

## Chapter 16

# Summary – Targeting STI Policy Interventions – Future Challenges for Foresight

Leonid Gokhberg and Alexander Sokolov

It has been shown in this book that Foresight and STI policy are closely interlinked. Long term visions for the potential development of STI and the detection of potential challenges towards STI and society resulted from forward looking activities. The issue of implementing respective policy responses naturally arises. This in turn has significant consequences for the governance of innovation systems because challenges and development trends usually affect a variety of policy fields and recommendations for implementation. In this light the interconnection of Foresight and STI policy leads to the discussion of the impact of different modes of governance on the development of national innovation systems as a driver of national values hence economic conditions.

That said leaves the question which role Foresight has in STI policy. Basically one might argue that each actor in any National Innovation System has the right to act on his own behalf and without any obligation to anyone else. However, as society is becoming increasingly aware of upcoming challenges and given the public good nature of science this assumption becomes only semi true. The reason is that future but also already recent challenges, opportunities but also threats are by far too large and complex to be solved by individual actors and are characterized by a significant risk and uncertainty of completion and eventual application. Moreover the current global economic conditions are not favorable to allow public bodies responding to challenges identified by Foresight studies in an appropriate manner. This refers especially to developed countries which are especially affected by an economic but to some extent also political crisis. In such constellation the attitudes of policy makers towards taking risk in form of uncertain STI investments are weaker than usual since more urgent current problems have to be solved. In consequence long term challenges although known are not immediately on the agenda of policy makers and STI implementation bodies.

---

L. Gokhberg (✉) • A. Sokolov  
Institute for Statistical Studies and Economics of Knowledge, National Research University –  
Higher School of Economics (HSE), Myasnitskaya st., 20, 101000 Moscow, Russia  
e-mail: [lgokhberg@hse.ru](mailto:lgokhberg@hse.ru)

Foresight studies carry the potential to contribute possible answers to the basic question for the role of science in the economy and the overarching societal context. It often appears that science is still considering itself as a self fulfilling prophecy, e.g. justifying its existence and especially public finance with the assumption that scientific work is delivering a given though not predetermined value. This assumption is increasingly challenged by policy and society but to some extent even by industrial opinions holding ever more true in the national S&T policy context. Here the challenge arises if a nation can still afford to maintain a science system framework covering all disciplines to the fullest extent or being forced by financial constraints to focus on selected priority fields. What seems reasonable and plausible at first sight turns out problematic when looking at this challenge from a broader perspective.

Many science fields are already and continue to be more interrelated and interdisciplinary. Consequently to pursue the development of selected, S&T priorities the broad spectrum of S&T fields need careful consideration.

Interdisciplinary science and technology is the result of the underlying basic research. One of course might argue that S&T is global thus a sole country might specialize in a few selected cross-disciplinary fields taking advantage of the development of complementary or underlying fields in other countries. Though such strategy seems reasonable and plausible at first sight, the implementation is likely to fail in the long term. However it needs to be kept in mind that science and technology is mainly tacit knowledge and bound to persons thus cross-disciplinary team work requires different competences and knowledge at one place, which eventually determine a fertilizing research and innovation culture.

Foresight studies run the danger of becoming a tool of professional communities which justify their existence but are barely in a position to influence the implementation and use of Foresight results. However in course of this the confidence and trustworthiness of the Foresight community might suffer to some extent in selected countries. There is obviously a tendency that although emerging and transition countries are willing and keen to learn from other countries in most cases the efforts of countries are limited to 'first phase learning', e.g. getting acquainted with existing approaches of other countries which is step one and desperately needed but not complemented by step two in the learning process which is the further development and adjustment of these approaches to the local, regional and national specific framework conditions.

While Foresight has been applied mainly in developed countries to a large extent for significant time transition countries are discovering the potentials of Foresight for STI policy only for the last decade. However in such course the Foresight and STI communities in these countries often quote the respective international communities for proving their legitimacy without considering their own strengths. However the strength of these international communities' is never asked / questioned at any time in the whole dispute, instead the community is given new drive by new members each of them struggling to survive in the new scheme. Eventually it shows that the established communities and their inherent thinking and attitudes dominate the establishment and the reshape of innovation systems hence Foresight and STI policy at all levels.

The doubtless potential of Foresight studies' contribution to the shaping and future orientation of STI policy is challenged in several ways. Foresight studies are to a large share based on expert knowledge which stems from scientific or engineering background. Scientific results usually do not allow their use and immediate application in given circumstances. The global value chain of scientific production is composed of numerous parallel streams, e.g. in form of research projects which belong to certain science and research fields. Although developments in the scientific value chains might inspire each other to some extent the applicability and usability of the results in fields others than the one of origin are limited at the early stages.

The speed of development of different science fields is not universal, e.g. the likelihood that science fields generate results in time allowing complementary use in other fields is rather low. Having said so it becomes obvious that Foresight might identify promising S&T fields but still can not overcome the uncertainty of achieving success in meeting challenges in a given time. Moreover the general consideration of the time factor is crucial in the public debate. Foresight is of long term nature but there is a strong presence of the immediate proof of return on these financial resources invested into science. Still the awareness of the unpredictability of 'measurable' results from these investments is missing to a large extent. Hence the expectations towards the splitting the work associated with respective science fields between locations, regions or nations are high but the interfaces between these are not considered in course of cooperation models and especially in course of time.

Science fulfills more than the research task and the academic dispute about research findings. Moreover it is common practice that research results are included in ongoing education and training activities. Hence the regional proximity of research and education is weakening for the education and training of the next generation of researchers and engineers. Modern media such as remote learning are becoming more widespread especially in the social sciences but remoteness becomes a challenge for basic sciences when it comes to exercising in labs. That holds still true in the beginning age of virtual labs.

Finally the identification and support of priority fields in most cases do not include the long term impact assessment of these fields. Although direct impacts can hardly be quantified in a long time future horizon, potential effects can be assumed and monitored at early stages.

Eventually it shows Foresight studies have the potential to contribute even stronger to STI policy in many fields.

Foresight studies show an ever increasing potential to serve as one basis for S&T strategy building at different levels. Foresight based visions which are commonly used for strategy development. However S&T strategy development is different from implementation and varies between the actors developing these. S&T strategy by industry differs from one provided by governments and funding agencies in many ways, e.g. time horizon, S&T development stage, risk and uncertainty acceptance, investments etc.

Given the fact that Foresight studies are in widespread use it is ever more surprising there is little knowledge about the factual implementation of their results. Thus far the assumption prevails that Foresight impacts the national innovation capacities and the quality of national innovation systems. There are reasonable arguments which enforce globally comparative evaluations and impact measurement studies of Foresight over a longer time. Such evaluation should cover the implementation phase and equally important the need to include the learning from previous Foresight studies in the design of new ones. Most Foresight studies are initiated by national public authorities, e.g. governments or related agencies. However the initiation and the design of these studies are often done by different units. Hence a systemic approach towards the preparation and design of Foresight is ever more needed in order to ease the preceding phase and to limit the repetition of failures and mistakes done at the preparation and design stage. The design and initiation phases of Foresight studies include the setting of objectives and the identification of themes which need to be aligned to the broader perspective and mission of the initiator but even more important the tendering procedure for launching a study. Typically both public and private studies undergo an initial tendering procedure. The preparation of such tender process and the subsequent assessments and selection of applications are a complex process which is critical already for the quality and validity of the results to be expected. Hence guidelines for the design and preparation of studies, e.g. the tendering procedure, are valuable instruments for Foresight. In line with such guidelines a set of requirements to contractors for undertaking professional Foresight studies should be developed.

At national but also at international level it seems recommendable to establish a network and a central database collecting the experiences of these studies to make them accessible and usable for future Foresight studies. The main focus of such a collection should be on the procedural dimension, e.g. learning from the Foresight processes and the organization of these. Moreover a documentation of such processes will certainly turn out valuable for Foresight practitioners in course of a Foresight study to provide inspiration for solving certain challenges which are likely to occur.

Currently Foresight studies are used for detecting future challenges towards society, the assessment of potential technological developments and the identification of gaps and needs for immediate, mid-term and long-term measures. However Foresight studies also have the potential of being used for the anticipation of potential policy measure impacts and the identification of the next generation of innovation policy related measures. Here a new field for applying Foresight studies is likely to arise in the near future.

Summing up the book chapters provide a comprehensive overview and in-depth discussion of many different facets of Foresight studies and innovation policy. The editors wish to express their gratefulness to all contributors of this book and Basic Research Fund of National Research University, Higher School of Economics who made this book possible.