Research on novel STI indicators

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Filters type:	Information/communicational	**Signal type:**	Mainly positive
Importance:	For the for the EU and the World	**Implications:**	Beneficial
Occurrence:	2005-Now	**Impacts timeframe:**	Now-2025
Key words:	Indicators, policy, S&T, patents, surveys, innovation		

Weak Signal

INNOS&T aims to develop and collect novel science and technology indicators with extensive European coverage, to be used in empirical models that can contribute to improve European, national and regional policies on: 1) Economic use of patents, i.e. unused patents and strategic patents, licensing, entrepreneurship; 2) Knowledge flows in the invention process, i.e. science-technology linkages, geographical proximity and knowledge interactions; 3) Gender, education and mobility of inventors, 4) Value of patents. This will mean exploring science-technology links and other phenomena. There could be numerous important results from the project (or few: indicators research sometimes just reveals things to be highly complex). But what if this project is a weak signal that quantitative studies of S&T activities, especially if informed by the sort of understanding yielded by its programme of interviews, could achieve a real breakthrough in analysis and forecasting of links between fundamental research and its commercial exploitability, or between patterns of research activity and industry-academic relationships and the achievement of highly successful (even transformative) innovations? What if this is a weak signal that we will be able to prioritise areas of applied research to fund much more effectively, organise and steer innovation-conducive ecologies for academic and industrial researchers and mangers, increase the value-for-money of public research and the impact of innovation policies more generally? The developments of indicators could be just part of the trick here – what might be equally or more important would be the application of new techniques of simulation modelling (not just conventional multivariate statistical modelling, but use of some of the emerging tools here).

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Typology

Social research projects such as this are frequently presented in very cautious terms, and are subject to critique by researchers from other traditions. Results are often expressed in obscure probabilistic terms and deal with factors at one remove from leverage (e.g. Universities have considerable autonomy and cannot always be induced to operate in new ways) and which are highly context-dependent. Making results usable may be highly challenging and involve much translation.

Policy makers frequently prefer to be informed as to priorities associated with specific criteria, while retaining the right to make final decisions based on their own judgement and political gaming (e.g. need to satisfy specific interest groups, need to trade concessions or for alliances with competing policy areas).

Importance

In principle significant developments could lead to important shifts in EU and member state STI policymaking, with benefits in terms of (a) enhancing relative innovation performance and (b) speeding the pace of innovations directed to major challenges.

It is not inevitable that the EU would be the first to capitalise on such understanding, however. Other countries might equally apply such knowledge to enhancing their innovation. (Some countries would find this difficult simply because they are not yet geared up to produce many STI indicators – this is probably true for most large emerging economies.) Furthermore, applications might not always be toward socially beneficial innovations: military technology and other problematic areas might well be among the first areas where such instruments were applied – this is even one field where the US might be able to act rapidly despite its general lack of national innovation policy.

Finally, there is some debate about whether extremely high rates of innovation are necessarily a good thing. Organisations can take time to assimilate new tools and techniques, and social conventions and regulations may be challenged by new technological opportunities that allow actors to do things in new was. A hyper-innovative society (and world) will not be universally welcome.

Associated with this is the possibility that technocratic rationality applied to STI policy, as elsewhere, is liable to focus on certain types of means and ends (especially those that can be easily measured) and neglect others; that important stakeholders will feel disenfranchised from decision-making; (putting the two points together) that some actors will find themselves marginalised because, for example, their kinds of research, their contributions to community life, etc. are not valued.

Potential implications

It might be argued that what is most likely is incremental improvement in analysis for policymaking, though one factor that might support this scenario would be more widespread advances in simulation of human social and economic behaviour – and the acceptance of such modelling in policymaking. (As suggested earlier, military and security applications might predominate, but this is not necessarily so since many commercial organisations are seeking to develop and apply better understanding for their own purposes).

Beyond the implications discussed earlier under the heading of importance, a number of other possibilities might be explored:

One possible implication is a shift in the locus of decision-making power – for instance, if it is demonstrated that policies can be conducted most effectively at local level (e.g. cities) or at EU level.

A second is that a demonstrably more effective STI policy might mean increases in, or shifts in the balance of, funds and other support going to specific types of policy action – fields of research, support for cooperation, styles of innovation (e.g. open innovation), and the like.

The interests involved in this case do not make it likely that there would be deliberate efforts to subvert the trend. However, it is a commonplace that when indicators become embedded in polices (especially as targets or allocation tools), then their meaning is changed as actors seek to maximise their perceived performance. This would mean that some of the value of the new tools would be diluted.

Current situation

There are many indicators used in STI policy. Many of these are used mainly in a relatively crude "benchmarking" and exhortatory sense, with little detailed examination of how different indicators stack up against each other (or, indeed, the limitations of many of our most familiar indicators). When it comes to topics like prioritisation there is still much reliance on expert judgement, because indicators are often poor for assessing emerging fields – and to date the most ambitious efforts to progress this area have not been particularly successful (they end up requiring heavy expert interpretation, for one thing).

Here is an assessment of the current state of affairs from ENID.[1] The European Network of Indicator Designers:
"The recent years have witnessed an extraordinary diversification of the demands for Science and Technology (S&T) indicators for policymaking and strategic decision of the actors involved in S&T

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policies. New demands have emerged as a consequence of the growing complexity of innovation systems at the regional, national and international level and of the needs of new indicators types to characterize the position and the linkages of individual actors (so-called positioning indicators). Whole new fields of indicators have emerged, like collaboration indicators, web indicators, indicators on human resources and mobility, while even in classical domains like input measurement existing indicators are no longer fully adequate to the needs of policy…."

For a more critical view see ReSIST (http://www.resist-research.net/cms/site/docs/WP1%20Summary%20final.pdf) where it is argued that "STI policy tends to over-rely on the input of experts in decision-making, and judging performance based on indicators of efficiency. Accountability processes are often technocratic, dominated by elites, and indicator-based. Similarly, STI policy analysis following this model also focuses on indicators of the operation of the science and engineering enterprise with an eye to economic growth, and with a lower concern on identifying wider social impacts."

Drivers

T

- Improved computational technology, able to work with large data sets, and apply new modelling techniques

E

- Business interest in forging more innovative alliances with each other and research institutions.

P

- Need for policy intelligence and frustration with limited value of available indicator systems and models

Filters

- Much policy research promises a lot and delivers little
- Policymakers tend either to overvalue quantitative data, or to fail to grapple with it on grounds of complexity or narrowness

Potential issues

- Scope for improving effectiveness of innovation policy.
- Possible unanticipated consequences of attempts to restructure innovation systems (e.g. negative social and scholarly impacts).
- Shifts in power within STI policy apparatus and across levels of governance
- Intensified competition in innovation? Increased rate of innovation?

Potential risks

immediate (before 2015).

- dispute between stakeholders about new policy regime

short term (between 2015-2025)

- Possible negative effects related to objectives and activities not captured in the system.
- Competing countries using the tools more effectively than the EU, improving them and being more able to apply within national environments.
- Alienation of stakeholders from technocratic decision-making.

Potential opportunities

immediate (before 2015).

- Scope for meeting Grand Challenges more effectively
- Scope for building more support for STI policy on grounds of demonstrable success

short term (between 2015-2025)

- Scope for meeting Grand Challenges more effectively
- Scope for much more improvement and sophistication in these models, extending them to more areas and social objectives.

Potential stakeholders' actions

- **short-term actions (now-2015)**

Stakeholders of all types need to assess the value and limitations of these tools, techniques and results, and the extent to which proposed policies actually embody their conclusions. They need to explore missing variables and unintended consequences of these actions.

- **long-term actions (after-2015)2**
- possibly explore alternative models and modelling approaches.
- Examine whether gaming is developing and how it can be minimised.

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Relevance to research areas

The developments discussed here will have strong impact on work dealing with STI and knowledge economy developments more generally.
Impact on foresight work, and forward-looking elements of all research projects.
Expect research community to form new patterns of alliance exploiting this intelligence; anticipate formulation of research and training proposals (etc) so as to justify them in terms of the main conclusions of the work.

Relevance of the ERA strategies

The tools discussed here would be valuable for assessing and monitoring the success of ERA strategies, and also help to prioritise among and interrelate them. They might well indicate need for greater coordination of specific types of activity, but anticipating precise implications requires more discussion.

Relevance of a research-friendly ecology

The weak signal is actually being interpreted here as contributing to the upgrading of research-friendly ecologies. It is plausible that the environments that are already most advanced here would be particularly receptive to these tools (unless they were extremely narrow and based on principles that these environments have effectively outgrown – for example, if the tools neglected open innovation possibilities).

Relevance to future RTD & STI policies

The weak signal concerns whether STI policies are on the brink of a revolution in evidence-based policymaking. If this materialises, we would anticipate huge changes.

Final remarks on importance for Europe

The weak signal is important for European STI policy, and if it really meant step changes in policy effectiveness, this has implications for EU competitiveness. As noted, however, there is no guarantee that the benefits of these tools would be restricted to Europe.

Sources and References

- INNOS&T website: http://www.innost.unibocconi.it
- ENID STI conference website: http://www.enid-europe.org/conference/themes.html
- RESIST Work Package 1 Policy Dimensions of the Global Knowledge Economy, at http://www.resist-research.net/cms/site/docs/WP1%20Summary%20final.pdf

iKnow interconnecting knowledge

About the project: iKNOW is funded by the EC Directorate General Research under the Seventh Framework Programme theme eight: Social Sciences and Humanities (SSH). It is part of a series of foresight initiatives promoting 'blue sky' research on emerging issues affecting European science and technology. The **iKNOW** project aims to connect knowledge for the early identification of issues, developments and events (e.g. wild cards and weak signals) shaping and shaking the future of science technology and innovation in the European Research Area (ERA). In particular, **iKNOW** will develop conceptual and methodological frameworks to identify, classify, cluster and analyse wild cards and weak signals and assess their implications for, and potential impacts on, ERA).

[1] See http://www.enid-europe.org/conference/themes.html

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