SOMEWHERE BETWEEN TECH AND SOCIODETERMINISM. PROBLEM-SOLUTION MINDSETS AND THE HYPOTHESIS OF INTERESTS AND ELITES IN PUBLIC IT-POLICY*

*Gunnar K. Njålsson***

* This is the first of a series of articles regarding the elites and their problem/solution mindsets and power networks' effects on public IT policies. The project *Technological Revolution as a Political Coup d'état 2002 – 2006* has as one of its first goals the development of political analysis that is systematic, neutral and demystified of technological development, to be used in the context of evaluation, formulation and description of national, regional and international IT policies. This project has received support from different Nordic foundations. The author wants to express his acknowledgement to Nylands Nation, Georg & Ella Ehrnrooth, Otto A. Malm, Sven & Dagmar Salén, and Oskar Öflund, because of their generous support. This article was received on 19-11-2004 and was approved on 15-05-2005.

** Post. Grad. Cert (hons.), Universidad de Helsinki, Finlandia, 2003; Cert. Gest. Pol. CyT, Universidad Nacional de Quilmes (UNQ), Bernal, Argentina, 2002; Cert. Idiom. Extranj., Universidad de Helsinki, Finlandia, 2002; Politices Magister (gest. públ. y econ., hons.), Universidad de Helsinki, Finlandia, 1997; Dipl. Commerc, Colegio Sueco de Comercio de Helsinki, Finlandia, 1994. International Institute of Space Law (IISL); Sociedad Argentina de análisis politico (SAAP), International High IQ Society. Investig. esp., Universidad de Laplandia, Facultad de Cs. Jurídicas, Rovaniemi, Finlandia. General Director, Founder of SPACEPOL Academic Publishers/ Government Policy Consulting, Québec, QC, Canadá y Esbo, Finlandia. E-mail: njalsson@spacepol.com

ABSTRACT

The article attempts to identify the spectrum of major theoretical schools of thought relating to the nature of technological development. These, it is argued, range from the *tech-deterministic* at the one end to the *sociodeterminisic* school of thought at the opposite end of the spectrum. The purpose of this article is also to present the hypothesis that interest and elites are involved in the formulation of public IT-policy. Such elites, it is argued, are in turn guided by their occupationally-related *problem-solution mindsets,* in addition to their interests. The article concludes with a concrete example of the hypothesis and structure of an IT-policy study based upon one of these schools and upon the author's theory of problem-solution mindsets.

Key words: Technology-policy aspects, public technology policy, elite groups, government planning, problem-solution mindsets, public administration.

RESUMEN

Entre el determinismo técnico y el social: actitudes referentes a problemas–soluciones y la hipótesis de los intereses y las élites en las políticas públicas relativas a la tecnología de la información

El artículo trata de identificar las principales escuelas de pensamiento teóricas relacionadas con la naturaleza del desarrollo tecnológico. Se asume que éstas se ubican entre dos extremos identificados como el determinismo técnico y el sociodeterminismo. El otro objetivo del artículo es presentar la hipótesis que afirma que los intereses y las élites están involucrados en la formulación de las políticas públicas relacionadas con la tecnología de la información. Se afirma que tales élites se guían por sus propias actitudes referentes a problemas-soluciones, además de sus intereses. El artículo concluye con un ejemplo concreto de la hipótesis y la estructura de un estudio sobre las políticas relativas a la tecnología de la información basado en una de las escuelas de pensamiento y en la teoría planteada sobre las actitudes referentes a problemas-soluciones.

Palabras clave: aspectos de política tecnológica, políticas públicas de tecnología, élites, planeación pública, actitudes relativas a problemas-soluciones, administración pública.

In order to obtain meaningful answers to pertinent questions about the formation and implementation of national information technology policies, it is necessary first to place any such academic endeavour within its theoretical context. Understanding the spectrum of theories available when examining public information technology policy (hereafter IT-policy) from a social science perspective, and how these theories relate to each other and differ in nature, is paramount to any attempt to formulate hypotheses on the subject or indeed, in order to defend one's choice of methodology.

In this article, I shall attempt to identify the spectrum of major theoretical schools of thought relating to the nature of technological development. These, I shall argue, range from the *tech-deterministic* at the one end to the *sociodeterminisic* school of thought at the opposite end of the spectrum. The purpose of this article is also to present the hypothesis of my own research —that interests and elites are involved in the formulation of public IT-policy. Such elites, I maintain, are in turn guided by their occupationally-related *problem-solution mindsets,* in addition to their interests. I shall conclude the article with a concrete example of the hypothesis and structure of an IT-policy study based upon one of these schools and my theory of problem-solution mindsets.

1. Definitions of IT Policy and IT Policy Analysis

It is possible simply to define information technology policy as that area of public policy which refers to activities within the realm of information technology. This includes the proposal, formation, approval and implementation of regulations, goals, programmes, resource allocation and priorities concerning the subject area. While policies themselves are probably never totally objective in the strictest positivistic sense of the word, this is less true of IT policy analysis, which, I propose, can be *objective, normative* and *speculative* in nature.

By the term *objective policy analysis*, I am referring to the descriptive or comparative analysis of a particular area of policy *through the filter of a particular theoretical framework, without attempting to influence it in any manner by way of this analysis*. This does not rule out the use of the results of such an analysis by policy makers wishing to improve policy, based on normative criteria or objectives. I will use the term 'normative' when referring to *the attempt to evaluate the performance of, to affect or to change a particular policy*. This latter term explicitly or implicitly involves the idea of how a particular policy *should perform* and what its goals and effects *should be*. This implies that any evaluation of particular public policies regarding science or technology would logically belong to the normative analysis of IT-policy, particularly as such an evaluation is almost always a part of the policy process itself. By simply describing the nature of or classifying a certain science or technology policy, one is working within the realm of objective policy analysis.

The instruments of science and technology policy, as exercised by the state (*normative* science/technology policy, that is) are a direct manifestation of the relationship between state and scientists (Saenz-Menéndez &

Santasmases, 1996, pp. 10-15). According to Saenz Menéndez and Santesmases (1996, pp. 9-12), the dominant mode of intervention of the state in the fields of science and technology is by means of a particular science or technology policy which affects incentives and resources needed and utilized by those actors making up the research system. The actions taken on the part of the state are at times explicit, ordained and prioritized. However, more often they are a reconstructed *ex post* reaction to prior performance, and restrict themselves to measures taken within national boundaries. In some countries, the expressed scientific or technological policy or *explicit science/technology policy* is not congruent with the actual or *implicit* version of this policy (Herrera, 1995). Science and technology policy involves structures and functions which often differ, depending upon which country or region is examined. One of the most common structures of science and technology policy often put in place by the state is the research council, which carries the national mandate for rewarding such research projects as are deemed to be of high quality and in step with national priorities. In addition, bodies for the advancement of technology and R&D have a similar mandate relating to the field of IT-policy.

Where we can classify the nature of policy analysis referring to information technology as neither objective nor normative, whether this be due to a lack of sufficient reference to arguments or facts or to the highly general or hypothetical nature of the claims made, such policy analysis may appropriately be classified as *speculative*. Speculative policy analysis regarding information technology will usually contain elements of either *tech-determinism* or *socio-determinism,* which I shall discuss in detail below. What separates speculative policy analysis from normative policy analysis is the almost total absence of definitions of what is right, wrong, good, bad, desirable or undesirable. Speculative policy analysis differs from objective policy analysis in that it does not base itself entirely upon facts regarding the present status or effects of a particular policy, but rather also upon inferences regarding the future nature and effects of a policy, which at least in part are intuitive and not readily demonstrable in any uniform manner. IT-policy can, and in practice at many times does, utilize the results of speculative policy analysis.

2. Tech-Determinism, Socio-Determinism and in Between

Immediately upon moving into this particular area, one is struck by the apparent lack of consensus as to the nature of the development of information technology as a social phenomenon. Rather, where debate is at all heard on the subject, it moves between seemingly opposite poles, one insisting upon the utter autonomy of technological development from the raging conflicts of what we know as politics and from many other social aspects, and the opposite upon the nature of technological development as a purely social process full of conflicts of interests and power struggles for the right of definition of the future. As Langdon Winner (1977) so shrewdly observes, technology might well be demystified in its presumed autonomy, so as to develop a functional politics of technology. For by enshrouding,

for instance, IT in a cloud of mystery, and treating it as though it were autonomous and neutral, we are in fact cloaking the process through which technology is produced by and within a society, and in doing this also the specific interests and actors who design and develop these technologies, as well as the currents of thought regarding them (Winner, 1977).

Even central theorists such as Thomas P. Hughes (1983) are academically opposed to the idea of IT as autonomous, while noting that it is in effect difficult to change the direction of large socio-technical systems such as that system involving IT. Yet most modern and even developing countries have formulated and are formulating national information technology programmes and using indicators to evaluate how close they are to becoming "information societies". There is, in a word, an IT policy being put into place while it would appear that there is a seeming lack of objective IT policy analysis, something which the previously cited authors repeatedly stress.

A dichotomy can be drawn between the academic point of view sanctioning the autonomy of technological development in relation to social processes as perhaps its effects upon these processes, and the view which asserts that technology is merely a social process and that technology is influenced solely by society. It was probably Karl Marx who formed the school of thought highlighting the influence which production technology exercises over society at large in his famous *Poverty of Philosophy*. Yet technological determinism has also been subjected to biting criticism, in some cases by theorists claiming Marxist theoretical orientation. Whatever their theoretical persuasion, those proclaiming the social determination of technology have made their mark on the social theory of technology, forming several schools of thought, including social construction of technology (SCOT) (Thomas Hughes, Wiebe Bijker), actor-network (Michel Callon) and socio-technical constituencies (Alfonso Molina).

Lewis Mumford, focusing a critical humanist eye on future technology development and policy, painted a rather haunting picture of what is to come:

> ... the new liberty is transformed into a more sophisticated version of the ancient slavery: the rise of the political democracy of the past centuries has been increasingly nullified by the successful resurrection of authoritarian, centralized technologies [...] through mechanization, automation, cybernetic administration, these authoritarian technologies have overcome their most serious weakness, their original dependence upon the resistance, at times outright active disobedience of human service functions, still human enough to maintain intentions which do not always coincide with those of the System. (1967, pp. 4-5)

This view (despite the sociodeterministic orientation claimed by its author) contains within it an extreme version of technological determinism in the most negative sense of the word. Here, technological development and the nature of the new technologies ultimately erode not only liberal democracy, but also the human aspect of humanity. It would appear that Mumford, in his critique, sees

before him an autonomous technological *system* exercising a negative influence over many vital aspects of a democratic society, such as the human personality, knowledge of the processes of history, the primacy of abstract intelligence as well as the physical environment and ultimately mankind.

Though ideally a critic of technological determinism belonging to the humanist persuasion, Mumford would appear to put forth certain views, which, if anything, are a brilliant illustration of the effects of an inhuman, autonomous technological development, seemingly living a life of its own and influencing, if not utterly forming society.

Technological determinism or tech-determinism as a conceptual point of departure contains two major suppositions- the *neutrality of technology* as well as the *autonomy of technology*. Accordingly, the concept of the neutrality of technology maintains that the negative or positive effects experienced in a society are not the product of technology *per se*, but rather of the uses to which said technology is put. Further, the autonomy of technology dictates that technology evolves according to its own innate rationality, external to the control of humans. A common example of this idea taken to extremes would be the thesis that "technology evolves more rapidly than politics" or that "technology is outside the realm of values and morals" (Kreimer, 2000, p. 141).

Not all tech-determinists would subscribe to the chilling picture of future technology painted by Mumford. Indeed, many of today's spokespersons for autonomous technological development combine old ideas of direct democracy and positive progress with the possibilities offered by the new technologies, so-called electronic visions (Haug, Enebakk & Schjölberg, 1999). This is, however, commonly demasked as *revolution as the result of wishful thinking* or a *new legitimisation of the* status quo by critics such as James W. Carey (Carey & Quirk, 1989). In such visions, an automatic relationship is alleged to exist between technology, decentralization and democracy, thus offering many policy makers what at first would appear to be a road map, not only to good technology policy, but to efficient democracy as well (Haug et al., 1999). In a word, technology is autonomous and affects society and democracy in a most positive fashion.

Located somewhere in the theoretical middle-ground, much closer to tech-determinism than to socio-determinism, is what Robert L. Heilbroner (1967) would label *soft tech-determinism*, in which technological development is in itself a social activity and according to which technology occupies a central role only at given moments in human history. He writes:

> ... technological determinism is, therefore, a problem peculiar to a certain historical epoch-specifically speaking, that of big capitalism and little socialism- during which the forces of technological change have been liberated, even more, in which the agencies of control and direction of technology are still rudimentary. (1967, pp. 338-339)

It has been proposed (Kreimer, 2000) that the philosophical roots of tech-determinism lie in its historical ontology. That is, the

"historical narration" of the development of technology has the *artefact* (the computer or telegraph cables, for example), usually in the singular, as its subject or centre living the contextual drama of its own *evolution*. Perhaps the reasons for this ontological point of departure can be found within the fact that the artefact is the most evident product of technology. Additionally, the fixation upon the concrete and evident product of a certain system of production, with the resulting fixation of observation on the product, and omitting the system in which the product is produced, tends to be a common operational deficiency of certain types of econometric analysis.

One theoretical and operational solution would be to move the focus from objects and artefacts toward the processes which make their existence possible, and toward the motives for their production. Technical inventions and innovations arise from a multiplicity of possible new relationships and networks. J. Schumpeter (1934) would have it that these inventions are merely synonyms for new combinations of existing knowledge and many persons. The tech-deterministic school of thought has received theoretical competition during the past 15 years, based upon its own omissions of important factors contributing to the evolution of particular technologies. One of the central arguments for the move toward socio-determinism has been that it is impossible to make *a priori* divisions between the social, the technical, the economic and the scientific.

The non-divided view of the social and technological gave rise to the social constructionist view of technology and society known by the metaphor of the *seamless web*, to which belongs the *social construction of technology* school of thought or SCOT, as I shall refer to it in what follows. The theoretical groundwork for SCOT can be traced back to science sociologists such as Harry Collins with his "empirical programme of relativism" or EPOR. This alternative was offered in light of the fact that traditional approaches to the subject of technological and scientific development were conceptually bankrupt (Haug et al., 1999). Accused by internalist traditionalists à la Kuhn of falling into the trapping quagmire of the relativism problem and of moving social science attention away from what happens in the laboratories toward interests, conflicts and intrigues, EPOR was later forced to undergo conceptual and operational revisions. Theorists such as Bijker and Pinch strove to accomplish this through SCOT. Of particular interest to any study wishing to identify not only technological artefacts but also the groups involved in creating and promoting them is the observation of Wiebe Bijker regarding social groups:

> The concept of relevant social groups is a category of actors. While the actors do not use these words, they actively employ this concept in order to organize their world [...] A crucial proposition in the development of the constructivist model of technology is that the relevant social group is also an important category of the analysis. (1995, p. 48)

According to Bijker (1993), it is necessary to view the artefacts as they are seen by the relevant social groups in order to understand technological development as a social phenomenon. Otherwise, technology will be-

come conceptually autonomous, taking on a life of its own. Further, Bijker points out that society is not determined by technology nor technology by society; both emerge as two sides of one socio-technological coin during the process of the construction of artefacts, deeds and relevant social groups.

The socio-technical constituencies model of Alfonso Molina (1989) expresses the idea that technological constituencies being composed of artefacts such as expertise, tools, machines, etc. meet social constituencies composed of individuals and their interests and/or group values, etc., and that no single isolated element can in itself be used to explain the nature of technological processes; both constituencies are inseparable, each is experiencing constant flux and change.

Trevor Pinch (1997) sees technological artefacts as containing the plurality of societal aspects (technical, social, economic) within themselves, thus forming a part of the seamless web discussed earlier. More toward the pole of socio-determinism lies the model of technological systems usually associated with Thomas Hughes (1995). He defines the activities of technological systems as follows: "Technological systems solve problems or satisfy objectives making use of those means disposable and appropriated; problems reorganize the physical world in forms considered useful or desirable, in particular for whoever designs or employs a technological system" (1995, p. 52).

The technological systems proposed by Hughes contain complex components, both physical artefacts and humans oriented in terms of problems-solutions. The artefacts can include organizations, firms, books, articles, university programmes or laws. These types of artefacts are subdivided into categories such as physical, scientific and legislative. The artefacts forming the technological system are socially constructed. When the purpose or characteristics of one artefact change or that artefact is removed, the characteristics of the other artefacts are simultaneously altered. Though this model might appear at first sight void of subjects, Hughes (1995) assigns this role to actors denominated as *system builders*. Thus, per definition, the artefacts of technological systems are socially constructed because these are invented and developed by system builders and their associates.

Unique to this social constructionist view of technology is the idea that technological systems tend toward inclusion of their environments into the functions of the system, particularly with an eye to reducing sources of threats or uncertainty. It is, however, important to draw the distinction between what is included in the technological systems and what is not. For instance, those actors within the external environment, though being somewhat dependent on a technological system, are not considered part of that system if they do not interact with its various components. Artefacts within the technological systems are controlled by the system builders who invented or developed them. Components, on the other hand (inventors, engineers, financiers and workers), would in theory have more freedom of choice than artefacts, but Hughes notes that system builders have tended to bureaucratize, routinize and disqualify with the objective of minimizing the level of freedom

of the workers or administrators of the system. Perhaps one of the greatest contributions of this complex and at times seemingly unmanageable theory is the idea of *technological styles* (Hughes, 1995), which reveals the fallacy associated with the perception of technology as simply applied science and economics. The perception of autonomy is accredited by Hughes to the phenomenon of *system momentum* and is illusory.

Michel Callon (1987) will not allow for the separation of actor from network in his proposed actor-network model for analysis of technological development. This approach contains a level of abstractness highly representative of social constructivism, and Callon stresses that the term actor-network is not to be confused with actor and network in the sense of their relationship, so typical of network theory. An actor-network can be an artefact (an object) or a person situated together with other actor-network elements. They can redefine their position in relationship to each other at any time. An actor-network is at the same time both an actor seeking to link heterogeneous elements within the network, and a network capable of redefining and transforming its own substance. Callon translates this model to the technical realm by way of the concept of techno-economic networks, these being co-ordinated combinations of heterogeneous actors (laboratories, technical research centres, firms, financial organizations, tech-users and government) who actively participate in the conception, development, production, distribution and diffusion of procedures for producing goods and services (Callon, 1992).

One of the particularly useful aspects of Callon's approach is the idea of *system convergence* which can be expressed in degrees. This convergence takes place through a complex process containing elements such as 'translation' between entities within the network who define and construct a world populated by other entities. As such, actor 'A' sends 'I' (any intermediary) to B by providing B with a definition (through the intermediary), thus imputing to B certain interests, projects, desires, strategies, reflections, etc. Also included in the complex process of convergence is the idea of 'network alignment'. The degree of network alignment is directly related to the degree of success in translations between the various actors involved in the network. Network co-ordination, on the other hand, is the result of the previous processes which restrict the number of possible translations in a given network, what Callon refers to as the translation regime of that network (Callon, 1992). The result of the different degrees of network co-ordination (the result of how well the previously mentioned processes are working) is a corresponding level of co-operation and harmony amongst the various actors in the network. It is important not to confuse the heterogeneous Callon-networks with the homogenous networks encompassing single sectors or groups.

3. Bruno Latour, Networks and Translation of Problems/Solutions

In what is at times referred to as the French school of sociology of science and technology, the network theory of Bruno Latour assisted by the 'translation' concept of Michel Callon, which I discussed above, has played a central role in the development of several sub-schools of thought. According

to Latour, the techno-sciences exist within the context of recently established fields which are to many foreign and fragile, and which accumulate a disproportionate amount of economic resources. These fields can at times occupy a strategic position. Because these fields may at the same time be so diluted and so concentrated, so powerful and yet so marginal, this would signify, according to Latour (1989), that they contain the characteristics of a network. Per definition, this indicates that resources are concentrated in particular fields or *nodes* of the network.

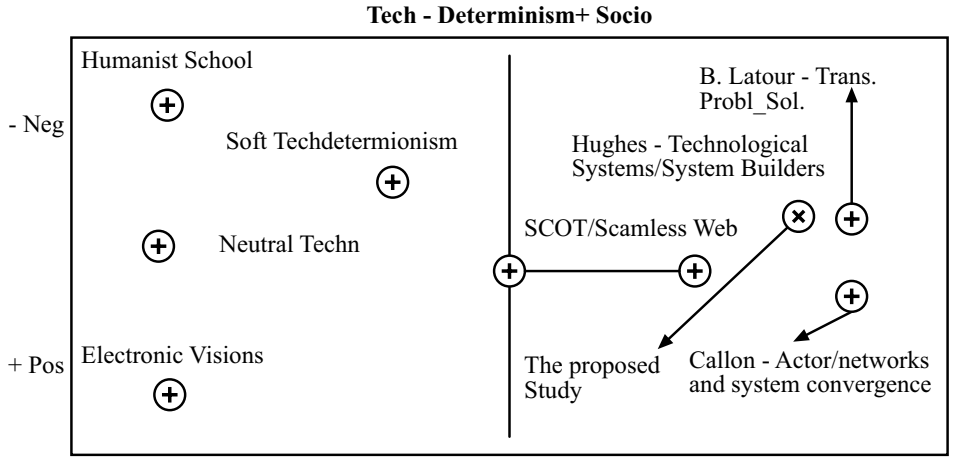
Within the interior of the network, actors decide who will be their allies, since these networks are not in such a genuine equilibrium as would result from the consensus between the different actors. Alliances are, on the contrary, established in order for the participating actors to be able to strengthen their own position and to be able to impose their own interests on their adversaries. This struggle involves complex networks of humans and artefacts, instruments, resources and actors, which together participate in the game of alliance-building. Furthermore, each actor attempts to create context, content, objects of study and the problems to be solved, signalling that by identifying a problematization, one may identify in turn the corresponding actor. One group of actors may attempt to mobilize others around a certain theme of interest to the first group, attempting to convince the others as to the nature of reality through the act of translation and the redefinition of the problems and solutions.

The recurring theme of the lack of (perfect) information as the root of all economic evils, a conceptualization proposed by economists and perhaps shared by those involved in tech-design and —distribution, is evident in discussions where the rest of society is persuaded to see this 'problem' as well and to adopt the corresponding 'solution'. A case in point cited by Haug et al is the insistent campaign by the Ministry of Education in Norway for the inclusion of IT in schools around the country, something which must have been seen in the context of increasing needs and interests of Norwegian business, as concerns procurement of well-educated labour (Haug et al., 1999). Interestingly, the tech-deterministic nature of much of the information being sent out through government channels to citizens in many countries around the world would appear to be defining the 'problem' as *IT-retardation* or *computer illiteracy* on the part of these citizens, assuming that technology will evolve and survive even without them.

4. Interest Groups in IT Policy

A more socio-deterministic IT policy analysis, such as that which my own research represents, must be concerned with the social processes linked with the allocation of resources to particular IT sectors and projects, as this allocation can be deemed to correspond to the priorities of the allocator, usually the nation state or a regional organization. Also, written, explicit national or regional programmes must be seen as the concrete expression of the IT policy of a given state or region. Here, the process leading up to this final written product will contain important information indicating everything from the balance of power of differing groups to the struggle for the right of definition of the problems to be solved,

Figure 1
Four-quadrant Classification of Major Theoretical Schools



Source: Own elaboration.

as well as their solutions. Where policy documents and the statements being taken into consideration when formulating them contain information about the perceived state of affairs in some area, the reasons for this state of affairs and the solutions to be sought in order to improve the state of affairs, they may well implicitly contain the interests of the various groups expressing these statements. Let it be clear, that here I am referring to written policy, explicit policy which may hint at explicit or implicit group interests.

The idea of interest groups in the context of IT policy would appear not to be entirely foreign to Per Hetland, who notes:

> The success of the Internet might therefore just as well stem from the fact that the actors around the Internet have been good at communicating certain attractive or challenging visions of the possibilities of the Internet, rather than from the 'superior' technological properties of the Internet. (1998, p. 1).

According to him, the identification of the balance of power between the different actors involved is relevant in the highest degree. Who are these actors, then? Haug et al. identify them as the mass media, the public, politicians, tech-developers, tech-producers and tech-marketers. Those journalists, developers and other representatives of tech-related interests who provide metaphors and visions encouraging the acceptance of IT technologies by other actors are referred to by the authors as 'providers of legitimacy'. The number of persons involved in the development of both IT and the rhetoric surrounding it is relatively limited, being composed mainly of caucasian men between 20 and 30 years of age with a high level of technical and economic education (Haug et al., 1999). The utopian metaphors and visions surrounding the possibilities of the Internet and the so-called Information Society have even been referred to as the *Californian Ideology* (Barbrook & Cameron,

1988) —an IT-centred utopianism having its geographical roots in the Berkeley— Silicon Valley region and having become virtually the only acceptable IT orthodoxy among IT-users around the world.

When identifying the development of IT and its diffusion in a society as an, at least in part, ideological phenomenon, it is possible to note the seeming symbiosis between the current IT-friendly atmosphere and neo-liberal economic ideals. Class, conflict and ideology and interests are diagnosed as symptoms of lack of (perfect) information. IT will ensure that this is corrected and that the prerequisites for perfectly rational decision-making will do away with all of these symptoms (van de Donk, Snellen & Tops, 1995).

In the attempt to benefit from such observations when identifying possible IT policy interest groups, it is important to look at who may have something to gain, not only from the proposed ideologies of IT, but also from the effects of the implementation of IT policies. Perhaps employers and large corporations stand to benefit from automation of functions which were previously carried out by highly unionized workers. It might be that the desire on the part of technocratically-oriented nation states to document the behaviour and movement of their citizens and (particularly) foreign nationals in their territory for legal or other control-related reasons causes them to unite with IT developers and producers, creating policies favouring the allocation of resources to the development and distribution of particular technologies.

Even seemingly democracy-oriented IT projects (e-democracy) may contain the seeds of an increasingly technocratic process of democracy, where one is forced to trust in the work of technical experts to ensure that e-democracy will keep functioning properly (Myklebust, 1997: 45). All of that which has been discussed should serve to warn policy analysts of the risks of ensnarement when dealing with the issue of IT and democracy. Objective IT policy analysis must respond to these dilemmas, admitting the complexity and dynamic nature of the processes involved, but at the same time attempting to demystify the issues of power and interests which are important to both governments and citizens in the context of the democratic process.

It is necessary, then, to move the focus of serious IT policy analysis to the limited group of individuals involved in the development of IT and the rhetoric surrounding it, as well as those involved in the lobbying and formulation of IT policy in a nation or region. As we are referring in such a context to a very limited number of actors, we will likely be speaking of an oligarchy, most likely of some type of policy elite. Here it is important to stress that I do not propose that there exists one colossal IT policy elite, but rather that there most likely exist several separate elite groups bound together by common characteristics —what our previous theorists might refer to as this Californian ideology, amongst other common characteristics. The concept of ideology will also not suffice in itself in the context of such an analysis. Rather, it is important to break down and more proficiently define the characteristics of possible elite groups within the IT policy process in terms of values and problem-solution mindsets.

One elite study, that of Ilkka Ruostetsaari (1994), gracefully illustrated that one might well locate several elite groups with similar values regarding technology, and examine whether these same elites were in actuality part of the national IT policy process of Finland during the 1980's and 1990's. Ruostetsaari found that both the technology and the business elites (educated as engineers and economists) were the most optimistic with regard to the ability of technology to solve present and future problems of mankind. The raw data used in this highly quantitative analysis are readily available for the period in question and might well provide information which would, for instance, assist in predicting which groups most likely were present in the formulation of IT policy in Finland during the 1980's and 1990's.

The involvement of interest groups within the policy process does not require the existence of any type of conspirator's agenda on the part of those involved. Rather, it may well be the result of their particular problem-solution mindsets, a concept which draws upon some of the theoretical arguments of Bruno Latour, Michel Callon, and Thomas Hughes, which I discussed earlier.

5. A Theoretical Framework for IT Policy Analysis

The theoretical position of Latour and Callon discussed above has relevancy for any attempt to identify the interests present in a given IT policy process. If actors within networks struggle over the right of definition (and the resources granted to those proving themselves to be indispensable), then their interests can be identified by their conceptualization of problems. Latour and Callon would seem to admit the possibility that definitions of problems and solutions may, in part, be based upon the conceptual background of the actors. For instance, an engineer may see technology as the solution to many problems, even the shortcomings of the democratic process, which while being seen as a problem also by a social scientist, may according to the latter require a non-technical solution. The concept I coined earlier, namely *problem-solution mindsets,* may be one way of identifying the most likely Latourian problem-solution inclination of a predetermined group of actors within a network. Taking the example of the engineer, we might hypothesize that it is irrelevant whether the particular problem-solution mindset typical of an engineer is the result of that individual's education or the very inclination which inspired the individual to seek admission to a technical university. What is relevant here is the particular way of creating problems and their solutions attributable to this person. The same would apply to an economist, a humanist or a jurist.

This way of perceiving the division between the thinking patterns of different occupational groups is not altogether foreign within policy circles. Often expert statements will be requested by government and organizations precisely with the aim of utilizing these differences in order to gain as complete or varied a picture as possible of a particular issue. Poor policy can be expected to result from one-dimensional preparation of policy by occupational groups incapable of perceiving the issues, problems and solutions of that particular policy area. For instance, attempting to allow engineers to grapple with

the social or psychological aspects of a municipal zoning plan will, allowing for a very few persons of exceptional multi-occupational talents, likely result in technologically well-planned but sociologically and psychologically poorly planned or outright disastrous municipalities.

To identify certain groups present in the formation process of IT policy is a major aim of objective policy analysis in this area. By hypothesizing the existence of and participation of a number of elite groups in this process, one is in no way finalizing the number and types of categories of the participants. They can (and most likely will) be re-defined as information is gained regarding the actual history and events of importance within the formation of IT policy. I consider it, however, likely that at this stage we can identify at least three major elite groups present in the IT policy process, largely based on what is known about policy-making and what has been shown earlier in this text. These groups are: technocrats, econocrats and bureaucrats.

By *technocrats* I mean experts within the technical field or techno sciences, usually possessing a degree in engineering or at least broad experience within this field. Where a technocrat is involved in non-engineering related policy activities, I would argue that this individual will nonetheless tend to see the world in terms of technical problems to be solved by technical solutions. A technocrat will also be most optimistic regarding the possibilities and solutions offered by present or future technologies. While most technocrats in this analysis might be expected to be engaged in the development of new technologies, they may also be present within ministries, businesses and various lobbying bodies involved in some way in the IT policy process.

By *econocrats* I am referring to businessmen or experts with a background in commerce or economics, be it by way of an academic degree or diploma or years of practical experience. Where an econocrat is involved in non-business activities within the framework of government, I would argue that this individual will tend to conceptualize the issues at hand in terms of economics and trade, often comparing the bodies involved in the execution of policy-related activities to a business. Econocrats can be expected to possess a relatively high degree of tech-optimism, insomuch as the technology at hand can be deemed to be marketable (income, consolidation of wealth) or improve the production process (lower production costs, less human capital, efficiency). They will tend to equate the neoliberal utopia with the possibilities offered by the new technologies.

Bureaucrats are perhaps the most loose-knit category of elite, as this category may contain persons of differing occupational and educational backgrounds. By tendency, bureaucrats will be disposed to act according to one of the first categories mentioned if they possess education and experience in that field. Jurists and social scientists will tend to be law and regulation-oriented. They will be most susceptible to the attempts by the first two groups to define the problems and the solutions, adopting, for the most

part, one or the other orientation (*technocratic-econocratic*). As they are mostly involved with the implementation and administration of policy, they will be per definition often forced to change with the times in their rhetoric and orientation; that is, to adopt the dictated problematizations and solutions of the dominant elite groups.

Ilkka Ruostetsaari (1998) notes an interesting phenomenon when speaking of the use of power by elites within working groups appointed to affect policy. According to his observations within a concrete study of the formation of Finnish electrical energy policy, power can be exercised on the part of a policy elite by transforming political issues into technical issues, thus limiting the arena of legitimate criticism and concentrating the policy preparation in the hands of a few with similar occupational and socialization backgrounds. This is an example of the type of exercise of power I would expect of *technocrats* in their attempt to exercise the power of the definition of problems and solutions mentioned by Latour and Callon. The phenomenon of the 'reign' of various occupational groups in the history of the Finnish government and its policies has been previously documented by Markku Temmes, explaining the important roles held first by jurists and then by public administrators and engineers throughout the years. This analysis should lend support to many of the claims made by Latour, Callon and others of the French school regarding the struggle for the definition of problems and solutions, which, I propose, can in many cases be deemed to pertain to the various occupational groups and their problem-solution mindsets.

6. Current Research Activities Attempting to Apply the Problem-Solution Mindsets Theory

If technological revolution is thought of a political coup d'état, a question arises imediately: Is finnish national IT policy like the hegemonic project of several elites?

Based on what has been discussed above, the utility of an objective analysis of Finnish IT-policy, and particularly one which examines this policy from a non-tech-deterministic vantage point, should be evident. The theoretical framework for the study would be *Problem-Solution Mindsets* which influence the way actors with differing occupational backgrounds perceive problems, and the solutions they propose to these problems, and which, according to previous research on elite groups, may well correspond with the various categories or types of elites. This theory is adapted from those of Bruno Latour and Michel Calon dealing with the social construction and translation of problems and solutions, and includes the aspects of *interests* or *survival projects* touched upon by Manuel Castells and Pekka Himanen (2001).

I would in the context of the future study hypothesise that the Finnish IT Policy formed during the years 1980-2000 is the policy outcome of social networking between an administrative elite, an IT/technology elite and a commercial/financial elite; that it correlates to a significant degree with their problem-solution mindsets and priorities; and that these elites have over time effectively concentrated themselves in strategic areas of

the technology/research-related policy process in Finland, a development which would be reflected by an increase in the observed correlation over time, and correspond chronologically with the ever-more central role of this particular policy area within the context of the national priorities of Finland.

As clearly expressed earlier, a more socially-oriented understanding of the IT-policy process and its actors would demand further research into the political and power aspects of the Information Society. Are these developments autonomous or are they the results of sectorial interests? The very fact that the current development affects the lives of many or most of the citizens of our country and indeed people around the world, including their livelihoods and futures, should provide ample persuasion concerning the societal significance and democratic benefit of making these developments more transparent to scholars and ordinary citizens alike.

The methodology of the proposed study would be both quantitative and qualitative in nature, utilizing thorough qualitative interviews to obtain details as to the chronology, directions of influence, and particularly active individual actors within the context of developments in Finnish national IT policy (cross-checking). The hypothesis might well be further broken down into several sub-hypotheses or sub-modules, so as to allow for the needed methodological differentiation when attempting to apply, examine and verify/falsify parts of the hypothesis which are very different in nature as regards the type of sub-study to be carried out on them. The methodologies would include detailed interviews with a very limited yet very experienced and knowledgeable group of individuals who have been directly involved in Finnish IT policy during the period 1980-2000. Statistical analyses such as rank correlation analysis, correlation analysis and regression analysis involving change over time might also be employed to examine aspects of the hypothesis, such as the relationship between problem-solution definitions or priorities on the micro (actor/organization) level and on the macro (national) level.

Social network mapping in relation to the documented policy process flow (from private initiative/motion to committee to ministry) and its strategic points, and analysis of interlocking directorates, including the direction, nature and intensity of influence, could be utilized when trying to determine whether those groups whose problem-solution mindsets correlate with the official priorities of Finnish national IT policy exhibit signs of networking and strong influence on the policy formation process and the changes in this behaviour during the period 1980-2000. The results obtained would be cross-checked against the qualitative information obtained by means of the expert detailed interviews. In the case of significant conflicts between the qualitative and quantitative narratives on the development of Finnish IT policy during the period, follow-up interviews and further statistical tests, including complementary raw data, could be obtained.

The study would focus on the elite *group* to which the actor pertains and not on the individual actors per se. On the organizational level, attention would be given to the particular firm or organization, particularly if it was or has become part of the IT policy

process flow. The point of departure for the formation of the analysis might be the study of the structure and flow of the national IT policy process, including national IT programmes and policy documents from 1980 to 2000. This information would then be complemented by several detailed interviews with persons possessing years of on-hand experience in this policy field. From this a reliable organogram and policy flow model would be drawn up, including important changes to it during the period. The membership of committees might then be analyzed and the names of the businesses linked to them would be listed in order to make a subsequent analysis of the membership of the boards of directors of these businesses. During the entire process of construction of the sub-studies, raw data could be cross-checked with the information from the detailed interviews in order to avoid omissions or errors relating to aspects such as chronology, direction and the nature of influence in interlocking directorates and the role of various organizations.

Concluding Remarks

This article has demonstrated that IT policy analysis may be classified as objective, normative or speculative, depending upon whether the analyst simply reports the state of affairs, denotes how policy *should perform* or combines statistical information and current facts with prognoses and some degree of speculation regarding future developments. The major theoretical points of departure regarding the nature of technological development have also been classified in this article, according to the degree of techdeterminism or sociodeterminism inherent in them, as well as how positively or negatively they would appear to view the nature of this development and its future. It has been argued that IT policy and technological development may be greatly influenced by a limited group of actors, usually comprised of well-educated, younger men with backgrounds in technology and economics. Smaller groups of elites exercising this type of influence are an important focus for future IT policy studies, and such a study should define the elite groups behind national and international IT policies. Such groups, I propose, create problems and the solutions to the problems in accordance with their own *problem-solution mindsets,* which are to a significant degree dependent upon the cognitive and educational background of the group members. In accordance with the ideas proposed by Michel Calon and Bruno Latour, each group attempts to transfer its problem-solution mindsets to others when building alliances. Group and mutual interests cause these elites to attempt to translate their priorities into national and international priorities. A future study should determine to what extent elite groups have translated their own problem-solution mindsets and priorities into Finnish national IT policy during the period 1980-2000.

List References

Barbrook, R. & Cameron, A. (1998). *The californian ideology.* Recuperado de http://www.wmin.ac.uk/media/HRC/ci/calif5.html.

Bijker, W. E. (1993). Do not despair: There is life after constructivism. *Science, Technology and Human Values,* 18 (1), 113-138.

Bijker, W. E. (1995). *Of bicycles, bakelites and bulbs: Toward a theory of sociotechnological change*. Cambridge, Mass: MIT Press.

Callon, M. (1987). Society in the making: The study of technology as a tool for sociological analysis. In: W. Bijker, et al. (comp.), *Social construction of technological systems*. Cambridge, Mass: Cambridge University Press.

_____ (1992). The dynamics of techno-economic networks. In: R. Coombs, P. Saviotti & V. Walsh. *Technological changes and company strategies: Economical and sociological perspectives* (pp. 83-103). London: Harcourt Brace Jovanovich Publishers.

Carey, J. W. & Quirk, John (1989). The mythos of the electronic revolution. In: J. W. Carey (comp.), *Communication as culture: Essays on media and society* (pp. 201-230). Boston: Unwin-Hyman.

Castells, M. & Himanen, P. (2001). *Suomen tietoyhteiskuntamalli* [*The finnish model of the information society*]. Helsinki: WSOY.

Heilbroner, R. L. (1967). Do machines make history? *Technology and culture,* 8 (3), 335-345.

Herrera, A. (1995). Los determinantes sociales de la política científica y tecnológica en América Latina. *Redes 5. Revista de estudios sociales de la ciencia de la UNQ*, 98-112.

Haug, T., Enebakk, V. & Schjölberg, R. (1999). *Demokrati og IKT —en kunnskapsstatus om forholdet mellom demokratiske teorier og nye informasjons— og kommunikasjonsteknologier* [Democracy and ICT- A Preliminary Report on the Relationship between Democratic Theories and New Information and Communication Technologies]. Skriftserie 1/1999, TIK: University of Oslo.

Hetland, P. (1998). To connect or de-connect? That is the question! The internet user: Inscribed, transcribed and described. In: *Notatserie for kommunikasjon: Teknologi og kultur 15*. Oslo: University of Olso Press.

Hughes, T. P. (1983). *Networks of power: Electronification in western society 1880-1930.* Baltimore: John Hopkins University Press.

_____ (1995). The evolution of large technological systems. In: W. Bijker, et al. (comp.), *The social construction of technological systems*. Cambridge, Mass.: MIT Press.

Kreimer, P. (2000). *Aspectos sociales de la ciencia y la tecnología.* Buenos Aires: UNQ.

Latour, B. (1989). *La science en action*. Paris: La Découverte.

Molina, A. (1989). *The transputer constituency: building up UK/european capabilities in information technology*. Edinburgh: Edinburgh University Press.

Mumford, L. (1967). Authoritarian and democratic technics. *Technology and Culture,* 1, 1-8.

Njålsson, G. K. A. (2002). *Los consejos de investigación y el desarrollo de la ciencia* [informe]. Buenos Aires: UNQ.

Njålsson, G. K. A. (2003). *Science and technology as a problem for political science: An interim report on the political nature of IT policy and the need for analysis of technological development from a political science perspective.* Finland: Espoo.

Pinch, T. (1997). La construcción social de la tecnología: una revisión. In: M. J. Santos & R. Díaz

Cruz (comp.), *Innovación tecnológica y procesos culturales: nuevas perspectivas teóricas*. México: Fondo de Cultura Económica.

Ruostetsaari, I. (1994). *Vallan ytimessä: tutkimus suomalaisesta valtaeliitista* [*In the corridors of power: A survey of the finnish power elite*]. Helsinki: Gaudeamus.

_____ (1998). *Energiapolitiikka käännekohdassa: järjestöt ja yritykset vaikuttajina vapautuvilla energiamarkinoilla* [*Energy policy at a turning point: Organisations and businesses as lobbyists in the liberalisation of the energy market*]. Tampere: University of Tampere.

Saenz Menéndez, L. & Santasmases, M. J. (1996). Ciencia y política: interacciones entre el Estado y el sistema de investigación. *Zona Abierta*, 75-76.

Schumpeter, J. A. (1934). *The Theory of Econonomic Development.* Cambridge: Cambridge University Press.

Van de Donk, W. B. H. J., Snellen, I. Th. M. & Tops, P. W. (comps.) (1995). *Orwell in Athens: A perspective on informatization and democracy*. Amsterdam: s. e.

Winner, L. (1977). *Autonomous technology: Technics-out-of-control as a theme in political thought*, Cambridge, Mass: MIT Press.