

PRIME-ENID AMSTERDAM SUMMER SCHOOL
Science, Technology and Innovation Indicators & Knowledge Dynamics Visualisation
Tuesday 1st – Friday 4th September 2009, Amsterdam

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Local organisation: Department of Science System Assessment (SciSA), Rathenau Instituut, The Hague
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Presentation

The measurement of scientific activities and achievements, and the availability of information on science and innovation are increasingly important in policy contexts in many countries.

Science and technology indicators and visualisation help tools are essential for understanding national and international efforts and results in knowledge production. A growing need for indicators is expressed by scholars, policy makers and stakeholders, relating e.g. to identification of changes in national research and innovations systems, and to understanding of internationalisation and integration processes in public research, higher education, and knowledge production modes. New approaches in indicators and visualisation are developed to indicate the structure and dynamics of research and innovation, and the position and performance of higher education institutions reacting to public interventions. For a proper understanding of results on these and similar approaches, clarification of basic propositions behind indicators and visualisations of S,T&I is necessary.

To promote networking and design in the field of indicators, the European Network of Indicators Developers (ENID) organizes several activities, such as Conferences (Lugano, Nov. 2006; Oslo, May 2008), and winter/summer schools for PhDs (Rome, 2007). The Amsterdam summer school fits into this line of events.

The Amsterdam Summer School supplies a short intensive training period to PhDs and post-doc students on fundamentals of and new developments in STI Indicators. Policy relevancy of indicators and visualisations will be a main issue in discussions, together with deepening of understanding of validity, reliability of indicators and visualisations, at policy relevant levels, ranging from macro, intermediate, to the micro-level. The lectures and hands-on sessions link to relevant lines of research and findings of PRIME projects.

Lectures and lab sessions

Basic Epistemological and methodological issues (Rémi Barré and Benedetto Lepori)

This lecture will provide a broad introduction to S&T indicators, looking to their epistemological status and main methodological issues. It will be driven by the conception of indicators as contestable constructs based on theory and normative choices, which have to be considered as an instrument to nurture the stakeholders debate rather than firm quantitative answers. Further, the lecture will deal with recent changes in the nature and use of S&T indicators and on their implications for the organization of the indicators production system. We will show that the changes in the science and innovation system towards a more complex and interconnected system implies a broadening of the realm of S&T indicators, with complete new domains of indicators emerging, but also a multiplication of the customers, since S&T indicators are increasingly required by different actors as a tool for their strategy, thus introducing the notion of positioning indicators as a new conceptual framework for these developments. We will argue that two functions are critical to provide an answer to this issue. The first one is the capability of designing new indicators (*experimental design function*), the second one is the capability of transferring effectively those indicators which stand-up the early phases of their development to a systematic and long-term production setting (*capitalization function*), which jointly allow for a dynamics of innovation in the field of S&T indicators.

Characterizing public interventions in research and higher education (Benedetto Lepori)

This lecture will deal with the construction of indicators to characterize public interventions in research and higher education through the characterisation of public funding flows, both concerning their allocation modes and the amount granted. We will thus introduce the data from R&D statistics based on Frascati manual and their contribution in characterizing research systems at the performers side, as well as their limitations concerning the analysis of funding flows and interactions between funding agencies and performers. In the second part of the session, we will present the new positioning indicators which have been developed inside PRIME to characterize and compare between countries the structure of public project funding. This will include a discussion of conceptual model behind these indicators, the strategy for data collection and resolution of comparability problems and, finally, the development of categories for the comparative analysis (and their limitations). Selected results and interpretation for science policy will be presented.

Knowledge Dynamics and Knowledge Visualisation (Peter van den Besselaar and Robert Braam)

This lecture focuses on knowledge dynamics and visualization of indicator information. Visualisation is the graphic display of indicator information, such 'laboratory activity profiles', and 'maps of science'. Knowledge dynamics can be visualised by longitudinal displays of STI-indicator based information. In this session we will give a brief overview of types of knowledge dynamics that can be distinguished, of the indicators to measure knowledge dynamics, and of visualization tools to communicate indicators and the lessons that can be derived. Examples will be shown of policy relevance and use of indicators/visualisation, from our experience.

Visualisation tools session (Thomas Gurney, technical support)

In the laboratory sessions the participants will be provided with some hands on experience, regarding visualisation tools, through the analysis of real and interesting (prepared) examples, aided by technical support. This session will help to grasp possible usage and limitations of knowledge dynamics visualisation.

Positioning Higher Education Institutions (Ben Jongbloed and Frans Kaiser)

Going beyond one-dimensional rankings and their associated problems, this session will address new indicators and related techniques that allow the various stakeholders in higher education and S&T communities to characterize and assess the multi-dimensional performance of individual higher education institutions (HEIs). Europe's HEIs reveal a large diversity in strategies and missions. Therefore the challenge is to capture (to 'map') this diversity, using a set of indicators from which spidergrams and institutional profiles can be derived. We will discuss multi-dimensional classifications, performance profiles, and user-driven ranking methods. Using real data, we will demonstrate how these tools can be used for mapping diversity, positioning HEIs and how they can inform policy making.

Laboratory session: working with institutional level university data (Cinzia Daraio)

This session will present the work done in the PRIME-AQUAMETH project for the construction of a database of institutional-level data on universities and deal with methodological problems, data collection and the solution of main comparability problems. Besides a general presentation and an overview on the possible exploitation of the database for higher education studies, students will be requested to do an exercise in the extraction and analysis of a set of data, in order to grasp the practical difficulties and skills required for this kind of work. The session will thus be highly complementary to the general session on higher education indicators.

Innovation indicators (Svein Olav Nas)

This session will present and discuss different approaches to constructing empirical indicators for innovation activities and outcomes in firms and public organisations. The main focus will be to discuss concepts and selected approaches in the Oslo manual with the related CIS data collection effort. This particular data source will be put in context to other supplementary or complementary indicators, such as R&D investments, IPR, human resources etc. In addition to the theoretical discussion the session will present examples of use of the data, for instance in the European Innovation Scoreboard and in a variety of micro-econometric studies. Lastly the session will address the desire for and some challenges related to developing indicators for innovation in public sectors/services. The latter will in part be based on ongoing work in the Nordic countries and the UK.