



# ABSTRACTS



Henry Etzkowitz

LEARNING FROM TRANSITION: THE TRIPLE HELIX  
AS AN INNOVATION SYSTEM

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A triple helix of overlapping spheres of university-industry-government is increasingly the core, rather than the periphery, of national, regional and multi-national innovation systems. This paper discusses the methodology of achieving a triple helix transition through initiatives in knowledge, consensus and innovation spaces. Policy recommendations are offered to create an innovation system based on university-industry-government interactions.

**Key Words:** triple helix, endless transition, entrepreneurial university, knowledge, innovation and consensus spaces.

Franc Mali

THE NEED TO ACCOMMODATE THE NATIONAL INNOVATION  
SYSTEMS OF SMALL TRANSITIONAL COUNTRIES TO THE MAIN  
PRINCIPLES OF NEW EUROPEAN RESEARCH AREA

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The main goal of the contribution is to answer how the small countries in Eastern and Central Europe are meeting with the challenge of the increased processes of globalization. The recent processes of globalization are leading to unprecedented integration of nations and localities in the new global order. Even nations with very large human resources are forced to join their R&D efforts to supra-national entities. But, we cannot even think about globalization without referring to specific locations and places. It is global-local dialectics which different analytics have in mind when they talk about "globalization". That is true for the situation in Europe as well. There is no doubt that after a more than two decades of action, common intervention had created a new R&D scene in Europe. The new European Research Area (ERA), as this idea is experienced among EU Member States, Acceding and Candidate

Countries, is in many respects not only new, but also revolutionary. For small transitional countries in Eastern and Central Europe, the “philosophy” of ERA is very important, because it encourages national and international R&D synergies. To implement the “philosophy” of ERA, The European Commission has embarked upon a serious of actions to tie the researchers in the common European R&D programs. The instruments and actions in the context of ERA further research partnerships among the R&D groups of all European countries, focus their efforts to interdisciplinary, practically relevant and applicable issues and give attention to – what is especially important for the small transitional countries in Eastern and Central Europe – the cooperation between the academic research sector and industry. The contribution emphasizes the above indicated issues. Primarily, it will analyze the situation in small transitional countries in regard to the processes of commercialization of the academic science. In many respect, the commercialization of academic science is becoming a fundamental value not only in USA, but in Europe as well. ERA effectively promotes cross-sector cooperation. The main thesis of the paper will be that for small transitional countries in Eastern and Central Europe it is very important to follow the strategic goal of ERA: to create strong university-industry-government relations. Namely, these relations are not important only because the diffusing basic research findings to practice. They are important because of re-definition of old-fashioned scientific values in this part of the world as well.

**Key words:** European Research Area (ERA), CEEC, transition countries, R&D systems.

Slavo Radošević

(MIS)MATCH BETWEEN DEMAND AND SUPPLY FOR  
TECHNOLOGY: INNOVATION, R&D AND GROWTH ISSUES  
IN COUNTRIES OF CENTRAL AND EASTERN EUROPE

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Paper analyses the relationship between R&D and innovation in countries of Central and Eastern Europe. It points to a gap between local demand and supply for R&D and innovation as one of the key issues for long-term growth of the region. Analysis is based on innovation survey, R&D, patent and business survey data. Based on analysis paper develops policy implications.

**Key words:** CEEC, long-term growth, innovation gap, R&D system, innovation system.

Devrim Göktepe

A NETWORK PERSPECTIVE ON EU ENLARGEMENT:  
THE ANALYSIS OF SIX-EUROPEAN NATIONAL INNOVATION  
PROGRAMS AND IMPLICATIONS FOR TRANSITION ECONOMIES

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The concept of innovation networks has become popular among academics of various disciplines and policy-makers. Though innovation network concept has been used in national, sub-national or sectoral innovation analyses and policy development, it *has not been utilized* enough at the international levels such as political institution building both in the transition countries and in the European Union enlargement. It is the belief of the author that although all nations have experienced unique trajectories in transition to knowledge-based economy, they are all advised to utilize networking between the users and producers of knowledge as a prevalent policy-tool to utilize the benefits of knowledge-based economy. This similar modus operandi of the national innovation programs would less complicate the enlargement of EU especially concerning the establishment of a common research area and cooperation in innovation.

**Key words:** transition economies, policy appropriation, institutional set-up, international innovation networks, EU enlargement.

Željka Šporer

KNOWLEDGE-BASED ECONOMY AND SOCIAL CAPITAL  
IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

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The comparative analyses between the EU and the CEEC using 17 economic indicators reveals a complex picture of similarities and differences. In some respects, the difference between the European south and north is bigger than the difference between EU and CEECs. The capabilities of the human capital in CEECs are not far behind the EU, and are above those of south Europe. Orientation toward an open economy (globalisation) is present more in some CEECs than in most of the EU countries.

CEECs in general, invest less in research. Governments are still heavily involved in research funding in countries with a tradition in strong central planning systems and a large number of researchers. In other CEECs business enterprises are starting to be more involved in research funding but on average are still far below the EU. CEECs are substantial lagging behind EU countries in implementing new communication and information technol-

ogy. These countries are not taking advantage of the new cycle of innovation. As a consequence, the technological gap widens even further.

The ability to implement and adapt to change depends on social capital. Some dimensions of the value system indicate the prevalence of a modernistic orientation in CEECs. But because the communist system was dysfunctional, especially in relation to the market and democracy, social capital was rapidly replacing the imperfection of the formal system and social networks. Trust became more important than the law and regulatory institutional systems.

**Key words:** Knowledge-based economy and society, economic indicators, social capital, Central and Eastern Europe Countries, European Union, comparative analysis.

Jadranka Švarc  
Jasminka Lažnjak

#### WHY HAVEN'T THE EU ACCESSION COUNTRIES YET ACCESSED KNOWLEDGE-BASED SOCIETY: WHAT CAN SOCIAL SCIENCES DO ABOUT IT? THE CASE OF CROATIA

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The main thesis of the paper is that moving towards knowledge-based society is deeply socially and politically rooted. To support the thesis the authors analyze the social context of R&D and innovation activities in Croatia - an East European country in transition. The state of social and political "semi-modernism" in Croatia prevents the recognition of innovation and technological change as the main driving forces of the new economy. It also prevents the establishment of the national innovation system (NIS) which is the environment necessary for structural changes towards the new economy. The main components of the Croatian NIS are described to illustrate the influence of semi-modernism and the failures of the de-industrializing intellectual and political elites.

The authors compare the two models, the national innovation system and the triple helix (TH). They find out the striking similarity between NIS used to describe the transformation of economy towards innovation based competition and the concept of the Triple helix used in social sciences as an useful theoretical and analytical framework for studying the social process of that same "endless transition" towards the knowledge-based society. The authors conclude that the role of TH in social science closely corresponds to the role of NIS in economic sciences. The TH model of evolutionary convergence of the

three helices towards economic growth resembles the idea of managing innovation and designing growth by building NIS.

Finally, the paper argues that the concept of TH is suitable even for the less developed countries because today the transfer and imitation of innovation are knowledge intensive as well as network activities. If nothing else, the Triple-helix model of communication between helices is a democratic way of setting up national development priorities that Croatia, a semi-modern society, lacks.

**Key words:** EU accession countries, knowledge-based economy, triple helix, socioeconomic aspects, national innovation system, social sciences.

Vesna Andrijević-Matovac

## CROATIAN NATIONAL INNOVATION SYSTEM: HOW TO CREATE AND TRANSFER KNOWLEDGE AND TECHNOLOGY

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Innovation is increasingly important to business success. However, business efforts toward innovative activity are much more effective if the government plays its role through the National Innovation System.

The goal of this paper is to explore the possibility of improving the Croatian National Innovation System. First, the characteristics of the Croatian National Innovation System are presented. A survey on the innovation activity of Croatian firms is conducted and the results are briefly described in the paper: (1) transfer of new technology, (2) innovative and patent activity, (3) goals of innovative activity, (4) sources of ideas and information for innovative activity, (5) factors that influence innovative activity, (6) strategy of firms, and (7) investments in knowledge and research and development. The paper examines the experiences of successful countries that base their economy on innovations, and describes the experiences of Croatia's most successful firms. The disadvantages of the Croatian system for encouraging innovations are examined and the Croatian system is compared with the ideal national innovation system.

The following measures for increasing the effectiveness of the Croatian National Innovation System are presented: (1) measures for increasing input quality, (2) measures to provide a suitable environment, and (3) measures for improving communication. Measures for increasing input quality include intensifying the quality and availability of education, especially in computer science, increasing financial support for education, research and in-

novative activity, and decreasing the tax burden for innovative firms. Measures to provide a suitable environment include simplifying and lowering the cost of intellectual property protection, reducing bureaucratic procedures that block entrepreneurs, fostering consulting services for innovators, and encouraging firms that are oriented towards the development of new products and towards increasing their quality. Measures for improving communication are the triangular distribution of knowledge among universities, research institutes and industry, and promoting the innovative culture among Croatian citizens.

**Key words:** innovation, technology, national innovation system, economic growth.

Maja Bučar

#### SLOVENIA'S POTENTIAL FOR KNOWLEDGE-BASED ECONOMY WITH FOCUS ON R&D AND INNOVATION POLICY

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The paper addresses the R&D and innovation policy of Slovenia as a country with the ambition to actively promote transition to knowledge-based economy and society. It starts with the presentation of the key factors which according to the World Bank KAM project determine the readiness of a particular country for knowledge based economy and looks into the position of Slovenia. In particular, attention is given to the current R&D and innovation policy. The implementation of basic elements of knowledge based economy and society is closely linked to the transition to a more innovative economy. This on the other hand is only achievable with a much more focused R&D and innovation policy, which needs to become a central element of development policy. While several documents reflect Slovenia's government's awareness of the topic, the day-to-day policies fail to implement the set goals.

Insufficient attention given to the so called "soft" indicators and horizontal measures (including a development of a coherent national innovation system) may in the long run be one of the key factors for slower growth and development of Slovenia and restrict its possibilities for catching-up with developed countries. On the other hand, forward-looking R&D and innovation policy could contribute significantly to the transition to knowledge-based economy and society. Lessons learned from Slovenia can be highly relevant also for other transition countries.

**Key words:** innovation policy, Slovenia, Slovenian system of innovation.



Mira KRNETA  
Anči LEBURIĆ

## THE APPLICATION OF THE TRIPLE-HELIX MODEL IN AGRICULTURAL SECTOR OF CROATIA

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Since the nineties the technological development and various innovative activities have been considered to be the most important sources of productivity rise and of the material wealth of every country. The improvement of the competitive position has been broadly based upon knowledge, i.e. the ability to develop new products and methods and apply them when answering to the development challenges of a company, economic sectors and the economy in general.

Knowledge is regarded as the common welfare that can be shared by all human beings without losing its value. The companies are directed to R&D activity and their cooperation with the researching institutions becomes more intensive. However, prevailing are the indirect ties between companies and the researching institutions. The lack of some linking mechanism between the companies and the researching institutions has been noticeable. Building and spreading of knowledge has been markedly interactive and in communication terms an intensive process, therefore, it is necessary to develop mechanisms that would stimulate the company ability to build knowledge, to create links with other companies and with own R&D environment. Consequently, the usual role of an university has been more frequently redefined to the role of creating the source of knowledge which is having an indirect influence upon the development of industrial innovations and entrepreneurship.

Nowadays, in numerous countries, the regional economic development has been encouraged by the government policy through relying on universities, R&D institutes and small and medium sized companies. Creating the system of relations among the universities, industry and state for the purpose of providing for the conditions necessary for transition into the knowledge-based society can be operationalized by Triple-Helix model. The model is based on commercialization of researching where universities, industries and governments take part, and, therefore is regarded to be the relevant methodological approach for faster development of socio-economic system in Europe and Nordic countries, as well as the development of innovative centres that would serve as supports to the small and medium-sized entrepreneurship in Italy, modern Russia and similar. In such model environment,

the government, by taking different measures, including securing of financial sources for R&D and creating of nets of small and medium-sized companies, determines the main directions of the sector and region development of the country. Projects having particular interests and common social importance are being formulated. The companies are focused on creating new products or technologies, and in an feedback operation, suggest the fields of research to the universities and R&D organizations.

The authors, in the mentioned context, analyse projects in the agricultural sector of Croatia, which projects are based on the application of in-vitro technology in production of seed potatoes and pyrethrum flowers (*Chrysanthemum cinerariifolium*). The former project is undergoing the accomplishment stage, i.e. the first tone of the seed material, free of viruses, cultivated in green-house conditions, has been produced and planted on plough-fields for further multiplication. The latter project is in the phase of goals determination, scope planning and defining of the relations that would create the Triple-Helix model matrix as the prerequisite for the successful project launching.

Both projects have been assessed important in terms of the country economic development since they relate to one of the strategic agricultural products - seed potatoes are still imported and the importing dependence of the country is beyond dispute. In the other example, pyrethrum is considered to be the basic product in the development of ecological agriculture.

The accomplishment of the projects illustrated above presume linking of the sources of knowledge, the applicable ones in particular (universities, green-house production), with the industrial production (a large farming production capable to ensure the production base for commercialization of knowledge and a group of sub-contract relations), as well as the economic policy incentives in the accomplishment of R&D of the projects' development part, financing, employment policy etc.

The authors conclude on the usage of the research findings with respect to (1) planning of the agricultural sector development strategy, particularly the development of certain farming products and regions (areas of special government concern, islands and similar); (2) creating of the development stimulation system corresponding to the goals defined by the development strategy; (3) concretization of the role of universities, of certain faculties, i.e. certain R&D institutions in the process of building and spreading of knowledge.

**Key words:** triple helix, agricultural sector.

Sonja Radas

INDUSTRY-SCIENCE COLLABORATION IN CROATIA:  
FIRM'S PERSPECTIVE

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It has been recognized that industry-science relationship is at the core of national innovation systems, however in most European countries there is a gap between the public research and industry. An important barrier for industry-science collaboration that was identified in prior research is that these two worlds have different priorities, goals and culture. Understanding these differences can help improve the science-industry relationship, and consequently improve the functioning of the innovation system.

This paper reports on a study that was performed in spring of 2002. The study examines impediments to science-industry collaborations in Croatia. Hundred and ninety firms were surveyed, as well as ninety-five scientists from sixty institutions. In addition, fifty directors of research institutions were surveyed. This paper examines how each of the surveyed groups perceive the existing collaboration and investigates their motives for collaboration. This analysis offers insights into the functioning of the industry science relationship in Croatia.

**Key words:** industry-science cooperation, Croatia, survey.

Sanja Tišma  
Krešimir Jurlin  
Anamarija Pisarović

THE ROLE OF RESEARCH AND DEVELOPMENT  
IN ENHANCING CROATIAN COMPETITIVENESS

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The ability to participate in the scientific and technological progress, through increasing productivity of factors and enhancing the quality of products and services, is the key element of the economic growth. Moreover, competitiveness of national economies is no longer relying on low labor costs, but on knowledge and investment in R&D aiming at upgrading the processes and products. Therefore, the innovation policy in research, production, management and all accompanying business activities shall be stimulated.

This paper is based on the results of the Annual Report on Croatian Competitiveness, which has been prepared following the Global Competitiveness Report 2002/2003 of the World Economic Forum (WEF). The

aim of the paper is to identify the role of research and development for enhancing the competitiveness. The analysis of the R&D activities in Croatia in the 1997-2001 period is accompanied by the benchmarking analysis of Croatian performance in R&D compared to 12 selected referential countries, including both hard data and the results of the executives survey, contained in the Global Competitiveness Report.

Data suggest that Croatia is lagging behind in technological progress due to low R&D in business sector focused on defensive restructuring, and not recognizing knowledge and technology as important production factor by state. In this regard the paper shows basic policies of R&D stimulation highlighting the role of state in the promotion of modern education system, financing the public research projects, and in stimulating research and development in the business sector. It is of the utmost importance to develop mechanisms for promoting the cooperation between enterprises, university, public and private research institutes.

**Key words:** knowledge, innovation, technology, research and development, Croatia, competitiveness.

Ilian Petkov Iliev

Domagoj Račić

#### VENTURE CAPITAL FIRMS AS PRODUCTION NETWORK PARTICIPANTS IN TRANSITION ECONOMIES

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A comparison between the industrial structures of developed and Central and East European economies (CEEs) reveals that in CEEs Small & Medium Enterprises (SMEs) play a comparatively smaller role in corporate production networks, and are characterised by lower levels of innovation. This contributes to a lower level competitiveness and flexibility in CEE production networks, which justifies a research focus on the sources of this difference, and the identification of mechanisms to improve this aspect of CEE economies. We focus on Venture Capital firms (VCs) as an organisational form that can contribute to increased levels of innovation in CEE SMEs and increased levels of competitiveness in CEE production networks.

In developed economies VCs play an important role in the identification and development of innovative SMEs and their integration in production networks. By contrast, in CEEs VCs are less important as a source of support for innovative SMEs. We distinguish two areas of interaction between VCs and corporate production networks: directly,

through the sale of VC-backed firms to corporations, the use of VCs to develop corporate spin-offs and Corporate Venture Capital (CVC) programs; and indirectly, through VCs facilitating science-industry technology transfer via their supportive role for the selection, development and integration in production networks of Higher Education Institutions (HEIs) spin-offs. In CEEs VC investments have so far been focused on SMEs that are readily integrated in MNE production networks, with very little interaction with domestic corporate production networks and HEIs. This type of investments have tended to be in late-stage companies characterised by low levels of innovation. We see this pattern of development as problematic, as the impact of MNEs is limited to SMEs that fit in with MNE strategies, which leaves out the possibility of developing innovative SMEs and strong linkages with domestic production networks.

We identify two general areas where barriers to the further development of VC role in domestic industry. Firstly, domestic corporate strategies are characterised by low levels of linkages with SMEs, and low levels of technology development, and weak linkages with HEIs. In the VC industry this is manifested by little interest in purchasing innovative SMEs from VCs, few corporate spin-offs that could be supported by VCs, and no significant corporate venturing programs. Secondly, science-industry technology transfer policies remain underdeveloped, with weak technology transfer mechanisms. Consequently, the incentive systems, resources and organisational support are not in place that would allow the development of HEI spin-offs, which in turn has meant few avenues for linkages with VCs. We argue for the urgent need of formulation of policy measures in these two areas, in line with the overall policy maker concern with increasing the knowledge-intensity of CEE economies. This in turn necessitates further research focused on the problems we identify.

**Keywords:** venture capital, production networks, transition economies, systems of innovation, small and medium size enterprises.

Marina Dabić  
TECHNOLOGICAL MANAGEMENT:  
EXPANDING THE PERSPECTIVE FOR CROATIA

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Globalization has increased competition which has shortened the product life cycle forcing firms to integrate product development with development of technologies (Bhalla,

1987; Drejer, 2000). Due to these global pressures, technology management has gained increased attention in the research environment. Unfortunately, there appears to be very little consensus on what technology management actually is. This research illustrates the differences between R&D management, management of technology and technological management. Also, the process that integrates the impact of technology on management functions with the other traditional managerial activities to identify and exploit business opportunities is described utilizing an interdisciplinary vision and multidisciplinary approach. The findings are presented in the transitional economy of Croatia with a focus on technology management in the context of global competitiveness.

**Key words:** R&D Management, Management of Technology (MOT), Technological Management, technology - knowledge diffusion process, CEE countries and Croatia.

Denisa Krbec

## “EUROPEANIZATION” OF EDUCATION: CHALLENGES FOR ACCESSION COUNTRIES

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In the Communication “Towards Europe of Knowledge”, the European Commission for the first time officially set out the guidelines for future action by EU member-states in the areas of education, training and youth for the period 2000-2006. The process is directly linked to the aim of developing a lifelong learning strategy, which the Union has set itself to promote the highest level of applied knowledge.

The Communication was adopted as a further step toward improving the coordination between education policies and their social effects on the development of human potentials. Furthermore, the idea of a “European education space”, similar to the proposal for the “European research area” is fundamental to the contemporary structuring of the EU. In this frame of references a particular problem in the “Europeanization” of education is presented with respect to higher education.

This paper focuses the creation of a strategy for changes in Croatian education policy. Despite current debates and adoption of the Scientific Research and Higher Education Law in July 2003, a general academic consensus has already been moving toward establishing a form of international standards, especially in the context of Croatia’s approach toward joining the European Union. Despite radical reconstruction of different inter-organizational and

procedural academic activities, the creation of a “European education space” at all levels is the basis of a faster and more efficient integration and implementation of knowledge, training and work in this new Europe.

**Key words:** knowledge, education system re-form, “Europeanization”, European Union, Croatia.

Katarina Prpić

### GENERATIONAL DIFFERENCES IN RESEARCHERS’ PROFESSIONAL ETHICS: AN EMPIRICAL COMPARISON

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Empirical studies of research ethics, sociological or other, have been rarely carried out, and the existing ones usually follow two different lines of research interest: interest in scientific misconduct or preoccupation with scientists’ cognitive convictions. The latter can be also discerned from the studies of scientific quality, especially research focused on the criteria of evaluation. Yet, such data are partial too. Unless we gain a comprehensive empirical insight into both levels of research ethics – the normative and the behavioural level – the contrasting descriptions of old academic and new research ethics are merely hypothetical models. So, the discussions and controversies concerning that subject remain mainly speculative and thus not very promising.

In order to achieve a better insight, two comparable empirical studies of scientific ethics were carried out in Croatia. These studies started from the sociological concept of professional ethics as a constituent component of a profession. The conceptual framework helps in avoiding the onesidedness of traditional understanding of the scientific ethos as a unitary and static set of norms, from which scientists depart very little in everyday professional life. The concept may be also helpful in avoiding another extreme: equalisation of the research ethics with professional ideology meant for the public, without any deeper importance in scientists’ daily work. Research ethics is thus defined as a set of professional values and norms, but also as everyday professional practice of scientists, including their ethically problematic behaviour. On both levels, scientists’ professional ethics is seen as composed of cognitive and social elements; it consists of standards of scientific work and standards of behaviour in social relations connected with the performance of this profession. Operationalization of these cognitive and social standards was based on some theoretically articulated and empirically examined normative and behavioural components of scientists’ professional ethics.

In both empirical investigations, the same batteries of questions were used: a) respondents' ratings of the importance of professional standards; b) respondents' perceptions of the accordance of scientists' daily behaviour with these standards; c) respondents' perceptions of the incidence of ethically questionable behaviour and research practices in their institutions. Besides, the time interval between the investigations was not long (three years) which makes the comparison acceptable, since there were no radical social, economic or political changes and events that could have influenced the respondents' opinions and perceptions. Both studies were carried out by the use of mail surveys; the first one in 1995 and the respondents were eminent Croatian scientists (N=320), and the second in 1998 on a sample of 840 young researchers. Since the eminent were much older, a comparison of two groups can show some generational differences in professional standards and perceptions of daily research practice. To analyse these changes will be the primary aim of this paper.

**Key words:** scientific ethos, researchers' professional ethics, young scientists, eminent scientists.

Matko Meštrović

## INTANGIBLES' VALUE – A CHALLENGE TO POLITICAL ECONOMY OF INFORMATION

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I would like to remind us of two extremely important warnings that could serve as a latent or virtual imaginative framework for any serious consideration of what an information society, as a notion or reality, is.

Changing from the perspectives of *restrictive* economy to those of the *general* economy implies a reversal of thinking – and ethics. The possibility of pursuing growth is itself subordinated to giving. An immense industrial network cannot be managed in the same way that one changes a tire... it expresses a circuit of cosmic energy on which it depends, which it cannot limit, and whom laws it cannot ignore without consequences (Bataill).

The differential deployment of technoscience or tele-technology obliges us more than ever to think the virtualization of space and time, the possibility of virtual events whose movement and speed prohibits us more than ever from opposing presence to its representation, “real time” to “deferred time”, effectivity to its simulacrum. The mesianic trembles on the edge of this event, it is this hesitation (Derrida).

**Key words:** value of intangibles, information economy, intellectual capitalism.