Indicators for the evaluation of research programmes. Which use?

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S&T indicators have been until now a tool which has rather found limited use in the evaluation of (large) research programs. Of course, practically all evaluation exercises extensively used data like participants' statistics, statistics on funded projects and information on outputs to support the evaluation; moreover, there has been an extensive use of methods based on quantitative data in evaluation, especially econometric models and cost-benefit analysis. However, beyond the simple use of existing indicators for broad comparisons and benchmarking, there has been no systematic reflection on the potential of S&T indicators for evaluation purposes, as well as on the principles and practices to develop customized indicators for this purpose.

In this paper, that largely drives on work in the PRIME network of excellence on S&T indicators, we argue that there are some good reasons why S&T indicators might be increasingly relevant for the evaluation of large research programs, especially at the European level.

- firstly, the limitations of other approaches in face of the size and complexity of large research programs, where most of the impacts are in fact provided by relatively few projects and thus efficiency of survey-based approaches have to be questioned, while panels find difficult to get an overview. By their nature, S&T indicators are designed to condensate information and to focus on few relevant dimensions and thus well-suited to this purpose. Indicators can also to some extent answer to the need to have strong and objective empirical evidences able to indicate the value of activities, thus legitimating the investment done.
- secondly, the stronger emphasis on structuring effects of publicly-funded programs on the research landscape, like the European Research Area objective for EU framework programs. Thus, evaluation tends to shift from assessing results at the projects level to broader impacts on the European research landscape and its research units, a domain where S&T indicators can be particularly helpful.
- thirdly, new developments in the field of indicators moving from standardised national-level indicators towards customized ad hoc indicators at the institutions and research groups levels (so-called positioning indicators), which better suit the needs of evaluation exercises.

In the second part of the paper, we discuss a number of key interrelated requirements concerning the evaluation process in order to exploit this potential: these include the correct identification of the function of indicators in evaluation; a focus on design rather than on production; the set-up of a minimum of infrastructure.

a) Indicators as support for expert and stakeholders debate. A widespread conception equates indicators with objective measures and thus sees their contribution in evaluation to provide firm answers to specific questions. This forgets that, by their definition, indicators are meant to provide information on properties which are not measurable directly and thus strongly depend on theoretical assumptions, but also on value choices about these properties. Different assumptions and choices are likely to lead to different results as it has been demonstrated even in the simplest cases (Barré 2001). This draws to a different conception of the role of indicators in the evaluation process: indicators need to be designed starting from the evaluation objectives and then valuated and interpreted by review panels, combining them with other information and judgments to get meaningful results (Barré 2004).. This drives to a close integration of indicators design and production with the evaluation process itself, beyond the approach based on external studies.

b) Focus on design rather on production. An implication of the previous discussion is that indicators are closely dependent on the framework of each specific evaluation: standard S&T

indicators can hardly be of some use (except for very general purposes) and there is no off-the-shelf repository of indicators for evaluation purposes. Designing indicators to answer to specific questions has to be largely done case by case and its an highly demanding intellectual process which needs finding a compromise between evaluation requirements, availability of data and resources and time needed to produce indicators (even if some standard approaches are likely to emerge after a while). Moreover, designing indicators should be pursued through a joint effort between experts and stakeholders, in order to co-develop indicators suitable to address the evaluative objectives as well as to clarify what indicators themselves are not able to tell us. An early definition of the main evaluation objectives and questions and an early specification of the required indicators is a related requirement, since typically design and production requires more time than it is usually allowed for panel evaluations.

c) Create procedural and infrastructural requirements. The previous discussion does not imply that nothing can be done in advance, but that the focus should on providing the needed procedural and infrastructural requirements for the evaluation process. Three of them stand out from our experience: a close integration of indicators and production in the evaluation process and structure; the provision of the needed competences and resources and a clear identification of the functions (distinguishing for example external studies, useful to build basic competences, and internal competences on indicators to support the evaluation panel); the ability to unambiguously identify programme participants at research unit level, since almost all indicators except the simplest ones will require this information. This might be achieved easily for small programs, but requires the set-up of a suitable infrastructure for the largest ones and especially for European framework programs.