

Societal Benefits of Freely Accessible Technologies and Knowledge Resources

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Table of Contents

Preface	vi
Chapter 1	
The Political Logic of Free, Libre, Open Source Software	1
<i>Jacinto Davila, Universidad de Los Andes, Venezuela</i>	
Chapter 2	
Towards a Nationally Pertinent System of Knowledge, Science, and Technology.....	25
<i>Jose Aguilar, Universidad de Los Andes, Venezuela</i>	
<i>Oswaldo Terán, Universidad de Los Andes, Venezuela</i>	
Chapter 3	
Sleight of Hand or Global Problem: The Two Sides of the Net Neutrality Debate	54
<i>Sulan Wong, Universidad Católica de Temuco, Chile</i>	
<i>Julio Rojas-Mora, Universidad Austral de Chile, Chile</i>	
<i>Eitan Altman, INRIA, France</i>	
Chapter 4	
Impact and Potential of Emerging Technologies for Fostering Democracy	81
<i>Amir Manzoor, Bahria University, Pakistan</i>	
Chapter 5	
Cultural and Collective Rights of Indigenous Peoples in Venezuela: Political and Legal Framework	110
<i>Soledad Torrecuadrada García-Lozano, Universidad Autónoma de Madrid, Spain</i>	
<i>Vladimir Aguilar Castro, Universidad de Los Andes, Venezuela</i>	
<i>Carlos Grimaldo Lorente, Universidad de Los Andes, Venezuela</i>	
Chapter 6	
Patents and Scientific Research: Five Paradoxical Scenarios	135
<i>Sulan Wong, Universidad Católica de Temuco, Chile</i>	

Chapter 7	
Social Media and Free Knowledge: Case Study – Public Opinion Formation	156
<i>Jose Aguilar, Universidad de Los Andes, Venezuela</i>	
<i>Oswaldo Terán, Universidad de Los Andes, Venezuela</i>	
Chapter 8	
Political Framework of the Production and Use of Seeds in Venezuela: Approaches at the International Regime.....	191
<i>Vladimir Aguilar Castro, Universidad de Los Andes, Venezuela</i>	
Chapter 9	
A New Approach to Knowledge Sharing: The Multifactory Model.....	211
<i>Giulio Focardi, Osun Solutions and Bigmagma, Italy</i>	
<i>Lorenza Salati, Osun Solutions and Bigmagma, Italy</i>	
Chapter 10	
Open Modelling for Simulators	237
<i>Bruce Edmonds, Centre for Policy Modelling, UK</i>	
<i>Gary Polhill, The James Hutton Institute, UK</i>	
Chapter 11	
The State of Technology in Venezuela in the Context of Production Chains.....	255
<i>Leandro Rabindranath León, Universidad de Los Andes, Colombia</i>	
Related References	286
Compilation of References	316
About the Contributors	359
Index	362

Detailed Table of Contents

Preface	vi
----------------------	----

Chapter 1

The Political Logic of Free, Libre, Open Source Software	1
--	---

Jacinto Davila, Universidad de Los Andes, Venezuela

Information technology development is a must for societies in the whole world and, particularly, in the so-called third world. However, which particular research goal and which mode of research are suitable for that development are questions that need careful consideration and reasoning. In this chapter, we try to explore those reasons by visiting the logic in Free, Libre, Open Source Software, FLOSS, as a general concept. It is a political logic, because it clearly interferes and is interfered by dominant economical policies with respect to issues such as knowledge diffusion, copyrights and intellectual property. In the chapter, we explore available evidence over which principles are actually held and how that is done. Our highest goal, however, is to show that information technologies are best understood in the wider context of socio-political games and any suggestion of the opposite is itself a move in some of those games.

Chapter 2

Towards a Nationally Pertinent System of Knowledge, Science, and Technology.....	25
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Jose Aguilar, Universidad de Los Andes, Venezuela

Oswaldo Terán, Universidad de Los Andes, Venezuela

This chapter describes an autochthonous system of Knowledge, Science, and Technology (KST): its actors, policies, strategies, and instruments. It is proposed to create it via a continuous reflection-action process. Such a system is aimed at promoting an autonomous nation, and will strongly rest on culturally free KST, beyond its actual conception (as universally valid, and neutral) in the Western Society. We argue that since the culture, problems and needs of the western nations are different from those of the non-western nations, such as Latinamerica, Africa or the Muslim World, the use of western KST in non-western societies without an appropriate reflection about national and local pertinence, generates dependence on KST that has very limited local societal benefits, and prevents developing an autonomous and pertinent KST system – non-western societies can only superficially capture the creations of the western society. To overcome this, we suggest that non-western nations must generate an autochthonous KST system.

Chapter 3

Sleight of Hand or Global Problem: The Two Sides of the Net Neutrality Debate 54

Sulan Wong, Universidad Católica de Temuco, Chile

Julio Rojas-Mora, Universidad Austral de Chile, Chile

Eitan Altman, INRIA, France

The neutral nature of Internet has allowed its consolidation as a crucial tool in the dissemination of knowledge and access to culture. Due the creation of new business models of Internet access, a debate about the need of keeping a neutral Internet has emerged, leading to a sudden regulatory process that seems to emerge from a process of public consensus. However, participation in this debate requires knowledge in telecommunications, economics, and law, leaving participation to expert actors. In public consultations on Net Neutrality and in the resulting legal documents, three fundamental problems related to net neutrality are studied. Firstly, what constitutes a neutral, open and free Internet? Secondly, what is the effect of traffic management and what are the consequences of providing differentiated services? Finally, can transparency be an efficient tool to curb potential violations of net neutrality? This article presents the historical background that led to this debate and how its main points have been treated primarily in USA and Europe.

Chapter 4

Impact and Potential of Emerging Technologies for Fostering Democracy 81

Amir Manzoor, Bahria University, Pakistan

In recent years, several case studies have appeared on how emerging technologies had an impact in bringing grass root political changes. It has been widely argued that emerging technologies are influencing democracy all over the world. This chapter explores how emerging technologies support various pillars of democracy (freedom of expression and freedom of press, rule of law, human rights, and individual liberty) to strengthen and foster the democratic processes. While there exist substantial evidence that technology provides strong support to democracy, significant issues still exist and need to be addressed for emerging technology to contribute to democracy. The chapter discusses these issues and offer recommendations for better use of emerging technologies for democracy.

Chapter 5

Cultural and Collective Rights of Indigenous Peoples in Venezuela: Political and Legal Framework 110

Soledad TorreCuadrada García-Lozano, Universidad Autónoma de Madrid, Spain

Vladimir Aguilar Castro, Universidad de Los Andes, Venezuela

Carlos Grimaldo Lorente, Universidad de Los Andes, Venezuela

In this chapter, the authors attempt to demonstrate that respect for cultural identity of all human groups should be seen as a fundamental right. Ignoring Collective rights of indigenous peoples, those related to their cultural traditions, generally causes the lack of respect. Thus, knowledge of the cultural manifestations and their origin and meaning (as part of the history of the territories they inhabit) can conquer this respect on a par with its defense. This obviously with comprehensive training aimed to sensitize the general population in the positive assessment it deserves it different. The actions of nation-states governments with strong indigenous population has been characterized, until recently, by a remarkable disregard for indigenous cultures, having as a result the result of which such attitude, today from the non - indigenous perspective indigenous cultural manifestations are reduced to colorful folklore shows, when not seen as backward and primitive traditions. This chapter delves deeply into the legal framework for the protection of collective and cultural rights of indigenous peoples. The authors also attempt to show the weaknesses of the law and how states should act to strengthen them. Proposed article does emphasis on indigenous traditional knowledge and not in a wider debate on the topic of knowledge in general.

Chapter 6

Patents and Scientific Research: Five Paradoxical Scenarios 135

Sulan Wong, Universidad Católica de Temuco, Chile

It is argued that patents encourage scientific development, benefiting society by creating useful products and services that improve the quality of life. However, by granting exclusive rights of exploitation, patents create situations in which they interfere with the exercise of the freedom of scientific research. This work examines five scenarios where this problem can be seen and the utilitarian function of patents is questioned. Firstly, the effects of research funding in the definition of the lines and research objectives are observed. Secondly, the anticommons is studied, as it is a situation where excessive fragmentation of ownership in scientific knowledge may prevent its use. Thirdly, broad patents and their implications are examined. Fourthly, the deterrent power of patent litigation, which creates an unexpected business model, is analyzed. Fifthly, secrecy is looked upon, as it is encouraged by the logic in which the patent system works.

Chapter 7

Social Media and Free Knowledge: Case Study – Public Opinion Formation 156

Jose Aguilar, Universidad de Los Andes, Venezuela

Oswaldo Terán, Universidad de Los Andes, Venezuela

Mass media (e.g., TV) and social media (e.g., Facebook) have a large utilization nowadays; they are becoming an integral part of our life. This chapter describes the psychological effects of media bias and manipulation, along its impact on public opinion by using “agenda setting” and “prototypes/framing”. It shows how media can artificially create feelings and emotions. It will also explore the relationships between free knowledge and media. Free knowledge has a strong potential to prevent media manipulation, and for people emancipation from media control. The paper suggests using media in a more humanistic way, as a space to create knowledge, where social interaction influences knowledge. We talk of communities where people regularly share and create knowledge. The media do not replace existing processes of building knowledge; rather they provide an additional dynamic environment, which must meet certain criteria for what the social knowledge will be emancipator, and not manipulative.

Chapter 8

Political Framework of the Production and Use of Seeds in Venezuela: Approaches at the International Regime..... 191

Vladimir Aguilar Castro, Universidad de Los Andes, Venezuela

Political and legal developments addressed to protect traditional knowledge are the result of huge efforts made by different actors at international and at national level. Nevertheless, traditional knowledge is broadly understood as freely accessible. Intellectual property norms are highly developed and strongly protect some knowledge products that are excluded of public domain, such as new varieties of plants. In light of this situation, political and legal tensions emerge in different countries, especially when it has an impact on areas highly profitable for some industries. This is the case of multinational agricultural companies that act globally by using technologies protected by intellectual property rights, threatening traditional expressions applied for the use and conservation of seeds by local communities in different countries. In Venezuela, such tensions are present in the 2002 Law about Seeds, Animal Material and Supplies for Biological Reproduction, which is analyzed in this chapter.

Chapter 9

A New Approach to Knowledge Sharing: The Multifactory Model..... 211

Giulio Focardi, Osun Solutions and Bigmagma, Italy

Lorenza Salati, Osun Solutions and Bigmagma, Italy

A Multifactory is a new concept of productive environment. This chapter presents what Multifactories are, their constitutive elements and how these interact. In this chapter will be also presented the governance system, that is largely self-generated, and the way knowledge is shared and how this brings to innovative practices in exchanging skills and professional services. The chapter will also present the way the Multifactory Model was developed, from the direct observation of different real cases within Europe to the on-field test of the model. The chapter also suggests how Multifactories can be a possible way to face the needs for job creation and an environment where to experiment innovative ways to share knowledge.

Chapter 10

Open Modelling for Simulators	237
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Bruce Edmonds, Centre for Policy Modelling, UK

Gary Polhill, The James Hutton Institute, UK

This chapter motivates and discusses the process of making a simulation model available for others to freely inspect and use. Firstly, it outlines the three reasons why this is necessary: democratic right, scientific scrutiny, and public value extraction. Then it describes the basic steps for doing this, including: making code comprehensible, documentation and licensing. It then describes some further things one might do when releasing a complex model to help ensure it is understood and re-used appropriately. It briefly looks at some tools and approaches to help in all this, and ends with a discussion about the change in underlying “modelling culture” that is needed.

Chapter 11

The State of Technology in Venezuela in the Context of Production Chains	255
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Leandro Rabindranath León, Universidad de Los Andes, Colombia

This chapter develops a discursive context called “the sawmill metaphor” that interprets the technology as a system of timber production that runs through a river. Trees are cut upstream and transported by the river towards a sawmill in the midstream. The sawmill then transforms trees into logs that are sent down river towards other factories that produce finished products downstream. Using this metaphor a link between technology and production is identified as well as the vital importance that the interlinking networks has on production. This context allows us to propose a diagnosis of the state of technology on Venezuela in 2014, a country which regardless of plans of technological acquisition sets forth since 2003 with sizable investments, far from increase technological sovereignty has lost it. Finally, taking as a basis the Venezuelan case, we present a set of general guidelines to consider in a plan of technological acquisition.

Related References	286
---------------------------------	-----

Compilation of References	316
--	-----

About the Contributors	359
-------------------------------------	-----

Index	362
--------------------	-----

Chapter 2

Towards a Nationally Pertinent System of Knowledge, Science, and Technology

Jose Aguilar

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ABSTRACT

This chapter describes an autochthonous system of Knowledge, Science, and Technology (KST): its actors, policies, strategies, and instruments. It is proposed to create it via a continuous reflection-action process. Such a system is aimed at promoting an autonomous nation, and will strongly rest on culturally free KST, beyond its actual conception (as universally valid, and neutral) in the Western Society. We argue that since the culture, problems and needs of the western nations are different from those of the non-western nations, such as Latinamerica, Africa or the Muslim World, the use of western KST in non-western societies without an appropriate reflection about national and local pertinence, generates dependence on KST that has very limited local societal benefits, and prevents developing an autonomous and pertinent KST system – non-western societies can only superficially capture the creations of the western society. To overcome this, we suggest that non-western nations must generate an autochthonous KST system.

INTRODUCTION

The dominant actual meaning and societal role of Knowledge, Science and Technology in general (KST), and of both Free Knowledge, Science and Technology (Free KST, or FKST, which is promoted by, e.g., the Copyleft licenses), and proprietary Knowledge, Science and Technology (or PKST, e.g., that promoted by Copyrights), are creations of the dominant Western Society¹, and are understood as universally valid, and thus neutral. This allows defining the worldwide dominant western models of KST, which are the western KST, western FKST and western PKST).

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Given that western KST has been created for a (western) society, whose culture and other particular characteristics are different from non-western or peripheral regions and nations, such as Latinamerica, Africa, Asia or the Muslim World, their use in non-western or peripheral societies, without an appropriate reflection about national and local pertinence of such KST, generates dependence (at different levels: economic, political, social, cultural, etc.) on western KST, which has local limited societal benefits. We do not neglect that these non-western or peripheral regions partially share elements of the western world, but they are culturally different and are not leaders in relation to the creation of KST in the world, but rather followers of the western KST and way of life. In this sense they are peripheral, since they are marginal to a dominant western, which imposes them a certain way of life, and a form of KST.

Thus, the western KST promotes a foreign and not pertinent global social model in detriment of the local/autochthonous social model and culture, preventing and precluding the development of an autonomous KST system. A reason for this is that non-western societies can only superficially capture the creations of the western society, viewing from their perspective only the instrumental and passive features, which are easily imitable, while missing its fundamental aspects. Among the aspects missed when coping the western KST are its creative and endogenous character, since western KST appears as a consequence of the western needs and culture, which differ from those in other regions of the world – each region has its own particular local environment, needs and culture –. The most immediate and easiest aspect of KST to be copied is its instrumental use, reduced sometimes to its vacuous employment. This is a use *without any local meaning*, but considered good by the non-autonomous actors (actors who imitate western KST), because actual western KST is fashionable, so it is imitated in order to get *actualized*, and because of the illusion that coping the west KST keeps the non western or peripheral nation “modern”, “advanced”. Despite of all this, we are not rejecting the fact that some peripheral cultures and societies share in some degree common aspects with western culture and society, and thus western KST has some degree of pertinence with western culture and society. However, such pertinence must be determined and used as a criterion when copying western KST.

This peripheral KST also has some expressions of FKST and PKST (no good copies of the corresponding western FKST and PKST), as well as certain degree of autochthonous KST. Peripheral KST of diverse regions or nations in the world have some relevant common characteristics despite of the differences among such regions or nations. We will centre our attention in such common characteristics, but will describe some particularities specific for the Latinamerican region.

From the point of view of this paper, a common culture defines a Nation. In this sense, the Latinamerican region defines a Nation conformed by several countries (they share a common culture), most of them appearing after the split, into several countries, of the American Spanish Empire in the 19 century. The other country included in this Nation is Brazil, a country coming from the American Portuguese Empire, which also shares the Latinamerican culture. In this chapter we will be using with the same meaning, and indistinctly, the terms national and regional to refer to that which is particular to a Nation (the term regional highlight the fact that the Nation is placed in a certain place, and undergoes some particular situation, in the world).

For this paper, western Knowledge is that theoretical corpus or practical understanding of some subject of interest in the western society. On the other hand, western Science is related to systematic/formal organization of knowledge, in accordance to western social needs and dominant forces (e.g., corporations). Finally, western Technology refers mainly to tools and knowledge useful for solving problems in accordance to western needs, which since several decades are defined mainly by western dominant forces (e.g., industry, corporations, governments, and other actors), and aspire to continuously increase

productivity and economical growth, despite of the social and environmental negative effects of this unconstrained increase of economical growth.

Similarly, KST could be developed in a peripheral region in accordance to the social needs of this region. If such development is *autonomous and creative*, i.e., corresponds to the societal needs of the region, we call it *autochthonous*. Usually, KST in a peripheral region is a copy of western KST; in this case, we call it peripheral KST. That autochthonous KST is characterized here as Nationally pertinent, and then *necessarily free* in terms of the culture of the nation. This kind of knowledge in turn promotes an autonomous society with an auto-generative culture.

In order to clarify our argument, we will usually refer to two cases of peripheral societies and KST:

(1) an autonomous society with an autochthonous and creative KST system. This models of society and KST closely linked to the idea of endogenous development suggested in (Ochoa, 2006); to the idea of a creative model of KST described in (Varsavsky, 2006, 2013); and to the idea of a KST as a practice, or as a social process, as described in (Núñez, 1999). Such ideas, can guide application in a particular field of action, such as Social Simulation (Terán & Ablan, 2013). In broad terms, following these authors, we suggest here creatively cultivate KST as a social practice, from the social forms of doing, considering the local know-know. Such a model of KST corresponds to an autonomous, just, democratic, solidary and nationalist society

(2) On the other hand, we have a dependent society and its dependent KST, which we can call “developmentist” case of KST (modelo desarrollista de KST, following Varsavsky 2006, 2013). A developmentist model of KST corresponds to a society culturally dependent on the western culture (its people wish to have the form of live of western people), which attempts to develop by itself all products that the dominant western society elaborates, imitating and copying western KST in its search for economic independence. This form of searching for independence is a trap, given the fact that this nation and its society will never become economically independent: given its cultural dependence. People in this nation necessarily will be always wanting/wishing/desiring what is promoted as good in the western nations, including its KST. The characteristics of this society are a search for economic efficiency, low level of cultural autonomy, and low levels of solidarity and nationalism.

Considering the actual highly interactive and interdependent world, and the historical western domination/exploitation of peripheral nations, it will be impossible to have a totally autochthonous KST system. Thus, in a peripheral nation, an autochthonous KST system has to co-exist with the KST imitated from the west. Given this, the hope is in increasing the level of national pertinence of the KST, measured in terms of the proportion of investment and creation of autochthonous KST in relation to the total KST being in use in the Nation. Because of this, *in this chapter we will usually consider two cases: the western KST and that of a region highly dependent on western KST, such as Latinamerica. Along these two actual cases, for contrasting purposes and clarity in the presentation of our argument, we will manage the two possible models of peripheral KST, named above: the autochthonous and creative one, and the developmentist (imitative) one.*

This chapter will be focuses in *proposing a form of a nationally pertinent (autochthonous) KST system*. In a further work the authors will consider a methodology for developing such a KST system.

The chapter is organized as follows. In the second section, the main characteristics of the western, the imitative peripheral, and the national autochthonous KST systems will be defined. Section three will

consider the dominant role of western KST. Afterwards section four offers a wide and concise description of an autochthonous (Nationally Pertinent) KST system. Finally, section five will summarize some characteristics of the actual Latinamerican KST, and will give some guidelines necessary to promote an autochthonous Latinamerican KST system.

TOWARDS A CONCEPTION OF A NATIONAL PERTINENT KST AND FKST

The Western KST

The notions and differences between PKST and FKST appeared in the western society, as part of its actual situation. In this society, both, PKST and FKST, have a clear sense and role, and involve an intricate network of diverse activities.

Amazingly, PKST is developed not only in private organizations, as expected, but also in many public organizations, which get only *partial* “support” from private entities. This fact benefits the private sector in detriment of the public sector, since privative KST gives little recognitions to, while gets strong benefits from, public KST and traditions.

The main feature of privative KST is that it is closed, in the sense that its access is constrained, since the developing entity imposes copyright and other kind of restrictions on its use. Restrictions include constraints on its modification, sharing, studying, redistribution and reverse engineering. Aside this, many international and national legal instruments have been created or modified to protect copyrights of organizations developing privative KST. When such constraints are canceled either partially or totally then open source and free KST, respectively, appear. Open KST means that still some constrains remain. Because of this, in this chapter, open KST will be included as part of privative KST.

We will present a summary of some of the deepest views about technology in the western culture, which is extendible to western KST, following Heidegger (1977), Habermas (1968), and Feenberg (2002). In accordance to these thinkers, the agenda of knowledge and science has become dominated by technology (by the technocratic interest in increasing productivity).

Heidegger (1977) considers that in the western culture technology has become different from technique, as this was known in traditional cultures. Technique in traditional cultures does not depend on high exploitation of energy and nature. The western European culture was traditional until the third quarter of the XIX century. Heidegger considers that western technology dominates man in the sense that man becomes an instrument of technology rather than, as expected, technology being a tool for man. He explains how man serves technology as man makes technology without a clear function for an autonomous humanity, but rather just to make technology, becoming so part of the net of instruments serving technology. In this sense, technology, and western KST in general, has become autonomous from man, and dominates a subjugated man.

Similar ideas are presented by Habermas (1968). Habermas conceives technology as an organic progression of the means people have available, extending their natural capabilities, in order to solve problems. But there is a difference between traditional societies and capitalist modern society in relation to the developed technology, as in the last one the emphasis is on efficiency and individual success.

To explain the differences between a traditional society and the capitalist society in relation to technology, Habermas defines the categories: *Work* and *Interaction*. Work is understood as rational action and choice, or a combination of both, oriented to accomplish tasks with given ends. Thus, Work is based

on the *use of the reason to achieve given ends*, and has two components: the *instrumental* one (action: to perform the Work) governed by technical rules based on empirical knowledge, and the *strategic* one (to choose among ways of action, i.e., evaluation of alternatives) supported on analytical knowledge.

Interaction is defined as actions that allow people to engage on socio-political issues. It rests on adherence to social norms of behavior understood and regarded by the involved agents. Violation of norms by an agent has negative consequences for the agent. Interaction is based on human relations, on individual and in-group participation in community activities, in order to increase social benefits. Such activities are mainly publics, but can require the participation of private enterprises (element of Work) as a medium for the achievement of specific ends. National Interaction must be based on the culture while enabling sane cultural change, in the sense that makes possible that the culture keeps its autonomous character. The concrete form of global Interaction (national level of Interaction) emerges from regional and local Interaction.

Under this view, the institutional mark (e.g., the family) of a society rests on Interaction while other subsystems of the society, such as the economical system and the state, which are subsystems of *rational action* respect to given ends, are based on Work. The economical system and the state are *instrumental forms* of organizing and administrating certain aspects of the western society (or an expression of this in a peripheral society), representing a kind of KST (usually called social technology), and, in this sense, are part of Work. In addition, the *learning of rules* of the rational action respect to given ends gives the discipline related with *abilities* useful to solve problems, while the *internalization of norms* of behavior offers the discipline that gives the *structures of the personality*, and the *motivation to conform to the norms*. *This last element represents the force that sustains institutions, and can promote or not emancipation.*

In a traditional society, like the western society before the third quarter of the XIX century (with few exceptions such as France and England), Interaction is the dominant category. In traditional societies, Work is an important force to sustain the society, but it is grounded on traditional values, and subjugated to Interaction. In a traditional society, necessarily the capacities of autonomy of the institutional mark cannot be over passed by the subsystems of rational action.

Different from the case of traditional societies, in capitalist societies (dominant in the west nations) Work is the dominant force, and Interaction is subjugated to it. Habermas observes that Capitalism is the first form of production in world history *institutionalizing* a self-sustaining economic growth, what leads to a fast rate of economic growth, and to a prosperous society in material issues. Nevertheless, at the same time, as growth is unconstrained, many social and cultural attributes are disregarded and even can fall apart.

All this creates individuals without conscience and political willing, i.e., “apolitical” individuals, where the culture is transformed in a view of the world as a thing, while nature and man are disposed in favor of the increase of productivity and technological rationality. This situation is not perceived by the individuals, becoming an unconscious trap for them. In this state of things, science and technology became an ideology, which defines and gives form to such trap. Western KST, then, takes a protagonic role in defining the policies of a society dominated by the interest in increasing productivity, and energetic exploitation of the nature. Consequently, western KST became autonomous, dominating the institutional order and Interaction.

From a point of view close to these of Heidegger and Habermas, Feenberg (2002) offers valuable arguments that help in clarifying the situation about western KST described by the two first authors. He affirms that, in the western capitalist societies, the cultural horizon is characterized and constrained by some beliefs/assumptions and social values respect to the technical objects. These beliefs/assumptions

define a technological dimension, which is the base of the actual modern social hegemony. That cultural horizon supports the social hegemony imposed by the technocracy, and give form to many aspects of actual modern life. While establishing the cultural horizon, the technological rationality introduces in the design and structure of the machines and organizational forms social values present in the dominant rationality.

Some actors and specific KST tools have a protagonist role in this situation, getting benefits from and/or promoting the domain of the technocracy, in particular among them we have transnational companies, traditional Economics and Systems Engineering. Some relevant social actors being under the domain of the technocracy are governments, universities, and even international institutions, including organizations regulating commerce or controlling development policies of diverse countries. The domain of Work over Interaction sets the agenda of these institutions, what has important social and cultural consequences.

Finally, among the properties of the western KST we have:

- It is autonomous from other social forces.
- It dominates institutional national and international settings (i.e., norms of behavior, with the help and support of communication media).
- It defines the “cultural horizon”, which at the same time supports the social hegemony of KST.
- It proposes and gets advantage of the idea of apolitical individuals and the neutrality of KST.
- Western KST is essentially different from technique in traditional societies (where Interaction (the institutional setting) is the dominant force and KST do not dominate man).
- Western KST represents the interest in increasing productivity.
- Western KST serves to the goal of getting high production of energy, exploiting nature without any limit.
- Transnational enterprises and systems engineering, apart from communication media, are key actors and forces supporting western KST domain.

The Peripheral KST

The fundamental aspect of peripheral KST is its *developmentist and imitative property* (superficially copying western KST). This is part of the strong imitative character of many peripheral societies and nations. This imitative character of peripheral societies appears because actors of the peripheral society see as good and desirable the form of life of the western society, i.e., actors of the peripheral society get a perspective of life, and define their aspiration levels about many issues, in accordance to what they perceive in the western society.

Consequently, peripheral KST's ideal is western KST. Similarly, the ideal for peripheral PKST and FKST are western PKST and western FKST, respectively. However, imitation never can be original, and a peripheral society can only copy the superficial aspects of western KST, failing to notice and take its creative attributes. As said above, peripheral KST has not a good correspondence with, and pertinence for, local needs. It is neither the product of local Interaction, nor of local based or relevant choice. Rather, it is mainly the product of imitative action and decontextualized choice. In this sense, only the form of using knowledge is copied, but the philosophical insight and base/generative KST, existing in the western society, are not, and cannot be, copied by the peripheral society. In fact, from the perspective of the western nations and KST dominant actors, peripheral nations have a marginal role, serving as providers of raw materials and consumers of final goods.

On the other hand, as part of imitation of the domain of technocracy in the western, technocrats in peripheral nations are supposed to have the truth. They imaginarily manage the valid “best” rationality and KST, having the power to design and direct social policies. Their opinion is supposed to be strongly valuable in order to develop the country or nation and so become part of the developed world, for what western KST is a fundamental component. Peripheral KST, including its research and teaching in peripheral universities, is usually reduced to issues of interest in order to serve to applications and research in the west. Knowledge of peripheral technocrats in productive organizations, and to a good extent in the universities is reduced to the ability to apply technology in accordance to some manuals elaborated in the west (Varsavsky, 2006).

Consequently, peripheral technocrats are disconnected from the culture of their society. They are “apolitically sheeps” dominated from external interest, and then become unaware extensions/representatives of foreign dominant technocracy, trans-national enterprises and governments. National KST then becomes dominated by a foreign KST, culturally strange, and which is, at best, instrumentally understood and copied. Even more, culture of peripheral societies becomes dominated by the resulting imitated (superficial and usually mediocre) technocracy, which is supposed to have the truth about political issues.

Given this state of issues, the culture of the nation can become strongly affected, loosing its autogenerative capabilities, if the proportion of autochthonous KST is small in relation to the total KST used in the nation. The country becomes a satellite at the service of the west. In particular, the KST system is dominated by a strongly imitative KST system, which is called interestedly “apolitical”, managed by technocrats that serve the interest of transnational companies and foreign nations. Finally, the characteristics of a developmentist society, as mentioned in the introduction above and suggested in Varsavsky (2006), are met: a poorly autonomous, highly dependent, as well as lowly solidary and nationalist society.

First Ideas about a National Pertinent KST

A peripheral nation has both: a) its peripheral KST (PKST and FKST), and b) its autochthonous/pertinent KST. The second is defined as the traditional and culturally congruent KST, in the sense that it serves to solve culturally pertinent problems, corresponding to an autonomous, just, solidary, democratic, and nationalist society.

Given the cultural dependence of peripheral nations, and their developmentist model of KST, in these countries usually western KST is recognized as highly valuable, while autochthonous KST is seen as retrograde and undesirable by the national dominant technocratic actors. This is due to the dominance of the copied western KST over the national interaction category defined by Habermas. A consequence of that is the low pertinence of actual copied KST to solve problems associated to the social reality of peripheral nations.

This chapter suggests reverting such a situation by: a) recognizing the superiority of the national culture, i.e., of Interaction over Work (rationality to achieve given ends); and, b) promoting a Nationally Pertinent KST. In this case the autochthonous KST will prevail over western KST. This KST should necessarily be *culturally free, creative and cultivated from the national social practices*.

THE DOMINANT ROLE OF WESTERN KNOWLEDGE, SCIENCE AND TECHNOLOGY

The Role of Knowledge in Society

In this section, we will discuss about the role of actual dominant western knowledge and the potential of free knowledge to generate societal benefits, especially to peripheral nations. There is an important relationship between the society, and how it uses and builds knowledge (we use here a wide connotation of the knowledge concept encompassing science and technology). Knowledge is one of the dynamic elements in a society, consequently it is valuable to reflect upon it. A society characterizes key elements of its life from the knowledge it manages: their ways of organizing, social rules, educational models, among others. Each of the alternatives, dynamics, etc., in each of these areas is conditioned by the knowledge that constitute them, and the possibilities they allow. This permits us to say that knowledge is political.

Furthermore, a fundamental aspect of any society is its cultural matrix. The cultural matrix is given by, among other things, knowledge, myth, and religion, of the community, what gives meaning to the life in the society (Aguilar & Terán, 2011; Fuenmayor, 2006). For people, for the human being, the more transcendent, fundamental public good, is its cultural matrix, since it is the one that allows him to regenerate, recreating his culture.

In this sense, all what is given to a society in terms of knowledge, should be harmonious with, and must be designed to feed its cultural matrix. But in capitalist societies, knowledge, expressed through technology and science that gives rise to it, is turning everything around it in a tool (Aguilar, 2011a, 2011b). This form of knowledge development has been associated with a deterioration of the cultural matrix (Aguilar & Terán, 2011; Fuenmayor, 2006, 2001).

This shows us that knowledge is not neutral in society, but rather plays a fundamental role in it. Several authors have analyzed this not neutral role of the knowledge from different perspectives; for example, (Núñez, 1999) has proposed look at it from two angles, first, from the point of view that the knowledge is the result of a social activity, and, second, from the point of view of the value of this knowledge in the cultural matrix of a society. Science and technology, as a form of knowledge, is perhaps where more naturally that role in society is expressed (Aguilar, 2011a). For example, authors such as Habermas (1999) argue that technology is a legitimating ideology of a way of acting, in most cases, following other ends alien to society, to the detriment of their culture.

Knowledge not only transforms its relationship with man, but also changes the relationship of man to man himself (Aguilar, 2011b). In particular, capitalist view of knowledge is becoming a society in a tank of “devices ready to use”. It is an instrumental view of knowledge, which sees it as cold, outside society, without an historical-social origin.

That is, the most widespread conception of knowledge today is the instrumental one, which serves as a means to achieve predetermined ends. However, knowledge shows other aspects (Aguilar & Terán, 2011; Aguilar, 2011b):

- Define key elements in the life of a society. The forms of governance, the community planning, the political system, the urban modes, to name a few, are mediated by technologies.
- It is not something cold, without a social-historical origin. Knowledge comes from a given cultural matrix.
- It is determined and determines the Science and Technology (there is a feedback among them).

We say there are more democratic ways of approaching knowledge, which opens to a society the possibility of a new form of power that is expressed in their active participation in cognitive activities, in the control of cognitive processes, and not simply watching knowledge as a mediator of social activities.

This requires rethinking the ways of organizing societies, where modes of citizen participation in public life prevail, accompanied by cognitive enrichment processes that feed social dynamics (as suggested in Núñez, 1999). This again leads us to the issue of neutrality of knowledge. We see that knowledge is not indifferent to the set of possible purposes it can serve. Thus, knowledge ends up favoring some and precludes other purposes, so it is not neutral (Varsavsky, 2006).

A major factor in the relationship between society and knowledge is the possible opening of cognitive processes to democratic forms of social control. That is, a “democratic intervention” of the society in the knowledge creation. It allows the apparition of social values of society in social cognitive processes, such as environmental claims, ancestral making, among others, and incorporating them the cognitive processes allowing development of knowledge in harmony with local interests (these ideas are close to those of socially constructed knowledge Núñez, 1999).

This is where the real power of free knowledge appears, in a new kind of society that understands the importance of knowledge in it. We’re talking about a public sphere in the political life of the society, in which appears something that until now has been closed to it, the conception of social cognitive processes, including technology assessment, and the design of the scientific-technological agendas, etc. This is not a struggle for wealth, but a dispute for questioning, disassemble and remake, social practices that structure our daily lives, characterizing, challenging and developing the knowledge that is embedded in them (Aguilar, 2010a). That means demystify the universality of the scientific-technological decisions, from a non-dogmatic view of them. To do this, we need to start from the consequences of knowledge (scientific and technological), and questioning the social framework that it generates, something that is allowed only by the potentials free knowledge offers.

But this democratic form of social cognitive processes requires extending the range of interests represented in them, sensitive enough to understand and modify, where necessary, the injurious social dynamics to its cultural matrix. The so-formed social groups are able to generate a reflective environment on their doing, their rationale, and the way they organize, enriched with its own criteria of its social environment. Thus, the decisions, evaluations, and performances of the society are given on a new rational dynamic where the senses are built collectively. From there will emerge a new kind of public life, as part of the democratization of society, typified by ongoing public debate on the knowledge that affects every aspect of social life.

We are talking about an active public participatory democracy, in which the ability to act warranting the decisions that have to take place must be rescued, from such participation. It is not a problem of majorities, as classically tells us the electoral logic that ends up ignoring minorities, but a space for discussion through cognitive analysis and virtuoso collective judgment. This would allow a “multicultural cognition”, in which each social context would have its own social interpretation (Aguilar, 2011b).

This process of democratization of knowledge implies that the scientific and technological development is seen as a political process, rather than instrumentally. That scientific- technological development would be a space of social struggle where ideas are discussed, and society is built, being that as it would confer the political nature of this process (Aguilar & Terán, 2011). It is one of the ways to break the cultural dependency in one of the areas where it is most remarkable and least perceived. This would define a scientific-technological culture for a society in which its agendas are discussed from the problems of everyday life, their ways of solution, etc.

We're not talking about isolating the society from the global advances, we are proposing a knowledge that suits the social meanings, that also incorporate the social values of the environment where it will be used. In this way, knowledge becomes meaningful in the culture of each local community, socially conceived and discussed, and not imposed by powers and particular interests.

This idea finds many obstacles, including technocracy, which states that the scientific-technological knowledge is beyond any questioning (forgetting Galileo Galilei). Thus, the actors that are in positions of organizational leadership, public or private, capitalists or communists, are subordinate to that way of thinking. In this sense, the economic importance of knowledge is negligible compared to its human implications, defining lifestyles, forms of social doing, among other things.

Economical Aspects of Knowledge

Knowledge can be stored in digital form, and then be forwarded for productive purposes. From this point of view, knowledge is seen as a means of production, unlike the mass production of the past, it has a defining characteristic: it is reproducible, in unlimited amounts, regardless of whether the research that originates it was expensive. The knowledge, once obtained, can be used indefinitely without losing any of its effectiveness. It does not spend or deteriorate, it may even get richer.

This stage of capitalism has exploited this codified knowledge, given origin to a new type of economy, called by some as Knowledge economy, or Knowledge-Based Economy. This conception of economics assumes that the knowledge is used as a key element to generate value and wealth through its transformation (Aguilar, 2011b). This is what is hidden behind the term "knowledge society", some authors have preferred to call it cognitive capitalism (Aguilar, 2011b), seen as the emergence of a new regime of accumulation in which the object of accumulation is knowledge. Cognitive capitalism has been taking over and privatizing universal knowledge, the common cultural heritage, for its sole benefit. This has been leading to a cultural impoverishment, to spaces of great social dependence, precluding self-generation of culture, because knowledge is been kidnapped (Aguilar, 2011b).

This idea of "knowledge society" has been analyzed by (Núñez, 1999) including several terms to describe it. The term "technoscience" to define the close relationship between science and technology without a clear frontier between them; the term "scientific industry" to describe the new mercantile processes around the science; and the term "scientific migrations" to describe the concentration of the scientific and technologic activity in several poles (North-America, Europe and Japan).

Apart from the idea of Núñez, the term "knowledge society" currently appears as one of the champions of progress, but in fact it seems too superficial and distorted, because knowledge that supports these production processes is being hijacked by artificial forms of access restrictions. The knowledge society has some distinct features compared to previous models of societies. It, without the intention of limiting the subject, has as most significant features: the globalization of knowledge, the prevalence of informational capitalism, the important role of technological infrastructure, the replacement of traditional mechanical production systems, the interactivity, the immediacy of outputs and outcomes, the work flexibility, the commitment to scientific progress, and its strong dependence on information and communication technologies.

Something that merits deep reflection on the concept of knowledge society is the idea of efficiency and progress. It is part of an ongoing struggle to reach the top positions (social, productive, and personal) over any ethical and social value. This clashes with more human schemes and social groups, where

Towards a Nationally Pertinent System of Knowledge, Science, and Technology

cooperation, solidarity and social welfare are the values prevail. This notion of knowledge society has allowed a conception of globalization with the following features:

- The dominant role of the financial world.
- The role of transnational corporations, with ever greater influence in governments and societies.
- The changing notion of time and space due to the use of ICT.
- The deterioration of the nation-state concept.
- The growing involvement of international organizations (UN, IMF, etc.).

The current globalization model of doing science and technology strengthens this new form of capitalism. A model that is based on violence today applies to restrictive policies regarding access to knowledge and creations derived from it, as a way to hijack that knowledge. We talked about a whole space of production and stimulation of business activity in which appear the intellectual property, new forms of monopoly, patents and rights of author, etc., having effects on health, food, etc.

In that sense, cognitive capitalism has elements that characterize it that need to be unveiled (Aguilar, 2011b). First of all, knowledge is merely at the service of capitalist production. Second, it is based on an artificial shortage of knowledge, where some are consumers of knowledge that others create and sell. Third, the economy is based on immediacy, where a consumer-based dynamics is imposed.

This step has been strengthened by the breakthrough of the Internet, which has allowed the dynamic commercial about knowledge to gain a global connotation. Specifically, the Internet has also added communicative element to this dynamic. Communication is crucial, since the new virtual economy is based on language in its different forms: oral, written, digital, becoming a mediator between scientific and technological developments and the social processes, while integrating different global dynamics of construction of knowledge. Nevertheless, as pointed out before, this stage has also been strengthened by the premise that ideas should be private. This privatization process is based on the notion that “ideas should be private property to protect authors, scientists and artists, who generate knowledge, engines of the new society” (Aguilar, 2011b). What they do not say is that by accepting this premise, the freedom of every man to learn what he wants, following the path he wants, limited only by its abilities, vocations, an a culture in a good state, is denied.

The Knowledge Economy profitability of knowledge is a necessity that is possible only when it has been coded (in the form of models, rules, etc.), being available to someone working with the codified knowledge, for its individual or collective benefice. Thus, this stage of capitalism is a new way of using codified knowledge, seeing it now as digital information for production processes (GI, Good Informational), making it an input. But these GI have several characteristics (Aguilar, 2011b):

- They are the result of a collective process of knowledge creation, which includes periods of collection and processing of information, tests and trials, correction and modification.
- They cannot be exhausted; its utilization does not undermine their effectiveness. On the contrary, the utilization can enrich it
- They have the ability to exploit the Internet to their development and dissemination.
- They exhibit the properties of continuity and replicability,
- They have a development trend according to the Moore’s Law

In recent decades, investments to develop this type of economy have been significant, even greater than those aimed at producing tangible goods (machinery, raw materials, etc.).

The Knowledge Economy has two new means of production vital to its dynamics, the computer and the Internet, generating knowledge workers, which have reconfigured the social relations of production, distribution and exchange in the world (Aguilar, 2011b). A new division of labor has emerged, which has transgressed the boundaries of nations, assigning roles to diverse regions of the world according to their cognitive, religious, social, and political conditions. The Knowledge Economy defines a new model of industrial development, which is followed by the software and telecommunications industries.

This new way of accumulation, in addition to knowledge requires other types of raw materials: technology, research, information, culture, communication and language. The two last are necessary to enable cooperative work. So, immaterial labor involves the management of information and communication linked to the processes of knowledge production, which introduces a cooperative dimension, which has the form of social interaction through communication, affective networks, among others.

But capitalism uses common cultural heritage for their own exclusive benefit (the human genome, that of plants and animals, among other skills), limiting accessibility, its social utilization, etc. This contributes to a cultural impoverishment that generates social dependence spaces never before imagined. Because of this, the culture is losing its self-generation capacity (Aguilar, 2011b).

However, new forms of resistance to that situation have been emerging. A clear example is the free software community. But many of the actions from the fields of resistance that have been created worldwide (free software movement, the free culture movement) do not question the notion of ownership, nor its idea that “creations” belong by default to the private. They, in some cases, reinforce that notion to build on their arguments. They do not study the social meanings of the restrictions on the access to knowledge (global dependence spaces, dividing citizens between first and second class people) being generated under these schemes. In this sense, these resisters are not a problem for the cognitive capitalism.

Recognize the strengthening of the property from the resistance processes is critical, because it allows us to understand the possible characteristics of the forms of struggle and resistance to fight the cognitive capitalism, and design a more humanistic economical model. This is important from the premise that intellectual private property is a theft of social knowledge, “kidnapping” and veiling its common good character.

Education and Free Knowledge

First of all, it is essential to reveal the political role of the educational processes of domination in terms of social class, race, gender, scientific and technological alienation, among other things, and how the hidden educational model that prevails in them builds a hegemonic culture. At present, in the western culture, all educational models respond to dominant political and economic model (Aguilar, 2011a).

The prevailing educational model imposes in man the law of fear (fear of doing things, afraid to build their truths, etc.), which precludes their emancipation. This educational model aims to fragment, kidnap knowledge, in order to facilitate the process of control, domination, alienation, awareness and, thus, ensure the hegemony of the ruling classes. Thus, education is a form of domination. It is a way of establishing and promoting economic, political, cognitive and cultural hegemonies. Here lies the shallow knowledge neutrality.

Is there a way to subvert it? Yes, through social processes where truth is grown. The culture of truth must lead to a permanent attitude of critical reflection that allows us to keep adding new levels of

truth-seeking in each event analyzed. This bustling about the search for truth must be made from our realities, with their edges and importance according to each setting, at each social context. The study of each social problem should arise by local frames of reference, seeking factors and making it appropriate to the particular case, without neglecting the universal experience, but without accepting it a priori. Thus, the value of each scientific-technological activity is particular to each context. In this way, not all research endeavors, and its forms, are equally important; therefore, a scientific activity in a society cannot be chosen randomly.

The philosophy behind free knowledge is the only one that:

- Defends the rights of citizens in relation to technology.
- Facilitates the incorporation of ICT in everyday life as a factor of progress towards a more just and egalitarian society
- Promotes effectiveness, efficiency and transparency in public administration.
- Allows sustainable development and dissemination of knowledge.
- Promotes regional production, endorsing technological sovereignty.

The philosophical principles present in free software communities appear naturally in this conception of knowledge, as pointed out in (Aguilar, 2011a):

- Knowledge must be accessed and used freely, allowing the encounter and using various sources of knowledge (ancient, scientific, etc.).
- Knowledge must be free to adapt to local work patterns.
- Knowledge should be freely shared through a process of collective construction.
- The knowledge gained can be improved freely, and these new versions of knowledge must be able to be shared freely with others, so that the whole world can benefit.

But the idea that knowledge liberates and emancipates the individual, and allows him to break the chains of disposal, requires another look. It must be a knowledge useful to learn and understand the world in which we live, to understand how we become who we are, take a holistic view of our lives, explain the historical causes of current events, establishing a narrative that gives meaning to our lives individually and collectively. And from this, that knowledge should enable action on our realities to transform and rebuild our mother language as an essential element for our cultural transformation. In this sense, the “four freedoms” of free software not realize the freedom of knowledge and technology in a transcendent sense (Aguilar, 2011a).

We are talking about a concept of free knowledge that goes beyond the notion of “accessibility” and “use”, which arises as an emergent quality of social dynamics itself, that seeks to integrate and is assimilated as part of social processes, and that is “free” if it provides positive socio-cultural processes of emancipation and integration, and it is based on inputs and modes of knowledge generation understood as common good.

To delve further this idea of emancipatory knowledge, (Aguilar, 2011a) has identified four elements. The first is that knowledge has an ideological component. For example, we have knowledge for the death and for the life, and each of these approaches to knowledge have completely different social dynamics. The next element is the idea of a free relation with the knowledge, which has to do with that we are not abducted for the knowledge, framed for it, because it is questionable, open to criticism, not a ready to

use product. The third element is to recognize the role of knowledge in the culture. Finally, the last point is that we must learn to resist the prevailing scientific-technological model.

From the above we can characterize emancipating knowledge as relevant knowledge, built from below in emerging participatory forms (Aguilar, 2011a). To achieve emancipatory knowledge we must break with the current educational model, kidnapped by academic elites, by bureaucratic forms of management, and by educational technocrats. This new educational model requires endogenous dynamics of social construction of knowledge (Aguilar, 2011a). This demands a culture of free movement of knowledge and expertise. It also requires new forms of knowledge construction (e.g., social networks are an example of collective learning spaces. They allow the emergence of native knowledge derived from the needs of the networks). We are talking about a new form of social activity where all participate in building the knowledge required for the implementation and construction of life projects in common.

The philosophy behind the free knowledge contributes to democratize access to knowledge, the social appropriation of knowledge, to facilitate innovation, to promote scientific and technological sovereignty, among other things. The creation of free knowledge is seen as a development strategy, which ensures sharing it and collectivizing the processes of knowledge generation and innovation. This is so because free knowledge:

- Promotes social inclusion.
- Endorses the effectiveness, efficiency and transparency with which the public administration must act.
- Enables accessibility and dissemination of knowledge, framed on the right of citizens to be informed and be partakers of the development process.
- Encourages local production, promoting technological independence.

Thus, the free knowledge is in the path of the Scientific-Technological Independence, because it presents several fundamental principles closely linked to the notion of endogenous development of a nation (Aguilar, 2011a), such as:

- Allows a sustainable development and diffusion of knowledge, framed on the right of citizens to the information
- Defends the rights of citizens in relation to science and technology, particularly on issues such as access to knowledge, rights of fair use media, etc.
- Facilitates the incorporation of knowledge in everyday life as a factor of progress towards a more just and equal society.

The free knowledge raises an interesting way of managing public goods and services, what is a catalyst for future social and organizational changes that are being accelerated by the Internet. This approach of a free society from the knowledge starts from the fact that social activities are cognitive processes. All this requires a reflection that allows us to address issues such as democratic rationality of cognitive processes in the society; demystification of knowledge; and finally, the need for social learning to ensure public participation of citizens in society, etc.

A NATIONALLY PERTINENT (AUTOCHTHONOUS AND CREATIVE) KST SYSTEM

As said in section 1, given the preference for foreign KST, because of the imitation of the west nations, the actual KST in peripheral nations has low pertinence (low cultural sense). That is so because the western way/view of development has been chosen as the reference model. *If we recognize that diverse models of development are possible, in accordance to the culture of each nation, as suggested by (Fuenmayor, 2000), then KST creation can be directed at solving problems in accordance to the nation interest and culture, which would be fundamentally autochthonous and pertinent. In this case, the Interaction would be dominant, as suggested by Habermas, and Work would be subjugated by Interaction.*

An autochthonous KST system must continuously question both, its conceptions and its form to search for KST, i.e., it must be fundamentally critic even about itself. In this sense, Fuenmayor (2006, 2001) recommends to plant and cultivate KST in terms of good and virtuous practices, in accordance to MacIntyre (1985) ideas. I will also be in line with Núñez (1999)'s ideas of building a system of KST from social practices, Varsavsky (2006, 2013) suggestion of a creative and socialist KST system, and Ochoa (2008) ideas of Endogenous development.

Necessarily, a peripheral nation must base its KST on socio-cultural needs, taking a form of constant *reflection-action*, which will rest on mutually supported (recursive feedback) *bottom-up emergent processes and top-down guiding processes*. The emergent bottom-up processes must start from the *internal dynamics* of the local actors and communities, and then go up towards the national level through more local and community levels. On the other hand, the top-down process *guides* and leads the bottom-up processes, increasing synergy, “dialogue” and coordination among several of these processes coming from diverse communities and regions.

The described *creative* and emergent processes, in accordance to cultural and societal pertinence, will construct: a) *a pertinent conceptual framework*, i.e., the meaning of relevant ideas and concepts such as what are “free” and “not free” KST; b) *community, local, national, and international policies, strategies and instruments*; and, c) *the organizational form and structure* of the KST system. Overtime, these processes must lead the nation outside the peripheral dependence on the west, as the nation would have its proper/autochthonous KST and will pursue its own development form, following National/Regional criteria.

The bottom-up and top-down processes will be described in further research. They are aimed at replacing the actual non autochthonous, developmentist, KST system, of the peripheral strongly dependent societies. For this, not only new different components and processes of the KST system should appear but also, and fundamentally, a different and appropriated attitude of the actors involved in the system should appear. These issues demand, on one hand, *a structural change* of the actual KST system into a new KST system with a new structure; and, on the other hand, KST actors with a new attitude, based on a better understanding and identification with the new system in construction, recognizing the priorities of the national culture and its institutional autochthonous mark, i.e., it must give an appropriated importance to *Interaction*. This *requires an educative project (an educative mother project²), aimed at strengthening an appropriate attitude and perspective in the nation.*

For this last goal, particular attention should be given to those actual imitative (of the west European Science), apolitical and rationalist (prevailing the rationally with given ends) attitudes of the actual technocrats. To overcome such attitudes, it is necessary to promote a change on the culture of the Nation in favor of *Interaction*. In particular, the process of *creation of the Nationally Pertinent KST System must*

be guided by virtuous of the national culture, who must have deep knowledge of the problems of the nation, and have a critical attitude towards the actual KST.

In fact, to increase sovereignty a nation needs an autochthonous KST, in order to sustain itself as an autonomous nation, which defines by itself its form of development. In this sense a KST has a political character, which tributes and contributes to the construction of a sovereign society, while being constructed/created by this society. The virtuous guide of the construction of the KST system should be accompanied by appropriate direction and control of the process, which can be carried on by an *autonomous public organization*. This public organization must be headed by virtuous people, who are compromised with the increase of the societal benefits of a pertinent KST system. They are virtuous in terms of their knowledge of knowing the society, its culture, international context and natural environment (see Fuenmayor, 2006). This organization must promote the auto-generative character of the culture of the society. In this sense, the process of development of a National Pertinent KST system should define its own concepts and practices, creatively, while dealing appropriately with those concepts and practices coming from the western society.

Summarizing, the Nationally Pertinent KST can briefly be defined as: a *Network of actors with the capacities and appropriated attitudes to cover the KST requirements of the nation, in order to solve its autochthonous problems, which includes also the final users, and is permanently adapting itself to the National requirements and interests* (this idea is in line with the proposals of a Virtuous Scientific System (Fuenmayor, 2006); a National Creative Stile of Science and Technology (Varsavsky, 2006, 2013), and the idea of Science and Technology as a Social Process, suggested by Núñez (1999)). This system must be in permanent construction and coupling via flexible change in relation to the National requirements, in a process of *research-action*, and includes the following components:

- A set of KST policies, strategies and instruments
- A group of virtuous actors orienting those processes.
- KST actors with an attitude coherent with the national requirements.
- A public organization of direction and control, which should be under the orientation of the named virtuous group.

These elements will be described in the next section. Finally, we cannot forget that this KST system is subjugated to Interaction , and is built in a process of research-action.

KST Policies, Strategies and Instruments

Organizationally, three elements must be present in all components and sub-components of the system: a) the policy element, which includes a discussion and dialogue about the ends of the KST system and the system being created, related to the analysis of Interaction in the society, and in the particular context of application (i.e., sector or region); b) the management element (about internal and external issues), associated to the strategic aspect of Work, to generate a correct synergy among the different components of the KST system; and, c) the operative element linked to the instrumental aspect of Work.

As said above, the organization of the KST system should be flexible, but also lowly hierarchical, where roles are assigned to actors in accordance to their engagement and virtuosity. Related models of this kind of organization are those used in the systems of free software development and in the systems of knowledge accumulation, such as in the creation of the kernel of Linux, and in the Wikipedia (for

more about this, see, for instance, Himanen, 2001; and Perozo, Aguilar, Terán & Molina, 2013). Strategies, policies and instruments are determined at different levels:

Interaction Category: National/Regional and Local Requirements, Criteria, Policies, and Mother Projects

The set of policies subjugates the other elements (strategies and instruments), and is autonomous from external domain. It must be fed from the most important dynamics occurring at the national Interaction.

The set of policies must implicitly recognize that the country's national life is based on a system of *myths/narratives* guiding the culture of the nation. This narrative accounts for the historical-cultural national context, which must make explicit from where the actual national reality comes from. That system evolves over time following an auto-generative dynamic, a sort of mythopoesis. What we mean with the idea of narrative as mythopoesis is similar to the description given by Guss (2014), when explaining the sense of the socio-cultural narrative of the Yekuana tribes of the Amazonian Forests in Guss (1990) and in De Civrieux (1992).

The description of the narrative must be constantly actualized by the national virtuous actors. It must include a description of how the peripheral aspects of the country, including western KST, are seen. Also, it must refer to the level of influence life in the west Europe (including the western KST) has over the socio-culture of the nation, and to the level of dependence (or correspondingly, of its reverse: autonomy) the nation has from such influence. The narrative must account for the present and past of the world in general (as seen from the culture of the nation), and for the nature of changes in present world (including involved actors and forces).

Social processes supported in such a narrative and creating KST must be emergent, involving actors and entities having national autochthonous capacities. They should be able to deal with external stimulus and rethink itself permanently, adapting properly to its context while keeping its autonomy from external forces. The KST will be autochthonous and nationally autonomous as far as it does not imitates foreign forms of doing KST, and rather constructs/cultivates/creates its own form of developing KST.

The socio-cultural narrative should indicate (interpreted by the virtuous group) the fundamental problems of the nation, which will define important needs in terms of food production, health, institutional organization, education, defense, among other basic requirements. The description should be both, general and by communities and sectors. *This set of basic problems allows the virtuous national group to identify the pertinent KST requirements.*

The definition of needs and requirements must regard the high importance that adherence to social norms of behavior has for a good state of the Interaction. In this sense, the organizational culture of the nation including traditional norms of behavior, must be taken into account and promoted by the developed KST system.

From these requirements, a first version of criteria for choosing KST, a set of KST policies and a set of associated KST key or mother projects, will be defined³. These criteria, policies and associated mother projects must be defined in order of importance, and necessarily linked, via an explanation, to the historic-cultural narrative. At this point of our discussion, four projects with the following goals can serve as examples of mother projects:

1. To cultivate national education, in order to support national autochthonous development, and increase the public good (this project was named above);

2. to continuously auto-generate the cultural narrative;
3. to conceptualize (including the definition of the structure and processes), and develop strategies and tools for the KST system;
4. and, to continuously update the research-action methodology and tools that guide the development of the autochthonous KST system.

Given that the set of KST requirements, policies and mother projects, should be also aimed at *dealing with the western dominant way of life, and its dominant KST*, in order to increase national socio-cultural autonomy, a mother project can also be created to help in dealing with this specific but fundamental issue.

In order to have a holistic idea about the set of KST policies and KST mother projects, a network of the concrete KST projects should be elaborated. Also, an explanation of the requirements, criteria, set of policies and mother projects, in terms that can be understood by the habitants of the country, must be elaborated. All of these are part of the *national KST plan* (this kind of plan are better explained in Varsavsky, 2006).

The national KST requirements, policies and mother projects, should take into account the communities at the local and regional levels. It must involve all diversity of KST actors, including communities, and especially KST virtuous actors at the corresponding level. It includes actors producing, conceptualizing, or using KST at all the spatial levels. In all levels, the analysis and report should be divided into a general and a by sectors part. Once the consult is made at the local and regional actors, the products of these consults should be unified in a coherent form by selected regional and local actors.

Strategic Element of Work

Once the national and local KST policies (national/regional, and local) have been defined in accordance to the national requirements, the KST strategies are created. I.e., once the fundamental outcome (requirements, criteria, policies, and mother projects) have been generated in accordance to the national Interaction, the following step is to determine the first component of Work. Before this step also the actors, including the virtuous ones, have been identified.

The first component of Work consists in the KST strategies to implement such policies, and move towards the KST national plan to achieve them via KST mother projects, and linked subprojects (both strategic and instrumental ones). During the determination of the “Strategic Element”, the set of mother projects is actualized, and projects, aimed at developing and complementing the mother projects, are elaborated. A mother project is carried out via several projects in a certain parallel or sequential order. This order gives a global form of the national KST plan based on all the projects. In order to facilitate the comprehension of the strategies and plan, these must be explained in a document along the KST policies. Such explanation must be based on the socio-cultural narrative (perhaps a summary), the social needs, and the associated KST requirements.

At this level, western form of life, and any kind of influence coming from the western KST system, must be analyzed from a critical point of view, in order to create and implement strategies for increasing national socio-cultural autonomy and an autochthonous KST system. All this will help, for instance, in designing national strategies oriented to control the influence from the west KST and way of life. As part of this control, the national pertinence of western KST must be determined, before western KST is copied and implemented in the nation.

In particular, the social games around KST involving the KST actors and forces must be described, in order to increase its comprehension and help the actors of the KST system in creating and refining strategies to favor a national autochthonous KST system. These games include those actors and forces representing the external influence coming from the western nations, as well as those autochthonous and non-autochthonous KST actors and forces existing in the nation. Strategies, interests, motivations, controlled resources and relations, etc., of these actors must be very well described. The description of the KST strategies and social games has to be made at all levels: national, and local. Tools such as situational planning methodologies and simulation models can help in the comprehension of these games, including the study and analysis of alternative scenarios (ideas from Social Simulation might help, see for instance Terán & Ablan, 2013). The description of the games also considers an explanation of the attitudes of the involved actors, and their relation/gap when compared to the ideal attitude of an actor coherent with a national autonomous culture and an autochthonous KST system.

Instrumental Element of Work

The definition of KST instrumental actions must take into account and improve the autochthonous know-how of the diverse communities, at all levels (local and national). Also, good practices (pertinent) found in particular communities should be recognized, motivated, and promoted/dispersed in other communities.

Virtuous Actors and Strategies of Change

The KST system must be oriented by virtuous actors in the sense of knowing well and caring about the culture of the Nation, while having an attitude coherent with the national pertinent needs, at the same time that are compromised/identified with the spreading of the autochthonous KST. The virtuous actors must be deeply involved in the process of KST creation from the “higher” levels of KST (conceptualizing and elaboration of KST policies), to the lower levels (KST usage by diverse communities), passing through any intermediate steps of KST creation. Among the virtuous actors, especial attention must receive the main actor orienting and coordinating the process of KST creation: *the public organization of direction and control*. Among the fundamental actors and their roles we have the followings:

Communities of Users of the Nation

The communities of the nation represent the main KST users. They face in their everyday life the autochthonous problems and needs, and consequently are the most important actors to define the requirements for the KST system. On one hand, they have to be taken into account by the virtuous actors to define the KST policies, strategies and instruments. On the other hand, they validate the description of such policies, strategies and instruments, collectively constructing the KST system. Consequently, these communities will be fundamental to define the KST local requirements, criteria, policies, strategies and instruments.

Actors in communities share life experiences and goals. They have spaces of collective learning, where KST is seen as a public good, whose property corresponds to the whole nation, or to the whole humanity. The KST system needs to be cultivated, in order to increase national wellbeing. This KST collectively constructed implicitly carries on a proposal of social action, what makes such knowledge pertinent and helps in promoting that proposed endogenous form of social action. This is a strategy of mutual promotion of autochthonous knowledge and social action (for more about these ideas, see Ochoa, 2008).

The KST processes of decision making at all levels must be based on dialogue and consultation, including all social actors. The communities and the virtuous actors must also have control about the process of KST creation, what requires decision spaces, free information flux to allow the virtuous actors and communities to audit that process. The auditing process itself should imply some KST specific requirements (more details about these ideas are proposed for the LA case in Section 5 of this chapter). Some of these requirements are in terms of learning processes and organizational forms, as well as strategic and instrumental tools (they might define a mother project). The answer to these requirements represents a feedback going from the KST system to itself.

The character of these processes of decision making and its products reveals the necessary free nature of the autochthonous KST system.

The State

The state must guarantee the good quality of the process of creation and maintenance of the KST system, favoring its autochthonous character. For that, *virtuous* public administration workers are necessary – they must know very well the culture of the nation and the pertinent requirements for the KST system. Once the KST system become highly autochthonous, the role of the state is reduced to place particular demands/requirements to the KST system, in accordance to its problems and needs, in order to assume its social duties. Aside this, the state must promote a strong educative system, which must be capable of creating the cognitive basic abilities, the necessary language (the language is defined basically as equivalent to the culture of the nation), to start the process of generation of the KST required by the nation.

The Public Organization of Direction and Control of the KST System

This organization must be conformed by those actors having the highest virtuosity (knowledge and practices) in relation to the KST system. It is responsible for the direction of the process of creation and constant adaptation of the KST system to the national requirements, as well as for its excellent virtuous qualities (nationally pertinent practices and products). It must be highly tied to the communities, and characterized by having excellent autochthonous practices.

The Universities and Other ICT Creators

Universities are institutions where universal knowledge is supposed to be cultivated. Universal from the point of view of this chapter means that diverse national development forms, each with its particular narrative or conceptualization, and KST perspectives are taken into account. It does not imply that, initially, a dominant perspective exists, apart from those possible from the point of view of the national narrative. Among the included perspectives are: firstly, the autochthonous perspective of the nation, and, secondly, the western perspective. The cultivated knowledge should spread among the actors of the nationally pertinent KST system. This study must be holistic and explain the cultural origin of each considered perspective, including the associated forms of Interaction and Work.

The university must also help in designing national criteria, policies, strategies and instruments for the national autochthonous KST system. Additionally, the university must contribute to educate actors creating nationally pertinent KST. Moreover, the university must have highly virtuous groups engaged in research-action projects that create pertinent KST to support the KST system in all possible forms.

The Productive Sector: Economic System, Enterprises and Cooperatives

Enterprises and cooperatives must generate products in accordance to the problems and needs of the nation, and thus will have some requirements for the KST system. Simultaneously, the KST practices of these actors must be culturally pertinent and should contribute to improve the national KST practices. This sector must be strengthened in order to export as much as possible the nationally pertinent products, as well as other products helpful to other nations in accordance to their culture.

The KST system should help in designing new organizational forms, aiming at fostering an economy subjugated to the national Interactions, and to a KST generated in the community spaces. The KST must help in creating mechanisms that allow building a social, organizational and economic agenda, from the dynamics of the daily local social activity, as well as mechanisms for auditing the developing of such agenda.

National Integration: A Necessary Police

Historically, dominant nations have being interested in, and have promoted, disintegration/fragmentation of dominated peripheral nations. This, with the help of particular egoist interests of some actors inside the nation, has created disintegration and fragmentation of peripheral nations, and even their split into several countries (e.g., Latin America, or the Arabian countries as they are nowadays). Because of this, national integration polices, as well as strategies and instruments to promote it, must simultaneously endorse the whole national KST system. Without it, nothing nationally significant will be possible, and even less a nationally pertinent KST system.

The integrating action should take the form of resistance against western KST domain, via defining an autochthonous form of KST, and authentic national, and local KST systems. It must promote national autonomy, and a deeply autonomous *mythopoetic* culture.

CURRENT LATIN-AMERICAN SITUATION WITH RESPECT TO FKST AND KST

Characterization of the Actual Situation

We must start by recognizing the role of the Latin American society as consumer and imitator of western knowledge and technology, mainly as a purchaser, but also as a replicator of them. The most popular model in the academic communities of Latin America is scientificism. The absence of moral and political commitment to social models in Latin America, which supposedly should serve the academy, and the strong attraction of the “scientific industry” described by (Núñez, 1999), encourage the scientificist model. This is in accordance with our previous characterization of Latin America, in section 1, as a *developmentist region*.

Apart from its basic imitative character, the current situation in Latin America is, in part, an extension of what happened to the Western world, described by Habermas (1999), Feenberg (2002), among others. According to them, in our time, technocracy has an ideological role, and the social media play a role in control of the masses. In general, technocracy follows interests of transnational and imperialist states.

The lack of a deep analysis about these issues, and in particular about the topic: “knowledge society”, is particularly serious in our Latin American countries, which currently is taking a big debate about our

future as society. Analyzing the Knowledge Society will give very important inputs to this debate. The apparent progress of the Information Society is part of an inequality, not only in use, but the difficulty of constructing a form of relationship of these advances, apparently neutral, with our cultures and realities. Indeed, these developments have generated profound processes of cultural alienation in Latin America (Aguilar, 2009, 2011a, 2011b).

It has instilled in us a deep admiration for the knowledge society, based on the feeling that we walk towards a fairer world sustained by human knowledge and the capitalist model of production of knowledge, supposedly to be the unique way to ensure the welfare of mankind. But this new form of capitalism has had a major impact in our countries in at least the following dimensions: at technological level, based on the physical infrastructure; at level of knowledge, linked to the skills and knowledge that the citizens must have to appropriate these technologies; and at level of citizen participation, linked to the opportunities of citizens not only to use knowledge in accordance to their needs, but also to intervene in decisions about its developments (Aguilar, 2009, 2011a).

In general, there are not clear policies in LA that resist and subvert this situation, looking for new forms of social activity where the knowledge is considered as a public good heritage. Public policies aimed at developing cognitive skills in order to improve our quality of life, our community life, are needed. The need arises to identify the key elements about the economic, social and humanitarian model, which considers knowledge as a dynamic centerpiece.

Among the current weakest aspects of public policies are the complete disconnection between national economic and social policies, and policies on science and technology. On the other hand, there is not any scientific and technological leadership that talks the need for knowledge to achieve a real emancipation process. Leadership must be understood at two levels: at the institutional level to assert its voice, and at community level to be relevant in its environment, as wise voice, but humble, accompanying the processes of community decision. At present, it has not been able to overcome the exclusionary view of the current model of doing science and technology, a model that approximates the developmental vision described by Varsavsky (2006), not perceived by much of the society, without an important role in the economy, society, politics and culture of Latin America.

They are very shy, or null, integration projects on Sciences and-Technology (ST), and such projects are not seen in the agendas for discussion and cooperation that have been built. The incipient level of agreements of ALBA⁴, MERCOSUR⁵, etc. in education are not sufficient to build a Latin American System in Science, Technology and Innovation (LSSTI), where we integrate all to share our problems, and from there, build our Latin American (LA) agendas in ST.

While it is true that the ALBA begins to show the rest of the countries in LA that another model of integration is possible, it is necessary to enrich the strategic partnership from people, from the Culture, Science and Technology diversity of our people. It is an American integration, but now from the edge of the ST liberated and liberating, not technocratic. We cannot talk about a Bank of the South⁶, PetroCaribe⁷ or a single currency, if we do not build spaces for social reflection and to establish new scientific and technological challenges that accompany those policies.

Moreover there have existed attempts to determine the role of a LSSTI in our development model. In this regard, there is not much progress in the construction of a new integrated scientific-technological community for LA, that is in tune with the needs and demands of our society. We continue doing research mainly recognized by developed countries, and in practice, with little connection to the Latin American social, economic and political environment.

Towards a Nationally Pertinent System of Knowledge, Science, and Technology

The dominant “ideology” of the Latin American scientific and technological community has not suffered a significant change. The current conception has not changed in its atomistic analysis of the phenomena, seen all around us as ready to be used. The new institutionalism in some countries is unable to consolidate methodologies to define scientific-economic agendas, spaces to create high-tech, etc. In addition, institutions tend to become bureaucratic, to be very slow, and do not encourage the appropriation of knowledge, with concrete proposals at the national and local levels. In fewer words, remains the task of reorganizing the LSSTI, based on the recovery of knowledge as a public good, as to make it an emancipatory tool.

There are some interesting LA experiences, but isolated, disjointed between countries, and in some cases without adequate stability for its continuation in time, as the Science Mission in Venezuela, or the Ecuadorian Prometheus program.

Returning to the theme of the scientific-technological appropriation, it has not reversed the idea of latent appropriation. There are not public policies in Latin America to promote a new concept of “appropriation” that goes beyond the mere connotation “transfer”, to include other aspects of knowledge: the invention, the copy and the development. Public policies that promote the appropriation must be based on three times: a) learning to use knowledge; b) learning to make knowledge; c) learning to unveil the historical context of knowledge.

Additionally, there are not consolidated technological scientific Latin American networks, and when some are mounted, they are guided by actors from outside the region (as the case of AmSud, proposed by France).

The lack of public policies has created inconsistencies between the Scientific-Technological doing and Latin American economic and social dynamics. It has enabled a scientific-technological Latin American model, whose components have their eyes on other societies, always under the premise of the universality and neutrality of knowledge. That scientific-technological model has allowed, first, an instrumental conception of knowledge as the only legitimate form of knowledge in the present, and second, maintaining a pseudo-LSSTI that continues excluding regional and local actors, with a perspective consumerist of knowledge.

Furthermore, the universally accepted model of neutrality and apolitical knowledge assigns roles to scientists from every part of the world, in some cases as generators of knowledge, in other cases as replicators or as consumers of knowledge, always under the premise that may use knowledge who can afford it, what is impacting the pseudo-LSSTI. In this model, the researcher produces scientific publications, and patents, but has a low relevant participation in community projects. It follows the same ‘career researcher’ defined by the world model to make science and technology, where publications are essential to promote knowledge. Also, we keep using the same parameters established by UNESCO, which states that “underdeveloped” countries need a scientific per thousand inhabitants or more. From this kind of reasoning, would need to import researchers to complete the quota in order to solve our problems? Of course not (Aguilar & Terán, 2011).

In the Latin American case, and the case of free knowledge, there are already some experiences:

- The Latin American Free Software Foundation.
- ST South American integration projects of cooperation between Venezuela and Bolivia: Infocentro, the agreement to transfer technology and knowledge for technology training under free software.
- Bolivarian Alternative for the Americas of the Free Software Community (ALBASOL).
- Efforts in Latin America to legislate on net neutrality, particularly in Chile and Ecuador.

- Specific efforts, of countries like Brazil and Venezuela, to promote the development of free software institutionally (creating research and development centers, etc.), as well as legal and institutional regulatory incentives to promote the development of free software.
- The creation of strong communities of free software in Argentina and Brazil.

In general, many people in Latin America study the issue of free software and promote good practices derived from it, but without transcending in the search for a society marked by the principles of free knowledge as defined in this chapter (Aguilar, 2011a).

Some Elements for an Integration Process for Latin America from Free Knowledge

The most important issue in a society is the culture, and the public good, in general. Therefore free knowledge must serve to develop the culture, the liberation of man and nature, and an autochthonous knowledge system. To do this, we require a native ST Project with liberating premises.

In this sense, we need to politicize the ST: accepting its non-neutrality, and democratizing its work. We need to understand that the actual ST is not neutral, it does not create any kind of knowledge, but only knowledge stimulated and of interest for the dominant actors of the political system (Aguilar, 2011a). It must be understood that the present global scientific and technological model provides a distribution of intellectual and financial effort as the needs of the dominant system, whose basis is the “consumption” and “technological fashion” model (Aguilar, 2009, 2011a). The essential point is to recognize that ST does not give a universal and neutral product. The results are full of cultural contents, are generated in many ways, and are the result of human actions involving human decisions. Each Scientific-Technological model is produced by men who think in a certain way, live in a certain form, and have some kind of values.

In particular, LA society and culture must recognize this, and ask themselves about which ST they require and should build, with the best talent and scientific-technological practices; i.e., in an local/own and native form, and thus in accordance to their culture. It is a suitable time now to build a new vision for a ST for Latin America.

In all this lies the idea of politicization of ST. We’re talking from the ST based on a logic of knowledge that unfolds all social tissue, forming a system of rules that legitimizes and articulates knowledge, providing validation and design guidelines, etc. That ST received feedback and is enriched from the social relationships. This requires breaking with how to manage the current ST in LA, which responds to the prevailing logic of power in capitalism.

Only one ST with these features enables an autonomous process of development for LA. Thus the LSSTI appears with a political sense that contributes to building a sovereign society. We’re talking about a Latin American society with a proposal of sovereign scientific and technological development from a democratic rationality (Aguilar, 2009; Feenberg, 2002), i.e., about a Latin American scientific and technological model to withstand the forces, pressures that the scientific-technological globalizing forms have imposed on Latin American agendas. In this regard, it is essential to characterize these forms of resistance from the processes of integration:

- Construction of social knowledge networks that learn to influence the powers that control science and technology;
- Questioning of the scientific-technological reality

Towards a Nationally Pertinent System of Knowledge, Science, and Technology

- Advance in a model in opposition to the dominant form that has treated to impose the globalization. In this respect, we should strengthen the processes of scientific and technological maturation, denying the scientific-technological fads, and deepen in the theme of scientific-technological appropriation.

That will allow us to respond, under current processes integration of our peoples, to questions like: What is the space to the ancestral knowledge of our people in the LSSTI? How must we share our knowledge in agricultural systems?, And so many more questions. From the integration process?, we must generate forms of resistance to the prevailing scientific-technological model (for more about these ideas, see the role of the “Communities of users of the Nation”, in section 4.2.1 above).

These forms of resistance must be based on the liberation of knowledge for collective learning processes, on social networking oriented to achieving forms of Latin American social activity based on reciprocity, honesty, trust and solidarity, among others characteristics. It must be characterized for at least the following four edges (Aguilar & Terán, 2011; Aguilar, 2011a):

- The roots of that task in ST must be in the Latin American context, in terms of its culture, its vocations, its knowledge and potential;
- The control must be in Latin America, specially based on the Latin-American social activity;
- It must take into account Latin American spaces of decision, debate and discussion to ensure the relevance of that task in ST on the Latin-American culture, among other things;
- LA must have an enrichment, tangible or intangible. Within the intangibles, one of the more important is knowledge

This breaks with the classical approaches of social processes, as part of the principle of man making himself (a free man). Then, there appear some knowledge sharing that is collectively constructed, which is not seen as a commodity, but is considered to be at the service of the creation of opportunities for sustainable living, seen as a public good. So, it is free, enriched and enriching the cultural matrix in which we operate, contributing to its self-generation.

An interesting question from the perspective of resistance is: How would free knowledge help in creating conditions for the integration of LA? (in Section 4.3, integration was mentioned as a key element for developing a national autochthonous KST system). It must resist the new power relations that have been established within cognitive capitalism, proposing different logics. For example (Aguilar & Terán, 2011; Aguilar, 2011a), it must:

- Raise community and collective dimension of knowledge.
- Shed the instrumental rationality of knowledge
- Ensure the free movement of knowledge.

Thus, the integration should be an area of struggle for the liberation of knowledge. But its task is not only to make knowledge freely available, but more importantly to liberate the society of a way of life imposed from cognitive capitalism, which imprisons man in an increasingly unjust society. From this view, free knowledge contributes to the creation of a humanistic and social integration based on values of affection, solidarity, collaboration, recognition and delivery.

These are goals that must be achieved through a Latin American plan, goals and guidelines established for the long, the medium and the short term. The ideology of the plan must be clear: based on the cultivation of a Cultural Matrix in a good condition. These guidelines should guide the definition of requirements, selection criteria and projects, definition of concepts such as efficiency, as well as Latin American integration processes, but now from the edge of a ST liberated and liberating.

A native, Latin American, ST should be a tool that facilitates and promotes processes of national/regional integration. We are talking about building a LSSTI to make ST a key element in this new culture of Latin American integration, which allows us to include problems that affect us, starting with the liberation of the cultural matrix.

This requires a LSSTI to generate free knowledge, tied to the care of an autonomous culture (Aguilar & Terán, 2011). Knowledge given in this context must have a high degree of authenticity, i.e., it must have sense in the Latin American culture. Also, this knowledge must be able to account and explain the events of the world. For that, the LSSTI must be composed by emerging social processes, giving it the autonomic capabilities to respond to external stimuli and permanently rethink itself. This will allow the LSSTI auto-adjusting itself endogenous and harmoniously.

This idea gives the knowledge a public good character, a LSSTI with dynamics capable of searching for answers to our needs, and, in that search, building research and appropriate technological agendas. We discussed ways of creating the knowledge embedded in community spaces, with shared common life goals. Also, we have redefined the role of the researcher and technologist, as a social actor, and not just the role of producing and applying knowledge. In that sense, the researcher is not only a seeker of truth, but also he is involved in generating processes that enhance quality of life, the socialization of knowledge attained, etc.

On the other hand, the economic activities in LA should be one of the main aspects to consider in the LSSTI. This should generate mechanisms of accumulation and generation of knowledge to ensure its sustainability. This would lead us to a sustainable endogenous economic model, based on the use of our knowledge.

Overall, it is a new scientific-technological culture, an emancipatory model of doing ST, an instrument for Latin America to change and build a new society with values of collaboration, solidarity, transparency, affection. It will permit to create:

- Relevant knowledge, built from social agendas designed from below, in emerging forms of participation, and social dynamics of endogenous knowledge construction.
- Collective learning processes, to enable the design of a fair world aimed at improving the quality of life, peace, and particularly to meet the needs of society (spiritual, material, etc.).
- Permanently reflection on the educational model of bureaucratic forms of management.
- Knowledge that allows us to cultivate the culture, i.e., free knowledge permitting the society to self-regenerate.
- Promote recognition of the skills of the subjects, establishing horizontal relations.
- Accumulation of native knowledge according to the Latin America cultural matrix.

Finally, given the deterioration of the current cultural matrix, an important part of the initial ST projects in Latin American must conceptualize the current status of its cultural matrix, as well as its possible future cultural matrixes. Using the last one, Latin America could define collectively a ST agenda,

one caring of public good, and contributing to create these cultural matrixes. Finally, the scientific and technological development must be seen as a political rather than as an instrumental process.

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KEY TERMS AND DEFINITIONS

Autochthonous and Creative KST: KST developed in a region (e.g., in a peripheral one) in accordance to the social needs and culture of this region.

Cognitive Capitalism: For some authors we are in a third phase of capitalism, where the accumulation is centered on immaterial assets, which follows the previous phases of mercantile and industrial capitalism. Those immaterial assets are protected through Intellectual Property Rights (patents, etc.), in order to create a surplus value resulting from monopolistic rents. It is typical in sectors such as the cultural industry, high-technology industry, the media, business and financial services, etc, and combines digital technologies with high levels of cognitive labors, ‘digital labors’, etc.

Free Knowledge, Science and Technology (Free KST): Is that kind of Knowledge, Science and Technology (promoted by, e.g., the Copyleft licenses); and opposed to proprietary Knowledge, Science and Technology (promoted by Copyrights). As an example, free software promotes the freedom to run, copy, distribute, study, change and improve the software.

Knowledge Society: In an ideal definition, it is a society which generates and makes available, to all members of the society, the knowledge to improve the human condition. However, the concept of knowledge societies encompasses broader social, ethical and political dimensions. These dimensions

rule out the idea of any ready-made definition. Particularly, it is based on the idea that Knowledge has become a key resource. The creation of value is about creating new knowledge and capturing its value. The most important property is the intellectual property. In this way, it actually shows similarities with cognitive capitalism.

Knowledge-Based Economy or Knowledge Economy: The new Economy of the more recent stage of capitalism, in which codified knowledge is exploited. It is based in the fact that knowledge can be stored in digital form, and then be forwarded for productive purposes. Knowledge has become reproducible in unlimited amounts.

Western KST: The KST created by the Western Society, which actually is represented by the dominant European and North American Societies, originated from the Greek Society and Culture.

ENDNOTES

- ¹ The actual dominant European and North American Society, originated from the Greek Society and Culture, at present including both Capitalist and Socialist countries in this area of the world.
- ² A *mother project* is a key enterprise to promote key components of an autochthonous and creative KST system. Usually, it is a big project oriented at achieving important services or products for the benefit of the nation.
- ³ Some of these elements (e.g., criteria and policies) are considered in Varsavsky (2013) as part of the necessary work in the process of constructing a technological style. Such elements are previous to the elaboration of a National Plan for Science and Technology, which in turn is previous to the more operative plan aimed at concretely carrying out the technological style.
- ⁴ It is a collaborative and complementary project in political, social and economic between certain countries in Latin America and the Caribbean, which stresses the fight against poverty and social exclusion. The ALBA is based on the creation of mechanisms that exploit the cooperative advantages between different partner nations to offset imbalances between those countries
- ⁵ MERCOSUR (the Southern Common Market) is subregional economic bloc composed of Argentina, Brazil, Paraguay, Uruguay and Venezuela.
- ⁵ ⁶The South Bank is a Latin American monetary fund, whose purpose is to function as a development bank to finance infrastructure and support to public and private companies in the three countries, under the premise of equality, equity and social justice. The bank is proposed as an alternative to the IMF, the World Bank and the Inter-American Development Bank
- ⁶ ⁷ Petrocaribe is an alliance in oil between some Caribbean countries and Venezuela, whose aim is that Caribbean countries buy Venezuelan oil under preferential payment.