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The Science and Technology in Society Forum: Lights and Shadows

Kyoto, 5 October 2008

Speech by Minister Cristina Garmendia

"(...) concern for man himself and his fate must always form the chief interest of all technical endeavors (...)"

A. Einstein

Mr Chairman, distinguished members of this session, ladies and gentlemen, it is a pleasure for me to be here with you today, participating in this discussion forum dealing with new problems stemming from the explosive progress of science and technology. We are all aware that the fact that these benefits are not reaching most of the world's population is causing increasing social and economic inequalities.

Let me therefore thank **Mr. Omi** for his kind invitation for me to participate in this event and for his initiative in organizing this forum. Mr. Omi, I wish you great success with your initiative and I am quite confident that we will be able to use developments in science and technology to solve the problems facing humankind.

Ladies and gentlemen,

Few topics generate greater consensus today than the need to implement policies that encourage the generation, dissemination and application of new knowledge leading to economic growth and well-being. We cannot forget that innovation, in its broadest sense, has played a major role in social progress and in improving quality of life.

We need to produce and apply knowledge that addresses global challenges such as population aging, migratory flows, new energy sources and climate change. Such knowledge is essential for interpreting and responding to the demands of our complex society.

However we should be aware that ... in spite of great scientific discoveries and unparalleled technological development, **social and economic inequalities are increasing both within and between countries.**

Science- and technology-related activities are typically undertaken in developed countries, as illustrated by the fact that 95% of patented knowledge, 84% of articles published in top journals and 93% of technological agreements originate in the wealthier economies.

And the *paradox* we face today is that **new forms of social and economic exclusion are arising precisely because of unequal access to knowledge.**

The exponential **growth in information technology** that we have experienced in the last decades has been translated into productivity gains and economic growth. Information technology has changed the way we live, work and relate to each other. Paradoxically, however, it has also created



a **digital divide**, which is no less than a new form of social and economic exclusion within the national and regional borders of the most advanced societies.

The digital age is marked, for example, by a huge gap in internet user numbers—41.2% of the total population of Europe compared to 5.2% in Africa—and in mobile phone use—ranging from 110% of the total population of Europe compared to 28% in Africa.

The **lights and shadows** of scientific and technological progress are also to be found in **biomedical research**. Biomedical research and innovation have brought hope and have improved quality of life. But its social value rests on equal access to health care, and this is one problem we have to deal with. Moreover, biomedical knowledge and drug development are shaped by our understanding of citizenship, identity and difference; consequently clinical trials should be more comprehensive and include different groups and races.

For instance, antiretroviral therapy coverage among people with advanced HIV infections varies from 95% in Cuba to less than 3% in some Asian countries, especially those with Muslim majorities.

Hence, the question we have to address is how to bridge the gap between rich and poor countries. This challenge will be difficult to tackle unless we develop a **better understanding of the underlying social reality of the countries, cities, towns and villages that are unable to catch up**. This is the framework from which the Spanish **Alliance of Civilizations** initiative emerged, led by our President Rodriguez Zapatero.

Gender is also an issue to be considered in the context of science and technology in society. As it happens, gender is part of the debate in all our countries, independently of the level of scientific and economic achievement. Gender, in fact, is a **shadow** in a **world of light**. Despite the growing number of women conducting research, a substantial gap still remains in terms of the number of women managing scientific institutions and high-tech firms. Gender differences are also striking as women move up the academic ladder. According to a recent study published by the *Journal of the History of the Neurosciences*, in biomedical research—a field in which, unlike engineering, women have consistently participated—female doctorate students are less likely to receive promotion.

Leaving aside other contributing factors, I believe that a lack of support and networks is proving an **obstacle for the advancement of women** and is producing **discrepancies at several levels of the scientific world**.

I chose those examples because I want to draw your attention to the fact that the lights and shadows of science and technology in society go beyond mere economic development. The issue I would like to address today is precisely why science and technology do not respond, not only to the major challenges facing humankind, but also to small social dislocations and economic disruptions.



Although I'm afraid I do not have the answer, I'm truly committed to the search for potential solutions.

As a scientist and entrepreneur myself, and now as the Spanish Minister for Science and Innovation, I may be able to help you understand the implications of the concerns I would like to share with you today, which I am sure you have come across as well.

I am of the opinion that we have emphasised **the economic and market value** of science and technology over **its social value**. **Economic value** is associated with R&D investment acting as a driver of employment growth, productivity gains, competitive advantages and individual and collective well-being. **Market value**—which is slightly, but not much, different—refers to what business people denote as customer value, reflecting market success, competitive advantage and, ultimately, financial returns.

Social value in science and technology is a very broad concept that includes fulfilling social demands, solving social inequalities, contributing to social inclusion, providing solutions to economic externalities such as climate change and global warming, increasing life expectancy, and finally, learning about the unknown and expanding the frontiers of knowledge so as to seek feasible alternative answers to the big questions of humankind.

However, science [and technology] have difficulties in terms of interacting with **social problems and structures**. I do not mean that scientists do not give consideration to social problems: they do. However, often they fail—indeed we fail—to consider the impact of science and technology on society.

Advances in science and technology not only move back the frontiers of knowledge but also **often represent a challenge to the dominant social organization forms and structures**. There is much inertia in our social organization, and, consequently, some of the **lights and shadows** evident today are the product of a mismatch between new ideas and how these are used in accordance with social practices, beliefs and organization.

We also need to solve a **tension existing in the production of science and technology**. By that I mean that we must reach a **common understanding** and agree on an agenda that takes account both of **scientific interests**—often generated in a bottom-up fashion—**and strategic policy objectives**—including long-term social priorities and taking a broader perspective. To reconcile both, it is necessary to tackle major social challenges, such as those reflected in the Millennium Development Goals.

I know that this is a difficult task, but we have to give the best of ourselves in the pursuit of **coordinated strategic policies**, as the **social, economic and scientific gains far outweigh the costs implied**.

A good example of an initiative in pursuit of this aim is the building of the **European Research Area** as a scientific agenda shared by EU member states. We are currently working on the definition of several new themes that emerged in the Ministerial Conference held last July under the French Presidency. We are also working on themes that I placed at the top of the common agenda last week in Brussels; these include desertification and water resource management, and also the social sciences and humanities, as a research area that is particularly important for understanding the dynamics of complex societies.

Science and technology are pretty much like the key that opens both the door to heaven and the door to hell. Against those who think that the difference is a question of scientific ethics, I will argue that they are wrong: the difference lies in our **collective patterns of behaviour**.

We have to figure out how to use science and technology in a responsible way. More importantly, it is our **social responsibility to reconcile science and society from different perspectives**. Those are important reasons to work towards **setting the conditions and providing the tools** for our scientists, business people and individuals to succeed in the international/global landscape. And that is what we, at the Ministry for Science and Innovation, do, in cooperation with other nations and in a framework of fair exchange that seeks complementarities and synergies between scientific and technological capabilities. But the core of our activities at the **Ministry for Science and Innovation is the building of strong ties with society**, in terms of communication, participation and the inclusion of all our citizens.

Ladies and gentlemen,

The onus is on us to put science and technology to work in advancing the human condition as never before. It is crucial that our essential values remain at the core of what we do, and we must ensure that every single scientific advance confirms over and over again the most important fact of life: our common humanity.

It is extremely important for all of us make a better hand of this issue. Make no mistake about it, the advance of civilizations and the liberation of societies has, in no small measure, been the product of the science and technology revolution. But it is also crucial that we all agree on the relevance of science and technology as key drivers in the construction of a better world. We have advanced some steps in this direction—science and technology today are key components of the part of the policy agenda that is given over to cooperation and the promotion of the socioeconomic development of less favoured societies.

Although we have a **shared responsibility, commitment** will require us to work from our respective positions. I have worked with conviction and dedication at setting up the **Ministry for Science and Innovation**, which aims to add economic value to our scientific and technological capabilities



by recognizing the social value of what we do, and the social structure in which knowledge is generated and will be used. Big ideas in science do matter, but each idea has immense social significance in terms of its potential contribution to transforming the landscape of humankind. However, to come out from under the **shadows** we must act, and act today.

Thank you very much.