Indicators of the Science-Society Relationship

Martin W. Bauer, London School of Economics (great britain), rapporteur

Chair:
- Rémi Barré, Professor, Conservatoire national des arts et métiers (France)

Speakers:
- Martin W. Bauer, Professor, London School of Economics (Great Britain)
"Scientific Culture - Indicators for the Variable Science-Society Relationship"
- Kristina Petkokva, Professor, Institute of Sociology, Bulgarian Academy of Science (Bulgaria)
"The Changing Images of Science: Geographical and Historical Comparison"
- Rajesh Shukla, Professor, National Council of Applied Economic Research (India)
"A Conceptual and Methodological Framework of Construction of Science Culture Index"

The session brought together three contributions on indicators of scientific culture. This included new developments in conceptualization, data integration over time and different context, index construction and validation across EU-India and a comparative cohort analysis of UK and Bulgaria.

The conceptions of indicators of 'scientific culture' must depart from prejudices of public deficit (Martin Bauer). Cultures are an intangible asset to work with. An index of science culture transforms the intuition of a 'variable distance' between science and the public, and of the position of science within the public sphere, into a diagnostic metric. Research into public understanding of science has exposed the prejudices of a public deficit. The polemic over an entanglement of attitude surveys and such prejudices has performed well, but hindered the development of new ideas on how to handle this data. Separating the existing global stock of data on public attitudes to science from the interpretation as public deficits allows us to take a fresh look at this material. Such an initiative was started in November 2007 at an international Royal Society workshop in London, with follow-up meetings in Delhi, Sao Paulo, Sofia, and recently here in Paris. In 2009 there will be further meetings held in Tokyo and Buenos Aires. In these efforts, special care is required to avoid ethnocentrism both in basic measurement and interpretation of the results.

A fresh look includes taking stock of national surveys of literacy and attitudes towards science. Such data collections reach back to the 1970s, in Europe, India, China, Japan, North and South America, and in Australia. This data must be recovered, cleaned, and inspected for comparative purposes. In first priority, national data series should be integrated into single data files to allow for a step change in analysis, including scaling, longitudinal modeling and cohort comparisons. Integrated data series are now available for the US (1979-2002), EU12 (1989-2005), UK-Bulgaria (1992-2005), India23-EU32 (2004/05).

The comparison of attitudes to science across Europe and India shows several things (Rajesh Shukla). It brings to test the two-culture hypothesis of public understanding of science: the relationship between knowledge, interest and attitudes is contingent on the level of socio-economic development (Martin Bauer). It was shown in the Indian context that literacy and positive attitudes to science are positively correlated. In the EU context, this relation is negative: the more knowledgeable a country, the more skeptical the citizens are on average with regard to the general benefits of science.

This demonstration of a **non-linear relation between knowledge and attitudes** on a global scale has implications for the construction of the "culture index" of science (Rajesh Shukla). The question is: what is the asset in a particular context? For

the construction of a global index, a conditional transformation needs to be applied: up to a certain level of science literacy, positive attitudes count as asset. In the context of lesser development general support for science is based on general expectations of real benefits (at moderate costs), and this is the asset. Above a certain threshold of literacy, negative attitudes count. In these contexts the risks of science, environmental, social and financial, unforeseen consequences and ethical issues pose existential problems for citizens. Here, the generalization of the scientific culture of doubt to the wider public is the asset.

The index of science culture across 32 EU countries and 23 Indian states was presented (Rajesh Shukla). This index combines objective (R&D, manpower, educational attainment) and subjective (literacy, interest, attitudes and engagement) indicators into a composite index, including the conditional transformation of attitudes depending on literacy levels. The feasibility of such an index is demonstrated and validated by its diagnostic potential. This raises the stakes of the exercise: to bring into discussion a combination of objective and subjective measures in the definition of scientific culture.

Finally, the results of a cohort analysis of attitudes to science were presented, comparing UK and Bulgaria from an integrated database that spans the period of 1992 to 2005 (Kristina Petkova). Five age cohorts (Pre-War, War Generation, Baby Boomers, Generation X, and the Transition Generation born after 1972) were defined and compared on several facets of attitudes. The analysis reveals similarities and differences in the various facets of attitudes to science of these generational groups across the UK and Bulgaria. The paper demonstrates the **step change in analysis** that can be achieved with an integrated database.

The session discussed how these empirical efforts of working with past surveys (i.e. sunk costs) needs to be seen in the context of a wider agenda for the future. This includes the ambition to construct the analogon of the FRASCATI Manual for the coordinated collection of attitude and engagement data to construct a global index. It was also stressed that the nationally representative, questionnaire based survey is in no way the only relevant data stream to map the cultural assets of a location. Complementary data streams need to be mobilized and tested, such as mass media monitoring, semantic text maps, and inventories of public engagement activities of variable sizes and topics. Such combined efforts will realize the ambition of **mapping the societal conversation of science** in a comparative perspective.