomenon which dictates that new types of work affect social relations. For example:

> much emphasis is placed on major new clusters of scientific and technological innovations, particularly the widespread use of information technology, and the convergence of the ways of life around the globe. The increased automation of production and the intensified use of the computer are said to be revolutionizing the character of work and the structure of the workforce. At the same time, leisure, education, family relationships and personal identities are seen as molded by the pressures exerted and opportunities arising from the new technical forces (MacKinzie, & Wajcman, 1999, p. 142).

The situation is analogous to the changes which occurred during the industrial revolution. It is the same song, different tune.

Lately the school of technological determinism advocates that capital and labor have been replaced by information and knowledge as primary resources of social change; but the changes are still brought about by technology and society continues to react. Information and communication technologies have relegated manufacturing to the back burner. Also, technological determinists state that flexible work relations, customized production, and organization have replaced mass production (MacKinzie & Wajcman, 1999, p. 142). Even postmodernism, it can be argued, is the result of the technological advances in the last 50 years; but "here the issue is not so much with the transformation of production but with aesthetics, language, representations, and culture. When postmodern theories talk about current economic and social arrangements, they tend to presuppose that technological change has led to the dominant form of work becoming information or knowledge-based work" (p. 142). Politicians, even, state that we must embrace technological innovation and change in the name of progress and economic progress. Information and capital are labels for what we understand to be types of technology, and the social relations adjust themselves, either consciously or unconsciously, to accommodate this view. Also, it is a hard fact that the information age and the context of high capitalism have affected social relations: working at home, fewer employees and outsourcing are examples of this.

In our times, there is a plethora of technological options which can be considered components of a revolution, in many ways more radical than that of the industrial revolution. For example, "the impact of the revolution in information and biotechnologies is as great in the personal sphere of sexuality, consumption, and leisure as it is in production" (MacKinzie & Wajcman, 1999, p. 269). In terms of the status of women, both at home and at the office, the technological determinists predicate that changes in technology are the key to the enormous social changes that have occasioned for women's equality. Technology is also seen as the solution to the tyranny of women's unpaid work at home, but this element would not have been known were it not for the determinist's tendency to focus on the negative aspects of <technology>. In this sense, determinism is a model for provoking social change—a project. Accessibility, then, would be the key to allowing technology to be an international equalizer of social relations in one way as well as a liberator of social relations in another.

Due to technology's overwhelming and defining presence in society, there is a strong tendency to attribute technological change with deterministic qualities (agency), both in the resulting society as well as in the ideological and structural foundations of a technological world. Even though the ideas of technological determinism have given way to more recent applications of the social construction of technology, there still exists the feeling that technology is a dominating influence in our lives to the extent that it is able to shape society. Why is this? What is it about technological advance that inspires these feelings? Is it the values that technology perpetuates or nullifies? A technological expression affects how we understand concepts which then, in turn, affect how we think and act, including recreating similar technological expressions.

A technological innovation can permeate society at all levels: values, practices, etc., and it can even forever change the way we interpret the world. A step toward the possibility of a deaf person knowing how he/she sounds when talking is seeing the values behind our actions and social relations. Analogous to a deaf person knowing how he/she sounds when talking is essentially knowing how a society is being shaped through the values perpetuated through a greater dependence on technology. An example of this is seen through Henry Adams' observations of the Paris Worlds Fair. Adams "sensed that the dynamo had replaced the cross as the primary force in civilization... The contrast between the dynamo and the cross symbolized an enormous shift of faith away from the great principles of Christianity, and religion generally, toward those of science and utility. The former stood for love; the latter for power" (Merritt, 1996, p. 27). Does the dynamo have to represent power? Could science and technology derive from other values, other values than efficiency, acquisition and instrumentalism? The one was based on love and the other power, suggesting that core concepts can play a huge role in technological development and then later as shaping social relations.

There are some salvageable ideas from technological determinism which could alert us to *types* of change and their ensuing effects. In other words, technological determinism encourages us to become aware that certain changes have occurred due to a certain relationship with technology, and our consciousness of the technological element within that perceived change will enable us to retrieve a philosophical/critical perspective of technological change. Within technological determinism there persists a critical strain toward the notion of technological change which asks society to maintain skeptical to its effects, thus promoting critical reflection. This is valuable and worth sustaining as an epistemology both toward understanding and preparing for the potential effects of a technological innovation as well as toward actual technological development. In the case of the latter, the diversity of effects could be encouraged to influence the initial development and it may help reduce negative effects as the context of its use will be expanded—the greater the criticism, the greater the technological diversity and higher possibility for a more harmonious existence between society and technology.

The very idea of determinism contains at least two entities, the one thing or idea affecting another; then we are asked to judge the effects since we know the cause. Were it not for this relationship we would not question the effects, nor would we be encouraged to look for alternatives. Determinism is a project in critical reflection whereby we are asked to judge the type of social relations and values that are, at the same time, being influenced by as well as perpetuate determinism. Perhaps we want technology to determine our society which is a phenomenon that could be justified by our reliance on consumption.

B. <Technology> as consumption inhibits critical reflection

In such a scenario systemic needs become individual needs. Technological determinism is about a type of society in stead of another type whose social relations are shaped by different *forms* of rationalities. A philosophy of technology is to keep concepts open so as to not be too dependent on their instrumental role in society—thus promoting critical reflection. It is important to be aware that we are loosing critical reflection due to the fact that collective interests are obscuring individual ones related to our relationship to technology. The recuperation of critical reflection is a step in knowing how we sound as deaf speakers. For Hebert Marcuse determinism is about choice or solutions as opposed to others. His idea of determinism is one which forms us in terms of expectations.

Although Herbert Marcuse is not a full blown determinist, he advocates that there is a pervasive technological ideology that directs society and diminishes our analytic potential. Nevertheless, society plays a huge rule in elevating the importance of technology's role. There is a class of experts that the social and political realm has afforded an inflated prestige and as a result they play a major role in "making technological autonomy plausible" (Scharff, & Dusek, 2005, p. 384). Said autonomy is witnessed in the standardization of our social relations and standards. *One-Dimensional Man* is a critique of domination and social control with the end of a freer and happier human existence (Kellner, 1991, p. xi). According to Marcuse, the effects of the production of material, beginning with the Enlightenment, has been unexpected from the perspective of a true understanding of the emancipation of society. Instead of liberating mankind, modern technology has standardized our critical potential and expectations (Aronowitz, 1988, p. 165). A reversal of this process would be analogous to cleaning a dirty lens or keeping extra lenses handy.

Marcuse argues from Weber's theory of rationalization where the type of rationalization has a foundation of domination. Domination, both as and through <technology>, is a prevailing feature of our lives. The rationale of domination pervades our relationship with nature and society. It can be argued that <technology> constitutes the context for everything in the form of artifacts and as a rationale that diffuses throughout society, producing an almost universal result. <Technology> learned from science whose values, characterized as a domination of nature, were given priority over those from other aspects of our lives. Through its own methods and concepts, science has projected an image of the universe whereby the domination of nature is linked to the domination of man—an ideology that has permeated all of society and social relations. The image is the following:

> Contrary to the pervasive belief that technology and science are neutral aspects of the forces of production and may be regarded as part of the legacy of a new socialist society, they are in fact repositories of domination. According to Marcuse, 'domination perpetuates and extends itself not only through

technology, but as technology, and the latter provides the great legitimization of the expanding political power which absorbs all spheres of culture'. Moreover, science, by virtue of its own methods and concepts, has projected and promoted a universe in which the domination of nature has remained linked to the domination of man—a link which tends to be fatal to this universe as a whole. Nature, scientifically comprehended and mastered, reappears in the technical apparatus of production and destruction which sustains and improves the life of individuals while subordinating them to the masters of the apparatus. Thus, the rational hierarchy merges with the social one (Aronowitz, 1988, p. 160).

Domination is the paradigmatic value behind this, but it is a component of what is considered rational. Rational, regardless of the form, is considered progressive. An action can be justified if it is rational, disregarding the fact that the term rational is not normative. "That which is called rational contains the progressive organization and subsumption of all human action by criteria that subordinate action to the purposes of the organization of domination—corporate, state and ideological" (Aronowitz, 1988, p. 160). Much of this is done through consumption which can be interpreted as a means to surrender to domination. We have sacrificed freedom for a freedom to consume due to the contingencies of capitalism and the political apparatus needed to maintain it. In other words, we are witnessing a submission of human activity toward an ultimate political or economic goal. It is the rationale, of economics for example, that is deterministic:

> The penetration to all areas of the social by criteria of rational decision increases production, makes the functions of the state appear less arbitrary and increasingly subject to bureaucratic rules, and through its institutionalization harnesses science and technology to economic and political purposes (pp. 159-160).

This rationale is witnessed in the material result of science and technology which, through instrumental rationality, has in turn left a stamp on all of society, a consensus common to all although the power is concentrated to an isolated few. Marcuse is asking us to look at the type of rationale which guides our behavior and technological choices—this type being characterized by domination.

A main concern for Marcuse in *One-Dimensional Man* is the real possibility of analytic uniformity, or homogenization, which stems from the idea of false needs. The choices that we make in society perpetuate the social structures that control the choices. "Marcuse was one of the first critical theorists to analyze the consumer society through analyzing how consumerism, advertising, mass culture and ideology integrate individuals and stabilize the capitalist system" (Kellner, 1991, p. xxx). This relationship strengthens these structures and those in power obtain a tighter grip on their control. Those in power pre-program need and thus become more powerful by fulfilling the need. "The political needs of a society become individual needs and aspirations, their satisfaction promotes business and the commonwealth, and the whole appears to be the very embodiment of Reason" (Marcuse, 1991, p. xli). If need were left to the masses whose social relations would flourish, then perhaps a truly critical attitude will emerge. If needs are homogenized then there is less incentive and fuel for critical reflection.

Marcuse's rather unrealistic goal is that if societies can learn to use technologies in ways that promote happiness, instead of pigeonholing their happiness to the categories laid out by consumerism, then we would know freedom. Happiness does not have an eminent form. "[Marcuse's] argument is that the system's much lauded economic, political, and social freedoms, formerly a source of social progress, loose their progressive function and become subtle instruments of domination which serve to keep individuals in bondage to the system that they strengthen and perpetuate" (Kellner, 1991, p. xxxi). As it is now, we don't know freedom, only freedom as determined by consumerism. Consumerism has emerged as a kind of project, but can it be used as a model for an entirely different social project with a foundation of diversity and the rewarding of critical reflection?

In *One-Dimensional Man*, Marcuse characterizes technology as a rationale in terms of our association of technology with a type of progress, which suppresses individuality, the result of which is a loss of critical potential. He argues that the level of critical apathy and atrophy is such that an individual's consciousness of a lack of freedom is hampered by the urge to satisfy needs which are created by the criterion of technical progress. The right to choose one's master does not liberate one from slavery (1991). It is a cyclical relationship. This investigation is an attempt to recuperate the misplaced critical potential in order to facilitate a more holistic, and therefore accurate, dialogue with technology.

In the introduction to the second edition, Kellner opines that for Marcuse, technology is a method of standardization or mode of thought that manifests in many aspects of our lives brought about by industrialized society. Kellner quotes Marcuse who wrote that our civilization has developed:

> tendencies [which] have engendered a mode of thought and behavior which undermines the very foundation of the traditional culture. The chief characteristic of this new mode of thought and behavior is the repression of all values, aspirations, and ideas which cannot be defined in terms of the operations and attitudes validated by the prevailing forms of rationality. The consequence is the weakening and even the disappearance of all genuinely radical critique, the integration of all opposition in the established system (1991, p. xii).

"Radical critique" would create needs, and needs are the inspiration for innovation; but our needs and perspectives are vitiated by tendencies as modes of thought. These tendencies are: 1) technology as the organization of labor and modes of thought and 2) consumer capitalism. In this sense, the technological rationale suffocates ulterior modes of life. "[Marcuse] describes what has become known as the technological society in which technology restructures labor and leisure, influencing life from the organization of labor to modes of thought" (Kellner, 1991, p. xii). Organization can either exude a positive or negative connotation. Within organization are there elements characteristic of a harmonious understanding or does it imply something forced?

The real effects upon society can assume grand proportions. For instance, "Marcuse develops a conception of a technological world...[which he] sees technological rationality colonizing everyday life, robbing individuals of freedom and individuality by imposing technological imperatives, rules, and structures upon their thought and behavior" (Marcuse, 1991, p. xiv). To overcome this, Marcuse asks us to resort to more general concepts which would result in higher possibilities which help us distinguish between essence and existence. "Philosophy was thus to supply the norms for social criticism and the ideal of liberation which would guide social change and individual self-transformation" (Kellner, 1991, p. xv). Marcuse analyzed the concepts of essence, happiness, freedom and critical reason in order to "illuminate the potentialities that can be realized by individuals and the social conditions that inhibit or foster their development" (Kellner, 1991, p. xvi). The purpose of this exercise was to encourage dialectic thinking in the face of one-dimensional thinking which derives its criteria from society (technology) and ignores transcendent norms and standards. An individual exists only in so far as he/she is able to think freely first, then act. We act within the parameters of our concepts, and looking at them from different angles, perhaps from the perspectives of newly emerging social relations, could aid us in our endeavor to truly see *how* we act, through technological expressions, and not just *that* we act, as well as see all the accoutrements that surround their effects. Consciousness of even the possibility that <technology> has foundations in domination encourages one to seek new essential concepts to serve as additional foundations for <technology>. Illuminating the potentialities is a project conceived in order to promote critical reflection. Such a project could be spearheaded by Academia and rewarded by Industry, then later supported by government policies.

The individual has declined in status and complexity since the rise of the bourgeois class in the face of old superstitions and monarchical repressions. "The development of modern industry and technological rationality, however, undermined the basis of individual rationality" (Kellner, 1991, p. xix). The rise of capitalism demanded that the individual adjust to the economic apparatus which resulted in an increased bureaucratic control.

The idea is to develop human potentialities through the integration of philosophy, social theory and politics to combat conceptual inferiority in the face of a technological priority. For Marcuse, the technological framework is a limitation on our freedom to interact intellectually with our concepts simply because we have a limited ability to interpret them freely. For example, "metaphysics is superseded by technology, in that the metaphysical concept of subjectivity, which postulates an active subject confronting a controllable world of objects, is replaced by a one-dimensional technical world where pure instrumentality and efficacy of arranging means and ends within a pre-established universe is the common principle of thought and action" (Kellner, 1991, p. xxv). A subject is not fully active if he/she is programmed by instrumentality. Our interpretation of nature is determined by a framework characteristic of instrumentality and efficiency. Means and ends are ordered within a pre-determined world. Change becomes that which is prescribed by the parameters of the technological world. A return to the importance of metaphysics could be a way to generate the social relations needed to expand the concept of technology as well as make our dialogue reflect as much of society as possible. To look at the world through a mechanism characterized as a tool might not be the only way to perceive our natural surroundings. For instance the world could be revealed to us by mechanisms characterized as things which bring out the "is" of the object—to see the world not only as an entity which can be converted for our use.

But as things are, the type of control mentioned above, can be seen as a guide for social behavior which eliminated or oppressed many other outlets for social expression. Such behavior is crucial for an "organized capitalism …or an *atom-matization* in the economy, the rationalization of culture in the mass media, and the increased bureaucratization of all modes of administered society that was resulting from the decline of the individual" (Kellner, 1991, p. xxv). Reality is defined as such, thus making it difficult to resist or criticize. This conundrum is almost kin to resisting ourselves or our own potential.

The relationship between the subject and object is severely limited and prescribed. The possibility of the subject to free itself from a one dimensional relationship to the objects, according to Marcuse, presupposes an antagonism between a potentially free human subject and the objects with which it has contact. Thus the rationale of instrumentality defines the total context within which the means and ends are arranged. Does this antagonism have to exist?

The danger presented in the previous paragraph was also central to Marcuse's argument that our thinking has been stymied by a technological view of the world brought about by the systems of social control that dominate technological production. This is the essence of one-dimensional thinking. "In the one dimensional society, the subject is assimilated into the object and follows the dictates of external, objective norms and structures, thus loosing the ability to discover more liberating possibilities and to engage in transformative practice to realize them" (Kellner, 1991, p. xxvii). Is this the relation that which prevents us from an open and free dialogue with technology in our society? The object should benefit from the subject as a free resource. What is at stake is our critical relationship, not only with technology, but also with the world. We, as subjects, operate within the parameters controlled by objects rather than the "secondary qualities like values, aesthetic traits, and aspirations, which [could be] cultivated to enhance human life" (1991, p. xxvii). The objective would be to enrich our critical pool which, in turn, would augment our relation to technology, our natural surroundings and each other. A way to separate the subject from the object is to preserve perspective and aspects of society apart from the object or the standard image of technology. These aspects, once defined as entities apart from the object can be used for critical reflection.

It is the conditions which make man one dimensional. These conditions are practices, social relations, which conform to extant social structures, norms and actions. This is in contrast to "multidimensional discourse which focuses on possibilities that transcend the established state of affairs. [Subject-object distinction is preserved]...In the one-dimensional society, the subject is assimilated into the object and follows the dictates of external, objective norms and structures". In the case of the latter the possibility of discovering liberating possibilities is greatly diminished. The subject, in fact, identifies with the object. As such the ability to conceive another dimension is greatly diminished since dimensionality is determined by the object at hand. All others are left to atrophy (Marcuse, 1991, pp. xxvii-xxviii). It is paradoxical for a subject to identity with the object where the latter should benefit from the former.

Herbert Marcuse maintains that technology is still the dominant force when it is in contact with rivalries to its influences. "The scientific and technological rationalities that Marcuse describes are even more powerful today with the emergence of computerization, the proliferation of the mass media and information, and the development of new techniques and forms of social control" (Kellner, 1991, p. xxxii. In this sense <technology>

feeds off itself and becomes less open to diversification, much like an old man is more set in his ways than he was when he was an adolescent. It is as if these rationalities are conquering forms of life which could be valuable resources in our negotiation with the world. The mere existence of such a predictably crescendo trend gives rise to the homogenization of expectation.

Marcuse himself wrote the introduction to the first edition where he begins by comparing the colossal effort we make to prevent a nuclear catastrophe with the largely ignored possibility that the real cause lies somewhere in the social structure. What is the key to this polemic? As a pillar of the Critical Theory, Marcuse argues that we must analyze the actual historical experience, diagnosis it, and take from it what can be applied to change. His issue is with the development of man, or rather the one-tracked development of man. "In order to identify and define the possibilities of an optimal development, the critical theory must abstract from the actual organization and utilization of society's resources, and from the results of this organization and utilization" (Marcuse, 1991, p. xliii). What are all the resources? Is there an exhaustive list? Nevertheless, what it means to really know is to know that not all resources, social relations, etc. are being exploited. So, the idea is to encourage the social relations which enable us to utilize all of our resources as a society.

To recover lost relations or find new ones, we must be able to see that our life is the result of widespread technical progress which, "extended to a whole system of domination and coordination, creates forms of life (and of power) which appear to reconcile the forces opposing the system and to defeat or refute all protest in the name of ...freedom from toil and domination" (Marcuse, 1991, p. xliv). How does this occur? The answer lies in political interests which appear to override the individual needs. For instance the threat of communism, the war on drugs, terrorism, and of course the interests of the economy have been given priority. Notice that all of these imply the struggle between types of civilizations. A struggle between civilizations could even mean different labels of different types of lives within the same society. For instance, the time during which *One-Dimensional Man* was written, besides the theme of the "red scare", the American society was instilled with the idea of "keeping up with the Jones'". Forget about individual freedom. You too need a two-car garage! This was a type of life promoted over other forms to promote the economy and maintain dissent. Qualities, as that which marks the distinction between styles of life, are given to us rather than stemming from the masses of individuals.

In sum the price we pay is within the category of qualitative perspectives. As things are now, qualitative need is determined for us. In a society where there is vast amounts of wealth in the face of global poverty and where production and destruction are almost indistinguishable, "the fact that the vast majority of the population accepts, and is made to accept, this society does not render it less irrational and less reprehensible" (Marcuse, 1991, p. xiv). The technological society has quashed man's desire to satisfy qualitative need. "It is precisely this need which the established society manages to repress to the degree to which it is capable of delivering the goods on an increasingly large scale, and using the scientific conquest of nature for the scientific conquest of man" (p. xlvi). The non neutrality of technology can also be put in terms of a loss of the many categorical influences throughout society to the technological. "With the growing integration of industrial society, these categories [individual, class, private, family] are loosing their critical connotation, and tend to become descriptive, deceptive, or operational terms" (p. xlvi). These categories no longer retain their critical intent. They are merely receptacles of the technological society. They have been *technologized.*

Fundamental to Marcuse's argument in his essays throughout the 1930s is that there is a potential within humanity that can emerge and instigate social change—a project. This potential originates in critical reason which Marcuse feels is the core of philosophical thought and critique. Nevertheless, "technology serves to institute new, more effective, and more pleasant forms of social control" (1991, p. xlvii). To combat this, he advocates that we jettison our view of technology as neutral. Technology is the medium through which politics, culture, and the economy participate (p. xlviii). If this is true, then, <technology> is that which can change politics resulting in a change in technology. To change something, one must first be aware of what it is or what it is not, otherwise one runs the risk of reproducing it. The mere act of assuming that <technology> is non neutral would leave a conceptual void which could be filled by other values that we choose to substitute. This is part of the process of working toward seeing technology for what it is which then allows us to have an uninhibited dialogue with it.

According to Marcuse, advanced industrial society is an exercise in the reproduction of the same, or the pursuit of a total incorporation of the aspects of society and technological production. The technical process of production and distribution, "determines the product of the apparatus as well as the operations of servicing and extending it" (1991, p. xlvii). Here, Marcuse is giving a nod to globalization in that there is the suggestion of total integration which is a highly prized value of Modernity with the extreme benefit of the State in mind.

> In this society, the productive apparatus tends to become totalitarian to the extent to which it determines not only the socially needed occupations, skills, and attitudes, but also individual needs and aspirations. It thus obliterates the opposition between individual and social needs. Technology serves to institute new, more effective, and more pleasant forms of social control and social cohesion. The totalitarian tendency of these controls seems to assert itself in still another sense—by spreading to the less developed and even to the pre-industrial

areas of the world, and by creating similarities in the development of capitalism and communism (pp. xlvii-xlviii).

Marcuse is saying that there is a danger of a hyper-rational approach to society and that we run the risk of sacrificing much in the blind pursuit of rationality as it has been manufactured. A form of rationality is an orientation of everything toward strengthening the capitalist market whereby the needs of the society become those of the individual. Technology cannot be neutral in this context. It cannot be isolated from its use. <Technology> is based on the techniques needed to control man and his society (1991, p. xlviii). For example, the policy of laissez-faire in one country affects the economy and well being of other countries. This is a technique upon which politics, economies and technologies are constructed. For example, according to Noam Chomsky, it is the American foreign policy to intentionally exploit the world in order to maintain a position of power (2003). It can even be argued that laissez-faire was an inspiration for the maverick policies of neo-liberalism.

From one perspective technology is the means and the ends, the control of which is basically the control of society. From another perspective, that of the individual, the benefits of material technology have become the standards by which other areas of our lives are judged; these benefits are the goals to be obtained in our lives. This is, in a sense, a freedom from actual personal desire, apart from what we are conditioned to desire. Marcuse asks if we even know freedom in such a context.

As a social theorist, Herbert Marcuse puts the state and the economy in a capitalist context which allows us to view new technologies and modes of mass culture under the microscope. *One-Dimensional Man* swings between two contradictory factors. There are forces in society capable of containing qualitative change but at the same time there are social tendencies that are capable of breaking this containment and exploding on to society.

The problems that faced Marcuse at the time of writing were the conventionalization of Western thought, Civil Rights, and the Cold War. These are mere specifics. In fact these problems have continued today but with greater frequency and complexity. These issues can take the form of policies that affect the world as a whole. Western governments, the U.S. in particular, encourage technology to develop without an undue amount of restriction, thus directing our social structures toward an existence friendly to technology. This is seen in the promotion of the economic theory of laissez-faire which was given precedence over any political theory in the exploration of an adequate method of social development. In other words, business first, then the governmental form followed (Heilbroner, 1996), which was a dominant social project at the time.

Even though his ideas are a bit exaggerated, they are important to make us recognize one-dimensional thought when we see it. For instance the media blindly followed and perpetuated the Thatcher-Reagan-Bush-Bush policies, forming a combined political and media establishment. Everything was portrayed in a positive light when the reality was quite different: The War on Drugs, Nicaragua, Communism, etc. In fact, aggressive behavior is like a social bond. It facilitates the preservation of power (Marcuse, 1991). Instability fostered by aggression is, ironically, a foundation of conservative liturgy. A similar circumstance emerged with the aftermath of 9/11. The media system helped exaggerate the symbolic victory of the 9/11 attacks. The media also exposed the complicated web of security systems (FBI, CIA, Airport security?—*too many cooks in the kitchen)*, but the media fueled the problem by *being* the media. So, while power was preserved at least for the next few years, the security system was exposed to be unorganized and poorly orchestrated. This is not so much characteristic of one dimensional thought as it is self defeating.

Marcuse views our society as one where productive and rational values have replaced the traditional values of freedom of thought, speech, and consciousness. All of theses are designed to critique and protect free enterprise). An intellectual culture was replaced by a rational and more productive one. "Once institutionalized, these rights and liberties shared the fate of the society of which they had become an integral part...independence of thought, autonomy, and the right to political function are being deprived of their basic critical function in a society which seems increasingly capable of satisfying the needs of the individual through the way in which it is organized" (1991, p. 1). In other words, an individual is easily satisfied by the preservation of the structure of society, the status quo, which is usually under the control of a small percentage of the population. We often feel that manipulation of something implies power over it; this is not the case. Manipulation of a system of understanding only perpetuates the system as it is already.

> Such a society may justly demand acceptance of its principles and institutions, and reduce the opposition to the discussion and promotion of alternative policies within the status quo...Under the conditions of a rising standard of living, non conformity with the system itself appears to be socially useless, and the more so when it entails tangible economic and political disadvantages and threatens to smooth the operation of the whole (p. 2).

One is not encouraged to demand political and economic changes if these are working together to raise the standard of living as we know it. If you are physically happy, then you have no reason to protest according to Marcuse's reasoning. But what if you are not happy? Could the conditions which suggest that one might not be happy be encouraged so as to create the need for a social project geared toward change and diversification? Marcuse is talking about kinds of freedom. We are free to bounce around within the parameters of the market, thus technological change reflects these same parameters. He asks what if the market criteria were given less emphasis thus releasing untold amounts of individual freedom (social relations and perspectives). This might reveal uncharted avenues of technological expression.

Discussing modern societies needs an epistemology which encapsulates the issue in such a manner as to give practical direction to its discourse. Modern Western societies can be discussed in terms of freedom and to what degree we are free from oppression. Man is free according to Marcuse to prove himself in the market; and to Marcuse this is a travesty because <freedom> is too important a concept to be restricted to the market or even as something lost as traditional. The task of knowing true freedom is a difficult one, Marcuse admits, since the <machine> is the greatest weapon in preserving the interests of politics which then become the interests of the machine. The machine maintains Nature as a thing to be organized. Organization implies comfort and predictability which are pillars of <technology>.

He asks if the productive apparatus can be reconfigured to address vital needs in which case man could truly exercise his potential to be free. The technological rationality, Marcuse argues, could liberate man from his dependence on the market place and the small corridor of freedom that it provides us. This could be possible because our needs are not necessarily those that are completely satisfied by the market conditions. Does this address all our needs? Nevertheless, "by virtue of the way it has organized its technological base, contemporary industrial society tends to be totalitarian" (1991, p. 5). This is logical since the industry needs markets that need the specific industries. The conflict suggested here is like the competition between cultures. An idea would be to promote the emergence of a new culture capable of competing with the industrial/consumer culture. There is room in the market for diversification of needs. In fact, the market would thrive if such were the case; however, this could mean an increased justification for further exploitation. We can easily be made aware of a counter culture since its systemic participation would depend on our needs. This is a project. Such a project could be based on substituting the machine paradigm with another, perhaps seeing nature as an organism whereby all components have important roles in a cosmic vision of nature—an organism.

Nevertheless for Marcuse, society behaves as a machine, organizing the output of politics, the media, scientific production, etc; and the machine is recognized as a consolidation of needs that are answered by the power hierarchy and those who control production. The result is that needs of the system become the needs of the individual. "All liberation depends on the consciousness of servitude, and the emergence of this consciousness is always hampered by the predominance of needs and satisfactions which, to a great extent, have become the individual's own" (1991, p. 7). The obstacle to liberation is a system of *needs* that are not your own. The society, however, represses certain types of needs, those that demand liberation. The satisfaction of false needs, on the other hand, will serve as a deception and delay the freedom of the individual. "Under the rule of a repressive whole, liberty can be made into a powerful instrument of domination...Free election of masters does not abolish the masters or the slaves" (p. 7). Free choice is not absolute. Choices are really options. The irony here is pretty heavy handed especially since the choosing of options is tailored to suit certain types of need.

Marcuse's idea that "consciousness of servitude" is the key to finding the social relations that can liberate us from oppressive consumerism. Again, concepts affect how we think; therefore, if our relationship with the market, let's say, contains this awareness of servitude then we will think about the market differently, thus generating novel social relations, values and perspectives.

The mechanism behind this control is not in the mass media; the media merely provides us with a message that we are programmed to receive. We are already preconditioned to receive its information easily; rather, the control is in what Marcuse calls the "flattening out of contrast (or conflict)". Within our society, there is irrationality bred into rationality. By this he means that tastes are uniform and that we are unable to distinguish between entertainment from manipulation, from the car as a convenience or as a nuisance. There is no real recognizable alienation since people identify with what they have. Conflict appears to be avoided as long as people feel that they have access to the same material objects (Marcuse, 1991, p. 8-9). Could not these conditions be reversed so as to show people that they do not have access to the same material objects thereby creating a need for change?

Following Marx, Marcuse believes that the more we are conditioned toward amelioration by the technological rationality, the more agitated we will become. As it stands, aspirations are organized by vested interests, but there is a firm mass basis against the efforts of the status quo who counter by containing science and technology within a growth in a specific direction. Nevertheless, "in spite of the political fetters imposed by the status quo, the more technology appears capable of creating the conditions for pacification, the more are the minds and bodies of man organized against this alternative" (1991, p. 17). Pacification is a conceptual band-aid, and individuals can only be mollified for so long, especially as need is a very complex component of our lives to address. It is not with technology per se that there is a problem; rather, it is with types of technologies, untapped, that are being limited by this rationality. Technology suffers by a restrictive rationality.

Industrialized society is characterized by the technological rationality and the containment of it within the established institutions. The success of industrialized society is in the ever better control of man and its resources and it becomes irrational once "the successes of these efforts open up new dimensions of human realization" (Marcuse, 1991, p. 17. which can be interpreted as the cultivation of valuable social relations. Marcuse feels that this can never occur as the result of mere economic or political changes. The techniques which sustain man is seen as an aggressive object of administration must be changed; however, the reality is that "techniques of industrialization are political techniques; as such they prejudge the possibilities of Reason and Freedom" (1991, p. 18). Techniques work against man's diversified interests. Wealth and productivity are used to perpetuate a permanent state of defense against the mobilization of man's potential.

Potential is stymied since society is mobilized within the energy generated by common interests: the economy, national security, etc. Closing the political purpose is a phrase Marcuse uses to describe the blurring of needs and interests as well as to channel needs and interests to reflect the political purpose. One such example of this assimilation is the unification of purpose between academia and national purpose. Another is the concentration of national interests on those of the big corporations. The political parties, even, are indistinguishable (1991, p. 19). All of these trends are still hot issues today. How to combat this trend? The answer is to promote the conditions which would encourage dialectical thought thus separating entities and institutions from that which unifies them and then use these fresh perspectives to enhance <technology> and technological expressions—a project. Here, a project could initiate with a more autonomous treatment of academic pursuits that are liberated from those of the government.

Dialectical thought, for Marcuse, is a guide for social transformation. One-dimensional thought as applied to technology would not challenge technology's privileged presence. As a concept, <technology> constitutes a force that comes to organize and integrate many aspects of society. It has characteristics of a living entity which Marcuse argues the individual participation perpetuates. The reality of that image is that technology is the manifestation of the logic of domination. Our form of reason is based on antagonism—antagonism with nature has transformed to one toward each other. In turn technology affects our politics. Is there any other way, or is this even possible?

One of the ways to maintain the above and to quash the importance that quantitative change enjoys is to assimilate the classes—that is to merge the working class with the white collar. Domination has become administration. Responsibility is swept under the rug of corporation. Blame, in other words, lies within the chain of command or policy interests (Marcuse, 1991, ch. 2). Top-down policies are both conflictive and ameliorating. They are also indicative of a closed system—a system closed to the influence of perspectives and social relations from below. Even the difference between what we consider quantitative and qualitative becomes confounded which is a dulling of critical reflection and a denial of a valuable resource for the complexification of technological expression. The preservation of different promotes comparison and critical reflection. This is a philosophical issue that can be nourished in Academia.

In our society, differences are blurred more and more—again the dulling of critical reflection since comparison is not a judgment between different entities. Machines can become subjects. For instance with automation the individual is removed from the labor process, thus the machine replaces the individual and a subject. Our society consists in machines, as well (actor-network). Also, in the Welfare State the individual is maintained happy by participating with the administration by enjoying the goods and services handed down to them. "Competing institutions concur in solidifying power of the whole over the individual" (Marcuse, 1991, p. 50). The freedom to compete (within one regimented market) becomes a way to dissuade quantitative change. "Democracy would appear to be the most efficient system of domination" (p. 52). Pluralism, in this sense, works against itself as far as diversity is concerned, but it is congealed to serve a single purpose—the pacification of society, for example.

What are the results of a false pluralism? As such, uniformity, culture, and art are no longer sublimated. There is no mystery within the order of artistic expression. The myriad of social components have been categorized as elements toward progress. Cultural expression used to be reflexive and beyond social norms. One concept contained the possibility of many which denies us the privilege of true comparison—critical reflection. Fulfillment is not social but ontological. For instance sexuality, as portrayed in the nineteenth century, was "highly sublimated, mediated, reflective—but in this form it is absolute, uncompromising, unconditional. The dominion of Eros is also that of Thanatos" (Marcuse, 1991, p. 77). On the other hand, de-sublimated sexuality places all the elements, behaviors and characters within a social character, or they are critical of the social order. The characters of the novels today wear their sexuality on their shirt sleeves (ch. 3). Ironically, too much information leads to a lack of reflection since everything can be proven to be true. And in another contradiction, hyper rationality leads to a loss of perspective and destruction.

Conversely, consolidation could be a positive good. It might even promote critical reflection instead of animosity. For example:

> the concentration of individual enterprises [leads to] more effective and more productive corporations....The curtailment of prerogatives and national sovereignties impede international organization of resources. That this technological order also involves a political and intellectual coordination may be a regrettable and yet promising development (Marcuse, 1991, p. 1).

This implies contact with other free thinking entities and not contact with barriers—a project. Reflection is the key to a good and happy life; but reflection must not be coerced.

This refers to what Marcuse says about how we are not truly free, only free to consume:

> For Marcuse, humans have been forced to cut a deal in order to gain material comfort. They have been obliged to surrender their individual and collective control over their own destiny. Or to be more accurate, the promise of freedom made by the old bourgeoisie has now been refurbished by the new apparatus of capitalist domination to mean freedom to consume. Marcuse finds that this apparatus of domination appears rational, that is, the apparatus appears in the form of science and technology, and thus becomes virtually immune from attack (Aronowitz, 1988, p. 160).

True "control of their destiny" must not come from a limited set of values or interests. All perspectives and social relations should be encouraged to participate. Consumption is the rational link between the hierarchy and the social order. Is it, however, rational to suppress human potential or does this produce tension in society? Is consumption the *sheep's* clothing concealing the *wolf* of determinism? Is the unification of action and participation a symptom for technological determinism? In the next section we will explore the idea of unification of interests further. For Marcuse, <technology> is the manifestation of a rational suppression of human potential. In this it is also irrational. Consumerism is one solution, but that is all it is.

<Consumption's> connotation is negative since a one-way flow from the system to the individual is implied; but the concept could be reoriented to suggest a sense of participation with the many elements of society and nature. Conceptual reorganization leads to and promotes the emergence of new social relations. We have a choice, according to Marcuse. We can either assume that the machine works perfectly and be happy facing the wall of shadows or we can assume that the machine will eventually break due to the lack of

creative influence from society upon technology. Our creativity is the source of technology's possible emergence in society. Critical reflection must be encouraged in order for our creativity to be inspired. What inhibits critical reflection is a mechanism which exists to destroy the other: instrumental reason.

C. Determinism as Modernity, Progress, and Reason

Determinism can also be a type of rationality, that of instrumental reason, which exhibits characteristics of agency. This is so in how a society operates based on this type of rationality. The understanding of the effects of technological determinism can also be grasped by visualizing a process whereby many categories of life, social relations, are amalgamated into the idea of progress. Given that the Enlightenment was a deliberate attempt, through a specific type of reason, to liberate man from ignorance and the perils of nature, modernity becomes hegemonic to say the least. Though progress was not as clearly defined as it is today, that is as modern technology, we can see the common thread in the partnership between the rise of nationalistic policies and the use of technology to perpetuate them. Modernity is characterized by a homogenization of norms and values, the concentration of force for increased results, both militarily and in capitalist production, and the centralization of power with the state. The concept of reason of the Enlightenment has become the "will to instrumental mastery" (Habermas, 1995, p. 4). In this sense, technology, as an abstract social phenomenon, can be recognized everywhere the ideals of scientific rationality and self preservation or domination are seen to influence the activity or environment, however local or global, in a significant manner. This is determinism par excellence.

Modernity is a break from the past and a focus on the future. is an exercise in futility since one cannot focus on something that is not yet here. Modernity is a process that is generated out of itself and not the past and its traditions; it is its own normative process in that norms are formed out of the idea of modernity itself and not traditions. Modernity can be conceptualized by "assimilating the aesthetic concept of perfection to that of progress as it was suggested by modern natural science" (Habermas, 1995, p. 8). This is a manufacturing of reason whereby the values of the natural science were given a lot of authority. Perfection became progress and science was the initial motor. Modernity's association with progress is also characterized by a constant renewal which explains modernity's kinship with mode or fashion. This way generates a continuous look to the new or the innovative, regardless of any value that is not connected to its virtue as something new. This perspective creates the condition for an explosion of technological development especially in conjunction with instrumental reason. Always focusing in the same direction is a hegemonic treatment of the other perspectives that are not being given consideration; therefore, the multiplication of focuses would welcome the social relations and perspectives that are being ignored. Progress as an all too clearly defined concept, as technological progress, is a form of determinism and the revealing of such asks us to question progress and encourage the emergence of a <progress> which reflects the totality of human experience. Focusing on the future is a positivist attitude where man is encouraged to hone his/her creative capacity in a direction. Critical reflection, on the other hand, if not coerced can blossom in any direction and in any form.

Another characteristic of Modernity is that it is based on instrumental reason and selfish subjectivity. Modernity must ground itself on the future since modernity is characterized by divisions within society in general on down to the individual. Said divisions do not constitute a united foundation for agreement. Ironically, we are united by our separation from one another. Harmony is something to aspire toward but never actually reached as the validation of the individual self consciousness is achieved via instrumental reason, further isolating segments of society. Harmony, by definition, requires the un-coerced participation of the other. The foundations of harmony as such are self defeating since the unifying element is the promotion of subjectivity. Subjectivity is the universal law, but this is naturally self alienating. So, inevitably one must look to the ideals of progress. Progress, in this type of world of self gratification and as defined by the natural sciences, can only be fulfilled through technology. <Technology> becomes the equalizer of subjectivity and critical reflection and perspective.

The idea of progress is paradoxical and this paradox reveals another potentially deterministic feature of technology. It unifies us toward a future of innovation, newness and a technological ordering of nature, regardless of the cost. At the same time, however, it divides us from one another and our own background of standards because it disregards everything that does not directly contribute to the fulfillment of progress. If the idea of progress is allowed to remain as the thread of history dating back to the Enlightenment, then we are compelled to ignore all that does not correspond to the accomplishment of our *civilizational* progress, and these contingencies are ignored. Due to our blind participation with progress, we are obsessed with the "new" without necessarily being critical of it—a object's newness is enough for it to pass muster. Why can't alternative ideas of history, change and technological development thus reconfigure our idea of <technology> or expand its scope to include more social relations?

Besides their disagreement on the nature of reason, the distinctions between Habermas and Marcuse rest in the status of science and technology, the former being how things are and the latter as an ideology. Jurgen Habermas is more of a technological determinist than Marcuse since he feels that technology is the defining and foundational element to all problems and social relations, though he wishes to extract some relations out from under this foundational element in order to promote his theory of inter-subjective communication. For Habermas, the technocratic conscience is to be taken for granted.

Marcuse's mistake, if we consider Habermas' viewpoint, is within his definition of ideology. Ideology, determined by the Enlightenment dictated, was inextricably tied to a certain class of people, the bourgeois, and the elevation of capital became the ideology for this new class of people. The ideology was the creation of favorable conditions for this class of people. They were the goal. The class of people constituted the means and the ends. Such redundant and fatalistically circular social relations would encourage the loss of critical reflection, but as a project the recognition of a class of people or ideal as the target or the goal is a step in the right direction.

Habermas, on the other hand, is of the opinion that science and technology do not adhere to this antiquated understanding of "ideology". Science and technology are not ideologies in the utopian, normative-oriented sense since norms; rather, for Habermas, ideologies are the result of class struggle. Thus, for Habermas, science and technology are not ideologies, as they are no longer mythic as they were regarded in the 17^{th} century. Science and technology are real features of society that we must deal with. The mythic feature was lost since science and technology have been subsumed under a system of rational purposive action (Aronowitz, 1988, p. 161). Nevertheless, according to Habermas, ideology is technically oriented such that class struggle, political problems, and economic power are all considered technical problems to be solved through rational means. We must take for granted the technocratic consciousness since its existence is a material reality. But this realization requires a proactive intellectual dialogue with technology; and determinism puts us in an adversarial position to do so. A dialogue, in the true sense, must not be unduly influenced by an overarching structure of representation. A participant must not interact while under the gun.

Science and technology are not ideologies; rather, they destroy ideologies or, at least act upon them. For instance, science as an ideology in the seventeenth century was mythic like a religion. Today science is "instrumentalized and subsumed by a system of rational-purposive action which, in Habermas' words, makes permanent the extension of subsystems of purposive rational action and thereby calls into question the traditional forms of legitimation and power, ie ideologies" (Aronowitz, 1988, p. 161). In short, once we are aware of the rational purposive element, we have a justification for criticizing them—the target, at least, has been identified. Ideologies of the past guided us toward externalized ends; today's technology is both a means and an end. Technology has too much of a real and material presence in our lives to be an ideology. It is real and Habermas argues that we cannot treat it as if it were an ideology. For Habermas, science and technology could be vehicles toward rational understanding as they help us break from traditional forms of life which serve to create boundaries between peoples. Science and technology, for Habermas, are not neutral. They are natural facts which can be used toward the autonomous participation of social actors (Aronowitz, 1988).

Again, Habermas feels that technocratic consciousness must be taken for granted. Science and technology are not ideologies; they are the foundation of modern life. "Technology and science are at once the new hegemonic forces of production and the institutional framework for social life", and Habermas maintains that "emancipatory practice must focus on the restoration of that which has been suppressed by late capitalism: the richness of inter-subjective communication informed by social norms—in short, the moral life" (Aronowitz, 1988, p. 162). Here again we see the value of maintaining an epistemology founded upon technological determinism in that we are confronted with the loss of "that which has been suppressed". Conceptual expansion is about the emancipation of understanding which seems more valid as limited concepts are applied to a variety of experience. Validity requires the participation of all parties involved. The aforementioned ideas would certainly be conducive to a freer dialogue with technology. Habermas' theory of communication is a response to communication based on domination. Using Habermas' inter-subjective theory of communication would be a strategy to unleash the plethora of social relations that are not being utilized and could have a favorable effect upon technological expression and to expand the scope of <technology>. Recall that this theory states that the values of everyday life are characterized by the values of <communication> rather than instrumentalism.

The above process is a general shift in paradigmatic thinking. Another example would be to make divisions between things that are not always considered separately. In the "importance" of science versus its application, Habermas joins the concepts of science and technology which he claims have a common origin in instrumental reason. He is so blasé about this, suggesting that their distinction, at least at this stage of the polemic, that we must focus on the future. The properties that may or may not distinguish them are immaterial to Habermas as he must take them as they are in order to work toward a solution to their instrumental foundations. Habermas, along with later theorists following the Frankfurt school, "wants to find pathways back to reason but no longer find them through the route of science. In effect, for Habermas, science and technology have become part of the taken for granted world of instrumental reason" (Aronowitz, 1988, p. 33). Science and technology, as manifestations of rational-purposive action, are the historically evolved form of the relations of humans to nature. Perhaps, a form of reason that is not pursued and edified by science and instrumental reason would result in a different <technology>, and novel technological expressions might rise to the surface. The construction of such is a project and one that I feel should come from Academia.

Science and technology have evolved to become the form of human relations to nature and "to that part of social relations having to do with work" (Aronowitz, 1988, p. 163). All of our activities, according to Habermas, have been molded by rational-purposive standards. Habermas wants to separate some of the activities from these standards that can still be influenced by normative rules. Habermas does say that we must accept it as fact that technology is a collection of immutable things, as instruments, and he argues that all problems are technical and must be approached rationally; but his idea of reason stems from Kant who made the distinction between reason and judgment. Making distinctions helps promote the axiom of comparison and critical reflection. An entity must be separate from that which it is compared. This is to divest all sorts of prejudice.

For Habermas, the rational/instrumental aspect of the Enlightenment is here, now, and forever. It only needs some modification. Habermas' approach to the scientific rationale or technology has an essence in the idea of self preservation. The provenance of these ideals, as they apply today, lies in the Enlightenment period when an anthropomorphic manner of seeing was used to justify the objectification of nature and domination of our fellow human beings (Habermas, 1995). Since self interest is at the heart of this rationale, it could be argued that the abuse of power is not judged to be negative, even in the social realm; rather it is simply the paradigm in which we live. In other words, an activity or a thing is considered to have a credible existence or justification if it satisfies self interest. In this sense, Habermas states that "validity claims are determined by relationships of power" (Habermas, 1995, p. 116). Like Marcuse, Habermas argues that relationships based on power are considered to be rational; but, Habermas feels that this does not have to be the case. Validity and meaning can be the result of inter-subjective values rather than instrumental ones. Universal validity, if possible, must emerge after the truly un-coerced participation with the other. This is another type of project that can begin in Academia.

For Habermas, there is no need to dispute the position that technology has in the world. For him it is here to stay; however, there are moral implications within the idea that validity has roots in power; therefore our standards are embedded in a framework of domination and self preservation. Technology, as a tool fulfills the above ideals in a world where the paradigm is constructed around a subject centered reason. Technology, according to Habermas, has merely, though quite conclusively, muffled our variety of experience. The idea behind Habermas' approach is to clean our lenses through the employment of technological expressions since this is an inevitable factor in our lives and create critical space, through the recognition of new social relations. This process would create new vantage points for perspective with the end of enhancing our concept of <technology> and perhaps technological expressions.

We follow technology's example, but by deemphasizing the technological presence we would be recovering much of what we have lost or suppressed in our instrumental and hypnotic relationship to technology. Technology is not the target; it is the goal. The target is the ideology behind its production—rational, purposive action. "The compulsion toward rational domination of externally impinging natural forces has set the subject upon the course of a formative process that heightens productive forces without limit for the sake of sheer self preservation, but lets the forces of reconciliation atrophy" (Habermas, 1995, p. 110). There is the sense of an objectified environment and a repressed internal nature that could be revitalized if we were able to force technology to reflect our social diversity. Habermas' theory of inter-subjective communication implies a subject who exists as a subject but also as a subject who is partially constructed by his/her environment and by that which he/she is in contact. Here the other plays a constructive role in the subject. There is a transcendental autonomy in that validity is not locally determined. Validity is within the construction of the self and other simultaneously. Could we, through his idea of Reason, not re-orient <technology> to reflect this schema?

For Marcuse, determinism was about the limitation of choice; for Habermas, determinism applies to the rationale that we use behind and before choice. So, for Habermas, the determinism comes from a type of reason that we have adopted which can manifest in different ways, but there is no predetermined result to the type of reason we have. Technology is price we pay for comfort. There is nothing wrong with that. We must accept technology as the foundation of social relations. What must be reoriented is our understanding of reason. Rather than being rational-purposive, it needs to be the vehicle toward inter-subjective understanding. Just as technology exists at all levels and in all aspects of society, rational-purposive reason is also so ubiquitous. This is analogous to Jacques Ellul's understanding of technological determinism. For him, determinism emerged as a form of social organization whose organizing principle is uniform throughout society. In other words, the society we have is the result of historical circumstances that have acquired a determining effect on the continuation of this particular form of society.

In conclusion, Habermas feels that we must accept technology's position in the world with which we have evolved, only use it toward other ends, like perhaps altering our form of reason. Then, a new form of rational behavior would result in new technological expressions. Here again, we are talking about altering the paradigm behind technological expressions which requires that we shift the social relations which determine <technology>. Again, the other plays a constructive role in the creation of the subject. The other must participate without duress in the process of validation creation. The other is required for critical reflection which, in turn, is required for the diversification of technological innovation.

D. Determinism as technique

Technique is a name of the type of society that we have where technology determines social relations. Technique incorporates experience and social relations into a value system determined by the project of technique. In this sense, determinism becomes a form of sociological epistemology. Jacques Ellul demonstrates that all the activities that we presume are independent from technology are in fact tied to technology and obliged to it. Ellul's issue of whether or not technology is autonomous stems from Weber's idea of a social rationality or that our reason is essentially instrumental. In addition, Weber maintained an idea of rationality which organized society to common purposes which in effect suppressed individual initiative. For Ellul, technology can be understood as the label we attach to the totality of rational methods conceived in order to obtain maximum efficiency—technique. Technique is the mechanism which organizes society. Technique as an organizing principle, or the maximum social relation with which we have evolved, is evident in our compulsion to bring everything from research and investigation to human relations and artistic expression under rules and explicit organization (1964). Technique is also that which serves to integrate many aspects of society for the purposes of exploring new possibilities.

To organize relations in terms of rules can be thought of as an objectification of our surroundings which is an instrumental attitude that could cause us to "cease to think about the question of the ultimate end of our practices" (Scharff, & Dusek, (2005, p. 383). The paucity of reflection is an indication of technological determinism; nevertheless, human factors have sustained this eagerness for rules and organization, thus giving credit to both the social constructivist and determinism schools. Nevertheless, the technological demand, expressed through more control, invention and development, has the ability to determine our ability to effectively reflect upon our actions resulting, by way of an absence of criticism, in a perpetuation of technological values. The values that characterize technological values are often by default. Though they may be difficult to identify, they displace other values. "Admired as endlessly innovative, scientifically informed, progress-oriented phenomenon, technology comes to be admired as the primary creative force in our lives, and its values displace traditional morality, which is now regarded as merely something inside our minds" (Scharff, & Dusek, 2005, p. 383). To recognize that <technology> is the prime force behind our social relations asks us to seek other influences for our social relations that are not determined by technique. These new social relations could then be applied toward the expansion of <technology> and the diversification of technological expressions.

Despite the almost universal rejection of determinism, I feel that there are aspects of determinism that are worth salvaging, so that in the very least we are keen to negative effects of technological choice. The perspective that I would like to maintain valid is that "changes in technology dictate changes in society" (Scharff, & Dusek, 2005, p. 384). Yes, we still have reflection, but it is reflection as such, which is not freely pursuing intellectual ends apart from those influenced by technical properties. This, I believe, is the true value behind preserving a critical eye toward the determinative qualities of technology.

It can be argued that that which influences whether or not we regard something as true is based on its ability to fulfill its instrumental role. What ways of knowing are being suppressed as a result of an obsession with the pervasive application of technology to all aspects of society? Understanding technology as a mechanism through which we interpret and negotiate the world whereby many aspects of our society perpetuate this mechanism is characteristic of technological determinism in that technological ideals (efficiency, quantitative standardization and instrumentalism) constitute a guideline for social behavior as well as technological development. This guideline manifests as social participation which then serves to give the appearance of the reification of <technology> by way of maintaining a certain type of knowledge—the knowledge of effectiveness or possessing technological knowledge. That technology appears to be autonomous can be maintained by society's rekindling of its role. Without suggesting any type of agency, our society has been so constructed so as to allow the apparent autonomy of technology.

In "The Autonomy of the Technological Phenomenon" Ellul explores the alleged phenomenon of technological autonomy with regards to the flexibility and latitude that technology enjoys. Through certain types of production, technology is encouraged to adapt to the functionability of this type rather than answering any other realm of human need or social requirement. Technology omits certain roles for the sake of others such as calculation and control. "Performing this function, technology endures no judgment from the outside nor any restraint" (2005, p. 386). To illustrate this point Ellul refers to the "space race" about which the president of the Permanent Commission for the Coordination of Interplanetary Research in the USSR commented "there are no forces capable today of stopping this historical process" (2005, p. 386), referring to the construction of Soviet rockets and satellites). Ellul added that such a statement can be applied to all technological applications. A person cannot analyze one's lenses without taking them off and examining them, but then one's vision is bad and he/she must employ a tool to analyze a tool.

Technology is hardly affected, and certainly not detained, in the process of modifying the hopes that surround its development; but our hopes are modified by technology. For example, when dealing with closed data, improved technologies can process the information in faster and more efficient ways; thus our hopes and expectations are changed while the technology doing the processing changes very little. Technology depends on itself regardless of the ups and downs of its development or our interaction with it. It depends on no prefabricated milieu; rather it creates its own environment by rendering superfluous certain values and displacing them with those of efficiency, control and speed (Ellul, 2005, p. 387). What are the foundations of this autonomy that technology enjoys?

Ellul answers the question of autonomy by showing us that technology has been denied the exposure to certain social relations, in particular values and morals by giving us five characteristics. 1) Technology does not progress in terms of any one moral ideal or virtue. It does not have a built-in path to virtue. 2) Technology cannot tolerate moral judgment. In other words, "so long as the problems are purely technological, they can always find a clear and certain solution. But once the human factor has to enter...they seem insoluble" (2005, p. 394). 3) Technology will not bear being terminated or re-directed due to moral perspectives. In our society, this notion is greatly instilled. On the whole we have the tendency to think that it must be good, if it is technological. 4) Technology is the new standard of excellence. We are easily dazzled by a presentation that incorporates technical assistance regardless of its actual content. Science per se used to fulfill this role, now "it is technology that now validates scientific research" (p. 395). 5) Technology has eclipsed many previous measures of value. "It attributes justice to human action, and man is thus spontaneously led to construct an ethics on the basis of, and in terms of, technology" (p. 396). Technology, then, demands certain actions and virtues from humanity (precision to name one), and technology establishes very clear value judgments in society (what is effective and useful, for example). Furthermore, technological norms and values are truly experienced by society on a wide scale giving them priority and a privileged status over other forms of norms and values. That technology so easily exacts from society a certain mode of being due to its internal properties, screams of technological determinism. Technology is a society wide standard, but standards and norms are by definition social agreements. The relationship between technology and society is like the effects of action-reaction: for every action there is an equal and opposite reaction. Technology demands a corresponding type of society. Precision and effective are not universally legislative. In Roman times, effective, for example, incorporated metaphysical qualities. Within the construction of an aqueduct there were considerations of eternity, aesthetics and imitation as the technology was built to carry water on into perpetuity, like a river (Scharff & Dusek 2005). Behind the construction of the aqueduct are social relations that we were not aware of. This exercise of finding new concepts behind technological constructions is kin to finding new sources for conceptual construction in social relations. New concepts lead to new actions and perspectives. The restriction of new concepts is a form of determinism whereby means and ends are not in a healthy opposition; they serve to perpetuate a structure.

That the means have become the ends is also a form of determinism. In his article "Technological Order", Ellul asks the question of whether or not man can remain master in a world where the means are determining the surroundings. Recall the question raised earlier in this investigation: "can a new civilization emerge which would include technique as only one element among others?" (Mitcham & Mackey, 1983, p.6) For Ellul, Modernity is technique and vice versa; and progress becomes the extreme virtue. Recall that technique is "the totality of methods rationally arrived at and having absolute efficiency" (1964, p. xxv) for all levels of human activity. For Ellul technique is the central component to our world much like Catholicism defined the middle ages by replacing the natural milieu. "Not only is modern technology artificial, autonomous, self-augmenting, and monistic, but there is also an ambiguity about technical progress which reinforces these characteristics. Technique evolves by solving some problems, but only at the expense of creating new ones" (Mitcham & Mackey, 1983, p. 5).

The creation of new problems actually serves technique and it justifies its continued existence. In addition, means have priority over the ends, whereas the reverse should be the case. Perhaps what is most compelling is that our repertoire of choice is tinged with the technical process. In this way, technique is artificial, and progress is determinative, at least as to the kind of change to which we aspire. As a project, we can ask ourselves if the kind of change we are determined to experience answers all of our needs. Or we can ask ourselves if there are aspects of humanity that are not being utilized in the production of technological expressions and that would alter our idea of progress. A healthy separation of means and ends is a project that Industry could promote; such a project is based on critical reflection, and separating means and ends is a way to reflect upon one or the other without either of them being unduly influenced by the other.

Recall the comment about "action-reaction". In fact, our idea of progress is quite exclusive as our expectations stemming from efficiency and success have established that the notion of progress is a process of de-humanization. "And the process is a natural one: every part of a technical civilization responds to the social needs generated by technique itself. Progress then consists in progressive dehumanization—a busy, pointless and in the end suicidal submission to technique more" (Merton, 1964, p. viii). Seen this way, progress has very little to do with enhancing the human endeavor apart from perpetuating technique itself.

Even though the process of accommodating technique is a natural one, this is not to say that humanity is totally satisfied. "In Ellul's conception, then, life is not happy in a civilization dominated by technique. Even the outward show of happiness is bought at the price of total acquiescence" (Merton, 1964, p. viii). Happy, then, is a concept characterized by a smooth acquiescence to technique. Merton uses the word "life" which suggests the totality of experience where there are many categories that either are ignored or suppressed in the operations of technique.

"The essential point, according to Ellul, is that technique produces all this without a plan; no one wills it or arranges that it be so. Our technical civilization does not result from a Machiavellian scheme. It is a response to the laws of development of technique" (Merton, 1964, p. viii). Nevertheless, we are talking about a type of technology and a type of progress. These are not absolute terms. It just so happens that this type of progress determines that the means are the ends—a process which becomes a vicious cycle whereby our *human* potential is being dulled. Humanity's full, critical potential atrophies with such a limited application.

The de-humanization is a phenomenon that occurs at all aspects of society, rendering a distinction between the two aspects of science and technology even more insignificant; but we are united by this common denominator. There are many other socially defined entities besides progress which also unite our experience. There is an entire panoply of relations that science and technology have with society (artifacts, decisions, judgments, values, etc) that can be referred to simply as "technology" which is just one region of influence among many throughout society.

Jacques Ellul's *The Technological Society* is an abstract approach to his argument that technology constitutes a collective reality and has a deterministic quality that acts throughout our society. It is not an empirical description of technological problems in relation to their users, "such an approach will never arrive at an adequate conception of what technology is and how it functions" (Scharff & Dusek, 2005, p. 171). When talking about technology's relationship to society, one must consider this association as a whole. Ellul refers to this relationship as *technique* which is the result of socio-historical conditions that we have come to accept and, thus, perpetuate through our actions. Technique is the subject form (grammatically speaking) of the adjective rational.

Technique is what he labels as the defining component of modern society. In his note to the reader, Ellul explains that "a technique or technical operation is one carried out in accordance with a certain method in order to attain a particular end" (1964, p. xxv). The individual qualities of technique are not tantamount to understanding its role in society;

rather its importance lies in the relationship between society and the technological phenomenon and how it defines the age. Everything is situated within a technological context which is reflected in our activities, ideas, beliefs and myths (social relations) (Mitcham, & Mackey, 1983). Being aware of a type of context encourages one to search for means to change the context.

He describes our society as driven by organization toward technical ends. Technique can be understood in terms of an abstract machine whose wires touch all aspects of society. The advent of the machine into society had such an impact on social relations that everything had to be adapted to it: work relations, social divisions, urbanization, etc. "Thus everything had to be reconsidered in terms of the machine, and that is precisely the role that technique must play…Technique integrated the machine into society…Technique clarifies, arranges and rationalizes; it does in the domain of the abstract what the machine did in the domain of labor" (Ellul, 1964, p. 5). The technological society, which is characteristic of a machine model of behavior, has qualities that suggest its total autonomy simply because technique helps man adapt to further goals and methods characteristic of technique.

Social growth was formerly reflexive or instinctive, that is to say, unconscious. In the present context:

> new circumstances (the machine) now compel us to recognize a kind of social development that is rational, intelligent, and conscious…Technique integrates everything. It avoids shock and sensational events. Man is not adapted to a world of steel; technique adapts him to it…Technique thus provides a model; it specifies attitudes that are valid once and for all. The anxiety aroused by the turbulence of the machine is soothed by the consoling hum of a unified society (Ellul, 1964, p. 6).

The machine was used as a model for many social relations. Sociologically speaking, why are we so inclined to apply by analogy? A unified society is unified in as far as it is a rational society that reflects the ideals of technique. The formulation of the individual, even, is determined by technique. Ellul argues that:

> when technique enters into every aspect of life, including the human, it ceases to be external to man and becomes his very substance. It is no longer face to face with man but is integrated with him, and it progressively absorbs him. In this respect, technique is radically different from the machine. This transformation, so obvious in modern society, is the result of the fact that technique has become autonomous (1964, p. 6).

Could we not choose other models to be used to apply analogously toward favorable technological expressions or social relations?—a project based on an ideal, perhaps.

In the realm of technique, autonomy is total which surfaces through our participation with modern technology, but for Ellul, modern technology is *a* form of thought which has been calibrated throughout the years since the Enlightenment to be agreeable to the promotion of technology as rational-purposive agent as well as to the diffusion of these ideals throughout society. The world is mechanized. Within the technological perspective, thought organizes its object mathematically before any real value can be attached to the thing. Furthermore, prior to technique humans were able to assert themselves over the rational organization of technique, but with the advent of efficiency and modern technology, technique bores into man and determines his judgment. For this price we are "consoled by a unified society". Technique acts through man and this affords <technology> a certain amount of autonomy since it is liberated from excessive qualitative applications. By this last statement Ellul is saying that all aspects of our lives, once technique enters, exhibit their technical qualities thus diminishing any qualitative influence apart from technique (1964). Here, there is the loss of critical reflection.

In simpler terms, I recall Horkheimer and Adorno who argued that nature looses its qualitative essence and is only recognized for its worth as reserve material for our instrumental view of the world (2002). Given that technology determines how we order the world, individual freedom is inhibited to the extent that its many "visions" are organized under the ideals of technology. "If we may ascribe to the machine a superior form of know-how, the mechanization which results from technique is the application of this higher form to all domains hitherto foreign to the machine" (Ellul, 1964, p. 7). The machine has become the ideal, the standard by which we judge other activities.

Technique is an organization of society around certain values—the result of the efficient pursuit of its own ends. In other words, society applies the methods of technique toward goals consistent with technique. Goals can be thought of as techniques which are what constitute the entirety of technique. These goals or techniques (social relations) were chosen simply because technique instills values in us and we exhibit them when we choose to pursue certain goals. Robert K. Merton describes this process in the introduction to Ellul's *Technological Society* as a, "description of the way in which an autonomous technology is in process of taking over the traditional values of every society without exception, subverting and suppressing these values to produce at last a monolithic world culture in which all non-technological difference and variety is mere appearance" (1964, p. x). This is kin to the aphorism: *out of sight, out of mind.* We don't see that which does not subscribe to this way of being; therefore, we will cease to be able to draw upon the resources that do not stem from Technique. Again, there is a loss of critical reflection.

With the industrial revolution, the machine taught us methods of rationality and efficiency which Ellul's technique absorbed and applied to all aspects of society. The machine is the *very* manifestation of rational hierarchy. It has a goal, from which it cannot part, and it has parts organized toward the completion of that goal. Society imitated this. For example, the state learned to organize itself toward its own ends whereby it tried to incorporate everything that would serve its status as a state. This is the birth of the nation-state. Napoleon is the ultimate product of technique. He was at the top of a hierarchy which was constructed to observe the supremacy of the state. He even codified laws with the hope of applying them to conquered new territories (1964). If technique can manifest as laws, what other technological expressions would emerge based on another social project? <Technology> has a code; it could have another code which consists of a different set of values.

Technique did exist prior to the Enlightenment, but it only enjoyed isolated instances and it was experimentally applied. Modern technique, however, has become fully visible and is characteristic of the emergence of a systematic creation of standards. Certain institutions were not uniformly constructed. For example, prior to the Enlightenment, slavery manifested itself in different forms. Roman law did not spread evenly to all territories within the Empire whereas the Napoleonic code spread to non French territories (1964).

These same conditions were also crucial for the emergence of Ellul's idea of technique as a totalitarian entity capable of organizing many aspects of our lives. This can be thought of as standardization at many levels of our existence. Standardization, Ellul argues, leads to mechanical solutions that pass without criticism which can be applied to numerous problems. Standardization is often the substitute for intelligence which relates to the problem surrounding researchers who are unable to work without the equipment that a laboratory provides him. On the other hand, standardization is also a technology per se since it aims at preventing problems that could arise (Ellul, 1964). But, substitution for something valuable, like consciousness, understanding and flexible expression can be considered negative determinism.

Technique is seen in the activities surrounding the technological output in our current economic conditions. In the context of hyper-capitalism science is hardly distinguishable from its technical result and capitalism makes it both lucrative and costly. The result of the relationship between science, technology and capitalism is an acceleration of production. Capitalism has shortened the potential time between a scientific discovery and its technological application, leaving many important factors left unaddressed. In such a scenario a lone scientist is often confronted with moral dilemmas. However, the scientist would want to continue his work so he must accept the terms put form by capitalism or, as was the case with the Manhattan project, the state. In the case of the Manhattan project, the state orchestrated the conditions so that the only place that the physicists could work was in Los Alamos, New Mexico. The scientists may have the intellectual know-how, but the state had the means to sustain their desire to continue the research. Either the physicists did the work in the deserts of New Mexico, or they did not work at all. Here we see a consolidation of efforts like no other—a rational approach to technological output par excellence: a variety of disciplines, machinery, technicians, scientists, a wartime context and unlimited amounts of money (Ellul, 1964). Here we see an illustration of how the effects of either commerce or war provide the venue for technique.

Technique must not be confused with the machine, but this is a common misconception since the machine is the ideal toward which technique aspires. However, the machine itself is not the issue; rather the issue is the transformation of elements into the machine model. The introduction of the machine in the nineteenth century was received with some speculation since an inhuman atmosphere emanated from the social relations surrounding the machine. This skepticism did not last since technique functioned as the attempt to restore order to society so that we may be able to adapt to the machine. Ellul is concerned with an ongoing process of solutions that lack institutional foundations to prevent further problems related to the use of technique:

> The problems created by mechanical technique will be heightened to a degree as yet incalculable, as a result of the application of technique to administration and to all spheres of life...This development adds to the technical problems by offering a partial solution to old problems, itself based on the very methods that created the problem in the first place. This is the age old procedure of digging a new hole to fill up an old one (1964, p. 12).

Here, Ellul is asking if any problem in any sphere of life can be solved in a similar fashion. A second consequence of our society, according to Ellul, involves the unpredictable process of technique adapting the many spheres of life to the machine:

> The final result will be that technique will assimilate everything to the machine; the ideal for which technique strives is the mechanization of everything it encounters....The technical age continues to advance and we cannot even say that we are at the peak of its expansion. In fact, some decisive conquests remain to be made—man, among others—and it is hard to see what it is to prevent technique from making them (1964) p. 13).

Ellul's pessimism is partly based on his assumption that technique is always put to immediate use resulting in a momentum of action that is difficult to resist. His pessimism is also based on the fact that scientists themselves are particular targets of technique. Nevertheless, such ends are not entirely the result of human needs in general, independent of technology; rather, they are heavily influenced by technology's presence, since, as Ellul points out, by nature we cannot ignore a technological advantage. The technological advantages of this are great, but the human, qualitative effect is deemphasized or ignored entirely. Technique pulls a variety of elements toward a goal, but many of these elements have little to do with technique. This is Ellul's concern.

In fact, technique qualifies judgment just as technologies affect conceptual construction. Whereas technique is a limited entity in terms of its constitution of calculability, efficiency and rational application, it affects a great portion of our society in ways too subtle to be objectified by the aforementioned characteristics. Science and technology are realms that naturally fall back on reduction. A scientist does not know anything about the relationship between the machine and man, so this aspect is quite naturally ignored. Ellul is concerned with the effects of technique that are not able to be calculated. Ellul asks, "what, after all, can one hope to deduce from the purely qualitative statement that the worker is fatigued?...[which shows that] an entire realm of effects of technique cannot be reduced to numbers" (1964, p. 18). This example suggests that the limits to technique are, in fact, directly related to the social effects that Ellul is concerned with. Is there not potential fuel for <technology> within the aspects of live that are ignored because it cannot be reduced to calculable data? Of course. And what about a technique based on, not a machine, but something entirely different?

Rationalization preceded mechanization, suggesting that the former is higher in a hierarchy, implying that the real possibility of rationalization exists in many different forms besides that of the machine. "The widespread mechanical development came after most of these other techniques" (Ellul, 1964, p. 44), but these did not depend on a rationalization of society; rather it was a combination of factors with the individual scientist acting as the go-between for scientific principles and human needs. It was at this time that the industrial revolution provided humanity with the mechanization abilities to unify society toward common goals. There was, at this time, an advance in application and not in knowledge *per se* as scientific discoveries are not imperative to technical invention. From Mumford we understand that, "the principle initiatives came, not from the inventor-engineer, but from the scientist who established the general law. The scientist took cognizance both of the new raw materials which were available and of the new human needs which had to be met. Then he deliberately oriented his research toward a scientific discovery that could be applied technically" (Ellul, 1964, p. 45). In this sense, technology is certainly superior to science. Application and commercial value comprise a deep well which ultimately organizes scientific energy, implying that there might be other sources of organization, other techniques. Rationalization, in the form we know, is not a priori. It could have another form, suggesting that the resulting <technology> would also.

There is evidence of tension created by technique. Large technological movements can be felt as they affect our values, even at the level of an entire civilization. For instance, rational technique with undertones of efficiency can establish a system of action that excludes others. "When in the nineteenth century society began to elaborate an exclusively rational technique which acknowledged only considerations of efficiency, it was felt that not only the traditions but the deepest instincts of humankind had been violated". The reaction to this was a re-vindication of morality and aesthetics. Machines were decorated, and Victorian society was characterized by moral unrighteousness (Ellul, 1964, p. 73). Such additions, according to Ellul, are superfluous. They are only meant as a band-aid to the moral void created by the machine.

Supporting the aforementioned point, man made up for this loss of values by recalling other aspects of life, like aesthetics. They decorated sewing machines in futile efforts to maintain the vitality of aspects of life which are sustained outside technique; but these efforts were frivolous and short lived. Technique highlights other areas of our lives, almost by opposition:

> Modern society is, in fact, conducted on the basis of purely technical considerations. But when men found themselves going counter to the human factor, they reintroduced in an absurd manner of moral theories related to the rights of man, the League of Nations, liberty, justice. None of these has any more importance than the ruffled sunshade of McCormick's first reaper. When these moral flourishes overly encumber technical progress, they are discarded—more or less speedily, with more or less ceremony, but with determination nonetheless. This is the state we are in today (Ellul, 1964, p. 74).

This state of affairs has not changed as the nations of the 21st century are polite to the United Nations by deferring to this organization without any conviction of its ability to reconcile international tensions. Perhaps the problem with international organizations is that they are highly rational in their organization but their constitutions are based on values and interests that are not globally legislative or applicable, like "humanitarian aid". What is that? Is it a military intervention? Is it food, training, temporary housing? Or is it a dialogue characterized by an invasion?

Reconciling humanistic interests within a technical context is a Herculean task. For example, by comparing the detachable sunshade of the McCormick reaper, Ellul is saying that our attempts at morality, or attempts to compensate for the effects of technology by recovering our humanistic attitudes are fashionable. Humanitarian efforts in a technological world will last as long as they are humored by society. They are cosmetic, much like the sunshade attachment to the reaper. Our priorities, according to Ellul, are quite obvious. The fact that technique can encourage the surfacing of other traditional aspects of life shows us possible realms that the concept of <technology> can include. It shows us what is no longer important.

Where is the standard by which to judge whether or not something is admissible in the world of technique? It is through efficiency; but efficiency as an approach is self defeating in that it promotes a total rationalization or uniformity of technology. Efficiency promotes the idea of a specific object being the best object for a specific use; and technological diversification starts with the ideal of efficiency. Efficiency then leads to the spread of technique to ever more aspects of society—the advent of specialization (Ellul, 1964). Efficiency as an end, it must be noted, led to the specialization of society. This suggests that technique embodies a force that organizes society and the individuals who reside in it. How can we recuperate what is lost by technique or how can we attribute importance to certain social relations that have de prioritized by technique?

All of this, both the successful systemic operations of technique as well as the possibility of distinct systemic operations not yet in effect, implies a seamless web with many results, both foreseen and unpredictable; therefore, an institution, a decision making entity or a state must be sufficiently wealthy to maximize the effects of technique. For example, a technical advance in one area promotes the development of others, and a state must posses the financial strength to capitalize on such growth. The invention of the internal combustion engine means cars but it also implies roads, maintenance and pollution problems; but it also led to the production of submarines and airplanes (Ellul, 1964) and, I might add, MADD (mothers against drunk drivers). A technique is put into use as soon as it is available, and its social implications are not considered to any degree that could avoid collateral tensions unrelated to technique. If we have the bomb, we use it; otherwise the bomb is art. The mere exploitation of technique determines its own expansion and, like a force driven by gravity, it expands everywhere it can, including into many parts of the world. The nature of the problems caused by technique is secondary or not considered. Technique does not consider elements that have nothing to do with the method of technique. It is selfish and deterministic. Consciousness of the fact that some activities are determined by a mechanism or that our increased participation with and reliance on technology is the result of a nebulous, but deterministic, quality of technology should help us see other avenues. In other words, to know what something is, or even reputes to be, is to know what it is not.

Speaking of the problems caused by technique, the application of technique can expose violations of traditional interpretation of individual rights. For instance, developments in criminology have demonstrated that it is efficient for the police to have information on as many people as possible, regardless of their status as a citizen, without discretion (Ellul, 1964). The sacrificing of one's rights is like robbing Peter to pay Paul. The more information we have, regardless of its nature, and the more efficient communication between bodies results in the greater transparency of the individual (Lyon, 2003). Technique is modernity gone mad in the sense that the individual being is defined more by the information that other bodies have than about how the individual constructs him/herself. The ontology of the individual is ironically based on external information. Identity construction is too much within a global context that is united by technique, and the problem is a conflict between the ends of the global and those of the individual. What are the costs to the individual for the sacrifices to the universal?

Obviously, the progress of technique is not stalled at national borders, but the conditions in neighboring countries must be ripe for a more or less friendly reception of technique. So there exists the, "need to make different civilizations uniform" (Ellul, 1964, p. 117). Therefore, to preserve its own interests, a state must expand into territories beyond its normal sphere of influence. In fact, technical progress favors war and vice versa. Nations do already cooperate to serve technique under the guise of the requirements of an international market. International agreements in the form of free-trade, outsourcing, temporary contracts, flexible labor markets, etc have come to be more important than the autonomy of nations themselves. In the epoch of high-capitalism where suddenly there was an explosion of competition, "what had critically altered, however, was the position and autonomy of financial markets within capitalism, outflanking national governments, which spelt systemic instability of an unprecedented kind" (Anderson, 2006, pp. 79-80). One of the symptoms of this instability is war justified by competing for shares in the market, but the real reasons for military options are never overtly revealed. The obvious reason for this is that it is low and base to kill for the possibility of money.

It is not a little ironic that war is conducive to technique. Thinking of war as the emissary of technique almost requires an actor-network view of reality. There are many more winners when society is translated into these terms. The economy improves, oil reserves are deepened, production increases, and markets expand. Even destruction is fuel for technique as there will be the need for construction contracts and building materials—think of Iraq. The only categorical losers are those who die, but even they may die for a cause. It is funny that we have to resort to romantic ideals to justify the collateral damage of technique. Do we not go into war with fewer reservations, the more efficient wars become? Technique converts the enemy into an objectified daemon. With technique as our justification, war is pursued when war is traditionally understood to be the last card of negotiation.

War, ever since it lost its chivalrous connotation, has come to be considered both an ethical, humane, and efficient resource. Recall the justification for the second Gulf War and the horrifying civilian casualties in comparison to the military deaths. In fact, the hyper efficient application of technique to military strategy has effectively removed the intricacies of tactics, such that offensive and defensive maneuvers are almost indistinguishable. Take for example the ideas of preemptive strikes or saturation bombing. Are these actions offensive or defensive? The destruction of a city, for instance, has become an objective, and the city itself is no longer considered for is implications as a life center. So, now that war is considered to be an efficient means to advance a nation's or an economy's interests; all that is left is to find the pretext to initiate the hostilities which is simple when the justification of a nation's existence is called to question. This brings to mind the example of the life of capitalism or democracy, both of which have been used to justify wars, then and now. Now, we resort to nebulous pretexts such as "terror" which also serve to further objectify the enemy.

What is deterministic in all this? There are social conditions which caused the rise of our form of technique and maintain its influence. These conditions act within and through society. But how? First of all our values and expectations are determined by technique. For example we expect the perfection of the police power to ensure a smoothly run civilization which implies forfeiting more responsibility and information over to the police. In the same way, we expect the identical absolute order from our interactions with nature. "The more we mobilize the forces of nature, the more must we mobilize men and the more do we require order which today represents the highest value" (1964, p. 103). Order on this scale is expensive, requiring more efficient means of technique to provide it and more and more of society to participate in the accomplishment of such order. Since this technique is so expensive, "it must pay off in money, prestige or force" (p. 105). This example shows the deterministic affects of technique, thus our investment in technique maintain its momentum in our society. The threat that there won't be a return on the investment requires "state intervention to control the effects of technical application" (p. 115), and things such as war are taken lightly as it is a necessary evil toward the perpetuation of technique. Hence, these are the social conditions which give rise to the project that favors the perpetuation of technique. Technique could be a neutral description of the emergence of society, but the fact remains that <technology> and its expressions have emerged as such within a specific context of technique. Technique is a meta paradigm.

For Ellul the project of technology as we know it, more than any other paradigm including capitalism is the defining structure of society. Ellul wrote that, "[he] was certain that if Marx were alive in 1940 he would no longer study economics or the capitalist structures but technology" (Mitcham, 1984, p. 57), and Ellul went on to investigate the matter in a way that he thought was similar to how Marx used to study capitalism. Capitalism was the gamble in Marx's time; now the gamble is technology. The importance of this is that technology is a framework or mechanism for behavior, however abstract, for all sorts of activities just like capitalism is now and religion had been in the past.

Technique is an essential characterization of modern technology, but as "artificial, self-augmenting, universal and autonomous" (Mitcham, 1984, p. 57). It is also non neutral in the sense that it eclipses other forms of negotiation. Ellul describes this technical phenomenon as a social manifestation which "resists incorporation into or subordination to non technical attitudes and ways of thinking" (p. 59). There is a reciprocal relationship leading to the perpetuation of technique. If a project has to resist certain values, then these values must exist and be threatening to the project; and awareness of this process asks us to look for the conditions which would promote the emergence of these unheard values. This is critical reflection.

Ellul's approach is characteristic of technological determinism but only in certain social settings. Responding to the social constructivist perspective, Ellul counters, "that numerous socio-cultural and economic factors are taken up into the technical process, and that at different times and places the search for the one best solution to technical problems can yield superficially different results, in no way undermines the comprehensiveness of the technical phenomenon" (Mitcham, 1984, p. 60). In other words certain societies have opted for the technological milieu. Ellul calls this the "technological bluff" whereby even the philosophy of the absurd is infected with the technical. Ellul concedes that it is the act of the gamble, the bluff, which is socially constructed, but the bluff itself is determined by technique. Ellul's determinism, however, has a purpose which is to leave room for the possibility of man repossessing his perspective and negotiation with the world. If there was no deterministic element to our understanding of technology, then there is nothing to do. This is as good as it gets; but, if we are encouraged to see certain patterns within our participation with technology that guides our behavior, then we can realize that we might not be truly free, and change would be at the forefront of our thoughts.

Objectives, and thus rules, are either tools of oppression or preservation depending on what side you are on; they establish an order. "A hierarchy can better be established when precise rules are specified which are based on the economic value of the human being" (Ellul, 1964, p. 225). Nevertheless, "economic" is a qualitative term which is merely that; it constitutes one way to classify the relationship among social relations. A hierarchy is also a model for analogous applications in many aspects of our lives.

The Technological Bluff is one of Ellul's later works, and we see that his fervor of technological determinism has been toned down a bit. By using the terminology of gambling, Ellul is saying that our relationship to technology is a risk, a challenge. This is not such a bad situation to be in since, if we think about it, "to make a wager, is to be free" (1990, p. 7). A bluff is analogous to a myth. Are we free to call the bluff, forcing technology to show its hand by challenging it with the totality of human experience? Nevertheless, in this game, all the problems relate to technical questions. Technique has a part in both political and economic problems. So, we are free to gamble, but we must settle for what we get; however, we are free to challenge the bluff. Ellul is implying that by asking different questions we could direct the answers to more favorable technological expressions the process of which is a project.

Any technological change is a gamble, in a holistic sense for society. Ellul uses the example of the computer to show that society was somewhat disrupted by this introduction. The computer is an epistemic filter. "We see at once that both individually and socially we are not prepared quietly to accept the computer…It is a challenge because it upsets not only our rhythm of management but also our way of thinking. It overtones our bureaucratic and cerebral approaches" (1990, p. 9). The computer affords us the possibility to think in the millions. It puts different systems together that were hitherto unimaginably compatible. The difference between the computer and previous technological innovations is that there are fewer choices in regards to accepting it or not. The computer represents networks which eliminate the previous networks. We could accept the computer without even being aware that we have. "To bring the [computer] into play is to challenge not merely social organization but our philosophical concepts, our traditional humanity, our morality" (p. 9). The gamble is that technique is not only a simple instrument in the service of human thought, "but the stake is also knowledge itself. Can we continue being able to know as humanity has known for centuries past?" (p. 10). The question that Ellul asks is not about the longevity of technique; rather it is whether technique will be brought under political control or whether technique will bring about a normalized society. Here, Ellul is advocating a certain type of social project—that of bringing technique under some form of control. If we challenge the introduction of a new technology, then we are calling the bluff. We are not powerless, as Ellul might have suggested in the past, to the effects of technological change; but critical reflection requires us to play an active role in questioning the effects of technological change.

Knowledge is always knowledge as such since it is the result of social relations; it is a product; but it is crucial that we are aware of the vestments it has been given by society or the implications which it carries in order to maintain an adequate level of criticism towards its effects. Ellul maintains that the new technologies of today do not alter his position in *Technological Society* since all new technologies fit nicely into technique. So, yes we can easily respond to the challenges of new technologies since they are all either directly or indirectly related to technique to which we are very well accustomed. Again, technique is the key to integrating social relations toward new ends as well.

The technological bluff is not easy to call since we are well conditioned to comfort and convenience through technique. The problem could be that we all too easily accept new technologies without proper censure from other standards—loss of critical reflection. <Technology> then is the context for experience and judgment. Technique determines goals for society. Society consciously applies a rational method towards an efficient end by avoiding goals that do not comply with the values determined by technique. Efficiency is decided upon by the minimization or maximization of values whereby technique mediates on behalf of society to determine which values are goals Mitcham, & Mackey, 1983). Technological values are goals. For Ellul the concept of <technology> is technique which is a society wide mechanism that determines action, interpretation, expectation, and organization. Nevertheless, technique is the result of specific social circumstances: commerce and war brought about by events following the Enlightenment and the rise of the Nation-State. Technique does not represent the totality of man's potential, but we can challenge it through a broader conceptualization of <technology> in order that we may have more favorable technological expressions which reflect the totality of experience within "life". The problem remains, however, that <technology> as technique is used as a foundation for the construction of values and social relations. Technique coerces rational thought and critical reflection.

E. Culture determines

Technology manifests as a particular type of social relation suggesting that different social relations could generate different technologies. Technology is that which distinguishes one culture from the next. Lewis Mumford is talking about shifting the paradigm behind technological expressions.

The type of <technology> we have affects social relations as well as technological expressions. Like Ellul, Lewis Mumford feels that we are more capable than the manifestations of culture and civilization which exist now within the confines of technique. Also like Ellul, Mumford's purpose is to establish our relationship to technology as deterministic in order to highlight our other potentials. His main argument is that "culture, not technology, should be considered the prime determinant of human history". The machine is the standard by which all else is measured. This standard began 5000 years ago. Basically, Mumford wrote about types of technologies: one stemming from power and the other harmony. The former, he calls monotechnics, and modern technology maintains the essence of this type of technology. Modern technology epitomizes the pursuit of power which is focused on "scientific intelligence and quantified production, directed toward economic expansion, material repletion, and military superiority". The totality of this activity is under a center of authority, a king, priest or military ruler (Mitcham, 1994, p. 43). The second type of technology is characterized as *polytechnics*. This is characteristic of a harmonious existence that addresses man's needs and aspirations "in a democratic manner to realize a diversity of human potential" (p. 43). It is almost as if Mumford is talking about sources of technological inspiration, implying that if we can shift the source, then material production will reflect this change.

Additionally *polytechnics* is a holistic approach to technology in that it reflects a pluralistic and harmonious existence with the environment and society. On the other hand, *monotechnics* is hierarchical with a unified goal while the latter is conducive to a collective of individuals seeking to promote their own identities. *Monotechnics* is a limitation to the diverse potential of humanity, which "restricts and narrows human life with a focus on power" (Mitcham, 1994, p. 44). Our version of this, technological systems, is the progeny of monotechnics. This is to say that our version of technology reflects one that is founded on power; it also plays a role in the formation of our identities. Participation with such a system restricts our development whereby our efforts are put toward the service of the goal or megamachine and not toward a more diverse development and holistic existence with our total environment. The megamachine is characteristic of a hierarchical and single minded goal which necessitates that our diverse energies, rather than be cultivated, are discouraged and focused toward the completion of a single goal, like an army or building the Great Wall of China. By making this comparison, Mumford is promoting a "radical reorientation of mental attitudes that would transform monotechnical civilization" (p. 44). Mumford is not advocating that we jettison all technology; rather, he is making the distinction between forms of technology that either jibe with human nature or don't. An additional form of <technology>, one that reflects the totality of our experience, would result in different technological expressions. There were social relations behind the megamachine; therefore, new social relations could give rise to new means of negotiating our experience.

It would seem that Mumford's determinism is abstract and universally applied. Our society is determined by a large scale technological system whereby the individual components are organized into a body that serves the hierarchy or the body itself. In addition, technological forms and innovation reflect this total relationship. This seems extremely authoritarian and to be the result of a dystopian image of civilization; but, what is enlightening is his vision of a common thread of our technological development extending back 5000 years. The vision that we have of ourselves encourages certain technological forms which in turn affects our social structure, and Mumford suggests that the vision we have of ourselves as tool makers stems from the original megamachines that humans were forced to incorporate due to historical conditions. In my opinion it is the recognition of a technological system, stemming from a certain type analogous to Mumford's megatechnics, which is deterministic in as far as other such hierarchies do not enjoy the prestige that the technological one boasts. Social relations such as standards of excellence, judgment and expectation are defined by this technological system. Polytechnics, on the other hand, promote integration with other systems of expectation. This suggests that there are types of technologies, and any one form is not absolute.

Mumford's *polytechnics* is similar to "soft technologies" which Thomas R. deGregori characterizes as: "(1) renewable based on energy income, not on depletable energy capital, (2) diverse, (3) flexible and relatively low level and (4) and (5) matched in scale, geographic distribution, and quality to end use needs...Soft technologies are flexible, resistant, sustainable, and benign" (1985, p. 164). Solar energy is an example of soft technology in that it expends little amount of energy at little cost and effort from the local environment. Soft technologies are not connected to a larger technological system, and therefore, not dependent on it. Likewise, *polytechnics* is in harmony with the local conditions, and it is more amenable to the social influences in order to address local concerns and its diversity of aspiration and is not dependent on scientific intelligence and "quantified production, directed mainly toward economic expansion, material repletion and military superiority" (Mitcham, 1994, p. 41). Monotechnics is formative of human identities as it converts human activity toward to the ends of one purpose. It excludes activities from the human realm that relate to morals and aesthetics, thus affecting the individual profile (pp. 42-43). As was mentioned earlier, it is not unheard of to include such realms in technological production. Metaphysics even has its place.

Recall that Mumford's principle thesis is that the essence of man is not his capacity to be a tool maker; rather, it is his ability to think, reason, and negotiate the use of symbols indicating that the instrumental rationale of technology is a limitation on man's existence. Mumford writes that:

> the human essence is not making but finding or interpreting. 'What we know of the world comes to us mainly by interpretation, not by direct experience, and the very vehicle of interpretation itself is a product of that which must be explained: it implies man's organs and physiological aptitudes, his feelings and curiosities and sensibilities, his organized social relations, and his means for transmitting and perfecting that unique agent for interpretation, language (Mitcham, 1994, p. 42-43).

Mumford reveals a huge area of potential that is not directly addressed by a technological perspective in so far as it embodies an instrumental relation to the world. If we were to recognize man more for his symbol organizational capacity, then this would allow other hierarchies to emerge along side of the technological systems. In other words, if we were to identify ourselves for different qualities, then <technology> and technological expressions would experience a corresponding effect. The process of this reengineering of identification is a project in critical reflection.

> Mumford summarizes his argument by saying that much of what we do is not:
> for the purpose of increasing food supply or controlling nature than for utilizing his own immense organic resources...to fulfill more adequately his superorganic demands and aspirations. The elaboration of symbolic culture

> through language was incomparably more important to further human development than the chipping of a mountain of hand-axes (p. 43).

In terms of the pursuit of power, technology is the means to man's aspirations, but it seems that the activities involved in the pursuit of power are subsumed under a system organized by symbols.

Symbols rank higher than the activities involved in the pursuit of power. Symbols have a potential that is without end. Recall the symbolic victory of 9-11. So why should their use be restricted to representing power/control structures? Could not a new understanding of who we really are manifest as new technological forms and provide us with a more complex and, perhaps harmonious, understanding of <technology>? For Mumford, <technology> continues to be the means, but that the social relations which have emerged favor technology as an end as well. It does not have to be this way, according to Mumford, and he points to technologies which reflect different social hierarchies which both participate more harmoniously with the environment and allow the emergence of other forms of hierarchies. A shift toward elevating the importance of symbols is a shift in the technological paradigm, an expansion of the scope of <technology> and a nourishing of the social relations required for new technological expressions. The social relations which promote our symbol-making potential need to be uncovered. Symbols require social relations to give them meaning. Symbols are also liberating in that they can acquire experiences like a juggernaut and they are flexible enough to account for any combination of experience we like. This is a project.

F. Society gives in to technology

Why do we readily accept technological change as a positive good? We are conditioned to do so. For various reasons, we have created the kind of world which favors being driven by a technological narrative.

Do we question technology or technologies to any degree that could alter its course? The answer to this question could help us reveal just how autonomous or determinate technology really is. Langdon Winner concedes that technology may be socially constructed but "that we have so socially constructed technology as to make technology the fundamental constructive influence in our world" (2001, p. 12). Another approach is to view technology from the perspective that it is *the* standard to which the social system corresponds affecting social relations at many levels. For much of the 20th century up to around thirty years ago:

> many economists, historians and social theorists argued that the development and use of technology followed a fairly linear path, that technological change was a kind of univocal determining force with a momentum and highly predictable outcomes…the belief that all societies move through stages of growth or development, linked to technological sophistication…achieving the kind of material prosperity and way of life found in the late 20th century (2001, p. 12).

Material technology, then is a symptom of a certain stage in development that was predetermined. This way of seeing the world, and progress, for that matter, is favorable to the production of technology. In response to this general and pervasive attitude there were the pessimistic viewpoints of this which were concerned with the "human and environmental costs of rapid technological development, as in the critical visions presented by Jacques Ellul's *The Technological Society* (1964), Herbert Marcuse's *One Dementional Man* (1964) and Lewis Mumford's *Myth of the Machine: the pentagon of power* (1970)" (p. 12). To the aforementioned writers there is a fatal element to technological determinism.

These authors write that the present conditions of society as well as the direction we are heading are due to our relationship and contact with technology. In fact:

Modern technology had certain essential qualities, among which one could list a particular kind of rationality—instrumental rationality, the relentless search for efficiency—and a kind of historical momentum that rendered other kinds of social and cultural influences on the character of social life far less potent. Such views were largely in opposition to the more popular view of science and technology as a neutral phenomena that could be adopted by a variety of societies (Winner, 2001, p. 13).

These authors wrote in protest to the detrimental effects of a technological determinism, or technology as a "self augmenting force" which has the power to direct society on many levels, even at that of the individual.

More recent studies however have revealed that technology is not a juggernaut but rather a body of options. The idea is that <technology> contains elements of voluntarism instead of determinism. Winner finds it ironic that in conjunction with the more widely accepted social construction perspectives that "in the world at large it seems increasingly clear that unstoppable, strongly deterministic, technology centered processes rule our times". He even states that the language of momentum, trajectory, and determinism is more prevalent today than in the 1950s (2001). Nevertheless, we choose to believe that technology is deterministic.

This new vision of technological determinism has come to influence the social constructivists who demonstrate that the nature of technology's presence is socially shaped and that society is given more direct credit for technology's overall design and use (Winner, 2001). At least for the moment, the viewpoint of the social constructivists has triumphed over that of the technological determinists; however, there is a:

common perception that social change is driven by necessities that emerge from the development of new electronic technology as from nowhere else....Among

> many economists, businessmen, and politicians there is an openly deterministic vision of technological change seemingly oblivious to the new vision of historically contingent, socially constructed, and endlessly negotiable technical options....From the president of the US on down people are inclined to describe the future as one dominated by the forces of computerization, globalization of production, and other insistent technology-rooted trends (pp. 12-14).

Winner's theory is that the notion of choice within the social constructivists' vision of technology is largely erroneous.

> Perhaps the exposition of a wealth of choices supposedly available to us was merely an academic exercise anyway. Far from embracing the promise of humane, voluntaristic, self-conscious, democratic, social choice-making in and around technology, a great many observers have-for reasons they find compelling and completely congruent with their lived experience-cast their lots with ideas that reject or even mock choice-making of that kind (pp. 15).

Why would this type of decision making emerge as the dominant form? Winner's argument reminds one of the phrase "if you can't beat them, join them". In this case "them" describes those who readily subscribe to the *technologicalness* of our future. "Them" can also be understood to be the standard for business, national growth and the sophistication of a nation. It is progress. The Third World will be battling this for generations to come. What is interesting about the consideration of the Third World is that these nations are now being referred to as emerging nations as if the type of participation that they will be experiencing in the near future were predetermined by the technological development of the first world. It is true that we cannot live in isolation from one another; nor can we live in isolation from the dominant trends that guide social relations, but behind all of this there is choice, the exclusion of which technological determinism is able to highlight. This suggests, then, the need for a society wide project and not one initiated with only localized aspirations in mind.

In another article, "Alternative Technology", Langdon Winner analogously comments that technology constitutes modern life. "During the past 200 years most of the institutions of Western society have been either consciously of unconsciously reconstructed to accommodate the operating conditions of new technologies". Perhaps even more compelling is his comment on how the pattern of our lives has changed. For example, he says that the automobile did not replace the horse; it replaced religion (Winner, 1977). This is fine, but why must technology replace any such aspect of life? Can't technology, as a type of life, coexist alongside other forms of life? The social relations that surround the use of the automobile have become more important than even the relations inspired by religion which causes one to wonder if there could be other technological expressions with an expanded foundation of values that could inspire a comparable set of changes.

Even though the automobile began as a means of transportation, a glorified internally combustible engine, it evolved as a way of life which created needs. The automobile is self generating in that it creates needs which perpetuate its position of importance in our society. These new needs have trumped others, meaning that other social relations have been left on the side of the road. We have a car culture much in the same way that we use to live our lives based on the teachings and promises of religion. In addition the car changes expectation.

It would seem that a new technological expression could be engineered to intentionally create other needs, perhaps ones that produce more favorable technological expression. Technology, it would appear, has become the manifestation of culture, success and progress. Winner's approach to determinism is lighter than Mumford's and Ellul's, but he asks why we have so willingly adapted our social norms and institutions to technology.

For Winner it would appear that <technology> is the model and framework which societies use organize themselves. This is especially true, as I mentioned earlier, since technologies affect our concepts which affect how we think and act. There is a relationship of agency here. Later I will discuss the intentionality within technologies in "Do Artifacts Have Politics?"

G. Inner logic as agency to technological change

Is there a logical connection between technological change and social evolution. In Heilbroner's first article on the inner logic of technological change, he opines that there can be no other way. Robert Heilbroner's well known article "Do Machines Make History" is largely an academic dissection of Marx's infamous statement that the stirrup gave us feudal society. His argument is that technological development follows a certain pattern, and exceptions to this rule are due to a society's material incompetence. In this pattern, technology imposes a certain structure upon society both in the labor force and hierarchy of work organization. Finally capitalism stimulates the growth of scientific discovery and technological output. Technology is the manifestation of a logical relationship between society and its technological development. It can be treated as a system of material potential and practices that represents how we are able construct and interact with the world at a particular time in our societal evolution. The universality of this experience can be challenged if we discuss technology in terms of its presence in actual artifacts.

Heilbroner states that the presence of technological innovation, as artifacts, is both the cause and the result of social conditions. As to the latter, Heilbroner is referring to a certain type of economic relationship which, he argues, is required in order for there to be a relationship between technological and social change. Technological production follows a logical pattern. To prove this, Heilbroner demonstrates that technological production does not skip—we don't go from the car to the rocket, for example. Also, the phenomenon of the simultaneity of invention suggests a predetermined path of technological invention among certain societies. Finally, social conditions must be ripe to welcome technological change (1996). To the extent that machines make history is valid but only under certain social conditions, meaning that there are many societies who do not count with the degree of technology of which the industrialized worlds boast. On the other hand, Heilbroner's theory lends credit to the idea that the evolution of social relations is a uniform process, as long as the societies in question are ripe for technological invention, and that the <technology> we have is inevitable and cannot be changed. For there to be a natural evolution of technological production and innovation, there needs to be a uniform concept of <technology>. The question remains whether or not "industrialization" follows a similarly determined path or could it be altered by social projects or if the conditions which gave rise to capitalism are absolute.

The influence of technology, then, must be regarded as a socially distinct phenomenon—for industrialized nations. As far as Heilbroner is concerned, technology is a mediator in the evolution of society and civilization. Heilbroner lists three criteria which seem to give rise to the existence of a world whose social relations are dominated by technology's presence: 1) capitalism is the ultimate stimulus for technological production and expansion of technology within the market system; 2) the policy of laissez-faire has instilled within us the notion of automatic technological expansion; and 3) the rise of science gave new impetus to technology (Heilbroner, 1996). Under such conditions, technology has been unleashed, and the social forces to check its advance are weak and rudimentary. This is because, according to Heilbroner, society is ill prepared to challenge the free play of the market and is ever more inclined to a scientific ethos. While this ethos is only viable under certain social conditions, the fact that Heilbroner calls it an ethos suggests that it has the potential of spreading into many aspects of society.

Heilbroner shows that technology will continue to be a determining factor in our lives but only as long as the social conditions permit. In a capitalist context, technological production is highly favorable; in fact, our needs become predictable as they are tied to technological development. This is so because our needs are increasingly related to technology in that if the social conditions within a society are right for a certain technological development, then the scientific barriers will be breached in order to fulfill the void (1996). The conditions of the world of high capitalism and industrialization are perfect for technological advancement, but there must be a demand.

The conclusion of Heilbroner's article, "Do Machines Make History", alludes to the real possibility that if we don't take an active, critical stance toward technology it will continue to influence our social milieu in a manner conducive to technology exclusively (1996). Again, as with Winner, we see how society plays a role in technology's reification and can, in turn, affect its role in society. This is not to say that society has played a passive or blind role with regards to technology; rather, the type of role that society plays is conducive to the development of technology. Our role is passive, according to Heilbroner, only in the sense that we have allowed technological development to assume the appearance of an automatic path or growth. In order for us to sustain an active and critical role, perspective must be regarded as a virtue given its value toward the promoting of critical reflection. The elevation of perspective could be the foundation for a social project, trickling down from academia. History as a construction or narrative is the issue. The problem, then, becomes that society adapts to technology's sense of automatic expansion; and society actually perpetuates this feeling by accommodating itself to meet the demands of technology and adapting its needs to stimulate technological growth. It cannot be argued that capitalism and competition promote technological production, but what is debatable is whether or not other types of technological expressions could emerge if there were another grand narrative competing alongside capitalism which could influence the emergence of other types of technologies.

Perry Anderson makes the argument that one of the fatal traits of our post modern epoch is that there is only one grand narrative—that of high capitalism. During the time period which we understood to be Modern, the early 20th century up until the advent of the Second World War, there were competing narratives which served to promote the hope of new horizons. This hope engendered within the population the desire to challenge traditional forms expressions which is why so many "isms" came out of this era. Technology, at this time, was not weighed down with negative baggage. In fact, technology was an inspiration. The airplane, the skyscraper, the radio, etc were truly innovative and these expressions inspired change in other aspects of life—but revolutionary change. In the era labeled as post modern, the possibility of revolutionary change is stymied since we have only one narrative with which to participate whereas during modernism or the early part of the 20th century we had many. For instance each narrative (the traditional land owning and aristocratic societies were still around, international socialism, emerging capitalism) was a distinct influence. Also, the combination of each narrative and their competition served to promote innovation and critical reflection. Now this combination of influence is severely limited since we only have one narrative with which to participate, and critical reflections is hampered by this restricted idea of comparison. By the way, we cannot avoid the one narrative we have left (Anderson, 2006). What Anderson's analysis suggests is that a different set of historical and social contexts, where economics is at the crux, would encourage the emergence of different types of technological expressions.

As an element in a historical narrative, technology is a key player in the greater game of economics. There is an inner logic which ties technological change to the capitalist market. Heilbroner feels that technology is the result of an evolutionary process whereby society has been inculcated with the idea that we are defenseless against technology and that we can do nothing to affect its progress. Technological change, argues Heilbroner, should be seen as a process that society determines through a more actively critical attitude toward it. But:

> the view that technology just changes, either following science or of its own accord, promotes a passive attitude to technological change. It focuses our minds on how to adapt to technological change, not on how to shape it....Instead of modernization being a process that just happens to societies, it should become a process that is actively and democratically shaped (1996, p. 59).

This idealistic view puts technology at the mercy of social actors. In terms of technological change, it is in the hands of society and not determined by technology itself. Heilbroner feels that if <technology> were understood to be a concept that included our interests along with a multitude of social variables, then we would be more inclined to influence its use in a way that reflects the aspirations of the society as a whole.

For Heilbroner machines influence history, but only certain histories, those of high capitalism and low socialism. He was later to recant his inclusion of low socialism since the loyalties to socialist countries is both to the centralized government and to technology whereas in capitalist countries, even the government gives way to the needs of technological development. The type of technology is different in Soviet Union as that of the U.S. Technological development follows a certain path (simultaneity, no leaps of tech development, predictability and social investment). Next, "the technology of a society imposes a determinant pattern of social relations on that society" (1996, p. 59). A technology determines the type of labor force as well as the organization of labor. However, "even where technology seems unquestionably to play the critical role, an independent social element unavoidably enters the scene in the design of technology, which must take into account such facts as the level of education of the work force or its relative price...These caveats urge us to practice what William James called a soft determinism" (p. 61). So, determinism is not so much an entity of agency; but it does suggest that a certain technology requires a certain social setting.

For example, the conditions of capitalism and the market gave us the inventor-manufacturer:

> The prospect before us is assuredly that of an undiminished and very likely accelerated pace of technological change (even though we wont know the political, social and existential changes). What seems certain, however, is that the problem of technological determinism-that is the impact of machines on history- will remain germane until there is forged a degree of public control over technology far greater than anything that now exists (Heilbroner, 1996, p. 65).

A higher degree of public control requires the cultivation of distinct social relations which would be an exercise in the expansion of <technology>. Heilbroner's argument suggests that a change in economic environment would result in a corresponding change in technological expressions—a project.

Despite his strong deterministic economic theory of technological change, Heilbroner is suggesting that the technological influence is not so extensive if society can alter its perception of <technology> in the way he is proposing. As it stands today, progressive societies, and this would include the developing countries, seem to be self structuring in order to promote technological development, but they are not structuring themselves in a way that could fundamentally contribute to technological innovation, thus making technology more of the same. So, for Heilbroner, <technology>, as a type of economics, is deterministic in as far as we credit it with the power to construct historical narratives.

As long as <technology> is the key to understanding social development, then it will be taken to be deterministic; but if there were a broader understanding of <technology>, our choices would not be considered as so much determined by technology because <technology> would include choices in addition to the ones determined by our current understanding of technology. In other words, <technology> would incorporate en element of liberation stemming from additional choices along side the choices which perpetuate the logical path of technological development that Heilbroner advocates.

H. Determinism as sublime progress

Nevertheless re-channeling the source of inspiration can result in a change in technologies. Power and inspiration that is not associated with technology is a truly human power. <Technology> is an expectation of the new and only type of progress witnessed through technological expressions. This process is cyclical and deterministic. The answer would be to re-conceptualize the purpose of technological expressions in our relation to the world. What is technology really "doing" to this relationship? How does technology characterize this relationship?

In "Toward a Philosophy of Technology", Hans Jonas maintains a holistic vision of the irreversibility and inevitability of technological change; however, he feels that there should be some ethical standards that respond to this change (Scharff & Dusek 2005). He writes that since modern technology touches on almost everything essential to our existence, a philosophy of technology is needed which houses all other branches of philosophy: science, language, history, social, political, thought, etc. He divides the philosophy of technology in to two sections: "(1) the formal dynamics of technology as a continuing collective enterprise, which advances by its own laws of motion; and (2) the substantive content of technology in terms of the things it puts into human use, the powers it confers, the novel objectives it opens up or dictates, and the altered manner of human action by which these objectives are realized" (Jonas, 2005, p. 191). The first considers technology as an abstract whole within which there are many systems of production, expectation and interest, and the second has to do with the concrete uses and their impact on our world and lives. Both of which can be folded into an idea of progress.

Prior to the advent of modern technology there was no concrete idea of progress. Progress was neither continuous nor constructive in terms of an idea which built upon itself. Modern technology lends itself well to such an idea of progress since it builds upon itself and creates need. Even expectation, which is a thing as yet unreal, is part of the process of progress. Modern technology is characterized as an entity which gives rise to steps in many directions, and "the innovators themselves expect, beyond the accomplishment, each time, of their immediate task, the constant future repetition of their inventive activity" (Jonas, 2005, p. 192). Modern technology spreads easily due to the fact that innovations tend to build upon one another and it takes advantage of the overall efficiency of today's level(s) of communication. The relation of means to ends is not linear but circular, and needs in one area of experience have a tendency to emerge in response to inspirations from another. For example, who would have predicted that a helicopter would be used to defoliate the jungles of Vietnam through the use of napalm?

There is expectation that one technology will be used in a variety of ways and that it will generate needs and the creation of new technologies; but this expectation does not have a material form; it is merely the expectation. Expectation without consideration of the consequences does not encourage critical thinking. This form of thinking, that of having hope without caring about the material form that the hope will take, is merely a form which could be exchanged for another; but we need to foment the social relations which can give rise to different forms of thinking. This is blind expectation without considering the effects.

Wanting the adjective of new without considering its subject is tantamount to wanting progress per se. Somewhere in this process is an ethical void.

Nevertheless as things are now, "new technologies may suggest, create, even impose new ends never before conceived, simply by offering their feasibility...Technology thus adds to the very objectives of human desires, including objectives for technology itself" (Jonas, 2005, p. 192). Technology opens up realms of experience that did not exist before, meaning that technology can combine areas of experience which are not necessarily related. In the case mentioned above transportation and defoliation are within the scope of the technological expressions of transportation and chemistry. Fortunately for technological production, our desires are many,--benevolent, as well as nefarious. Again, this is the result of wanting the *new* (adjective) without caring about the *thing* (subject) that is new. However, these new combination can serve to promote new avenues and possibilities due to the new social relations that are behind this combination.

Progress, as the result of combination as such, is neither linear or nor predictable. It "is an inherent drive which acts willy-nilly in the formal automatics of its modus operandi as it interacts with society". Progress as the rubric for the modern world is neutral; however, the effects of progress are non neutral. "A later stage is always, in terms of technology itself, superior to the preceding stage" (Jonas, 2005, p. 193). So, to say that progress is non neutral is to say that we don't question the *betterness* of a technology simply because it is new. Unlike traditional technology, modern technological change is not a state; it is a process and a goal.

On the other hand, one could make the argument that progress per se, acting through technological expressions, is non neutral as well since it preprograms the need for itself through technology. There is some intention here, a perpetuating force within technology, an internal engine. "To a considerable extent, technology itself begets problems which it is then called upon to overcome by a forward jump" (Jonas, 2005, p. 193). We also, thanks to technology, have a utopian vision of the world, an ever better life "instilled by the dazzling feats of a technological progress already underway and thus more a response than a motor of it" (194). However, we humans also have the belief that there is no limit to progress or that there is always something new and better to discover. We do not put a limit to what can be found or invented. This idea also explains the creation of potential problems to be solved that were not problems a generation earlier. Finding or inventing anything, but at what cost? In order to diversify <technology>, it would help to concentrate our attention on *how* we find and *what* we invent. <Technology> as an expectation of progress through technological expressions is a latent potential to advance into other areas or advance in a different manner. Advance is not an absolute term. There are various forms of this.

<Technology> as an enterprise of progress rather than a concrete state suggests a feeling of *neverendingness*. In fact progress seen this way is built upon a constant feeling of *arriving* to the goal and not the *arrival* itself. "The effect of its innovations is des-equilibrating rather than equilibrating with respect to the balance of wants and supply, always breeding its own new wants….Not only does technology dominate our lives, in fact, it nourishes also a belief in its being of predominant worth" (Jonas, 2005, p. 196). There is no suggestion of agency here; rather, this process is a simple cause/effect relationship. We rely on technology itself to formulate an opinion about it and to reflect upon its effects. In addition we let our needs be determined by technology from the outside and not from within, meaning that we should be the source of technological change and not technology.

Part of the reason why, according to Jonas, we need an all inclusive philosophy of technology is because we no longer imitate, or that which we create does not have a precedent from which to base judgment, expectation and validity. We invent phenomenon which stem from no foundation of understanding—invention for the sake of it and we are weak in guiding its direction. For instance, "electronics indeed creates a range of objects imitating nothing and progressively added to by pure invention". Our foundation for critique and interpretation springs out of the technology itself, and there is not distinction between wants and needs. Our needs don't originate in the human realm. The problem of wants and needs has reached a new level. Ends are invented, says Jonas, and they serve themselves. For instance, "communication engineering answers to the needs of information and control solely created by the civilization that made this technology possible and, once started, imperative" (2005, p. 199). Ironically our needs come from means. The question then becomes: is this a natural course since everything we do has a purpose, or can we have the need for technological expressions which does not spring from an expression of means? But questioning the source of need, the totality of human experience, is a project in critical reflection.

One way to address the above question would be to look at the overall purpose of our technology by re-conceptualizing our relation to the world. We are not making the world more habitable, as some technological expressions could do; rather we are extricating ourselves from the world. "In the pervasive mentalization of physical relationships it is a trans-nature of human making, but with this inherent paradox: that it threatens the obsolescence of man himself, as increasing automation ousts him from the places of work he formerly proved his manhood. And there is a further threat: its strain on nature herself may reach a breaking point" (Jonas, 2005, p. 199). Yes, we created this scenario; but we are not prepared to deal with its ramifications that are technologically determined. The philosophy of technology must serve to reunite man and technology. As it stands now, technology is pulling us away from our human nature as well as nature herself. This is the true essence of our technological expressions, but could a new conceptualization of <technology> have a positive effect upon technological expressions in the future? This is the role of the philosophy of technology. The ethical void left by unprecedented technological production could be a space, an opportunity, from which to guide technological expressions. This space could also be the proving ground for a new and more complex concept of <technology>, one that reflects the diversity of humanity which would include ethical considerations. At the very least, it is a space for critical reflection and comparison.

Reflection is the path back to understanding our total nature and potential. Another example about the potentials of technology affecting humanity and the world is seen in how technology affects the biological makeup of man. "If technological power is really going to tinker with the elemental keys on which life will have to play its melody in generations of men to come, then a reflection, in short, on the image of man, becomes an imperative more urgent than any ever inflicted on the understanding of mortal man. Philosophy, it must be confessed is sadly unprepared for this, its first cosmic task" (Jonas, 2005, p. 200). Technology presents us with an ever changing ontology of the human experience, but these revelations originate within a purely technological context and not the human. The survival of man, his image and the environment will be the key issues, so how can man continue to be free when these are priorities? Are we free to decide when the decisions are merely choices established by the technological?

Yes, technology has given us greater and more varied powers. We have a pluralism of choice, but these choices are within a very limited parameter. The determinism that Jonas refers to relates to the effects that the artifacts have on the creator and user. His determinism, due to the range of choices, is not homogenous in character; rather, it is multifarious in nature and acts upon our own susceptibility for spontaneity. "We, abstractly speaking as the possessors of those powers, are concretely subject to their emancipated dynamics and the sheer momentum of our own multitude, the vehicle of those dynamics".

We are not complacent toward solving problems; but we need to be aware of the long range problems that technology has set up in its sway. "The real problem is to get the well-meaning into power and have that power as little as possible beholden to the interests which the technological colossus generates on its path" (2005, pp. 201-202). This seems to be similar to Mumford in that if we re-channel the source of technological inspiration, then we will have new types of technological expressions; but again it is an exercise in reformulating the purpose of technology in our relationship to the world—a re-conceptualization.

Jonas analogously likens our relationship to technology to "all mankind in a lifeboat". This lifeboat, however, has a direction of its own. It is an odd direction since its trajectory is any which way and every way as long as it they are new. The lifeboat has a way of isolating us from other possible paths since it will lead us down paths that only the life boat can go. Once we are all in the boat, we cannot make rules against the boat. We have no choice as long as the power we operate comes from technology. We need a power—an ability if you will—that is disassociated from technological interests.

Ironically, what could save us is also the origin of the problem—our spontaneity which baffles all prediction. By this I am referring to how easily we adapted and modified our social relations to technology. "We should expect to be surprised and to see our predictions come to naught. But those predictions themselves, with their warning voice, can have a vital share in provoking and informing the spontaneity that is going to confound them" (Jonas, 2005, p. 203). To provoke and inform our technological whims is what preserving the fundamental concerns of technological determinism could do.

Like many others, the problem that Jonas sees is that technology becomes its own end. Technological progress is not linear; it is circular. Today our main goals seem to be the production and alteration of objects, "threatening any substantial and extra-technoscientific idea of what we are like and what life is for" (Scharff & Dusek, 2005, p. 171). "Substantial and extra-technoscientific" are new paradigms which could be encouraged with our own potential for spontaneity, but how can tools determine our identity? In order to determine our ontological constitution, we need to separate ourselves from technological interests. This can be thought of as an objective measure to study ourselves in a vacuum of experience.

The old questions of who we are and why we are here are certainly challenged by technological innovation. We have different answers to these questions given a new technological context. The appropriate role of the philosopher in such a scenario would be one on the look out for disaster, of any form, but we need to recognize disaster as it exists apart from technological terms. This is the power to which Jonas is referring (Scharff, & Dusek, 2005, p. 171). But we can also challenge technological expressions by questioning their general purpose. Jonas is stating that we need to separate the interests of humanity from those that serve to perpetuate the technological. At the very least, we should recognize the interests that reside purely within the technological. Once certain interests and social relations are out from under the technological spell, then they can serve as freer influences on <technology> itself.

I. An abstract form of determinism

Progress, as Modernity, continued. However, post modernism became the ultimate context for the unidirectional path of technology which served to blur boundaries of experience and reduce critical reflection. Perhaps one of the most subtle forms of determinism is also its most powerful—that of the association between the ideas of progress, technology and modernity. Once <technology> is characterized as a narrative, especially one which has as much clout and venerability as Modernity, then we run the risk of having a narrative that is without the benefit of our critical reflection. When we think of technology, we think of progress; and this implies collusion (Rip, 2003). A progress that is allowed to go unanalyzed or criticized can be disastrous. We begin to question unbounded progress with events such as the arms race and nuclear disasters, generating pessimism in technology or its direction, at least. Leo Marx debates the changed image of technology from one as a collection of discrete identifiable artifacts of the nineteenth century to systems of technology which produced pessimism in the 20th century. Once we include the ideas and social relations of pessimism, morals, and the negative effects of technological change as constituent parts of <technology>, then we are widening the concept so as to conceive of it as an entity which serves as a rubric for our collective social evolution. If we can be so pessimistic about something that had hitherto been so worshiped, then <technology> is insufficient for lack of influence, meaning that it is illogical for something to be reviled if it stems from us. This is like hating your own child. If the child began to develop along a path that was fundamentally contrary to one's understanding, then we could be pessimistic about reproduction.

Once technology is associated with the metaphysical qualities of progress, it can be seen as an agent of social change, or it can be seen as the manifestation of social change per se. <Technology>, then, becomes the standard of measurement for the nations of the world. In the Enlightenment, technology was seen as a means to and end. It was the vehicle of universalistic hopes of context free and certain knowledge, and it would have been inconceivable for the Enlightened thinkers to imagine the disasters of the 20th century, both in material technology and enlightened ideology gone mad in the form of nationalism (Marx, L. 1996). So, at least a rethinking of our idea of progress would facilitate a critical attitude to technological change. <Technology> must not monopolize our ideas of progress; if this is the case, then we are denying ourselves the opportunity for critical reflection.

Progress is an abstract concept; and, when one attaches technology to progress, technology in turn becomes reified as that which can move society toward the future, or technology becomes the future itself; but it is a future characterized by newness, or *fasterness* and, more efficient of the sameness. In other words, progress is a goal—one that is not concrete. Progress is a goal in the future and we do not criticize technological choice based on the technology per se, it is judged upon its attachment to progress. With the Enlightenment, the advances of science and the practical arts were singled out as the primary, peculiarly efficacious, agents of progress. Science and technology worked in tandem as partners in change (Marx, L.1996). Why couldn't there have been other elements involved in the process of influencing change? With science as the main engine for change, the goal was more clear, though highly abstract—the liberation of man; with the technological explosion of the 20th century, the goal is less clear.

Regarding this, the explosion of technological production has been compared to former totalitarian regimes and the exploitation of colonialism, whereby technology serves an economic function in the control of the globe. For many, Horkheimer and Adorno, and Weber included, the Enlightenment has engendered an idea, however, inadvertently, which became the seeds of self destruction which is basically a weakened sense of rationality in the face of an elevated sense of rationalism or even nationalism. Rationality is now one tracked; it is a type of rationality.

We have a limited idea of rationality and, even though the effects can be quite grand, the nature of these effects is consistent with instrumental reason. In terms of the State and forms of colonialism and capitalism, action is interpreted in the context of domination, either through politics or economics. For instance, "in complex postindustrial societies, fascism corresponds to the colonization of the life-world by the systemic pressures of unbridled global markets, wild technological sprawl, and … religious fundamentalism" (Borradori, 2003, p. 75). Recall Habermas' vision of reason as a rationally reached ideal (by way of inter-subjective communication) apart from one's own agenda, traditions, and norms. Reason creates its own norms. Reason must be freed to act against nationalist pursuits which take the form of the pursuit of global markets or military intervention. A wild technological sprawl implies that technology is out of control, thus supplanting other forms of development, but clearly blurring the original goals of the Enlightenment. But technological systems must and will expand due to the nature of the global market which requires that new resources, at an unlimited supply, by exploited. Are these the only goals that should be guiding technological change?

Later, technological production greatly outstripped science in its role as the emissary of progress. Technology now has a much more complex role in that it participates in many more aspects of society. "By the 1920s, "technology", no longer confined to its limited role as a mere practical means in the service of political ends, was becoming a flamboyant, overwhelming presence" (Marx, L. 1996, p. 253). Recall Anderson's comment (above) about how the technological advances of this time were spectacular and inspiring. The overwhelming presence is seen as technology began to assume an ideological context through progress per se. In the 1920's this ideology was a positive influence; later, as modernism morphed into post modernism, technology was the subject of interrogation. What this suggests is a primacy of technical goals over political and moral ones. Technology becomes the end and the means, as progress. Shifting the goals or questioning the very essence of the ends themselves could encourage the emergence of new and more favorable technological expressions.

If the justification of the ends is within the means, the ends themselves are not under scrutiny. This is comforting to the post-moderns since they can blame technology for the many problems for which the 20^{th} century is infamous. So, pessimism is not directed at technology but rather at its role as that which can unify many societal aspects. As post-moderns attack a broad-stroked interpretation of history, they are attacking the central role of technology as the major mover of society. Seen this way, technology is the force behind social change, and the post-moderns would prefer a more dynamic interpretation. In other words they want to give credit to other forces, thus recovering the forces that could, in turn, influence technology.

Post-moderns attack power stemming from universal concepts as well as systems which tend to restrict the relativization of perspective; thus, they attack large technological systems as these can infiltrate many aspects of society thereby making the concept of <technology> much more sophisticated. Boundaries are important in a post modern world, not so much for purposes of absolute meaning as for the need to contextualize meaning. Individuals need their own context and boundaries also promote critical reflection—a dying breed in our time. Individuals must carve out their singular identity. This is a difficult task in our age, especially given the interconnectedness of technological production. Electronic communication systems are a likely target. "This outlook ratifies the idea of the domination of life by large technological systems…In any event it reflects a further increase in the difficulty, noted earlier, of discerning the boundary between what traditionally had been considered technology, and the other socio economic and cultural components of these large complex systems" (Marx, L. 1996, p. 257). Technology has been elevated or directed by progress which has the tendencies to bring life's categories and human experience within one rubric. This is the loss of critical reflection. Technology is pulled from a force—the unclear area of the future and the new and the different—that has little foundations in what it is to be human. A way to recover or strengthen our idea of what is human would be to preserve the ontological boundaries between concepts, like that of between

<technology> and <human>. Technology can be a part of humanity but not the other way around if we want to maintain a sufficient level of critical reflection.

> The pessimistic tenor of post modernism follows from this inevitability diminished sense of human agency. If we entertain the vision of a post modern society dominated by immense, overlapping, quasi-autonomous technological systems, and if the society must somehow integrate the operation of those systems, becoming in the process a meta-system of systems upon whose continuing ability to function our lives depend, then the idea of post modern pessimism makes sense (p. 257).

The post modern criticism of immense and autonomous technological systems actually demonstrates the deterministic tendency of <technology>. As if by opposition, the recognition of a loss of humanity gives credit to deterministic arguments. The post-moderns have exposed <technology's> value by suppressing quality; but preserving the conceptual boundaries between humanity and technology would keep humanity as a standing reserve to be used toward making technological expressions more favorable to our existence as well as to keep its progress in check. The recognition of a type of progress is a mental confrontation with the real possibility that there are other types of progress that are being suppressed. Once this is recognized, then to combat it requires space for critical reflection whereby there are systems of expectation which reward such a challenge to <technology>. For example, the choice of publications could be arbitrated based on the inclusion of this element of questioning types of progresses.

J. <Technology> is not a myth

Progress can be deconstructed to see it as separate from its association with a grand narrative. This is to appreciate it for its parts. There is a rationality that is built in to the relationship between technology and progress which is also seen in our historical narratives, especially with the age-old rule that History is told by the winners and the losers go to the gallows or are relegated to silence. This rationality tends to obscure important contingency histories. "Rationality versus Contingency" by John Staudenmaier (1996) has to do with the complications that arise between viewing technological change as determined and technology as a "tangle of diversity". Maintaining a dual perspective is important if we are to preserve the possibilities of diversifying technological production as well as critical reflection. Unraveling <technology> from its position as the standard of change and recognizing it for its diverse inspirations is an important exercise because it can highlight further avenues of influence that might otherwise have been overlooked due to an unfair grouping of components as it is easy to line up all towards a single goal or coming from a single inspiration after the fact.

But technology as the concept stands now, the standard of Western progress, is part of a larger narrative. Technology, as we know it, is a conceptually charged term. It implies a certain kind of technology as well as a kind of progress. "Technology is defined as the application of modern Western science, and since science is understood to operate free from all bias in its pursuit of objective truth, technology must not be impeded by Luddite romanticism from continuing the triumphant march by which Western societies conquer nature" (Staudenmaier, 1996, p. 263). This viewpoint tends to ignore the perspectives which were lost or pushed out. There are failed alternatives which are not considered in such a rationalist view of history. Additionally, such a perspective tends to sideline the many unforeseen consequences of technology that could have been revealed if the alternatives were given more consideration.

John Staudenmaier takes a contextual approach to technology rather than a rationalist one. The contextualist approach is comfortable with ambiguities; whereas for the rationalist, progress is real. Historians of technology, "try to open the black boxes, to demythologize the ideology of autonomous progress that would render such detailed attention futile, and to restore the essential humanity of the design process" (1996, p. 272). If we recognize progress as an entity that is not autonomous and inevitably bound to one path then we are encouraged to look for the elements within society that keep it from being autonomous. Perhaps if we detach from the idea of progress as that which can unify and thus eliminate individual effort, we can explore means of finding alternative technological expressions.

Artifacts demand attention, not as their connection to a narrative of progress but as their expression of humanity. "As we pay attention to their history, unpacking the black boxes and restoring the essential humanity to the technical design process, these commitments unite us at a deeper level than our diverse readings of rationality and ambiguity" (Staudenmaier, 1996, p. 273). Technology tied to progress, as we know it, is not tied to human reasons or interests. A singular type of progress obscures interests. The essential humanity is a resource for diversifying <technology> and technological expressions. Perhaps such a perspective will help us see technology as the potential result of local needs, human reasons, and not as an agent which answers to progress. Again, we see the suggestion that a different perception of <technology> should yield different material results.

K. The different forms of technology within two distinct narratives

Why it is important to recognize determinacy? The two opposing ideas of 1) historical *narrative* vs 2) Historical *narratives* in the plural is a polemic whereby the competition within the latter encourages the liberation of human agency. Progress implies unification of purpose, but isolation of the individual. This sentiment is witnessed in Philip Scranton's article, "Determinism and indeterminacy in the History of Technology". Scranton sees technology, not as a rubric for a progress that is predetermined, but as part of a larger socio-cultural context that has no participation in society independent of human agency. There is no master narrative to historical construction. This article is about meaning and its construction. Looking back it is easy for us to see a grand narrative when explaining technological change, but this tendency obliges us to ignore individualized interpretations. For example, take the American technological explosion of the 19th and 20th century. On the one hand we have the American political hegemony characterized by infinite progress through technology and on the other the disenfranchised individual who is pessimistic toward the former, romanticism. It is easy to see determinism within technological change in retrospect—that is through historical analysis.

Sometimes it is easy to assume agency to technological change. In the case of an historical narrative focusing on American achievement, it is easy to fall into this trap. For example, "if half the world's cars were Ford in 1920, if American industrial might had turned the tide of the Great War, if its second industrial revolution giants were surging toward global leadership, it took little effort to shun an earlier sense of contingency" (Scranton, 1996, p. 145). Why do we exhibit such a tendency toward technological determinism? I would say it is because technological expressions, regardless of their form, share a common denominator which is their essential, aporiatic purpose. To attack this purpose, to challenge it, is the object of this investigation.

For much of the 20th century it has been favorable for Americans to accept technological determinism since technology was pivotal in contributing to the idea of the "American Century". Technology in this way is the foundation for progress, and the U.S. is its quintessential product. Technological determinism, argues Scranton, was for many Americans an article of faith and not the insatiate juggernaut that someone like Ellul claims that it is. If technological innovation was insatiable, that was taken as a good thing. This perspective began to change with such catastrophes as the Viet Nam war, failures in the space program and nuclear disasters. Such unforeseen tragedies opened our eyes to the many areas of our society that contributed to the disasters as well as to the contingent effects that reached far beyond technical failures (1996, p. 146). If we read technological history as a united and unidirectional trajectory, these social problems and poisons would be undervalued. They would be regarded as aberrations rather than as potential catalysts for technological diversification. A shift in epistemological approach could serve this purpose. If human agency, as the many areas of our society, played a role in the tragedy of technological evolution, then it can also serve to redirect technological expression and perhaps how we understand <technology>.

If we divest ourselves of any technological or sociological teleology, then perhaps we can sever the relationship between technology and progress and contextualize it in different terms, resulting in alternative technologies. Scranton's argument which is almost the antithesis to Heilbroner's mentioned above is:

> 1) that technological change proceeds in the absence of overarching rationalities; (2) that it proceeds along multiple coexisting trajectories, (3) that links between technical change and socio-political relations are intimate and underspecified, and (4) that stepping beyond reductionist teleology reveals an array of intriguing silences in the history of technology. Issues of product variety and the construction of sameness exemplify the conflict between diverse forms of industrial performance and a conjunctural ideological campaign to define efficiency (1996, p.163).

This is a movement to highlight the importance of diversity and division rather than the inertial of technological trajectory. Highlighting the intimate relations between society and technological change would open up other avenues of change.

At issue is the need to place problems in new and more complex frameworks such that more individual perspectives and problems, apart from those that are linked to a linear technical-progress narrative of history, would be given importance. This type of consideration is one of cooperation, and it promotes harmony as both the ideals of quality and collaboration are celebrated. "This evolving tapestry of context-framing actions and action-inducing contexts generated a technological momentum different from that to which Hughes refers, for it was open, non-systemic, locally determined, and as much dependent on social relations as on engineering refinements" (Scranton, 1996, p.154). This is an approach based on the individual and the contingent that is commonly left out of historical investigations. This is postmodern to the bone.

On the one hand we see a more whiggish interpretation of technological change that orients all elements to appear to agree with technological change. However, technology is the result of innumerable social contingencies. <Technology> as a unifier, historically justified, affords technology an objective veil which puts it somewhat above reproach, like Science itself. In addition, the proved methods of science have instilled in us an idea of continuity in technological change. We feel comfortable with this. Public opinions of technology do change as Smith put in his essay though this is usually after the fact; therefore we might be able to look to the individualize public for a redefinition of technology.

In a historical context, standardization seems a logical conclusion of efficiency, efficiency or coherence in explanation. Sameness is a weapon in economics and the market systems. Plus, it serves to maintain order, especially at the level of the ideological. An idea of progress as that which unifies and directs our study of technology will tend to guide us away from any alternative approaches. But why does the tendency to view technological change with such over-arching potential to unite all elements under a single umbrella?

Rather than fundamental explanations, Scranton argues that there are reciprocal relations and that technological inspiration can be better sought in the conjunctural complexities. Such a revamped perspective will also help us shed old myths in order to make room for new ones (1996). Again, Scranton is referring to a relation between a social perception of <technology> and its corresponding reality, both potential and real which, by the process of individualization, could generate a more democratic concept of technology. At the very least, such an approach encourages critical reflection, and it downplays any favoritism of technology being the incarnation of a grand trajectory or narrative.

L. Conclusions

Concepts determine our thoughts and our actions, but they are also the result of empirical circumstance, meaning that the properties of agency ultimately reside within society—as its values and expectations to the exclusion of others. For instance if we conceptualize nature as a pool of resources for our use, then we will be encouraged to dominate, modify and control nature to that end. This type of activity was encouraged due to the historical exigencies of the times: competition between nation-states, colonization, and then, capitalism (characterized by consumerism and production).

If we have a limited idea of efficiency, well then our applications will reflect this limitation. If we want to diversify and make more complex a concept, we must uncover the social relations which give rise to the fuel of diversification. In other words, the project is about expectations and systems of negotiation. We need to encourage the social relations which enable us to utilize all of our resources as a society.

The danger of the existence of technological determinism is also its greatest epistemic virtue. On the one hand determinism is a phenomenon that acts as a form of <technology> constructing value systems and ordering social relations. On the other hand, the recognition of these types of constructions (social relations founded upon a kind of

<technology>) encourages one to seek out the other types of constructions. For instance <technology>, as that which is founded upon certain values, has determined a certain kind of progress that does not consider effects as we are not encouraged to judge them. If the effects are consistent with our notion of progress, then this is how things are. We just know that to produce something is good, and its use is eminent. The technology will be applied, and this process is part of progress since something new is an unquestioned good. Our understanding of progress is related to historical circumstance. The knowledge that our idea of progress excludes values and restricts social relations forces us to search for other forms of progress.

None of this is meant to suggest that we are not always unaware that society adapts to the values and social relations determined by <technology>. Sometimes we embrace it, as is the case with the market or certain political motives; and other times we are blind to it since the term technological is almost synonymous to logical. This is the case since technologies affect our conceptual construction. We don't easily question concepts; usually concepts do that for us. <Technology> has affected concepts in that they now reflect technological values and there is a logical relationship between them. The logic, however, has proven to be based on power and domination such that we are calloused or apathetic to the negative aspects of these concepts.

<Technology> has translated these ideas into invisible determinants of social relations to the point where we cannot judge them for what they are. <Technology> is founded upon certain concepts. These concepts are now good. They are well seen or not seen, and they are behind our every interpretation and contact with the other. Nevertheless, knowing this mechanism or relationship leading from these concepts to action is a step toward searching for other concepts upon which to base our social relations. The diversification of our conceptual foundation from social relations is an exercise in critical

reflection. As things are now, technological expressions do have agency in that they, as mentioned earlier, affect conceptual construction. Our continued use of the concepts further perpetuates this relationship, giving the appearance of hard determinism.

That <technology> is autonomous or that it has a sense of agency is still up in the air; however, it does exhibit homogenizing qualities in that it is able to determine what is rational in addition to being able to standardize value systems and social relations. To do this requires the participation of society which constructs institutions and organizes social relations to perpetuate a certain kind of <technology>. Organization does not have a predetermined form; there are many ways that something can be organized. Recall Mumford's mono versus poly technics in terms of an invisible <technology>. Ellul's technique is an invisible technological expression applied on a civilizational level, and society has adapted to this model.

Technological determinism shows us the limits of <technology>, and knowing the limits of <technology> provokes comparison and critical reflection. Our models for <technology> are a limitation on its expressions; man's potential is the source of expansion and diversification, but he must be liberated from certain paradigms in order to fully diffuse his influence. Social relations need to be reoriented so that new expectations, ones rewarding man's full potential, can emerge rather than ones which perpetuate a limited concept of technology as well as our limited participation with the production of limited expressions. Concepts guide our cognitive processes. An expanded conceptualization of our idea of technology would enhance our participation with the production of technological expressions since this would promote critical reflection—a project.

The events of the 20^{th} century have showed us the limits of the Enlightenment as it was progressing which is not to suggest that it could not be continued in another direction under a new tutelage—a project so to speak. The Enlightenment inadvertently served to equalize subjectivity in its efforts of rationalization through the construction of hierarchies. However, a project designed to give new value to the subjective or individual point of view might prove to be that which is needed to revitalize the project of the Enlightenment. This is the worship of perspective which promotes critical reflection, and the interface between the subject and the other is <technology>. But as long as we are determined by our own faith in the new, we will not have this critical reflection.

With the last few authors (Marx, Staudenmair, and Scranton, for instance) that we have looked at, we see a trend in determinism which is moving away from viewing history as an entity that is motored by any single motive or trajectory. So, these authors are attacking <technology> as a measuring stick or as a label given to historical evolution—a tendency to see social evolution, history, etc. as marked by technological development. These authors see technology as the manifestation of society and the effects of this form of <technology> are witnessed at the level of the individual. This is related to an approach known as soft determinism which considers that technology may not be deterministic per se, but it exhibits certain qualities which have individual effects throughout society. Soft determinism is more subjective and less universal in its treatment of the idea of change. <Change> emerges in the presence of a technological expression or it can even be witnessed in the origin of change as the causes are much more subtle than they were with the technological determinists.

If critical reflection is encouraged, new social relations will emerge which give rise to new perspectives and technological expressions. In sum, the pure technological determinists approached the issue of technology from a meta level, the conceptual level; the soft determinists, on the other hand focus on the actual relationship between technology and the many aspects of society. Let's look at this now.

As far as the possibility of a project is concerned, it would seem improbable that

<technology> could be expanded due to the overpowering historical forces working against this possibility. Nevertheless, this is looking at the issue from the perspective of a grand narrative and its strong element of determinism as perpetuated by this specific type of society.

VII. SOFT DETERMINISM

Introduction

At a more local level, on the other hand, we will see the possibility for the emergence of a project geared toward expanding the scope of <technology>. Much like technological determinism is the result of historical circumstance at the theoretical and conceptual level, soft determinism shows that our individual artifacts are also the result of elements tied to historical demands. However, the choices we make, in terms of the material development of <technology>, are not necessary; rather, they were the result of certain interests being prioritized over others. We will see that these interests, values and expectations are arbitrary, meaning that others could have been employed. Due to considerations of power distribution, the possibility of a project seems unlikely, though not impossible.

A. Technology and Modernity.

Determinism becomes a way to negotiate the set of social relations and choices. Rather than over arching social theories of determinism, as was the case with Ellul, Mumford, Habermas and Marcuse, the advocates of soft determinism focus on the intricacies of technological choice or the *actual type* of determinism. There is human agency behind this choice as we adapt our social relations to this type of <technology>; however, there are effects that are inextricably related to the technologies themselves which are at the heart of our social relations. Whereas the philosophers of hard determinism associated social change with an inner logic of technology, either by way of artifacts, frame of mind, or systems of values and expectations, the proponents of a soft version of technological determinism merely shift the origin of the deterministic qualities. No longer within the technology itself, the deterministic qualities are within the type of choices that a society makes which perpetuate a technological society. For instance, technology has come to replace many of our former symbols that were used to shape a nation's identity. What is the essence of a technological society? Many authors of the soft-determinist school claim that it is founded on a notion of a special type of progress—material progress (Merritt, 1996).

The issue of technology's presence in our society has been approached from the possibility that it is a socially shaped entity as well as an autonomous force which has the power to determine its social surroundings. Either way, technology is so pervasive in our society that it gives the impression that it is a viable force with a life of its own. Obviously, any degree of technological determinism would promote the belief that technology plays a more active role in our society; but even a social constructivist perspective would acknowledge that the importance of technology in our society dictates that we must cater to its presence in ways that serve to maintain its status, however specious, as a viable entity. We help maintain its power and perception as a living entity by our actions and the structure of our institutions. Since we help maintain the force of technology, soft determinism seems to be a worthy approach in dissecting technology's ontological anatomy.

People of modern society accept technology's power to change the way they live, and as an agent of change, technological power occupies a privileged place in modernity. We are comfortable with narratives that attribute our knowledge of the world and history to some technological feat or artifact, like the compass. For example, "newly invented navigational equipment is thus made to seem a necessary condition or cause of Europe's colonization of much of the world" (Smith, M.R. & Marx, L. 1996, p. x). In other words, our history is typically a focus on the material artifacts and the changes if effects. This sentiment is still true today through technological determinism (the X machine put the riveter out of work, etc.).

There are various degrees of determinism that survive in academic approaches as well as social forms of thought.

> At the hard end of the spectrum, agency (the power to effect change) is imputed to technology itself, or to some of its intrinsic attributes; thus the advance of technology leads to a situation of inescapable necessity...*technologized* our ways to the point where, for better or worse, our technologies permit few alternatives to their inherent dictates. To optimists, such a future is the outcome of many free choices and the realization of the dream of progress; to pessimists, it is a product of necessity's iron hand, and it points to a totalitarian nightmare (Smith, M.R. & Marx, L. 1996, p. xii).

That such perspectives persist demands, at least, that we give attention to the possibility of the existence of determinism, manifesting either as an entity acting on all of society or as a force which has specific effects on individuals, groups, etc.

The problem with hard determinism is that it raises plausible questions of agency. "The soft determinists locate [technology] in a far more various and complex social, economic, political, and cultural matrix" (Smith, M.R. & Marx, L. 1996, p. xiii). The soft determinists might give credit to a growing credence throughout society to the idea of determinism.

> Thus agency as conceived by soft determinists is deeply embedded in the larger social structure and culture—so deeply, indeed, as to divest technology of its presumed power as an independent agent initiating change....In that case, technological determinism has been redefined; it now refers to the human tendency to create the kind of society that invests technologies with enough power to drive history...People seem all to willing to believe that innovations in technology embody humanity's choice of its future (Smith, M.R.& Marx, L. 1996, p. xiv).

This implies that choice is not so much an expression of free will as it is a manifestation of freedom within certain parameters. The actual agents may be human, but their weapons are technologies. Their weapons are also social maneuverings which are also designed to keep technologies in certain social realms. Here again, technology is at least the line of division. Are there not ways to test the parameters? A shift from hard to soft would be a way to expose perspectives and social relations that could lead to a broader understanding of <technology> thus improve our dialogue with technology. This shift is a way to uncover perspectives since soft determinism touches upon individual aspects of society rather than the broad narrative of society itself.

B. Our fate tied to technology?

But by reorienting our focus and values that we apply toward technology we could have a positive effect on technological expressions. In her article, "The Political and Feminist Dimensions of Technological Determinism", Rosalind Williams argues that technologies, in particular technological systems, reflect authoritative entities to which many social groups are excluded. Other perspectives, she argues, could reveal a closer relationship between the social and the organic (1996). She does not wish to perpetuate the belief that technology is inherently rational "because it obscures the fact that technological systems can be, and often are, designed for authoritative purposes of control and domination" (p. 217). Simply put, we need to see the motives behind powerfully determinative technologies since they are excluding social relations and perspectives. They are also dulling critical reflection. The reason for this is simple. Technological systems are creating a hybrid environment where the natural, social and technological are indistinguishable; therefore, we must be aware of the real possibility that technology, while not necessarily determinative, is affecting the fate of humanity more and more. Again, boundary maintenance is a way to promote critical reflection and comparison. Altering perspective to highlight the relationship between the social and the organic could be the constitution for a social project designed to diversify technological expression. To do this would require a cultivation of the social relations which reward a closer relationship between the organic.

Williams uses Lewis Mumford's comparison between authoritarian monotechnics and the more natural and organic polytechnics to show that histories can co-exist and that our relationship to nature is not just man over nature; rather this distinction is much more arbitrary. To see change or history as the result of pure determinism is to omit other interpretations of history. For example, "while women have played highly significant roles in the development of democratic biotechnics, they have been routinely excluded from the creation of and operation of authoritarian monotechnics". This is important because it recognizes "the inextricable relationship that exists between the social and the organic, between human and nonhuman nature" (1996, p. 217). If the relationship between man and nature were as simple as Mumford advocates, we would not see the complexity of the problems we have as well as the diversity of solutions that technology can be enlisted to fulfill. Williams' position implies that if more social roles were included, those of women for instance, they could have a positive effect on technological production. Encouraging the participation of various perspectives (of women for example) is a way to encourage critical reflection and to challenge technological expressions.

Williams begins her discussion by illuminating the confusion surrounding the definition of technology. For her, technology is a set of artifacts, power relations, and systems. Today we have the tendency to think of technology, not as specific artifacts, but as systems which have "tended to expand imperialistically into social, cultural, economic and political domains. Even the non human natural environment may be incorporated into the technological system as a resource, as a sociologized actor (which cooperates or resists) or as a dump site" (1996, p. 218). The point is that human agency pervades the technological relationship to the world, and it is the job of philosophy to put the initial motives behind technological change and innovation under the microscope. More actors should result in a more democratic participation with technology thereby diversifying its conceptual base. What we are talking about here is the creation of epistemologies which is properly done in Academia.

In her analysis, Williams draws upon Mumford's idea that machines were originally organizations of people coerced into meaningless labor with threats of violence. Today, we have replaced the king with a technological system, perpetuating the image of technology as a driver of history. "In modern times the center of authority lies not in a visible, all powerful king, but in the system itself, invisible but omnipresent" (1996, p. 228). More often than not, writes Williams, the system as deterministic favors a masculine perspective and producers rather than the users. The system is capitalism, and systems like technologies, affect conceptual construction. Of course a machine is the manifestation of power, but power does not have a necessary essence or perspective. In other words, power can be the result of community, for example, as well as something like a king. Finding these new origins of power is done by uncovering lost social relations and perspectives thereby expanding <technology>.

In the context of modern industrial capitalism there is an emphasis on rationality, regimentation and order which through technological progress can shape humankind's identity as well as society's progress in that fashion reflecting that rationality. In such a system, we feel that economics, as the maximization of fortune, is the mechanism which provides us with space to achieve our individual ends. This seems to imply a very rational relationship between technological development and our individual needs. Lewis Mumford, however, asks if there are not political agendas behind technological development.

"Mumford raises the possibility that the language of rationality might serve as a cover for political purposes of control and domination—motives that may or may not be congruent with individual goals of acquiring fortune" (Williams, 1996, p. 230). The language of rationality, in this sense, is a meta-technology serving a double purpose. Goals would certainly depend on the individual ones of those in power and the common interests that they may have. Rationality obfuscates individuality.

For Lewis Mumford, the stability that is maintained as mono-technics is system is based on centralized power and not one that operates as a thing that is multi-centered. This can be overcome, he argues, by casting off the myth of the system. Williams comments that this is quite difficult since the authoritative systems are very real especially when the purpose of the system is to "deprive human beings with the liberty to survive outside those systems" (1996, p. 229). This would be like going against the grain or biting the hand that feeds you. The myths that drive entire systems can be traded away like baseball cards.

By way of example, one can make an analogy between a myth and a political agenda. "Mumford's dualistic theory, crude as it is, challenges us to consider the political agendas behind technological development, and in particular to consider the irrational motives of those who build enormous technological systems" (Williams, 1996, p. 229). Once a system has failed, as did the Soviet Union's, it becomes easier to see the motivations as "an irrational drive to construct all-encompassing systems of control" (p. 231). The mere irrationality of the Soviet movement seems based on paranoia. "Communism was an attempt to organize all of life according to a single model, and to subject it to central planning and control regardless of whether or not that was what life wanted" (p. 231). Communism was a project that failed twice. But it did enjoy a decent span of time suggesting that projects at the civilizational level are possible. We do not have to wait until the system fails. Because the myth of communism evaporated, we can now question its contact with technology. Can we not also question technological change based on another totalitarian concept, that of the "invisible hand" of capitalism, let's say? Communism is an invisible, technological concept that operated on a global level. It affected many smaller technologies and social relations.

Williams quotes Vaclev Havel who feels that we can overcome this uncomfortable control by embracing more democratic values over authoritative ones. Again, there is reference to tension. "Human beings must come to value democracy over authority, multiplicity over centralization, personal life rather than impersonal systems. Things must once more be given a chance to present themselves as they are, to be perceived in their individuality. We must see the pluralism of the world" (1996, p. 231). In a world where the human and non-human constitute a hybrid environment, we cannot pretend to establish systems that are totally separate from nature (as in conquered nature). Changing our value structure would affect technological expressions, or it would at least diversify it with a shift in focus from, for example, unification to individualization. But the social relations which feed a shift in value systems, from authority to democracy, need to be encouraged and rewarded.

Like the Soviet regime, Mumford writes that authoritarian systems are inherently unstable, "whereas modest but durable bio-technics accepts the interdependence of human and non-human nature" (Williams, 1996, p. 234). He is talking about *types* of material technology. "Our population and our technologies have reached such a scale that they have intertwined with natural systems...Is global warming a technical event or a natural one?" (p. 235) The same question could be asked about a nuclear holocaust. It seems that we need a less hegemonic view of technological systems, one that does not exclude the human element, or at least one that excludes as much of the human experience as possible like the bio-technics which is characterized by an interdependence. For instance, as the essayist

Wendell Berry stated: "We may choose nuclear weaponry as a form of defense, but that is the last of our free choices with regard to nuclear weaponry. By that choice we largely abandon ourselves to terms and results dictated by the nature of nuclear weapons" (p. 227). Here we see how the process of decision has been turned over to a system of decision making, and the human element has been left out; this is the value of soft determinism as an epistemology toward <technology>.

The fact that we cannot distinguish between natural and technological problems demonstrates the need to, at the very least, alter our focus; but we also need to recognize biotechnics and its close relationship to the environment. "This new hybrid environment may not determine history, but it will profoundly and decisively affect the human fate" (Williams, 1996, p. 235). Authoritative technology obviates other avenues or resources. <Resource> is less complex and potentially less useful when authoritative measures are taken to guide technology. Resources can be found simply in a project that exchanges one type of technology (mono-technics) for another (bio-technics). With the latter, we are able to see better the complexity of the origins of the problem, the problem and the complexity of our relation to it.

Soft determinism is about the social choices behind technological expressions. It would seem that our choices within a bio-technics system would be more democratic, dynamic and complex in their nature since authoritative systems serve themselves. A system of bio-technics serves the much more complex and liberal relationship between humans, non-humans and the environment. It would also promote critical reflection.

C. The double edged sword of modernity as modern technology

Modernity and technology is a relationship as that which unites us as well as that which excludes local conditions and social relations. However, identity can be constructed through local reactions to Modernity. Technology and Modernity are inextricably interconnected, and a philosophical study of technology would add further empirical material to the understanding of Modernity. In other words, through the study of technology we are able to broaden our conceptual horizon of modernity. A slice of pizza suggests the size and composition of the whole pizza, and the former can be thought of a micro perspective while the latter a macro approach. Combining the study of modernity and technology studies gives us both a macro and micro level approach to "our world with its modernist projections, its technological achievements and its vulnerabilities" (Rip, 2003, p. 360). We can see global in the local. With this tandem approach we see real problems as well as the "concern with the dominance of modernist regimes and what, rightly or wrongly, they exclude; and thus with the possibility of lateral views, or ruptures, as these occur or are sought after. In this way, reflections may create openings for transformations" (p. 360). This last refers to the idea that there is no one formula for Modernity. It has versions, and it is constantly reconstructed. Transformations are also new social relations and perspectives which can function to expand <technology> and its expressions.

The recognition of the possibility that there are various forms of Modernity encourages critical reflection. This is a project which requires the uncovering of perspective. Arie Rip refers to the idea of a window in order to create a bridge between the *localness* of technology and the *universalness* of modernity. "The local and specific practices allow us a view of what is of wider significance. Our view is of the global as it appears in the local and is refracted by it (in turn, the global structures the local)" (2003, p. 361). The soft determinists help us find the perspectives which are affected by or can affect <technology>.

A specific technological expression can also serve as a window to the larger modern world. For instance, in 1903 Osaka Japan, at a technology fair, the modern Western World and its ideological baggage were seen through the steam engine. To the Japanese, technology was portrayed as the key to power and a more secure future. The train represented these goals, and we are privileged to see the specific reaction of the Japanese people at this time. In an analysis at the local level, the Japanese were willing to make certain cultural sacrifices in order to achieve national security. Yes, they did see the Western world through the train as it carried values and an entire system of technological production and cooperation, but they also saw spaces of opportunity that would allow them to make this technology Japanese, so to speak. This is a way to see technologies differently which, if applied to other situations, could be used as a model for altering technology's course so as to make it more agreeable. The concept of <technology> then would have to include this flexible, interpretational element. Technological choice, it would seem, has a cultural element.

These windows (through a specific, localized technology) show us new perspectives. They show a co-construction of modernity and technology, thus implying the idea of *multi* modern technologies. "If we use the right windows, we can see something interesting and important about technology and modernity that we had not seen before," (Rip, 2003, p. 362), while at the same time preserving a common thread with the greater issues of modernity. Windows also show us unexpected anomalies which illustrate the co-construction of technology and modernity; but more importantly they reveal that there are, in fact, many Modernities. This is an approach to see openings for which technology is called upon to fill. Here is the opportunity to change technology. <Technology>, as a concept, must be encouraged to exhibit this flexible quality. Could there also be many <technologies>? Soft determinism provides us with the means to see the individual effects of technological expression which can then be used as resources for the expansion of <technology>.

The very idea that there could be many versions of Modernity is a drastic paradigm shift. It does not ask societies to catch up; rather, it rewards them for their own contribution. This is a mega project—a conscious denial of the hegemonic view of modernity and a celebration of multi-perspective. These are resources for technological expressions and the social relations and perspectives which give rise to these resources need to be encouraged—a project.

The relationship between Modernity and technology can be seen in opposing empirical situations and their technologies. For example, one can see modernity in hierarchal and functional systems of an IBM exhibition and see post modernity in the fluid and imaginary technological demonstration of SONY. These local exhibitions allow us to see a wider significance as they indicate boarders between Post modernity and the twilight of Modernity; plus they basically define, by example the larger movements. We see connections between local practices as they reflect the larger trajectory of Modernity; thus, there is a co-construction between modernity and technology which allows us to view the idea of agency in a new light. Agency, in the modern sense, implied knowledge of heading toward a set goal. Agency is now an academic tool which, when used, shows that one is aware of the intricacies of how humans and their technologies are tangled up in the same fate. Local technologies show this link between humans and their technologies as well as the link to the larger goal, though now this goal is not pre-set. It is more of a goal that is the result (Rip, 2003). Our means create ends.

The link between technology and modernity is also strangely recognized in the common belief that modern technology will always create problems at the cost of the benefits it brings. This is technology's role in modernity. It brings progress, but it also creates collateral ramifications. Nevertheless, technology has the lead part in modernity. Technology's role in modernity is specific, however, in that it is oriented toward finding solutions to problems that we will encounter in the future. Here, we see a fixed link between modernity and technology as they are geared toward the unknown future. This is the essence of modernity. It is a process whose keel is always pointed toward the future (Rip, 2003). If an entity is oriented toward the future (an unreal entity), then it is natural for the local and present conditions to be ignored. These social relations and perspectives are sacrificed.

There is also something pathological, almost fatalistic, about the relationship between technology and modernity. For instance, modernity supports novelty simply because it is new, and technology is the vehicle to obtain the new. Once the new is achieved, then both modernity and technology are left to reap the benefits, suffer the costs or called upon to fix the problem. On the other hand, the idea of co-construction of modernity and technologies could go either of two ways. One, it could be argued that modernity is fractured and thus powerless by local technologies. Two, modernity could be viewed as constantly under construction. Nevertheless, what remains important is that studies of this type keep us open to the alternatives. For example, in some fields, such as agriculture, adherence to locality is better; while in medicine the global is the desired approach. The juxtaposition of modernity and technology can also reveal tensions within society as highly rational technical systems are superimposed over local conditions (Rip, 2003). In other words, some fields are more appropriately approached from the local perspective and others from the global. The space for analysis must be outlined and defined in terms of which social relations *can* be encouraged to surface.

The following is an example of the feasibility of including one or the other approach. The abstractness of this approach is part of its value. For one, Tom Misa talks of the importance of spaces over action. "Spaces [in the cracks of modernity] offer opportunities for agency and for a variety of agents". The agency within the cracks, in turn, shifts our understanding of modernity. And for another, co-construction is happening all the time and the actors "will anticipate and reflect and act strategically all the time" (Rip, 2003, p. 372). Through their design efforts one can divine elements of the local and the universal. The idea of multi modern technologies begins in the design. "Such design efforts should not be modernist, starting with a concept or prototype that must then be implemented. Designers, in particular in information and communication technology, but also in other technologies and projects, have been learning—often the hard way—interactive design that includes input from projected users is very important" (p. 372). Considering projected users is part of a project in the search of social relations and perspectives. By acknowledging the project users, one is recognizing the social relations and perspectives behind them.

The idea is that understanding the co-construction of modernity and technology will help us understand better where we are going and where we could go. Again, this seems to be maintaining a more democratic approach to technological production as the projected users is a set of social relations which does not have a predetermined parameter.

The other side of the coin, where the local reinforces the global, is seen in Don Slater's article, "Modernity under Construction: Building the Internet in Trinidad". Here, he looks at how the Trinidadians have made use of the internet, and we see their local activities in the global. Their local behavior serves as an entrance into the rational universe of the Enlightenment. The internet had always been taken to be the ultimate post modern technology, but the experience of the Trinidadians reveals something quite different. While most individual use of the internet is put toward an individualization, the citizens of Trinidad use it to recover common ground among its many citizens all over the world. The citizens of Trinidad show their identity as being from Trinidad through the use of the internet, even if they live in New York or other parts of the world. So, rather than using the internet as a means to personalize one's context, the Trinidadians use it to identify with the larger group. Instead of letting modernity pigeonhole and heirarchize individuals, the Trinidadians are using it to celebrate their own right to modernity. They are using the internet to claim their right to modernity. They are using a postmodern technology to be modern. This article shows us that modernity is flexible. There is no inner logic to modernity that applies to all circumstances (2003). A flexible modernity constitutes an entire new set of social relations and perspectives which can help us expand the concept of <technology>.

In their use of the internet, Trinidadians do not necessarily separate their personal and virtual lives; thus it mutually reinforces modernism and locality. The local becomes global. For example, in Trinidad the language of the internet is the same as it is in real life. But at the same time, Trinidad understands the economic benefits of the internet in terms of business development and promotional purposes. This was seen when Trinidad hosted the *Miss Universe* pageant which was both very Trinidadian as well as very global in terms of marketability and technology. Both of these uses (the local and the global) of the internet simultaneously diversify the technology as well as redefine our traditional interpretations of modernity showing that modernism can be treated as a heterogeneous phenomenon (Slater, 2003). The fact that the Miss Universe contest was both very Trinidadian as well as Western is an example of how a technological expression can be diversified with the uncovering of new social relations and perspectives.

Trinidad has certainly earned the right to participate in Modernity. The Trinidadians enjoy a high level of industrialization as their petroleum production facilities are the best in the region. They feel that they have long deserved to take advantage of Modernity but were blocked from it due to colonization. They are experiencing a latent Modernity. So, the internet has provided them with the vehicle to the rational cohesiveness that the Enlightenment promised three hundred years earlier. Their nationalism is reinforced by the internet. “Between ethnographic particularity and higher-order generalization, we can think about modernity as a global phenomenon that nonetheless emerges from particular and divergent conditions. A comparative approach asks us to uncover and account for different Modernities, in the sense of different constructions of what it is to be modern” (Slater, 2003, p. 154). Globally, the internet is the very expression of post modernism; however, the experience of Trinidad demonstrates that this is not always the case. A comparative approach also encouraged critical reflection.

This shows that it is possible for a technological expression to have a different meaning when it is exposed to different social relations. Soft determinism, as applied to the experience of the Trinidadians, has revealed a new potential within <technology>. The local can reinforce the global, and the local can even rekindle older narratives such as Modernity. By locally interpreting the concept behind the internet, the Trinidadians modified the technology of the internet and altered its meaning; their experience with the internet was a choice; and in turn the internet served as a vehicle for group identification. The internet, now, is a major force in preserving group identity where it is normally considered to be a tool which atomizes individuals within a society. Epistemologically speaking, technology and Modernity do not have to be seen in tandem, and to think of them as separate is to re-conceptualize both entities thereby allowing new social relations to come to the surface and exercise new avenues of influence.

Modernity and technology do not always serve their co-construction in a positive way. Perhaps the greatest or most spectacular example of a bridge, and then the rupture, between modernity and technology are the events corresponding to September 11th, 2001. In this case, technology was used to bring down Modernity. One could actually witness the exact moment where two disparaging viewpoints collided. Here, it was technology that ironically aided in the symbolic victory of the Taliban. The event was filmed live and there was so much communication and competition between the intelligence agencies that they became isolated and ineffectual. Then, of course, the US's very technological reaction only exacerbated the situation—two wars and counting. A response characterized as human might have been more effective. Where the Taliban used technology to attack the West, the US could have used humanism to combat fundamentalism; but such social relations are not encouraged in the US. If they were, there would have been a different story. Turn the other cheek, the golden rule, whatever—these are the aporias of new projects. The examples shown above are projects whereby there was cooperation between Government and Industry, but the example of 9-11 is one where Government failed since it did not consider any other realms of society.

D. Welcomed determinism and social adaptation of technology

Some technologies enable rational behavior. Certain systems encourage the creation of new values and ends. These are deterministic. Despite the ire that people have against technological determinism, there seems to be qualities of the relationship between society and technology that are deterministic, at least to some extent. These qualities can be so subtle that they often go unnoticed thereby making them all the more subversive—the double edged sword aspect of <technology>. Technology in this sense realizes a hidden purpose that is almost clandestine to the point that we could consider it a non neutral, however passive, entity within society. Technology is more deterministic within certain societies as the tie to modernism is strong, but once the technology is transferred to another society then it becomes less deterministic and more susceptible to localized interpretation. Nevertheless, it is up to the user of a transferred technology to pick and choose between the components (abstract, real, structural or elemental) which are applied to the localized conditions.

In the article, "Creativity of Technology: an origin of modernity", Junichi Murata maintains that there exists a feature of technology that helps us realize specific actions, thoughts, rational behavior, etc. This, he calls the *otherness* of technology which exists in the essence of particular technologies to facilitate rational thinking, but it also encourages creativity between producer and user of technologies. "It is difficult to retain a non essentialist view of technology when we consider technology to be one of the essential factors of modernity; it seems that we cannot but assume that there is an essential character of modern technology that marks it as different from traditional technologies" (2003, p. 227-228). In fact Heidegger's concept of "Gestell" and Horkheimer and Adorno's idea of the "domination of instrumental rationality" are examples of the essentialist approach. Murata's purpose is double. At the same time, Murata wants to distinguish modern technology from traditional technology while maintaining a connection to modernity. Murata asks if this is possible while trying to avoid essentialist overtones.

Murata refers to artifacts as co-actors instead of tools because the role they play is more complex than merely instrumental and passive entities. "We use artifacts as instruments to solve certain problems. In this sense an artifact has a meaning only because human beings use it for a certain purpose. But sometimes we are encouraged or compelled to use specific means for a specific purpose, if we want to be intelligent and rational" This is the *otherness* of technology that cannot be identified as instrumental means which "motivates various interpretive activities corresponding to each situation" (2003, p. 229). There is an element within technology that serves as an inspiration for rational behavior in one way or another. In fact, the use of technology in certain situations is what is commonly accepted as rational. This is what Murata calls the otherness of technology which is a co-actor or agent in our intelligent behavior.

The mere recognition of the otherness expands <technology>, but it could also serve as a constitutional element for a social project designed for diversifying technological expressions. Otherness is very complex and diverse; new social relations would spawn new rational behaviors. Merely to recognize the otherness is to acknowledge some form of agency in the technology. Each time there is the recognition of a new element within a technology, there is recognition of a new set of social relations.

Intelligence can have many forms, a phenomenon to which Murata alludes. An artifact is an agent in rational behavior to solve particular problems, and this feature is not sufficiently explained by interpretive flexibility. The otherness represents a common ground between a co-actor view and technological determinism. The artifact determines our rational behavior, and it plays a part slightly more sentient than a mere tool.

Artifacts are agents in our rational behavior. They make rational behavior possible; however, "sometimes the situation is far from being well defined and is ambiguous enough that there is an opportunity to develop a new relationship between human beings and artifacts" (Murata, 2003, p. 231). Murata calls our attention to how invented artifacts can create new ends. In this sense, the objects have a force upon us, it would seem—another facet of the otherness of technology. The creativity of artifacts, according to Kitaro Nishida, comes from the contradictory relationships that constitute our environment, such as subject-object and motion-rest. We exist in a world of constant creation, rather than a world that is already created. "Our world is technological because it is a world of poesies, a self formative act that moves from the created to the creating," (p. 233), and in an interconnected world we have to transcend this crisis created by the unstable relationships. The contradictory relationship between the producer and user is the seed of creativity—a reverse determinism. Nishida's approach to technology is one of non-essentialism at all levels—from the producers on down to the users. The recognition of new relationships is the celebration of new social relations and perspectives which could expand the concept of technology and its expressions.

Nishida also argues that technologies do not add stability to our world since technologies posses the role of, "radically transforming our social world [and] because of this characteristic of technology, our life is always in the process of self negating of self creating and is therefore unstable...In every action we stand on the brink of crisis in some way or other. Our world of everyday life is a world of true crisis" (Murata, 2003, p. 234). Our constant use of technology is continuously denying an aspect of our humanity as well as reconstructing our very humanity. This process is well seen, and it constitutes the standards of our expectations; therefore, it does posses the power to affect history in the large sense. A form of crisis can also be the non neutral effects of a limited concept of <technology>.

Finally, Nishida claims that today, as opposed to the 18^{th} century, we have a much stronger identification with the dichotomy between the individual and the global. Murata applies Nishida's theory to a case study comparing Japan and China in the area of technology transfer. In both cases the technologies were Western, but with Japan the technologies were accepted and adapted to Japanese conditions while in China they were rejected and did not survive in the manner for which they were intended. The adaptation to Japanese conditions is essentially recognition of the appropriate and pertinent social relations required for a successful and inoffensive transfer of technology. A policy of nationalization based on security and protectionism is an example of the type of social project, in terms of scale, that could be used as a model for a project designed toward expanding the concept of <technology> and altering technological expressions.

The transference of technology to Japan, in this case the steam engine, modern weaponry, and the telegraph, was relatively easy in the nineteenth century since the

Japanese received the ideology as well as the instrument because they felt that industrial technology was the key to the country's success. <A country's success> to them was a neutral concept that caused little friction since it was something that they felt everyone could agree upon, plus the government encouraged it by creating a campaign in favor of industrialized technology. Success and security were ends, and the Japanese only needed the means. Rational behavior in the face of possible invasion was also the end, and the industrialized technologies were the means.

The Japanese saw *modernity* and *success* through the technologies; they did not see the *West* through them in terms of a threat to their traditional society and culture. "They fully realized that the engine of Western modernity was industrial technology; from their viewpoint modernity and technology were inseparable" (Murata, 2003, p. 237). The Japanese realized that they had to accept the entire socio-technical network if they wanted to have the big technological systems needed for military production. This realization enabled the Japanese to consider the industrial-technological systems as neutral and not as ideologies which could efface traditional identities. Their nation's security trumped any ideological threats, but the Japanese did not feel they were becoming Western with these technologies. They merely felt they were increasing their nation's chances for success and security. Here we see how a simple shift in perspective, not seeing the West in the technology, can help the transfer of technology. A shift in perspective is the emergence of a new social relation.

Military production requires the establishment of large industrial complexes; however, other Western technologies are potentially local. For example, as to the transfer of the mechanical clock, on the other hand, it was small enough for a smooth translation into the system of local craftsmen. This process seemed to be rational to the Japanese since they already had the artisans and the virtue of time. The clock did not require that the Japanese adopt the socio-technical apparatus. A clock does not require a civilization to fabricate an entire system of production; they could just rely on the skills of the local craftsmen. The Japanese craftsmen were able to fashion their own form of clock. These men transformed the Western ideology of modernity of the clock and Japanized it. "Japan used a variable-hour time system so Japanese artisans adapted newly introduced western clock mechanisms to move according to the Japanese time system" (Murata, 2003, p. 244). The Western technology was made local; therefore, it had less ideological baggage. This was a project characterized by a compromise between Government, society and Industry.

This case is contrasted to the unsuccessful entry of the mechanical clock into China in the 18th century. The Chinese would not adopt the western ideal of time, so the clock was produced in China but it remained a toy. <Time> had no pre-existing place in the Chinese culture. In fact, to the Chinese, to adopt the clock was to adopt the Western ideology of a time as a virtue which would have conflicted with their cultural identity; therefore the clock remained a toy. The Japanese were successful because they had no problem with the concept of time, it was already ingrained within their culture, while the material technology was something to be modified using their own artisans. "Modernity without the help of tradition would remain only an ideology" (Murata, 2003, p. 244). Technologies cannot be transferred into other contexts unless traditional technologies already existed to aid in the transition. "What we can say is that modernity does not exist in a universal sense, but in modernity there is always a dual structure of modern factors and traditional factors. In this sense there are always various Modernities (in plural) together with various transformational processes of tradition" (p. 251). Steve Fuller maintains that the successful transfer of technology shows that there is nothing unique about Western science. It is only a matter of contingency (p. 239). Nevertheless we can say that there must be a conceptual match or local compatibility for the successful transfer of technology.

The potential conflict of values could impede technological transfer, as it did with the Chinese and the introduction of the clock into certain realms of their society. Either the technological expression introduces new values into the host culture requiring an assimilation or rejection of said values, or the host culture itself *creates* new values that enable them to adapt to the new technology. The process of the latter is referred to as reverse determinism. For example:

> a capital goods industry is an environment in which the interaction between producer and user is constantly made possible and the reverse determinism initiated by users can be realized....Through the processes supported by this institutional structure, new values and new problems are constantly created. This type of creation is held in high esteem in "our" society, while it was not in pre-modern traditional society (Murata, 2003, p. 251-252).

What Murata concludes is that the distinction between the two distinct cases of technological transfer is that with modern technology the creative process within technology is institutionalized within a socio-technical network inside the culture. This process is not random, and there is a cooperation whereby social relations are of the kind congruent with the technological expression. It is situated within a capital goods system that encourages and accelerates the global relations as well as the interaction between producers and users (2003). This is a form of soft determinism. The otherness of technology fulfills two distinct functions: 1) it facilitates rational thinking and 2) it encourages creativity between user and producer. Murata argues that this process is situated in a socio-technical system which encourages creative production and is distinctly modern.

So, for the successful transfer of technology, there must be a system of interaction already in place between producers and users. As was the case with Japan, the government forced technological production on its people with national security as the justification.

National security is like such a system of interaction between producer and user in that there is feedback and common interests. As for the clock, the system was defined by their pre-existing respect for time. The clock merely had to be Japanesed, so to speak. What marks the distinction between pre modern artisans and modern technology is such an idea of a system which unites interests.

Murata demonstrates that creativity surfaces through the transfer of technology if there is a socio-technical system to support it. Creativity, says Murata, can be encouraged by an interaction, like a dialogue, between producers and users. If technological expressions facilitate this dialogue, then there will be more creative flexibility. In Japan, the dialogue was expedited due to preexisting concepts and artisan expertise which are components of sample social conditions which promote a creative relationship with technology. As for China, <time> enjoyed a different position in society—one that was not conducive to the production of clocks, or at least clocks as time regulators and not toys. Nevertheless, this goes to show that there are different cultures and sets of social relations which could produce different technological expressions; and determinism proves to be a decent epistemology to bring out these relations.

Purpose has much to do with it, especially when the interests of a nation are on the discussion table. Again, "we are compelled to use a specific means for a specific purpose, if we want to be intelligent and rational" (Murata, 2003, p. 229), which was the case with the transfer of military and communication technologies. The Japanese wanted to be a more powerful country, so they had to adopt the socio-system of production needed for its realization. So <technology>, as rationality or as the successful preservation of their nation for example, is a neutral concept while <creativity> is not. Within this relationship there seems to be fuel for the further diversification of <technology>. In sum, <technology> is the manifestation of a system of concepts, ideals, interests, local know-how and traditions which does not have an absolute manifestation.

E. Modernity, technology: hyper-rationality, sublimated being

Big Business and Governments want this level of control, but why is there little resistance to its practices? In "Surveillance Technology and Surveillance Society", David Lyon writes that surveillance is a commodity and a way of life which has matured in conjunction with modernity. "Surveillance is a distinctive product of the modern world. Indeed, surveillance helps to constitute the world as modern" (2003, p. 161). Surveillance is a high tech form of bureaucracy which is a traditional representation of modernity. It is the processing of information for the purposes of efficiency. Bureaucracy channels information in a way beneficial to the state, and information remains in the hands of the state or the army, for example. Surveillance, in a modern context, defines us as beings; and surveillance affects our concepts of <free will> and <being> in that individuals are determined by the information that other bodies posses around them. In other words, the constitution of our identity is determined by the technology that others used to construct our existence; and experience is heavily influenced by this as well. As we move into a postmodern approach to the issue of surveillance, there is little in the way of a force that can counteract the information infrastructure. Human agency must be encouraged to confront surveillance without being inhibited by the patterns of life that our level of surveillance dictates. Again, technologies affect our concepts which in turn affect how we think and act.

Surveillance is a means through which our personal experiences (social relations) are shaped as it is one way that we come into contact with organized social life. "Personal experiences of life are shaped, among other things, by relationships with organized social life, and this includes how organizations try to influence, manage, and control us through surveillance" (Lyon, 2003, p. 161). In particular, computers are, more and more, the technology which mediate between individuals and surveillance systems. They are both socially shaped and socially influential, but their effects have been less than predictable. Databases, to which computers are ancillary components, make up a web of control. "The result is not a neat pyramid-like structure of control, such as the classic bureaucracy, but something much more like a creeping plant that sends out shoots here and there, growing rhizomatically" (pp. 161-162). Consider background checks for people who wish to obtain a loan or apply for a job. This process is routine and considered to be inoffensive. Why is a background-check such an easy thing to do and why is it so widely accepted? In other words, why are the social relations that give rise to these procedures so readily or thoughtlessly allowed to continue?

Since the attacks of Sept. 11, surveillance has suddenly become a hot issue, and the level of surveillance that has been reserved for criminal contexts is now being considered for the monitoring of everyday activities of regular people with the pretext of fighting terrorism. That 9-11 will affect technological innovation is not in doubt, but the choice of technologies will determine the relationship between individual citizens and the nation-state. Both technological developments and social processes have reciprocal effects upon one another. "Whereas the nation-state and the capitalist workplace are the primary sites of surveillance in modern times, computerization has not only augmented surveillance in those sectors but also moved decisively into the consumer sphere" (Lyon, 2003, p. 163). We are not even aware when we are being watched. For the convenience of passports and credit cards, we sacrifice information to databases which in turn utilize this information to recreate our identity, study us as a consumer or political target, etc. As a result, our concepts of <space> and <individual entity> have become double edged swords since they are being constructed with rules and social relations of which we might not be conscious.

As a form of soft determinism acting through <convenience>, let's say, surveillance technology, and not social relations per se, constructs our concepts of <space> and <identity>; and the price we pay for convenience is that technological expressions have assumed the role of determining our concepts.

Lyon is concerned with the task of Modernity in the face of 21st century conditions where heightened surveillance is but a symptom. Is Modernity still the appropriate rubric? Some argue that surveillance is the price we pay for post modern individualism. In other words, our need to re-invent our identities through computers and credit cars has augmented the ability for data bases to keep track of us. Our information is used by market analysts to manage consumers. Our emerging identities also raise issues of privacy and civil rights. "Surveillance practices and technologies are becoming key means of marking and reinforcing social divisions, and thus are an appropriate locus of political activity at several levels" (2003, p. 166) Social practices of bureaucracies are equivalent to their technological vehicles. Lyon argues that modern societies were preprogrammed to be surveillance societies and that our post modern delusions of information overload are just that—delusions. Institutions also imitate the operations of their technologies, and this practice is considered quite normal as there seems to be little in the way of critical reflection. There is no resistance to this practice, plus if there were, how could it materialize? There is choice behind applications of surveillance technologies, but such technologies affect concepts like identity and being. The ramifications of these choices and inter-relationships are not always predictable.

Originally, computers were used to process information more efficiently, thus answering questions concerning the cumbersomeness of bureaucracies. The introduction of computers mushroomed into practices that were seen as much more covert, such as the practice of preemptive surveillance and categorical suspicion. "This refers to the ways that the computer matching of name lists generates categories of persons likely to violate some rule" (Lyon, 2003, p. 169). Also, there emerged the ability to cross reference information between government departments. With the events surrounding 9-11, surveillance technologies are an issue as their techniques are more and more intrusive. Government agencies and corporations trust them to no end, but the average person is not so sure. "Despite its best efforts, modernity does not always overcome ambivalence, but often creates it" (p. 169). Again, certain technological expressions behave as double-edged swords. The question then becomes whether or not there was intention behind the ambivalence which would be an exercise in technological determinism whereby certain aspects of society are taking advantage of the confusion that is generated on a grand scale when systems of surveillance are interconnected and coordinated.

The State is a means to increase and support this element of interconnectedness and cooperation. Before 9-11, the greatest danger presented by surveillance technologies was the increased power of the nation-state. Now, corporations enjoy the same privileges. In fact, government laws and policies are tailored to meet their needs. 9-11 also changed our idea of risk. "The events of September 11, 2001 raised awareness of risk, including technologically generated risks such as biological terrorism, and the risks that civilian populations face from enhanced surveillance...The two faces of surveillance may be thought of as securing against, and unintentionally generating, risk" (Lyon, 2003, p. 170). Here, <risk> can be thought of as a manifestation of the otherness of technology mentioned in the section about Murata above. This otherness is a feature of determinism whereby the technological expressions create more subtle manifestations of risk. Again, technologies affect our conceptual constructions.

Surveillance has also changed in kind. "By the 1990s, then, surveillance had become both more intensive and more extensive. Using biometric and genetic methods, it promises to bypass the communicating subject in the quest for identificatory and diagnostic data obtained directly from the body" (Lyon, 2003, p. 172). Surveillance is concentrated on the person and in the cities, thus people "find themselves subject to scrutiny by agencies and organizations interested in influencing, guiding, or even manipulating their daily lives". In this sense, "surveillance technologies that helped constitute modernity are still present as is modernity" (p. 172). The connection here between the grand narrative of modernity and the individual is that the subject is not necessarily considered for his/her subjective qualities; rather, one is recognized for the manner by which he/she participates with the larger system. The subject is bypassed thereby diverting Modernity's movement further away from its initial liberal intentions, directing it more toward its rational and hierarchical motivations where there is cooperation between systems of surveillance.

Data systems are not isolated. They interact. It is like fighting a war on all fronts, but that the access of information becomes easier the more convenient becomes the technologies and the more contact there is between technologies. In this scenario

> Surveillance at the start of the new century is networked, polycentric, and multidimensional, including biometric and video techniques as well as more conventional dataveillance. These same information and communication technologies are the central means of time-space compression, in which relationships are stretched in fresh ways involving remoteness and speed, but are still sustained for particular purposes, including those of influence and control (Lyon, 2003, p. 172).

One could argue that this is characteristic of the post modern means of surveillance—a type of surveillance. "Both technological dependence and consumerism characterize modernity, of course, as does surveillance. What is new is that surveillance increasingly depends on information and communication technologies and is driven by consumerism" (p. 173). The other difference is that there is no central brain; rather there are millions of points on a web. Also, we are not aware of surveillance, nor are we aware of people who are criminals or how they may be tagged. Finally surveillance is treated like an idol much like efficiency was treated in the past. Idols are worshipped, and they are venerated without empirical foundations, thus our dialogue with surveillance technologies is weakened by a ready-made respect for and, more importantly, fear of their function in society. In an information age, it is almost natural to think that there would be some form of void if there were not an equal amount of surveillance technologies to counteract the mountain of information. Information and its surveillance in conjunction then become a new value in that they are an amalgamated form of the two preexisting values. Society reacts accordingly by way of a degree of determinism in that the technologies have molded our conceptual constructions of individuality and participation.

Modernity is partly characterized by its element of interconnectedness whereby many concepts are understood in conjunction. This aspect of Modernity is also seen through a heavy reliance on bureaucratic systems for social administration and control. Now that theses systems are armed with computers, other features emerge that are magnified by increased technological capabilities. Surveillance practices generate general information about the population. "This suits nicely the burgeoning enterprises of consumer capitalism, which now have the means to more directly manage their markets" (Lyon, 2003, pp. 178-179). A market criterion becomes the foundation for decision making, even at the government level, "thus, subtly and imperceptibly, the shape of modernity morphs into the postmodern" (p. 179). Additionally, this serves to maintain social divisions. This is the very ideal of rationalism as populations are categorized and ranked, so to speak.

Groups of like technologies and sets of social relations, like Modernity and Technology, are co-constructed in a post modern setting. For instance, call centers "utilize the new technologies to reduce overheads associated with commerce, and may be located wherever sources of labor are relatively cheap. They illustrate the shift toward consumer capitalism and the flexible labor force" (Lyon, 2003, pp. 180-181). The natural evolution and creation of technologies and social relations however does not occur in an ethical vacuum. Also, the price of convenience is an open door to one's personal activities. Concerns for privacy are seen as an antidote to the surveillance technologies whereby the self is portrayed as the sacred possessor of dignity. "Moreover, the development of privacy policies has itself contributed at least tangentially to the shaping of surveillance systems, and this has to be recognized as a factor in co-construction" (p. 182). So, the phenomenon of co-construction works both ways. Technologies generate social reaction. The new policies could then, in turn, affect technological production—an exercise in using new social relations to generate different technological expressions. Privacy policies are manifestations of reverse determinism that could be used as models or examples of social projects designed to alter technological expressions. Nevertheless, there is still some degree of choice within the parameters of technological determinism.

Technological expressions and social relations also work together to create distinctions within society. As a result issues of fairness are raised, and this is not to say that concerns for human dignity are forgotten. In fact, it emphasizes the need for analysis and criticism for the benefit of those who are most vulnerable. "At the end of the day, to explore co-constructivism as the mutual shaping and influence of technological development and social process is to explore possibilities as much as it is to discover patterns of determination". Technology is socially shaped which means that it can be reshaped. In fact, Judy Wajcman argues "if it is true that technology is socially shaped—as, indeed, social situations are also technically shaped—then it may also be reshaped for appropriate purposes" (Lyon, 2003, p. 183). A pattern that is socially constructed can be dissected thus revealing other possible constructions resulting in different technologies.

Lyon shows how the interaction of technologies and social relations at many levels can help social life and "foster caution concerning postmodern surveillance processes [which] is perhaps the more modest task and one that social analysts should undertake" (2003, p. 183). This is related to Johan Schot's comment on the connection between social and technical problems and how we are conditioned through our relationship with modernity whereby we apply a technological or regulational fix. To use his example, increased airport traffic has created the need for either another runway or increased regulation. "The key issue [that Schot's] analysis raises is whether modern societies are indeed trapped within these two conflicting positions" (2003, p. 272). Schot implies that this would not be the case if we were able to establish a true politics of technology.

We are caught, according to Schot, in technology and regulation solutions; but he asks, if we can "discuss contending social and cultural issues in relation to technology? This leads to the related question of what conditions would encourage and allow actors to work on both the technical and the social simultaneously, in a related way" (2003, p. 272). Technology and modernity mean different things for different peoples and societies. If technology is required to be apart of its political, cultural and environmental contexts, then we will interpret it differently. The purpose of this investigation is to encourage the conditions which would liberate actors to work freely with the technical aspect thus creating a more honest dialogue with technology. The total politics of this relationship is the key and it could be the skeleton of a project designed to positively affect <technology> and its expressions.

To do this concepts need to be constructed, and, for this to happen, we look to social components which is what Schot is asking us to do in terms of our relation with technology and its effects in society.

> To achieve such a constructive technology politics, it will be necessary to nurture a new set of institutions and discourses that aim at broadening the design of new technologies to include societal actors and factors. When such institutions proliferate, design processes will happen in new networks and circumstances. Ultimately such a development would allow for the constructive experimentation of technology and society….By institutionalizing negotiation spaces (or nexus), both proponents and opponents will become responsible for giving meaning to technology and its effects (2003, p. 273).

Concepts need to be broadened, and Schot is broadening the process of design to include many more factors. This also suggests that the scripts in the upcoming dialogue are flexible enough to deal with local practices. "The effect of broadening is that the designers' assumptions or "scripts" concerning their technologies are articulated as early as possible to the users, governments, and other parties who will feel the effects of the technology, and have their own scripts. At present there is no space for such an early exchange of contending scripts" (p. 274). If broadening occurs, it would encourage anticipation, reflexivity, and symmetrical social learning, according to Schot. This is a strategy to recuperate a deeper level of critical relationship with <technology>.

There is a mutual learning process which helps us learn more about particular technological options. In other words, the more complex and sophisticated context we immerse the technology into, the more we know about it. The technology has been expanded and diversified in terms of its ontology and social effects. This is incorporating the ideal reflexivity into the concept of <technology>. "The purpose of incorporating these features in design processes [reflexivity, symmetrical learning, and anticipation] should be to shape technological development processes in such a way that social and technical aspects are symmetrically considered" (Schot, 2003, p. 276). This is to make technological development more transparent and responsive to social considerations. Schot characterizes this process of treating technology as one of nurturing. "Eventually this change will make technologies more open to and more flexible so users can easily control them. Technological development will also become more complex" (p. 276). Schot wants to expose the design process to the complexities of society—a return to Romantic thought in which the relationship between technology and society is not severed. This is a broadening of the concept of <technology> that would serve to facilitate a more holistic dialogue with technology.

While modernity's dependence on bureaucracy is still a determining influence on our lives, and while post modern forms of surveillance are hyper extensions of modernity control, we still have the power to socially shape the material shape of technologies. For instance, the overall purpose of surveillance does not have to be for enhanced marketability of the consumer. Could it not be for heath purposes or environmental awareness? Finally, Lyon seems to be saying that the cooperation generated within the relations between technologies and society will serve to enhance material production, but one of the consequences of this is an altered sense of identity in that being can become a liability as well as an asset. By this I mean that these technologies play with our desires. If we want to negotiate certain advantages of the modern world, we are forced to participate in a way which compromises our existence and takes advantage of our pool of subjective resources. In other words we exist on the terms of another, but to change this, the concept of <technology> needs to be heavily laden with the ideas of reflexivity, flexibility, etc. This will be difficult since a technology based on control, change and prediction, for example, would not be open to being influenced from other entities. It is not in the nature of something whose foundations are built on domination to be in turn dominated or influenced; but this is exactly what Schot is proposing.

F. <Technology> as meaning in experience

<Technology> as the manifestation of a machine can be the model for a society. This damages our idea of free will. Could there be a <technology> or technological expressions which promote the flowering of free will? If we see <technology> as special interests, a socio-political agenda or as identity, then perhaps the answer is yes. Advanced technologies have provided us with the means to weaken our symbols through a bombardment of information. Their meanings are diluted. Without the power behind the symbols, a society is forced to look for meaning, and the likely provider for this is technology. In fact, technological innovations are purposely endowed with meaning and emotions through advertisements in order to inspire awe and dread among the public, much like belief systems and religions have done in the past. Advanced technologies also have a similar effect in our own time. Take for example, information technologies which have the power to erode political institutions. As such "more information becomes the cause for the atrophy of the various democratic functions. Maneuvered by multinational corporations and the unbridled free market, mass culture thus imposes its own rules of democratic participation: namely, utilitarian rules serving private interests rather than the universal rules serving the public interest" (Borradori, 2003, p. 58). Symbols have become trivial. We rely on their repetition and availability in stead of their meaning. In fact, their meaning has been converted to their availability whose frequency we cannot control. That technology replaces traditions and forms of negotiation is not in doubt. This happens today as well as in the past. This form of determinism is by way of opposition—private interests are

promoted instead of public ones. Private organizations are doing the job once performed by political institutions whose interests are more publicly inclined.

We tend to attribute alien qualities to our machines. Why? The machines of the 19th century, for example, were admired for their symbolic power as well their material accomplishments. They were given life-like qualities implying that machines could change history and society, as if they were human or were at least endowed with agency (Smith, M.R. 1996). A possible result is that we see technology as that which shapes society and not as an entity which waits to serve our ends. In "Recourse of Empire: A landscape of progress in technological America", Michael L. Smith asks why Americans "attach so much of their national and personal identity to technology" (Smith, M.R. 1996, p. 37). He does not believe in so perfect or flawless a symbiotic relationship between society per se and technological production throughout to believe in technological determinism in its purest understanding. Nevertheless, he does lend credence to technology's deterministic potential, but the question is why we let this happen. In other words, the question is why do we, as people who have evolved within the last 300 years with the idea of free will, willingly accept the baggage of something that is deterministic. Has free will not evolved in a similar fashion?

His answer is that technology is the main agent of progress, leaving others to pale in comparison. Progress through technology, especially in the United States, became the ideal, a glorified metaphysical concept where material progress was the defining characteristic of the US society as well as the means by which to maintain it. In the U.S. determinism is stronger since there is very little past that is exclusively American There is only the West, the next frontier, space, another market and the future, for example. Technology is for America what the Catholic Church was for Europe in the Middle Ages. "Technology and science not only became the great panacea for everyday problems; they also stood for values at the core of American life" (Smith, M.R. 1996, p. 23). Technology, then, can become the manifestation of values; so we identify with machines and attach symbolic value to them. Humans will create culture out of anything and for whatever end. Just look at the alacrity with which the culture of Nazism rose. The United States simply choose technology to be the core of its burgeoning cultural identity. The goal was progress which was, arguably, arbitrarily chosen. Could not another value or social project be chosen to have an altering effect upon the concept of <technology> and or technological expressions thereby determining a different process of identity formation?

Michael Smith puts technology at the crux of an identity battle where the United States, from its inception, used the idea of progress to characterize the nation. More specifically, Smith asks how Americans have so easily identified with the machine and progress, and he highlights media representations of technology to provide an indication of public opinion. Machines have values, and, more importantly, they exclude other values. A machine is about production; it is insensitive to ethical concerns, and a machine exists only in so far as it can produce. For production to continue there must be a reason; so a machine then becomes the excuse for a nation to expand, invade, take over markets and modify international laws, both legal and unethical, in order to maintain a society whose structure is modeled after the machine. Think of Manifest Destiny, the Monroe Doctrine and the Cold War as policies put toward the perpetuation of an ideology founded on the idea of technological progress being the new frontier. Many interests and concerns are sacrificed for the values of the machine.

Technology has come to represent progress in a world where every aspect of humanity seems to be controlled by scientific experts; therefore, those who resist technology are merely fighting for authority in determining our identity. The idea that technology is synonymous with progress is a myth that is reminiscent of technological determinism in that the idea of progress can give a nation an identity toward which we aspire. Technology represents progress toward ever receding goals. Smith also refers to the American thrill with technology, comparable to a drug addict. We know that it will one day destroy us (Smith, M.R. 1996), but we also think that it will one day solve all our problems. This is a form of determinism.

This double edged optimism comes from a conceptual understanding of <technology> that has been created since a nation, the U.S, has chosen to identify with technological progress. When <technology> is a major component of one's or a nation's identity, then it is natural to ignore technology's potential to destroy. Plus, if technology, as the foundation of our identity, will destroy us, we might be inclined to think this is a natural process since it is who we are, and it cannot be prevented. This fatalistic tendency can cause us not to look for alternatives. Can it be expanded, diversified or relativized to the point where many ideas of technology coexist thereby resulting in an explosion of varied types of technological expressions?

Technology can also be a threat to identity which can be seen in the question of who has the authority in our society, God or technology. Smith mentions the Scope's trial as a skirmish in the larger battle for this identity. He treats the anti-evolutionist position not as an argument against technology, but as a reaction to the forces which were coming to dominate what we thought of as human, an identity crisis (Smith, M.R. 1996). This identity crisis has continued today in America. Thus, our symbols are technologically inclined symbols. Who are the Americans of the 21st century when the ideals of the Puritans of the Northeast and the Cowboys of the West survive alongside advanced information technologies and a weapon's industry which has not only altered military tactics and technologies in awe inspiring ways but is perpetuated for economic purposes?

Smith follows the holy treatment that technological progress has received in the U.S. In the past there have been efforts in the U.S to maintain a democratic relationship to technology. For example he points out how the implementation of the metric system lost to the British system based on a man's knuckle, the rule of thumb, even though it would have been politically favorable to use the newer French metric system as opposed to the older British system. In that case, the invisible technology (the metric system) was subservient to local traditions since it was easier for tradesmen to use their knuckles to measure an inch, for example. At that time technology per se was not seen as something so holy, but today technology is put in an ivory tower, on a pedestal. Smith says that the American. A:

> nation's political and corporate leaders have spoken in the sweeping cadences of technological determinism because of its irresistible power to cast them as trailblazers on the uncontested, inevitable path of progress. And as technology became more complex, and the decisions behind its development receded from view, the public increasingly had to rely on images of technology for its understanding of both technology and progress (Smith, M.R. 1996, p. 40).

Where is the Cowboy of the American West? He survives as an ideal where the entrepreneur is the quintessential example. Here again we have a cooperation between certain areas of society working in conjunction with a belief we have about technology's power. In this case technology is vested with the potential to make great progress; however, our knowledge of its power is transmitted through simple images. This constitutes an imbalance between the role technology plays and the information a society possesses as to the details of its role. <Technology> became a myth, a project and an ideal.

Why did <technology> assume such a metaphysical connotation? Identity like power hates a void. The essence of progress will survive in the population since it is the foundation for identity. The outward indications of the identity do change, but this is still the same song with a different tune as the tune must be consistent with the song just as the outward manifestation of one's identity is true to its essence. The image of technology had the characteristics of progress, in some form. These images were important for the nation's identity. America was founded with the ubiquitous ideas of expansion and progress. Initially, as was the case with the settlers of the early 17th century, the problem of overcrowding and need for more salutary lands required the western expansion. Later, there was the ideology of Manifest Destiny and the invasions of foreign territories; but once territorial expansion was no longer feasible, there was a void left unsatisfied which was replaced by a new form of expansion—technological expansion.

Technological determinism survives as a national project, a myth—a very powerful myth. So, the expansion ideal of the U.S survived into the 21st century, and progress did too, though not as democracy only. Progress survived as technology. In another sense, Smith advocates that determinism survives because faith in technological progress "serves as a substitute for more genuine participatory democracy" (Smith, M.R. 1996, p. 38). Power can be maintained through <technology> and it is a form of social pacifier. We are pacified.

Smith takes two media representations of how technology is represented to show how the American identity is shaped through technological progress. In the first (just after the Civil War), technology is depicted through a train carrying civilization westward across the plains. Technology was the emissary of progress as defined by the Anglo-Saxon image of American. It was that which unified a culture and guaranteed economic growth as this culture expanded west. At this time, 1868, the frontier still existed, but it was rapidly shrinking. While there was still a geographic frontier, the train conveyed progress. Progress was predestined and peaceful. It suggested an orderly life, well known to us, in the future, brought by the train and the telegraph. The future was a place where the society of today would later fill and occupy, replicating the social relations and technological progress like a formula. Later, with the frontier completely explored, Americans looked to a technological frontier. In this sense, technology does not bring progress; it is progress.

In the other media representation of technology in his article, published just after WWII, technology is portrayed as a new and exciting agent in an unknown future. Rather than technology taking us to a distant place in the future where we will repeat civilization as determined by the preexisting technology—copying the formula, this magazine picture has technology in the foreground representing the future or progress itself. The foreground of the advertisement contains familiar images of cars, rockets and airplanes, but as the viewer follows the pattern of technological images into the background the objects transform into almost science fiction formulations of the same cars, rockets and airplane (Smith, M.R. 1996). What this is saying is that progress is now the manifestation of the new. There is no prefabricated formula, but technology is the emissary of an unknown progress where the newness of a thing is not in question. Now, identity is heavily influenced by the favorable impression the Americans have of the novel, the new and the innovative. Newness is now its own virtue. This virtue isolated from specific cultural moorings.

Both visions of technology as progress imply determinism in that they are myths of a certain direction: one as a geographical representation of Manifest Destiny and the other reflects a market need for more products or as an illustration of anything new is good. The former shows a unified project, or a trajectory. The later is more chaotic, and Smith refers to the catastrophes of the second half of the 20th century as this image, "Science on the March" was released in Life Magazine at the beginning of the Cold War. In the latter, progress is the unknown (more modern images of familiar technologies). What will the future bring? Here is the lost adventure of the pioneer relived. A former relic of the identity is preserved, but it has been reoriented to such that technology is the new frontier. The image suggests that we must channel all our energies to the creation of the new so as trust its results in an upcoming battle with the Soviet ideology.

If technology is the goal, as a manifestation of progress, then what are the parameters to guide it? If <technology>, as change, can be guided by 1) the vehicle of perpetuating the Anglo-Saxon way of life or 2) as the tangible representation of the new as a force against communism, then there must be other socially inspired guides (social relations) for technological production. It is our job to find them since it appears that making the shift from one conceptual foundation to another is feasible. The first was <technology> as an emissary of a way of life, and the other portrayed <technology> as the horizon of newness. Nevertheless, each was the manifestation of an intentional social project.

The implications of an ideological technology are that they limit dialogue. In fact, Smith wants us to talk to one another and redefine our concept of progress not as national defense, but as national health care, for example. Here, we see a desire for a conceptual make-over for <technology>, but it would appear that such a move would need to be supported by the forces of government or, perhaps, the result of a civilizational tragedy. <Technology> is a national, political agenda. If it is left unbound it could bode badly for mankind. Included alongside a national agenda, <technology> should have other agendas (international, environmental) influencing its evolution. What if the Scopes trial had gone the other way? This would have been a legitimate alternative to be used as the conceptual foundation for new forms of <technology>. The point is that society can find these core inspirations or aporias of technology and convert them into projects designed to alter technological expressions which match the necessary social current or guide it away from unfortunate effects.

These images were created and followed by an enormous population. They and their accompanying ideologies were a successful project between Government and Industry. These ideas were also communicated to the people. This fact says that they were speaking to receptive social relations. People can identify with a message as long as there is a means within their constitution to receive this message. There are many more means within us to receive messages of all types, thereby suggesting that another message, as a project, could be manufactured to match a friendly means of reception within the population.

G. Technological determinism as a specific ideology

In "Technological Determinism Revisited", an article written 25 years after the publication of "Do Machines Make History" (mentioned above), Heilbroner reassess his theory that technological determinism was strong in both capitalist and low-socialist societies. He had included low socialist societies because he felt that they still embraced capitalist-like motivations. "He links technological development to a stable and systematic acquisitive drive to maximize possibilities for gain" (Williams, 1996, p. 229). He still maintains the link between technological and therefore economic determinism; however, he recanted to some degree by saying that any form of socialism would not embrace the capitalist notions of a market dominated society needed to maintain an idea of technological determinism. It is the relentless drive for profit and expanding markets which has become an ideology that drives technological production which in turn heavily influences our society (Heilbroner, 1996).

If Heilbroner effectively removed socialism, as a context for technological development, then this implies that technological progress is not as predetermined as if it would be if a variety of societies can serve as the context for its development. A certain technology is the result of a certain type of society, meaning that another type of society will foment another type of technology. This seems to suggest that a society's perception of

<technology> definitely affects technology's role; and, in this case, technology is either the driving force that sustains us or it is an appendage to society. Society must accept the ideological motivations for technological choice and innovation in order to be able to fully appreciate the reasons behind certain social relations. Knowing that our social relations are based on, let's say, <gain> is a step in the process of diversifying our conceptual foundations for <technology>. It is also an exercise which demonstrates the epistemic importance of technological determinism. Again we see a form of reverse determinism, demonstrating the power of social projects upon technological expressions.

Technological Determinism must be understood in a context of economics or within our obsession with exchange value. It is technology, according to Heilbroner, which either impedes or hastens our pursuit of exchange. "The translation mechanism of economics [enables] us to speak systematically about how machines will bring pressures to bear on socioeconomic formations" (1996, p. 74). Technological determinism is merely a heuristic from which we can gage socioeconomic events and social relations.

Soft determinism would more appropriately describe Heilbroner's later viewpoint since determinism comes in the form of technology's participation in the undeniably predictable behavior of social organization but at the same time there are always imprecise elements surrounding individual behavior. Within a market society, there is a logical relationship between technology and the pursuit of maximizing possibilities. Technology constitutes the specific direction, and economics is the framework which is a stimulus for change in human behavior. The technological change comes from the environment that economics provides. There is a logical relationship here. We want to acquire fortune; therefore, we must go where the money is, and technological change is registered in changes in the price and demand system. We follow it and this is the rule which salvages some aspects of technological determinism as an epistemic. For example:

> we live in a social order in which an economic calculus takes precedence over, and enters into the definitions of, many aspects of life...As long as economics constitutes the most powerful and pervasive motivational force, and the only one to which behavioral regularities can be ascribed, a perspective of soft determinism seems to [Heilbroner] the one most likely to enable us to grasp the processes of history in which we are entangled (1996, p. 78).

To see History as, at least in some respects, deterministic, asks us not to ignore that we have chosen certain conditions that do heavily influence action. To see the reasons behind the actions is a path to seeing that things do not have to be the way they are. One form of economics, one that is based on profit, foments a type of <technology>; another form of economics, one based on cooperation, for example, would generate an entirely different <technology>.

The problem with this is that it is culturally independent; however, if we isolate the economic factor for interpretation (profit), we are able to appreciate a historical continuity which gives us insight into the ties between technological development and our developing history, though in a general sense. Recognizing historical continuity is a form of technological determinism. It gives us a macro level of analysis based on technology without having to resort to the specific material artifacts. In other words, it shows a conceptual relationship between technology per se and history. It is a rule of thumb based on a logical relationship between one's desire to posses things (acquisitive mindset), a condition created by the market system, and historical development. He finishes the essay "In the land of Procrustes, the standards of the inn keeper are those that apply" (Heilbroner, 1996, p. 78). The standards in our reality are those of economics, and Heilbroner feels that it would be naïve to ignore this generalization. Such a view of history is not restrictive, as Rosalind Williams believes, rather it is analytically instrumental.

This approach also allows us to see history as a continuous thread. The connection to the past perhaps can provide us with a foundation to change the future. Again, it demonstrates that <technology> can reflect certain social structures, even those that are energetically pursued and not just accidentally stumbled upon. Does economics have to be the factor in technology's ontological and conceptual existence in our world? Heilbroner is implying that it does not; and an exchange of economy for another such institution would affect technological production and its conceptual existence. In any event, a different economic mechanism would result in a different <technology>. I am not advocating that we replace this concept, rather I am asking if other images of <technology> can exist along side the one we have now thereby diversifying its existence as well as broadening its conceptual potential.

H. <Technology> as *one* paradigm for experience, a hegemony

Technology is also the manifestation of a social purpose. Paradigms can be determined by the degree to which tools play a role in determining social relations. The coexistence of authorities would serve as multiple inspirations, and <technology> needs to include this possibility thereby encouraging a more critical and flexible dialogue between us and technology per se.

The paradox of technology is an age old issue. Technology is a burden as well as a blessing. Technology multiplies the possibilities of our experience, but these possibilities are within a technological framework; and, finally we have the promise of technology, but at what price? Neil Postman is concerned with these questions in his book, *Technopoly* (1992). Technology as a form of knowledge is a key issue in *Technopoly*. According to Postman technology is a *form* of wisdom and not wisdom per se, and the problem is that a mastery of the technology will be confused with truth or knowledge, for example. In addition, the problem is that technological expressions determine our conceptual construction. Thus, those who are in a position to posses the means of expressing knowledge will control its definition as something we have confused with truth. Knowledge becomes practical knowledge.

More generally, Postman is concerned with the idea of <replacement> or substitution of real cognition with cognition with a technological crutch. Technology bears with it the threat that we will use it as a crutch, thus weakening our conventional faculties such as thinking and reflection, for example. In a sense, technology changes meaning. What does it mean to think with such technical support, and what is the result of thinking with the help of a technological apparatus? Is the result "meaning" per se or is it meaning as such? Technology puts traditions and concepts in a corral or a framework. In addition, Postman writes that, "those who have control over the workings of a particular technology accumulate power and inevitably form a kind of conspiracy against those who have no access to the specialized knowledge made available by the technology" (1992, p. 9). There are winners and losers when a new technology is concerned. "Once a technology is admitted, it plays out its hand; it does what it is designed to do. Our task is to understand what that design is-that is to say, when we admit a new technology to the culture, we must do so with our eyes wide open" Postman, N. (p. 7). This is the role of the philosopher of technology. Our eyes require a clear vision, and a more accurate or inclusive concept of <technology> would serve the purpose of counterattacking the deterministic element of technology. "Our eyes wide open" is not an exclusive statement, neither in terms of people nor in how we see something.

One of the premises of *Technopoly* is concerned with substituting traditional authority with the interests embedded within technology. Technology as an ideology or as progress itself could not exist in a world where there would be ideological obstacles or rivalries. For example, in *Technopoly*, individuals are seen as consumers who fuel technological progress in a world where wealth is in currency. Wealth as such is a purpose which we have conditioned over the years since the Middle Ages. Postman says this could not be so if individuals were on this earth to serve God, but the point is that this purpose was created; it is not *the* purpose. A society wide project or purpose has the power to alter all institutions within that culture. When ideologies confront one another, they attack each other on all fronts. We loose our connections to traditions and subscribe to the economic benefits related to technology. Thus, institutions and cultures change. After the printing press, Europe was not simply Europe plus the printing press, but it was a different Europe (1992). We need to be aware of the changes to our social relations that are the result of new technologies. A technology can appear to have a purpose, but a new or additional purpose would result in a new concept of <technology> as well as new technologies, and we are united by a social purpose. A change in our project would reflect throughout our institutions and permeate on down the production of our technological expressions.

Technology unifies us, especially as it serves as the crux of our cultural identity. A specific technology carries social and ideological baggage and has the power to affect the cultural institutions of other societies. "Surrounding every technology are institutions whose organization-not to mention their reason for being-reflects a world view promoted by the technology. Therefore, when an old technology is assaulted by a new one, institutions are threatened. When institutions are threatened, a culture finds itself in crisis" (Postman, 1992, p. 18). This is representative of the power that is inherent within technology. We should be aware how our conceptual constructions are affected. This was the concern in chapter one whereby the King was concerned with how writing affected how we memorized. For critical reflection to be promoted we need to be aware of what is gained and lost with the introduction of a new technology. In addition, there are social relations gained and lost with each new technological introduction.

What are the forms that a crisis can take when institutions are at stake? For one, a crisis can be a conflict defined by a struggle for authority. The Scope's trial had demonstrated that the Bible's authority was weakened in defining and categorizing moral behavior (Postman, 1992). In another example, the idea of liberalism in the18th century had a moral purpose, but liberalism in the middle of a technopoly is devoid of purpose, causing there to be a lack of direction. The only direction left is that of progress. "Amid the conceptual debris, there remains one thing to believe in—technology" (p. 55). When the culture promotes material progress as the operating paradigm, then technological production, within modern contexts, must be heightened and constantly improved upon due to modernity's affiliation with the new. As a result, technology is the initial beneficiary and not necessarily the problem at hand. Belief also despises a void. As a people, we need to believe, and the concept of <technology> should include this tendency within its scope.

With the introduction of a new technology, there are always winners and losers, both in the literal sense and in the conceptual sense. In the former, some people may be pushed out of a job due to the introduction of a new technology. In the latter, a concept such as <efficiency> may be deceiving. For example, computers may help one to balance their checkbook better, but it also gives acrimonious individuals, government agencies, marketing companies and terrorists access to our personal lives making their data-based decisions more efficient (Postman, 1992). Values are not legislative nor are they universal in time or space; they are ambivalent, and <technology> should import a sense of this flexibility as its expressions manifest as values that one might assume to be good per se when they are in fact relative. Relativity is a symptom of comparison which is positive toward the promotion of critical reflection.

Embedded within every tool is an ideology, according to Postman. This is explained by what Martial Mcluhan's phrase *the medium is the message* or the famous aphorism *when* *all you have is a hammer, everything looks like a nail.* When you have a computer, the world is data. The point is that technology affects our perception of the world and others (Postman, 1992). The conflict is heightened when we realize that "new technologies compete with old ones—for time, for attention, for money, for prestige, but mostly for dominance of their world view. This competition is implicit once we acknowledge that a medium contains an ideological bias" (pp. 16-18). For example, written and computerized technologies promote private learning and isolation whereas oral activities encourage group interaction and social responsibility. The point is that it is not possible to contain the effects of a new technology to one or two aspects of humanity. It is not that these technologies act alone; there is human action, investment and laziness which helps maintain a certain technology in the competition with others. When the genii is out of the bottle, it is a colossal effort to put it back in since a technology, according to Postman, is selfish in its desire or potential to influence all of society. So, when attempting to put the genii in the bottle, this act is difficult since we are struggling against a myriad of social relations that have a stake in keeping the genii out of the bottle. How can we abstract this resistance from the social relations so we can put the genii back in the bottle if we choose to do so?

I chose to call this section "paradigm" as a calculated reference to Thomas Kuhn. More specifically, I wish to call attention to the tension created once a former theory begins to no longer serve. Will we always be satisfied in knowing the world in the way(s) in which we do now? Whether or not we will, we cannot see the future; however, we should not block ourselves from other ways of knowing. Seeing <technology> as a substitute or crutch will enlighten us as to the fruitful possibilities of looking within ourselves and our more traditional means of cognition for means of diversification. The issue is not that we are learning with technology, but the issues are *how* we are learning and what the price is for this which implies that knowledge can be generated by other means.

Postman's concern is how we know the world in conjunction with the tools that we use to facilitate this process. Postman often refers to the computer as his guinea pig since it is a widely accepted advanced technology and not some more advanced instrument of an earlier invention like the cell phone was to the ground line phone. "What we need to consider about the computer has nothing to do with its efficiency as a teaching tool. We need to know in what ways it is altering our conception of learning, and how, in conjunction with television, it undermines the old idea of learning" (1992, p. 19). How or in what way does the computer change our perception of reality as well as our understanding of reality? To know something, in this case the relation between computers and how we learn, is also to know the price we pay for its use. <Technology> could incorporate this idea of a trade within its scope of understanding.

Postman argues that civilization has evolved according to the degree to which tools have influenced our experience. The question is whether or not this is necessarily the case. In the Marxist tradition of connecting technological conditions to symbolic life, Postman classifies the evolution of Western civilization in the following sequence: tools, technocracy, and technopoly. In each stage, material technology represented a paradigm in our relationship to technology. The first is a society where tools are used to solve specific natural problems like flooding and to the specific symbolic life like building castles. "Tools did not attack the dignity or integrity of the culture into which they were introduced" (1992, p. 23). In a tool using society, technology is obliged to the same rules as the rest of society, including in war. Technology is the arm which obeys the social head. Technology is a face of social relations and it is consistent with the social order; technology does not change it.

In contrast to the tool paradigm, "in a technocracy [the second stage], tools play a central role in the thought world of the culture. Everything must give way, in some degree, to their development. The social and symbolic worlds become increasingly subject to the requirements of their development" (Postman, 1992, p. 28). Tools attack culture and become culture forcing institutions like politics to fight for their lives. The tools were about truth, not power. So the scientists of the time, Bacon included, were not talking about a total takeover. There was a separation of moral and intellectual values. In other words, technological values had not completely taken over. In a society characterized as a technocracy, "a society only loosely controlled by social custom and religious tradition and driven by the impulse to invent—an unseen hand will eliminate the incompetent and reward those who produce cheaply and well the goods that people want" (p. 41). Other societal institutions were subordinated to technology, even humiliated by it.

A major shift from technocracy to technopoly (the third stage) comes from a shift in the idea of the individual. In the former the freedom of the sublimated individual was the goal (Enlightenment). In the latter the individual became an economic entity; and, therefore the individual as such represented a political force. In a technocracy, machinery is still the servants and it existed along side other institutions (Postman, 1992). In a technopoly, on the other hand, all other institutions are eliminated in as far as their traditional aspects, not related to technology are concerned. "Technopoly eliminates alternatives to itself....Technopoly is the submission of all forms of cultural life to the sovereignty and technique of technology" (Postman, 1992, p. 48) Institutions are technological institutions. Technology, in a technopoly, is the paradigm and guide for social relations. Eliminating alternatives to technology is not a way to promote critical reflection, but if we are aware of this occurrence then we can look for the social relations that can sustain alternatives, new perspectives, etc.

The publication of *The Principles of Scientific Management* by Fredrick W. Taylor in 1911 was a catalyst to the age of Technopoly. The book's fundamental assumption is that efficiency is the main goal of human labor and thought. It maintains "that technical calculation is in all respects superior to human judgment; that in fact human judgment cannot be trusted...that subjectivity is an obstacle to clear thinking; that what cannot be measured either does not exist or is of no value; and that the affairs of citizens are best guided and conducted by experts" (Postman, 1992, p. 51). These ideas and those of August Compte's social science have tended to give one the impression that humans were subordinated to their techniques and worth less than their machines. Workers became constituents of the *factor* to which they pertained within the factory system. They were cogs in the wheel, but a shift in importance or that which is considered necessary (in this case the workers) can easily result in a change in technology, as Taylor actually did with his theory of scientific management.

The above scenario is not a problem per se since the ideals of technopoly do not cause any undue and obvious tension in America because the human endeavor is encouraged to challenge its limits. Everything must be tried in the United States. Plus, American capitalists were quick to take advantage of the technological innovations of the 19^{th} and early 20^{th} centuries. They were referred to as "Robber Barons" because they were actually stealing the American past. Nothing, they thought, was worth preserving if it stood in the way of technology. Finally, for every old world belief there was a technological alternative. For instance, the substitute for prayer was penicillin (Postman, 1992). The culture of America involved the substitution of the older traditions, values, etc that were amalgamating under the protective umbrella of technological progress. Again, knowing the price we pay for the use of a certain technological expression is part of the process of knowing its entire concept. The price here is conceptual modification to match the influence of the technologies.

In a technopoly, information, and by default knowledge, is technological information; and information's only means of transmission is by way of those dictated by technology. In fact, technology legitimizes information which, as was mentioned above, can be dangerous. "Word of mouth" is no longer a treasured means of transferring information. What does this do to our perception of individuals? This may be hard to imagine, but information does not have a prescription as to how it is divulged. One of the consequences of a technopoly is that we are bombarded with information and, thus, we have no reason not to believe it. "There is almost no fact, actual or imagined that will surprise us for very long since we have no comprehensive and consistent picture of the world that would make the fact appear as an unacceptable condition. Technopoly deprives us of the social, political, historical, metaphysical, logical or spiritual basis for knowing what is beyond belief" (Postman, 1992, p. 58). Since there is no established pattern of divulgation or standard of judgment, we expect anything. This is passive behavior when we should engage ourselves with information and the form by which it is transmitted. All of the aforementioned contexts provide us with the material for critical reflection since the same piece of information can be quite different in a different set of contexts; but without the knowledge of the conditions which gave rise to the information, we cannot analyze it to the degree that it deserves or compare it to another set of circumstances.

We are experiencing a glut of information which affects our very concept of information. What is information? It is everything and nothing in that it can simultaneously have a great effect or no effect at all. Prior to the telegraph, for instance, "information was sought as part of the process of understanding and solving particular problems" (Postman, 1992, p. 67-68). Information was of local interest as it had a context attached to it. Later, space and time were no longer factors in information processing; they were also not considered to be obstacles. The telegraph was the great grandfather in a line of information technologies where one can receive a message from an unknown source. When compared to a posted letter, the ramifications of this can be quite dramatic, even subversive.

The above changes were a good thing, but the telegraph created context free information. In other words, the value of information was divested of any potential "function it might serve in social and political decision making and action. The telegraph made information into a commodity, a thing that could be bought and sold irrespective of its uses or meaning" (Postman, 1992, p. 67-68). In addition there was an explosion of visual imagery which tested our means to construe, process and negotiate reality. This is fine as long as we are conscious of this process and are able to maintain a critical relationship to it and are not numb to it. Information in a technopoly is severed from the human purpose. Information is indiscriminant, and directed to no particular social group or person. The high speed and volume of information is disconnected from theory, meaning, or purpose. In sum, a technopoly is a world, not of human progress but technological progress, and we are adapting to it. Cultures can suffer just as much from a glut of information as they can from a lack of information. We have information without control mechanisms. This is like *crying wolf* on a civilization wide level where knowledge itself is the victim as well as the shepherd boy. There is a price to too much information. Control mechanisms, such as types of information technologies, are repositories for critical reflection.

Cultures seek authorization in technology; it is the standard of expectation. Technology is a blessing and can solve all problems. Supporters of technopoly feel that the unbridled flow of uncensored information is an absolute good which offers complete freedom. The problem is that dogmatic belief is a product of technopoly as people believe in technology whole sale. Technopoly is most profitable when people's defense systems are down as they are if there is an unwavering belief in technology. Institutional life is too weak to deal with the excess of information. "When there is too much information to support any theory, information becomes essentially meaningless" (Postman, 1992, p. 77). Decisions are not based on social and traditional filters, nor are they determined through a process of knowledge construction; they are determined by practicality and convenience. By this I mean the ready access to information takes precedence over the critical reflection of its content. <Knowledge> is now disproportionately tinged with elements of quantity and superficiality as the excess of information has produced a nonchalant attitude toward the content of information.

The regulation of all this information is through bureaucracy which is far from a legislative body which can organize social relations based on any real authority. The legitimacy of a bureaucracy is with its performance and control of the system, and we are inclined to support a bureaucracy if it appears to be functioning smoothly. We are worshipping a system based on its degree of efficiency, but "bureaucracy has no intellectual or moral theory—except for its implicit assumption that efficiency is the principle aim of all social institutions" (Postman, 1992, p. 85). Other values are less worthy, irrelevant. In fact, bureaucracy is a means of avoiding responsibility. It is a crutch which servers a useful purpose, but it also comes at a price.

This price is what is lost (critical reflection) by such a complex system of control. "As the power of traditional social institutions to organize perceptions and judgment declines, bureaucracies, expertise, and technical machinery become the principal means by which Technopoly hopes to control information and thereby provide itself with intelligibility and order" (Postman, 1992, p. 91). Bureaucracy is an invisible technology which determines our concept of <organization>. It is regulation and discrimination, but it is not the most appropriate manner for expressing the relationship between technology and human cognition. It discourages critical reflection. Humanity, in terms of our relationship to knowledge, does not need a harness; it needs mechanisms which multiply our forms of expression and reflection. As things are now, technology functions in a way characteristic of regimentation since it implies the forced extrication of information reformulated into certain terms. Also, it is necessary for information to be extricated, like a mineral from the ground; then the information is pigeonholed to fit its purpose since information freely versed could be dangerous. It is like allowing a power void to exist while passively waiting for another entity to come along and fill it. It is better to fill the void on one's own terms, thus avoiding rivalry.

Technology provides us with a frame of interpretation and action. For instance lie detectors show us degrees of truth through levels of stress, and standardized tests restrict intelligence to the information provided. Truth, though, manifests in numerous ways; and there is no prescribed method for its transmission. Technology, in other words, works as a script for us to construe the world; and, in the medical profession, particularly in the US, technology guides treatment. Doctors smother patients with technology, unnecessary surgeries, treatments, etc. If the technology exists, use it all. Technological application is not neutral. It creates its own imperatives and social systems which encourage support of it. (Postman, 1992). People have accepted the computer with the same enthusiasm as they have medical science. Computers redefine humans as information processors and nature as the data to be processes. Humans are now similar to machines in terms of resources, data, etc; and how we gather information or digest it is an imitation of machines and computers. Filling out forms involves much less thinking, analysis and critical reflection that filling a blank page. Again, the computer technology has affected our concept of cognition.

The computer is involved in many aspects of our lives so its value is hard to isolate while being pervasive throughout society. The computer works well with bureaucracy. They are allies in the battle to suppress free thinking.

> Large institutions such as the Pentagon, the Internal Revenue Service and multinational corporations tell us that their decisions are made on the basis on solutions generated by computers, and this is usually good enough to put our

> minds at ease or, rather, to sleep. In any case it constrains us from making complaints or accusations. In part for this reason, the computer has strengthened bureaucratic institutions and suppressed the impulse toward social change (Postman, 1992, p. 116).

The standardization of the computer and the expanse of bureaucracy don't really provide order to society; rather they encourage isolation among the members. This is so because there is little negotiation and dialogue since, "they place an inordinate emphasis on the technical processes of communication and offer very little in the way of substance" (Postman, 1992, p. 118). Bureaucracy is about efficiency, but our most serious problems have little to do with information. For instance, starvation and a nuclear holocaust are not problems or potential problems due to a lack of information. So the computer is universally appreciated but is it the ultimate tool in dealing with problems? What skills are we loosing with such a pervasive reliance on the computer?

There is a sense of determinism to a technopoly, but it comes not in the form of more obvious examples of technological expression; rather, it emerges through the social relations of an entire society which shares a technological common denominator. Because of this we are not concerned with values lost to the values that are promoted by technology. "Technopoly encourages insensitivity to what skills may be lost in the acquisition of new ones" (Postman, 1992, p. 120). The encounter between paradigms is almost like a battle for authority to guide our actions—a battle for our souls. It would seem that a coexistence of authorities would promote a more transparent dialogue and encourage a healthy reflection. Also there would be a competition between authorities for different types of experience, allowing the possibility for the application of a more appropriate authority to the corresponding form of experience. Perhaps creating the space for alternate authorities is a new way to conceptualize <technology> thereby having a positive effect on technological expressions. In a technopoly, technology organizes social relations and it directs conceptual construction. The reverse could be true in that <technology>, instead of being the guide to social relations, could be a receptacle for them.

What about a <technology> which is based on a variety of skills which do not necessarily relate to the role of tools? This particular understanding of <technology> would come from a social project founded upon an idea of liberalism—but liberalism at all levels throughout all aspects of society and not just the political. The application of a technological expression or a system of expression has a double purpose. One is the obvious and intended use of the thing(s); the other, the more subtle and subversive, is the smothering of skills, other technological expressions, values, perspectives and social relations that do not correspond to the execution of said technology.

Postman also refers to invisible technologies such as the subject-object dichotomy, language and the scientific management of factories. Language, for instance, contains an ideology that distinguishes it, in the essence, from other languages. "To reason in Japanese is apparently not the same as to reason in English or German" (Postman, 1992, p. 124). The message within language is so subtle that we are not able to detect it. Questions and question types prefabricate answers. Statistics change our vision of reality by showing us patterns on a large scale. Lacking an ethics, statistical objectivity is the authority of technopoly. The example is polling and statistics. These make technological decisions rationally based and directly related to the society at hand. These methods also make democracy rational. This complex and interconnected sense of rationality blinds a society to actually seeing social relations as actions based on technology exclusively.

Democracy is affected by technology. Should this concept be so rational, or should it promote diversity and creative participation in society? Again, I recall the question posed earlier in this investigation: what if a deaf person could hear how they talk? They might be inclined to change the way they talk if they could. Also, I was inspired by Escher's spherical mirror which is a physical manifestation of this investigation in that I am trying to show the world what it is with a mirror which incorporates many more social relations that have been previously considered.

The reason for doing this is that we loose sight of the issue that *a* method is not necessarily *the* reality. "When a method of doing things becomes so deeply associated with an institution that we no longer know which came first—the method or the institution—then it is difficult to change the institution or even imagine alternative methods for achieving its purposes" (Postman, 1992, p. 143). There is choice behind a method, but by this Postman is saying that we must be aware of where our technologies come from and what they are used for so as to restore them to our authority.

The totality of methods mentioned above has been understood as "scientism" in certain academic circles. In a technopoly, such a belief, or dogmatism, goes so far as to boast that the methods of science can be applied to human behavior and that society can be organized by a set of rational and humane rules—invisible technologies. Science is the rubber stamp of approval for society; it gives meaning to life (Postman, 1992). Ultimately, the purpose of scientism in a technopoly is to eliminate the conditions that obviate the need for technique. "Technopoly wishes to solve, once and for all, the dilemma of subjectivity. In a culture in which the machine, with its impersonal and endlessly repeatable operations, is a controlling metaphor and considered to be the instrument of progress, subjectivity becomes profoundly unacceptable. Diversity, complexity, and ambiguity of human judgment are enemies of technique" (Postman, 1992, p. 158). It is vain to believe that Science or any other ideology is a source of moral authority. "But science has no more authority than you do or I do to establish such criteria as the true definition of life or of human state or personhood" Postman, N. (p. 162). Why cannot science as an authority exist along side other forms of authority which could help in times of application? Again, this would be the result of a project of liberalism encouraged to permeate all areas of society. To put other ideologies and institutions is a project.

Just as power abhors a void, and the belief in one God obviates the belief in another, a technopoly will not share symbolic power with any other entity that is not a component in the social relations determined by technology. The role of symbols in a technopoly is diminished by repetition. We become calloused to their meaning and they have meaning only in so far as technology allows.

> In Technopoly, the trivialization of significant cultural symbols is largely conducted by commercial enterprise. This occurs not because corporate America is greedy but because the adoration of technology pre-empts the adoration of anything else. Symbols that draw their meaning from traditional religious or national contexts must therefore be made impotent as quickly as possible—that is drained of sacred or even serious connotations. The elevation of one god requires the demotion of another (Postman, 1992, p. 165).

Societies need culture and they will search for one when there is none, for better or worse. Postman points out the rapid spread of the Nazi culture, so embraced by the German people. Symbols are meant to carry a lot of interpretational value, but if technology is restricting this type of flexibility then it is at the same time reducing the possibility for critical reflection. Symbols can unite and organize us, but they can also serve as a means to create or recognize new social relations.

The point is that cultures and perspectives can be created almost out of nothing. Can we not create a culture which encourages the diversification of <technology>? If a culture can be so easily created based on aggressive nationalism and racism, then surely one can be created based on ideals that are agreeable to an international existence and harmonious one with the environment. Or we can create a culture whereby we require the existence of multiple authorities which should have a reverse effect upon our aspirations in that they would encourage a diversity of expression, reflection and experience—a multipurpose society instead of a single purpose one. Symbols are definitely within our range of authority. They are our advantage when negotiating the world; they should be under our control. Technology should not coerce our symbol making process as this is truly our gift, and symbolic flexibility is a great source of inspiration for technological expressions.

Can technology exist along side other forms of authority? The technological innovations that we have experienced since the 19th century, apart from being wonderfully convenient and efficient, have created the kind of world that treats tradition as an obstacle to a perspective required for the proliferation of technology. "Tradition is in fact nothing but the acknowledgement of the authority of symbols and the relevance of the narratives that gave birth to them. With the erosion of symbols there follows a loss of narrative, which is one of the most debilitating consequences of technopoly's power" (Postman, 1992, p.171). The consequences of a loss of narrative can be quite dramatic. A way to reconstruct a narrative could be to start from many more social relations at the bottom and build upwards. Another way would be to turn our eyes to a period in time when there was a healthy competition of narratives as was the case during Modernism. Another would be to place our current authorities along side the authority behind our symbol making potential.

Postman points out that he wrote this book during the first Gulf War which he claims is an example of a nation trying to muster a "national spirit and a sense of resolve" when there is no symbolic unification or tradition to justify this war. This was all the more difficult, commented Postman, now that the Cold War, along with its polarizing and symbolic power, is over. In other words, the US government found it difficult to find and express the core reason to go to war with Iraq, so the US contrived the reasons—"to face naked aggression", or something similarly vague (1992). Such a strategy, policy even, is now more than ever practiced as witnessed with such phrases as: *axis of evil, with us or against us, or bring it on.* These phrases are binomials when, in situations of international interest, mega-nomials should be employed. Symbols do not have a prefabricated meaning. It can even be argued that we no longer have symbols since their degree of efficaciousness has been trivialized. Efficiency should not be a standard by which we judge a symbol's transmission; rather, the manner by which its meaning interacts with the subject should be the standard. In order for this to happen, there needs to be time and space for reflection, understanding and interpretation; otherwise, symbols are merely forms of trivialized art. Symbols make boundaries; therefore they encourage critical reflection. The art of symbol making, on the other hand, creates space for new perspectives, also encouraging critical reflection.

If there were an aporia to <technology> it would be efficiency, the end point of technological analysis. Efficiency is another selfish concept which does not like to share the spotlight with other values. For example, when the question of whether or not to introduce computers into the classroom was made, the answer was to make education more efficient, and no one questioned the logic of this. Efficiency answers the question of how one is educated; but it evades the greater question of what is the purpose of education. "The Technopoly story is without a moral center. It puts in its place efficiency, interest, and economic advance...It casts aside all traditional narratives and symbols that suggest stability and orderliness, and tells, instead, of a life of skills, technical expertise, and the ecstasy of consumption. Its purpose is to produce functionaries for an ongoing Technopoly" (Postman, 1992, p. 179). We are not asking the purpose of this beyond the fabrication of functionaries for an ongoing technopoly. <Efficiency> is a form of authority in that it has altered our means of administering education; but it lacks an element of effect or reflection.

A more holistic concept of <technology>, however, would encourage the incorporation of new authorities and, by necessity, space for critical reflection. Perhaps even our understanding of <efficiency> would be diversified to the point where we think an action is efficient if it accomplishes nothing negative, for example.

A society is an object which is distinct from other societies, and it is an organization based on certain values, one of them being efficiency, let's say. A society also atomizes certain elements as it divests itself from the importance of its traditions which hitherto had bound it together. Our judgments are without independent foundations. The more technology is allowed to replace our symbols and traditions, the more flooded we are with information and the more isolated we become from one another. Efficiency does not need a justification since it is a means not tied to a specific end. Efficiency is not conceptually specific or linked to a social narrative that "gives meaning to the past, explains the present and provides guidance for the future. [A narrative] is a story whose principles help a culture to organize its institutions, to develop ideas, and to find authority for its actions" (Postman, 1992, p. 172). This seems similar to the idea of strengthening, diversifying or expanding a concept.

Postman concludes by advocating some form of resistance to technology. He refers to this form of resistance as a loving resistance fighter.

> A resistance fighter understands that technology must never be accepted as part of the natural order of things, that every technology—from an IQ test to an automobile to a television set to a computer—is a product of a particular economic and political context and carries with it a program, an agenda, and a philosophy that may or may not be life-enhancing and that therefore require scrutiny, criticism, and control (Postman, 1992, pp.184-185).

In order to produce these resistance fighters, Postman advocates a new type of education—one that contains "a set of ideas that permeates all parts of the curriculum" (p. 186). If there is such a core now, it is about marketable skills but no core (fundamental) point of view. Some would promote emotional health as such a point of view, and Postman would stress an education which encourages us to "gain a unified understanding of nature and our place in it" (p. 187). An education characterized as an interdisciplinary and intra-socio activity, in terms of cross referencing between perspectives and resources, would certainly promote critical reflection. This is a new paradigm of education, and education is a general term applied to the large issues of cognition and construction of meaning. Could we not also search for a new paradigm of technological achievement in order to alter or diversify its material output? Where are the tensions and the frictions which will compel us to find new types (paradigms) of technologies? One source would be from the overload of ungrounded information. Excessive output of information is the natural result of an over concentration of information technologies. We are putting all our eggs in one basket when the potential of humanity is far more diversified than to invest a skewed amount of our capacities into one type of technology.

Humans are too possessive to allow a form of justification to exist too far removed from their own control. Society must create the conditions which encourage a critical relationship with technology in order to improve it. <Technology> could be a concept which incorporates such a dialogue. What is important about Postman's analysis is that the meta-technologies (historical narratives) have a profound effect upon our conceptual constructions. Technologies affect our conceptual construction simply because we do not allow other authorities to rise to the challenge of doing the same. To do so would be a project which encourages a healthy competition between powers that could participate in conceptual construction—an extreme exercise in critical reflection.

I. <Technology> as the dominant frontier

Technology is a paradigm or standard for political change. Everything is possible, but possible how? Similar to Postman's theory about a society having a single purpose which determines that new purposes must be encouraged, Daniel Boorstin characterizes our relationship to technology as one of shared concerns and experiences whereby a society as a whole processes the same information at relatively the same rate, even though at varied levels of sophistication. In this sense technology is non neutral. By "processes" I mean that a society reacts to technologies and technological change in the same way and at the same rate, more or less. He labels such a society as "The Republic of Technology" where a new civilization, bound by technology, emerges. The title of the book is an obvious stab at our form of representative democracy. Most countries don't employ traditional democracy; we have re-publics which operate with a body of officials acting for the public good, or what they interpret as the public good. The problem is that the "public good" has been replaced with "technology", hence *The Republic of Technology.*

For Boorstin a republic is "an object for which government ought to be instituted…the public good…the public thing" (1978, p. 2). He nominates technology as that which constitutes our shared experience, the sameness of artifacts, experience and categories. In this sense, technology breaks barriers and dissolves ideologies, and the pace of change distinguishes nations. *The Republic of Technology* can be read as an allegory of the growth of America and why technological innovation has been so welcomed by American society. He feels that the American experience is defined by technological change which is in turn characterized by two values: convergence and obsolescence. These concepts prove to be the inspiration for a narrative or a project defining social relations and determining technological expressions. These concepts are also values which constitute a particular form of technology. Technology is our project when the public per se should be the necessary beneficiary.

These are two forces or concepts, according to Boorstin, that generalize the type of technology we have. Technologies exist through processes of obsolescence and convergence. As to the first, writes Boorstin, "nations seems to be distinguished not by their heritage or stock of monuments, but by their pace of change" (1978, p. 5). Technological change is so great that we render older technologies useless; in fact, this is the idea behind innovation. Also, the flood of information causes us to disregard previous information or to not comprehend any of it. We think change is good, regardless of the cost. For example, "a Louis Sullivan building is torn down to make way for a parking garage. Progress seems to have become quick, sudden and wholesale" (p. 5). These concepts permeate and affect technological expressions. Why must change be characterized and associated with obsolescence? Change can have other forms, and a new way to see <technology> would do this. New, in fact, can assume different qualities.

As to the second ideal, convergence, within *The Republic of Technology* there is a "tendency for everything to become more like everything else" and he uses the example of basing the classification of all the countries of the world on the similar root word of develop: developed, developing, etc. By this "we see the experience of all people converging. A common standard enables us to measure the rate of convergence statistically—by GNP, per capita annual income and by rates of growth" (Boorstin, 1978, p. 5). Within the ideal of convergence, individuality is not encouraged, hence the genius and beauty of the television is that its method of transmission does not require one to be very educated—just not blind and deaf, but even that is changing. All can receive the information at the same rate. Programming can even instruct one on how to understand the information being transmitted. Convergence seems to dissuade a subjective and total relationship with <technology>. Our diversity is being denied by convergence tendencies within technological production, but this is not to say that technological expressions must be determined by a limited number of concepts. This is reinforced by the term "emerging nations" which is a common phrase today that is coming to replace developing. In any event, "emerging" implies a predetermined context for development once the countries emerge or germinate.

Convergence also includes the idea of diminishing the differences "between older categories of experience" (Boorstin, 1978, p. 6). Take for example, the once elementary distinction between transportation and communication, between the moving person and the moving message. Now, the television can move the message much faster and to more people. So "our television screen becomes a superior way of getting there" (p. 7). The importance of the individual and his/her experience has been diminished in a world where having the same experience through television is more highly valued than that person's individual interpretation of an actual experience. [This sentiment is all the more true in the 21st century as email, black berries, and the internet have come to dominate the work place] So, in this sense, the republic of technology is a community which exhibits very non neutral qualities since it demonstrates the proclivity to prioritize, establish and exclude traditional categories of experience. Experience is *standardized.* Another option would be a <technology> that is constructed to encourage a variety of experiences? If we maintain "older categories of experience", then we are encouraging critical reflection.

The Republic is also non neutral in another sense, as well. It "invents needs and exports problems" (Boorstin, 1978, p. 8). In this sense, Boorstin's republic of technology is a departure from the original intentions of the Enlightenment which were directed toward the domination of real problems related to the natural environment and human disease (Borgmann, 1984). This idea of inventing needs and exporting problems is made possible by another technology which, according to Boorstin, is by way of advertising. The symbiotic relationship between technology and advertising means that a technology can be created without considering whether or not a society really needs it; advertising will convince us of its indispensability. In this way, "wants are created not by human nature but by technology itself" (Boorstin, 1978, p. 9). In turn, advertising relies on evermore new and innovative technologies to serve as fuel for their industry. To illustrate the aforementioned point, Boorstin shows that there was no demand for either the telephone or the automobile but that in conjunction with advertising, "technology create[d] progress by developing the need for the unnecessary" (p. 9). Here we see the idea of progress in a different light. Progress, according to Boorstin, is a superficial fabrication of technology itself; progress serves and is served by technology, and it does not have a necessary relation to its host society.

We would not have to invent needs and export problems if the source of a Republic's decisions actually came directly from the public and not from the collateral baggage of technology. Needs can come from any such source and not just technology, and seeing <technology> in a new way would encourage the tapping of this reserve. Re-source can be reinterpreted as an origin, like a fountain, for the people actually reflecting a re-public. This would be to view "progress" based on needs apart from those generated by technology per se. In this way, progress would not be sought based on itself but by external needs which would alter our concept of <technology>.

These days, progress can be understood as a measure based on the mere novelty of the technology itself and not its empirical value in society. This notion came of age after the industrial revolution seen through the idea of international fairs which embodied the Enlightenment ideal of the conversion of nature to something for our use. In the case of the international fairs, the conversion was from one of public space to an arena of capitalism.

Progress was associated with the newness of the thing and not necessarily with the qualities of the thing. In *Passagen Werk,* Walter Benjamin writes that the international fairs were the "origins of the pleasure industry which refined and multiplied the varieties of reactive behavior of the masses thereby prepares the masses for adapting to advertisements...At the fairs the crowd was conditioned to the principle of advertisement: look but don't touch and taught to derive pleasure from the spectacle alone" (Levin, 1993, p.310). What was seen, though, had to be new, and that was all. The criterion was challenging but yet simple: new. The fairs were visible proof of progress, and the crowds were to be impressed by the idea of progress as newness and availability. Again, technology creates need; and, in this case, need was based on <newness> which affected technological expressions accordingly. The technologies, by their newness, also affected our concepts of <good> in that it simply meant "new". Could not expressions be based on other concepts or needs apart from technology thereby having alternative effects?

Benjamin called this spectacle a phantasmagoria whereby the key was, "not so much the commodity-in-the-market as the commodity-on-display where exchange value no less than use value lost practical meaning, and purely representational value came to the fore. Moreover, when newness became a fetish, history itself became a manifestation of the commodity form" (Levin, 1993, p.311). The world became trivialized as the spectator passed through the arcades looking at the many displays under one roof. Another potential problem is that the concept of <new> does not necessarily have to be founded on anything within existing social relations thereby discouraging technologists to look to the public for inspiration. This encourages a separation, even, between society and technological expressions or a set of circumstances where technology influences the people and not the other way around.

The presence of these new inventions is not neutral; rather, technology is irreversible in the sense that once there is an invention, we cannot divest ourselves of its effects. This is so because once we have a better and more efficient way of doing something, we cannot return to that which was made obsolete by the new invention. For example, "we cannot go back and forth between the kerosene lamp and the electric light" (Boorstin, 1978, p. 9). According to Boorstin, this phenomenon is partly related to the ever increasing interconnectedness of technologies. An electric light is connected to many more other technologies than the lamp. Recall Albert Borgmann's device. A kerosene lamp is a device which contains the commodity of light and the apparatus which contains it as well as the industry which provided the accelerant to burn. An electric light, however, is a more technically advanced light, while the commodity is relatively the same, but the light is connected to many household items, the grid system, building codes, etc.

Perhaps what is most pernicious about our inability to un-invent technologies or their effects is that we don't really attempt to correct the wrongs related to the technology [recall the Kyoto accords on the standard emissions of automobiles]; rather we actually appease them. We make amends for the automobile by making crosswalks, construct environmentally questionable road systems which forever terminate any natural rebound and build temples to house them [parking garages]. Perhaps the most nefarious way in which we appease certain technologies, harmful or not, is in the area of politics. Politics serves and is served by technology. Take, for example, the television. The politicians will support the industry as well as rely on its benefits for campaigning and promoting their agenda (Boorstin, 1978). As to the constituency, they will elect someone who has a good presence on the television screen [recall the Nixon-Kennedy debate where Nixon technically won, but Kennedy looked better loosing]. As a result, this promotes a society obsessed with physical appearance, for example, rather than substance or character. "We live and will live in a world of increasingly involuntary commitments" (p. 10). Awareness of such commitments and sacrifices encourages critical reflection which then serves as an inspiration not to appease certain technological expressions. How can conditions be created which would serve as a catalyst for voluntary empirical social relations?

Technology assimilates experience. By this Boorstin means that daily experience is becoming more and more equal thereby reducing critical reflection. It also insulates and isolates us from our social and physical environment as well as from other individuals. In this way, the individual needs are prioritized over needs that are conducive to promoting harmony within a community. Boorstin uses the example of earphones to preclude conversation on an airplane or a private TV for children instead of a play house (1978). We are so comfortable with satisfying our own needs that the needs of the community are forgotten. Technology forces us to equalize our experience; it is ruthlessly egalitarian. Technology insulates and isolates in that it makes us so comfortable that we ignore each other. Technology can also separate us from unique experience or existence. For example a snow mobile converts a mountain into a highway. Isolation, as opposed to contact, does not encourage diversity or the expansion of concepts. The point is that conceptual foundations are determined by society, and a social project designed to encourage the implementation of certain concepts to the exclusion of others would require contact of a variety of perspectives and critical reflection.

What is also forgotten is our relationship to nature. There are so many inventions designed to prevent us from experiencing nature that we ignore their larger repercussions. Boorstin points out that the US has a number of different climates and diverse landscapes but that technology equalizes them, thus diminishing their individual significance (1978). The result of this is that political agendas will not reflect local conditions, but they will be characteristic of the needs which we all share or can be convinced that they are common needs. This sounds good, but the needs that transcend a certain country's unique peoples and geographies are related to the integrated needs of technology, like the information industry, the weapons industry and the oil industry. All of this is a form of suppressing diverse resource potentials. In order to promote diversity, we should not be forgetting or cutting relationships. We should be cultivating them so as to find new sources of inspiration for technological production. Contact with difference, as opposed to amalgamation, would do this.

Boorstin concludes the first chapter of *The Republic of Technology* by saying that the unique experience of the United States promotes the idea of a free relationship with technology (meaning reflective) which could overcome the problems characterized by the integrated needs of technology. There is a sense of hope that is left over from the days of colonization where there was an entire continent with which to experiment. He also says that Americans, "try the new as do few other peoples of the world. [Their] experiment of binding peoples from everywhere by opportunities rather than ideologies will continue. *The Republic of Technology* offers fantastic new opportunities for opportunity" (1978, p. 12). He asks, however, if we will be able to enjoy the advantages of technology which carries us "willy nilly beyond our imaginings and yet have some sense of control over our own destiny" (p. 12). Can we enjoy technology but at the same time control it to reflect our plurality of experience?

Boorstin asks us to reflect on the kinds of technologies, those characterized by obsolescence and convergence, and criticize them. "A world where experience will be created equal temps us in new ways and offers new dilemmas...Will we be able to continue to enrich our lives with the ancient and durable treasures, to enjoy our nation's inheritance from our nation's founders, while the winds of obsolescence blow about us and while we enjoy the delights of ever-widening sharing?" (1978, p. 12). Cannot technology reflect other ideals beside obsolescence and convergence? Boorstin is calling for a project that critically reflects upon the conceptual foundations of <technology> with the hope of altering technological expressions.

Boorstin is very optimistic about the potential of technology to create opportunities for opportunity, but he wants us to understand the drawbacks of technological choice. He warns us that "some strange fruit is apt to grow in the fertile orchards of our technological progress. If we remain aware of the special risks in the community of our future, we will run less risk of losing unprecedented benefits that we have come to take for granted" (1978, p. 8). Boorstin asks if we will be able to control our own destiny in a world of limitless and unpredictable opportunities. "The republic of technology where we will be living is a feedback world. There wants will be created not by human nature or by century old yearnings, but by technology itself" (p. 9). We don't address the problem of technology, if it exists, but we appease technology. "These devices that enlarge our sight and vision in space seem somehow to imprison us in the present. The electronic technology that reaches out instantaneously over the continents does very little to help us cross the centuries" (p. 11). The present keeps reinventing itself as we are not able to tie technology to the consequences or contingencies. In the *Origin of the Species*, Darwin wrote of the continuous emergence of the new. Darwin "provided a way of talking about change, of making plausible the emergence of novelty in experience, and of showing how the sloughing off of the old inevitably produces the new" (p. 19). This concept of change, as well as its status as a socially accepted idea, permeated many social relations which then later affected technological expressions.

Such thinking was a symptom and cause of the type of ideology that existed in the US as the Americans were learning who they were and inventing their place in the world. This way of thinking was practically fabricated by one man and it had implications in science, social science and the economy. Creating the conditions in which change can be discussed in a new way, could have a correlative effect on technological expression. Darwinism is an invisible technology, a meta-technology, which filtered down into many social relations.

To characterize technological change, Boortsin focuses on the experience of the growth of the United States as an analogy between a type of change and a particular type of *host* society. The early American settlers were presented with a land that was free, with no rules and few indelible obstacles—a clean slate. The result, both materially and ideologically was unpredictable. <Technology>, like the American frame of mind, can be termed with the phrase "anything is possible"; but if anything is possible, then the conceptual foundations of <technology> can be changed to, let's say, "any perspective is valid" thereby encouraging critical reflection.

The problem with a narrative built on possibility is that technological history, unlike social history, is much less predictable. In other words, the nature of technological change differs greatly from that of social change.

> Who, for example, could have predicted that the internal combustion engine and the automobile would spawn a new world of installment buying, credit cards, franchisees,...that it would revise the meaning of cities and transform morality by instigating new institutions of no fault reparations. The course of political change is somehow roughly predictable. Not so for technological change (Boorstin, 1978, p. 24-25).

Predictability, according to Boorstin, is indicative of an essential motive without which change can lead to disastrous outcomes. How can we augment our predictability element when reflecting on technological change? Technological change does not have a clear "why" unlike the political changes. There is also no clear how and what in technological change. We cannot even successfully assess technological change, the effects of the airplane, for instance. "While political change starts from problems, technological change starts from the search for problems" (p. 27), and solutions to these problems become problems themselves. So we cannot approach them in the same fashion. Boorstin is keeping the political and technological worlds separate which allows for opportunities for comparison and reflection. Being aware of how <technology> is oriented toward problems should serve to enrich our analysis of it.

The explosion of possibilities, ironically, diminishes the conceptual weight of what we understand to be possible. All scientific possibilities are technologically possible and technological change is irreversible. We cannot envision all the possibilities, but thanks to technology we feel that everything is possible.

> If anything is possible, then we really cannot know what is possible, simply because we cannot imagine everything. Where, as in the political world, we make the possibilities ourselves, the limitations of the human imagination are reflected in the limitations of actual possibilities themselves; but the physical world is not of our making, and hence its full range of possibilities is beyond our imagining (Boorstin, 1992, p. 32).

Different kinds of problems are not solved the same way, but technology teaches us to solve all problems the same way. That something is possible is no framework for reflection; plus something is possible in a certain way, and obsessing with the possibility will make us inclined to ignore other options or better ways. In this sense, technology is no guide for politics.

Politics is about mankind coming to terms with social problems, but "the central problem of technology is how to come to terms with solutions....our irritation with one another and with other nations come from our unwillingness to believe in the insoluble problem…Americans have tended to take the technological problem-the solution problem-as the prototype of the problems of our nation, and then, too, of all mankind" (Boorstin, 1978, p. 33). We assume that all problems are like them. We do not draw from the political or social; we derive our ability to judge and standards of judgment from technology more and more.

The early American settlers expected to get riches from the land as they entered virgin soil. In this way, Boorstin likens the American experience to bombed-out Japan and Germany after WWII. In these cases, technology did not have to compete with any previous technology or tradition. They then translated this sentiment to machines. "While the machine made man feel master of his world, it also changed the feeling of the world that he had mastered. The machine was a homogenizing device. The machine tended to make everything-products, times, places, people, more alike" (1978, p. 44). Of course the machine is wonderful, but Boorstin sees the problem as one of a lack of reflection. As to the homogenizing power of the machine, "Americans never even thought of it as an American peculiarity" (p. 45). They did not question it, thus we have a dearth of technological reflection but a plethora of production within a limited context. The reason for this is that if technological expressions and social relations are analogous one does not question them nor does he/she look for alternatives. What about a <technology> constructed upon a foundation of critical reflection?

Machines prove to be able to merge the artificial and the authentic in that we are not able to distinguish forms of being. "Americans watching television were often puzzled about when and where the visible events had occurred"(Boorstin, 1978, p. 46). The land for the Americans had a limit as to what it could provide, but the machine has no concrete boundary; therefore, it may encroach upon what is something's ontology. The issue or:

> The challenge of the Machine was as open-ended as the human spirit. Americans in the later part of the twentieth century, in defiance of some fashionable woe-sayers, had more chance than ever before to do the unprecedented. Their problem was not the lack of opportunity for adventure but the shallowness of their human satisfaction and human fulfillment. The American challenge was how to keep alive the sense of quest which had brought the nation into being. How to discover the endless novelties of the machine, how to make a plastic heart, devise television in three dimensions, explore the moon and planets. How to do a thousand still-unimagined works of machine magic without becoming the servant of the machine or allowing the sense of novelty to pall or the quest for new to loose its charm (p. 48).

Here, Boorstin is being subtle about saying that it is the quest for the new that will drive technological innovation. New is a weak criterion; but it certainly determined the evolution of the American identity. He is implying that if the Americans don't keep searching with the machine as their vehicle, then their identity will die. The quest for the new maintains technological production as well as identity. Is this the only inspiration or can it accompany others? <New> is not necessarily a concept which cannot exist in conjunction with others. The concept of <...> seems to be just as good an inspiration. These concepts are arbitrary, almost mythical.

Shifting the consequences of our considerations is a way to affect <technology> and the nature of our technological expressions. For example, the motivation for something new can also be about the other rather than the self, or it can be about morality along side of the efficient; but the doubts Boorstin is raising are related to the problem that we don't question the "what or that" of change. As it stands now, we are only concerned with "that" technology changes or that it advances us toward the new. This suggests that we seek change at all costs. We don't care about the "how" as much. This is so because Boorstin is comparing Americans in the technological age to the pioneers of the age of the expanding frontier where anything including genocide and laissez faire business practices that were destructive to the environment were the norm. Could a civilization embrace policies that encourage a harmonious development? Manifest destiny was without a doubt harmful on many levels. What about Incorporated Environmental and International Existence as ideological inspirations? Government and Industry can combine on a project geared toward the promotion of the aforementioned ideals.

Boorstin comments that a technology is a mechanism for satisfying means and desires which could manifest in many, often subtle, forms. For example the US Constitution was designed to address specific problems of government. It was an empirically based effort. The writers of the American Constitution were not as interested in the formulation of an ideology as they were in creating a technology of politics. In other words there was a technological spirit being applied to the formulation of a new society and government. "They were testing the well known principles by applying them to their specific problems. Their special concern was to organize the means for satisfying needs and desires—which is a dictionary definition of technology" (1978, p. 49). A forerunner to the US Constitution, in terms of importance, was the Declaration of Independence. Interestingly, this document was based on grievances not on principles. When accused of writing nothing original, Thomas Jefferson replied that the document was a justification of the subject before mankind. The document was a declaration of independence. This is technology in that it was designed to address a set of needs, one of which was economic autonomy. What is important is that each document (technological expressions that were the direct result of actual social relations) had an essential value which guided its production. Values can be easily exchanged for others that could have a favorable influence on technology. The point is that these documents were the manifestations of certain projects calibrated toward the goals of a society making seem projects seem both arbitrary and interchangeable.

The document that followed the Declaration of Independence, the Constitution, was a remedy, a device designed to unite the colonies for defense, justice, and trade. It was less a florid description of a young nation than it was an empirical response to needs, both current and future. "The framers aimed to guide the future not fence it in....They provided a document that was uncannily open to the future" (Boorstin, 1978 p. 53) just like <technology>. That it was left open to future applications without restricting the future of possibilities is an identification with Progress as an ideal which is constantly to be pursued but never obtained. Rather that a restrictive document, its power is in reverse as interpretation from the courts actually works to preserve the integrity of its principles. In addition, the flexibility and vagueness of the Constitution created the conditions for the government to adapt to empirical realities. This was accomplished through the process of amendments and the expansion of the nation's territory. "In these and countless other ways the Founding Fathers declared themselves custodians of an expanding future," (Boorstin, 1978, p. 56-57) where technology would be treated with utmost privilege as the vehicle of this expansion. Technologies have models, social relations that influence their form. In this case, government was conceived as an entity which would constantly adapt to technology. Here again, we see how technologies affect our conceptual construction.

The Founding Fathers wished not to limit the possibilities of their young nation as they wished to compete with European powers. Their solution was Federalism. The former is a means to allow for sovereignty between the states and the nation to come to the surface on its own without trying to force it to happen. In America everything was an experiment: the new lands of possibilities, new people, nations, innovative techniques to solve problems, etc. Later, in the 19th century this idea would flourish through new technological innovation. "What Federalism was in the world of politics, technology would be in the minutiae of everyday life. Just as federalism would test still unexplored possibilities in government, technology would test unimagined possibilities in the modes of common experience" (Boorstin, 1978, p. 59). What also resulted was a type of federalism between government and business. By analogy we can see an altogether different type of project based on a different agreement between Government and Industry. Concerning the time about which Boorstin was writing, business was encouraged to do whatever it wanted, thus relieving the government from so many tedious tasks as long as the business activity did not violate the rights of too many others. If the concept of <technology> could be shifted so as to include the <now> as well as the future then its material production should reflect this additional concept.

In the area of education, the structure of the institutions was left to the local arenas, resulting in a diverse, and sometimes deficient, idea of what it means to be educated. Toward the end of the 19th century the federal government gave the states land to be sold and then used for higher education. The result was that there was no system or educational hierarchy, as there was in the states of Europe. One result is that Americans cannot agree on what is an educated person. "The American preoccupation with the future—to which the past and the present are considered only a clue—has always made it difficult here to instill a decent respect for the body of traditional learning, and the vocabulary required for that acquisition" (Boorstin, 1978, p. 71). Since we are so focused on the future, we find it difficult to concentrate on the present. If we could focus on the present there would be a better, or at least different, form of standardized or socialized education. As it stands it becomes the responsibility of the individual to obtain a satisfactory education. The individual must apply him/herself toward the future, a non existent entity. The individual then looks and places himself with an eye toward the future. Looking to the future is analogous to tunnel vision and one does not see his/her surroundings. Our surroundings are resources which we are ignoring.

The characteristics of American education are based on the needs of the community in which the institutions are located and by adapting to the changing needs. In effect, the US has an education system that is not a system; it is a web of individual and invisible technologies. "At best the American situation has offered a national opportunity for creative chaos, endless variety, and open opportunity. At worst, the American situation has been anarchy and has promoted Philistinism" (Boorstin, 1978, p. 70). This is a price we pay for certain decisions concerning technology. Again, to know a concept is in part to know its implications. The knowledge of these implications is and is the result of social relations which in turn expand the concept of technology. As to our actual experience with technology, we either blindly accept it and the multitude of its expressions and deal or not with the chaos.

Despite the chaos mentioned in the previous paragraph, with the influx of intellectual immigrants the US experienced a Renaissance. The middle of the 19th Century and then later in the 1930s and 40s, the US became a repository of creation and artistic expression. The catalyst for this was massive immigration from Europe. Boorstin comments that the world of culture exists in conjunction with the empirical world. Despite the injustices inflicted in the empirical world, "there is no known device for artistic contraception. The brutal tyrannies of our age have dulled and diluted the cultures of their own nations. But the world of culture is beyond their jurisdiction" (1978, p. 74). This is to say that as artists are expelled from their own lands, they reappear in America. This reflects "the American belief in the right of voluntary expatriation" (p. 75). Again, we see the elevation of the subject to which Jefferson referred when accused of writing nothing new. It was nothing new per se because there was no tangible reference to anything innovative, only reference to the conditions for the new. To elevate the subject is to create the conditions for the new, which only comes later, just as technology or progress as the manifestation of the new is not based on anything recognizable new unless and until it is developed.

Technology and progress are founded on the conditions for the new and not necessarily on anything recognizably cultural, traditional, etc. In terms of the future, in fact, it could be argued that it is better to base technology on newness or even effectiveness, since we cannot know which traditions will be around to which can be enlisted to found technological change. A <technology> based on a vague set of values, those constituting the new, requires a powerful entity to be able to direct what the criterion for the new will be. This is not a cultivation of diversity; rather it is a restriction on individuality in that only a few interests are being satisfied.

Fortunately there was a space in the US for this influx of immigration. The immigrants who came as a result of fascism in Europe were already formed academically and socially. They only needed a system which encouraged or required their services—recall Murata's argument regarding the transfer of technology. They brought their vision and "in no period in American history were our thought and art and culture more deeply stirred or more grandly shaped by currents from abroad" (Boorstin, 1978, p. 86). The immigrants assimilated, but they kept their vision and individuality, thus adding to the diversity of potential to American production and ideology. Boorstin wants us to recognize this when compared to the policies of the US that have restricted immigration and created laws (anti civil rights) which have served to segregate or encourage assimilation. Spaces could be created where one's individuality is encouraged thereby encouraging the diversification of technological production. This is a project founded on social relations that behooved creativity, innovation and technological production of massive and complex proportions. Recall, there is no contraception for artistic expression; it only needs a friendly environment.

Assimilation is an important concept, and it is not limited to any one application. There can be assimilation between unrelated entities with new or modified results. Just as working with the land is a connection between man, God, and nature, the machine is also a sort of connection but one to the unknown. “The power of the machine is man’s power to remake his world, to master it to his own ends” (Boorstin, 1978, p. 91). A technological innovation takes on a life of its own. We cannot predict the influence of a technological innovation nor is it easily thrown away. Their affect is irreversible. Boorstin wants us to be aware that the greatest influence on our lives is not technology but our imagination. Prediction limits the potential of our imagination.

Our imagination is in danger of being restricted to a technological interpretation of the world which can be interpreted in any number of ways. This is similar to Mumford’s argument against the conception of man as a tool-maker and not primarily as a thinker. “Perhaps the greatest danger in a machine-dominated America is the temptation to believe that our world is more predictable than it really is. Each triumph of our technology tempts us to redraw the geography of our imagination. We move from the world of romance and adventure into the prosaic territories of what we already knew. From an open world of mystery to a world fenced in by margins of error” (Boorstin, 1978, p. 95). However, the wall between us and the impossible has been taken down, even though we are loosing our sense of wonder. “The increasing quantities of technical knowledge and the growing number of specialties do threaten to fence in our imagination. What the experts saw as impossible turn out to be the spectacular technological achievements of the twentieth century” (p. 96). It is from technology that we learned to believe that anything is possible, thus debilitating our imagination in the sense that we can imagine anything to be technologically possible. Our imagination is guided by technology; this is the danger Boorstin is warning us against. The realm of possibility is in a way a limitation in that there is a sense of predictability to it. Predictability is a limitation in that we are preconditioning a result when in actuality technologies posses some degree of agency which can be a resource put toward diversified use. By limitation I mean that there are few values which guide technological activity—predictability being one. <Predictability> is a fatalistic concept since it is based on the past, and it has the effect of smothering possibility.

If we have lost our sense of wonder, Boorstin says that it is healthy, thanks to technology, that there is no wall between us and the impossible. We have a problem with someone telling us that it is impossible. Technology has taught us this; however, we still need to remain skeptical. "The layman's vocation is to preserve the spirit of hopeful skepticism" (1978, p. 96). We need not be afraid as long as reason is left to combat the follies of another's imagination. What I believe Boorstin is suggesting is that to question something is more than just to question whether it is possible or not. There are categories of questioning that are being obscured by technology. Technologically possible is no longer good enough. There are other considerations which require space for critical reflection.

Boorstin says that we have a difficult challenge at the end of the 20th century—that of cultivating both the political arts as well as the technological ones. This, he says, will be very difficult since, "never before has a people been so tempted to believe that anything is technologically possible. And a consequence has been that perhaps no people before us has found it so difficult to continue unabashed in search of the prudent limits of the politically possible" (1978, p. 34-35). There is a clash of values at work here: politically prudent vs. technologically possible.

What does it mean to be *technologically* possible? Could there not be a revamped understanding of the adverb "technologically"? By this I am referring to the term technological being asked to incorporate or assume other categories, like politically and socially possible such that these newly incorporated categories would in turn have an effect on what we understand as <technological>. Prudent is a relative term, and it is open to options, both in kind and in number, when the application of technology is concerned. Finally, Boorstin is referring to the possibility that a type of society will then generate a type of technological expressions—a form of reverse determinism. Instead of technology influencing politics, Boortsin is hoping to cultivate more influences upon technology from within society—a politics of technology. The vague criterion of the new is behind our technological production. If it is new, it is good. We can see the sacrifice of critical reflection and individual participation with this set of values. Again, an essence of technology has affected our conceptual construction. If something is new then it is a good possibility, and we don't question this relationship.

J. <Technology> is still ours, but we think its values erode others

Free will can operate in a world influenced by technological values. The social sciences can establish patterns of exploration and social relations that science and technology can use for altering technological expressions. The human free will and value sets are far too diverse to be dominated by technological values and expectations; therefore, the former well of resource can augment the latter.

Just as Boorstin credits "possibility" with being able to impede other immediate and tertiary influences, Manfred Stanley explores the ability we attribute to technological values to influence other aspects of our experience. Basically his approach addresses the social phenomenon of our pessimism toward technology? Such ideas as "technologically possible" and the power we attribute to the juggernaut of technological values are real influences in our world. Why is this? Distinct paradigms of technology are witnessed in the difference between modern and traditional technologies, meaning that paradigms can shift with technological innovation. There is not a predetermined evolution from one innovation to another, and any technological expression is not necessarily the natural descendent of another; therefore, we are often unprepared to critically analyze and to properly negotiate the effects related to a new encounter with a technological expression.

Manfred Stanley argues that we must be acutely aware of the aspects of modern times since they are genuinely new, and humans have a propensity to fear things they don't understand. "The potentialities of modern technological systems are not repetitions of the past; neither are the instruments of modern warfare, the complexities of modern social organization, or the techniques of modern social surveillance and control" (1978, p. 4). The point is that these innovations do not stem naturally from past achievements or sprout from a natural sequence of empirical events, and we cannot pretend to understand the values and expectations that they generate; therefore we are weak when we attempt to understand and criticize these technological expressions. From the dawn of time man has feared the products of his own technological development, and now we really have a reason for such a phobia. Today, argues Stanley, there is a dominant view that technological vales of control have entered into many aspects of our lives generating an atmosphere of distrust in the face of a world heavily influenced by technology.

Many social scientists are reluctant to adopt such a pessimistic view of technology, but society in general does maintain a level of pessimism. When analyzing technology there are three positions which are commonly used to counter our tendency to demonize technology. The first position is called déjà vu which implies that technology has always been good; therefore, it will continue to be so (Stanley, 1978). Why do we have such a belief that serves as a subtle form of technological determinism?

The second response is more proactive whereas the first was a passive form of determinism, and the third is merely a total resignation to human nature. Stanley states that:

> the second response reverses the pessimist argument by pointing to the progressive possibilities of technology. And the third response reduces the problem to semantics by arguing that demonologies, like religions, are just dramatic names for the prosaic processes of human species adaptation and survival in nature. Fears and aspirations come and go; the human race goes on (Stanley, 1978, pp. 4-5).

Belief, either in technology or the human race, is a way to avoid critical reflection. In fact, it was belief which science rebelled against thus ushering us into the modern world. Now, we believe in technology. The inertia of the human race will drive technological choice if we are able to create the conditions to liberate humanity from such a passive attitude.

Scientists tend to steer away from literature that promotes a fear of technological achievement because fear is not an objective concept. Also, it is counterproductive to fear what we will be called on to solve. This is especially pertinent when there are bigger problems in the world that can use technology's assistance. "Yet the fear of technology not only persists but has found new and widely ranging expression within this century" which would be due to the catastrophic events which have characterized the 20^{th} century (Stanley, 1978, p. 5). Technologies also work in conjunction to magnify the problems. For instance, mass communication works to spread the news of a disaster related to another technological application.

In certain terms we are the masters of technology, not the other way around; however, Stanley feels that because the potential of modern technological systems does not mirror those of the past we must adjust our public awareness in order to remain critical. He is calling for a social project designed to combat apathy or the "technological somnambulism" that Winner warned us of. That technology is the manifestation of instrumentalism, for Stanley, is not in doubt; rather, he is critical of those who blame technology per se for the abrogation of non-technological norms and values. Those who blame technology feel that humans themselves are not the masters of the forms that this instrumentalism might take. In short, maintaining a level of fear of technology is analogous to denying humans the role as masters of technology and the autonomy of free will. Fear suppresses critical reflection and the active application of our experience with technological production. Fear can be exploited by a few powerful interests, and technological expressions pay the price of having a limited source of inspiration.

Technology is an extension of the human will over nature; but, the scope of the human will, according to Stanley, is not limited to the parameters of regulation and control—values that skeptics claim technology has the ability to distribute throughout society, thus eroding other values. In other words, technology represents only a part of the human will, and the values that technology carries are in no means exhaustive of our potential values. Nevertheless, the notions related to a concept dominated by control seem to dominate our understanding of technology which in turn generates a feeling of pessimism which Stanley refers to as *technicism.* This idea of control, we fear, has influence over non-technological norms and values or throughout the traditional areas of our lives. One of Stanley's chief concerns in *The Technological Conscience* is that unfair blame has been attributed to technology for the erosion of non-technological values. This spirit of pessimism seems to come from a belief that the technological values have come to overshadow other values within society:

> At the heart of this pessimistic reaction is a general conviction that there is something about technological norms and values that is capable of eroding or destroying non-technological norms and values. Whatever the final verdict, a

technological civilization cannot ignore whatever substance there may be to such an assertion. Modern technology, social and physical, is humanity's most effective innovation because it seems to extend human will over nature in ways that immeasurably exceed what is possible on the basis of human anatomical capacities alone (Stanley, 1978, p. 5).

The possibility that there is something inherent in modern technology which can dominate human will is potentially alarming. Our ideas of human will would have to be altered or abandoned entirely if we maintain such an image of the power of technological values.

There are three *characteristics* of anti-technological literature which deal with the hyper-power of technology to influence social relations. The first is understanding technology to be "something so seductive and autonomous in its influence as to abort non-technological styles of though and modes of experience". This feeling has caused anything from nostalgia to revolt (Stanley, 1978, p. 6). The second characteristic is technicism. For example, "the moment one moves beyond the direct effects of physical machinery, the distinction between technological and non-technological norms and values becomes rather cloudy. All human enterprises involve techniques of some sort" (p. 6). Various theories serve by way of an explanation as to why we feel that there are ways in which the presence of technology can affect non-technological norms and values, but Stanley feels that only *Technicism* is a real threat to human autonomy of the self. Finally, the third characteristic is the variety of ideologies which criticize technology. Stanley is concerned with "locating this common theoretical pattern without doing violence to the important difference that otherwise divides thinkers of anti-technicist persuasion" (p. 6). What is the common thread that could serve for purposes of analysis?

Stanley argues that there are four different epistemologies or ways of talking about the relationship between humanity and technology, all of which attempt to account for the pessimism felt toward technology throughout society. In other words, there are four approaches which make sense of how technological values can erode non-technological norms and values. Stanley refers to these as modes of anxiety about how technology is said to be destructive of free will.

The first, "Socio-technical Determinism" is the fundamental assumption of Marxism. "Physical technology, in the social form of mode of production, and their appropriate social relationships, creates preconditions of social organization. These, in turn, determine the forms and contents of the more abstract world of ideas and intentions" (Stanley, 1978, p. 7). Stanley reminds us that the notion that the mode of production can affect ideas was around even before capitalism and industrialization suggests that our pessimism towards technology is not due to modes of production of physical technology. Nevertheless, "much of the pessimistic literature implies that something new and more ominously deterministic has entered the picture in modern times which has affected Marxists and non Marxists alike" (p. 7). Determinism, in this sense, seems to be another way of extolling the potential of technology which is a phenomenon that could be classified more as psychological and not as material determinism.

The second is "Technocratic Elitism" whereby the triumph of technological norms and values is determined by, "an elite [body] of technicians and scientists dedicated to the standards of efficiency dominated by the dictates of machine production and social bureaucratization" (Stanley, 1978, p. 7). According to Stanley, this theory does not take into consideration the reality of the situation whereby science and technology are more often than not political tools which reflect the power structures of a society and not an environment controlled by elite scientists.

A third way in which technological norms appear to encroach upon other value systems is referred to as "Technological Dependence". This involves ways that humans have adapted to certain technologies whereby:

> the argument would be that such technological systems increasingly transcend the capacity of their directors to control them, basically because their directors do not understand them. Yet these systems perform socially desired economic functions, and hence human direction of technology is gradually supplanted by human adaptation to it (Stanley, 1978, p. 8).

It would not be practical to abandon our relationship with technology. It would be irrational; and, according to Stanley, a theory of technological dependence fails to consider that adaptation to technology does not exclude resistance to it as well. For instance, the arms race is an example where the control of technology is just as important as the adaptation to it. Plus, there is a discrepancy between the ability to control technology and the actual control of it. A dearth of resistance does not mean that the desire to resist is not there, lying dormant in society. We have much more potential to control technology, but we are unable to effectively do so because there are conflicts as to how to control it, says Stanley.

The fourth way that technological values can affect the world of non-technology, and thus create the feeling of pessimism, is referred to as *Technicism.* Technicism distributes the technological language of control to many aspects of society in a process that Stanley calls, *pantechnicism.* Technicism does not attack physical technology nor society and its institutions. "Rather, the focus seems to be on one sector of cultural meanings; those that legitimate institutions by defining the purpose for the sake of which institutions are now organized the way they are" (1978, p. 9). Technicism is the reflection of a particular world view. It is a method of legitimization. It is an ethos. Next the danger of technicism is not that it is a logic, but that it is not an explicit one. A "technicists man is apparently not expected to be aware that he is such...To its critics, the technicists mentality, it seems, is a state of inferior being. It is a rejection of some essential way of being human" (p. 9). There are non neutral elements of <technology> at work here by a tendency to limit the human potential. Stanley is saying that by focusing on "one sector of cultural meanings" we are restricting critical reflection.

Another criticism is a vision of technicism as the antithesis of what it is to be human. "Technicsim thus becomes an aspect of a total world view; a profound, unconscious, historical and cultural process rather than an individual or collective intellectual decision on the conscious level". Stanley refers to this as pantechnicism which occurs "when the entire world is symbolically reconstituted as one interlocking problem-solving system according to the currently dominant technological language of control" (Stanley, 1978, p. 10). The root of pessimism about pantechnicism is that there is a phenomenon that can inhibit an individual from participating in destiny. The root of the above criticism derives from a technicism that is:

> an alleged mental environment in which the vocabulary of agents and intentions has been displaced by a world picture of self regulating objective processes. These processes supposedly emerge out of non-technological events of natural selection...In such an environment, the language of consciousness, purposes, and free will is destined for obsolescence (p. 10).

Sociologically speaking, the critics of technicism fear modern society as sinking into an order dominated by technics. Humans are becoming functionaries. "All that counts is the self preservation of organized technologies whose original purpose was to solve a particular problem or to provide a specified service (bureaucracy)...The world of techniques and its maintenance thus becomes an end in itself" (p. 11). The human status is at stake and technological determinism, as technicism, works to direct social relations. Was this the underlined purpose of the Enlightenment which can also be interpreted as a highly complex form of invisible technological determinism? Understood this way, the target of the Enlightenment was free will; and it was a bull's eye.

Keeping in mind that technicism is the belief that humans are not in control of their destiny—"an intuition of threat to the distinctly human status itself" (Stanley, 1978, p. 11), *pantechnicism* is the application of this notion to many aspects of our lives. Stanley is mindful of such an idea as an inevitable force against human autonomy, and he reminds us that the modern world which gave birth to the technological values that are so threatening to some also produced and nurtured our ideas of liberalism. This is more than a little ironic. Modern society has produced liberalism and technological advance. Now these same societies are complaining that these liberal institutions cannot maintain political self determination because of technology.

> As far as actual social institutions are concerned, the greatest concrete victories of participatory democracy occurred in those societies in which the proponents of liberalism successfully propagated the ideals and practices of civil liberties. It would seem that some vast irony of unanticipated consequences is implied by the widespread presence, in these very societies, of a critical literature that now regards liberal institutions as incapable of sustaining the promise of personal and political self determination (p. 11).

This is reminiscent of Dr. Frankenstein who masterminded the Monster but was subsequently unable to control it, thus spending his life in fear of the Monster's desire for revenge. Stanley, however, would argue that the Monster, or the presence of a particular technological expression, does not automatically destroy the mind's ability to continue to determine our personal destinies as well as the values behind technological expression.

Again, Stanley is talking about the loss of critical reflection since boundaries that were, at one time, good for comparison have been blurred by technological values. Social diversity is a valuable resource for technological production. If the social relations which cultivate diversity and creativity are not nourished then we will be restricting technological expression.

It is important not to confuse technicism with science or technology. For example, if I was to accuse you of being a technicist and your defense was "no, I am being scientific", this would make it seem like "science and technology are somehow determinants in a strict causal sense, of whatever one condemns as their misuse" (Stanley, 1978, p. 12). Maintaining an attitude of fatalism between the relationship between science and its effects, under the label of technicism, is an easy way to avoid critical reflection. This is diminishing the benefits of science and technology by placing the cost of morals too high. Science and technology do not necessarily provoke the moral reactions. We provoke moral reactions, and such a proactive reaction might be what is needed to generate the social relations required to change technological expression, and Stanley feels that humanity is not powerless against technology. Promoting the power of humanity could be the foundations of a social project geared toward expanding <technology> and guiding technological expressions to match the diverse human condition and needs.

In response to the fear of technisim, Stanley feels that science and technology are not able to dehumanize people since these institutions are the product of human free will. Science has certain regulating assumptions which make it what it is, but these are created by us. That science is deterministic is simply because a complete description of the state of the world is required for prediction which then establishes the conditions for finding truth. For example:

> a technological test of truth assumes that the ultimate standard of verification of a scientific theory is the ability to control the world...This requires a mechanistic view of the world of in the sense that any explanation of a scientific sort is mechanistic. [However] the ultimate test of understanding something scientifically is the ability to deconstruct and reconstruct the object of understanding at will (1978, p. 13).

To accomplish the above actually requires free will. Humanity, according to Stanley, is equipped to deconstruct and reconstruct something scientifically which is also an exercise in challenging the concept of <technology>. However, this is not to say that technicism does not occur within science, though through technological references. For one there is the all too ready acceptation of technological metaphors as a premature explanation, and "the second level of technicism emerges when the constitutive assumption of science themselves are extended to areas of discourse in which there is no reason to believe they are appropriate" (p. 13). Technicism thrives when we ignore the discontinuities between the human and technological worlds. It also thrives when we ignore the epistemological limits of science as applied to other fields.

The deterministic and mechanistic viewpoints which suggest that technological values are permeating all aspects of our existence ironically come from humanity; however, the trend of technicism suggests that we extend these types of explanations to areas that are not amenable to explanations of this nature. The problem comes when, "the regulating assumptions of science are being illegitimately extended, to the detriment of respect for human free will" (Stanley, 1978, p. 14), affecting the concepts of the social world and of human goals, problems and knowledge. 1) In sociology, technicism has guided us away from the creative agencies of persons. 2) In science, the notion of technicism encourages us to believe that measurable phenomena are the only types that technology can address since they are more conducive for science to work with them. 3) Science chooses solvable problems; therefore, we think that they are the only problems or the only types of problems; and 4) the idea of expertise is that we can recreate the world based on the natural laws and that this is the only way to recreate the world.

Stanley argues that the *form* of sociology and the sciences is the result of the human free will, and their form does not necessarily preclude other forms; rather the actual form of these institutions has merely been judged appropriate by society. So maintaining the conditions which encourage free will we reflect positively on technological expression in terms of diversity as well as expand the concept of <technology>. Just as free will created the conditions which favor the hegemony of technological values, it can also steer us away from them so as to uncover additional social relations and values.

Sociology can reveal social relations which promote free will which, in turn, can accomplish the aforementioned. We want to avoid a total rejection of science in order "to interpret science itself as part of the history of human freedom" (Stanley, 1978, p. 16) which stems from the social sciences. Science takes up where sociology leaves off. "Social science is of great practical benefit in the search for patterns of apparent determinism in human activities. After all, not all activities are based on the full use of human capacities for consciousness, reason, and free agency. Science is the effort to overcome barriers to the more refined uses of these capacities" (p. 16). In this sense, science, technology and sociology work hand in hand. "Social science is part of the larger quest of art, religion, and philosophy: the search for apparent order in the world on whose foundations the terrors of chaos may be held at bay. Social science yields important technological benefits that can be used as tools for the more efficient fulfillment of consensual human ends in nature and history" (p.16). Labeling the social sciences as "tools" is an indirect way to influence

<technology> and technological expressions; therefore, <technology> with an element from the social sciences would surface as different technological forms.

Science and technology are extensions of a social order in which humans are active participants, and Stanley argues that if technology has the power to convert humans into functionaries of technology, then all discussion of the existence of human free will must be abandoned. He is not prepared to do this as it appears that science and technology are the result of our free will to negotiate the world in the best way. The scope of the human will, according to Stanley, is not limited to the parameters of regulation and control. Within our collective experience, guided by free will, there are new potentials to diversify <technology>. Also, the truth value of technological application is not limited to control mechanisms. Truth does not have to be based on control. Here, I am alluding to the possibility of a new aporia of <technology>, but technological control comes from human, free will. Is this the only way that our free will can manifest? Doubtful. Again, Stanley is talking about the possibilities of technological expressions stemming from free will which he thinks is too powerful to be hampered by technology. The type of project that Stanley is promoting is one that encourages us to employ our humanism in the face of blind and ignorant technicism. Such a project would be appropriately began in Academia.

K. The technological threat

The hegemony of technology acts upon our concepts and institutions. <Technology> can be an epistemology toward its own effects. *The Technological Threat* deals with the nature of the challenge technology posses to our traditional ideas of freedom, individualism and forms of government. How does technology threaten these traditional concepts and institutions? Jack Douglass looks at the particular form that these threats take and how they affect choice within our society. Douglass feels that only a systematic and critical examination of the relations between the evolution of our massive technological society and our fundamental values would help us endeavor to exact free choice in policies and forms of government. Basically he is trying to expose the effects upon our social relations that are caused by the technological society (Douglass, 1971). Again he is emphasizing how technologies affect our conceptual construction.

Douglass wants us to be aware of the reasons behind how our concepts are thus affected. Such awareness would give us advanced warning to the negative effects of technological choice. There is a relationship between our technological expressions and our fundamental concepts. If technologies can change our conceptual constructions, then this is a sure sign of determinism as society applies these concepts in experience. Experience becomes a technological experience.

L. Determinism is an analytical tool

<Technology> is an epistemology. Bruce Bimber shows us the elements of <technology> that are truly deterministic thus revealing elements that are not deterministic. Bimber gives us a more accurate account of technology's conceptual constitution and its potential as a driving force in society. Determinism, in the true sense, is free of any human elemental influence.

Historically, technological determinism has been a point of reference from which to analyze social-economic movements on a grand scale where entire civilizations are affected by certain aspects of technology; but there has been some discrepancy as to the value of this particular point of reference. Therefore, it is worth further study to find a clear understanding of technological determinism which can be applied objectively to our social narratives. Errors in this process could result in erroneous accusations that certain effects were the result of determinism but have nothing to do with the inner logic of technology.

Bruce Bimber analyzes three categories of technological determinism: nomological, normative, and unintended consequences. He determines that only the nomological approach is truly deterministic. He uses G.A. Cohen's criteria as a measure of determinism which states that for something to be deterministic, it must operate on *laws*, either physical or biological, and there should be a *necessary* role between technology and the events of the future in society.

A normative technological determinism is not as deterministic since it "claims that technology is an important influence on history only where societies attach cultural and political meaning to it" (Bimber, 1996, p. 81). Jurgen Habermas is a proponent of this approach. He is concerned with how can:

> societies employ ethical conceptions to exert conscious, willful control over the norms of practice involved in technological development. [Habermas] portrays this development as an essentially human enterprise in which the people who create and employ technology are driven by goals and judgments about public and private goods. Their actions follow certain culturally accepted norms and are sanctioned by politically legitimated forms of power. Habermas' critique of this enterprise rests on the observation that industrial societies have developed an over reliance on norms of efficiency and productivity in directing the conduct of these processes (p. 82).

When the goals of efficiency and productivity substitute value-based debates over methods and alternatives, a degree of determinism has been reached.

Norms and values can become so subtle in their influence upon social relations that they are left out of political or ethical discussions—almost as if they were givens in a mathematical equation. "Habermas suggests that technology can be considered autonomous and deterministic when the norms by which it is advanced are removed from political and ethical discourse and when goals of efficiency or productivity become surrogates for value-based debate over methods, alternatives, means, and ends" (Bimber, 1996, p. 82). In this sense, Habermas attributes the values of efficiency and productivity with deterministic qualities since they have replaced other criteria for decision making processes. These are the criteria; however, the society must establish a system of rewards and punishments for complying with them, and Habermas' concern is that the result is a cultural mindset which "limits discourse and judgment to matters of efficiency" (p. 83). Normative accounts talk about how ideas of determinism merely obscure human agency. The most well known advocate of the normative approach is Jacques Ellul.

The next approach, the Nomological, states that given the conditions of the past a certain type of future is sure to follow. For instance the production of the railroad logically creates certain social and economic conditions. Heilbroner is the most famous of this school. The Nomological school is radically different from the Normative in that the latter is based on how people perceive technology whereas the former's element of agency springs totally from the actual technology. In this sense, the Nomological approach is culturally independent.

The third approach, *unintended consequences*, attributes some measure of autonomy to technology through the unforeseen results regardless of the intentions of the society or inventor. Unlike *nomological* accounts there is no inner logic to the changes that it causes, and unlike *normative* there are no social or cultural practices which help produce the effects of the technology (Bimber, 1996).

G.A. Cohen's criteria to establish technological determinism is based on two components: determinism and technology.

> The first component of this view is that technological determinism should hold that history is determined by laws or by physical and biological conditions rather than by human will….The second component of Cohen's standard is that technological determinism should be truly technological in meaning….,[meaning

that] technology is the medium through which physical laws shape the course of human events (Bimber, 1996, p. 86-87).

By having such a criterion, Bimber wishes to maintain the interpretive value of "technological determinism", but we must know the degree to which an approach is based on technological determinism so as to not make false assumptions. If we group hard and soft versions of determinism in with an epistemology that is truly based upon technological determinism, as is the nomological approach, then, in our analysis, we loose the critical advantage of the elements of each that are not included in all of them. Determinism is a tool, a scalpel; but it does not have to be a broad sword. Determinism is a malleable tool of interpretation, and this is quite appropriate since the object of study is equally malleable; therefore, a solid approach like the nomological one would serve as a novel way to see the overall relationship between society and technology. This approach is almost like a rule of thumb. In other words, Bimber's method provides an investigator with an objective tool to be applied to the subject to discover whether or not it is deterministic.

Only one type will survive as a view considered as technological determinism. Since normative accounts "attribute causal agency in the history of technology to human social practice and beliefs, rather than to technology or prior technological laws, they fail on both grounds" (Bimber, 1996, p. 88). *Normative* accounts deconstruct technological determinism into a *cultural* phenomenon. *Unintended consequences* also fails on both grounds. As to the first, there is nothing determined about a specific outcome. The only aspect that is determined is *an* outcome that was not predicted, not necessarily *that* one. As to the second, "many human activities reveal the properties of unpredictability or uncontrollability of final outcomes" (p. 89). As for the *nomological* interpretation of technological determinism, it passes both components. Societal change is directly related to the technology without any particularizing, socio-cultural interference.

To broaden the scope of his analysis, Bimber applies Cohen's criteria to Marx's historical materialism and asks if "1) social change be causally determined by preceding phenomena or laws; and 2) these laws necessarily depend upon features of technology for their logic or as their vehicle" (1996, p. 91). Marx believed that technology was in the ultimate service to humanity and his form of determinism seems, to Bimber, to be more a form of "economic" determinism since the necessary technological factor in Marx's argument is absent. Bimber has practically removed any analytical power from technological determinism. Why? Because if Marx is not a technological determinist then there are few who are. Also, technological determinism is based purely on the substance of technology, and he is asking us to abandon technological determinism as an analytic tool. He mentions Hughes' momentum as a better option.

It would seem that a purely technological idea of <technology> is inappropriate. Bimber is asking us to incorporate many more factors when we say that something is the result of a technological expression; however, what is important is that we are able to isolate the elements of <technology> which are truly deterministic. Also, he is saying that maintaining a complex level of analysis, rather than cause/effect determinism, is far more appropriate and accurate. By isolating the technological component as the necessary ingredient of technological determinism, Bimber is asking us to look toward accounts whose analysis draw upon more human resources. For one, he mentions the various cultural factors and the multiple possibilities within in unintended consequences, both of which depend on random social relations. He also mentions momentum which is heavily based on the amount of social and individual investment. There are many for variables for analysis when the human factor is given precedence over the technological. Thus, Bimber is promoting an epistemology that is open to creating social relations and perspective.

M. "Momentum" as an epistemology

Momentum shows us when and how to act proactively toward technological production. Momentum adds an element of "time" to <technology> and its expressions as we analyze its relation to society. In contemporary society there are still elements which can give one the impression that our social relations are moved by technological determinism. We have discussed the ideal of progress as technological, for example. There are other elements, though more tangible, which can also give the impression of technological determinism. In the past the technological determinists have done justice to the role of technology in effecting social change; however, the social constructivists have reminded us that we are not passive in the face of powerful technologies. It is for these reasons that Thomas Hughes advocates that we use a combination of theses perspectives since both have their attributes. His idea of momentum incorporates elements of both. Technological momentum is "somewhere between the poles of technological determinism and social constructivism," (1996, p. 101), and this approach encompasses the complexity of the social and technical forces involved in technological change. "Momentum infers that social development shapes and is shaped by technology. Momentum is also time dependent," meaning that it is less powerful as a force in the initial stages of technological systems than later (p. 102). Technological systems are characterized as social relations that have a technical core. The technical aspect refers to hardware and artifacts and the social encompasses everything that is not the artifacts and hardware.

Hughes takes three case studies to characterize momentum, but basically they all point to the phenomenon that technological systems are more prone to be influenced by social elements in the beginning than once the environment of the system has much vested interests. Things that can *create* momentum are the existence of industrial complexes, the surplus of a certain product, and a certain know-how that could be applied in a diverse manner. Things that can *affect* momentum are political changes, economic developments, and social movements.

Momentum is like a solution looking for a problem. Momentum is the result of an invisible technological expression which has components worthy of study if we are to be better equipped to reflect upon its effects. A large technological system can be both the cause and effect of social issues.

> What does this interpretation of the history of technological systems offer to those who design and manage systems of to the public that might wish to shape them through a democratic process? It suggests that shaping is easiest before the system has acquired political, economic, and value components. It also follows that a system with great technological momentum can be made to change direction if a variety of its components are subjected to the forces of change (Hughes, 1996, p. 112).

This way of viewing technological systems helps one better understand them in terms of their complexity and their competing social and technical forces. It shows us that technical elements can be deterministic once they have reached a certain level of invested interest, and it allows for the possibility of change from the public on to the technology. Technological know-how can be redirected from, say military to humanitarian purposes—a social project if you will.

Hughes' momentum is appropriate analytical tool needed for reflection because it is conceived for what he calls "technological systems" which in addition to involving technical and social components, the phrase also translates well into today's environment. In other words, it is up to date in terms of the social relations and their close link to technologies. Hughes compares technological systems to Weber's iron cage of bureaucracy which are primarily social institutions and not technical whereas today it is hard to tell the difference. There is also an element of hope incorporated into the ideology of momentum in that grass roots movements and legislation can affect the direction of technological systems. In addition, momentum allows us, as critics of technology, to see what is important and when (1996).

So, as an analytical tool, momentum exposes more situations and creates more targets for analysis. Momentum dissects the subject of analysis and makes it more complex than it appears at first light. For instance, if enough momentum has accrued, then we are encouraged to look at the political and technical elements whereas if a technological system is still in its infancy, there is still a chance to make it agree with a variety of social conditions. Momentum is a frame of reference for analyzing technological systems. Momentum outlines the many aspects involved in and affected by technological systems (expressions). It shows <technology> as a force, but it also highlights the areas where the inertia is strongest. Perhaps if we want to affect technological expressions we would act when there is the greatest chance of affecting it; therefore, <technology> can be treated as an entity which has a life and requires nurturing in the early stages and critical reflection in the later. Finally, Hughes' analysis shows that even in our study of technology, there are perspectives and social relations which can serve to enhance the concept of <technology>.

N. Determinism as social interests

Determinism is a social choice guided by certain interests within society or it is a collective desire to attribute technology with the power to determine social relations. The latter could be classified as analytical laziness, but <choice> as a concept does not contain a finite set of options; and it is up to society to create avenues of choice whereby technological expression reflects favorable desires comparable to the conditions of the kind of society we want. Technological choice begins by questioning the very values and desires of a society.

Deterministic qualities of technology can exist in very subtle ways. Langdon Winner argues that our social relations perpetuate this image of technology. Traditionally, technology has been understood as the result of a human endeavor to overcome nature's inconveniences and it is the manifestation of a hope to predict and prevent these very inconveniences. Technology has become a factor in such a multitude of areas in our lives that it appears to have the qualities of a force upon society, even though it owes its existence entirely to the will, creativity and needs of humans. The force of technology is often treated as an entity which exists autonomously and has the power to exclude other realms of society. The reality of the situation is that <technology> is a choice, and the fruits of this selection allow us to encapsulate the possibilities of our natural presence; and, in the process, technology seems to be acting as a barrier to other aspects of life. In this sense, technology is:

> a particular kind of rationality—instrumental rationality, the relentless search for efficiency—a kind of historical momentum that rendered other kinds of social and cultural influences on the character of social life far less potent. Such views were largely in opposition to the more popular view of science and technology as a neutral phenomenon that could be adopted by a variety of societies (2001, p. 12).

This is not to say that there are not elements from within society which help perpetuate the existence of technology as a viable entity which has the power to exhibit a certain level of agency. We have so acclimated ourselves to the benefits of technology to the extent that it is primary to all other forms of social and natural negotiation such as those understood as spiritual or traditional. Is technology an autonomous force upon our culture such that when we choose our choice will always be conditioned by the benefits of technology? Can its course be altered or even objectively analyzed without the process being considered a never ending return between technology both as the focus of investigation and the tools by which to proceed? Rewarding the social relations that encourage a degree of proactive reflection upon technology and its effects could be a desirable social project directed toward affecting technological expressions.

Regardless of its appearance as autonomous, technology's real power lies in the fact that society allows it to appear to be autonomous; and, any sense of reification is the result of our choice. "It may well be that technology is socially constructed—but that we have so socially constructed technology as to make technology the fundamental constructive influence in our world" (Winner, 2001, p. 12). In other words, the bullying characteristics of technological determinism are no longer believed to stem from within technology and its increasing momentum but rather these qualities stem from us. We choose technology and we choose the techniques which tend to promote technology. For instance, technology as a force alone lacks real substance in its ability to influence society; as a result, society utilizes methods which tend to deemphasize any sort of *imaginariness* and encourage concreteness or agency. The example is polling and statistics. These make technological decisions rationally based and directly related to the society at hand. These methods also make democracy appear to be rational (Postman, 1992), but if we perpetuate a certain perspective toward technology, then we can redirect such a mentality. There is a tendency in society today to view the world as:

> dominated by the forces of computerization, globalization of production, and other insistent technology-rooted trends. The smart people are those able to re-engineer their organizations and careers by liquidating older roles, relationships, and institutions in response to technical and economic necessities that loom ahead. The less proactive to these conditions are doomed to suffer as the new technical order crashes in on them (Winner, 2001, p. 15).

Again, people are subscribing to the advantages of technology without, and not necessarily, addressing problems.

One's subscription to the wave of technology, however, does not necessarily imply being determined by technology. There is choice in technological change and emergence in so far as:

> technological devices, systems, and methods are socially shaped and thoroughly contingent products of human interaction. Looking closely at how they arise and how they are affected by the contexts that contain them, one does not find a juggernaut preordained to achieve a particular shape and to have particular consequences, but rather a set of options open to choice and a variety of contests over which choices will be made (p. 15).

There is choice, and human interaction, then, is the key to being able to make uninhibited choices about technology; and it would make sense that an amplification or encouragement of social relations would aid in increasing our ability to freely interact with technology—a better dialogue.

Within society there is an element of volunteerism concerning technological change that is in opposition to notions of technological determinism, and "it is ironic that at the very moment that notions of contingency and social construction of technology have triumphed among social scientists and philosophers of technology, in the world at large it seems increasingly clear that unstoppable, strongly deterministic, technology centered processes rule our times" (Winner, 2001, p. 13). Whereas the analytical tools are not of deterministic perspectives, the actual technologies are. Talking of the digital revolution, "it shapes new codes of behavior that move each organism and institution-family, neighborhood, church group, company, government, nation-inexorably beyond standardization and centralization" (p. 14). The digital revolution is a force which disperses us and isolates us from one another as well as our institutions from its roots; but it also shows us a technology which is not necessarily based on control.

When we allow that, make choices for or ignore forms of determinism, there is excess energy or resources that are not being applied toward <technology> or its expressions. This is to say that analytical energy is in reserve when we allow for the social relations that encourage determinism. Said energy can be applied toward enhancing <technology>. Currently, our analytical tools for approaching the philosophy of technology are largely of the social-constructivist school. This is odd in an age where we, through our social relations, are promoting the conditions which allow that technology changes society in so many ways. This suggests that we support the kind of changes that technology brings about. It is this blind support of "progress" which needs a conceptual and analytical foundation, but blind support is still a choice. Social constructivism does not challenge us to question the effects of the result to the extent that a soft determinism does; in any event, Winner's proposal of encouraging the emergence of social relations, human contact characterized by the promotion of <choice>, seems to be a positive step toward a freer dialogue with technology. Ironically determinism, as an epistemology, serves to expose potentially influential perspectives that had not been involved in the processes of human contact that Winner was talking about. It seems feasible that policies, either governmental or through social norms, could be created which would encourage this contact—a social project.

What we have in our world today is a technological orthodoxy which "has retained considerable power over our conceptions of what the modern world is about". The result is that we associate technological progress with a way of life. We are satisfied with this, but "questions of meaning could be indefinitely postponed" (Winner, 1977, p. 116). We are lazy. This is Winner's fear of a technological somnambulism. Basically the technological orthodoxy is that men know best and control their neutral technologies which are applied to a world that is characterized as full of problems waiting to be solved. The solutions are called technologies which are judged according to their efficiency, and this entire process is called progress, but it is a form of progress and it is by no means an absolute form.

The nineteenth century saw the beginning of unprecedented material production and the solidification of the modern nation states. The relationship between material progress and the strength of a nation raised some questions about technological agency. "Of course from the very beginning there have been difficulties in maintaining the faith in steady, unblemished progress and technical neutrality" (Winner, 1977, p. 116). This was due to the phenomenon that 19th century political and economic thought grew from a paradox that has continued until today. Political thought was founded on the paradox created by the industrial revolution and today, "obvious signs of social and environmental ills have cast a shadow on the most ambitious applications of technical virtuosity" (p. 117). This calls for scrutiny. "Inquiries into the relationship of human beings and nature in the Western tradition, the qualities of instrumental rationality, the paradoxes involved in the quest for control, and a host of moral and political questions about the meaning of technological phenomena have begun to fill the vacuum of thought about such things which had grown so conspicuous over the past century" (pp. 117-118). What caused there to be the vacuum of thought and then latter the need to fill the vacuum is first the explosion of material production and its entire global, political and economic context then the negative results of such. In this sense <technology> is non neutral.

Winner proposes a new orthodoxy to replace the old one—that technologies are not neutral instead of being agents in determinism. The wide variety of techniques and socio-technical relations "provide the basic patterns for everyday, human activity" (1977, p. 118).

Technology is still deterministic in the sense that it constitutes modern life. It is the very face of our civilization and culture:

> During the past two hundred years most of the institutions of Western society have been either consciously or unconsciously reconstructed to accommodate the operating conditions of new technologies in industrial production, mechanical transportation, electronic communication, modern warfare, modern architecture, medicine and household convenience. When one adds up the combined effects of those innovations, what one has is something like a picture of the constitution of modern life (pp. 118-119).

Winner comments that to say this is not to advocate technological determinism per se because we still do not know all that gives shape to the technologies; however, "what one can say with assurance is that once built and in operation, modern technologies are ways of life" (p. 119). Technologies govern, in ways that are often unpredictable, the patterns of modern life, but they also represent our efforts—our ways of life. Ways of life are not passive or apathetic to alternative ways of life. Take for example competing economic systems or ideas of private and public property. Both conditions of conflict are perhaps best seen with the treatment of the Native Americans upon the arrival of the European colonists.

Ways of life can manifest as values, and through them technological expressions govern in very subtle ways. These innovations are put into place without consideration "of how [they] would effect the lives of the people in the broader sense. It seemed enough to ask only one question: Will the thing be efficient, effective or profitable in a particular area? (Winner, 1977, p. 120). These values are the result of the market conditions in conjunction with the rise of the modern nation-state. "One can imagine what might have happened if, in the late eighteenth century and early nineteenth centuries the democratic revolution and the Enlightenment had joined in the attempt to bring technological development under conscious social control". Winner mentions that political freedom could have helped shape technological progress, but this did not occur since at that time political freedom was severely limited. "Economic freedom, rather than political freedom, was the norm which guided innovation" (p. 121). As a result, technology reflected profit minded motives. Here, Winner is alluding to the possibilities of different technological expressions as a result of a different technological paradigm: economic, political and even environmental. Social projects can have foundations in one form of inspiration or another; it is still about choice.

Profit is a dominant value that often effaces others. For example, the rail system and the electric system of the US put profit over organization, which is not to suggest that efficiency took a back seat; since, in this case efficiency is that which is between profit and cost. These systems were, "not designed according to a reasonable, humane assessment of the needs of the people to travel or move freight. No, they were designed to extract profit" (Winner, 1977, p. 122). This is proven by the fact that once there was no profit from the transportation of goods on trains, the capitalists let the train system deteriorate and they easily made the transition to a trucking system. The concept of technology is heavily determined by profit. Why could we not have a <technology> which incorporates the idea of leaving no footprint on the environment? The choice of one form of <technology> or diversifying it to the point of diluting the influence of profit is a social project that could be spearheaded by Industry and its accompanying system of rewards.

There are no blue prints which dictate the final form of technological expressions. For instance, technologies could be based on an emancipated industrial order which was precisely what Robert Owen, an early 19th century British manufacturer, advocated. He "insisted that industrial revolution be tailored to a comprehensive vision of a new world and guided by a criteria offered by an enlightened moral philosophy" (Winner, 1977, p. 123).

Another potential paradigm shift in our understanding of technology was inspired by Marx who advocated a shift in ownership, from the capitalist to the proletariat. "The proletariat would take over all political and economic institutions of industrial society and reshape them to produce a fully human, socialist order" (p. 124). In effect, this is to force material technology to match the aspirations of a type of person or vision—a social project. In any event this is a shift in the inspiration for change.

The inspiration for change is arbitrary, but it is still a choice. What is important is that change is considered in order to restructure technology to reflect ideal conditions or simply different conditions. There are now many groups around the world dedicated to researching alternative technologies, a need that has emerged to address the various crises around the world. Winner is asking us to consider, in "Alternative Technology", technology's role in the totality of our social relations. "The significance of alternative technology is not limited to whether or not it does, for example, help solve the energy crisis. At stake in this kind of thinking, research and development is the possibility of a fundamental reevaluation of the place and meaning of technology in human activity" (Winner, 1977, p. 128). Sustaining, at least, the idea of determinism asks us to question the very social relations which give rise to the technologies which, once implemented, can give reason to restructure society in order to spark different technological forms. Juxtaposing the meaning of technology with all of human experience would generate new sources of inspirations for new types of technological change. Determinism is important in helping us see the meaning of <technology> as it relates to our society rather than just understand everything through the labels that we have grown accustomed to.

Winner feels that we are deficient in our preparedness to create technologies which comply with the annals of a harmonious existence with technology. This is because of "our adherence to the terms of the technological orthodoxy have brought us to see everything in terms of progress, growth, narrowly conceived efficiencies, and the myth of technical neutrality" (Winner, 1977, p. 130). In effect, this is a diversification our criterion for technological development. For instance, we should consider "the notions of self sufficiency and interdependence as regards the lives of individuals and communities…Thinking about alternative technology seeks to investigate conditions far removed from those commonly found in modern technological societies" (p. 132). The concept of <technology> could also be expanded to include these new spaces for conditions which could encourage alternative technologies. Concepts are not bound to any one form of filling its continuum. Time, space, language and social relations can serve as the constitutional foundations for a conceptual foundation for change. Conceptual criterion is the issue, but the criterion depends on us—a project.

At the level of the empirical, however, Winner is talking about a design criterion which guides investigations on new paths. By advocating alternative technologies, Winner asks us to entertain a more specific technological criterion than just economic or efficient. Once this is accomplished one is freer to accept or reject certain technologies without being bound to the technological orthodoxy. For example, one could choose technologies that don't accord with advanced capitalism and are based on notions of humane conditions or environmental ends (1977). By not questioning the basic criterion of technological design, we are either blindly accepting the result or that specific *form* of change, a phenomenon Winner refers to as technological somnambulism which, he says, is a form of determinism. Choices about technologies are choices about the kind of society we want. Winner is encouraging us to choose the kind of society first then let that choice determine what kind of technology we utilize in achieving it. <Technology> becomes a reflection of our ideal society.

In other words, a technology is a certain face of a form of life. Here I refer us to the comment Winner made about how the car did not replace the horse, rather it replaced religion. “To see technologies as forms of life is not to see them as solutions to problems in need of a technological fix. A sign that alternative technology has reached a meaningful point of sophistication would be its ability to move logically from a set of critical, evaluative principles toward specific criteria of technological design” (Winner, 1977, p. 137). This would include social consequences. Winner talks about choices about technology which are before us all the time which he refers to as the political philosophy of technology. These are:

> choices about the kind of society in which we shall live. Over the next several decades our common life will take on new forms powerfully influenced by the adoption of devices, techniques, and systems of various kinds and qualities. As it refines its ability to speculate and to make reasoned judgments, to demonstrate the relationship between ideas and design, the political philosophy of technology may help clarify what many of the important alternatives are (p. 137).

Winner is asking us to open up and diversify what we understand as <technological>, to challenge its standard of judgment beyond that of merely the technological as the adjective that we know but don’t question. The realization of the social relations which can make this possible is through a social project. In other words, technological change does not have to be achieved by merely technological means; rather it can be the direct result of changes in our social structures. Again, to see <technology> as the result of social relations where choice is a premium would have a corresponding effect upon technological expressions.

It is about technological choice, a choice between technologies and types of technologies, and paradigms of technologies; thus, it is about the type of society we want. In the conclusion of Winner’s article, “The Whale and the Reactor”, he says that:

> we should try and imagine and seek to build technical regimes compatible with freedom, social justice, and other key political ends. Faced with any proposal for a new technological system, citizens or their representatives would examine the social contract implied by building the system in a particular form...Are the conditions produced by the change compatible with equality, social justice, and the common good? (Smith, M.R. 1996, p. 32-33).

Winner is asking that we base technological expression on new values and metaphysical goals. In the ideal conditions, technical expertise would meet face to face and answer to the ideals of democratic citizenry. In a sense this is prioritizing the ends over the means; discussions about technological choice would begin with the ends and defining them as they relate to society as a whole, rather than leaving the ends undefined as progress. Winner is concerned not so much with technological determinism but with "the often painful ironies of technological choice" (Smith, M.R. 1996, p. 32-33). Again, it would seem that <technology> could have an entirely different aporia than it does now if we would encourage conditions that would create space for reflection, consideration, and more diverse influences upon technology. As Winner uses words such as "accommodate, adhere and somnambulism" he is suggesting that we cannot be passive to technology's potential hegemony. We could influence technology if we weren't so lazy. This aso suggests that we have the power to influence technology's progress, evolution, type, what have you. Values and goals can be the point of departure for a new technological criterion. The concept of <technology> could be expanded and diversified if it were exposed to an entirely new approach, one that began with the essential desires of a society, its values and goals.

O. Conclusions

Soft determinism is about <choice> which is potentially a very complex concept especially when one considers all the possible choices and their effects within which there are infinite social relations—both considered and not. When different social relations are favored, different choices emerge resulting in different technological expressions. Those social relations that are not considered are potential resources for technology. In addition, the approach of soft determinism has demonstrated that we have a type of progress—material progress. This is fine, but epistemologically speaking soft determinism focuses on the individualized effects of this type of progress, how certain cultures have responded to it, what perspectives are left out and how these perspectives could be used to alter <technology>. The use of these perspectives, as the calibration of a project, seems difficult due to the distribution of power; and it would seem that there would need to be catastrophic events to change this distribution. Well, we have them: violence and planetary health.

<Technology> constitutes a kind of society, but it is not uniformly applied to all. It experiences variations in the contact with other cultures and lost perspectives, and soft determinism is an advantageous effort to uncover these points of view thus promoting critical reflection. There are degrees of determinism. Technology has a shape that is determined by the relationship between individual cultures and a universal idea of <technology> and maintaining this level of flexibility can serve to highlight aspects of <technology> that, ironically, awaken us to possibilities of change.

In sum, soft determinism has revealed to us that humans have the tendency to promote the kind of society which perpetuates <technology> as that which can drive history; however, when cultures collide with <technology> they are not passive. They adapt <technology> to fit their individual needs. These needs are the direct result of historical exigencies whereby some expectations and values are favored over others. We have seen that the criterion for technological choice is weak; either it is based on the new or confined to address a few interests. Individuals are not encouraged to participate in the construction of a more diverse criterion even though the resources are there. A vicious cycle is created in that technological choice is being cut off from its greatest source of inspiration—individual and un-coerced participation. We are complacent about this due to the fact that we are satisfied. As technological expressions affect our conceptual construction, we are weak in our ability to criticize both the technologies and the concept itself. Trying to criticize technology with technological values is like trying to analyze one's eye glasses while looking through the lens.

Satisfaction has become easily achieved as our criticism of technology has been weakened. In some cases we still create huge technological systems, like that of surveillance and communications, which strongly promote the values mentioned in the chapter about technological determinism; but there are choices behind this, and there are individual effects of these choices. The recognition of this is a step toward a kind of society which promotes critical reflection. Un-coerced critical reflection requires choices and a friendly atmosphere of consideration. Choices are found in social relations, and they must be allowed to surface to the realm of consideration.

Perhaps what is most important aspect of soft determinism is that it puts the concept of choice in a new light. <Choice>, despite its *voluntaristic* connotation, also contains a passive or lazy attitude toward technological change which implies that there is latent power within human experience that could be applied to technology. We have chosen the type of society we have, but choice is often achieved by doing nothing. Again, concepts are powerful in that they are universally understood to be a part of our experience, but they can be subjectively applied. Interpreting <choice>, as a passive concept, encourages one to look for active solutions. As Winner says, we chose the kind of society which favors a form of technological determinism; but knowing that we chose it suggests that we could choose another type of society. What is required is a search for the social relations which would promote another type of society.

The process of choice can begin with constructing the very criterion of <technology>. A society can choose certain values, expectations and goals from which to begin constructing the conceptual constitution of <technology>. This process does not have to be about replacing the conceptual criterion that is already in place; it could be about expanding it to include additional values and perspectives which are found in social relations. A conceptual approach would appropriately begin in Academia from where its influence would permeate throughout society and eventually reverberate in Government and Industry.