

OECD Working Party on Innovation and Technology Policy

**Workshop on Innovation Disparities**

Panel 3: How should sustainability and inclusiveness be integrated in STI strategies?

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Mr. Chairman, Ladies and Gentlemen,

In this session, we have been asked to consider how sustainability and inclusiveness can be integrated into STI strategies.

Let me start by underlining that the world community is increasingly focused on the need to move towards inclusiveness and sustainability, demonstrated by the commitment of all countries to the sustainable development goals as a broad framework for action. However, it is widely recognized that incremental improvements will not be sufficient to achieve sustainability. Deep transformational change will be required after years of evasion and delay in facing the intensifying challenges of the modern world.

Research, development and innovation, which are the focus of this meeting, will be key factors to improve welfare and inclusiveness and to achieve sustainability. The Expert Group on Economic and Societal Impacts of Research of the European Commission, ESIR, in a Memorandum of December 2017 states this clearly: “Research and Innovation Strategies become the key pillars of Europe’s strategy – achieving transformational change through challenge-led missions to galvanise innovation.”

As we are focused on sustainability, let me first clarify the significance and content of this broad concept.

Many recent scientific reports have demonstrated in recent months the realities, the scale and the urgency of the risks we face. These include in the environmental area:

- The destabilization of the climate;
- The degradation of the ecological life-support systems on which humanity depends coupled with the sixth mass extinction of species;
- Unsustainable levels of resource use, pollution, and waste;

and in the economic and social areas:

- Rising levels of inequality in income, wealth and opportunity;
- Imbalances and vulnerabilities in economic and financial systems;
- And, increasing social polarization coupled with a weakening of governance capabilities and of the essential framework of international cooperation.

The fact is that we face a deteriorating situation in the real world: we are at present, rapidly moving away from sustainability. The current path of growth worldwide is aggravating inequality and undermining sustainability - as is evident for example, from the continuing rise in greenhouse gas emissions in spite several decades of efforts to reduce them. Young people across the world increasingly understand this. They know that the present path of world development is not sustainable: this is the first generation to be confronted by such existential crises as climate and species extinction within a foreseeable time horizon.

To combat these adverse trends, knowledge, research and innovation are crucial potentials which can be mobilized by humanity to achieve a stable and prosperous future. From this perspective it is clear that strategies for science, technology and innovation must rapidly incorporate considerations of sustainability. This implies, in systems terms, that our economic, energy, social and technological systems – effectively, our model of economic growth – must be adapted to these changing realities: this may imply redundancy and inefficiency in the short term in order to achieve longer-term resilience and sustainability.

How then can STI strategies be adapted to promote transformational change and inclusive, sustainable welfare? Again, as phrased by the ESIR: “The ambition of the European Community is to create economic growth not just in quantitative terms but in qualitative terms - smart, innovation-based, inclusive and, above all sustainable.”

This implies that technological change has not only a rate but a direction and therefore, that it can and must be guided by public policy.

Research in many critical fields of sustainable development demonstrates that incremental improvements, for example in resource and energy efficiency, are certainly necessary to improve our prospects but that they are not sufficient to assure sustainability. STI strategies must therefore be targeted to achieve transformative, structural change through an increased focus on mission-oriented approaches. This is not, as Margaret Thatcher claimed, the Government “trying to pick winners.” It requires a thoughtful, coherent strategy of incentives and targets to guide research and innovation to meet social goals in the common interest.

Before drawing some conclusions on how STI strategy can promote inclusiveness and sustainable development, let me briefly consider how far public policy can influence technological progress and the direction of enterprise innovation.

The direction of technological progress is, of course, to a significant extent driven by the autonomous processes of the generation of knowledge and know-how through basic and applied research and scientific discovery. These processes have been the focus of OECD attention since the 1960s. The concept of technological progress emerged in a book by Dennison in 1956, “Why growth rates differ” which triggered intense research to find an answer.

However, we must recognize that the process of innovation is embedded in the social context of each country, influenced by established structures of power and economic interests and oriented by forces of market power, factor costs, history, culture and ideology. Thus, as we know, technological progress is heavily driven by the commercial interest of industry and finance – both directly and through political influence – towards objectives of short-term profitability and market share. This approach, though justified in a commercial, shareholder-value perspective, often discounts wider environmental and social considerations and neglects longer-term consequences.

Mission-oriented STI strategies must therefore clearly be oriented to advance the interests of society as a whole to guide technological progress towards inclusiveness and sustainability. This is all the more important when we recognise the profound social and employment implications of the wave of next-generation, disruptive technologies now emerging, such as artificial intelligence, bio-engineering and robotics.

Let me now suggest some key aspects of how STI strategies to advance inclusiveness and sustainability.

1. STI strategies must increasingly emphasise mission-oriented research and innovation so as to stimulate the emergence of radical new technological solutions, including their testing and diffusion. This will be essential if we are to contain urgent challenges in the time available. This implies that research funding must increasingly be driven by the demand side, a focus on the need to tackle critical issues, and less by the supply side, the interests of researchers to pursue their on-going programmes.
2. Strategy should be framed in the perspective of both present and future needs and challenges so as to mobilize and guide scientific potentials. And, as many of the most critical issues we face are truly global – as is the international scientific community itself – STI strategies should recognize and integrate the realities, the potentials and the needs of the billions of people of the developing countries so as to use scientific capabilities in optimum ways.
3. STI strategies should aim to influence the path of technological progress not only through public budgets but by establishing a clear and predictable framework of regulations, targets, taxes and incentives to stimulate desired behavior of other actors, providing direction for both public and private investment in mutually reinforcing research and innovation.

As phrased by the ESIR Expert Group: “A mission-oriented innovation policy should shift attention from inputs to the impact of the many complex systemic interactions between basic and applied research, innovation and diffusion.... It should combine top-down orientation with bottom-up engagement and experimentation to galvanise growth.”

4. This implies that STI strategy, within a transparent framework of incentives and targets, should integrate a range of connected public policies, such as: to strengthen and mobilize education and training; to promote employment and retraining; and to extend the provision of information services, finance and support to small and medium enterprises. This raises a fundamental question: what are the supporting conditions which enable innovation to take root in society, leading to positive contributions to employment and growth?

This also implies a re-orientation of public expenditures for research and innovation both to create the foundations for future prosperity and increased opportunity and employment in the low-carbon, green economies of the future and to avert the adverse effects on the lives of citizens of the growing non-traditional threats to stability and peace, such as the impacts of accelerating climate change.

5. Finally, to address the systemic challenges we face, STI strategy should adopt a systems approach. This requires integration of the contributions and insights of the hard sciences, the social sciences and the humanities. This will be essential if the process of technological, economic and social transformation is to be founded on the values of openness and participation, social justice and legitimacy.

I will now conclude by flagging a number of difficult policy choices or dilemmas in the formulation of STI strategy.

1. It is urgent to achieve action through the wise diffusion of new technological solutions on a macro scale to counter deteriorating trends. But we must avoid locking-in comparatively less-efficient technologies. In considering research portfolios and the timing of investments, there is therefore a need to balance short-term impacts with longer-term optimization and to reconcile mission-oriented research and innovation with widespread diffusion.
2. There is a need also to balance STI policies aimed at encouraging disruptive, breakthrough solutions with policies aimed at sustaining steady incremental improvement.
3. It will be particularly important also to establish a realistic calculus of costs and benefits – including accounting properly for externalities, subsidies and co-benefits – as a sound guide for policy, incentives and investments.
4. The formulation of STI strategies must also take account of rising levels of risk and uncertainty, recognizing the risks of non-linear behavior of the complex and connected systems involved. This implies that the past is no longer an adequate guide to the future and therefore, a growing emphasis on anticipation and resilience.

5. To manage the complex, systemic issues we face, STI strategies must balance an integrated systems approach, favoring multi-disciplinary, cross-sectoral collaboration, with the need to ensure and maintain scientific rigor and excellence through specialisation.
6. Finally, STI strategies must be based on transparent, participatory processes to engage the public and key actors in society, so as to take proper account of the fair distribution of costs and benefits between groups and special interests, and between present and future generations.

This is particularly important because the goal of STI strategy is not simply to achieve innovation but beyond this, through successful innovation, to advance the wider goals of society for prosperity, inclusiveness, social justice and sustainability.