

## **Blue Sky II – What Indicators for Science and Technology and Innovation Policies in the 21<sup>st</sup> Century**

### **Panel Discussion: What has been learned and what happens next?**

#### **Summary Remarks Fred Gault**

##### **Telling the Story**

Science, Technology and Innovation (STI) indicators is a young field and we do not yet speak with the same language in public discourse. That will come, but we must be able to tell our story to: the policy community; the public; and to ourselves.

At the 40<sup>th</sup> anniversary conference of the University of Sussex Science Policy Research Unit (SPRU), the same issues of language and communication were addressed and the solution there was to embed science policy in undergraduate course. This is something that the indicators community might consider.

##### **What is the Story About?**

We have no shortage of topics arising from changes, since the last Blue Sky meeting, in economic and social structure. Examples are globalization and the growing role of commercial services in developed countries. Also, when we look at STI activities, we are asking now if the activity is sustainable, in terms of its use of energy, materials and people, and the consequences of transforming the energy, materials and people into goods and services. Some of these consequences are greenhouse gas emission, ground water pollution and oppressive working conditions.

##### **New or Extended Indicators to Tell the Story**

The indicators we use to tell the story are changing. For many years we have measured activities such as: R&D; invention; innovation; technology diffusion; and, human resource characteristics in these areas (education, training, mobility, ...). Now, we are urged to go beyond R&D. The role of intellectual property protection of invention is being challenged by Eric von Hippel in the context of democratized innovation and people are playing a more entrepreneurial role. The result is a need for more indicators of the characteristics of both people and innovation and how they interact.

We are also urged to measure the linkages between the actors (government, business, higher education), the knowledge flows, as well as financial, material and energy flows, in order to see the outcomes and, eventually, the impacts. It is no longer enough to measure just innovation. As a result, the story moves from the occurrence of the activity to what happens, economically and socially, when the activity takes place. This is especially true if there is public investment in the activity and the 3<sup>rd</sup> edition of the Oslo manual supports this approach.

New indicators of globalization of R&D were proposed. The use of novelty was used both to distinguish R&D from scientific services and making sense of innovation measures. In Canada a propensity of manufacturing firms to innovate of 80% is limited in its use in explaining innovation, the rate of 9% for firms producing new to the world innovations is more useful.

Panel measures were proposed as well as measures of collaboration, open innovation, and the democratization of innovation. Size of the firm being observed and its location are important variables. Small firms are different from large firms and some of the variables describing them, those related to knowledge management for instance, are discontinuous as size increases. The size at which the discontinuity occurs has implications for management practice and policy. As for location, firms in small towns are different from those in large urban areas.

Non-technological has become more important over the last decade, and will become more so, as the role of knowledge activities, e-business and design are found to be significant correlates with the activity of innovation.

Human resources are key and we have looked at human characteristics, including mobility and learning. We have surveys such as the Programme for International Student Assessment (PISA), the career path of doctorate holders (CDH), and mobility studies, but we need to integrate HR into the mainstream STI indicators. Related issues are the human capital stored in the people and the network capital stored in the linkages between the people. It was also suggested that PISA become a global survey, but funding was not addressed.

With the indicators just described, a story can be told about the economic and social change over the last decade. However, to produce the indicators, there has to be analysis of data.

## **The Analysis**

Repeatedly, we have been told to move from the macro to the micro to improve and make more specific our analysis. This does not mean that we give up using macro data bases, such as STAN, but we need more analysis of micro data and ways to facilitate that analysis. There are also the data bases from other international organizations and there is a case for co-ordinating the population of these data bases and the use of common concepts and definitions. An example is the common R&D survey used by the OECD, Eurostat and the UNESCO Institute of Statistics.

John Marburger suggested that the indicators community needed intimidating models to confer legitimacy on our contribution to the policy debate. There is a challenge.

One of our strengths and weaknesses is that we are multi-disciplinary. We use different lenses, techniques and languages. We are learning to talk to one another and that has been an outcome of this forum. However, it is almost entirely a discourse with developed countries. What about development?

### **Why is Development Important?**

Development matters because an outcome of an STI activity can be a decrease in human suffering and if we admit a moral or ethical context to our work, we must make our indicator knowledge accessible to colleagues in developing countries. That is what the annex to the 3<sup>rd</sup> edition of the Oslo Manual is about. But there are opportunities to do more, including the challenge to contribute to what replaces the UN Millennium Development Goals (MDGs) in 2015 posed by the Chief Statistician of the OECD. There is also a question of what happens to the Kyoto targets after 2012.

### **Statistical Offices and Indicators**

One of our communication problems results from the fact that some of us come from statistical offices and some come from policy departments and universities. If we are to promote micro-data analysis of data held by statistical offices we will have to build on those cases where researchers are given access to the data under controlled conditions and make it the rule rather than the exception.

Statistical offices are also challenged by globalization and how they produce meaningful economic data, especially when there is massive outsourcing. However, statistical offices do not change easily and stimulating this change might be a collaborative project with the OECD Statistics Directorate. Another area of collaboration is the capitalization of R&D. We need measures of deflation and depreciation and there is already close collaboration between the national accountants in the Canberra II Group and the NESTI Working Party.

Statistical offices are institutions and other institutions like regulators, policy makers, cultural organizations, universities and businesses are part of the framework within which we operate. The challenge is to capture knowledge about them in our surveys so that we can see the big picture.

At the beginning of the Forum was a challenge to describe STI indicators in ways that are meaningful to policy makers. Some progress had been made in this direction as well as in meeting the second but longer term challenge, to provide our ministers with the same quality of information on STI as the Finance Minister gets on economic and social change.

## **Next Steps**

The next step lies with NESTI and with other Working Parties at the OECD to, as Luc Soete put it, 'assume the arrogance consistent with the importance of the task'. But, the importance, the difficulty and the specialization, of our subject takes us beyond NESTI, the Working Party on the Information Society (WPIIS) and the Statistical Working Party of the Industry Committee (SWIC), to other Directorates, including the Statistics Directorate. This too is a challenge.

We go from this meeting expanded as a community, better informed, more focused and open to collaboration.