Societal impact of enabling research fields

ICT research: A Dutch and a UK case

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Introduction

Interaction between science and society has received more and more attention in the past two decades. It has been theorized in literature using concepts such as Mode 2 (Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow 1994) and Triple Helix (Etzkowitz and Leydesdorff 1998). Concurrently, societal impact of academic research has been addressed increasingly in national research evaluations (e.g. HEFCE 2010; VSNU KNAW NWO 2010) and in assessing.

However, the empirical base for societal impact (and similarly for public engagement) indicators is still modest, as our understanding of how science has societal impact is rather limited (De Jong, Van der Meulen, Spaapen and Van den Besselaar forthcoming). Nonetheless, numerous indicators to assess interactions between science and society and to assess societal impact of academic research have been proposed and are used. These indicators generally are markers, not measuring the objectives, but intermediate results. They serve to inform decision making during the process towards the ultimate goals. As research assessment indicators are known to influence behaviour (Barker 2007), it is important to empirically investigate the adequacy of the indicators in terms of the intended and unintended consequences.

In a recent paper, we have studied the societal impacts of *practice oriented research fields* such as architecture and law, and the indicators suitable for measuring this (De Jong, Van Arensbergen, Daemen, Meulen and Van den Besselaar 2010). A main channel for producing societal impact in these fields is are the many professors working part time in academia and part time in practice.

How research has societal impact depends on the specific characteristics of research fields. In this paper, we will extend our understanding of societal impact by studying the mechanisms producing societal impact in a different set of research fields: *research on enabling technologies* such as ICT or chemistry. The main research questions are: (i) What interactions produce the societal impacts of enabling research fields? (ii) How can we evaluate societal impacts of enabling research fields using indicators? By answering these research questions, we aim to contribute to the development of valid societal impact indicators for an important set of research fields.

Theory

Interactions between researchers and between researchers and societal actors are required to have societal impact (De Jong et al., 2011). Interactions can take place in every phase of

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knowledge production: in agenda setting, research collaboration, dissemination and use of knowledge. It may include personal interactions, such as collaboration; indirect interactions, for instance via papers and tools; and formal interactions like contracts. The interactions are facilitated by interaction channels, of which (Callon, Larédo, Mustar, Birac and Fourest 1992) identified four categories; texts, people, artefacts and money. These four categories are used as a heuristic in our case studies.

Method and data
We have studied the impact of ICT research in two national settings; the UK and The Netherlands. We selected ICT research because of two reasons. Firstly, ICT represents a huge research investment and it is considered an absolutely critical technology for economic growth and development. Evaluating whether these expectations about societal impact come true is crucial. Secondly, ICT is considered to enable almost all scientific, economic, and social activities, and therefore one may expect that its impacts are generated indirectly and over longer periods of time. ICT research, however, also can have short term and direct links to society. This allowed us to validate the findings of a previous study in law and architecture, where direct impact seemed to be the dominant form (De Jong et al., 2011).

We have studied two research programmes in the UK and a university department in The Netherlands. We studied documents about the programs and department, including earlier evaluation reports. Both academic researchers and societal stakeholders were interviewed, using the same interview protocols across cases and countries.

Of the interviews full transcripts were made that were coded for impacts, stakeholders and the four interaction channels. Based on this information, we reconstructed the networks of the involved researchers and the ways they communicated with other researchers and societal actors about their research findings.

Expected Results (comparative analysis is currently done) Preliminary results are the following. Three pathways to societal impact can be discerned in ICT research.

1) The first is comparable to the way *practice oriented research fields* have societal impact: by direct interaction with stakeholders, and through double positions in research and in society. This results in impacts on a relatively short time scale for societal actors known to the researcher.
2) The second is via knowledge chains; results from ICT research are used by one or more consecutive upstream users in academia before they are applied by societal actors. These users and the way they make use of the knowledge form ICT researchers are regularly unknown to the researchers.
3) The third is that research results need years of development and adaptation by societal actors before deployment and actual impacts can be expected. Nevertheless, impacts of recent innovations that could be linked to ICT researchers were found, as well as factors explaining the time to impact.

From this we can draw at least two lessons for the assessment of societal impact of academic research. Firstly, societal impact assessment should be extended to include knowledge chains. In this way, enabling research fields can show how they enable societal impact of other research activities and through this contribute to societal impacts. Secondly, the time frame for research evaluation should be related to the specific dynamics of research In this way, research fields that typically produce academic knowledge that needs a relatively long time and several other actors to be developed into societal robust knowledge can be appropriately assessed too.

Literature

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