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Inaugural Speech of the Secretary of State for Science, Technology and Higher Education of Portugal, **Manuel Heitor**

The evolving phenomenon of democratizing innovation: competence building, brain circulation and the challenges of experiencing knowledge networks

Let me start by acknowledging and thanking the organisers of this meeting and to welcome you all to Portugal:

- The University of Porto and INESC Porto, for guaranteeing the local organization;
- The International Organizing Committee for the ICTPI, that have kept the annual organization of the Conference since its very first realization in Macao, China, in July 1997;
- The University of Texas at Austin and the IC2 Institute, for keeping a dynamic network of partners looking at the frontier of science and technology commercialization;
- The University Technology Enterprise Network, UTEN, as established by the Portuguese Science and Technology Foundation to strengthen national skills and competences in technology transfer and commercialization.

I will focus my brief reflections on the emerging debate worldwide on **patterns of innovation** and the **challenges of experiencing knowledge networks**, which requires us to look at competence building and the need to better understand the process of user innovation worldwide. Overall, I will refer to the evolving phenomenon of **democratizing innovation** and will argue that value creation does require a serious commitment in the advanced training of more human resources and in supporting and promoting their research through knowledge networks.

This is because it has become a commonplace to say that “**knowledge is increasingly important**”. Commonplaces are comfortable, but often sterile, both intellectually and in terms of suggesting actions to private and public decision-makers, given that it is difficult to add much novelty to discussions associated with commonplaces.

We should take the challenge of attempting to probe deeper into the relationships between knowledge and the development of our societies. Our inspiration comes, among others, from the seminal work of Lundvall and Johnson¹, who challenge the commonplace by introducing the simple, but powerful, idea of **learning**. Lundvall and Johnson speak to us about a “**learning economy**”, not of a “knowledge economy”. The fundamental difference is associated with a dynamic perspective. In their view, some knowledge does indeed become more important, but there is also knowledge that becomes less important. There is both knowledge creation and knowledge destruction. By forcing us to look at the process, rather than the mere accumulation of knowledge, we add a dimension that makes the discussion more complex and more uncertain, but also more interesting and intellectually fertile.

The richness associated with the concept of the learning economy has been demonstrated in recent years throughout the world, both through leading scholars and policy makers. It has been recently addressed beyond Europe² and it is at the centre of the debate in China, India or Brazil. For example, MGK Menon, former Minister of S&T and member of Parliament of India and current President of the India International Centre, in New Delhi, has recently written about the conditions necessary for innovation to thrive, which require specific local action through a process of “communitization”.

This follows very much the lessons Eric von Hippel³, a well known Professor at MIT, have provided to the world in recent years based on American experiences in that user-centered innovation is a very powerful and general phenomenon. “It is based on the fact that users of products and services - both firms and individual consumers - are increasingly able to innovate for themselves”. It is clear that this is rapidly growing due to continuing advances in computing and communication technologies and it is becoming both an important rival to and an important feedstock for manufacturer-centered innovation in many fields.

¹ Lundvall, B.-Å. and Johnson, B. (1994), “The Learning Economy”, *Journal of Industry Studies*, 1/2: 23-42.

² Conceição, P., Heitor, M. V. and Lundvall, B.-Å. (eds.) (2003), *Innovation, Competence Building, and Social Cohesion in Europe—Towards a Learning Society*. London: Edward Elgar.

³ Eric von Hippel (2005), *Democratizing Innovation*, MIT Press.

I would like to argue that the innovative capacity of a country depends largely on the concentration of knowledge integrated communities as drivers of larger communities of users. This may be discussed in the context of evolving and changing patterns in Portugal⁴.

Portugal has recently achieved the average EU level in terms of the number of researchers per thousand of workforce and the need to **double** this figure in coming years and continue fostering advanced human resources is taken as our main hypothesis⁵.

This has three main implications. **First**, we need to consider **innovation together with competence building** and to foster individual skills through the complex interaction among formal and informal qualifications. We need to widen the social basis for knowledge activities, including higher education enrolment, and we need to strengthen the top of the research system leading to knowledge production at the highest level. Numbers of graduates, on the one hand, and of PhD holders, on the other hand, remain still much below European ambitions.

Moreover, the life-long learning European landscape needs to be redesigned if Europe is to succeed. Higher education institutions are key to that reform which should take into account the immense revolution provided by information technologies in the internationalisation and inclusion of all sectors of society in the fabric of knowledge networks.

Second, we need to consider the **social shaping of technology and the emergence of “human centred systems”**. This is because although incentives and infrastructure greatly inform our understanding of economic development, they do not tell the whole story about the differences across the various knowledge networks under development in Europe. Both incentives and infrastructures do not operate in a vacuum, being shaped by and shaping the particular context where they operate. In the scope of our

⁴ P. Conceição, M. V. Heitor, (2005), *Innovation for All? Learning from the Portuguese path to technical change and the dynamics of innovation*. Westport and London: Praeger.

⁵ M. Heitor and M Bravo (2009), “Portugal on the crosstalk of change, facing the shock of the new: People, knowledge and ideas fostering the social fabric to facilitate the concentration of knowledge integrated communities”, *Technological Forecasting and Social Change*, submitted.

analysis, the local context must have embedded a set of social capabilities that define the context under which knowledge networks evolve.

For example, analysis has shown that the mobilization of the information society must overcome some critical uncertainties, including:

(a) unclear expectations related to the level of dematerialization of social and economic activities;

(b) effective adoption patterns of new technologies by citizens and customers, particularly influenced by accessibility, affordability and usability;

and

(c) unpredictability of demand for interactive services from both localized and geographically dispersed communities.

Our evidence supports the critical need for adequately managing those uncertainties and shows the necessity of effective infrastructures, incentives and adequate institutional frameworks to be promoted over time and across space.

Third, we need to also consider **experimentation in social networks**, which necessarily involves fluxes of people. It is the organized cooperation among networks of knowledge workers together with different arrays of users that will help diffusing innovation. But establishing these innovation communities requires the systematic development of routines of collaboration on the basis of sophisticated research projects, not limited by administrative constraints and in a way to facilitate new forms of using products and services, as well the design of those products and services. William Mitchell, from MIT, referred to these communities as “creative communities”, for which the experimentation of new ideas in “design studios” is particularly important to provide adequate forms of interaction of users with adequate research environments⁶.

But we also know today that the development of these communities depends of attractive settings that facilitate the exchange of more talents among the different poles of knowledge networks. In other words, this requires us to evolve from the old paradigms of “brain gain” to foster “brain circulation” among our regions.

Let us remember you of someone that was born in Rotterdam, studied in Paris and in Louvain, preformed research in Cambridge and London, in England, and worked in Basel, Switzerland. This is not new and happened some 500 hundred years ago. I’m

⁶ J. Bento, J. Duarte, M Heitor and W. Mitchell (2004), “Collaborative Design and Learning: Competence Building for Innovation”, Praeger Publ.

referring to Erasmus of Rotterdam and our challenge is to make this possible to all European citizens. In fact, we celebrated in 2007 the 20th anniversary of the Erasmus Program, probably the most successful exchange program in Europe, whose main social actors are the students themselves, and their commitment to international openness and to the building up of a renewed European society. Knowledge networks in Europe should aim at the development of new and challenging learning and research environments for students. In fact, the full participation of both graduate and undergraduate students in research is, in this respect, still an open issue.

To cope with such a variety of demands and with a continuously changing environment, we all know that the tertiary education systems, in particular, needs to be diversified. But the challenge of establishing modern tertiary education systems requires effective networks and a platform of research institutions, notably for stimulating the political debate among the various stakeholders and for assisting in the networking of national constituencies promoting the positioning of our institutions in the emerging paths of brain circulation worldwide⁷.

I would also argue that strengthening external societal links and “system linkages” are critical in making the institutional changes required to meet the needs of global competition and the knowledge economy. They consider, among others, public and private research organisations for universities and regional and business links associated with vocational training institutions⁸.

The debate on the emerging reform of European Universities is considered in terms of the allocation and future evolution of R&D expenditure in Europe, which must consider the different nature of private and public incentives for science and technology (S&T) and foster the strategic collaborative involvement of both public and private stakeholders. “Blanket” recommendations to enhance property rights or to limit public resource allocation, based on perceptions of the US experience, may be misguided. In fact, the key message that emerges from analyzing the US patterns of investment in

⁷ M. Heitor (2008). “A system approach to tertiary education institutions: towards knowledge networks and enhanced societal trust”. *Science and Public Policy*, 35 (8), pp. 607-617.

⁸ M. Heitor (2009), “Tertiary Education Institutions in Times of Change: A Systems Approach to Institutional Transformation”, in “The Future of the Research University: Meeting the Global Challenges of the 21st Century”, Kauffman Foundation, pp. 55-67. Also presented at at The 2008 Kauffman-Max Planck Annual Summit on “Rethinking the Role of the University and Public Research for the Entrepreneurial Age”, Munich, June 8-11, 2008.

S&T over the long-run is that the development of the US S&T system was based on a diversity of policies that led over time to increased opportunities for citizens, as well as to increased “institutional specialization” based on a clear separation of the role of private and public incentives to support S&T⁹.

Concluding, our analysis calls for policies that consider long term approaches of dynamic environments, which require to be continuously monitored, assessed and externally evaluated. We need to focus our attention on the need to foster advanced human resources and the concentration of knowledge integrated communities as drivers of larger communities of users. This requires a continuous public effort, but also a better understanding of the effectiveness of the mix of public support mechanisms and private incentives for the development of knowledge networks.

To clarify this debate, this Conference brings together emerging issues worldwide leading to new insights in science policy and technology commercialization. It also addresses recent approaches to technical change realized in Portugal, based on an emerging diversity of policies and increasing “institutional specialization” and clarification of the role of the private and public incentives to support science and technology. This process is reflected in the trend in developed economies towards increasing private investment in science and technology and we argue for the need to promote public and private strategies in modern societies fostering a non-hierarchical integration of formal policies and informal system linkages towards knowledge-driven societies. This certainly includes the continuous adaptation of systems of competence building and advanced studies, among which the reform of higher education is particularly important.

⁹ M. Heitor (2009), “The European Research Universities and the Challenge for Science and Technology in Europe”, in: Charles F. Bonser (ed.), *Adapting Universities to the Global Society - A Transatlantic Perspective*, Münster: LIT-Verlag, February 2009.