Dialogue among Civilizations

The International Expert Symposium on "A Culture of Innovation and the Building of Knowledge Societies"

Moscow, 9 to 11 November 2003

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Reinaldo Plaz

Timo H m l inen

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Zareen Karani Araoz

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Guest Speakers

Lyubov Sliska

Galina Nikolaevna Karelova

Eleonora Mitrofanova

Philippe Queau

International Experts

Eleanor Glor

Dragoljub Najman

Timo Hämäläinen

Ranjit Makkuni

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Bureau of Strategic Planning

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Foreword

The International Expert Symposium “A Culture of Innovation and the Building of Knowledge Societies” held in Moscow in the Russian Federation on 10-12 November 2003, was a challenging and significant event. Above all, it demonstrated that the concept of a “culture of innovation” is still in many ways in its infancy. While the notion of innovation has emerged as a key concept in economic, business, societal, political and scientific life over the past two decades, it has thus far been viewed and applied in a rather limited manner, being essentially focused on the economic dimension related to the private sector and on researching new markets and products through science and technology, mostly in national contexts.

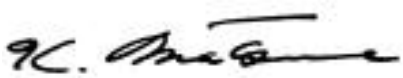
Increasingly, however, there are calls for a more broad-based and holistic approach to “a culture of innovation” with a view to achieving a better understanding of complex innovation processes. In that regard, the 31st Session of UNESCO’s General Conference, in October 2001, unanimously welcomed the initiative taken by the Russian Federation and other countries to promote the concept of “a culture of innovation” and, through dialogue, to draw upon and learn from the experience of different societies.

UNESCO’s specific interest in the issue lies in broadening the Organization’s understanding of how “a culture of innovation” affects contemporary societies in general and UNESCO’s domains of expertise (education, the sciences, culture, communication and information) in particular.

Innovation and innovative approaches also play a highly significant role in the quest for knowledge societies and must be assessed in that context. The International Expert Symposium was followed by two other important events: the Ministerial Round Table “Towards Knowledge Societies” organized during the 32nd session of the General Conference on 9-10 October 2003, and the High-Level Symposium “Building Knowledge Societies – from Vision to Action” held in Geneva on the eve of the World Summit on the Information Society on 9-10 December 2003.

The present publication, the eighth in the series on Dialogue among Cultures and Civilizations, contains the proceedings of the Moscow International Expert Symposium and papers prepared for it, and sets out a series of ideas and concepts for future orientations in the field of "A Culture of Innovation and the Building of Knowledge Societies." The publication also contains a selective overview of approaches adopted by some governments to promote and encourage innovation in all fields of societal endeavour. It thus complements and further expands the Framework for a Culture of Innovation and the Building of Knowledge Societies, unanimously adopted by the Symposium participants on 12 November 2003.

With its multisectoral competencies in fields where diverse processes of innovation and dialogue are taking place, UNESCO can make a valuable contribution by identifying well-defined innovation practices, including the framing of policy guidelines. In addition, its experience as a catalyst of international cooperation, its role as a champion of peace, tolerance and mutual understanding, and its engagement with the design and construction of pluralistic, equitable and inclusive knowledge societies provide UNESCO with a distinctive orientation to the challenge of innovation. We intend to further explore this new terrain and its interesting possibilities.



Ko chiro Matsuura
Director-General of the United Nations Educational,
Scientific and Cultural Organization
(UNESCO)

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Framework for a Culture of Innovation and the Building of Knowledge Societies

We, the participants in the international expert symposium “A Culture of Innovation and the Building of Knowledge Societies” jointly organized by UNESCO and the Institute for Strategic Innovations have agreed that future work on A Culture of Innovation should build on the following concepts, principles, and approaches:

1. The concept of a Culture of Innovation is strongly linked to the concept of knowledge societies. Innovation essentially implies that creative people who lead economic and social development put knowledge to work. Hence, innovation is knowledge intensive.
2. In knowledge societies, there exists an inverse relationship between time and funds - in relation to basic studies, applied research, and industrial production - that would be required in underpinning the innovation process.
3. Innovation is one of the main drivers of globalisation. Technological advance, research, financial innovation, managerial and operational improvements, (“soft”) social innovations, and educational skills become universalised and transform societies. Different approaches to Culture of Innovation can be systematised with a view to

developing a holistic framework thriving under enabling conditions and in an atmosphere of receptivity.

4. A Culture of Innovation can be defined as a specific expression of societal dynamics, of self-reflection, and of collective aspirations. However, it should not be considered an end in itself. Each society has to define its own ethos and set of ethical and social values that underpin an innovative culture. Innovations can occur in many different constellations, ranging from deliberate innovation management to institutional and policy innovation to responses to societal crisis situations.
5. Contemporary societies strive for solid paths towards sustainable development, guided and inspired by the concept of human security, which transcend the traditional concept of national and military security. The identification of sustainable solutions, of modifications in consumption patterns, and the exploration of related behavioural patterns and cultural practices and delineate areas where innovation will need to be pursued. Society must confront an ingenuity gap as problems are produced much faster than solutions are devised.
6. A Culture of Innovation forms an integral part of the Dialogue among Civilizations in the understanding of how other cultures cope with innovation processes that are rooted in concrete expressions of human interaction, common values, tolerance, mutual respect, and cultural diversity.
7. Intercultural exchange and multicultural settings can stimulate and enrich conditions for innovations. So-called “diaspora innovators” are an emerging source for cross-boundary and cross-cultural innovation, creative learning processes, and new synergetic alliances.
8. The rapid advance and diffusion of information and communication technologies (ICTs), the global integration of product and financial markets, the increasing specialization of firms' value-adding activities, new cooperative and skill-intensive forms of organization as well as the growing differentiation of demand patterns have challenged the old economic and social institutions. Indeed, there is a need to understand better institutional change under difficult conditions and feedback loops.
9. In a rapidly changing environment, the performance of socio-economic systems is increasingly determined by their institutional adjustment capacity. To ensure a well- balanced and equitable adjustment process, and to accommodate resistance and circumvent exclusion, it

is important to understand the determinants of institutional change, which is deeply embedded in cultural practices.

10. Scientific knowledge and technology can therefore never substitute for social interaction and human capacities. The abilities to learn and to foster personal experiences constitute the human side of Culture of Innovation and are key elements of knowledge societies. As a result, all innovation and knowledge policies have to be people centred.
11. Innovation and knowledge creation have long-term perspectives. Too much emphasis on short-term gains in the name of global competition and economic efficiency can lead to destabilization. A Culture of Innovation must be based on a clear and concise strategic perspective, inspired by principles of democratic governance and inclusiveness.
12. Technological innovations typically arise before most individuals and institutions are ready to adequately estimate and effectively apply them. Investment in human capital will be key in order to ensure the fertilization of the social-cultural soil of change. The innovation potential of any society, institution or domain can only be fully exploited through a genuinely pragmatic approach.
13. From an integrated innovation perspective, innovation is network oriented and involves different actors from the public and private sector, educational institutions, and civil society, ideally at local, regional, national, and supra-national level. The formation of clusters and the establishment of new partnerships can help to facilitate structural change in the economy, thus leading to overall societal change.
14. The role of knowledge in a Culture of Innovation is therefore not confined by an organization's boundaries. Instead, it evolves around networks of common practices, experiences and traditions. In most cases, innovation is the result of recursive multi- dimensional and holistic processes and does not follow linear patterns of progression.
15. Innovation and knowledge creation together with its appropriation and application are inseparably linked with education and especially worldwide efforts towards Education For All (EFA). Contemporary societies increasingly rely on education to prepare for innovation and to harness and maximise potential benefits. “Knowing how to know” becomes ever more important with education playing a major role in shaping mental frameworks and creating mental flexibility. In that context, innovation in education - and its barriers and constraints - becomes both a tool and a specific problem area for effective

innovation systems and policies. The education sector has been remarkably resistant to innovations, especially those driven by new media and information and communication technologies (ICTs). Specific challenges of the education sector will be: I) How to achieve more with fewer resources II) How to shorten the period of initial training III) How to ensure a better education, especially for individuals from Least Developed Countries (LDCs) IV) How to successfully fight against illiteracy V) How to include illiterates who can neither write nor read, in the educational process in order to improve their quality of life.

16. In this sense, awareness, access, and capacity are crucial determinants. Information and Communication Technologies (ICTs) can help make technological progress work for human development, though special attention must be paid to the impact of the digital divide. In the end, education itself becomes a field for innovation.
17. The creation of a Culture of Innovation does not allow for a standard procedure to be followed at ail times and in every situation. Truly innovative outcomes can only be achieved through a case-by-case approach strongly influenced by ethical postures and views, configurations of culture, innovation, and knowledge, which are always dynamic, flexible, and contextual.
18. At the enterprise level, innovation determines competitiveness. Innovation reflects current power and institutional relationships and may sometimes increase inequality. A Culture of Innovation must be inclusive. Inclusion is only possible through the empowerment of individuals, employees, customers/clients and citizens.

Welcoming Messages

Liubov Sliska

First Vice-President of the State Duma Federal Assembly of the Russian Federation

On behalf of the State Duma of the Federal Assembly of the Russian Federation I welcome you to Russia's capital for this international expert symposium entitled “A Culture of Innovations and the Building of Knowledge Societies” to discuss one of the key developments of our civilization!

It became obvious at the dawn of the 21st century, that needs for updating all spheres of the ability to live of the human society promptly grow. It shows new requirements to perception by the people of innovations, abilities and readiness of their realization. The Culture of Innovations becomes the strategic factor of development.

Russian scientists from its inception, were actively supported by the Deputies of the State Duma in postulating and formulating of questions on the Culture of Innovations, Mr. A.I. Nikolaev, Deputy and Chairman of Committee of the State Duma on defence, has headed this work as the Chairman of Committee on the Culture of Innovations of the Commission of the Russian Federation for UNESCO.

Russian legislators will continue, in every possible way, to promote efforts of the Government, of the Ministry of Foreign Affairs of Russia and of the scientific and educational centers, aimed at the development of international cooperation in the field of Culture of Innovations within the framework of UNESCO.

I wish you all every success in the work of the symposium and for the creative application of its developments in the future

Galina Karelova

Vice-President of the Government of the Russian Federation

I welcome the participants of the symposium “A Culture of Innovations and the Building of Knowledge Societies”.

I trust that the discussions arising from such a complex question, uniting Science, Education and Culture with social and professional application, will allow for the enrichment of the potential of the project on a Culture of Innovations thereby achieving new frontiers in its development and its further realization under the aegis of UNESCO.

Elenora V. Mitrofanova

First Deputy Foreign Minister of the Russian Federation

You have gathered together to discuss one of the greatest problems put before humanity in the 21st century. Development of science and technologies progresses so quickly that people frequently cannot make the most efficient use of them. Conversely, inventions with doubtful properties whose consequences are unpredictable for people and nature are at times created. These circumstances called into existence a new socio-cultural phenomenon referred to as “the Culture of Innovation”. The culture of innovation characterizes the ability of people to perceive innovations, to assess them critically and objectively, and also to realize them as innovations.

To develop a culture of innovation in a person, a group, a society is to enrich the motivation of their behaviour, to equip them with knowledge, skills and abilities to act in conditions of rapid renovation not only within industry, but also in all spheres of human activity.

I would like to remind you that two years ago at the 31st session of the General Conference of UNESCO, Russia initiated the inclusion of the Culture of Innovation in the Programme and Budget of the Organization. During this period, due to efforts of the Culture of Innovations Committee of the Commission of the Russian Federation for UNESCO and the Institute of Strategic Innovation, the subject of culture of innovation was discussed at more than 30 international and national meetings. Serious theoretical and empirical research has been carried out.

At the recently-held 32nd session of the General Conference of UNESCO these results served as the basis for the subsequent promotion of the project on culture of innovation by the Organization.

We attach great importance to the holding of working experts meetings in Moscow. It is time to unit isolated efforts of scientists and experts from different countries thus giving them new impetus for their activities appropriate to the global nature of the problem.

I would like to inform you that the subject of this meeting has greatly interested the Government of Russia. Publications were sent for information to all committees of both chambers of the Russian parliament, as well as to a number of ministries and departments. I am pleased to note that this project is being developed in close co-operation with the leading division of the UNESCO Secretariat — the Bureau of Strategic Planning.

I am sure that the present meeting will strengthen our co-operation thereby giving it a more purposeful and multilateral character.

Philippe Qu au
Director, UNESCO Moscow Office

I would like to add a few words on the theme of this meeting. It is a current practice, nowadays, to contrast information and knowledge - and hence to infer a difference between “information society” and “knowledge societies”. The so-called “Information Society” is based on information technologies and the exchange of informational goods, on a worldwide scale. In contrast, “Knowledge Societies” are not technology- driven, but mind-driven; they are not necessarily global in scope, but rather based on distinct cultural, political and economic traits, shaping up what I would like to call specific “epistemic regimes”. An epistemic regime (from the Greek episteme, knowledge) characterizes the cultural, economic, societal role of knowledge in a given society. For instance, the epistemic regime of a society relying heavily on the merchandizing of knowledge and the development of “intellectual property”, differs from the epistemic regimes of, say, the 19th century European universities, which considered as obvious that knowledge was a public good, that academic research should flow freely, and that, to be useful, research had to be useless...

Epistemic regimes are the results of socio-economic and political constructions, where different balances may be adopted concerning access to information and to education, freedom of speech, or critical reflection.

To take an example, the Anglo-Saxon notion of a “knowledge society” is not equivalent to the French “société du savoir”. Etymologically, know/edge points to utility and power, savoir points to theory and contemplation and, in Russian 3HaHue points to generation. This may be the symptom of differing epistemic regimes, of differing social ends in shaping up the fundamentals of a society.

The questions I'd like to ask are: (1) How can we assess the impact of a given epistemic regime regarding a sound culture of innovation? Or to put it in another way, can we characterize different epistemic regimes today, in various regions of the world but also, among different communities (private sector, academic circle, general public)?

(2) How the se epistemic regimes allow the promotion of, and access to the “Global Public Goods” that constitute a key part of any society, and a key ground for public action? Can we identify the Global Public Goods that are relevant in the fields of education, scientific research, culture, information, and communication?

In a rapidly shrinking planet, the scourges that afflict mankind can leave none indifferent or unconcerned, because we are actually embarked

in the same boat. This is why a culture of innovation should not just be fit to any particular policy agenda or to some regional interests. It should aim at maximizing the greater common good of humankind, with a view to solving the most daunting problems it encounters.

This is why the essence of a culture of innovation is nothing technical, or economical: it must be capable of describing in practical terms where lies the greater common good of mankind.

Papers presented to the Symposium

Hans d'Orville
Director, Bureau of Strategic Planning, UNESCO

The Culture of Innovation and the Building of Knowledge Societies

I. The past and present scope of innovation

During the last two decades, the term innovation has emerged as one of the key concepts of academic, societal and political life. Many different actors, ranging from major regional organizations, various national governments, multinational corporations, and universities worldwide, have underscored its importance. Major documents, such as the European Union's Green Book on Innovation, published in 1995 and national strategies, such as those formulated and implemented in countries like Singapore, Canada, and Australia, have put the innovation issue high on political agendas. At the same time, we are witnessing a proliferation of committees, institutes and think tanks, both privately and publicly funded, dedicated to the promotion of the concept of innovation. More recently, the European Commission has published a comprehensive study of innovation

policies in the six candidate countries for membership in the European Union, and is now in the process of putting in place a Europe-wide common research framework.

All of the above described initiatives rest on three basic assumptions:

Innovation is a national affair

The major driving forces in the formulation of innovation strategies are national governments. Numerous countries have established commissions or committees dealing with the creation of an innovative society.

Innovation is about science and technology

New government programmes increase public spending for scientific research, IT-infrastructure, and efficient patent systems. The state tries to coordinate and foster interactions between the government, universities, and the private sector and, indeed, we witness an increased commercialisation of R&D. Patents and citations are not only key indicators of innovation and R&D, but also of a high degree of technological determinism. On the other hand, one should not forget the other pole of innovation, social determinism and the social shaping of science and technology.

Innovation is primarily an economic concept

Key goals pursued through innovation within the private sector are new ideas, new alliances, and new markets. The main objective of this kind of innovation policy is to formulate proactive strategies designed to create, expand, and maintain systemic competitiveness in the economic field.

In brief, the term innovation can be defined as a “descriptive umbrella notion” covering a series of complex and interrelated economic and governance changes underway in various countries aimed at ensuring systemic and reinforced competitiveness in a global economic environment.

An interesting trend is that a vast majority of highly industrialised countries have set up so-called National Innovation Systems (NISs) in order to analyse and react to technical change. This approach stresses the linkages between actors and institutions involved in science, technology, and innovation. Supporters of NISs argue that technological change and innovation are fundamental to long-term economic growth and prosperity.

Some of these arguments can be traced back to economists like Joseph A. Schumpeter (1883-1950) and Karl Marx (1818-1883). Countries like India, South Africa, and Brazil have joined in, increasingly recognising that the establishment of an innovative environment is a prerequisite of development. The aims of such innovation policies are: to create jobs, to reduce public expenses, to improve efficiency and operational methods, to generate publicity, and to increase the satisfaction of citizens. The basic "principle" of most of the related documentation and reports is that in the 21st century the ability to innovate will separate economic leaders from the rest.

While all of these developments clearly show the growing importance of issues related to innovation, it is necessary at this stage to obtain a more profound and comprehensive understanding of the concept. This paper will attempt to take into account the numerous critical voices that have been heard over the last couple of years in order to define a "new" concept of a culture of innovation.

II. Broadening the concept of innovation

A number of organisations and institutions have called for a new orientation and a broader approach to innovation and the creation of a culture of innovation. They lobby for a better understanding of complex innovation processes, underlining the importance of social and cultural aspects.

First, innovation itself is increasingly interpreted as a highly social and cultural process. At the same time, more and more research focuses on the link between successful innovation and its adaptation within a given society or group. In order to understand people's ability to innovate and their ability to adapt to change, one has to take into account the social and cultural components of innovation. Our environment - including our belief and value systems - shapes the way we view the world around us and determines how we react to ongoing changes. Technological change has another often overlooked social effect or consequence, namely, it alters social hierarchies and the power structure of groups within society and in some cases society itself.

In the end, these "soft factors" are the tools that enable us to create a culture of innovation. Past discussions about the relationship between technological change/innovation and society focused almost exclusively on extremes. Believers in so-called "technological determinism" emphasize the exogenous nature of technology, meaning that all technological innovation takes places because of an internal necessity. On the contrary,

believers in so-called “social determinism” see technology as a purely social process. The key to a “new” concept of a culture of innovation is to achieve a delicate balance between the technical and social nature of innovation processes.

In their report to the Ministry of Research, Science and Technology (MoRST) the Knowledge Policy Research Group of the Humanities Society of New Zealand has emphasized the crucial role of “reflexivity” in the contexts of innovation and of scientific and technological change. Next to managerial expertise and technological competence, the report lists “cultural literacy (the ability to recognise and exploit social, cultural, lifestyle, and ethnic distinctions)” and a reflexive approach to knowledge and practices among the core competencies that are crucial in creating A Culture of Innovation. To fully grasp this broader concept of A Culture of Innovation, one has to look for a different set of basic assumptions:

Innovation is network oriented

One of the main driving forces behind innovation is knowledge, which is not confined by an organization's boundaries. Instead, it evolves around networks of common practices, experiences and traditions. Innovation calls for new interactions and new partnerships involving different actors from the public and private sector, and civil society organisations (CSO). Because networks characterize a sustainable culture of innovation, activities at a local, regional, national, and international level are always included.

Innovation has a scientific, economic, social, and cultural dimension

In most cases, innovation is the result of recursive and holistic processes and practices and it does not follow linear patterns of progression. Using the analogy of an orchestra playing together, real innovation is normally achieved by a team, “with each member playing a different instrument – bringing something different or unique to the question at hand.”

Innovation is about knowledge

Any concept of a culture of innovation is strongly linked to the concept of knowledge societies. Societies have always been knowledge societies, however, the modes of knowledge production have changed from

traditional societies to our times. According to the Dutch Professor Hans Opschoor, innovation essentially implies that creative people who lead economic and social development, put knowledge to work. In any case, innovation is knowledge intensive. Both are interrelated and have to be addressed simultaneously.

Innovation and knowledge creation are people centred

Scientific knowledge and technology can never substitute for social interaction and human capacities. The abilities to learn and to foster personal experiences constitute the human side of a culture of innovation and are key elements of knowledge societies. Therefore, all innovation and knowledge policies have to be people centred.

Innovation and knowledge creation have long term perspectives

In the past, policy makers have placed too much emphasis on short-term gains in the name of global competition. A culture of innovation, with the features of a knowledge society, can only be created based on a clear and concise strategic perspective. This strategic process ideally rests on the principles of democratic governance and inclusiveness.

Knowledge creation and a culture of innovation are keys to development

Research has shown that increased investment in human capital can determine competitive advantage and indeed success in the development of least developed countries (LDCs). With the increasing importance of information and communication technologies, (ICTs), the digital divide has grown at a rapid pace. It is important to bridge this gap by fostering LDC's access to ICTs in order to make technological progress work for human development.

Innovation and knowledge creation are inseparably linked with education

The radical social transformations implied in the development of knowledge societies and a culture of innovation mean that the global population is increasingly in need of the necessary type and level of education to harness and maximise the potential benefits while minimising

the risks of globalisation and innovation. As it becomes more and more important to "know", the importance of "knowing how to know" also arises. As knowledge becomes the essential factor in development, both personal and economic, it is of capital importance to increase access to education.

The international community committed itself to increase access to education at the 2000 World Education Forum with the adoption of the six Dakar Goals. UNESCO, as international coordinator of the Education for All (EFA) movement, has declared access to education as a fundamental right and pursues also on a priority basis the improvement quality education and the stimulation of innovation and the sharing of knowledge and best practices.

It has become clear that the creation of a culture of innovation does not allow for a standard procedure to be followed at all times and in every situation. As modern social scientists have argued, culture, innovation, and knowledge are highly "contextual." Only a unique mix of actions and measures together with a serious effort to continue the learning process can ensure a positive and truly innovative outcome.

This "new" concept of A Culture of Innovation thus calls for new interactions, partnerships and various forms of dialogue involving different actors from the public sector, the private sector, and civil society at all levels. The process of innovation has to be recognized as a process of a multifaceted nature that can only be established in the long term.

III. UNESCO's past and present activities

UNESCO has been involved for a long time in the development of various concepts of, and approaches to, innovation in education, science, and culture. The most recent initiative was an international round table on "Science, Technology and Innovation Policy: A parliamentary perspective" co-organized by UNESCO and the Committee for the Future of the Parliament of Finland, in January 2003 as well as a Ministerial Roundtable on Knowledge Societies held during the General Conference in October 2003.

In the past, UNESCO has also been active in debates concerning knowledge societies and in the establishment and functioning of networks. In striving to meet the commitments of the Dakar World Education Forum, the Organisation has been one of the first and most active promoters of the development of sustainable knowledge societies, identifying potential threats to, and opportunities for, their implementation. Indeed, one of the

cross-cutting themes in UNESCO's Medium Term Strategy (31 C/4) for the years 2002 to 2007 is centered around the contribution of ICTs to development and the construction of knowledge societies. An example in this field is the development of appropriate normative instruments, such as the "draft recommendation on the promotion and use of multilingualism and universal access to cyberspace" which has been adopted by the General Conference in October 2003.

At the same time, UNESCO serves as a forum for intellectual and ethical debate. These processes of dialogue will feed into the first UNESCO World Report, on 'Building Knowledge Societies' that will be published in 2004. These debates will also be the focus of a number of conferences and seminars, in particular the World Summit on the Information Society (WSIS) that will take place in December 2003 and 2005. In preparation for the Summit UNESCO has published a series of books dealing with crucial issues for building knowledge societies, such as the digital divide which increases the development gap, free circulation and equal access to data, information and to good practices and the knowledge of information societies, and the development of norms and principles based on an international consensus. In a similar vein, UNESCO is encouraging community-based approaches and local action. This means directing assistance towards those members of civil society who are most in need, notably women and youth, so that they can acquire the knowledge, skills and training they presently lack. (See also in the annexes the summary statement on the results of the UNESCO High-level Symposium on "Building Knowledge Societies – From Vision to Action" held at the WSIS, Geneva, 09-10 December 2003.) Other examples of UNESCO's activities include the publication in March 2002 of its "International Social Science Journal". The journal focuses on knowledge societies, the construction of a clearing house/knowledge base, research and best practices related to the use of ICTs, the development of virtual libraries, such as the Nigerian Virtual Library for Universities and Institutions of Higher Learning and the development of a multidisciplinary UNESCO portal with several sub-portals.

The 21st century has only just begun, yet national governments and international organisations are already asking themselves how to adapt to a world that is changing faster and more profoundly than ever before. The times of standard answers to standard problems are irrevocably over. Instead, we need to search for more comprehensive and flexible frameworks and mechanisms, thus leaving enough room for case-by-case adaptations.

The enormity of the task can be illustrated by the results of a study by the University of California at Berkeley. It showed that during 2002, Five billion gigabytes of data was generated around the world. That amount, which is the equivalent of about 800 megabytes per person, is enough to fill 500,000 U.S. Libraries of Congress. The university conducted a similar study in 1999, and the new results indicate a 30 percent rise since the first study in the amount of stored information. The amount of data stored on hard disk drives was up 114 percent from the earlier study. According to Peter Lyman, a professor at UC Berkeley, those involved in the 1999 study expected that use of film and paper would drop as users moved those media into electronic formats. Although film-based photographs have dropped 9 percent since 1999, paper documents, including books, journals, and others, have grown by as much as 43 percent. Lyman said that much of the content is accessed on computers, but users print it out.

By embracing a Culture of Innovation and promoting the creation of knowledge societies, UNESCO pursues a flexible approach that could, on the one hand, help to set up guidelines for national governments, civil society organisations and the private sector, and, on the other hand, enable individuals to deal with innovation processes and the creation of knowledge.

Timo Hämäläinen
Director, Innovations and Business Development, Finnish National Fund for Research and Development, Finland

Culture of Innovation or Innovation in Culture

The world economy is currently going through a major techno-economic transformation that is comparable to the first and second industrial revolutions (Freeman and Louca 2002, Perez 2002). The rapid advance and diffusion of information and communication technologies (ICTs), global integration of product and financial markets, increasing specialization of firms' value-adding activities, new cooperative and skill-intensive forms of organization as well as the growing differentiation of demand patterns have challenged the old economic and social institutions of industrialized societies (Hämäläinen 2003a). The market-oriented reform proposals of neoclassical economists are too limited in the face of this historical paradigm shift. It requires institutional adjustment at all levels of socio-economic systems: in families, private, public and third sector organizations, industrial sectors and clusters, regional and national economies, and even in supranational institutions.

In a rapidly changing environment, the performance of socio-economic systems is increasingly determined by their institutional adjustment capacity. Rapid and balanced adjustment to the changing environment can produce massive increasing returns that stem from the systemic interdependencies, complementarities, synergies, positive externalities and feedback loops within the new socio-economic paradigm (Lipsey 1997; Hämäläinen 2003). These systemic benefits increase the productivity and aggregate demand in rapidly and systemically adjusting societies. On the other hand, slow or partial adjustment leads to increasing contradictions within the system, declining returns, slow productivity growth and sluggish demand.

Major institutional changes are not easy, however (North 1990). There are numerous examples of once mighty firms (Hämäläinen and Laitamäki 1993; Christensen 1997), industries (Womack, Jones and Roos 1991; Aoki 2001), regions (Schienstock 2003; Eliasson 2003) and economies (Fairbanks and Lindsay 1997) that failed to change their strategies, structures and institutions to match the rapidly evolving environment. The most important barriers to change are mental: rigid cognitive frames, beliefs and assumptions, values and behavioral norms

(Harrison and Huntington 2001; Hämäläinen 2003a). Some would call these cultural rigidities. Well-established mental structures may prevent decision makers from recognizing the institutional problems altogether. This leads to 'normal' responses and policies that have worked well in the past but do not anymore work in the changed environment.

Thus institutional change capacity and economic performance is ultimately determined by collective learning and unlearning processes which change the collective mental structures, or 'culture' (Harrison and Huntington 2001; Hämäläinen 2003a,b). Major institutional and policy changes require reflective, 'second order' learning processes which do not usually start without increasing contradictions, poor performance and stress in the system. Such contradictions may stem from rapid environmental change or the path-dependent specialization of the system.

Policy makers have many options in their attempt to facilitate systemic change processes. The availability of information and knowledge about the changing environment and accumulating contradictions is an important determinant of collective learning processes. Policy makers can take a proactive role in facilitating collective learning and institutional change processes. They can promote the Culture of Innovation through intelligence activities (e.g. foresight, benchmarking, future-oriented research, etc.), policy- and future-oriented research, facilitating competition in the media, reforming the curricula and teaching methods in the education system (towards greater reflexivity), building reflective organizational cultures, supporting networking activities, compensating losers of change, building platforms for dialogue and undertaking innovative pilot projects. These proactive policies are motivated by the great potential benefits of rapid systemic adjustment and the need to avoid major crises in the adjustment process.

Ranjit Makkuni
President, Sacred World Foundation and Consultant, Hewlett Packard Labs

Culturally Rooted Innovation

1. Introduction

Over the past 18 years, through a series of technology exhibits of traditional culture shown in museums, we have not only explored new forms of dissemination of culture through multimedia technology, but have also shown how cultural domains can shape new interface technology. The projects aim to preserve, disseminate, and re-interpret the world's traditional knowledge using digital tools, however, the contribution goes beyond mere digital documentation. The projects create an interesting space of culture-conscious product design for "the rest of us", the 4 billion people lying on the wrong side of the digital divide, and illustrate the potential of innovation in developing nations and emerging economies.

Re-questioning the Interface

The present form of the PC, consisting of a TV display with a screen, a keyboard and a mouse, is based on a 30-year-old invention of the optical mouse. While the hardware (keyboard, mouse) and software (button pushing, windows, point and click) of the PC has stabilized over time creating rich genres of multimedia documents, it is clear that this form needs to be re-questioned, as paradigms of information access move from personal computing to ubiquitous, mobile, and physical and tactile computing.

Culturally rooted Computing

Over the past decade there has been an increasing interest in bringing computing to developing cultures, and within these cultures, bringing computing to untapped markets in rural areas. Since rural areas of the world represent the last remaining areas of living "analog" cultures in the world, i.e., cultures that rely on hand-based skills, our work seeks to integrate traditional knowledge, hand-skills and body-friendly design in new interface technology and learning applications.

In this paper, we present three examples of culturally rooted computing which show how the interaction with the cultural domain can help in re-designing the form of the computer itself. It is our hope that the linkage of 'culture' and author will result into the design of richer computing interfaces.

2. The Crossing Project

The term "crossing" is related to the Sanskrit term for a pilgrimage site, i.e., a pilgrimage site as a crossing point and a space of learning, refection and transformation (see Makkuni, 2003). The Crossing Project has created a physical/virtual multimedia exhibition that was shown in Bombay, New Delhi, New York and Linz allowing learners to connect to the living knowledge traditions of Banaras, India, a pilgrimage site by the river Ganges, and a 2000-year-old centre of learning. The technologies invented illustrate a new form of body- and culture-friendly, tangible interfaces with digital content.

The Crossing Project brought together futuristic, mobile, multimedia technology and archetypal content, dealing with one of the world's most ancient living cultures, Banaras. With respect to technology, it questioned the computing system and the Graphical User Interface paradigm, which has served as the substrate of modern computing systems for thirty years (see Wellner, 1993, Ishii and Ullmer, 1997; Want et al., 1998). The Crossing technology presents alternative paradigms of information access that integrate the hand and the body of the user in the act of computer-based communication and learning. With respect to content, it matched a traditional society's notion of eco-cosmic connections with mobile, multimedia technology-based connections. With respect to design, it incorporated the expressions of traditional arts and crafts in the design of information delivery devices.

The exhibition included 41 installations that illustrated alternatives to the traditional computing workstation. The exhibited alternatives invited the users to touch, turn, and tilt the interface of objects to access learning content.

3. Vrindavan Physical-Virtual Authoring Tools

Physical -Virtual Authoring Tools

The Crossing Project was initially conceived as a museum exhibition. However, it now extends to fields of product design and user interaction paradigms. In the Vrindavan Physical-Virtual Authoring Tools project, we use the tactile physical icons concept developed by the Crossing Project to explore continuous authoring activities using physical and virtual media. In doing so, we examine in how far physical interactions with computing representations provide a new medium for creative expression. At a more general level, the development of such interfaces could be applicable to cultures where keyboard and mouse paradigms may not make sense.

The Vrindavan Content Domain

The Vrindavan project explores new forms of Physical-Virtual authoring tools, in which children can compose multimedia presentations using physical icons as well as virtual multimedia.

In order to explore the new media, we worked with children from Vrindavan, a culturally rich and sacred city in North India, which has been for many hundreds of years associated with the mythology and legends of the cowherd god Krishna, and his consort, Radha. Since many places in Vrindavan are physical embodiments of mythology, the city becomes a living document enacting ancient mythology.

Workshops

A series of experiments in visual and tangible multimedia composition allowed village children to understand the form and composition of modern multimedia. A second series of experiments enabled these children to present concepts and calendars, to develop storyboards and to plan and execute a multimedia presentation.

Work Process

Children huddle around a shared representational and display space when composing work in traditional media. Children work on clay icons, involving social interaction, the observance of each other's tools and the

emergence of a shared artifact. Most modern workstations function, to the contrary, as individual workspaces with no provision for social interaction or for shared access to presentations of the “collective” or the “periphery of the collective”.

Physical and Virtual Authoring Medium

Inspired by the form of a huddled group of children around a shared work and presentation space, we created a computational display and interface allowing children to share a combined display screen and interface, and use tools to compose a multimedia presentation using physical tactile and digital multimedia. We call this process ‘PV’ – physical and virtual authoring. The size of the display allows a group of seven and eight children to work together and compose a map of their city. Children see each other around the display and share each other's tools, while the display itself functions as an interface. Physical objects can be placed on the surface, affecting the presentation, so that an action on the interface, and the resulting update of the display occur on the same surface.

Composition Tools and Process

We used the new display and interface media to allow children to compose a map of their city, Vrindavan. Vrindavan is a city of temples, gardens, trees and roads with mythological stories associated to physical spaces. Children compose a map of the city by designing roads, positioning temples and trees, and associating different elements on the map with video links, also produced by the children. The selection and arrangement of images on the map, and the creation of links to the map allow the child to compose a reasonably complex multimedia document.

4. Communal Innovation in Transportation Technology in Asia

A wide spectrum of public transportation is used in Asia, such as rickshaws and taxis. Communities personalize these functional modes of transportation, which serve millions of people, with their own narratives. Technologies that would otherwise homogenize their users thrive as platforms of cultural expression.

Communities of users personalize their vehicles to different degrees of ornamentation. The resulting array of graphics, textures, patterns,

motifs, paintings, embossing, composite materials, talismans, quotes and decorative accessories constitutes an amazing variety of anonymous artists and indigenous art, ranging from hand paintings over poster art, paper cutting and audio mixing to accessory art.

Different communities collectively express their identities in diverse ways. This study focuses on vehicular graphic art as a point of departure to explore in how far the need to ornament is fundamental to Asian cultures. Since global companies are becoming interested in the dissemination and accessibility of ICTs in emerging economies, this study, particularly, focuses on the process of personalization so that future products and services respect fundamental cultural needs. The study infers that culturally rooted technology is a means to increasing accessibility of ICTs in emerging economies.

We therefore deduce that technologies that provide for personalization can enable cultures to preserve their identities in an era of globalization.

Conclusion

The aforementioned projects are beautiful examples of innovation in the field of technology interfaces that feature technology that "ceases" to be a mere "technology", but becomes an extension and experience of community identity. Working with developing countries' cultures provoked innovation at fundamental levels of user interfaces. It also highlighted designers' awareness for ornamentation, customization and personalization. The rich technologies described in this paper illustrate the potential of innovation that can be released through working with and in the traditional cultural domain at the fundamental level of interface re-design as well as at the level of culturally appropriate computing in developing and developed nations.

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Susana Borrás
Associate Professor Roskilde University, Denmark

Promoting the Culture of Innovation: on systems of innovation, knowledge and policy

1. Culture and societal dynamics in the innovation system

The understanding of the phenomena of innovation has gradually changed since the second half of the 20th century. Generally speaking, from the 1930s until the 1960s, industrialized countries emphasised the production of advanced scientific knowledge. Science was to provide wealth and progress in the post-war period and in the golden age of the welfare state. But in the 1970s, the productive crises and subsequent difficult industrial adjustment processes directed the attention towards issues, such as strategic industries and technological development. The focus on science was not abandoned, but it was placed in a broader context in which the industrial application of advanced knowledge was a key notion. This technological perspective was the dominant paradigm in the 1970s and all through the 1980s.

In the 1990s, however, the previous perspectives on science and technology turned out to be too narrow and too disentangled from other important societal and economic processes, which could also generate development and growth dynamics. The term "innovation" emerged, seeking to relate this process to a broader context beyond the strict scientific and technological realms. Innovation is related to the overall socio-economic context in which productive and economic activities take place. Figure 1 illustrates in how far the term "innovation" not only comprises science and technology, but also the overall economic institutional framework including technical change as well as the "soft" societal context embedding the innovation process.

This systemic vision on innovation is based on the understanding that it takes place within the specific features of each national economy, namely, the 'structure of production' and 'the institutional set up' (Lundvall, 1992), and the specific features of each society, namely, its 'self-understanding' and its 'collective aspirations' (Borrás, 2003). This is what we might call, the 'integrated vision of systems of innovation', whereas a

Culture of Innovation is a specific expression and a central element of the societal dynamics taking place within the overall innovation system dynamics.

Christopher Freeman has suggested a different understanding of systems of innovation. For this author a system of innovation is composed by five different sub-systems, namely, science, technology, economy, politics and general culture, which interact with each other generating a specific innovation output (Freeman, 1997, 2002). *"These five subdivisions are proposed here for fundamental reasons. In the first place, they are proposed because each of them has been shown to have some independent influence on the process of economic growth, varying to be sure in different periods and different parts of the world. Finally, and most important of all, it is precisely the relative autonomy of each of these five processes which can give rise to problems of lack of synchronicity and harmony or alternatively of harmonious integration and virtuous circle effects on economic growth. It is thus essential to study both the relatively independent development of each stream of history and their interdependencies, their loss of integration and their reintegration' (Freeman, 1997: 8)."*

These five sub-systems are interconnected, but operate autonomously from each other. Figure 2 illustrates the "Olympic rings" model.

Freeman's co-evolution of these five sub-systems of human action is suggestive, as it does not take into account their intrinsic inter-dependency and provides little explanation about 'what matters most', or about the form of their interaction.

The integrated vision of the innovation system, illustrated in figure 1, places the societal dynamics and economic institutions, as the elements that define and shape the knowledge and productive systems, at the very centre of the innovation process.

Societal dynamics of self-reflection and of collective aspirations can be broadly defined as the Culture of Innovation, representing the true 'glue' and dynamic element of the system.

2. Some policy initiatives in Europe

In spite of these theoretical considerations about how the elements of the system of innovation relate to each other, the term 'innovation' has received much attention from policy makers of the industrialized world.

The endorsement of the innovation policy paradigm by many European governments (Biebelbauer & Borrás, 2003) since the mid-late

1990s allowed public action to expand from the scientific and technological field to the 'soft', 'cultural' and 'societal' dimensions of the innovation process.

Interesting initiatives at national, supra-national and sub-national level have been launched, that tackle this 'soft' aspect of innovation.

Examples at national level

All through the 1990s, the Danish government has developed a series of initiatives on innovation. The most popular ones focused on the risk capital market and the stimulation of inter-firm collaboration (Christensen, 2003). Recently, the ministry of industry has launched an ambitious action plan to reinforce entrepreneurship, in the fields of entrepreneurship culture and risk-taking attitude, professional business services, better administrative context, financing and taxes, and research and high technology.

Another interesting example is the recent effort of the Estonian government to enhance the conditions for spin-offs. The Spin off programme has two main goals: to assist the creation of new knowledge-intensive firms, and to support different forms of technology transfer to entrepreneurs.

Examples at sub-national / regional level

Interesting European initiatives also exist on the sub-national (regional) level. The government of Catalonia (Spain) has recently elaborated an innovation plan with six different areas of action: knowledge-intensive entrepreneurship, innovation management, technological market, production innovation and logistics, digitalisation and financing. Initiatives promoting the enhancement of innovative management tools range from the development of methodologies, studies and practical cases to be diffused among firms, to advanced support to design management.

The 'Knowledge Cluster' was created by the government of the Basque Country (Spain) in the mid-1990s with the objective to promote a series of activities related to knowledge diffusion, knowledge exchange, and internationalisation. Within the field of knowledge diffusion, it is worth mentioning the creation of a 'knowledge society observatory', a panel of firms about intellectual capital, a knowledge management web-site resource, and a series of agreements with international knowledge centres. Knowledge exchange activities include the active participation of firms in

the exchange of experiences and practices related to different aspects of knowledge and innovation management.

At supra-national level

Since the mid-1990s, the European Union has developed an 'innovation policy', which complements Member States' actions.

In a series of communications and green papers about innovation policy (1995, 2000 and 2003), the European Commission has set up a whole range of objectives and goals, that go beyond the scientific and technological goals of previous initiatives.

Within this framework, the Commission has emphasized issues related to Culture of Innovation and entrepreneurship, such as a favourable environment to the creation of start-ups (access to venture capital and university spin-offs), access to business support services and structures (incubators), and training schemes in entrepreneurship and innovation management. The EU uses three instruments in order to achieve these goals: the innovation Trendchart which analyses and disseminates experiences at national level; the Community innovation survey collecting statistical data; and a series of networks on different topics such as private financing of innovation or innovation relay centres.

3. Some reflections about knowledge, Culture of Innovation and policy

In what follows, five different issues about knowledge, Culture of Innovation and policy are discussed:

What knowledge in the knowledge society?

Economists distinguish between codified knowledge (knowledge that is explicitly expressed and available) and tacit knowledge (which is embedded in specific personal skills and 'savoir faire', and is not universally available). The theoretical debates about which kind of knowledge matters most for economic and industrial development are still raging (Cowan, David and Foray, 2000; Johnson, Lorenz and Lundvall, 2002).

However, and perhaps most importantly, the contents of codified and tacit knowledge are constantly changing and expanding. A particular economy needs not only a specific 'stock of knowledge', but must also be able to expand and change this stock. It is, therefore, important to focus on

the learning abilities and capacity of adaptability of individuals and of collective organizations.

The dynamics of the knowledge system

The production of advanced science and technological knowledge is essential for innovation and economic growth.

Therefore, the structures that allow or hinder such knowledge production are a central element of the overall innovation system.

Rather than just 'mapping' the institutions and organizations involved in knowledge production governmental attention should investigate the specialization of knowledge production, its strength and weaknesses, and identify possible bottle-necks in the dynamics of knowledge production and its final industrial exploitation.

Public action instruments: sticks, carrots and sermons

Since the political perspective on the innovation process widens, taking into consideration social aspects as 'the Culture of Innovation', the role of policy and public action is also changing.

The traditional instruments of direct funding and support are now being complemented by a new generation of public involvement, concerned with:

- Emphasising the diffusion of information and experiences related to innovative activities (i.e.: networks of firms, conferences, web-sites);
- Fostering social awareness on these issues (i.e.: promotion campaigns, prizes);
- Strengthening specific competences of firms and individuals (i.e.: management of innovation, life-long learning schemes);
- Enhancing intrinsic resources to public administration (i.e.: benchmarking exercises of policy initiatives/experiences, data bases with best practices, observatories);
- Active involvement of stakeholders in public initiatives, acknowledging not only the reflexive dimension, but also the importance of ownership of these collective goals.

This new generation of public action means that public involvement is no longer based on a distanced "stick and carrots" strategy. To the contrary, it invites public authorities to get directly involved, promoting interaction with firms and innovators at the representative, planning and implementation levels.

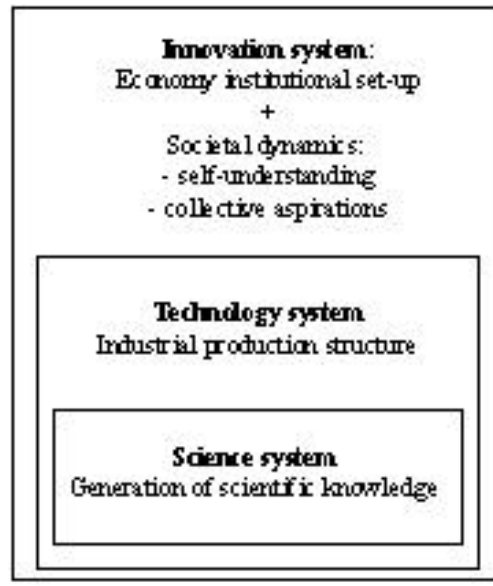

Figure 1: The integrated vision of the innovation system

Is policy learning a panacea?

Many of the initiatives on innovation at the international level aim at generating policy learning. It is therefore important to recall that policy learning is a goal, which real output should be measured and studied.

The exchange of information and experiences among national and regional governments is a very important activity in order to promote and spread best practices. However, it is equally important to bear in mind that this exchange of information does not automatically generate policy learning.

Policy learning (also called policy transfer) is a complex process involving political dynamics and administrative-organizational change. Relevant literature within the field of political science generally agrees on the fact that learning involves adaptation to the specific social, political and economic institutions of the particular country.

Ethos and the Culture of Innovation

The promotion of innovation and of a Culture of Innovation should not be considered to be an end in itself. Innovation is an important factor for economic growth and social well-being.

The surge of the so-called 'risk society' in Europe, characterised by a high degree of risk-aversion, indicates a critical approach to technical

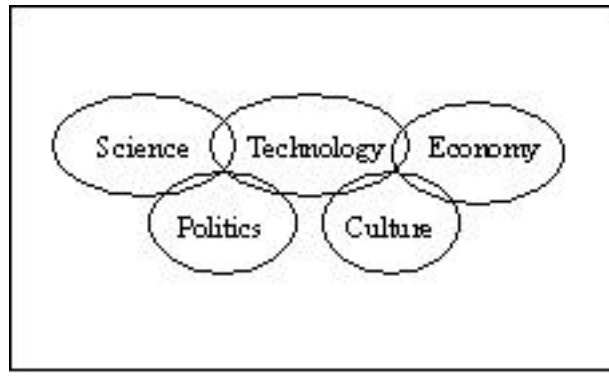

Figure 2: Freeman's Olympic rings' model of the innovation system.

progress. Modern societies are concerned about post-material values, such as environmental protection, consumer protection or food safety. This means that societies do no longer accept technological development and innovation at any price and implies that each society has to define its own ethos, that is, the set of social values that underpins its innovation culture.

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Reinaldo Plaz Landaeta
Researcher, INGENIO (Institute for Innovation and Knowledge Management), Valencia Polytechnic University, Spain

Challenges for Building a Culture of Innovation in the Spanish context: The case of the Valencia System of Innovation

The experience of National System of Innovations (NSI) highlights the importance of culture as a driving force for successful innovation. To only pay attention to the technological dimension of the system is not enough to improve competitive results at community level or even regional and national levels. The case study of NSI teaches us that the development of an innovative culture means giving priority to core values and "doing attitudes" at both company and institutional level. It also means achieving effective inter-relation and cooperation among people and institutional agents. Technology capabilities are essential instruments for innovation results. However, an adequate cultural ambiance is also needed to favour and spur innovation.

This paper presents some insights in technological innovation and innovation culture. Innovations are made of two complementary dimensions, the artefact dimension and the system dimension. The assimilation and implementation of new technology paradigms lead to new products and services. However, they are not immediately adopted by and integrated in our cultural system. Whereas new technologies modify our culture, an appropriate Culture of Innovation is necessary to consolidate new technological paradigms and integrate them in the institutional and cultural system.

Innovation and technological change

The impact of technological innovations is not limited to transformations of the productive system. It also extends to the institutional, social and cultural system. It is obvious that minor innovations are restricted to their fields of action, however, incremental effects of clustering innovation may lead to radical changes with major consequences for the social system as a whole. It has been argued that the rise of new technologies compels the social system to evolve and adapt to changing conditions. But at the same time, institutional changes may have

important effects on the technological trajectories of innovations and their future evolution.

There is a permanent relationship between the technological system, defined in terms of artefacts and technical capabilities, and the institutional system, which includes organisational, cultural and behavioural dimensions. This relationship is not only apparent at the level of firms but also extends to the whole institutional system. According to Freeman and Pérez, the cluster of interrelated products, processes, and technical and organisational innovations points to patterns of structural change in the economy, with implications for the prevalent social system. As a matter of fact, innovations have to be socially accepted. An adequate innovation culture is, on the other hand, needed at the institutional and social level in order to profit from benefits of technical change. This is particularly relevant when considering the social importance of a Culture of Innovation in the so-called knowledge society.

The dynamic character of innovation requires a systemic view on economic and social transformations, which are not limited to the industrial and productive system, but also extend to the institutional system in which they occur. We are living in a period of important structural change due to new technologies, which has major effects on social and cultural structures. This century's "successful" societies will be those with adaptable technological systems and institutional support structures in which knowledge plays a predominant role. A knowledge society needs flexible institutional frameworks and a culture that can deal with innovation.

Expert scholars have pointed out that recession and depression in economic cycles are the result of a disruption of the socio-institutional system by the new dynamism of the techno-economic system. Technology paradigms are independent of the cultural system in which they take place: technology passes ahead of institutions.

It has been suggested that a distinction be made between the technical knowledge embodied in innovations and the "cultural dimension" associated with the knowledge base of the society that transforms these technological innovations into market and social innovations. In the same sense, innovations as "artefacts" must be distinguished from innovations as "a system". The concept of innovation is an "abstract entity", however, society is much more interested in fulfilling its needs than in acquiring products with certain technical attributes. Society's needs have a cultural dimension and although many innovations are not aligned with our social needs, new technologies create opportunities for social and cultural development.

It has been argued that successful technological innovations are dependent on two main factors: innovation itself, its form, appropriateness and application within the framework of a technological system; and the cultural ability of the society, through its institutions and people, to grasp the technical opportunity and translate the technological into a social and cultural success. This perspective relies on a comprehensive understanding of technological innovation, ranging from the innovatitive and the technological system, in which the innovation is produced, to the institutional system.

Sociologists and economists studying the nature of public policies and their impact on the social and economic performance of innovations have widely recognised the importance of governments' actions in order to build a Culture of Innovation for technological development. The definition of "knowledge society" highlights the significant role played by governments for the co-ordination of a country's innovation efforts, the creation of a Culture of Innovation as a social value, and the enhancement of so-called national systems of innovation.

Although market rules have been recognised as more effective mechanisms to select and absorb innovations, there is a wide acknowledgment among most economists and policy-makers that market mechanisms fail when new technology paradigms emerge and disrupt institutional paradigms. Free market systems need certain types of intervention to stimulate and promote the evolution of institutions, social statements and cultural values in order to consolidate the coexistence of the new technological paradigm and the existing institutional and social structures. A knowledge society needs a Culture of Innovation as a driving force for development and the emergence of new technological arrangements that improve the living conditions of human beings.

Innovation and R+D markets are generally considered imperfect. Enterprises that conduct and introduce innovations are often unable to appropriate to themselves a sufficient share of the innovation's total social profit. Therefore, there is a large disincentive for enterprises to invest in innovation activities, which is why an anti-Culture of Innovation exists among certain sectors in society. Innovation and R+D efforts are risky and uncertain, relying on private investment. Even if important amounts of public resources are allocated to the promotion of innovation, its social benefits are limited due to the risks involved. Information markets are also imperfect, restricting, thus, the access to scientific and technical information of economic agents. Due to the imperfect diffusion and transfer of information, an overinvestment might occur in particular

scientific or technological fields producing a wasteful duplication of efforts.

At this point, it is worth making a semantic distinction between innovation policies, and science and technology policies. While these terms are often used synonymously, their semantic content and operational interrelations are not clear. “Innovation policies” is a comprehensive term that constitutes a step forward in the study of policies related to innovation and technology activities. It recognises that competitiveness is not only enhanced through science and technology, but also through the transformation of scientific and technological results into business success. From this perspective, “technology policy” is a component of innovation policy, since its main objectives are not technological achievements for its own sake, but rather the achievement of innovations accepted by society.

Recent studies of countries' experiences have emphasised the importance of the institutional and cultural dimensions of innovation. Although, as has been pointed out, the leading role of governments for the creation of an innovation culture is unquestionable, the existence of institutional structures is also of great importance for the evaluation of a country's innovative performance.

Several definitions of a national system of innovation (NSI) have been proposed. Lundvall emphasises technology interactions as key factors for the determination of a country's innovation and technology capacities. He also highlights synergy effects of institutional interactions within a given economy. Freeman has further developed the concept of NSI into a network of institutions of the public and private sector whose activities and interactions initiate, import, modify, and diffuse new technologies. Others have suggested that interactions among these units may be of technical, commercial, legal, social and financial nature aiming at the development, protection, financing or regulation of new sciences and technologies.

Technological innovations are produced, above all else, by firms. However, the innovative success of a particular firm depends to a great extent on its institutional framework. Technological and institutional changes are the engine of development. In this respect, development is the result of a recurrent conflict between technological dynamism and institutional change.

Innovation is also a dynamic process of learning and searching. Institutional interactions within this process are, therefore, at the core of the NSI. These institutions and agents not only include those that are directly involved in technological and innovation activities, but also those that support institutions and economic agents in the allocation and

management of national resources. These institutional intercations involve interactions between R+D, production and marketing units within the firm; user-producer interactions among firms; in-house R+D departments and extramural R+D organisations at firm and at branch level; other institutions for basic science and education. All these interactions take place in a context of learning.

However, the sole existence of institutions does not guarantee for efficient and effective innovation processes. It is rather the complementarity with other factors that forms the real potential of a NSI. In this respect, the role of governments is crucial. The contribution of governments through direct investment plans and funds for R+D and innovation is small, compared to the possible impact of a coherent governmental coordination of national institutions' efforts in creating a Culture of Innovation. Competition is important, however, cooperation is necessary in order to take advantage of national capabilities that are not within the reach of individual agents.

Key Factors to a Culture of Innovation

Innovation is, first of all, about people. People and ideas are the source of knowledge societies.

Innovation is about socialisation. Innovative artefacts might be the product of technological innovations. However, society needs adequate institutions with an appropriate Culture of Innovation to take advantage of new developments. Systems of innvations should, therefore, be oriented towards culture and society. Nowadays, it is difficult to conceive innovation as an isolated phenomenon: technologies are interrelated leading to innovation clusters and a more inter-related and inter-connected perspective on innovation.

Innovation is about capital. A knowledge society thrives on knowledge and innovation. Venture capital allows entrepreneurs to come up with new ideas and innovations. A Culture of Innovation provides for a more comprehensive understanding of innovation challenges and requirements. Innovation is not only a matter of innovators and productive firms. It is a national problem.

Innovation is about entrepreneurship. Human curiosity is a powerful source for innovation. Combined with the creation of wealth, it is a driving force of the economic and social system.

Innovation relies on teamwork, dependent on culture and the respective state of mind. We need to cultivate a system that fosters a culture

for innovation. Strengthening a Culture of Innovation suggests that special efforts need to be made in order to not fall behind others. Other firms, other institutions, other cities, other countries with the same technological capabilities might take advance of their technology systems if their culture is better equipped to meet the challenges of a new knowledge economy.

A Culture of Innovation implies new learning models based on a lifelong acquisition of knowledge, understanding and experience. A Culture of Innovation is based on integrated patterns of human knowledge, beliefs and behaviour that determine people's capacity to learn and to transmit knowledge. Innovations can only grow and expand if people's culture supports them, which is why we should consider culture as the base of communities' innovations.

In this regard, national and regional policy frameworks expand their focus from investments on technology and research to investments aiming at the improvement of knowledge and behaviour of agents involved. Assuming that learning is a national value and one of the challenges that every community must meet, leaning models play an important role in the process towards innovation.

Innovation is about knowledge acquisition and implementation. ICTs provide new mechanisms that help to enhance people's capacity to access new information, to assimilate it and to utilise it in the development of their own, new ideas.

A National System of Innovation cannot be successful without local leadership. Governments do not only face the task to provide assistance from the outside, but also from the inside, as a driving force towards success. Leadership means to assume a more coordinating role in order to guarantee the efficiency of the whole system. Leadership means also that firms and individuals build a culture of thrust allowing for full collaboration, for participation in multidisciplinary networks and clusters, and for the exploitation of advantages and benefits of diversity. Innovation builds on diversity and the collaboration, rather than competition of universities, research institutions, firms and the community as a whole.

A Culture of Innovation is like a mosaic, consisting among others of people, socialisation, institutions, clustering, capital, entrepreneurship, teamwork, collaboration, learning, education, knowledge acquisition, business implementation of knowledge, cultural behaviour and leadership.

The purpose of a National System of Innovation is not only to assemble different institutions and to provide a framework that promotes innovation's core values, but also to stimulate individuals to get involved in this process that, moreover, seeks to define common challenges related to

innovation. We must examine our assumptions about the role of individuals and today's challenges in order to act accordingly.

The development and implemention of a collaborative culture relies on individuals and agents, and their contributions. Communication, mutual respect, and personal concern foster trust and cooperation and strengthen personal relations. The innovation process, driven by trust and confidence has, thus, built its own momentum.

In this regard, knowledge societies face a series of priority issues:

Education: Innovations of the 21st century will heavily rely on high technology. However, there is still a shortage of qualified people who keep pace with these innovations.

The transformation of society, roles and the workplace: We need institutional changes in order to take advantage of new technologies. Innovation is not only a matter of technology artefacts, but it also relies on social assimilation and institutional comprehension. We need to innovate socially, culturally and institutionally in order to master technology and science and thus innovations themselves.

A new business management orientation: Organisation and management are essential to improve the efficiency of the innovation system. A culture of knowledge is a necessary ingredient for a successful innovation. As the dynamics of innovation expand within enterprises, becoming more and more interrelated, a culture of knowledge-management is essential to assure the best allocation of resources, knowledge and expertise in order to speed up the innovation process.

Access to capital and the diversification of risks: Innovation is not only about new ideas; it also incorporates risks when these ideas come into society. In order to diversify the risk of inventions, we need to improve the access to capital.

Strategic investments: Broadband, information technologies and on-line services are ways to enhance education and learning, not only in schools but also at local, regional and national levels. Issues like accessibility, equity and social inclusion must be taken care of.

R+D+I tax reform in order to foster innovation and entrepreneurship: Capital and profit-insensitive taxes penalize the spread of innovation because they discourage the acquisition of leading-edge and expensive technologies.

Brands are a manifestation of culture: Brands are social and cultural assets relying on the efficient exploitation of intellectual capital, excellence in social capital and infrastructure, excellence in applying human knowledge, excellence in education and individual talent, excellence in

productivity, excellence in service and infrastructure support and excellence in rewards, compensation and public recognition.

In conclusion, we can formulate that a Culture of Innovation incites the individual to get involved and to take responsibility. It values and empowers actors of innovation and helps organizations, institutional agents and individuals to build their capacity to change.

The Valencia System of Innovation: some thoughts and conclusions

As has been pointed out in Valencia's Scientific Research, Technological Development and Innovation Plan (PVIDI), the "Comunidad Valenciana" can either be viewed as a society of four million people, of which little more than one million seven hundred thousand are part of the active workforce, or as a society of four million potential beneficiaries of a progressive knowledge society. The Valencian Government favours this second option aiming at the transformation of passive human resources into active participants through a process of sustained and sustainable development, giving, thus, a new value to the "Comunidad" at the start of the new century.

The inclusion of innovation in the PVIDI is particularly relevant. Firstly, Valencian firms play an increasingly important role within the innovation process. Using innovation as the driving force of technological development and basic research, these private actors not only generate knowledge, but also stimulate the Valencian society in general. Secondly, innovation closes the technological process once the new or modified product is launched. Thirdly, numerous regional and national systems of innovation profit of the dynamism of geographical and sector clusters, which act as authentic industrial districts allowing for an efficient interrelation of productive activity and technological innovation. These synergies provide important insights on the role that a Culture of Innovation may play for and in the region.

Our interest is to understand patterns of innovation from an institutional perspective. In this regard, and according to the green Book on Innovation in the "Valencian Community", important conclusions can be draw:

About the innovation system

VIS (Valencia Innovation System) resources are still poor. Although it performs better than the national average, the system is not well

articulated. Few linkages exist with other socio-economic sectors. This becomes evident when we compare funded R+D activities and main economic sectors in the region. The transfer of knowledge from universities and research laboratories to the private sector is slow and inefficient highlighting the need for better technology transfer infrastructures. Existing technology support programs, as the Nation Plan for R+D and the Profit Program, could stimulate higher levels of innovation performance, especially among SMEs, if their mandates were broadened and access was simplified.

There is little participation of the entrepreneurial sector. More important, there is a clear lack of leadership. In this regard, educational and communicational activities are needed to raise public awareness of the value of technology as a driving force for socio-economic development. We need to stress the importance of the technological dimension of public policies. Understanding the positive effects of technology on Valencia's welfare will help to justify an increase in resources allocated to technological innovations. In order to implement technology as an issue in Valencia's understanding of innovation, a culture of science and technology must be promoted.

A special effort has been taken to increase the resources allocated to develop the VIS. Despite national and local governments' efforts to increase investments, universities and firms continue to face operational funding problems, with a negative effect on infrastructure needs. Valencia has limited financial and human resources for R+D in comparison to Spain and the rest of Europe. A major objective of local governments should, therefore, be to raise the level of R+D investment to a reasonable average of national and European standards.

Strategic investment in R+D facilitates the allocation of limited resources to areas in which Valencia is developing or actually enjoys a good international reputation. However, further efforts are needed in areas that exhibit dynamic developments. All efforts should be directed towards the goal of improving the global efficiency of the regional system.

About the enterprises

Valencian enterprises do not employ enough qualified human and sufficient financial resources in the process of technological innovation. According to recent figures, innovation expenditures of Valencian firms are smaller than the national average. Firms find it difficult to enter financial markets: only 11% of firms consider that local financial markets are

appropriate instruments to finance innovation and new entrepreneurial projects. In fact, there is only one venutre capital agency in the Valencian Community, which, obviously, is an important limitation. R+D resources, in relative terms, are sensibly smaller than the national average due to the small rate of university professionals in Valencian firms.

Valencia's innovative enterprises cooperate less than the Spanish average. Although the number of innovative firms exceeds the average of the rest of Spain, Valencian firms' collaboration index is lower. Technology clusters have to be created in order to improve innovation in the region; infrastructures must be built to support networks of enterprises. Clusters develop naturally under entrepreneurial and industrial leadership and in an environment that is characterised by strong interactions among business leaders, various levels of government, academia and leading research institutions. Such a process would facilitate the creation of technology-based business start-ups, strengthen the capacity of locally based research and development organizations, and enable commercialisation that leads to economic growth.

The particular structure of Valencian entrepreneurship does not engender enough knowledge generation, absorption and dissemination. Although we observe a clear export orientation of Valencian firms, we could not register an improvement in high technology exports in the last decade.

Enterprises should employ more young talents; they should be aware of mechanisms to identify I+D+i results that can be exploited industrially; they have to participate more in the spin-off process generated by research centres; they should acquire the habit to cooperate with other enterprises and agents of the VIS; they need to develop a culture of thrust based on cooperation, collaboration and knowledge transfer.

Private sector companies lack R+D investments. Innovation and R+D funding is public in most cases. Firms have little opportunities to raise venture capital due to the long-term cycles between conceptualisation and commercialisation, which discourages potential investors to provide long-term venture capital and, thus, hampers the development of innovations and new technology-oriented firms.

About the public system of I+D+i

Growth in the last years in the I+D public sector is outstanding, especially in the sector of higher education. Public I+D have improved efficiency and productivity. However, entrepreneurial assimilation and

absorption remains low. The public I+D system has research groups that are well-connected to the productive system and that are capable to respond to I+D needs. We start to see the formation of enterprises that are based on a spin-off model in order to exploit and disseminate research results.

The I+D public system should consider environmental demands. For this, it is important to promote the formation of multidisciplinary groups and structures with a problem solving based approach on innovations and technology, rather than new inventions. The public system should design and implement strategies to promote a collaborative culture among socio-economic agents. The I+D public system should also establish permanent mechanisms of transfer of science and technology to enterprises. It should, thirdly, foster the creation of spin-off enterprises as a way to improve mechanisms of knowledge transfer.

About the innovation environment

Valencia's Culture of Innovation does not differ from the rest of Spain. The formation of human capital through universities and research centres does not correspond to firms' needs, and does not stimulate an entrepreneurial culture. In this regard, there is a clear need of new approaches to education and learning systems.

Valencia is in need of an entrepreneurial class. A learning-centred approach adopts studying to students' needs and circumstances and will, therefore, improve the outcome. A multi-disciplinary approach to learning systems not only raises students' awareness of other needs, but also promotes teamwork. As a result, students' employment chances rise as much as their innovative capacities.

Beyond the formal learning system, there is a tremendous need for continuous learning. All learning, regardless of where or how it is done, is relevant for acquiring a culture of lifelong learning. Governments, industry, universities and communities need to collaborate quickly to advance the deployment of accessible and affordable e-learning and broadband facilities.

Final remarks

It is our conviction that the development of a Culture of Innovation supports and encourages cutting-edge policies. A Culture of Innovation focuses on values and attitudes that are embraced by society, such as pride, trust, empowerment, talent recognition and a number of

other institutional factors that, on the one hand, are ingrained in the culture of firms, cities, communities, the government, institutional agents and finally the nation itself and, on the other hand, contribute to their success. The Valencia System of Innovation and its components provide a good source of information and valuable insights for public policy.

The experience of the Valencia Innovation System underlines the importance of a Culture of Innovation for success. Highlighting the importance of core values, including both individual responsibilities and institutional cooperative capabilities, demonstrates the necessity for public policies and institutional mechanisms to foster change, to modify existing patterns and to stimulate a Culture of Innovation among social agents. It also implies the support of innovative initiatives as well as the provision of incentives in order to empower people to be innovative.

The study of Valencia Innovation System's strengths and weaknesses allows us to understand the Culture of Innovation that has served as the starting point for the foundation and implementation of innovations within the system. The stress lies on culture, because public policies often rely on assumptions or patterns of belief that are taken for granted to the point that they are not even questioned. As has been stated in the Valencia Scientific Research, Technological Development and Innovation Plan (PVIDI), an integral view on governmental actions would, among others: improve the level of excellence and strengthen the competitive capacity of the Valencia Science-Technology-Business System; foment vertical integration, coordination and interrelation among the different agents involved in scientific and technological development and the innovation system (university departments and institutes, research centres, technology centres and firms); reinforce the mechanisms of transfer of research results and increase the social and economic yield of existing ones, so that they can be of the maximum utility for the Valencian society; encourage the participation of the private sector in the development of technological innovations as a strategic action of Valencian firms and as a driving force of technological development and research; foment the diffusion and development of science, technology and culture in the Valencian society; and finally, coordinate the activities of the Valencian executive related to RDI with the actions of the Spanish and European executives in the “Comunidad Valenciana” as well as the establishment of relationships of cooperation with other agents, both national and international.

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Bronislav Konstantinovich Lissin
President of the Institute of Strategic Innovations, Moscow, Russian Federation

The Culture of Innovation and Building of Knowledge Society

Significant technological breakthroughs occur ever now and then with no regard to whether the society and its institutions can appreciate and use them. Without questioning the priority of technology and the necessity of their development, we should not forget the role of socio-cultural institutions. Governments and societies, investing considerable funds in the creation of new technologies, mechanisms, equipment and devices, quite often consider the functioning of social systems, on which the outcome of technologies depends, as a routine task.

Almost 100 years ago, the outstanding scientist Vladimir Vernadsky pointed out that “mankind, to a great degree, is governed by ideas, which reflect the state of mind and scientific knowledge of generations that have disappeared in the past”. During the last century, this inconsistency deteriorated an has received the name “cultural delay”.

I. Culture

It became apparent that the development of civilization is largely determined by culture. Thus, the ever-increasing role of culture as a global phenomenon of development has bypassed its conventional conception as a complex pattern of literature, architecture, arts, artistic traditions and their specific manifestations.

The voices of leading scientists and managers about the necessity to overcome the gap between production and culture are becoming more and more convincing. Economic success occasionally depends on social and cultural factors. In the eyes of professor Hans Juergen Warneke, president of the Fraunhofer Society of the Federal Republic of Germany, “practically all ultimate goals, such as the increase of market shares and the improvement of the quality of products are best achieved by means of strategies influencing the social system. Machinery and technology play a significantly smaller role in this process”. The dissociation of culture and art on the one hand and natural sciences and machinery on the other hand would be catastrophic.

It should be noted here that there is a material and a spiritual culture. Although the linkage between them has recently been weakened, it was never interrupted. It is namely the spiritual, the non-material culture, which gave impulses and new opportunities for the development of a material culture (machines, devices, structures, technologies etc.). Elements of the global cultural heritage and material elements developed and enriched in a successful and complementary process corporate, business, entrepreneurial and organisational activities.

However, the socio-cultural potential is insufficiently exploited. At the UNESCO World Conference for Science (Budapest, 26 June – 1 July 1999), the General-Secretary of SREDE, Hel Mooney, stated: "a hundred and twenty years ago people studied the Earth as a system that did not include its people. Now we must include social sciences".

The globalisation of culture demands for a cardinal revision of the methodological and technological bases of those sections, fields and directions, which influence the sciences, management, education, the economy and information, therefore, guaranteeing their harmonisation.

A Culture of Innovation, which has not yet developed its full methodological and technological potential, can play such a role. It is deeply linked to the individual and the community, using their readiness and capacity to participate, to promote and to implement novelties with a positive impact.

It is obvious that such a development might launch a series of innovations. However it is of crucial importance whether these novelties then force their own way causing losses of time, quality and quantity, or whether they create favourable socio-cultural, psychological, legal, organisational, informational and financial prerequisites.

Nikolai Uostryalov, a philosopher of the XXth century, considered that the core of progress was the initial spiritual impulse. Without underestimating the complexity of the formation of such an innovation-sensitive ambience, we shall point out a number of concrete, executable projects that might help to resolve this socio-cultural problem.

II. Definitions in the field of innovation

A Culture of Innovation is based on two key concepts: "innovation" and "culture". The increasing need to develop and construct a new scientific space has not only attracted various specialists, but has also created a more precise and interdisciplinary scientific approach as well as specific definitions. These definitions are not always appropriate. The

creative process of invention, activities in research and design are seen as innovations. However, cultural processes and their sources are not linked to a Culture of Innovation.

Yu. A. Karpova explains that the French term “innovation” has first appeared in 1297, the English term in 1553. Both languages used the term to describe “something new” in the fields of linguistics, botany and procedural law. In the XIXth century the term referred to cultural elements that had their origin in other cultures. The term innovation is multifaceted describing either a process of innovation or an innovative outcome.

A unified system of definitions is needed to resolve problems concerning the development of innovations, the formation of a Culture of Innovation and the underlying theoretical research.

Let's consider the most important elements of such a system.

Novelty - a new or a new combination of existing scientific, technical or technological elements or the invention of devices, methods and services with new properties or spheres of application. A novelty is an indispensable condition for the beginning of the innovation process (a cycle).

Innovation process (a cycle) - transformation of a novelty into an innovation by means of parallel or consecutive communication.

Innovation – a realised novelty; a result of an innovation process (a cycle) that takes the form of a finished product, good, service or method.

Innovation policy – part of the general national policy in the field of development; implementation of targets of development within the field of innovation; the normative-legal regulation of subjects and objects of the innovation policy and their relation to each other; organisation and control of innovation activities under consideration of rights and interests of all its subjects, including the state.

Innovation potential – an aggregate of the intellectual, financial, technological and craftsmanship potential of individuals, enterprises, organisations, other subjects of law, regions, branches and the state as a whole that secures full or partial implementation of novelties.

Innovation project – a comprehensive action plan to create or change a concrete system by the transformation of a novelty (several novelties) into an innovation and the establishment of concrete conditions of implementation (terms, finance, equipment, management system etc.).

Innovation infrastructure - of an institution, a company, corporations or structural units of companies designed to ensure or support the implementation of innovative processes. The innovation infrastructure can, but must not be part of a company itself.

An innovator – a subject of innovation activities; a physical or a legal person organising the innovation process or single stages of it.

Basic innovation – an innovation based on the implementation of new knowledge or approaches. Basic innovations provide the technological or administrative basis in order to realise concrete innovations (e.g. machinery).

Strategic innovation - an innovation with a significant impact (economic, social, technological) on the society or parts of it.

Innovation stagnation - describing the economy and the society as a whole and within these a low level of sensibility to novelties, an absence or blockade of legal, social and economic mechanisms necessary for the implementation of innovations, a high degree of bureaucratisation of the innovation process, a defiance against the formation of a Culture of Innovation and the support of venture enterprises.

One example of innovation stagnation is the gap between decreasing exports and increasing imports of high technology products. With reference to established companies this index describes either the ratio between expenses on R&D and the volume of sales or the number of employees in the field of R&D and the total number of employees.

All these definitions are interconnected and based on guidelines provided by the Organization of Economic Cooperation and Development. They are used in common practice, in scientific literature and legal documents of different countries. It is thus possible to use them as the basis for further consideration of the nature of a Culture of Innovation.

III. The Culture of Innovation

The Culture of Innovation includes different cultural processes and characterises the degree of responsiveness of a person, a group or a society to different novelties ranging from simple tolerance to willingness and capability to implement it.

The Culture of Innovation is common to all cultures. It is a new reality that arose out of society's search for material and spiritual renovation. It acts as a precondition for qualitative changes of people's activities and is at the same time the basis of progress and harmonisation.

Within these processes - the renovation of objects of the material culture, the acceleration of the rate of social change - changing social needs are not always reflected in the structure and functions of social institutions. A high level of innovation in the sphere of the material culture interacts with changes in the socio-cultural domain. This is important, because the

Culture of Innovation reflects the involvement of people in innovative processes and their satisfaction from such a participation.

The concept of the Culture of Innovation derives of the concept of culture - a historically definite level of vital activities of society and its individual members conditioned by material and spiritual values. This level of activities at a certain moment is determined by previous evolutionary or spasmodic developments. The impact of these transitions between different periods is the higher, the more successfully they utilise the potential of a Culture of Innovation as a methodology and a means of change and harmonisation.

The capability to innovate, an immanent quality of cultures, relies on social and material renovations. When the level of the Culture of Innovation increases, the renovation process of different cultural segments becomes more intensive and universal, encompassing changes of a higher order, for example, the transition from information into knowledge societies.

The value of the Culture of Innovation increases in this process of transition and is naturally connected with the nature of knowledge. In this regard, the correlation of innovation and tradition is important. Tradition is a stable element of culture. Due to its unconditional importance it has to be taken into account for the elaboration of a concept of innovation. Innovations contradict traditions. These contradictions can only be resolved when innovations follow traditions. It is therefore not enough to have a novelty, to estimate its significance and the consequences of its implementation. It is necessary to have an integrated concept of innovation that takes into consideration traditions as well as the capacity and readiness to use the novelty for the well-being of the whole society. There are social needs that arise out of a Culture of Innovation, because the population is involved in the process.

The Culture of Innovation reflects values, motives, knowledge, ability and skills, as well as models and behaviour norms of man. Through the Culture of Innovation it is possible to influence the whole society. It is possible to regulate the use of novelties in order to prevent harming man, society and nature. The Culture of Innovation is of international nature. However, innovative efforts should be based on cultural traditions of each country, because traditions vary from one culture to another. In the opinion of professor Warnecke “the Asian cultures… owe to their cultural and historical features the achievement of higher coordination of actions of man, the technology and organization”.

The 1995 Green Book on Innovation of the European Union understands the Culture of Innovation as a social, economic and political phenomenon, the key line of innovative activities.

One of the determining factors of the development of a Culture of Innovation and the resolution of related problems is its organisational nature. An institutionalisation of the Culture of Innovation, that is, the transformation of its manifestations into an organised institution and a formalised process with well-defined relations, a discipline, rules of behaviour, an infrastructure etc. is indispensable. UNESCO should support these institutions. The efficiency of these institutions and the respect of common values and goals will proof this institutionalisation.

The harmonious integration and interaction of the state, the civil society and private companies, of public and private law will be of great importance.

A Culture of Innovation is therefore a global trans-cultural phenomenon, in terms of a common cultural process as well as consequences for different social groups, regions and states. A Culture of Innovation creates favourable preconditions for the diffusion of an innovative culture into other cultures and societies.

IV. Empirical indexes of the innovative culture

The Culture of Innovation as an objective reality must be the object of sociological studies. “To measure everything accessible and to make everything inaccessible accessible for measurement ” is one of the postulates of science. Possible fields of research might be: the structure and the different functions of the Culture of Innovation; the conditions and its manifestation in different social environments; different factors influencing its formation; the interaction of the Culture of Innovation with other social institutes, including the knowledge society. Different aspects of business, organisational and legal cultures were subject to sociological and comparative research. Unfortunately, there is no attempt of a comprehensive analysis of the Culture of Innovation as a socio-cultural phenomenon.

In 1999-2000 the Institute of Strategic Innovations conducted research in Russia and in 2002 a public poll of 852 chiefs of enterprises and scientific-technological organisations in Russia, Belarus, Kyrgyzstan, Moldova and the Ukraine was carried out.

The main indexes that describe the Culture of Innovation in Belarus, Russia and the Ukraine are very close. These indexes are based on experts’

estimation of the motivation and the quality of the people in relation to the number of respondents.

- sense of “the new”, disposition to innovations: Belarus: 47,5%, Russia: 45,7%, Ukraine: 49,5%;
- initiative, striving to decide difficult tasks: Belarus: 45,9%, Russia: 52,7%, Ukraine: 44,1%;
- ambition, desire to make a career: Belarus: 18,0 %, Russia: 20,4 %, Ukraine: 25,8 %;
- public vocation, social status: Belarus: 21,3 %, Russia: 17,7 %, Ukraine:15,1 %;
- openness to risk: Belarus: 4,9 %, Russia: 3,2 %, Ukraine: 8,6 %;
- striving to receive economic benefits for an organisation: Belarus: 45,9 %, Russia: 50,5 %, Ukraine: 47,3 %;
- personal material interest: Belarus: 86,9 %, Russia: 74,7 %, Ukraine: 82,8 %.

Different factors influence the differences between countries: statistical error (2,5-3 %), differences of the conditions of economic activity and labour, mentality, etc. However, the figures do not diverge a lot. This proofs the objectivity of theses indexes and allows us to use the data as a point of reference for the development of the Culture of Innovation.

There are, of course, also factors that hinder the development of a Culture of Innovation.

- vigilance against “the new”, formalism: Belarus: 44,3%, Russia: 46,2%, Ukraine: 37,6%;
- jealousy of the success of others: Belarus: 18,5 %, Russia: 10,2%, Ukraine: 21,3%;
- no self-confidence, indecision: Belarus: 14,8%, Russia: 16,1%, Ukraine: 12,9%;
- laziness, reluctance to superfluous efforts, indifference: Belarus: 45,9%, Russia: 45,7%, Ukraine: 41,9%;
- risk aversion: Belarus: 47,5%, Russia: 45,7%, Ukraine: 46,2%;
- inability to raise and resolve innovative tasks: Belarus: 59,0%, Russia: 52,9%, Ukraine: 63,4 %;
- misunderstanding of the benefits of innovation: Belarus: 50,8 %, Russia: 33,9 %, Ukraine: 40,9 %.

The factor that describes best the negative factors to innovation is the inability to raise and resolve innovative tasks. It could easily be solved by educational and psychological-pedagogical measures, which, regretfully, have not been undertaken. The development of

corporate cultures in companies has begun in many enterprises in order to increase the effectiveness and performance.

However, more than 90 % do not develop systems of corporate culture. This might be due to the need to overcome personal problems in a difficult economic situation. These problems of motivation of staff remain underestimated.

The following figures shall describe the Culture of Innovation in scientific-technological organizations in Belarus, Russia and the Ukraine:

- careful, constructive attitude to other judgements: Belarus: 24,6%, Russia: 28,5%, Ukraine: 44,1%;
- understanding of innovation as a significant social value: Belarus: 49,2%, Russia: 42,5%, Ukraine: 47,3%;
- healthy competitiveness in the implementation of new ideas: Belarus: 49,2% Russia: 40,9%, Ukraine: 19,4%;
- estimation of ideas according to their actual value and not according to the status of the author: Belarus: 50,8%, Russia: 62,4%, Ukraine: 43,0%;
- counteractions to conservatism: Belarus: 23,0%, Russia: 21,0%, Ukraine: 84,9%.

Many social institutions influence the formation of the Culture of Innovation – in particular education. The major ones are known, however, the question is to what degree they affect the development of a cultures of innovation. The chiefs of the scientific and technical organisations have evaluated their impact as follows on a scale ranging from 1-5:

- school: Belarus: 2,17, Russia: 2,26, Ukraine: 2,59;
- high school: Belarus: 3,41, Russia: 3,39, Ukraine: 4,01;
- post-graduate higher education: Belarus: 3,66, Russia: 3,68, Ukraine: 3,66;
- family: Belarus: 2,26, Russia: 2,33, Ukraine: 2,09;
- mass media: Belarus: 2,96, Russia: 2,73, Ukraine: 2,61;
- working class milieu: Belarus: 3,72, Russia: 4,03, Ukraine: 3,45.

These figures show that the impact of families is considered to be more important than that of working class milieu and mass media. Children and teenagers are particularly receptive to education. Considering the potential of high school and postgraduate education, the mass media and the working class milieu, it is impossible to consider today's situation as satisfactory. The main problems are the lack of coherence in setting educational tasks, their implementation as well as the availability of scientific and methodical equipment.

The Culture of Innovation has a positive impact on the motivation, sensibility and ability to support and implement novelties. With regard to economics, it provides technological and organisational novelties that ensure the development of countries and whole continents. A Culture of Innovation forms the basis for the construction of an innovative space and the broad implementation of achievements of science and technology to eradicate poverty and other manifestations of inequality, to ensure equal access to education, high technology, know-how and high-quality products as well as a fair social order.

V. The knowledge society

150 years ago, Karl Marx wrote about science as “the universal social knowledge”, “the universal intellect”. It becomes more and more accepted that a number of leading industrial powers are on the threshold of a knowledge society. “Knowledge” becomes one of the key concepts of our societies. However, it was already a predominant element in postindustrial societies. The American scientist Peter Druker describes “knowledge” as a driving force of three revolutions leading to an increasing labour productivity: the invention of the steam engine; the use of knowledge in the analysis and the design of labour processes; the use of knowledge to improve management.

Is the knowledge society the highest form of our post-industrial society? Is the development process completed at a certain point? Different stages of development can be analysed along the scope, the depth and the capability of dissemination of technology as well as along the implementation of knowledge. The accumulation of knowledge is the basis for the transition from one stage of development to another. However, knowledge itself cannot complete this task. An appropriate balance and interaction of knowledge, qualifications, skills and motivations is necessary in order to ensure cardinal technological or other changes.

The information society started to develop in the 1960s and 1970s. Information and communication technologies opened up new capabilities in the fields of management, culture, science, education, industry etc. However, it turned out that information and knowledge follow different rules.

In the 1970s the USA and Japan began to speak about a society of knowledge. This new concept arose as a result of the analysis of the development of the information society and led to a clearcut separation of knowledge and information. Canada, Australia, Sweden, Denmark, Great

Britain and Finland followed the USA and Japan. Other less developed countries as India, China and Malaysia are also getting ready to enter the new knowledge economy.

The USA with only 5% of the world's population finance more than 40% of global expenses for scientific research and research and development (R&D) relying on a high rate of manpower with higher education. Canada's increasing expenses show its willingness to join the quintuple of the leading countries of the world; in relative terms, it comes close to the USA.

It is noteworthy, that these figures correlate with an increase in post-graduate students and other highly qualified specialists. This is natural as knowledge is in need of continuous "re-supply" and updating. New components of knowledge emerge as the outcome of individual efforts and are then disseminated throughout society enabling other individuals to "fill up" their knowledge reservoir and, eventually, to develop new tools themselves.

This cycle, the development of new knowledge, its transfer, dissemination, mastering and implementation, plays an important role for the development and existence of knowledge societies. Each step represents in itself an innovation while the overall success depends on the level of the Culture of Innovation of the individual, a group and the society.

Knowledge is a very expensive resource; its transfer must be submitted to rules that states and the international community are to develop. Today's system of international treaties and conventions regulates the protection and implementation of intellectual property. However, the system of protection hinders the circulation of knowledge. There are two alternative solutions: first, the reconstruction of the entire system of protection, security and application of intellectual property; secondly, the establishment of ownership not only of knowledge, but also of processes related to motivation, methodology and technologies leading to a more efficient use of knowledge. The Ukrainian scientist G. I. Kalitich stated in this regard: "It is not the knowledge that is the key point, but the knowledge of how to effectively use knowledge".

It is also necessary to underline the multi-disciplinary nature of today's knowledge. Nanotechnology of the 21st century will, for example, determine physics and chemistry, geology and technology, nuclear science and engineering. (Zh. I. Alferov)

Non-competitiveness and non-exclusiveness of knowledge, as determining factors of property of international social commodities, are unconstructive. A comprehensive regulation of the economy goes against

basic principles of a market economy. Doubtless, these ideas are attractive, but they are inaccessible and not beneficial in a context of globalization. It is possible to enhance the creation of knowledge societies in least developed countries, however, one has to ask what the price would be and in whose interests this knowledge would be used? An omnipresent profit from the joint possession of knowledge is impossible as this radically contradicts the principle of private property.

Modern information and communication technologies open up a new potential for the implementation of information. However, there are also negative side effects. Generations of students are not capable of generating new knowledge, because they simply extract existing knowledge from the Internet. The gap between information accessibility to everybody and genuine knowledge will continue to grow.

Nevertheless, the potential profits, available at any time of transition towards a knowledge society on the basis of the Culture of Innovation, are doubtless. The task is to optimise this process. There is, therefore, a clear linkage and interaction of the concepts “knowledge society” and “Culture of Innovation”.

VI. Principles of interaction of the Culture of Innovation and knowledge societies

It is not our task to consider in-depth the question of formation and functioning of knowledge societies. However, we are to define the main principles of interaction of the two concepts and should seek to find ways to implement them.

One condition is a coherent packet of knowledge, i.e. of the knowledge itself and a set of knowledge to implement basic knowledge. Another condition for the functioning of a knowledge society is the availability of an innovative-cultural space creating favorable conditions for the implementation of knowledge. The formation of such a space must take place at the same time than the building of a knowledge society or might even be a condition for the latter.

It is the elements of the Culture of Innovation, which promote or hinder the implementation of knowledge as an innovation. It is important that the already mentioned process of the creation of a Culture of Innovation does not only extent to professional milieus, but is also supported by other social stratas, involving customers, observers and ensuring that those who are not formally involved in the process understand their personal benefits (environment, jobs etc.). While

taking into account these circumstances and UNESCO's wide experience, it is possible to formulate a number of fundamental theses that understand a Culture of Innovation and knowledge societies as one system.

1. Close interrelation of innovation and knowledge: knowledge can only be realized through innovation as a process and in the form of results-based innovation. This holds for any area: culture, business, education, management, communications, science, policy etc.
2. An integrated approach to the formation of a Culture of Innovation and the building of knowledge societies: A successful innovation process that interacts with the process of formation of a knowledge society depends in many respects on the degree to which factors that form an innovative-cultural space favourable to the manifestation of knowledge are taken into consideration.
3. The individual is both subject and object of a Culture of Innovation and the knowledge society: The individual develops, distributes and consumes. However, his ability to integrate into a system of "innovation-knowledge" depends on his position and activity.
4. The implementation of a Culture of Innovation and knowledge societies is a long-term process: The nature of knowledge and innovation as well as of the preconditions for the construction and functioning of an innovation-cultural space require clear-cut long-term strategies.
5. New requirements for partnerships: The days when innovation and knowledge were considered as purely economic or educational issues have passed. Different sectors of civil society, different activities, national and international players are involved.
6. Creation of knowledge and the Culture of Innovation - the key to development: the aforementioned shows that neither the creation of knowledge nor the building of a Culture of Innovation can meet the pace, quality and volume that is needed for development: a combined approach is necessary to ensure and create development.
7. Education as a principal means to unify and implement the two concepts: Many countries have a huge potential with regard to their educational systems. However, inertness and conservatism must be overcome, making the educational sector itself a subject of development. Nevertheless, education is the key factor for the development of a Culture of Innovation and construction of knowledge societies.

VII. Formation of the Culture of Innovation

The formation of a Culture of Innovation represents the creation of an innovation-cultural space as a part of a common social space. An "innovation-cultural space" describes a system of elements, their linkage, density, interaction and diversity. It is impossible to describe all elements of a Culture of Innovation, but it is necessary to determine those that help to solve problems of another order.

A basic feature of an innovation-cultural space is its global character as well as its significance irrespective of the country, the social and economic system etc. in which it emerges. At this point, it is necessary to formulate the regulative framework of the Culture of Innovation, such as legitimacy, values (justice, humanity, democracy etc.) or its problem-solved orientation.

Concrete means to disseminate a Culture of Innovation depend on mentality, spheres of activities, the role of the innovation-cultural space for the population as a whole, for certain professions and social groups. Social institutions as family, school, university, post-graduate education, industrial environment, mass media, cinema and literature also play a key role in the formation of the Culture of Innovation.

It is worthwhile to emphasize that the formation of a Culture of Innovation is a rather discordant process consisting of a whole package of inconsistencies. Its elements include and regroup different persons, types of work, value orientations and cultural habits. UNESCO's experience in inter-sectoral projects can help in overcoming these inconsistencies. The consolidation of scientific centers and specialists that work in the field of innovation and knowledge societies, the preparation of political documents addressed to UNESCO's Member States as well as a booklet that familiarises with the objectives and problems of a Culture of Innovation encountered by Members of Parliament, governments, employees of international organizations, scientific and training centers, leading specialists, journalists etc. are indispensable. It is also important to organise scientific-practical conferences, seminars and round tables that should concentrate on the following themes:

- research on "the Culture of Innovation and construction of knowledge societies", its structure and contents, specificities and features in different national, social and professional environments;
- research on social and psychological factors that stimulate or hinder innovative activities within the framework of the formation of knowledge societies;

- research on innovation potential and innovation activities of individuals, enterprises, cities, regions and countries
- Results should be widely disseminatied throughout the society via the mass media and the Internet. Anticipated results of the aforementioned might be the following:
- giving an input to activities of scientific institutions and individuals;
- extending and strengthening interdepartmental, inter-regional and international relations and cooperation of these institutions and specialists;
- creation of a global network of scientific and concrete activities on problems related to the Culture of Innovation in knowledge societies;
- publication of practical manuals on the implementation of measures aiming at the strengthening of the Culture of Innovation and innovation activities;
- elaboration of effective means to encourage innovation activities as well as measures against inertness, conservatism, laziness and other obstacles to innovations on the basis of a deeper understanding of the Culture of Innovation in knowledge societies;
- attraction of the public attention to the innovation culture in knowledge societies;
- analysis and dissemination of information on innovation activities of different national, social and professional environments, in particular in the fields of “science - production - education”.

We are faced with the necessity of a radical transformation of the education of school children, students, and specialists. Research aiming at the elaboration of methods of assessment of children's work in the fields of arts, sciences and technology are indispensable. The formation of innovatve, active and creative personalities should be one of the main objectives of university, post-graduate and continuous education of adults. The mass media is to shape the understanding of each citizen to innovations as an indispensable element for the future wellbeing of their children and the state in general. All these elements will promote a healthy competitiveness as well as intellectual and material incentives to innovation activities. The following concrete actions should be undertaken:

- elaboration of programs for kindergartens, schools, universities, postgraduate and continuous education on the theme “innovation culture in knowledge societies”;
- preparation of methodologies for teachers of all stages of education on the Culture of Innovation in knowledge societies;

- preparation of a series of manuals for pupils, students and adults;
- implementation of continuous, progressive and up-to-date learning systems in order to introduce the Culture of Innovation at all educational levels;
- organization of television programmes on the Culture of Innovation in knowledge societies;
- organization of competitions among pupils and students on the issue;
- organization of competitions between cities, regions and states for the best innovative proposals.

Open-mindedness to the accumulated experience in different countries is of great significance. Interest in the Culture of Innovation has grown: courses are given and papers are written. In Russia its elaboration is concentrated in The Institute of Strategic Innovations. The National Charter of the Culture of Innovation in November-December 1999 in Ulyanovsk and Moscow is of great importance. It has become the first public programm that concentrats on the Culture of Innovation and on ways to solve related problems. Representatives of science, culture, education, management and the private sector of different regions of Russia have signed the Charter.

Activities of the Institute of Strategic Innovations and of the Committee for the Culture of Innovation of the National Commission of the Russian Federation for UNESCO focused on concrete implementation. Under the auspices of UNESCO and with the support of the Government of Russia, an international forum “Culture of Innovation on the Edge of Centuries” was held in 2001. Twenty concrete activities in Russia, France, Switzerland, the Ukraine and Uzbekistan were discussed. The forum confirmed that the Culture of Innovation is a complex social phenomenon, which organically links problems of science, education and culture with social and professional practice and concluded that the Culture of Innovation within the framework of knowledge societies is a strategic resource for the new century.

Scientific discussion, including at an international level and with UNESCO's participation, empirical research and the elaboration of new concepts help to determine the lines of activities for the implementation of “A Culture of Innovation and the building of knowledge societies”. This project in itself is an innovation with strategic and global consequences in many sectors, thus calling for the active participation of UNESCO.

Alberto Araoz
University of Massachusetts, Boston

Zareen Karani Araoz
Managing Across Cultures

Using the Intellectual Diaspora to help build a Culture of Innovation in an Emerging Economy

The emigration of high-level human resources – the brain drain – is a phenomenon of long standing that has affected many countries with an emerging economy. In some cases it has given rise to a sizeable intellectual diaspora that can be considered as a potentially important resource for the country of origin. In this discussion paper we explore the possible use of a key segment, the diaspora innovators, to help build up a Culture of Innovation there.

1. Brain drain and the intellectual diaspora

For the world as a whole, it makes sense for people to use their skills in places where they earn the greatest reward - a corollary of globalization. Countries of emigration would benefit from a trickle down effect through market mechanisms.

However, this may not happen in a reasonable period of time, and may even not hold true for some countries. This would be the case of Guyana, Jamaica and some African countries that are losing a very large proportion of their high level graduates, and of certain countries of Eastern Europe where a large exodus of scientists and academics took place after 1990, with particularly harmful effects.

Frequently it is the best talents, the cream of the crop, that are more likely to leave their countries or to stay abroad once their studies are completed. For instance, almost one-third of Mexicans with PhD's are out of the country. Three fourths of Africa's emigrants have higher education, and roughly half of Asia's and South America's. About 30 percent of highly educated people from Ghana and Sierra Leone live abroad. The US absorbs large proportions of the most educated people from neighboring countries: 12 percent of Mexico's and 75 percent of Jamaica's live in the US.

There is no doubt that the brain drain has often brought about harmful effects. As graduates and experienced personnel have left, some

countries have experienced significant losses in educational investments, lower fiscal receipts, a decrease of the country's productive potential, and a worsening of the health and welfare of the population as doctors and nurses are attracted to other countries. Most significant is the loss of actual and potential innovators, who might have led the way to modernization.

However, there has been compensation. In the short run, emigrants send remittances back home. In the longer run, some high level people return, bringing along useful knowledge, skills, contacts and even capital. Moreover, the intellectual diaspora – the sum of highly qualified persons living abroad - may constitute an important resource, helping the home country from long-distance through the contribution of know-how and investments and as a side-effect enhancing international trade. This is shown by the experience of overseas Chinese. The recent report on the Indian Diaspora says it is "a valuable asset and has great potential to play an important role in the multifaceted development of India" and "in making India a knowledge super power".

The brain drain, essentially a spontaneous phenomenon guided by market forces, political pressures and the personal search for better educational and professional opportunities, has more recently been exacerbated by the active immigration policies of some industrial countries. In order to sustain the rates of growth and living standards of their economies, such countries need larger numbers of high level human resources, particularly scientists, engineers and health-care persons, than what they are currently producing from their citizens and their educational system. Thus, they are encouraging skilled immigration, and relaxing the rules forcing foreign students to go home when they graduate.

It is not only poor countries that provide such immigrants. Britain, Australia, Canada and some other industrial countries also lose high level personnel to the United States. On the other hand, they get immigrants from elsewhere. Britain, for instance, gets doctors and nurses from South Africa and India, while British doctors and nurses emigrate to the US. Canada gets engineers from the Middle East and other places but loses engineers to the US.

The US is the ultimate destination and has been benefiting quite amply from the immigration of high level personnel, to the point that many activities in science, education, industry, health care and other key areas would suffer heavily if such immigration were to decrease substantially. At least 20 percent of all medical doctors, and 23 percent of all Ph.Ds, in the US are immigrants. The dependence of high technology companies on qualified immigrants is well known; foreign-born scientists and engineers

account for one-third of the technical force in Silicon Valley. US technology faces difficult prospects as the workforce declines and at the same time ages. NASA and other technical organizations find that the pipeline of US nationals with science and engineering degrees is shrinking. Immigration makes up this deficit. About 500,000 foreign students enter the U.S. every year, and some 175,000 of them come to study science or engineering. Many of them stay on after graduation; about half of all foreign students who get Ph.Ds in the United States are still there five years later.

2. Dealing with the brain drain

The experience of many countries has clearly shown that the loss of highly skilled people cannot be stemmed successfully by constraining mobility, but rather by a favorable political and economic climate, the provision of better work facilities, adequate pay and advancement through merit. This helps retain exceptional talents within the country and make good use of them. It may also help to bring back some of those who had previously emigrated.

Some ways to counteract the negative effects of the brain drain may be briefly reviewed:

- Permanent return. Well-qualified emigrants may return permanently. Though this has happened in a limited way in most countries of emigration, the return flow has been significant only in a few, principally Korea, Taiwan, China and more recently Ireland, largely prompted by the factors mentioned above - an improved political and economic climate, better salaries and working conditions, and various positive measures by the government, including opportunities and incentives to initiate innovative ventures.
- Temporary engagement. Such persons may return temporarily to engage in scientific, professional and managerial work, and in teaching activities, without the need not sever ties with their country of residence. They may be willing to accept a modest payment or fee for coming to the home country to work for periods of weeks or months in government units, universities, research centers and enterprises. This helps assuage some of the “guilt of abandoning one's home country” and can be personally if not financially satisfying. On going back overseas they may continue their cooperation, giving advice and rendering different services for the benefit of the home country. There is an interesting and successful initiative for temporary return: the UNDP Program of Transfer of

Knowledge through Expatriate Nationals, TOKTEN. This program identifies experts originating from a developing country that live abroad and are willing to participate in short-term technical cooperation activities in that country, with a local salary (rather than an international one) plus expenses. TOKTEN has been running for almost two decades with signal success, although constrained by a limited budget.

- Networking and using the Diaspora. A promising possibility is the utilization of the intellectual diaspora, principally by networking its members through the Internet, to enable and promote collaboration with the home country's people, institutions and enterprises. This may take place through contacts, visits, exchanges, teaching activities, joint scientific projects and eventually joint investments. Much can be achieved through accessing diaspora members wherever they are, tapping them for advice and support. The potential inherent in such an approach – the 'diaspora option' - is being increasingly understood by a number of brain exporting countries, and several of them are making efforts to organize and network their intellectual diasporas so as to better utilize their emigrants abroad. This requires a significant effort to survey diaspora resources, create an active network and develop those activities and programs. An earnest try took place in Colombia some years ago, through COLCIENCIAS, the top science and technology body; unfortunately it did not continue long enough, mainly because of insufficient resources. Currently there is an important effort in South Africa that has been characterized as "transforming brain drain into brain gain". India has also embarked on a similar enterprise, with the government having commissioned a Report on the Indian Diaspora, organized a meeting of the diaspora in January 2003 and another to be held in early 2004, and nominated an "Ambassador to the Non-Resident Indians". Other countries are also developing their own approaches to the 'diaspora option'.
- Investing in home country ventures. Members of the intellectual diaspora may also participate actively in new, innovative productive ventures in the home country. Emigrants that have accumulated abundant capital, developed novel technologies, and generated successful enterprises may be willing to create new ventures at home on the basis of such resources, often in association with a local partner. A promotional mechanism and adequate incentives may help here. This has happened in Korea, Taiwan, China, India and a

few other countries where the respective governments have catalyzed and nurtured such initiatives.

But much more can be done by harnessing brains abroad and utilizing them to spur the home country talents to a more innovative level, in a focused endeavor to create a true "Culture of Innovation" that supports and attracts creativity and meaningful knowledge generation.

3. Diaspora innovators and their utilization

As the UNESCO Issue Paper for the present Symposium says, "In order to understand people's ability to innovate and their ability to adapt to change, one has to take into account the social and cultural components of innovation. Technological change has another, often overlooked, social effect or consequence, namely, it alters social hierarchies and the power structure of groups within society and in some cases society itself…. In the end, these "soft factors" are the tools that enable us to create A Culture of Innovation".

Building a Culture of Innovation in an emerging economy can benefit very much from the knowledge, experience and attitudes of members of the intellectual diaspora residing and working in industrial economies. These persons have acquired cultural traits and specific knowledge that are of central importance to science, technology, entrepreneurship and innovation. Within the intellectual diaspora, some individuals have developed truly innovative capabilities. We may call them diaspora innovators.

There are very interesting examples of diaspora innovators living and working in industrial countries; perhaps the outstanding case is that of the many foreign-born scientists, technologists and entrepreneurs in the US Silicon Valley, where the innovation culture is at its strongest.

Diaspora innovators who have studied and worked for extended periods in a modern, innovative environment have acquired different beliefs and values from those of their original societies. They view the world differently and are able to react to ongoing changes in a more flexible, dynamic and positive manner. They have attained good managerial expertise and technological competence, as well as the qualities cited in the UNESCO Issue Paper of "cultural literacy (the ability to recognize and exploit social, cultural, lifestyle, and ethnic distinctions)" and "a reflexive approach to knowledge and practices".

These core competencies are crucial in creating a Culture of Innovation. Diaspora innovators indeed embody a specific capital that may be tapped for the purpose of developing a Culture of Innovation in the home country, and thus contribute to building a knowledge society there. Coming back home permanently or for limited periods of time and collaborating closely with scientists, technologists and entrepreneurs, they can help transform attitudes and encourage local innovative potential and ideas by working side by side with them, as well as by teaching in more formal training activities. Their network of contacts in their country of residence may help introduce new ideas and new technologies, thus promoting innovation. They can bring in investments in new, technologically based business ventures.

The diaspora innovators can therefore become key agents for bringing in knowledge and stimulating attitudes and helping create systems favorable to innovation. They are particularly qualified for this purpose since they speak the local language, are capable of fitting into the predominant culture (with some orientation) and can use their pre-existing networks of family, friends, former fellow students and colleagues to transmit with some degree of success new attitudes, values and knowledge. This is in contrast to foreign expatriates who would have an uphill task to do likewise.

It is important however to realize that most members of the diaspora coming back to, or even visiting their country of origin as “advisers”, can be viewed with some scepticism and resistance by the locals. It is therefore critical that they be carefully culturally oriented to be aware of the perceptions that people in their homeland may have of them. They should also be trained to adjust and adapt their approach and communication style accordingly, if their professional expertise and ideas are to be well received and have full impact. This is a crucial aspect in the possible influence that members of the diaspora can have in their home country, and in helping change ‘a culture of conformity’ into a Culture of Innovation in government, universities, enterprises and other organizations.

True innovators are likely to be only a small part of the intellectual diaspora, but because of their particular skills, knowledge and contacts they are an extremely important one. Over and beyond the efforts to utilize its intellectual diaspora, a country that wants to create a Culture of Innovation should take special pains to identify its diaspora innovators, particularly those that can really understand and relate to their home culture. They should orient them and use them as fully as possible for such a purpose, with meaningful professional, if not financial, incentives.

The transmission of innovative skills and knowledge may take place, as we have already indicated, in two complementary ways. The first one is to have the diaspora innovators work side by side with local partners and their collaborators, with on-the-job training – "learning by doing". In this process it is critical that the diaspora innovators themselves be open-minded and willing to learn from the local aspiring innovators, so that they may help develop the latter's innovative potential in ways best suited to their culture and their institutional setting.

The second way would be using diaspora innovators as teachers in formal, carefully planned training activities, particularly at universities. This may require first helping them become good transmitters of their skills.

A very important aspect in both modes of training, on-the-job and formal, is the need to overcome cultural obstacles and resistance by ensuring cross-cultural training and coaching methods for all concerned. We elaborate on this in the following section.

The learning by doing approach to the transmission and promotion of innovative attitudes and skills can best be carried out in a concrete situation of innovation, when an investment or a project is being planned and executed, in industry, business, educational institutions, hospitals, research centers, government agencies, etc. In an industrial or business situation, the place for this would be in forward-looking enterprises - locally owned, joint venture or foreign subsidiaries. In some cases a foreign firm establishing a subsidiary or going into a joint venture with local partners will bring in among its key personnel people who had emigrated some time ago from the country. If these people have explicit innovation skills and are culturally aware, they may function as trainers or coaches of local innovators.

Let us supply an example of this. In a recent article A. Banerji has described a successful on-the-job training activity on innovation he conducted. Going back to his native India to develop a key early-to-market product on which he had been working in California, he found "a refusal to innovate". The team "had engineers with basic engineering degrees with anything from two to seven years of experience doing mundane project consulting. Few had any experience with a product and absolutely no one had ever brought new technology products to market. At first, all attempts to work around engineering problems with creative solutions failed… After some intense weeks of breaking down chains and locks against innovative thinking, this relatively inexperienced team was well on its way to create a world-class, extremely innovative product", though "initially these same

bright engineers had just about refused to innovate – 'cannot do it' had been the attitude."

The persons to receive training should be selected on the basis of their professional competence as well as on their attitudes of risk-taking, creativity and the courage to consider new and alternative ways. They would be made to interact closely with diaspora innovators, both in the home country and overseas. They should ideally also be given some formal training on matters of innovation and on innovation skills and attitudes, through courses specifically geared to their cultural realities, with the participation of diaspora innovators as instructors or co-instructors.

However, local innovators cannot be innovative without a Culture of Innovation and supportive mechanisms that encourage and foster innovative ideas. So it is not merely individuals that require training. Developing the right attitude and climate to support these efforts, creating a Culture of Innovation in organizations, educational institutions, government units and corporations is an even greater challenge that must be addressed. These institutions need to be open to cultural changes and new, innovative ways of doing things.

It is not easy to solve this chicken-and-egg problem, but we feel that the use of diaspora innovators can help to start and stimulate the process. On the other hand, specific national problems that need to be addressed, like alternative energy development, burning health issues and agricultural production shortfalls can become meaningful goals that provide the incentives for the innovative effort.

Since this is a novel subject for most countries, it may be useful at an initial stage to seek the collaboration of an outside institution. (Please see the example we mention below of collaboration between Cambridge University and MIT).

At a certain stage, the development of an 'innovation cluster' in which universities, research centers, enterprises and other stakeholders collaborate closely would allow diaspora innovators to find a good habitat. Though the development of such a cluster is a tall order for most emerging countries, interesting examples may be found in some of them. One such example is the cluster that has developed around São José dos Campos in Brazil, with the Centro Aero-Espacial (a specialized research university, combining teaching and research in science and engineering), the EMBRAER airplane corporation (a very successful enterprise, the third largest commercial aircraft designer and producer in the world after Boeing and Airbus), and other forward-looking enterprises. Another interesting cluster exists in Bariloche, Argentina, with the Centro Atómico Bariloche

(also a technical research university), INVAP (designer and producer of nuclear research reactors, satellites and other high technology products) and several firms engaged in high-tech activities. In both cases, returning diaspora innovators have found a welcoming home in one or another of the institutions in the cluster, and have been able to transmit their attitudes and knowledge about innovation to a younger generation.

4. Cultural aspects

A number of cultural issues would need to be addressed to ensure that any of the above efforts can be truly successful. They include:

1- A possible erroneous belief on the part of the diaspora innovators that they are returning to a culture they really know how to interact in, and in which they would "just fit back in". This happens when emigrants are unaware of how they have changed, as people and as communicators, by living in another culture. There is also often not enough of a realization of how their country of origin has evolved and how that has affected its people and their subtle, unspoken interactions.

2- There is also often a lack of awareness on how "returnees" might be silently perceived by the host culture professionals and society in general. For example, as professionals from the diaspora return home from the US, unless they are sensitized to these issues, they could be talking louder than the average local colleague, being more assertive in ways that are valued in the US, but could be interpreted as "arrogant", "loud", "aggressive" or "pushy" in their country of origin.

3- Returning to "teach" some of their own classmates can lead to be perceived as a "know-it-all" and can provoke some resistance from those that consider themselves "equals" and resent a "big brother" syndrome from the "foreign-returned".

4- Attitudes that are the key to developing a Culture of Innovation can only be conveyed in a climate of genuine trust and mutual respect. It may not be easy to create this in a culture that one has lived away from.

5- Innovators can be seen as rebels, or as teaching employees to "buck the system", to which there may be great organizational resistance. In traditional, hierarchical societies there is a fear of innovation that might threaten to change well-embedded power structures.

How can we address some of these issues to ensure effective and optimum utilization of the services the diaspora can offer? The diaspora innovators need to receive cross-cultural training to help them to:

1- understand how they have changed by living outside their country;
2- understand how they might be perceived by their colleagues in their country of origin ("To see ourselves as others see us");
3- want to learn about and respect how things have been done and how people have been operating currently in their country of origin;
4-realize the need to adapt some of their approaches, as necessary, and proceed with great humility, and learn how to gain respect, express appreciation etc. in that culture;
5- see themselves as catalysts, recognizing that great talent, abilities and innovative potential lie untapped in the country itself, and
6-learn to give credit to the home country personnel and keep a low profile, while playing a highly inspirational role.

5. National policies

Innovators potentially exist in most countries. The challenge is to help them bloom, support their insights and build on their ideas.

The utilization of the intellectual diaspora, and of diaspora innovators in particular, can fuel a process in favor of development and innovation. This should be supported by explicit promotional policies from the government and other stakeholders, but even more so by the adoption of attitudes of openness and flexibility, that are not yet widely embraced in a mainly traditional country.

We first need to define "diaspora innovators". There is likely to be a gradation of the capacity to innovate in different members of the intellectual diaspora. This may range from those purely interested in the routine technical and practical aspects of their work, with very low innovative abilities, to those who have acquired strong innovative traits and capabilities on top of their professional skills.

We need research and discussion on how to define, assess and quantify those capabilities. Once an operational definition is agreed upon, it may be applied to a data base of the intellectual diaspora from the country in order to create a listing of diaspora innovators. Ideally, a few sub-categories should be contemplated, according to discipline and area of work, with particular attention to those needed in the home country.

Once this is done there is the question of how to reach out to diaspora innovators and motivate them to help the home country. Since these are very special individuals, who have attained good positions overseas, special incentives – not all monetary - may have to be offered. Even the stimulation of networking with other outstanding diaspora

innovators, with the challenge of addressing a nationally important issue, may be incentive enough for many. For example, India has developed a Business School in Hyderabad utilizing successful diaspora innovators to come together and plan this institution for their country, and has also managed to attract several “Non-Resident Indians” to invest in new ventures in India.

The design of a national program to utilize diaspora innovators would vary according to circumstances. The program's size would depend on the available diaspora innovators, the areas and issues involved, the numbers of local people to be trained, the need to provide seed or venture capital for new investments of an innovative character, and so on. It is clear that no general recommendation may be made.

Perhaps the most effective impact may be in injecting innovative blood into the educational systems of developing countries with restrictive and traditional educational systems, at the school, college and professional training level.

In the production system, an interesting instrument may be a promotional program to expand a novel industry of importance to the country, using it as a vector to introduce innovative capabilities with the support of diaspora innovators. For instance, the environmental technology industry would make a promising candidate for this approach. Developing countries' demand for environmental goods and services, now being imported to a large extent, is expected to grow sharply, at rates of over 10% per annum. It is only natural for a country to try to attend to this growth increasingly from local production capabilities. This needs the development of such capabilities, in areas and projects of existing firms, and in the form of new environmental technology enterprises. An interesting opportunity may thus open up – for instance, in non-traditional energy technologies. Diaspora innovators could bring in capital, know how and other capabilities necessary for a self-standing industry. In particular, it would be very important to create and nurture new, innovative environmental technology firms, based on technology developed locally. A promotional program with the participation of diaspora innovators experienced in this industry could result in expanding the local environmental technology industry, introducing innovative technology and at the same time transferring innovative skills to local people. Here once again a sensitive understanding of the local culture would be critical.

Finally, we may suggest using successful innovative entrepreneurs to train people and prompt a change in attitudes. There are in some industrial countries high-level immigrants who have founded, or are now presiding,

successful innovative companies. Some examples in the US are INTEL (microelectronics), Sun Microsystems (IT), Computer Associates (software and IT services), Bose (sound reproduction and acoustics), Sycamore Technologies (opto-electronics), TIAX (contract research and development), Arthur Andersen Consulting and Mackenzie (management consulting). A careful search is bound to bring up many more such companies, with founders/leaders from a variety of emerging countries.

Some of these leaders could be invited by their respective countries of origin to teach the principles and practice of innovation to a group of young people. The costs for the country are not likely to be high, since these persons are in a good economic position and would probably not require any fees. The program could contemplate a couple of visits to the home country of a week to ten days each. The first visit would include some presentations to stakeholders, plus training seminars on innovation conducted by the leader for a carefully selected group of 10-20 young people that have shown innovative capabilities. The trainees would then travel to the leader's country of residence and spend a few months working in laboratories and technical units of his company. There they would receive on-the-job training in innovation skills, perhaps working on a project that is important to their own institution at home, so that the training has additionally some practical relevance. On returning home the trainees would work on local innovative projects. After a few months, the leader would make his second visit, with seminars, tutorials and coaching for the trainees, plus some presentations for a wider public. Such a program could deliver a significant impact for a moderate cost.

A good deal of work would be required to design the program, determine which local institutions would be involved, develop the syllabi for classroom and for on-the-job training, select the trainees, and so on. It would also be important to explore how to follow things up for best results; for example, the top 3 or 4 trainees could become trainers themselves, helping to spread the Culture of Innovation more widely.

6. Role of international cooperation, bilateral and multilateral

There is certainly a role in all this for international cooperation. Let us first consider the case of bilateral, country-to-country cooperation.

As we have seen, many brain-exporting countries have experienced losses and suffered important drawbacks as their best people have left to pursue their studies and their professional careers in industrial countries.

At the same time, several industrial countries have strongly benefited from the immigration of high level human resources, to the point that many activities in science, education, industry, health care and other areas of activity would suffer if such immigration were to decrease substantially. This is especially true in the case of the USA.

Should high level migratory currents be wholly left to the interplay of market forces? We would like to suggest that there are valid ethical and normative grounds for the countries that benefit from them, particularly the USA, to help reduce the brain drain and to compensate the brain exporting countries for their losses.

This compensation does not have to be thought of only in monetary terms. There are a number of ways for industrial countries to help those countries reduce their losses, and to obtain some returns from the human capital in their intellectual diasporas. For instance, they may:

- moderate their recruiting in brain exporting countries of certain categories of personnel in areas that are of key importance to the home country, such as health care, agricultural research/extension and university education;
- make immigration temporary in cases where the brain exporting country is strongly in need of certain skills that are being lost to emigration;
- allocate more technical assistance funds to cooperation programs helping tertiary education in those countries, so as to cover, even partially, the costs of training of the people they are losing;
- help brain exporting countries to constitute diaspora networks and assist those countries to utilize their diasporas for their benefit.

We will now take this last point, and focus on assisting countries affected by the brain drain to develop a Culture of Innovation with the help of their “diaspora innovators” present in industrial countries. Imaginative programs of this sort could have a strong impact at a moderate cost, and could significantly help counteract the losses suffered by the brain exporting countries. Industrial countries that have benefited from high level immigration should consider including such programs among their bilateral cooperation activities.

A program of this nature, oriented to a particular country, could be called “Culture of Innovation (CI) Program”. It could follow similar lines to the ones suggested above for national programs. The donor country would collaborate with the home country in the:

- identification of members of the intellectual diaspora in the host country, and creation of a data base to be updated periodically;

- networking of the diaspora and creation of mechanisms to allow it to assist the home country;
- definition of diaspora innovators and listing of those in the host country, as a resource available on the Web;
- identification of a promising cooperation program;
- design of the program and analysis of its feasibility;
- selection of an institution responsible for the program. This could be a research university, an enterprise or a foundation;
- implementation of the program.

Take just one possibility. There is currently a major program being implemented between Cambridge University in the UK and MIT in the US. It aims at "enhancing the competitiveness, productivity and entrepreneurship" of the UK economy. This will be done by "improving the effectiveness of knowledge exchange between university and industry, educating leaders, creating new ideas, and developing programs for change in universities, industry and government". Such a mission implies, in fact, the development of a Culture of Innovation. Large resources are committed to this program, which has a 6-year time horizon but is expected to continue well beyond.

The insights, experience and new knowledge resulting from the program could well be applied at some future moment to a cooperation program, perhaps involving both institutions (Cambridge and MIT), for the purpose of helping one or more brain-exporting countries to use their diaspora innovators for similar purposes. Funding could come from one or both governments, international agencies or a Foundation.

The above refers to bilateral cooperation. There could also be a promising role for multilateral cooperation programs involving international agencies. UNESCO is already blazing the trail with the present symposium. The World Bank, on its part, has created a "Knowledge for Development Program", which in 2002 held a Latin American Policy Forum on "Using Knowledge for Development in Argentina, Brazil, Chile and Mexico". Beyond such preliminary explorations, there are exciting opportunities for these and other international agencies to promote the utilization of diaspora resources for the benefit of the brain exporting countries, in particular for the creation of a Culture of Innovation in them using diaspora innovators.

What could international agencies do for this purpose? In the first place, they may promote studies and debates on the subject. Secondly, they may broadcast to brain exporting countries the result of those studies and exchanges, and other relevant materials as well, promoting a wide

discussion of ways and means to use the intellectual diaspora and particularly the diaspora innovators for such aims. Finally, specific programs of international cooperation may be developed and implemented, responding to requests from interested countries. Participation of the World Bank and regional development banks would be especially welcome.

7. Role for UNESCO

UNESCO may wish to further develop the ideas presented in this discussion paper, and incorporate some of them into its activities for enabling the creation in member countries of a Culture of Innovation, and through this assisting in the development of a knowledge society.

A first step could be to hold a Workshop to review and discuss national experiences on using the intellectual diaspora and in particular diaspora innovators. A number of case studies could be specially commissioned for this occasion, following a common methodology. This workshop could be organized in cooperation with an institution of an industrial country now receiving many high level immigrants. (The University of Massachusetts, through its College of Management, would in principle be interested in offering its collaboration to UNESCO for this purpose).

The results of this exercise, together with what may come from further studies and dialogues, would assist in the design of strategies and viable policies. UNESCO may use this as a basis to formulate technical cooperation programs aimed at helping develop a Culture of Innovation in some of its member countries.

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Statements by experts

Olexandr Popovych,
Head of the Interdisciplinary Laboratory for S&T policy development and realization G. Dobrov Center for S&T Potential and Science History Studies at the National Academy of Sciences of Ukraine

The notion of innovation culture has become an increasingly frequent expression in our vocabulary. This is due to the rising awareness that investment per se cannot ensure an innovation boost. Problems related to the fostering of an innovation culture have been actively elaborated in Russia, where at the end of 1999, representatives from science, culture, education, public administration and companies from different regions of the country signed the National Charter of Innovation Culture. In spring 2001, Moscow hosted the forum "Innovation Culture at the Threshold of Centuries". An exciting report delivered by Dr. A.I. Nikolayev, Director of the Institute for Strategic Innovations, has been published in the journal "Science and Science of Science". Regrettably, interest in these issues in the Ukraine is still poor. Some methodological aspects and problems of the fostering of innovation culture in the context of the creation of a Pan-European S&T area have been studied. The Draft Concept of Innovation Development of the Ukrainian Economy that was worked out by the G.M.Dobrov Center for S&T Potential and Science History Studies of the National Academy of Sciences of

Ukraine envisaged a special section entitled “Fostering of the Modern Innovation Culture in the Society”, which refers to innovation culture as a “radical transformation of the spiritual development of the country, so that it may be organically embedded into the process of economic transformation of the nation to the innovation-based model of development”. This document emphasizes that it is an adequate innovation culture that, in the future, shall ensure the level of social development, creative capabilities and individual skills that meet the needs of innovation-focused economies. The potential and the creativity of individuals – competencies and skills, intellectual level, creative effort, and social relations – must be matched with the outcome of human activities (e.g. techniques, technologies, information, products of arts, legal and moral standards).

- The definition of “innovation culture” is still subject to discussions. The definition proposed by us and adopted by Ukrainian law “On Priority Areas of the Development of Innovation Activities in Ukraine” is as follows:
- “Innovation culture is a component of the innovation potential, featuring the level of educational, overall cultural and socio-psychological stand-by of an individual and a society as a whole to respond to, and to positively implement in practice, ideas of the economic development of the country on innovation basics”.
- Despite differing opinions on the relative importance of the different issues, the formulation of these tasks seems to be generally accepted. But when it comes to their practical implementation, or the emphasis given to present or future action, quite essential misunderstandings appear.
- To our opinion, broader interpretations are as much undesirable here as excessively narrow ones. It is clear that a required condition for fostering an innovation culture in an individual, a social group or a nation is the existence and availability of a certain educational and cultural level of the people involved. However, a unsound, even harmful tendency to equalize innovation culture and culture in a broader sense has appeared recently, adding unresolved problems of education to problems related to the fostering of innovation. This approach is harmful, because the specific notion of innovation might be lost, risking to “drown” in a multiplicity of concerns about the educational and cultural system. Today's paramount need is to raise public awareness on the fact that the Ukraine has no alternatives to

innovation, and no other model of economic growth, than the one that relies on the fostering of a cultural, educational and psychological willingness to vigorously implement possibilities of national, social, and economic development.

- It is admitted that the educational level of our workers and engineers, and of the population as a whole, is not lower, but often even higher than in many Western countries. However, we feel that the level of innovation culture in our society erects severe barriers for development based on innovation.
- Thus, in order to improve the decision-making process related to the enhancement of the population's innovation culture, the education sector should emphasize the following:
- Supplying staff for the priority areas of S&T and innovation;
- Expanding the possibilities for direct involvement of students in R&D;
- Adopting academic programmes and textbooks to scientific progress; not only in universities, but also in secondary schools (of course, this task cannot be solved without immediate and direct contribution from researchers);
- To take more care that gains achieved in the process of "poly-technisation" of our educational system throughout the XVII and the beginning of the XIX century be preserved;
- Liquidating the notorious "innovation illiteracy", e.g. through courses on the history of science and technology to be offered in secondary and higher education, as well as through courses that inform on leading trends in the development of global civilization, and factors and rules that affect the transformation of the world economy into a knowledge-based economy;
- developing a system of continuous education and the involvement of specialists with higher education diploma therein.
- On the subject of the level of innovation culture, special emphasis should be made on the vital importance of popularization of scientific knowledge, and on the need for a coordinated effort of those working in science, culture and education. Circulation of popular scientific journals has fallen rapidly; fees and recognition of work in this field have fallen to an extent that young scientists and journalists can no longer be attracted by the work; gifted popularizers have stopped for the same reason. This does of course affect the quality of publications, thus, strengthening various kinds of pseudo Scientifics that create false perceptions about science and, finally, contribute to the degrading level of innovation culture.

- Speaking about the role of literature and arts in fostering an innovation culture, it is necessary to emphasize the fiction genre, which, to our deep regret, has lately ultimately lost the right to be referred to as “science fiction”. While J. Verne, A. Tolstoy, I. Yefremov, V. Vladko, the brothers Strugatsky, R. Bradbery, Aizek Azimov and many other national and foreign authors prepared the public to the S&T revolution, encouraged people to reflect over contradictory problems, the work of many contemporary authors only confuses people's minds and creates a distorted perception about science, scientists, and about the significance and capabilities of scientific knowledge.

An important, in many ways decisive, role in fostering the modern innovation culture may and must be played by the mass media. Given the importance that the issue has for the future of the country, the mass media could help to propagate an innovative way of development and to resolve the aforementioned problem of the popularization of scientific and technological progress, and (not less important) in the dissemination of unscientific knowledge. There has been persistent the idea to create and implement broad-scale national programmes in mass media in order to streamline the public opinion in an “innovation direction”; contributors might be scientists, industrialists, prominent public personalities and, surely, journalists. The practice of such programmes is well known in a number of countries. But in the Ukraine no action has yet been done. There is a need for an initiative, or the material support of initiatives of the kind produced by public administration bodies.

- In this regard, it is also necessary to look at the question of how the level of innovation culture in public administration offices can be increased. Problems are evident at all times and at all places, but they become especially glaring when it comes to the negotiation of rules and other legislative acts relating to innovation activities in various ministries and administrative departments. To start with, many administrative officials do not possess modern terminology relating to the area and cannot understand what is spoken about. Moreover, we have often seen that any effort to support the development of science is being interpreted as lobbying for particular interests.

Such an “innovation semi-literacy” is not only a personal matter of administrative officials, but an insurmountable barrier for the implementation of S&T and innovation policies, thus questioning the very

possibility of making and implementing decisions. That is why the draft Concept of Innovation Development of the Ukrainian Economy claims (i) to better qualify government officials to manage innovation, to perceive modern innovation processes in the economy as well as mechanisms of implementing S&T policies of the state; (ii) to involve each employee in a system of continuous training.

The Ukrainian law "On Priority Areas of Development of Innovation Activities in Ukraine", adopted by the Parliament in 2003, refers to the development of innovation culture as a national strategic priority, clearly a positive step forward. Its medium-term implementation is envisaged via the following activities:

- Support of national book printing and educational and popular scientific publications;
- Development of educational and popular scientific programmes in the mass media;
- Organization of training centers for remote areas using advanced telecommunication technologies;
- Application of advanced computer technology in training and scientific work.

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Urii Vassilievich Puhnachev
Advisor to the Institute of Strategic Innovations

We are witnessing a very interesting stage of the development of our concepts, still it seems that we have not yet worked out a common system of definitions. Many of the things presented here are true revelations as the definitions and models were not known to everyone Only once we work out an interrelated system of definitions and models will we see real chances for substantial progress.

As we talk about common definitions within the context of knowledge society, we have to explain which place a Culture of Innovation has and will have in this knowledge society. At the roots of this question we find the notion of "knowledge". We have to take into account that knowledge is always divergent. But what does "divergent" mean? It means that new components of knowledge are generated either by an individual or a very small group of individuals, raising thus the issue of transfer and the spreading of this knowledge. How does the whole society digest this knowledge; how is it to be applied; who establishes a common methodology for this application? Each of the listed steps is of an innovative nature and we all know that processes of innovation gain in momentum and scale if there is a Culture of Innovation inherent in society.

This is why I hope that the Culture of Innovation will not loose its importance in the knowledge society even if we proceed to analyze different aspects of this culture. Let us assume that fundamental science is based on profound and precise knowledge; subsequently, the process of its production must be intensified; knowledge has to be transferred - means of communication must constantly improve; the more efficient the transfer, the more concise the information is; with regards to education, in order for each individual to learn more efficiently, the educational system must be improved.

Thus we have reviewed all fields of UNESCO's activity except for culture. We spoke about the issue of transferring knowledge from one generation to another. This concerns the educational domain, knowledge transfers between different social strata and the change of fundamental into applied knowledge. There is though one more important feature. We live in a world of diverse cultures, some cultures being more receptive to innovations than others. Let me give you some examples. Ancient Greek mathematicians invented geometry but were later confronted with a dead end. If they had not received new knowledge from India and algorithmic methods from Central Asia, their mathematical science would not have

developed any further. This interaction between European and Eastern culture gave a very powerful impetus for development in numerous areas. Different nations' ability and drive to innovate must be studied from an economic point of view. Let me give you another example. A prominent engineer once told me the following story. When he and his colleagues needed a roller bearing of exceptional quality they simply ordered a big amount of them, dismembered each in order to chose the balls with the best quality. It turned out that in Russia and USA only 1 to 3% of the materiel had been of exceptional quality. But the Japanese figures were close to 99%. What are the reasons for this difference? Is the steel different in Japan, or the machinery? I doubt that. The explanation lies in the realm of mentality, production system, and the degree of responsibility. There are similar examples in the field of fundamental science. In physics there had been a problem of the retaining of evenness; one of the first solutions was presented by Li Djhun Dhao and Yan Djhin In - two Americans of Chinese origin. Why them? Is it not because of their mentality? We understand a Culture of Innovation as the extent to which a society and its members are open to new things. This openness ranges from tolerance and mental flexibility to active participation in innovations. Different people have different qualities, which is why we must learn from the experience of others. The differences in language reflect this.

To give you an example: there is a nice German word, “gönnen”, which means “to be able to appreciate the success of others and even help them in their development while not being jealous”. There is no word for this in Russian or in many other languages. Cultural exchange works when nations communicate. Should we not introduce this exchange, which, in my opinion, is the focus of UNESCO's activities, in other areas?

Let me give you another, lighthearted, example of different mentalities. The inhabitants of Belgium and The Netherlands speak partly the same language, however, different religions have lead to very different mentalities. In the Netherlands one can buy books titled “Anecdotes about the Belgians” whereas in Belgium one can find “Anecdotes about the Dutch”. These people who speak one language are joking about each other on the basis of cultural differences.

To give you another more serious example: In the European part of Russia one settlement is usually a few kilometres away from the other. In Siberia the distance increases to hundreds of kilometres. In the European part, people tend to search conformity, whereas Siberians live in a spirit of independence, entrepreneurship and search for novelties – all of which is close to what we call innovation. In that sense, the Siberians are close to

the Americans. An interesting point to make here is that Siberia has always been the driving force of the Russian economy. Therefore, the geographical factor must be taken into consideration.

While we are developing a common system of definitions (which could take years to come), the problem of cultural exchange in which UNESCO has such a great experience, must also be tackled.

Dragoljub Najman
Ambassador of Serbia and Montenegro and Permanent Delegate to UNESCO, Serbia and Montenegr

The educational project in the Ivory Coast is an example of the utilization of television, and more generally of information and communication technologies in the educational system. The project took place in a system of primary education and had not only an impact on the whole country, but also on the way of thinking about new technologies and their utilization.

The system of primary education in the Ivory Coast lent itself to that experiment only because of the highly centralized educational system. The system, based on the French colonial system, established exactly in which grade, at which time, which subject would be taught. We were, therefore, able to know that at 8 o'clock in the morning all first graders in the whole Ivory Coast would have a French lesson and that this lesson would deal with a certain issue. We knew that at 9 o'clock there would be a lesson of mathematics, at 10 o'clock a lesson of sciences etc.

It was possible to connect the educational system to the centralized system of instructional television, since the latter could broadcast at the precise hour a precise pedagogical message that was to be understood by everybody in the country. We had to establish a system by which TV sets would be operational in the middle of the jungle, in a huge country, with thousands of classes and schools; at the end more than one million children were connected to the system. Another constraint was the low quality of teaching at primary level; teachers were under-qualified, under-educated and under-trained conveying a message of poor quality to the children.

Objective number one was to increase the system quantitatively – to get a maximum of children into primary education. Objective number two was to improve the quality of education in a revolutionary way, avoiding long periods of training for teachers.

In the beginning of the study in 1967-1968, we had 380.000 kids; in the last year of the experiment, in 1980-1981, there were 1.060.000 children in the system - an increase of 300 % in thirteen years. Since TV teachers were professionals, the quality of education during that period increased in a dramatic way. They were calling children to come to the screen; they were showing things; they were asking kids to point the finger on the screen to figures, to letters, to words.

The initiative was funded by UNESCO and France. In order to learn from others, we analyzed three micro-projects of that time, one in the

Saharan desert of Niger, one in American Samoa and the last one in San Salvador. In the Ivory Coast, we started with the first grade in 1971. After having built a system of TV studios in the country and prepared specialized TV teachers, the first 20.000 first-grade students enrolled. At the end of the project we had more than a million students, our quantitative progress.

I think that the next element will be of interest to you. In 1981, the system was stopped by a decision of the government of the Ivory Coast as a consequence of a general strike of secondary school teachers who felt threatened by the system. Primary school teachers were mostly under-qualified and established a good relation with the screen; but secondary school teachers, university graduates, feared unemployment. Most of those teachers were French nationals and the government of the Ivory Coast had no other solution but to stop our program.

From a technological point of view, we learned a lot. For instance we made the TV set go through some tests; because of local weather conditions in the Ivory Coast and the fact that when it was raining, it was raining not only outside but also in the classrooms, the TV was being dropped to a swimming pool to check whether it would work afterwards or not.

The TV set, for instance, had to be adapted to local weather conditions.

Secondly, we had people manipulating the TV sets; the TVs only had one button, to turn it on and off and establish the volume. At the time being there was only one channel in the Ivory Coast and we used that channel during the day for instructional education. In the evenings this channel was being used for population.

The third thing we learned was that in order to provide electricity, we should avoid any movements. We therefore decided to use batteries to operate our TV system. Only the batteries used by the railway system satisfied all our requirements. Additionally, we learned how to save energy; we found out that the longer the TV tube was, the less energy it consumed.

We also learned that children between six and ten years had an attention span of 8-12 minutes. Therefore, the duration of one lesson was 12 minutes.

Now, if we really want innovations, we have to ask ourselves 5 questions and try to answer them:

1- How to do more with less?

2- How can we shorten the initial period of training through life-long learning? For instance, it is a fact that when you become a doctor you are already 30 or 32 years old. The question I am asking when we talk about innovation is therefore, how can we create an educational system which is less time consuming?

3- How can we introduce positive discrimination into education, allowing poor people to be successful? This should be one of the major aims of those dealing with innovation in education.

4- What shall we do in order to ensure higher literacy rates? (I address this question to OECD countries).

5- The final question will be how to ensure education for those who have never learnt how to write and how to read. In our days, we have about one million illiterate people as well as 130.000.000 children who do not attend school. These people's standard of living must be increased although they are illiterate. For me, innovation should be above all oriented toward those areas.

Eleanor Glor
Editor in Chief and Publisher, The Innovation Journal, Canada

I have been working on innovation for a long time. I studied revolution in university as so many of us did. Since then I have found out a lot about how to change society without passing by a revolution. These changes occur mainly through innovation. I am, therefore, interested in innovation and try to understand the phenomenon from my own point of view – the perspective of somebody who works with the government.

I have worked for four governments, the private sector, and the non-profit sector. So I have had an opportunity to study how different organizations innovate or do not innovate. From my prospective, there is a very large difference among organizations in terms of how open to change and innovation they are. And that is the phenomenon that I have been trying to understand, why does it happen, why are some organizations and some people more open to changes than others.

Of course, like all of you, I cannot share all my thoughts in a few minutes. First of all, a little bit about my personal learning journey about innovation. Secondly, I would like to talk about innovation cultures, with an "s". So far, at this symposium, we have been speaking about one Culture of Innovation. I have come to the conclusion that there are several ones. Lastly, I would like to talk about what can be done, what we can do to help a Culture of Innovation emerge.

As I mentioned to begin with, I have worked in a number of environments in which I have observed big differences in how innovative governments are. One of my articles is the comparison of three governments and the differences that I have observed. I remember saying in 1980 that somebody should write a book about the government. Nobody had written that book by 1990, so I wrote it with colleagues from our government, documenting innovations both on the policy and administrative process side. We discovered one hundred and sixty innovations. I defined an innovation as the first time that something has been done in North America and in the first, or the second, or the third time. We thought that having found and documented one hundred and sixty innovations was a good enough way to demonstrate that the government was innovative.

The next stage in my personal journey is that I tried to understand the process that had allowed the emergence of that much innovation in one government. You may know the work of Mr. Rogers, the guru of innovation processes. His field is communications, innovations about

communications in general, and the dissemination of innovation in particular. He developed a process and I adopted that process for the context that I was working in.

It was mentioned yesterday that defining a process of innovation could create a static understanding of it. I agree that this is to be avoided and tried to do so by acknowledging that the process itself has stages that can be observed. The beginning of a process is the emergence of a good idea. The implementation of that process involves convincing other people, which turns the process into a social act. Whenever you try to implement an innovation you have to convince a lot of people, you have to create the will to implement it, you need money, and at the end you need a pilot project in order to convince people that the project is worthwhile without taking a high risk.

Once the project is implemented, organizations or societies that generate many innovations, must evaluate them. They must be willing to acknowledge both success and failure. One of you told me a story about a highly successful innovation that people rejected. Innovations do not always have the outcomes that we expect. If an innovation is to be a common activity, we must learn from our past experiences.

A number of others defined the process of implementation of an innovation. The question in creating a Culture of Innovation is how to institutionalize this process.

Having thought about the process of innovation, some thought must be given to its context, since it is the context that determines to a large extent how welcome innovations are. Each organization and society has its own culture; there is thus more than one culture. These contexts, these cultures have an impact on the implementation of innovations. How welcome innovations are, how well they proceed and how well they are implemented depends on different factors. I have defined three: personal motivation, organizational and societal culture and challenge. These factors form constellations; they are not one single phenomenon. What they represent is the impact of an individual, the organization or the group on things that must happen to create the innovation.

At the level of personal motivation, I make a distinction between intrinsic and extrinsic motivation. An intrinsic motivation comes from within, someone is totally committed to put an innovation into practice. The extrinsic motivation is exterior, based on the willingness to increase the efficiency or to improve things. A person who is extrinsically motivated will only continue to work on an innovation as long as there is an external reason to it. A person who is intrinsically motivated will continue to work on it forever.

I think that organizational and societal cultures reflect each other. It is important to distinguish between somebody who has been told to innovate and someone whose ideas are about the innovation. Innovation relates to motivation – they interact with each other. But the culture of an organization has an important effect on whether or not innovation grows, emerges and continues.

The third factor is what I have called challenge, describing possible obstacles when implementing the innovation. Major challenges to innovation are related costs, the legislative framework and agreements among partners who do not normally work together. Minor challenges are involved when the innovation is not hard to implement, when it does not cost much money or when it does not threaten anybody's power.

The constellation of these three factors and its subfields (extrinsic and intrinsic motivation; top-down and bottom-up culture, major and minor challenges) has an important impact on whether or not and how often an innovation emerges. Some of these combinations produce a lot of change and others produce very little change. When we talked about the innovation culture, we have mainly thought about specific patterns, which enable a lot of innovation. But innovations occur in all of the eight possible innovation cultures.

Let me give you an example: I have called the combination of extrinsic motivation, top down organization and minor challenges reactive innovation - an environment in which people wait until there is a problem and then somebody gets told to deal with it. The top determines how and why innovation takes place as well as how many resources are allocated. It is not difficult to implement the outcome, because those who are in control over the resources and the authority are in favor of the change. But the change will not be fundamental and it only happens after the problem has occurred.

Another example: the motivation is now intrinsic and again we have the top down direction to innovate, but this time a major challenge - a transformational innovation. Transformational innovations will produce major changes but are disruptive as they modify the way things are done. There is thus a tendency that the next government changes the reform in the other direction, producing huge swings from one extreme to another.

From my perspective, there is a more effective way to do innovation - through continuous innovation. In continues innovation people are intrinsically motivated to innovate. They notice the respective benefits and want to go ahead. They are all allowed or encouraged to move forward with their own ideas and although there might be major challenges, those

holding authority and the resources and the actual innovators co-operate. In the long run, major changes are created, but they are not disruptive.

I would like to share something that I have recently learned. Apparently we humans are not sensitive to change; we do not feel changes unless there is a 3 % change per year. That is very important, because 3 % change per year add up over time, but a slow continued change is a much more comfortable thing to live with than major changes.

My idea of innovation cultures is an attempt to provide a tool for people who are trying to innovate to recognize the context in which they are working. Cultures are never static, everything changes constantly. If you can recognize where you are right now and where you would like to go, then you do have some chance to go there.

I would like to use the concept of empowerment in order to show how to move from extrinsic motivation to intrinsic motivation, from top-down to bottom-up decision-making. There is a lot of talk about empowerment, however, it seems as if we talk more than we actually do. If we are truly to develop a Culture of Innovation, we need to empower both the people who are affected by it and the people who create it.

When we talk about empowerment, we often negate it: when we talk about employee empowerment, we talk about the delegation of responsibility without giving them more power. Sometimes we like to say that the individual must empower himself/herself as it cannot be done from the outside. Again, this increases the responsibility of the individual.

Others understand empowerment as a process that allows people to participate in power and I tend to think about it this way. As you may know there has been a concept called “the workplace democracy”. Today, the notion has disappeared, but if people are to be truly empowered we will need a process by which they can participate in power. It is the employee who needs to make innovations happen.

But there are also other actors in the innovation process, e.g. customers or clients. Governments tend to have clients; private sector organizations tend to have customers. These people need to feel that they are truly being empowered. The Japanese are very good at paying attention to what their customers want. If you have ever driven a Japanese car, you can tell how much they paid attention to what their customers told them. Their cars have all these little things, which do not cost very much but which makes it nicer to drive.

The last factor that I would like to talk about is citizen empowerment. Citizens are important actors when it comes to the allocation of power in a society. In Canada, we have a representative

democracy with general elections every four years. This is not a lot of participation. People are feeling very des-empowered; they think that what they are voting for does not seem to happen and what they are not voting for does seem to happen. There is a lot of discussion on how to better represent people. If governments are to be innovative they must have the agreement of their citizens. In the past we assumed that this agreement is giving through voting, but I think that this is not good enough any more.

Recently, my journal published a case study on the city of Porto Allegro in Brazil, where a consultation process about the city's budget has evolved. Consultations start at a neighborhood level, go up to the city level etc. The different groups and neighborhoods elect a representative for the next level and eventually a set of recommendations on what the city's priorities should be is presented to the city council. The city then allocates about 3 or 4 % of its budget for these issues. The process has led to a consensus on what should be done and it has led to very interesting decisions. There was, for example, an agreement to beautify the city center; to create cheaper bus services from the slums at the periphery of the city. The process created changes that were beneficial to different levels of the society - not always the same. This is a good example of citizen empowerment and I think that we need to find more ways like this to represent the people of our countries and not the elite, public services or other powerful and rich.

Vyacheslav Pavlovich Solovyev
Deputy Director, Research Center of the National Academy of Sciences, Ukraine

In the Ukraine, there are almost one thousand five hundred scientific institutions. These institutions have about 120,000 employees, not only scientists, but also other personnel. The main force of the Ukraine is of scientific, technical and innovative nature, represented by The National Academy of Science, which was a technological academy in the Soviet Union.

Competition for resources started to develop with the country's independence and the decrease of funds allocated to the science sector. It was therefore preferable to adopt the Ukraine to the new market on the basis of innovation and its technological potential.

The institute I am working for deals with questions of economics and scientific and technological progress. Besides, I am a consultant to the committee of science and education in the Ukrainian parliament. Our institute has developed several laws, for example on special investment activities for parks that regroup advanced technological institutions. A law on innovation activities states that one of Ukraine's main priorities is the development of the innovation culture of the society. Thus, the government gradually realizes the importance of innovation.

Of course, we must also deal with methodological and theoretical aspects. We do realize that economics in times of globalization means not only the mechanical fusion of companies, but also the development of an organization. The most active factor for an innovative development is indeed the individual who produces ideas and tries to realize them despite possible obstacles.

Our main topic here is the knowledge society. Societies transform from postindustrial into informational and then into knowledge societies. Economies can also be industrial and informational and, additionally, innovational and intellectual if the economy is based on knowledge.

Although our institute won a grant from the Ministry of Economics for the transformation of the Ukrainian economy into an economy based on knowledge, the Ukrainian society is not yet a knowledge society. We are very interested in the creation of practical, innovative infrastructure and help to establish technoparks and innovation centers.

Together we can decide which innovational development shall be used for the sake of human beings. Poverty, for example, can be solved by means of innovative development, the decrease of unemployment and related synergy effects. We must also compensate the migration gap. We

were doing some research on the problem of the brain-outflow and found out that the migration of high-qualified specialists can be used in order to fulfill high-tech needs. Germany showed this when its government announced the acceptance of 20.000 foreign ICT specialists of which 7-8 thousand found an employment.

The Finnish experience of venture capital was also very interesting for us. We analyzed it from the mid 60s until today and advised our government to go the same way. I have got a few concrete suggestions. First, the creation of an international network of information allowing for the exchange of information related to the question of how to build a Culture of Innovation. We could also publish a paper with the best articles on the problem of innovation culture. We do publish a journal in Russian, Ukrainian, English and we are ready to translate the new articles and publish them in our journal.

Clemens Heidack
Professor, Fachhochschule Düsseldorf, Germany

My first thesis is about the statement that only people with knowledge can create innovations. It was mentioned that the main problem of the new century was the construction of models reflecting all social aspects of life, starting from religion until education. Today, we are moving towards more flexible processes of innovation. As has been pointed out, changes create insecurity. It is thus necessary to have a comprehensive cultural approach in order to develop and implement innovations.

Let me say something about the situation here in Russia., Russia witnesses a process of decentralization. However, there is still no understanding of the term commerce in the Russian academic environment. The educational standard is high, but unfortunately only about 10 % of these intelligent people know how to deal with commercial activities. Programs to qualify specialists, in particular in the Eastern part of the country, must be enforced, but only a low percentage of participants acknowledges the necessity of such training courses. These programs are well developed, but have not been developed for countries of the East, but for Western countries with Western standards.

It is very important to understand where the roots of culture, education and innovation lie. These roots vary from one country to another. I think that Westerners are interested in what is going on in the field of innovation in the other parts of the world. We have certain values, for example, religious values. We all know that these values have played a crucial role for the constitution of a Culture of Innovation within our societies. Society and the individual create a certain climate for discussion and self-evaluation. Thus we have to work on the building of a climate, which allows for the development of innovation activities.

The individual is the initial force of innovation and innovation activities used to take place on an individual level. However, a new understanding of the different ways of development of a Culture of Innovation emerged taking into consideration the importance of common action. In 1979, Germany formed a research group on innovation in order to develop ideas and solutions to problems related to innovation. The group not only came up with innovative ideas, but constituted also the framework to develop these ideas creating, thus, efficiency gains compared to the work of an individual.

Coming back to the roots of culture: I would like to talk about the new humanism, the new economy and innovations, trying to highlight the main issues.

First of all a few words on the process of creation of value. Human efforts are the core value, whereas our view on culture is an added value. We live in a cycle, which starts with our birth, continues through the years of education and the creation of a family. We have to create a culture of labour; we have to be motivated to create something with other members of the society.This process changes the world; the individual follows its intuition and learns from others, dealing with barriers and obstacles.

At last I would like to say some words about Gandhi's seven social sins. Gandhi said that we should find obstacles to an innovation culture. We must increase our knowledge, we must implement principles in politics, we must create an economy with morality, we must create labour - a very important problem. At last, we must be open to sacrifices in order to change our culture.

Annex 1

Programme

Monday, 10 November 2003

10:00-10:30	Official opening of the seminar	
	Hans d'Orville,	Director, Bureau of Strategic Planning, UNESCO
	Philippe Quéau,	Director of the UNESCO Moscow Office
	Andrei Nikolaev,	Director, Institute for Strategic Innovations (Russia)
	Representative of the Government of the Russian Federation	
Panel 1:	The scope of a Culture of Innovation in the context of building knowledge societies	
10:30-11:30	Kick-Off Speakers	
	Hans d'Orville,	Director, Bureau of Strategic Planning, UNESCO
	Timo Hämäläinen,	Professor, Finnish National Fund for Research and Development (Finland)
	Yuri Pukhnachev,	Scientific Consultant of the Institute for Strategic Innovations
Panel Discussion		
Panel 2:	A Culture of Innovation from a regional perspective	
14:30-16:00	Kick-Off Speakers	
	Bronislav Lissin,	Director of the Institute for Strategic Innovations (Russia)

	Dragoljub Najman,	Ambassador of Serbia and Montenegro and Permanent Delegate to UNESCO (Serbia and Montenegro)
	Reinaldo Plaz,	Senior Researcher, Institute of Innovation and Knowledge Management (Spain)

Panel Discussion

Tuesday, 11 November 2003

Panel 3:	The scope of a future strategy and policy for a Culture of Innovation
9:30-11:00	Kick-Off Speakers

Eleanor Glor,	Editor in Chief and Publisher, The Innovation Journal (Canada)
Vyacheslav Solovyev,	Deputy Director, Research Center of the National Academy of Sciences of Ukraine (Ukraine)

Panel Discussion

Round Table:	The potential impact of innovation on education, the sciences, culture, communication and information: towards a deeper involvement of UNESCO in a Culture of Innovation
14:30-16:00	Discussion
16:30-18:00	Discussion of the final report

Annex 2

List of participants

Participants from the Russian Federation

Andrei Ivanovich Nikolaev,	Director of the Institute of Strategic Innovations
Bronislav Konstantinovich Lissin,	Deputy Director of the Institute of Strategic Innovations
Ludmila Vassilievna Lissina,	Advisor to the Institute of Strategic Innovations
Andrei Vladimirovich Orlov,	Advisor to the Institute of Strategic Innovations
Sergey Artemyevich Kulagin,	Advisor to the Institute of Strategic Innovations
Valeriy Vsevolodovich Cheban,	Advisor to the State Duma of the Federal Assembly of the Russian Federation
Ulia Alexeevna Karpova,	Head of a Chair of the Russian State University of Intellectual Property (RGIIC)
Boris Alexeevich Novikov,	Publisher, Editor-in-Chief, Innovations Magazine (Saint Petersburg)
Urii Vassilievich Puhnachev,	Advisor to the Institute of Strategic Innovations
Zueva Ekaerina Gennadievna,	Institute of Strategic Innovations
Alexandra Kartaeva,	Institute of Strategic Innovations, translator
Elena Lissina,	Institute of Strategic Innovations, translator
Alexandr Nikolaevich Marchenko,	Director of the Research Institute of the Russian Union of Industrialists and Entrepreneurs
Valerii Mikhailovich Rodionov,	HR Director of the Savings Bank of the Russian Federation (Sberbank)

International experts

Eleanor Glor,	Editor in Chief and Publisher, The Innovation Journal (Canada)
Dragoljub Najman,	Ambassador of Serbia and Montenegro and Permanent Delegate to UNESCO (Serbia and Montenegro)
Timo Hämäläinen,	Professor, Finnish National Fund for Research and Development (Finland)
Ranjit Makkuni,	President, Sacred World Foundation (India)
Clemens Heidack,	Professor, Fachhochschule Düsseldorf (Germany)
Reinaldo Plaz,	Senior Researcher, Institute of Innovation and Knowledge Management (Spain)
Vyacheslav Pavlovich Solovyev,	Deputy Director, Research Center of the National Academy of Sciences (Ukraine)

UNESCO participants

Hans d'Orville,	Director, Bureau of Strategic Planning
Ann-Belinda Preis,	Senior Programme Planning Officer
André Lieber,	Consultant

Guest speakers

Eleonora Mitrofanova,	First Deputy Minister of Foreign Affairs of the Russian Federation
Philippe Quéau,	Director of the UNESCO Moscow Office
Georgii Eduardovich Ordjhonikidze,	Secretary-General of the Commissions of the Russian Federation for UNESCO

Representative of the Russian President Administration

Representative of the Government of the Russian Federation

Annex 3

Communiqué of the Ministerial Roundtable on "Towards Knowledge Societies", UNESCO Headquarters, 9 and 10 October 2003

1- We, the ministers participating at the Round Table organized by UNESCO at this crucial time in the preparations for the World Summit on the Information Society (WSIS), arrived at the following common position:

2- Our Governments are committed to the improvement of the quality of life of our citizens and economic strength of our societies and to the achievement of an equitable and peaceful global community. The building of knowledge societies is an essential means to achieving these objectives and opens the way to humanization of the process of globalization.

3-0Knowledge societies are about capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for human development. They require an empowering social vision which encompasses plurality, inclusion, solidarity and participation.

4- Universal access to information and knowledge cannot be obtained without the building of the relevant technological infrastructure. Information and communication technology (ICT) is a major tool for building knowledge societies, and these societies also entail many issues other than technology and connectivity.

5- Knowledge societies must be based on universally recognized human rights, respect for privacy and human dignity, and solidarity of and among peoples. They must reflect high ethical and professional standards.

6- Building knowledge societies implies a commitment to the principles of democracy, transparency, accountability and good governance. This process must engage, and recognize the interdependency of, governments, the private sector and civil society. Lack of access to knowledge engenders marginalized and disadvantaged populations and hinders the participation of these populations in decision-making and the development process.

7- We are very concerned about growing inequalities in infrastructure development and in the access to and use of technologies. Our goal is to transform the digital divide into digital opportunity through digital solidarity.

8- Building knowledge societies is essential to achieving sustainability and future prosperity. Governments should thus reassess their development priorities in order to make the necessary investments in building knowledge societies.

9- We urge the international community to help the developing countries to build their capacity so that they can achieve self-reliance as soon as possible. To achieve this objective, we need to pay particular attention to the identification of possible mechanisms for the funding of this effort, including the setting up of a digital solidarity fund to augment national resources.

10- The following principles and parameters are essential for the development of equitable knowledge societies:

- Freedom of expression;
- Universal access to information and knowledge;
- Respect for human dignity and cultural and linguistic diversity;
- Quality education for all;
- Investment in science and technology;
- Understanding and inclusion of indigenous knowledge systems.

Freedom of expression

11- The free flow of information is the fundamental premise of knowledge societies. In a knowledge society, each individual will have more freedom and greater possibilities for selfrealization, while respecting beliefs and ethics. Knowledge societies encourage openness and dialogue and appreciate wisdom, communication and cooperation. They must be based on the principle of freedom of expression as guaranteed in Article 19 of the Universal Declaration of Human Rights: “Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media regardless of frontiers”.

12- Freedom of the press must be upheld and promoted to ensure that all media, traditional as well as new, can fulfil their role in the building of knowledge societies. Media professionals in particular, as key agents in materializing and ensuring freedom of expression, should be afforded an environment which is conducive to the exercise of their profession.

Universal access to information and knowledge

13- No society can claim to be a genuine knowledge society if access to knowledge and information is denied to a segment of the population. We therefore affirm the need for universal access to information and knowledge. By access we imply: infrastructure and connectivity; content; affordability; information literacy; know-how for use and development; education; and, the free flow of opinions and ideas.

14- Much of the world's population does not have access to any ICT, whether radio, telephone or the Internet. As traditional media are still an important brick in the building of knowledge societies, countries must accord a high priority both to the development of traditional media and to the putting in place of modern ICT infrastructure which is accessible to all.

15- It is essential to ensure affordable access to a wide range of content. This includes provision of data, publications, artistic works, radio and television programmes, and computer programs including open source software, support for access gateways such as libraries, and formulation of national policies to promote publicly accessible information, particularly in the public domain.

16- We also affirm the need to develop measures to create cyber-security, which do not infringe on the free flow of ideas, opinions and information.

Respect for human dignity and cultural and linguistic diversity

17- Cultural diversity is the common heritage of humankind. Understanding and respect for other cultures is a prerequisite for building inclusive and participatory knowledge societies. Plurality and diversity are central to our understanding of knowledge and society. Knowledge societies must enable citizens to access and create information and knowledge in their own languages and within their own cultural frameworks. We are committed to facilitating the participation of all cultural and linguistic groups in the building of knowledge societies.

18- Nurturing, preserving and diffusing tangible as well as intangible cultural heritage, both nationally and internationally, is an integral element in the shaping of knowledge societies. To these ends, appropriate cultural policies and public-private partnerships should promote the production of local creative content and its wide accessibility in electronic form. In particular, ICT should be used by creators and cultural institutions and industries to preserve and promote minor languages and cultures.

19- In the light of the opportunities and challenges of knowledge societies, culture and artistic expression and exchange should be promoted. Libraries, archives and museums, and the professions which permit them to function, are at the heart of knowledge societies, and should be strongly supported and promoted within national policies.

20- We underline the necessity for determined action to fight against forgery and piracy of cultural goods as an essential element of efforts to encourage healthy and diverse cultural creation.

21- In building knowledge societies, we must maintain and promote an equitable balance between the rights of creators, owners and users of intellectual property, and the public interest.

Quality education for all

22- Access to education is a fundamental right, as well as a tool for combating illiteracy, marginalization, poverty and exclusion. ICT provides vast opportunities to effectively and affordably provide quality education for all.

23- It is only through quality education that the profound changes which we seek in our societies can be brought about. The opportunity to acquire an information culture, which encourages critical evaluation of information, should be an essential part of education at all levels.

24- We need to rethink and redesign our education systems and processes to meet the challenge of the knowledge societies – to find new ways of looking at information and knowledge according to which we have a right to acquire and a duty to share.

25- Considering the rapid advances in ICT and its application in development, regular upgrading of knowledge and skills of information and ICT professionals is imperative.

26- Teachers are the pivotal force for achieving these goals and should be involved from the beginning in educational reform. We recognize that sustained effort will be required.

Science and technology in knowledge societies

27- There is a well established relationship between a country's scientific capability and its prosperity. Science and technology are the wellspring for creation of knowledge. Therefore, the public sector, as well as the private sector, in all countries should invest in building science and technology capacities, including research and development (R&D), science education, and electronic networks for science and research. Affordable access to scientific and technological content, such as publications and databases, is a critical development priority. There is also a need to identify and preserve traditional knowledge, to apply ICT to make it available to all, and to establish appropriate links with modern science.

Indigenous knowledge systems

28- Indigenous knowledge systems constitute an important component of emerging knowledge societies. Every effort should be made to identify, understand, digitize and mainstream indigenous systems to enable them to be universally accessible and to contribute to the development of knowledge societies.

29- We appeal to heads of state and government to participate personally in the WSIS, and commit ourselves to:

• Pursue earnestly the broad objectives of this Communiqué at the WSIS; and
• keep in mind the broad objectives of this Communiqué while formulating national policies.

30- We call on the Director-General of UNESCO to:

• bring this Communiqué to the attention of the WSIS and ensure the relevant follow-up;
• facilitate further initiatives for a better understanding of the impact of knowledge societies on efforts to build a peaceful and prosperous global community; and
• explore appropriate mechanisms for technical and financial assistance to the developing countries in the building of knowledge societies.

Annex 4

High-Level Symposium on “Building Knowledge Societies – from Vision to Action“, Geneva, 09-10 December 2003

UNESCO's Director-General Koïchiro Matsuura on 10 December 2003 summed up a two-day High-Level Symposium on “Building Knowledge Societies – from Vision to Action“ which was held at the venue of the World Summit on the Information Society (WSIS) in Geneva.The symposium brought together 20 speakers including four heads of state, ministers, Nobel Prize laureates, and leading academics, NGO and private sector representatives, as well as members of the press.(1)

Speakers highlighted the fact that the information and communication technologies (ICT), including the internet, had brought about a new, inexorable wave of technological revolution in which services and products, based on skills, knowledge and know-

(1) In order of intervention: Mr **Koïchiro Matsuura,** Director-General of UNESCO, Mr **Nitin Desai**, Special Representative of the Secretary-General of the United Nations for WSIS, Mr **Marc Furrer**, Secretary of State for WSIS, Director-General, Federal Office of Communications of Switzerland, Mr **Adama Samassékou**, President of the WSIS Preparatory Committee, H.E. Ms **Vaira Vike-Freiberga**, President of Latvia, H.E. Mr **Joaquim Alberto Chissano**, President of Mozambique; Chairman of African Union, Mr **Gary Becker**, Nobel Prize winner in Economics (US), Mr **David Cunliffe**, Minister of State and Associate Minister of Finance, Revenue, Communications, Associate Minister for Information Technology of New Zealand, Mr **Monkombu S. Swaminathan,** Chairman of M.S. Swaminathan Research Foundation (India), Mr. **Surapong Suebwonglee**, Minister of Information and Communications Technology of Thailand, H.E. Mr **Valdas Adamkus**, UNESCO Goodwill Ambassador for the Construction of Knowledge Societies, former President of Lithuania, Mr **Joergen Ejboel**, Chairman of the Board JP-Politikens Hus (Denmark), Mr **Robert Martin**, Director of the U.S. Institute of Museum and Library Services (US), H.E. Mr **Olusegun Obasanjo**, President of Nigeria, H.E. Mr **Boris Trajkovski**, President of the Former Yugoslav Republic of Macedonia, Mr **John Gage**, Chief Researcher and Director of the Science Office, Sun Microsystems (US), Mr **Lawrence Lessig**, Professor, Stanford Law School (US), Mr **Abdul-Muyeed Chowdhury**, Executive Director, BRAC (Bangladesh), Ms **Khedija Ghariani**, Director-General of the Tunisian Agency for Frequencies, Ministry for Communication Technologies and Transport of Tunisia - Moderator: Mr **Stephen Cole**, Journalist and broadcaster, BBC.

how, are playing a central part. WSIS could therefore capitalise on digital opportunities and devise digital solutions, incorporating contributions from all stakeholders. But beyond, it must also address the associated knowledge divide, focusing on capacity-building to facilitate the acquisition, absorption and spread of knowledge – for which the solution may not always be in the digital realm.

ICT should be used more fully to reduce poverty, through a variety of developmental applications, and to attain the Millennium Development Goals. Challenges in this regard are as much societal as they are technical - as we must balance technological precepts with human values, needs, capacities and opportunities. Human and global solidarity are overarching goals in this quest, as is the need to promote pluralism. Africa in particular is in dire need of people-friendly technologies to enable it to communicate with the rest of the world.

Technical innovation can play a critical role in bridging the knowledge divide. As they facilitate the generation, acquisition, storage, use, sharing and dissemination of information, it is clear that ICT has a tremendous potential, in particular for science and education. The paramount challenge for knowledge societies will be to create an enabling environment to pursue these goals at various levels, to build the requisite capacities, to create content accessible to various communities, to ensure connectivity and to foster dialogue.

Overall, technology has opened up possibilities for new forms of human creativity, pluralism and governance, which must be pursued in the context of participatory learning societies. Education remains pivotal in the generation, accumulation, preservation and dissemination of knowledge. To give full meaning to the WSIS Action Plan and its implementation with respect to education, speakers called for action and strategies on several fronts: increase investment in education substantially, given its high economic and social return; create open and flexible educational systems; institute life-long education; promote quality education in all its dimensions; introduce ICT-based learning initiatives - such as distance education, virtual libraries - drawing on the resources of libraries and museums. Moreover, there is a strong need to face the challenge of creating local content in diverse languages.

Speakers emphasized that knowledge comes in different forms and has different meanings in different contexts. It must be viewed in terms of specific cultures and traditions. Action must therefore allow for cultural and mindset diversity.

All speakers agreed that freedom of expression, for new and traditional media alike, along with the free flow of ideas and knowledge as well as unfettered, democratic access, was an absolute condition for the creation of open and inclusive knowledge societies.

The new forms of creativity made possible thanks to the development of digital technologies provided yet another incentive to reinforce capacity-building, speakers agreed. The need to review the present intellectual property regime was underlined so as to bring it in line with the evolving digital environment and with its creative potential.

Overall, discussions during the Symposium showed strong support for UNESCO's four key principles for WSIS and its follow up: freedom of expression, access to quality education, cultural and linguistic diversity, and universal access to information and knowledge, especially in the public domain.

Background and interventions are online at http://www.unesco.org/wsis/symposium/.

Annex 5

National Charter of the Culture of Innovations (2)

We, the representatives in the fields of science, culture, education, state and public administration, and business,

Recognizing that sustainable development of the present civilization is possible only through persistent innovations in science, education, culture, economics, and administration, and

Attaching strategically decisive importance to the culture of innovations, considered as the basis for people's high receptivity of new ideas, their willingness and ability to support and apply the innovations,

reached the following conclusions:

1- Insufficient progress in the fields of organization, management, education, and law among others, as compared to the advances in science and - technology, hampers the overall progress of humanity and the efficient application of new ideas.

2- Attempts to overcome stagnation in the society will not succeed if they are being undertaken by the means of investment or power-willed measures alone.

3- This problem calls for a comprehensive-system approach, directed, first of aIl, at creating an atmosphere in the society which welcomes new ideas and innovations and in which such ideas become the necessity and a cherished value for each individual citizen.

4- The culture of innovations caIls for radical changes in education of school and university students, as weIl as professional specialists. A chiId capable of producing new ideas should find understanding and support from teachers and the feIlow students or

(2) The National Charter of the Culture of Innovations, initiated by the Institute for Strategic Innovations, was signed in November-December 1999. It was signed by the representatives in the fields of science, culture, education, administration and business circles of different regions in Russia.

playmates. The society needs to develop methods of understanding and promoting creative potential of any individual, similar to the way of supporting children gifted in the spheres of arts, science, and technology. University, post-graduate and continuous education should advocate and encourage growth of gifted individuals.

5- The mass media should provide the public with a message that citizens' attitude towards innovations is a constituent part of their overall approach towards their own, their children's, and the state's wealth, dignity, and security

6- Educational, scientific, labor and other communities should develop constructive and respectful attitude towards innovations and their promoters, stimulate innovative initiatives, and help apply them in practice. The society should encourage atmosphere of healthy competition, arranging various con tests in different spheres of activity.

7- A particularly thorough attention should be paid to positive experiences state in creating corporate culture, which encourages innovations. The innovative potential of such cultures, having become a model for firms and companies, can produce a substantial economic and social effect.

8- The study of humanities, sociology and psychology in particular, should concentrate more profoundly on the phenomenon of the culture of innovations, its organizational component, its influence on people's professional and public activities. It should look for the efficient means of dealing with sluggishness, conservatism, cowardice, laziness of thought, and other vices, which hamper the introduction of innovations.

9- At the same time, while introducing innovations, interested individuals should take into account cultural traditions of the country, discern and prevent the application of those innovations, which can damage individual citizens and the society as a whole. They should undertake particular efforts to introduce environmentally clean and energy saving technologies in order to strengthen people's health and protect the environment.

10 The society should promote the legal culture, supporting and protecting, copyrights and intellectual property, stimulating innovative activity, and enhancing the responsibility for putting obstacles on the way of new ideas and thoughts.

11- The culture of innovations should actively interact with other cultural on of trends, such as those promoted by UNESCO and other international child organizations' programs. It should stimulate the exchange of experience between different cultures.

12- Support the establishment of the Committee on the Culture of Innovations on the basis of the Institute for Strategic Innovations within the Commission of the Russian Federation for UNESCO.

We address the citizens of the Russian Federation and other countries with an appeal to perceive the need to develop the culture of innovations as a response to the global challenge of the 21st century. Based on centuries-old cultural heritage, we should make a break-through in using the intellectual wealth and creative potential for the benefit and prosperity of all mankind.

Annex 6

Examples of National Approaches to Innovation Policy

The Federal Republic of Germany

Excerpts from translated articles on statements of Chancellor Mr Gerhard Schröder (2003 and 2004)

The German government's reform of the welfare state and its innovation initiative are two phases of a process that has one objective, i.e. that of making Germany secure for the future. In a speech given on February 3, Chancellor Gerhard Schröder reaffirmed that “innovation policy is an integral part of Agenda 2010”.

“We will only be able to preserve the measure of prosperity we have achieved as a society if we reform our social security systems so that they will be viable for the future and if we increase investments while reducing subsidies,” Schröder told an audience made up of representatives of industrial associations, noting that the reform process will have to be based on both these factors.

Ensuring access to education and training for everyone in society will be of key importance for the success of the innovation initiative launched by the government.

What was seen primarily as a social question in the past now constitutes an important economic factor as well. “We can simply no longer afford not to make full use of our reserve of human resources,” Schröder indicated, adding that it will not be possible to cover the country's needs for skilled labor on the basis of immigration alone.

As a country that is relatively poor in natural resources Germany needs to focus its attention more strongly on human resources, in particular on the creative abilities of well educated women. The creation of widely available day care facilities for children as well as all-day schools is intended to improve the ability of women to combine having children and a career. Schröder referred to this as a “key challenge for society”.

A broader understanding of the process of innovation combines cultural and scholarly knowledge with scientific knowledge. There is a need to improve information flows between research and industry. Where administrative barriers exist Chancellor Schröder would like to see them removed.

His government wants to increase the country's innovation rate with a high-tech master plan under which large sums of capital would be made available for use by innovative companies.

The climate of innovation is something that society as a whole will have to change. “Innovation will never be a process that can simply be ordered from on high,” Schröder observed. A genuine innovation process is something that never stops, given that economic conditions are changing at an increasingly rapid pace. There is a need to assess whether established policy parameters are still appropriate in light of these accelerating processes. At the present time these parameters could stand to be improved, Schröder said.

The German government wants to make 2004 a year of innovation. “We want to see Germany in a leading position with regard to inventions and other innovations in research and technology,” Chancellor Gerhard Schröder said.

Now that necessary reforms of the social security systems have been passed the German government wants to devote more of its attention to the second side of the Agenda 2010 program, i.e. to an offensive on innovation. It is only by means of innovation that growth and employment can be guaranteed in Germany on a sustainable basis.

Chancellor Schröder noted that two things are meant by innovation: investments in research and development by government and industry, on the one hand, and the creation of a competitive educational system, on the other. Schröder criticized the fact that stronger investments in biotechnology are being called for in Germany on the basis of the economic potentials they hold out while, at the same time, restrictions are being imposed on research in this area.

Schröder assumes that public debate will continue on biotechnology and genetic engineering as well as on stem cell research. As new knowledge is accumulated the German parliament will be faced with the need to reassess its past decisions in the light of this new knowledge.

Schröder said Germany needs a new Culture of Innovation: “This includes a need for greater public acceptance of innovation and a broad public debate on the opportunities and risks involved. There is a need to start promoting the scientific curiosity and creativity of our children at kindergarten and elementary school. Our children must once again want to become research scientists and inventors. In this way German can and will become a country of ideas. We want to gain public support for this objective in our country.”

Schröder announced a new high-tech master plan under which weaknesses in the German research sector are to be looked for in meetings between the scientific and business communities. He noted that Germany needs more private-public partnership here, i.e. closer cooperation between government, industry, and science.

The Chancellor indicated that there is also a need for a new public debate on education at schools. Germany needs to defend the reputation of its educational system, he noted in his New Year's address.

Germany is going to need further reforms to prepare it for the future, adding that in order to achieve sustainable economic growth it will be important to revamp the social security system as well as to produce innovations in science and technology.

Without innovation there would not be growth, social security, and participation. Conversely, without participation and without social justice the opportunities held out by a knowledge-based society would not be as widely accessible and significant potentials would go unused.

Innovation is a long-term process that will determine Germany's competitiveness in the future. “Our future will be based on our having a lead with regard to innovation, engineering processes, and new high-quality products.” ... “If we agree that this is our chance for the future then the logical consequence is that education and training, research and development, innovative products, as well as innovation in production will be areas of key importance for the future.”

The process of continuing to modernize Germany, being innovative and socially responsible at the same time, will succeed only if it is seen as a task involving society as a whole. There is going to be lots of work ahead for everyone in the effort to make Germany the most child-friendly country in Europe and to ensure that our future Nobel Prize winners will not just be from Germany but will also have done their research at German universities.

Last year showed that Germany is capable of instituting reforms. “And the process is far from being completed,” Schröder emphasized. We need to show that we are taking advantage of the opportunities being held out by the spread of knowledge around the world. These opportunities must be taken advantage of “so that we will be able to give our country prospects for the future that are solid because they are knowledge-based,” Schröder said.

The first part of the Agenda 2010 reform program, i.e. the restructuring of social security systems, has not yet been completed in all areas, but has gotten off to a good start, Schröder said.

Now that the social security systems have been made secure for the future the next step is to preserve and expand the economic base for financing them: “It is only if we succeed in returning Germany to a leading position in Europe and in the rest of the world, exploiting our strengths and overcoming our weaknesses, that we will be able to preserve our social security systems and keep the level of social security in our society at a high level,” Schröder said in reference to Germany's future as a place for business investment.

Quality growth will be key in this endeavor. Schröder called for a broad public debate on how Germany can be kept in or returned to a leading position on the basis of innovation in technology, research and education. The concept of innovation includes more than high-tech areas such as nanotechnology or biotechnology. It also includes social innovation. Society needs to develop a greater willingness to accept change, Schröder noted.

Biotechnology is an example of this. Public debate on the ethical aspects of stem cell research cannot be seen as closed as a result of restrictive legislation passed by the German parliament. The research landscape is subject to constant change and public fears change over time as well. Schröder feels that the decision of parliament to impose restrictions on stem cell research is “subject to review”.

Schröder renewed his call for binding national educational standards for schools and universities, saying that these standards need to be formulated in close cooperation with the state governments. He also said that elite universities should be developed from existing institutions.

In order to be innovative Germany will need to make use of all its educational reserves at schools, in the workplace, and at universities. This includes providing quality day-care facilities for the children of well trained women, “a framework in which living examples of emancipation will be possible.”

Schröder stressed the social component of the knowledge factor, saying: “Every young person has a right to career training that will provide him or her with the basis for making a living.” He added: “Anyone who wants to get ahead in our society needs to know that this will be possible only on the basis of education and training.”

Republic of South Africa

Mr Ben Ngubane, Minister of Arts, Culture, Science and Technology of South Africa addresses the European Coalition on the Sustainable Trade and Innovation Centre Coalition, 20-21 June 2002

Consumer power is globalising. In the developed world, consumer sophistication has increased to the point where the demand profiles of particular consumer groups can change dramatically based on social and environmental factors, or even perceptions about such factors. The developed world, however, is characterised by resource-poor producers who, frequently, are unaware of the types of issues that are important in developed country markets. This knowledge gap translates directly into ongoing poverty for very large numbers of people in the developing world. This situation is also exacerbated by increasingly complex regulatory and certification structures that place further demands on potential exporters to the developed world.

From a market perspective, producers must be responsive to the needs of consumers, and this means that they must develop the competencies to work in sophisticated markets at a reasonable cost. In order to stimulate better thinking and practice, a global partnership for issues round sustainable trade and the necessary levels of innovation to support it would be valuable.

It has been my privilege to chair a working group from the Commonwealth Science Council and the European Partners for the Environment who have been developing thinking in this regard. This initiative could potentially be a Type-2 partnership that may be launched at the World Summit on Sustainable Development in Johannesburg. This is therefore a good opportunity to review progress and to develop agreement on the way forward.

As part of this discussion, I will draw from a paper that the Secretariat of the United Nations' Conference on Trade and Development (UNCTAD) prepared as a Background Paper in contribution to the Fourth Preparatory session of the WSSD. UNCTAD recognises that, in many developing countries, particularly least-developed countries, the commodity sector provides employment for a large proportion of the workforce and generates the savings and foreign exchange necessary for development.

It is estimated that, overall, more than two and a half billion people depend on commodity production for their livelihood and one billion people in developing countries derive a significant share of their income from export commodities. Moreover, the incidence of poverty in these countries is most acute in the rural sector where commodity production is the principal occupation.

Practical experience of the Commonwealth Science Council and other organisations' work with developing country producers and exporters has established that exporters from developing countries are facing mounting pressures to integrate environmental and social factors into their export strategies.

While some of this is prompted by regulatory demand, the main drivers are business requirements from international buyers and a growing demand from the end consumer for products that demonstrate environmental and social responsibility. Although higher standards are sometimes associated with premium prices in export markets, more often than not they are simply an 'entry ticket' - an added burden rather than a source of competitive advantage.

These concerns are being heightened by the mounting complexity of environmental and social aspects of international trade, with an array of often-incompatible measures, from country-specific codes of conduct, regional norms and standards to global systems of certification.

The Sustainable Trade and Innovation Centre (STIC) is a new initiative based on earlier research that involved partners from South Africa, Bangladesh, Ghana, India and the United Kingdom. It is designed to enable developing country producers to respond to growing market pressures to integrate environmental and social factors into their export strategies. The Commonwealth Science Council (CSC) in collaboration with European Partners for the Environment (EPE) leads the initiative.

The problems underlying these issues and the possible solutions have received considerable attention in the planning phase of the STIC initiative. An initial scooping study established that, at a global level, no institution is mandated to support developing countries to respond to these challenges. The study found that an array of multilateral, national, NGO and business initiatives currently exist - in many cases delivering useful results. But these are often small-scale, limited in terms of sectoral scope or types of participants. To deliver genuine benefits to developing country exporters, the study concluded that a dedicated organisation is required that brings together four key attributes:

- Practical experience with export promotion;
- Expertise in sustainability issues;
- Technical competence in innovation; and, crucially,
- Developing country leadership.

The Sustainable Trade and Innovation Centre (STIC) aims to fill this gap. The proposed goal of STIC is to enable developing country exporters to respond, anticipate and ultimately shape the environmental and social dimensions of the market, thereby being able to participate in a global economy that is currently less than user-friendly.

Following the scooping study, further work has included a feasibility study with the key aims of:

- Finalising the aims and objectives of STIC;
- Designing the Centre's governance and decision-making structures;
- Presenting a possible work programme and working method; and
- Drafting a business plan.

Ms Ritu Kumar from the CSC will elaborate on the findings of the feasibility study and, as I hand you over to her, I would particularly like to emphasise the significance of the design of this initiative as having a considerable measure of “developing country” input. For partnership initiatives to work, it is necessary that no partner feel that activities and processes are an imposition. As I indicated in my earlier presentation, it is essential that all countries truly consider themselves as active participants in terms of the role they play in decision-making structures. The development of the STIC initiative has included participation by developing countries as well as developed countries, so we have had the benefit of understanding all sides of the cooperative trade and innovation arena, and developing countries can feel that they still retain the right to decide how they will approach their development challenges with the support base of quality information, access to new skills development opportunities, innovation programmes and brokering platforms for exporters and buyers.

Brazil

Excerpts of a speech of Mr Ronaldo Mota Sardenberg, Minister of Science and Technology, to the Global Forum on the Knowledge Economy Policy Frameworks for the Knowledge-Based Economy: ICTs, Innovation, and Human Resources, Brasilia, 16 September 2002

Our common aim is to engage in an exchange of ideas and experiences, and in the careful consideration of issues with a view to charting new directions for growth and welfare in the new Knowledge Society and the Knowledge-Based Economy.

My remarks will focus on science, technology, and innovation as key elements for the progress of Brazil and other developing countries, as well as for their relative position in a world that is undergoing continuous and profound change. We are going through a very complex period of international life, in which it is advisable to be prudent, to keep a level head and an open mind. The apprehension and instability which followed in the wake of the indescribable tragedy of September 11 – the first year of which has just been registered –, have had an extensive impact on international and domestic events, as well as on activities linked to science, technology and innovation (ST&I). This compels us to tone down the optimism regarding the economy and technology that prevailed in the 1990's.

New challenges have thus offset previous achievements that, though asymmetrically distributed, tended – as they still do – to further strengthen the global role of research and innovation in the current transition toward a predominantly knowledge-based world economy.

The Knowledge Society, the Knowledge-Based Economy, and the Information Society are some of the many phrases that try to translate the same global phenomenon that is already familiar to the most advanced segments of international life. They describe similar though distinct characteristics of our times and nourish hopes for a better world. Considering my audience's qualifications, I do not need to belabor the point that, wherever they may be brought to light, and provided they are effectively applied, scientific advances and modern technologies are determinant factors of economic growth.

But it would not be superfluous to remind ourselves that the relative status of nations and the social and economic performance of their populations depend upon their degree of participation in the knowledge revolution and in its applications as well as on countries' capabilities to effectively incorporate such advances into their development agendas and to disseminate them in their societies.

As I make these comments, I bear in mind that, in concrete terms, we in Brazil have already reached a reasonable degree of consensus about ST&I's place on the agenda for our future, that is, about how to best steer the lasting, sustainable progress required by our country and by Brazilian society. There is an unprecedented and – we hope — irreversible national effort to promote ST&I, which have been recognized as essential factors, although not the only ones, for our sustainable development.

The task of laying the foundations for the establishment of the Information Society in Brazil in recent years has deserved intensive efforts from the Federal Government, in partnership with the states, the business sector, the academic community, and society itself. This partnership benefits from a considerable historical tradition. For fifty years, the Brazilian state and society have been engaged in a sizeable effort to

build a strong university graduate and undergraduate system and a large, sophisticated, Science and Technology system. This system consisting today of over two hundred-fifty research and higher education institutions, many of which are internationally renowned, make Brazil stand out among developing countries.

As a result of systematic investment in advanced training of human resources and in fostering research, Brazil's scientific output has greatly expanded its presence on the international scene and may in many sectors be placed, according to relevant indicators, on a comparable level vis-à-vis developed countries.

One apparently obvious fact, which nevertheless fills us with pride, is that of having reached over 10 years the current figure of 97 percent children now attending school. In addition, the number of Brazilian-trained Ph.D. holders has also increased – to 6,300 per year, a 600-percent increase as compared with the early 1990s. We have also achieved a growth rate 3.5 times above world average in terms of articles published in indexed periodicals. We now account for 1.4 percent of international output, a level achieved by only 17 countries.

In certain areas, such as agriculture and animal husbandry, health, genome research, Information and Communications Technology, aerospace industry, isotopic uranium enrichment, and deep-water oil prospecting, our accumulated knowledge and innovation assets have yielded significant social and economic returns.

We have first-rate material and intellectual resources that to a large degree account for the accomplishments achieved so far. As we plan ahead towards achieving the future to which we aspire, we must take into account the patrimony we have already amassed, in spite of undesirable attendant imbalances. Although these results warrant great satisfaction, they also indicate that much more has to be done.

In this light, the current international scene provides some important, specific pointers. Firstly, we must bear in mind that the conditions—both internal and external—associated with models that were successful in advanced countries no longer exist, so that such models cannot be simply duplicated by developing countries, not even in the restricted area of S&T policy. We are confronted with a strong, perverse tendency toward world knowledge concentration, which is attested by hard data. The advanced countries account for nearly 90 percent of the world's total investment in R&D, including both public and private funds; the United States' share alone is certainly more than 40 percent of this total.

Secondly, one should also bear in mind that today, Brazilian S&T proficiency is widely recognized, as has been confirmed by a recent World Bank study. Together with countries such as China and India, we rank between the advanced nations and the rest of the developing countries, among which a group of 20-odd countries are on their way to achieving scientific proficiency but have not yet reached it, while some 120 other literally techno-excluded countries (the so-called lagging countries), for the most part, neither produce nor consume the technologies developed in more recent decades.

In Brazil, we have revitalized and reorganized material and intellectual resources and are implementing a science and technology policy according to new paradigms and values. We are fully in the midst of intensifying our national S&T effort, so as to achieve, within a decade, one of this generation's fundamental goals, which is to place Brazil among the advanced nations in the vast field of knowledge and its practical applications. Incentives to Information Technologies, innovation, and the

formation of the socalled intellectual capital—the themes of this meeting—do indeed have a central place on the agenda of the Brazilian Government and of the Ministry of Science and Technology.

The building of an authentic national innovation system requires that all phases of knowledge—from generation to application—be effectively addressed. The major share of responsibility for scientific and technological development has fallen on the Brazilian public sector along the last five decades. Nevertheless, in view of the clear relation between knowledge application and socioeconomic development, this responsibility is steadily shifting to enterprises. Technological development must be strongly identified with the productive sector and its needs in meeting social and market demands and be aimed preponderantly at creating jobs and generating income.

We have thus worked with determination to create the conditions for a general increase in the amount of available resources for S&T. In the White Book we have set ourselves the target of increasing, within a decade, the level of investment on research and development from 1 percent to 2 percent of GDP. This will require a doubling of public sector investment and a substantially higher performance by the productive sector, as is usual today in OECD countries. Specifically, in recent years we have sought to strengthen the interface between the private and the public sectors through effective political, legal, and institutional measures.

Furthermore, new initiatives include the Innovation Bill,. The bill incorporates novel proposals, such as establishing partnerships involving public research institutions, researchers, and enterprises; encouraging entrepreneurship and protecting intellectual property; creating an adequate legal structure for innovating enterprises that already exist and for those that will certainly emerge; making public laboratory facilities commercially available; and establishing a government-wide procurement system for high technology items.

The 17 Millennium Institutes, established under a cooperation program with the World Bank and organized under the form of nationwide research networks, have increased the installed lab base. Furthermore, they promote integration at the national level and with international centers, foster the regional decentralization of knowledge and, above all, lead to research excellence.

Also based on the network model, in the next few weeks the Ministry of Science and Technology will add to its structure three new research institutes on such diverse and pressing issues as the semi-arid lands, Amazon biodiversity, and nanotechnologies. The goal we are close to accomplishing is to strengthen the contribution of research and innovation to entrepreneurship, with a view to opening a new, more advanced cycle of research and innovation. This virtuous cycle is a trademark of modernity and it is by consolidating it that we expect to reach ever-higher levels of both development and social well-being.

What we seek to accomplish is to enhance the state-of-the-art and the contemporary elements of S&T. This we seek to implement by means of a forward-looking vision, by ascribing priority to innovation. This is consistent with the sentiment prevailing worldwide in our field of work. But what is done in Brazil and elsewhere falls also within a scientific and technological tradition with deep historical roots, which originated in the West but has now acquired a global scope.

International cooperation in S&T should be urgently revisited in all its dimensions, aspects, and potentialities, bringing into view a global perspective. On our part, changes are now under way also in Brazilian cooperation policy, with the diversification of external partnerships in science and technology. The multiplication of opportunities is illustrated by the 23 agreements and memorandums of understanding signed in the last 23 months with international organizations and advanced, proficient, developing, and lagging countries. It is worth noting that all of these agreements call for cooperation in ICTs.

The prevalence of the current political climate might entail countless problems. Instability in the economic area and the real entrenchment that separates peoples are not conducive to an environment that is free of risks and violence. The development of International Law and the practice of relations among States should not take terrorism as their main reference. Neither should terrorism be a reason for creating new barriers to international cooperation in S&T. In addition to their terrible consequences in terms of suffering and loss of human lives, armed conflicts inevitably entail disastrous economic effects. This is indicated by recent empiric studies prepared by international organisms.

The promotion of reinvigorated, innovative forms of international cooperation helps disseminate knowledge and leads to practical applications, while embodying a significant potential for contributing to the prevention of tensions and conflicts, thus reinforcing international peace and security.

New Zealand

Excerpts from the Statement to Parliament of Ms Helen Clark, Prime Minister, 12 February 2002

In the Prime Minister's Statement to Parliament a year ago I set out the government's thinking on the economic transformation which needed to occur for New Zealand to lift itself back up the economic ladder. Emphasis was placed on the need to be innovative in everything we do to create higher value in our economy.

The past year has seen a great deal of time and effort devoted by government in collaboration with the private sector to the development of new strategies to lift economic performance. The results of that work are being released today. The government's framework for growing an innovative New Zealand has been underpinned by the work of the Science and Innovation Advisory Council on innovation; by L.E.K. Consulting's work on strategies for building a talented nation; by Boston Consulting Group's work on how to target foreign direct investment most effectively; by Treasury's work on economic transformation; by the Tertiary Education Advisory Committee's work; and by the policy and programme development of other government departments and agencies in the economic and social development, trade, science and research, education, and immigration areas.

In addition, the Knowledge Wave Conference led by Auckland University and co-sponsored by the government played a catalytic role in bringing New Zealanders from many sectors together to work on how to make a significant improvement in New Zealand's economic performance and how to translate that into improvements in the quality of life for all New Zealanders.

Growing an Innovative New Zealand

The growth and innovation framework being released today flows from the consensus of advice received from across these sectors. What has resulted is a widely shared vision for New Zealand. It sees our country as:

a land where diversity will be valued and reflected in our national identity

a great place to live, learn, work, and do business

a birthplace of world changing people and ideas

a place where people invest in the future.

That shared vision sees New Zealanders:

optimistic and confident about our country's futurecelebrating our successes in all walks of life

creating globally competitive companies

committing to sustainable development

ensuring that a social dividend flows from economic success

gaining strength from the Treaty of Waitangi as our nation's founding document.

The growth and innovation framework's objective is to return New Zealand's per capita income to the top half of the OECD rankings over time. That requires our growth rates to be consistently above the OECD average for a number of years. While New Zealand's economic fundamentals are sound, that in itself is not sufficient to accelerate growth. The framework document brings together initiatives already taken with new initiatives to speed up growth in four key areas:

Enhancing the Innovation System

The government has over the past two years been active in lifting research and development spending; developing new strategies for tertiary education; announcing funding for new centres of research excellence; and backing innovative business start ups through support for business incubators and the establishment of the Venture Investment Fund.

New initiatives to be developed will include entrepreneur support strategies; more support for mentoring programmes, incubators, and cluster development; improving our intellectual property framework to ensure New Zealand gets full value from its innovations; and encouraging and incentivising tertiary education institutions and Crown research institutes to be more active across the innovation system, by, for example, engaging in the commercialisation of more of their research.

Developing Skills and Talent for New Zealand

This requires the government to keep investing as much as it can in education and industry training; to keep adapting its immigration policies so that they assist, not hinder, New Zealand's search for specialist talent and skills; and to enlist the talents of New Zealanders living off shore.

The new Tertiary Education Strategy, to be released in the first half of this year, and the Tertiary Education Commission being established in July of this year, will be aiming to get better alignment between tertiary education and New Zealand's development goals.

We also aim to build stronger links between employers and tertiary education and training providers to minimise gaps between emerging skills shortages and education and training responses. It is important that we make use of the talents of all New Zealanders. Most of the workforce of 2010 is working now. Upskilling the current workforce is critical for driving economic growth.

The new Talent Visa and the Skills Shortage Work Permit come into effect in the first half of this year. They will enable employers to access skilled people much more quickly than before. The World Class New Zealanders initiative being led by Industry New Zealand aims to build networks of talented New Zealanders based overseas, and to use those networks to establish exchanges and mentoring for young talented people and entrepreneurs. Related private sector initiatives are also underway. The government will look for ways of working together with the private sector on other recommendations from the L.E.K. report and the Knowledge Wave Conference in this area.

Increasing New Zealand's Global Connectedness

Here the government is focusing on the attraction of quality foreign investment; aggressive export promotion; and improved national branding of New Zealand.

The activities of Trade New Zealand's investment arm and Industry New Zealand's Major Investment Service need to be closely co-ordinated, and more work will be done on the best structure through which to drive our attraction of foreign investment. More funding will be needed to attract that investment, and the promotional activity will be targeted into priority areas.

Trade New Zealand is looking at beachhead programmes in which it makes premises available offshore for new exporters to develop forward marketing bases and for incubators for small and medium sized businesses establishing themselves in new

markets. Trade New Zealand is already facilitating the presence of New Zealand companies in a Singapore Technology Park.

Industry New Zealand's Business Grow programme is now focusing on those companies which have the ability both to grow quickly and to grow their exports quickly.

The government's trade policy is very active in furthering market access for New Zealand exports, and a lot of ministerial and diplomatic effort is going into that.

In seeking to rebrand New Zealand as an upmarket, innovative, dynamic economy, the government is leveraging off both the release of The Lord of the Rings and the defence of the America's Cup. These two events help promote an image of New Zealand as technologically advanced, creative, and successful. Government will work with the private sector to develop a consistent brand image of New Zealand across our industry sectors. As well as being seen as clean and green, we need to be more widely perceived as smart and innovative.

Focusing Government's Resources

In the drive to speed up growth and innovation, the government has decided to focus on three key areas, each of which not only has considerable growth potential, but which also has high potential spill-over effects for growth in other sectors.

Boston Consulting Group, Industry New Zealand, Trade New Zealand, and the Foundation for Research, Science, and Technology have all worked on sector targeting and come to similar conclusions. The consensus of advice is that government should focus on areas which are capable of having a material impact on growth rates across the board, which are capable of developing world class scale and specialisation quickly, and which contribute to the vision of a globally-oriented, innovative New Zealand economy.

These criteria led the government and its advisors to conclude that promotion of biotechnology, information and communications technology, and creative industries was most likely to help move New Zealand on to a higher growth plane. Biotechnology, for example, has spill-over effects for the primary sectors and the processing of their goods, and for the pharmaceutical and other industries. While research on genetic modification falls under the broad rubric of biotechnology, so do ecological research and many other areas of biological science. The need for a precautionary approach with respect to one aspect of biotechnology should not blind us to the opportunities which this fast developing field represents

Information and communications technology helps drive the modernisation of the entire economic and social infrastructure, and is an essential part of making e-commerce a reality.

Creative industries not only underpin the effective branding and marketing of all New Zealand goods and services, but also can, through areas such as design, have a major impact on industrial output.

The government will be moving to establish joint public-private sector taskforces to identify the strategic opportunities in these areas and will be ensuring that government departments and agencies prioritise the development of these areas in their policies and programmes. So, for example, the government and the private sector will need to give priority to developing the skills needed in these areas, research will be encouraged, innovation initiatives will be focused there, and appropriate foreign direct investment will be targeted there.

This focus will not be at the expense of strategies well under way to boost other key areas of the economy, such as wood processing and tourism. The government has been an active facilitator of business, industry, and regional growth, with many new programmes being driven through the economic development portfolios of the Deputy Prime Minister, and that essential work will continue.

The growth and innovation framework sets out the direction in which the government is moving to advance New Zealand's growth prospects. The priorities it sets will impact on the 2002 and future budgets.

The development of the framework to date would have not have been possible without sustained private sector input and collaboration. The government will continue to work closely with the private sector on the implementation of initiatives within the framework. An Advisory Board largely drawn from the private sector, including employee representation as well as that from business, will be established to advise the government on the progress being made and on new initiatives which should be taken, or on new areas for focus.

The government and private sector focus on growth and innovation has led to the development of a new economic agenda and a substantially shared vision of the future over the past year. While some still hanker after lower tax rates and further deregulation as the key economic prescription, I believe many more are seeing the strategic focus the government is adopting and the policy interventions which accompany it as more likely to contribute to sustained growth. New Zealand already offers a substantial degree of economic freedom and a low cost of doing business relative to other western economies. It is important to the Labour-Alliance Government and, I believe, to most New Zealanders that decent environmental and labour standards are maintained in the drive for a high value and sustainable economy.

Indeed for most of us the development of a stronger economy is a means to an end. That end is higher living standards and the ability to provide a better quality of life for all our people. An inclusive and cohesive society is an essential building block for a growing and innovative economy. In the past year as unemployment came down to a thirteen year low, many more New Zealanders had the opportunity to raise their living standards.

This government has been able to run a strong fiscal policy while also investing more heavily in the social areas and core services, in the environment and conservation, and in the arts, culture, and sport.

This year the government will continue its programme of engagement with Maori to promote economic and social development. Our focus has been on capacity building and opportunity. One size fits all policies have failed New Zealand. It is important that government tailors policies to meet the needs of our distinctive communities. Pacific peoples and other ethnic minorities have also seen government policies adapted to meet their needs.

Singapore

Speech by Mr Raymond Lim, Minister of State for Foreign Affairs and Trade & Industry at the Singapore Innovation Award 2003 Presentation Ceremony on 3 November 2003

Accelerating Competition - Innovation Is Key

According to Michael Porter, innovation is key to the competitiveness of a nation aspiring to be among the top growth nations of the world. For Singapore, the future lies in growth resulting from quantum productivity leaps. To secure the future growth of our companies and nation, we need firstly, to restructure the economy — from investment-driven to innovation-driven. Secondly, we need to ensure that the skills of our workforce continue to be relevant. Thirdly, we need to put in place the infrastructure for Singapore organisations to embark on the innovation journey.

To many people, the word "innovation" brings to mind images of high-tech machines and people with doctorate degrees working in laboratories. Similarly, they think of creative people as odd individuals with a weird sense of dress and behaviour. This is far from the truth.

Put simply, innovation is nothing more than coming up with good ideas and implementing them to realise their value. Innovations need not be new. They can be old concepts applied to new uses. Innovation is about value creation, whether in terms of product development, service delivery, process re-engineering or market creation.

Innovation is really not new in Singapore. Take the example of BreadTalk. Its concept of selling bread is not new. Nor is its method of baking bread. You may ask: "What's so unique about BreadTalk's offering?" Perhaps George Quek was inspired by the popularity of Starbucks in the heartlands. So he set out to make the humble bun trendy. BreadTalk became the talk of the town. Its success was phenomenal. It set a new market benchmark. Today, bakeries are vying to come up with innovative offerings, appealing not only to the tastes but also the healthy lifestyles of Singaporeans of all ages.

Qian Hu is another good example. It started as a breeder of guppies for the domestic market in the 1980s. Today, Qian Hu is Singapore's leading breeder and exporter of ornamental fish, supplying over 500 varieties to more than 50 countries and accounting for more than 30% of the global market. Who would have thought that a small enterprise selling "long kang" (drain) fish could make it big in the global market?

BreadTalk and Qian Hu show that Singaporeans are innovative. There are many more examples. Roti prata, for instance, is a simple Indian dish. Add cheese, banana, ice-cream and you end up with more than 15 varieties of prata to suit the most adventurous taste buds. How about ice kachang? In the past, you add syrup, red bean, some corn and maybe chinchow. Now, ice kachang comes with strawberries, durian and even something called "IQ balls". I don't know whether IQ stands for intelligence quotient or ice qachang spelt with a 'q'!

Innovation is found not only in the private sector. The government is also looking at ways to foster innovation in the public sector. The Pro-Enterprise Panel and Public Service 21 (PS21) are all efforts to find innovative ways to improve efficiency and service delivery in the public sector.

However, sporadic innovation by a few Singapore companies and the public sector is not good enough. In fact, the ranking of our firm-level innovation in the Global

Competitiveness Report is low — at 25 — way behind developed nations like Germany, the US and Japan. We need to create an environment in Singapore that is conducive for ideas to flourish. We need to make innovation permeate through every level of Singapore society.

Notes

Nurturing Innovative Organisations

A number of government agencies have taken on specific roles in promoting innovation. The Intellectual Property Office of Singapore is advising organisations on intellectual property rights issues. The Ministry of Education is revamping the school curriculum to bring out creativity in students. The Action Community for Entrepreneurship (ACE) aims to bring about regulatory changes and drive entrepreneurship in Singapore. In addition, there are financial schemes and tax deductions to help companies to expand their operations or undertake R&D activities.

SPRING launched the Singapore Innovation Class to develop the innovation capabilities of organisations. The programme includes an innovation excellence framework, which identifies the critical success dimensions of an innovative organisation. Response to the programme has been encouraging. Over 400 organisations have put in place, or are implementing, the framework.

One example is Neocorp Innovations Pte Ltd, a local construction SME. The programme has helped Neocorp to develop and implement innovative designs for its clients in both domestic and overseas markets, including housing developments in India and an airport upgrading project in Fiji.

Besides capability development, the Innovation-Class programme also includes a diagnostic process, where organisations are assessed and recognised for their achievements in innovation capabilities. I am pleased to announce that 19 organisations will be receiving the Innovation Class plaques this evening.

Developing Role Models

For Singapore to succeed in future, we need to step up efforts vigorously to boost our national innovation capabilities. There are few innovation icons in Singapore. We need to have more role models.

The Singapore Innovation Award is the highest accolade given to innovative organisations and innovations in Singapore. The objective of the Award is not only to confer national recognition for exceptional achievements in innovation. It is also for the winners to serve as an inspiration and to share their experiences with others.

The International Expert Symposium on A Culture of Innovation and the Building of Knowledge Societies brought together leading international experts on innovation and knowledge societies to discuss the challenges societies face in order to stay competitive and innovative at a local, national, and global level. During the last decades, numerous concepts of innovation in business, education, science and technology have been formulated. At its 31st session in October 2001, the UNESCO General Conference unanimously supported an initiative entitled "A Culture of Innovation" put forward by the Russian Federation and several other countries. Since then, UNESCO has organized in cooperation with the Institute for Strategic Innovations (ISI), Moscow a series of reflections on the subject, which resulted in the Moscow symposium and the present publication, which may also serve as a resource book.

The concept of a Culture of Innovation is strongly linked to the concept of knowledge societies. Innovation essentially implies that creative people who lead economic and social development put knowledge to work. Hence, innovation is knowledge intensive.

Framework for a Culture of Innovation and the Building of Knowledge Societies

Knowledge societies are about capabilities to identify, produce, process, transform, disseminate and use information to build and apply knowledge for human development. They require an empowering social vision which encompasses plurality, inclusion, solidarity and participation.

Communiqu of the Ministerial Roundtable on "Towards Knowledge Societies", UNESCO Headquarters, 9 and 10 October 2003

For further information about UNESCO's activities related to the Dialogue among Civilizations, please see: http://www.unesco.org/dialogue