SIAMPI final report

Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions between science and society

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Acknowledgements

Throughout the project we have been interacting with three sets of stakeholders in a series of meetings and workshops. In no particular order, these were a resource group of international experts on evaluation, diverse stakeholders in the case studies, and stakeholders at the EU level. These interactions have proven to be extremely useful to sharpen the framework, to understand their needs, and to translate our empirical findings into useful results.

Executive summary

Social Impact Assessment Methods through Productive Interactions (SIAMPI) involves two central tasks: to enlighten the mechanisms by which social impact occurs and to develop methods to assess social impact. SIAMPI produced a review on social impact assessment (see www.siampi.eu) and developed an analytical framework for the study of productive interactions and social impact in four different areas of research, and in four different European countries, and at the European level:

- Health care research in the Netherlands
- ICT in the UK, the Netherlands and on European level
- Nanotechnology in France, the Netherlands and at the European level
- Social and human sciences in Spain and the UK.

Central to our analytical framework is the concept of *productive interactions:* the mechanisms through which research activities lead to a socially relevant application. An *interaction* entails a contact between a researcher and a stakeholder. The contact is mediated through various means, as diverse as a research publication, a policy report, a prototype, a guideline, a website, a design, a protocol, a membership of a committee, shared use of facilities or financial contributions by a stakeholder. We distinguish three main types of interaction:

1. direct or personal interaction,
2. indirect interaction through a medium,
3. financial or material exchanges.

The interaction is *productive* when it leads to efforts by stakeholders to apply research results to social goals, i.e. when it induces behavioural change.

SIAMPI offers an approach for social impact assessment based on concrete data about the key elements in the production of social impact: productive interactions and stakeholders. To assess productive interactions we collect data through interviews and quantitative methods, to assess the role of stakeholders we use interviews and focus groups.

To give the reader an idea about our approach, the table presents the key elements from an evaluation perspective. In the first column you will find the three types of productive interactions we distinguish. In the second the major kind of social impact we expect to find in that particular interaction mode (but not excluding other impacts). The third one gives the major stakeholder contact, the fourth column the major tool to use to find evidence.

Productive Interactions	**Social impact**	**Stakeholder**	**Assessment tool**
Direct, personal	Behavioral change	One-to-one, personal and professional networks	Interviews, focus group
Indirect, media	Uptake, use	Different audiences	Quantitative data collection
Financial or in kind support	Collaboration	Joint projects	Annual reports, other documents

Summary description of context and main objectives

The quest for social impact assessment

Broadening the scope of scientific research evaluation – not only evaluating scientific outcomes, but also the value that the research has yielded for society – has become a vital quest in the current global context. Following the challenges set in a number of European agreements, in particular the Lisbon partnership in 2000, Europe's national governments started to work on an agenda to become the world's most competitive economy. Their central aim is to modernize society and the economy, under the condition of sustainable growth. In this, science and technology are to play a crucial role, and they are not only seen as a source of in-depth knowledge and innovation, but also as indispensable for the improvement of policy making, education, social learning and for the improvement of socio-economic welfare and quality of life. Scientific research helps us to understand the dynamics behind such issues as poverty, disease, climate problems, and social exclusion and is expected to help us solve these problems at local, national, European and global level. Being confronted with an ageing population and a shrinking workforce on the one hand and on the other with an accelerating pace of the global economy, the only way forward lies in a high quality productive sector built on a highly educated and skilled population and a very good interaction between science, technology and society.[1]

However, despite the multi-faceted function of research, and the grand social expectations, the evaluation of research projects and programs is still largely dominated by a focus on the scientific merit of research and not on its value for policy and society. The attempts to assess social impact are at an early stage and they have met with difficulties.

In its report on the evaluation of the Framework programs, the European Court of Auditors concludes that the practices the Commission has built into the program to collect data on dissemination and use of results were inadequate and applied at the wrong time. [2] This is not to discredit the Commission. Funding bodies at national and regional level and research performing organisations are wrestling with similar problems. None have been able to develop and implement evaluation methods for social impact that are robust enough to be used systematically and to be transferred to other organisations, other countries and across different fields of research. They all are looking to bring in the socio-economic dimensions of scientific knowledge into ex-ante and ex-post assessments, and all are looking for reliable instruments. And while there are some promising developments in methodologies for the evaluation of the contribution of research programs and projects to innovation and economic growth, methodologies for evaluation of social impacts of research are still underdeveloped and in an experimental phase. Fortunately, there is a growing number of experiments and pilots across Europe and beyond, designed to evaluate social impact, in a range of research fields and for different types of research organisations.

SIAMPI addressed the aims of the Strategic Activity, Social Impact Assessment of Research; namely, to contribute to the development of impact assessment methods by improving the understanding of the social impacts of research, alongside its economic and environmental impacts. It has addressed different evaluation contexts. The results may help the Commission to improve the evaluation of the Framework Programme.

Approaches and challenges for social impact assessment

The assessment of the social impact of research and of research-funding instruments is difficult but not impossible, and necessary but not without risk.

[1] See f.e. Communication from the Commission to the Council and the European Parliament **Common Actions for** Growth and Employment: The Community Lisbon Programme, Brussels 2005, SEC 2005 981

[2] European Court of Auditors, Special report No 9/2007 concerning 'Evaluating the EU RTD framework programmes – could the Commission's approach be improved?' Luxembourg.

It is difficult because of underdevelopment of methods, lack of consensus on how to use these methods for policy development, and also some reluctance in the scientific community. But it is not impossible to assess the social impact of research, provided that we enhance our knowledge of the interaction mechanisms between science and society. Social impact assessment is not without risk as there is ample room for misunderstanding these *productive interactions* between science and society and hence the ways social impact is achieved. SIAMPI was aimed at reducing these risks by enhancing our knowledge of the interactions between science and society and by suggesting innovative mechanisms to further and measure the social impact of research. The central concept is therefore *productive interactions between science and society*.

The concept of productive interactions is important because of a major methodological problem with the assessment of the social impact of research which is the linking of a particular impact to a specific research effort. On the one hand, there are many possible causes of social impact, research being only one; on the other hand, research is often a multi-faceted, multidisciplinary and multi-national effort. Precise attribution is therefore always problematic. But by focusing on interactions, and by closely following the ways in which researchers and stakeholders use these interactions to communicate about the research, its problems and its expected effects, we believe that we have been able to enlighten the attribution problem.

Before we started SIAMPI, we identified a number of valuable approaches upon which to build further work. All of them, in one way or another, assessed social impacts through the identification and articulation of productive interactions between science and society, that is, between researchers and stakeholders.[3] The main reason for the predominance of the concept of productive interactions is that social impacts of scientific research result from intricate processes of exchanges, of educating and learning, between involved parties.[4] In this complex social process it is very difficult to trace and then attribute socio-economic developments to specific research results. However, most reconstructions of how scientific knowledge becomes useful for society or a specific set of social actors show the crucial role of productive interactions.[5]

By productive interactions we mean:
Exchanges between researchers and societal actors in collaborative settings (networks) in which knowledge is produced and valued that is at the same time scientifically and socially robust and relevant.

In our analysis we distinguish three main tracks through which such interactions may occur:

1. through direct personal contacts (ranging from mere meetings to complex arrangements for research collaboration)
2. through indirect contact or mediated by specific carriers like expert reports, clinical guidelines, scientific advice, or through the transfer of artefacts and public goods (products, social practices, therapies, policy tools, exhibitions, training and education)
3. through funding or other support mechanisms.

[3] On 9 November 2007, an international expert meeting was organized in Amsterdam. The meeting was organized by a national Dutch project called Evaluating Research in Context (ERiC), in which the Academy, Research Council NWO and the universities work together. The project aims at developing methods for the assessment of the societal impact of research. For information on presentations see www.eric-project.nl. See also Jack Spaapen, Huub Dijstelbloem and Frank Wamelink, Evaluating research in context. A method for comprehensive assessment, COS, The Hague, 2007

[4] In that sense, this parallels the focus in general social impact assessment, which regards the study of impacts that are the consequences of usually large government actions, such as big infrastructural projects (a high speed railroad) or regulatory measures (concerning social security of privacy). The main focus in these kinds of social impact assessment is on communication between the central actor and the various levels of the social system (individual, group, organization etc.). See for example H.A. Becker, Social impact assessment, European Journal of Operational Research 128 (2001) 312).

[5] This parallels a trend in the general literature on social impact assessment, where participatory approaches are becoming more customary Becker et al, 2002, A participatory approach to social impact assessment: the interactive community forum, in Environmental impact assessment review, 23 2003 367-382

The objectives of the project

The objectives of the SIAMPI project were:

1. a better understanding of the way in which productive interactions play a role in the social impact research can have;
2. methods that can be used to assess the social impact of scientific research.

We have aimed at developing a generic method that can be used in different areas of research and in different evaluation contexts. The method seems indeed flexible enough to allow for disciplinary and contextual variation. As a result, we can demonstrate an overarching framework for the assessment of social impact, with room for variation in evaluation strategy and instruments.

In order to reach these objectives, we have:

1. Identified productive interactions between researchers and society in four fields (nanotechnology, health, ICT and social sciences) that are funded within the Framework Program and in national contexts. For each of these fields we have tried to analyse the range of expected and actual social impacts, and the interactions through which these impacts are realised.

2. Improved our understanding of the necessity of productive interactions as a condition for research to have a social impact.

3. Developed approaches for the evaluation of social impacts that are applicable in a range of fields and evaluation contexts, with a strong emphasis on the feasibility of the suggested mechanisms.

Description of main S&T results / foregrounds

Introduction

The dependency of scientific researchers and research organisations on public funding implies that they face, like many others in the public sector, the obligation to show ´value for money´. In Europe, these obligations have resulted in many different kinds of evaluation and monitoring systems. Most of these primarily regard the scientific quality of research. This focus neglects both the variety in missions of research organisations and funding bodies to contribute to society and the related performances of researchers.

The overall objectives of the SIAMPI project are (i) to improve insight in interactions between researchers and their stakeholders and (ii) to develop methods and tools for social impact assessment of scientific research. The main idea of the SIAMPI project is that research can only have social impacts if there are *productive interactions* between researchers and stakeholders, and that knowledge about these interactions is vital for any assessment of social impact. Productive interactions take on different forms; we distinguish three, direct or personal interactions, indirect through some kind of material carrier, and financial interactions.

In research assessment according to SIAMPI, social impacts are identified and assessed by tracking productive interactions. Compared to other methods for evaluating social impacts, the emphasis is on processes that induce impact, rather than the impacts itself. As a consequence results of impact assessments can be linked more easily to concrete research activities (projects, programs, and institutes) and are timelier in relation to policy processes.

In this document we present the main results of the SIAMPI project. We aim to apply the idea of productive interactions as an entry to evaluating social impacts. We elaborate in the following the three key concepts of our approach and the relations between them: social impact, productive interactions and stakeholders, and we draw conclusions for the assessment of social impact.

Our notion of social impact is primarily guided by evaluation practices in the context of institutional research policy, and to a lesser extent by practices related to general policy making. In our analysis, we therefore choose research practices and related researcher-stakeholder interactions as our focal point. Subsequently, we aim to gain insight in the relations between researchers and their stakeholders and social impacts. The crucial issue here is the definition of productive interactions. We have introduced a threefold distinction (direct, indirect and financial) that can help institutes to gather evidence for impact. Also, through this notion of *productive* interactions, we hope to distinguish those interactions that can be related to social impacts, from the manifold other interactions that researchers have, like any human being.

Because of this approach to interaction, we had to use a rather open definition of stakeholder, basically anyone who takes part in the iterative process that induces the results of research into social impact. Through discussions during our own stakeholder meetings and through the empirical findings in the cases we were able to gradually specify this open definition. At the end we were able to structure our stakeholder definition by using a stakeholder model that distinguishes different dimensions of the researcher-stakeholder relationship. In chapter 5 and 6 we discuss implications for evaluation and present three tools that can be used in assessments of social impact.

1. Methodology

1.1 General approach

Literature on social impact of research is often dominated by perspectives from the much vaster literature on economic impact. Part of that literature studies impacts econometrically, at a high aggregation level. Results of those analyses seem to depend very much on rather linear assumptions about research production in relation to economic output, and they are not related to activities of researchers that are characteristic for specific fields. In general, these analyses are not considered to be very reliable for impact evaluation.[6] In a bibliometric study on 'knowledge utilization' Estabrooks, Derksen *et al* found that most of this literature is (still) based on models of innovation diffusion and technology transfer.[7] Literature on non-economic impact is limited, apart from a body of knowledge on the use of research in policy processes.[8] More recently this research has taken up insights from science studies and looks at the boundary work that structures the relation between research and policy.[9] These studies look at impact in terms of modes of use and transformation of knowledge in the policy process.[10]

There is a third, emerging stream of literature which focuses on the knowledge exchange and interactions between researchers and other societal actors (firms, NGOs, governmental bodies). Examples are studies on Knowledge Value Mapping (Bozeman *et al*),[11] the Compass Card / Laboratory Activity Profiles (Laredo *et al*)[12], the Payback model (Hanney *et al*.)[13] and the ERiC methodology (Spaapen *et al*.)[14] Most of these studies map interactions and knowledge streams inductively. Often they aim at more quantitative data, and are aimed as input for research management or evaluation studies.

Our methodology is closely related to this last stream in its emphasis on productive interactions between researchers and other social actors. It distinguishes between three kinds of interactions: interactions through personal contact, interactions through texts and artefacts, and financial interactions. It assumes such interactions are a necessary condition for any social impact to occur. While in research management and science policy, discourses of funding and accountability are often structured around claims of expected impact in the future; our focus is on measurable effects in terms of these three interactions with various stakeholders. By focussing on these effects close to the researchers' activities, we offer a structure that is recognizable for researchers and stakeholders, including potential data for social impact. We don't mean to neglect what comes next in the process, but further dynamics are often outside the realm of the researcher, interfere with other driving forces such as local organisation, politics, business, environment. As a consequence,

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[6] Salter, A.J. and Martin B.R. 2001, The economic benefits of publicly funded basic research: a critical review, *Research Policy.* Vol 30, 509-532.

[7] Estabrooks, C.A., L. Derksen *et al.* The intellectual structure and substance of the knowledge utilization field: A longitudinal author co-citation analysis, 1945 to 2004. *Implementation Science,* 3: 49

[8] Zie onder meer het werk van Weiss: Weiss, 1979, The many meanings of research utilization, *Public Administration Review,* 39 (5) 426-431; Weiss, C. 1980, Knowledge creep and decision accretion, *Communication* 1 (3), 381-404

[9] Zie bijvoorbeeld: Halffman W (2003) Boundaries of regulatory science. Eco-toxicology and aquatic hazards of chemicals in the US, England and the Netherlands, 1970–1995. Thesis, University of Amsterdam; Hoppe, R., 2005, Rethinking the science-policy nexus: from knowledge utilization and science technology studies to types of boundary arrangements, *Poiesis and Praxis, 3: 199-215.;*

[10] Maassen, S; Weingart P. (eds.), 2005*, Democratization of Expertise, Exploring Novel Forms of Scientific Advice in Political Decision making*. Sociology of the Sciences Yearbook Vol 24, Springer.

[11] Bozeman, B., & Rogers, J. D. (2002). A churn model of scientific knowledge value: Internet researchers as a knowledge value collective, Research Policy, 31, 769-794; Rogers, B. Bozeman, Knowledge Value Alliances: An Alternative to R&D Project Evaluation Science Technology Human Values, 2001 vol. 26 (1) 23-55.

[12] Laredo P., P. Mustar, M. Callon, A.M. Birac and B. Fourest, 1992, Defining the Strategic Profile of Research Labs: the Research Compass Card Method, in Van Raan AF.J. et al. (eds), Science and Technology in a Policy Context, DSWO Press, Leiden.

[13] Hanney, S., Packwood, T. and Buxton, M. (2000) Evaluating the benefits from health research and development centres: A categorization, a model, and examples of application. Evaluation: The International Journal of Theory, Research and Practice 6,
137_160. Hanney, S., Gonzalez-Block, M., Buxton, M. and Kogan, M. (2003) The utilisation of health research in policy making: Concepts, examples and methods of assessment. Health Research Policy and Systems 1 (2)..

[14] Spaapen J. Dijstelbloem, H, Wamelink, F, 2007, *Evalauting Research in Context, a method for comprehensive assessment*, Den Haag: COS, http://www.eric-project.nl/files.nsf/pages/NWOA_73VH8D/$file/eric_book_internet.pdf

for evaluation purposes these further dynamics may not be timely enough and difficult to link to a specific research project.

Interactions may involve single and multiple stakeholders. Therefore, social impact can be assessed at individual and aggregated levels. In our case studies we found examples of both forms. Assessing social impacts at aggregated levels is more complicated than at the level of individual stakeholders. In our cases we have explored the limits of our approach and found productive interactions appropriate at both levels. Obviously, in the case of multiple stakeholders, other techniques come to the fore, in particular network analysis and bibliometrics. For example, in the case of nanotechnology we mapped stakeholder networks as a tool to understand the position of research actors in these networks and the expected contribution research could to make to social impact dynamics. In the health case we developed a bibliometric tool for assessing impact on the wider stakeholder community (contextual response analysis).

1.2 Exploratory case studies

We have conducted exploratory case studies in four fields to test and elaborate these ideas: Nanoscience and -technology, ICT, Health care research, Social Sciences and Humanities. The case studies were not comparative but exploratory. That is, we wanted to find out what the pros and cons are of our approach of social impact through productive interactions, and also to see what the role is of other actors in the social network around a research project. The choice for these fields was based on the following considerations.

Nanoscience and technology is a relatively new emerging field that receives major research funding from existing and new funding bodies. Funding in the field is legitimized by both scientific and socio-economic arguments. Promises for social impacts are manifold and include higher sustainability through increase of the effectiveness and efficiency of production processes and better health services through improvement of the drug development and drug delivery. The range of spheres where research in this field impacts upon society, is multiple and varied.

ICT, needless to say, is so important for our present society that without it, we could not imagine continuing the lives we live. And yet this area, as we know it today, is no more than a few decades old. Our dependency on the technology, which seems to grow at the same exponential pace as the chip capacity itself, raises all kind of legal and ethical, from personal privacy to quality of working life, and many kinds of risks in the event of failure or dependency on other global regions' technology. Here, publicly-funded research ranges from the frontier to applications of real ICT systems in domains of business and social activity.

Health care, our third case, is longer existing than the previous two, and of vital important in every society. It is an area that mixes the generation and deployment of advanced technological practices with the development of fundamental knowledge and a variety of social and ethical issues. Research develops in a variegated user and stakeholder context, from patient organisations to the general public to pharmaceutical industry, and from government and regulatory bodies to start-up companies.

Our fourth area is the combination of two fields with a long tradition, Social Sciences and Humanities. Although this area covers a wide range of disciplines, from an evaluation and impact assessment perspective, it is not uncommon to treat them as a single entity, if only because they encounter comparable problems with traditional evaluation that focus on publications in high impact journals. The area ranges from the very theoretical (for instance in some fields in sociology and economics) to eminently applied disciplines (like business studies). The area is not endowed with large sums of money in the EC Framework Programme or in national initiatives; nevertheless, it is of vital importance to address many significant societal problems such as for example migration and integration, or the development and implementation of health care systems. Further, research in this field can have considerable impact in the development of social institutions and on cultural change processes.

2. Social impact of research

Social impact of research is a subject loaded with political objectives, financial interests and epistemological positions. The dependency of universities and many institutes for basic research on public funding makes them vulnerable for pressures to show 'value for money' in terms of social impacts. Researchers and research organizations themselves raise expectations about impacts to create support for their research and raise (new) money. At the same time, claims are made that outcomes of scientific research are uncertain by the nature of science and impacts cannot be foreseen. Sometimes this still leads to the position that science is best left to scientists. It goes far beyond the project and this synthesis report to give a full review of the concurrent political, commercial and epistemological discussions. If the volume of research is large enough, one can always find positive cases of impact, as well as instances of unexpected impact and of no impact at all (yet). Our challenge is however to find ways to assess social impacts in a systematic way.

Our use of the concept 'social impact' implies a position which needs to be clarified. We use as a working definition of social impact.

> *Social impact of scientific research refers to measurable effects of the work of a research group or program or a research funding instrument in a relevant social domain. The effect regards the human well being ('quality of life') and or the social relations between people or organizations.*

'Measurable' in this definition is understood both in terms of quantifiable indicators and of qualitative measures ('indications'). With 'effects', we refer to changes in behaviour or use of organisations or people (for example using new instruments, introducing new protocols, etc.). In our case studies, we identify such changes, both in terms of realized changes and intended changes. 'Domain' refers to the relevant social environment for the researcher, which can be narrow (other researchers) or broad (including groups in society, for example patient organisations).

Note that in relation to the debates referred to above, we do not aim to link research to ambitious goals like social cohesion, national health, economic progress etc at a high aggregate level. On the contrary, we think that it is much more fruitful to focus on traceable effects close to the primary research process. In our definition of "social impact" the relevant social domain starts by the researcher and the interactions that she engages in. In our view, that is more realistic and fruitful for the assessment of behavioral change, then to relate research projects to ambitious high level impacts which depend on much more factors than the research project per se. To be sure, we do not oppose to paint the larger picture ('improve quality of life'), but for evaluation purposes, we want to be as concrete as possible.

The choice of a restricted definition of social impact is guided by our aim to develop useful tools and methods for evaluation contexts. Whether used in a formative evaluation context or a summative evaluation context, in the end the aim is to feed back results of social impact assessments to those responsible for the research program or project. The more impact is defined at a large distance in time and in causal relations from the research activities, the less appropriate it is for evaluation purposes.

Our definition differs in some nuanced aspects from other definitions and approaches of social impact. In evaluation studies, often a distinction is made between outputs, outcome and impacts. Impacts are then further differentiated to immediate impacts, intermediate impacts and ultimate impacts. This differentiation is based on the Logic Model often used to evaluate research programs and other policy interventions. In this approach, impacts are positioned at the end of a causal chain of events that arguably can be ascribed to the program. The use of such models is often driven by the need in evaluation contexts to attribute clear effects to the unit of evaluation. Reality though is often more complex and downstream the suggested causal lines more and more interfering factors are ignored. Impact of research starts close to the research itself and shows itself in the three kinds of productive interactions. By relating impacts more directly to the research work, the scope of impact is likely to be smaller than when using a 'logical' framework. But our approach enables us to

trace impacts, indications for impact, much earlier than through the logical framework approach. Also, we can come up with concrete indicators by using the three kinds of productive interactions. Moreover, the concept of productive interactions as a necessary condition for social impact allows us to look at both the institutionalized patterns of social impact dynamics and the more contingent ones.

Within the policy domain, new forms of impact assessment emerge, often linked to demands for 'evidence based' policy that presuppose research based data. New policy interventions have to be supported by ex ante impact studies and assessments. In some fields, like environmental policy and health policy, such interventions are well-accepted; methodologies are standardized and some are even codified in software programs. In these fields, the notion of social impacts is often used to denote a range of other impacts, not covered by standardized impacts. A report to the European Commission on the social impact of FP6, lists fourteen of such social impacts, including human rights, social and economic cohesion, culture, security and international co-operation.[15] A review of practices of social impact for the European Commission concludes that social impact assessments are carried out in several member countries as part of the policy process, but that budgets are limited, methodologies and models are weak and there is a gap between theory and practice.[16]

The working definition we use for social impact refers to 'social' as regarding human well being and social relations between people and organizations. This way, 'social' may overlap with other impacts such as environmental, economic, technological or health impacts. On the other hand, in our case studies we did not try to cover all possible impacts research can have in the long run. Especially research in generic fields like ICT and nanoscience- and technology may have a broad scope of impacts. Our goal is to define social impact in a way that ties it much closer to research activities, through the three kinds of productive interactions and through the broad definition of stakeholders, which makes it possible to include in social impact interactions with for example researchers in neighbouring fields or in commercial institutes as well as for instance government bodies or consumer groups.

2.1 Results from the exploratory case studies

The range of impacts we came across in the four areas of our case studies was very diverse. They include the application of social marketing techniques by a fire services in Wales, which led to a reduction in grass fires as well as the joined development of demonstrators for analogue-digital converter (ADC) integrated circuits with a firm. We found use of reports in policies for chronically ill, as well as the discovery, "translation" and publication of Spanish XVIth Century music as a valuable contribution to the preservation of Spain's cultural heritage. The list can be made much longer and reflects the diversity of our case studies as well as the diversity in relationships that researchers have with stakeholders.

More important, however, is whether such social diverse impacts can be linked through one or more productive interactions to the activities of a research unit, - group or –program that was analysed. This was possible in most of our cases in the social sciences and humanities and also in health care studies. But we also found cases in these areas where productive interactions could not be so easily linked to a particular research activity. Additionally, it became clear that research often is only one among many other contributions to a complex policy processes.

The variety of ways impact can be traced through productive interactions is illustrated with a few examples from the social sciences and humanities:

- The application of social marketing techniques developed by the BRASS team for the fire services in Wales led to a reduction in grass fires; this effect could be clearly identified and attributed to the application of the social marketing techniques. In this case, the researchers argued, impact could be measured using the same tools that marketing analysts use to assess the outcomes of commercial marketing campaigns.

[15] European Commission, 2005, *Assessing the social and environmental impacts of European Research,* EUR 27102, Luxembourg: Office for Official Publications of the European Communities.
[16] Ecorys, 2010, *Review of Methodologies applied for the assessment of employment and social impacts,* Brussels, 15th January 2010.

- Another of the BRASS projects had helped bring together different communities with divergent interests over mining operations in Argentina. The BRASS researchers had set up the grounds for unprecedented talks across communities with opposing interests and views on mining activities. This can be considered a relevant outcome of the direct interactions organized by BRASS researchers. Yet, it was too early to determine the final social impacts, in terms for instance of changes in specific mining practices, of the changing social relationships.
- The discovery, "translation" and publication of Spanish XVIth Century music was arguably a valuable contribution to the preservation of Spain's cultural heritage; but the audiences for this kind of music remain small. However, the impact on cultural heritage may arguably be assessed, rather than by the size of individual audiences, by the way in which the specific contributions of the research link with others to help rescue past cultural contributions and to understand them in their original context.

The second example shows that social impacts are not always wholesale changes in behaviour of stakeholders but confirmative impacts with piecemeal or incremental alterations of policies or professional practices. Examples of this were also found in our health care cases, such as reports on manpower planning, or the monitoring of social participation of chronically ill and disabled that largely confirm current policies regarding educational capacities at universities, or the adjustments in current policies regarding reimbursements for the chronically ill. Such incremental alterations often involve attuning of resources or maintenance of (policy) practices among stakeholders. Occasionally, behavioural changes in health care are presented as wholesale changes, such as the (political) decision to postpone the establishment of a local health centre for the elderly. This decision was taken in the face of research indicating that such centers raise spurious rises in health care.

Social impacts take a long time to emerge. In the field of ICT we found a small software company which used academic knowledge to create software for digital forensic purposes, which is nowadays used by police departments both nationally and internationally. In the early days, one of the professors we interviewed was hired by the company. The process to transform knowledge in a marketable product took over ten years. In the mean time, financial investments have been made by the company to develop academic knowledge into a product. Of course, further collaborations with other partners had to be initiated to market the software.

Against (expected) impacts that can be linked to a research group, there is a range of possible impacts that are much more difficult to grasp. This is especially the case where multiple stakeholders are involved, where research is embedded in a network of stakeholders, and where impacts are found at the aggregated level.

Examples from health studies make clear that changes might involve political decision-making in a field of stakeholders with varying interests. Interactions often involve broader ranges of impacts: firstly, many expectations about impact involve developments in the longer term. This is in particular the case with basic medical research in clinical applications for stem cell interventions, but other impacts (new guidelines for GP's or the monitoring of needs for care among (ex-) cancer patients) too are to be expected in the longer run. These are sometimes measurable, e.g. as compliance of GP's with the guidelines in diagnosis, but otherwise difficult to attribute as changes in behaviour depend on a variety of factors.

In other cases impact involves a multitude of stakeholders. This is the case with medical guidelines, involving several professional organizations, the involvement of universities, ministries and professional organizations in the aforementioned manpower planning, the investigations of environmental health care effects of a large steel mill, involving GP's and the people in the neighbourhood.

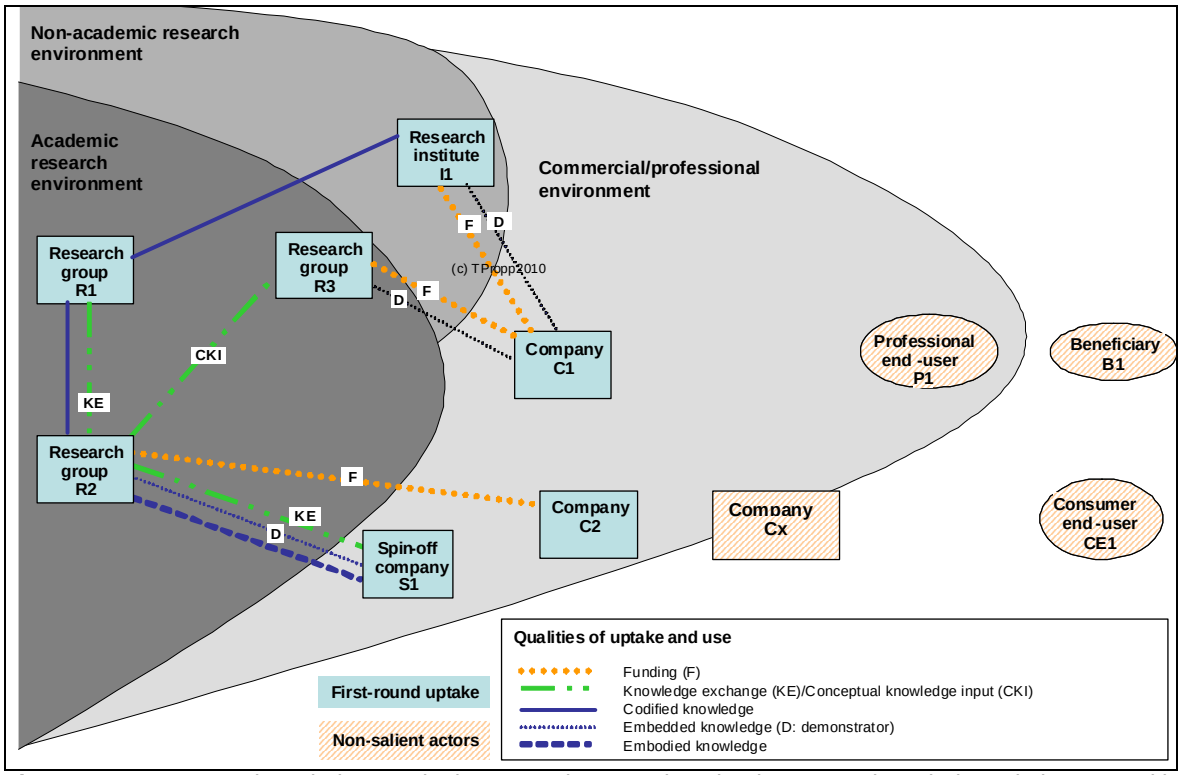

Figure 1 *Down stream knowledge uptake in NanoScience and Technology. Most knowledge relations are with stakeholders with a strong R&D profile. Relations with end users, beneficiaries and consumers in the lighter areas are only indirect and outside the realm of the researchers.*

From the study of nanoscience and –technology we learned that in order to understand the generation of social impact, a network perspective can be of crucial importance. In the area of nanoscience and -technology, social impact is often projected on the longer term. Impacts come about through relationships with direct stakeholders in academic and non-academic research environment as well as with firm labs in the commercial/professional environment.

To identify these interactions as related to social impacts, one needs to understand the knowledge flows within such a network (Figure 1). 'Network' means not only a network at a particular moment in time but also the uptake, transformation and exchange of research results in innovation chains over time. These chains are networks that are often only connected by one node; for example, one of the research groups produces in joint projects with firm X demonstrators for analogue-digital converter (ADC) integrated circuits. Firm X then, after up scaling, sells these as 'discretes' (components) to their customers. The research group rarely interacts with these customers. For the group at TNO the case is different in that the organization has to stay close to industry, which can include the supply chains of paying project partners.

In ICT we find similar forms of task division between different research groups. For ICT research projects, researchers often seek applications contexts in which their protocols, test beds, grids etc can be tested. An example is an ICT researcher, who develops as part of her research real platforms to enable scientists to do science. Scientists are factored into the research team as a key element in the research. She explained the process to impact of the research she led. "*You have to bear in mind that my software is for bio informaticians or scientific informaticians who then design mechanisms and software that biologists use and then biologists are doing something useful for society, so we are way down the food chain. I'm an applications group, so down the food chain further are the fundamental researchers who are working grid protocols etc*." This example is an explanation of the importance of understanding timelines to impact and also highlights the nature of ICT research and its role in the process.

Interestingly, in all the examples we found that as networks increase, timelines of impacts increase as well, while at the same time, through mapping productive interactions it is possible to see how the research activities are connected and what kind of impacts can be expected.

The social impacts from ICT research are various and almost unlimited, since ICT is an enabling technology, which can be applied in numerous ways, not only products and services but in how citizens interact with government, in healthcare and the environment. Some researchers produce knowledge or products that can be readily applied by social partners. Others play an enabling role; their knowledge and products can be used by researchers from other fields such as, psychology, biology or medical research, for example to solve problems related to data analysis. Other researchers may work on the more theoretical end of the computing spectrum and thus play a facilitating role more applied ICT researchers.

Discussing the issue of social impact and productive interactions often raised the awareness by researchers and research managers. It appeared in a number of cases that there are instances of (potential) impact not known to the management and other researchers that were discovered through the interviews we conducted. In one case, with a clear example of change in behaviour, the stakeholder was unaware of this impact. Through the interview the awareness was raised and the influence became clear to the stakeholder.

3. Productive interactions

Our project builds upon other evaluation approaches for evaluation of social impacts that focus on the interactions between researchers and stakeholders. (Larédo note 7, Bozeman note 6, Spaapen, note 9) In actual management and evaluation practices the issue is raised which interactions count and indeed induce social impacts. Researchers, like other social actors, have many interactions – ranging from interactions with clear intent to exchange knowledge and expertise and induce social impact to accidental interactions in which the actors combine and shift between multiple identities and social practices – like meetings at the gym or the school yard.

In order to develop instruments for assessment of social impact and focus the attention on meaningful interaction, we have introduced the concept of *productive interactions*. We call an interaction productive when it leads to efforts by stakeholders to apply research results to help achieve social goals. In some fields, such interactions are institutionalised in social practices aimed at transferring, exchanging and applying scientific results and knowledge. In Health care one can find this in the development of protocols for good health practice and therapies; in ICT in development of standards for software. Institutes may organise these practices themselves, e.g. through managing the interactions with stakeholders, involve stakeholders in the research process, and develop strategies to communicate results and disseminate outputs of research.

We used three types of productive interactions to structure interviews and other data collection, distinguished by the medium of interaction.

- Direct interactions involving direct personal connections revolving around face-to-face encounters, or through phone, email or videoconferencing. These can be established through formal institutional channels (joint research centres, research projects and programmes, technology centres) but they can also be informal; for instance contacts established through collaborations that are not mediated by any contract or formal agreements, meetings and conferences, chance encounters, old friendships, etc.
- Indirect interactions are contacts that are established through some kind of intermediate "carrier". The intermediate can be inanimate media, like all types of texts (articles, books, patents, reports, web pages, standards, codes of practice, clinical guidelines), exhibitions, blueprints, designs, models, films, musical arrangements. It can also be another person or groups of individuals; in these cases, the user or beneficiary of the research will become aware of the researcher's activities or their results through social networks or chains of different organisations.
- Financial interactions occur when stakeholders engage in an economic exchange with researchers. A research contract, a financial contribution, or a contribution "in kind" to a research programme, are traditional forms of financial interaction. This type of interactions cannot take place in isolation: it will be accompanied by direct or indirect interactions, or both. Yet, financial interactions inject different dynamics into the relationship and usually provide a stronger feedback into the researcher's activities than other forms of interaction: they will affect directly the organisation of research and often the research agenda itself.

While these types of interactions helped structuring the ways in which researchers and research managers view social impact, the lack of data about the kind of interactions we are looking for is apparent in most cases. One is used to gathering data for the assessment of the so-called scientific quality, but data on other output and activities is scarce. This goes in particular for the indirect interactions, mostly mediated through some kind of material carrier (a journal, internet, exhibition). The SIAMPI study helped to raise awareness in the research community that it is very helpful for the assessment to gather these other kind of data, and thanks to growing digitisation of media this is more and more possible. For data on direct/personal interactions the difficulty is that they are often complex and involving many different actors and diverse ways of contact and exchange; they occur either simultaneously or longitudinally through time. These data can best be collected through interviews of other qualitative methods, for example focus groups. Financial data are hard to get because they are often not revealed in public.

A complicating factor for interaction data is that individuals can play different roles intermittently which make it sometimes difficult to connect them to specific interactions. For instance, an academic can act as a paid consultant to a government office (financial), write reports that are read by officials (indirect) and hold meetings with her clients (direct); the three forms of interaction occur simultaneously and individuals operate in various social spheres both on the research side and the stakeholder side. Often research is thus embedded in networks of knowledge and innovation actors, and while interactions within these networks are more likely to result in impacts, linking specific impacts to a particular researcher becomes difficult. Social impact and productive interactions become therefore part of the management process, guided by the mission of the institute, the aims of research projects, or requirements of research funding.

3.1 Relations between different types of productive interactions

The distinction between direct interactions, interactions through texts and artefacts and financial interactions is helpful as a heuristic for recognizing the different interactions. Our results though show that most interactions with stakeholders are shaped by multiple productive interactions. The gist of our results is in the development of these interactions from informal ones to more formalized ones, the possibilities for researchers and research organizations to manage such interactions and as a result to distinguish for evaluation purposes those interactions that are more likely to have impact.

Knowledge creation, knowledge uptake and use (knowledge circulation) may concur with manifold interactions, and often incremental and radical innovations are induced by unexpected interactions. Our results show that such unexpected, informal interactions only have impact, i.e. affect the behavior of stakeholders, once they are followed up by further interactions. When they prolong they become more direct, and get embedded in networks of research and innovation actors. This is important for both sides. For researchers this requires ongoing engagement with the needs and demands of the stakeholder. For the stakeholder active knowledge uptake, further development of the knowledge, and use within his interactions with stakeholder communities. Thus, the contingency of impacts of scientific research should not prevent research organizations and funding bodies to assess and reward actual efforts of researchers to induce impact of their research.

These efforts don't need to be just individual efforts of the researcher, but can be managed and institutionalized at the organizational level. Especially when research and related stakeholder interactions are embedded in professional communities, research organizations can move beyond the contingency of interactions and find ways to organize them into productive interactions. The organizations more active in managing impact in our case studies show that once research institutes start to do so, the productive interactions become more heterogeneous. Also the chance that the more indirect interactions through texts and artefacts have impact is also increasing: these can be more tailored towards the needs of larger stakeholder communities. As we will see in the last chapters, this creates additional opportunities for evaluation, as broader impacts then those on the direct stakeholders can be mapped.

3.2 Different modes of interaction: Informal interactions and networks

In our case studies different modes of interactions emerged. Some were more formally organized, others followed a serendipitous pattern. In the cases in the field of Social Sciences and Humanities, both in the UK (BRASS) and in Spain (CSIC), we found that every project or group displayed its own dynamics, building contacts from the bottom up and without apparent central lead. We identified a wide variety of "productive interactions", with no dominant mode being apparent. There were, however, some distinguishing traits. At CSIC direct informal interactions were very important and they were almost always long-term: many CSIC interviewees had known the same stakeholders for more than 20 years. Small research groups had established long-term links with small stakeholder groups (often individual-to-individual) with whom they frequently collaborated without the intermediation of any contractual tool (mainly because the links were not associated with financial arrangements). At BRASS many of the interactions we encountered had been initiated and developed within the life of the Centre; they did not predate its creation. In both cases, however, indirect interactions established through publications were often the initial step

that led, eventually to other types of interactions. In several occasions we found that non-academic stakeholders had initially learned about a researcher or research group by reading their work; this indirect interaction had stimulated the stakeholder to take further steps to establish a direct interaction with the academics.

Personal networks, that is existing of people outside the research field, appeared to be important in several of the cases analysed. Examples could be found for instance in social science and humanities projects from the UK. These were situations in which the direct link between the individual researchers and stakeholders interviewed were not enough to explain the evolving set of relevant productive interactions. A network of common friends and relatives, for instance, enabled the initial interactions between researchers and stakeholders in a research study on Argentinean mining. The origins of BRASS work with the South Wales Fire Department lie in professional networks; in this case, a consulting that had worked with the researchers brokered their link with the Fire Department.

In the nanoscience and technology cases we did not see these personal networks, but we found that informal professional networks of stakeholder relationships were important. The interaction between researchers and stakeholders in this area is characterized by a very broad network and a long temporality. Stakeholders in this domain are a combination of actual and potential audiences of interaction and uptake, the boundaries of which are dependent on the kind of research a group is doing. For a group working on more fundamental issues of nano electronics, actual audiences are primarily other nano research groups; potential audiences are in the first place the 'more applied' groups that could act as potential intermediaries between research and industry. These more applied groups have actual audiences both among other nano research groups, as well as industry. At TNO, an applied research institute in the Netherlands, researchers relate both to immediate contract partners but sometimes also to their suppliers. In the Dutch sample, TNO is the one example that – depending on the case at hand - penetrates most deeply into existing innovation chains. The productive interactions in the area of nanotechnology research is hard to connect to social impact unless this is understood in terms of communication with other, more applied research groups, or as uptake in industry. Social impact is perceived in this field as referring to the long pathway from basic research to applied research to commercial engineering and further to product development and market introduction (be it the business-to-business or business-to-end-user market). Researchers in basic research as a rule do not have direct productive interactions with end users. Their interactions are focused on earlier sections of the pathway.

3.3 Productive interactions in all phases of the research process

Strong engagement with stakeholders during a research project is seen as essential to the success of that particular piece of research and results in a final product or deliverable that changes the way the stakeholders do their work. Without the interaction with the stakeholders the research cannot be undertaken to produce a successful impact in the user community. Productive interactions built into projects help the researchers to demonstrate different paths to social impact, and allow testing of emerging results. A feature of our ICT case study (particularly the applied research) is the structuring of such productive interactions into the research projects from the outset. These interactions include interactions with officials from University/EC or user groups and expert advisory groups. Also in the Health cases, we could map the organized forms of productive interactions research projects. In the phase of agenda setting and execution of research direct interactions prevail. In the phase of dissemination and implementation, indirect interactions (publications, reports) occur more.

An example of direct productive interactions structured from the outset into the UK Digital Economies Hub project includes regular demonstrations by researchers of the technologies developed from The Ambient Kitchen work being undertaken. The Ambient Kitchen is a lab-based project through which the research team is exploring the use of pervasive computing for assisted living. The project team is particularly interested in supporting the elderly and those with dementia. Researchers hold regular planned and unplanned opportunistic demonstrations for a variety of groups such as university students, representatives from other universities, members of the public,

city council members, company visitors and the media. The concept of delivering demonstrations to a variety of groups was planned but the type of audience is subject to opportunities emerging during the timescale of the project. Both Dundee and Newcastle Hub sites have professionalised the interactions with users. This was being achieved through the employment of staff to specifically recruit users and facilitate user groups and user interaction with the research. At Dundee University the computing department building facilities had been designed to facilitate interaction.

From data on the ICT case at the Free University of Amsterdam, a pattern could be inferred of developing interactions, starting with informal interactions towards formal collaborations between organisations. Often however the informal interactions are as valuable as the formal collaborations for knowledge exchange. We found this also to be operating within the UK, as the Hub has been built upon years of interactions with particular companies, third sector and social groups as well as incorporating some new ones. The Dutch case brought out some of the difficulties inherent, for example the different “cultures” of stakeholders and academics in terms of time pressures, priorities and interests in the research. These differences are already well-known, but should not be forgotten in our approach.

3.4 Organizing productive interactions

If productive interactions are formally organized, the form and intensity of these interactions is likely depending on the mission of the research organization. We can illustrate this for the health case, where the two research organizations studied have different missions: a mission to provide policy relevant work on the basis of scientific research (NIVEL) and mainly science oriented research (LUMC). As a policy oriented institute that depends largely on externally funded projects, NIVEL sees its mission to be a network organization. Interactions at NIVEL are more frequent and more organized than in science oriented departments at LUMC, in particular in the phase of agenda setting and execution of research. By contrast, the department of Anatomy sees its mission to deliver stem cell research that stands out in the international community of stem cell researchers. As this is basic research, clinically relevant research is only expected in the long run, and researchers are hesitant to interact with public audiences, patient groups and other stakeholders. This reluctance is also caused by the public and political sensitivity surrounding this topic.

The organizational degree and intensity of interactions in the network of stakeholders varies also in different phases of research. At NIVEL, interactions in the phase of agenda setting and research display characteristics of formal organization, both at the level of the organization as a whole and in individual research projects. NIVEL holds formal consultation rounds with various stakeholders (both among funding agents and non-funding stakeholders), and organizes user groups for research projects. Also, during projects, research on political sensitive issues is monitored at the institutional level by the management team.

Similar patterns to organize stakeholder interaction, though less intense, occur at the LUMC departments of Public Health and General Practice, where the agenda for projects on health care for the elderly is set in close interaction with stakeholders, including general physicians, nursing homes and local and regional health authorities. Projects too are carried out in close cooperation with these stakeholders. Although these organized forms of direct and indirect interaction are readily carried out by departments, the impetus comes from external sources. In the case of Public Health and General Practice, the interaction is required by ZonMW, the major funding agent for Health in the Netherlands.

4. Stakeholders of research

The notion of stakeholder has emerged in management studies as a framework to focus the attention of managers on the actors in the environment of the firm. In the 1980s, freeman defined stakeholders as those actors that can affect or are affected by the achievements of an organization.[17] Traditionally, management studies tend to focus on shareholders and stockholders, as the owners of the firm. Stakeholder theory brings other actors like governments, neighbourhoods of firm locations, labour unions, consumer groups and the like to the fore. These actors can have strong positions within the organizational environment and thus need to be taken into account in strategy development, or they might acquire such positions in the future. Some stakeholder theories link up with business ethics to highlight social responsibilities of firms towards society and negative effects of the organization's achievements.

The SIAMPI project uses the notion of stakeholder also in a broad sense, bringing other actors into the evaluation context. Usually evaluations of researchers include the researchers' peers, their organizational management and research funding bodies. These actors influence researchers' behavior also in other ways, overall emphasizing scientific quality of research. As a result, scientific evaluation of research has become part and parcel of doing scientific research, be it in the context of research funding, research management or institutional accountability. Initially, by adopting the notion of stakeholder, we simply referred to those societal actors researchers interact with and in one way or another get involved in the processes of knowledge production and knowledge use.

The examples of social impact in the previous sections show that the variety of actors is as varied as the kind of social impacts. The UK ICT projects had stakeholders in the form of professional groups (healthcare planners) and third sector organisations (charities and organisations representing social groups such as older adults and dementia sufferers and their families), small and large firms and regional economic development bodies. Similarly, the Dutch ICT case study showed multinational and small companies in ICT, communications hardware and software, Ministries, railway and shipbuilding companies and a not-for-profit organisation. Both the Dutch and the UK cases showed that other academic communities can be considered as stakeholders, as the ICT research is translated into tools and grids (e-science). At EU level we see again a range of different sizes of company, some within ICT and others applying it, and many local authorities and third sector organisations. As a result, it is useful to reflect somewhat more on the notion of stakeholders in relation to social impact and productive interactions.

Mitchell et al.[18] distinguish stakeholders according to whether a stakeholder has (1) power, (2) legitimacy, and (3) urgency in relation to the achievement of an organization's objectives. (Table 2) In relation to the SIAMPI cases, the notions of power, legitimacy and urgency refer to characteristics of the relation between the stakeholder and the researcher. If a stakeholder has power, she can for instance determine the researcher's research agenda, or has a say over funding and personnel affairs. Legitimacy comes from formal, often contractual relationships, or from regulations like ethical codes for clinical research. The urgency brings in the dynamic nature of relationships between organizations and their stakeholder. Stakeholders suddenly can become urgent for the researcher, e.g. if access to new resources is controlled by the stakeholders, or if shifts in stakeholder preferences requires researchers to move with these interests.

Dominant stakeholders often remain invisible as long as their interests are served. Typical examples in research are the actors controlling the institutional funds, and research councils with funding policies facilitating the researcher strategies. When interests of such dominant stakeholders change, such stakeholders may suddenly become active, and at that time will have the means to act. In contrast, demanding stakeholders may have an urgency to affect research, but do not have the power nor the legitimacy to do so. Citizens groups often start in such a position, and their strategies in order to be successful must include strategies to acquire power and

[17] Freeman, W.C. 1984, *Strategic Management: A Stakeholder approach.* Boston: Pitman
[18] R.K. Mitchell, B.R. Agle and D.J. Wood, 1997, Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts, *Academy of Management Review,* 22 (4) 853-886.

legitimacy to affect the researcher. Environmental organizations may have such a position in relation to nanotechnology, but we found no evidence in our case studies that there is mutual impact between them and the research groups analyzed by us.

Table 2: *Identification of different stakeholders*

Stakeholder	Power	Legitimacy	Urgency
Dormant stakeholder			
Discretionary stakeholder			
Demanding stakeholder			
Dominant stakeholder			
Dangerous stakeholder			
Dependent stakeholder			
Definitive stakeholder			

Definitive stakeholders have power, legitimacy and urgency to impact upon an organization or research group, and vice versa researchers need and probably will act upon their claims. Some of the social actors we have come about in our case studies are of that nature. Their stakeholder position emerges as a result of mutual interests in the results. Typical example can be found in ICT research, where we found several examples of ICT researchers linking up with stakeholders to have a development area for their ideas. Examples include the development of ICT platforms for bioinformatics research to develop an anti-malaria drug; development of security platforms for a ship company and the use of grid software for the German astronomy community. Once such relationships have established, these stakeholders become definitive stakeholders. They have legitimacy to influence the researcher as partners in a project. They also have some power as their experiences and needs are important for the ICT researcher in order to have a test environment. As the applications are of importance for the stakeholder as well, there is also an urgency to influence the researcher. The network for nanotechnology research can be interpreted in the same vain.

While our case studies show multiple examples of interactions with powerful stakeholders and stakeholders with converging interests, examples of interactions with NGOs, citizens groups and the like are less frequent. Patient organizations are a recurrent example of such a stakeholder. In Health, patient organizations can be counted sometimes as dependent, at other times as demanding stakeholders. How stakeholders are to be defined depends on concrete relationships and interactions that occur in individual research projects and in institutional relations between researchers and their social context. Depending on the representativeness of these organizations, researchers are urged to deploy multifaceted strategies to interact with these organizations and the people they stand for.

Given the tendency in research to seek interaction with limited sets of preferred stakeholders such as in public private partnerships, and to define impact according to the goals of these restricted relationships, it is important to keep in sight other kinds of stakeholders. A dormant stakeholder might become a dangerous stakeholder if excluded from crucial information. In Health, such examples can be found in cases related to the HPV research program. While researchers thought to be working along research and implementation strategies towards a vaccine in complete convergence with interests of future patients, when implemented in a vaccine program they were suddenly confronted with suspicious about the safety of the vaccine and their hidden interests.

Similar dangerous stakeholders are perceived in nanoscience and technology, of which not the research itself but the products are questioned for environmental and health effects. In some research programs this has led to pro-active responses to include such concerns in the research programs, but in our cases this was not reflected in productive interactions with stakeholders embodying these concerns. In the BRASS case we find a pattern of stakeholder relationships that might address the issue of dormant and dangerous stakeholders. BRASS, a research centre

funded by the ESRC has a range of stakeholders. The relationship though is not only induced by the mutual interests, there is also an obligatory element, in the sense that BRASS needs such relationships in order to conform to the funding criteria of the research council. In other words, the stakeholder positions are strengthened by another, definitive stakeholder. Though the stakeholder may by themselves have no power and legitimacy to influence the research of BRASS, the requirements of the research council give them such legitimacy, and depending on the availability of possible stakeholders some power as well. Analytically, if there are only few possible stakeholders, the stakeholder can easily become in these situations a definitive stakeholder. If the stakeholder is one out of many candidates, she remains a discretionary or depending stakeholder.

The diversity of stakeholder position raises the issue whether our own approach sufficiently brings weak positioned stakeholders to the fore. If the approach limits itself to the productive interactions and their impacts researchers themselves induce, it blinds itself to these stakeholders. To overcome this, it either needs to be complemented by methods identifying other stakeholders and bring in social impacts they experience or be done within an evaluation frame of reference that includes such stakeholders. In the latter case, neglect of such stakeholders results in weak performance on this aspect.

5. Lessons and implications for social impact assessment

Social impact of scientific research refers to measurable effects of the work of a research group or program or a research funding instrument in a relevant social domain. The effect regards changes in human well being ('quality of life') and or the social relations between people or organizations. These social impacts are a result of productive interactions between researchers or research organisations and their stakeholders. These productive interactions can vary from very incidental, personal and informal relations to highly organized and professionalized networks. In the last case, institutionalisation, professional knowledge valuation and collective strategies are indications for efforts of researchers and their stakeholders to induce social impact.

Note that the distinction between impact and interaction might become fuzzy, and some evaluation approaches use the interactions as proxy for social impact. The point is that in our definition of social impact, the evolution of interactions with stakeholders is included. Patterns of interaction are diverse and intricate with various stakeholders playing different roles and the interests and expectations involved perhaps switching during the process of transformation of research results to applications. Impact is not a one-way street concept, and it is often not the consequence of one actor. For example, government measures may have an impact on the research agenda which may lead to new kinds of interactions. Also, actions by researchers do not always lead to reciprocal actions from a stakeholder. Nonetheless, the action still might lead towards an impact. Last but not least, in many fields actors take on different roles, sometimes researcher and sometimes practitioner, which can be the case in such different fields as architecture, law, medical research or biology.

We have identified several patterns of social impact and productive interactions. First of all, we found the basic pattern of bilateral interactions between researchers and stakeholders, with a measurable effect. In our studies these were exemplified best by some cases in social sciences and humanities, were direct interactions had led to changes in strategy and further uptake of the research results. Such impacts can be mapped well with our approach.

We found also examples in which social impacts was embedded in larger networks than bilateral interactions between researchers and stakeholders as well as impacts on stakeholders at a distance of the research group. Mapping such impacts needs insight in the networks in order to interpret stakeholder relations and productive interactions properly. Most clearly we found this in cases of Nanotechnology and ICT, were for some research groups productive interactions with other research groups is more likely to induce social impacts on the long term, than interactions with end users.

When networks become larger, social impacts become more remote from the research process. Though one can still assume that there must have been some direct, indirect or financial productive interaction involved, for the stakeholders and the researchers alike the impact is much more a result of a non-reciprocal action from the side of the researchers. Examples include uptake of policy reports by policy actors outside the stakeholder network of a research institute, or in another vain, the effects on social actors with weak stakeholder positions. Note though that such distances do not necessarily mean that impact dynamics become outside the realm of the research organisations. On the contrary, some of our cases suggest that the embedment of research in larger networks of stakeholders is a result of institutionalisation of productive interactions and related processes of knowledge exchange, knowledge uptake, and knowledge use.

We have learnt that the quality of the interactions can vary from very incidental and informal relations to highly organized and professionalized networks. In some fields, productive interactions are highly professionalized (Health care, ICT). In such cases it is arguably easier to trace back the social impact, if only because the partners on both side agreed to work on a common goal. However, since in these professionalized networks power differences between the participants play a role in the elaboration of the research agenda, the kinds of social impacts that occur are also

partly a consequence of power differences (a governmental department that pays for the research vs. a patient organisation).

In assessment procedures, there are differences that have to be accounted for such as the mode of undertaking of research, temporality, and power differences in the context of research. We found that researchers working in basic research, in emerging fields, and in highly individualized fields, typically are engaged in direct, personal interactions with relevant stakeholders. In some fields (nano) these 'stakeholders' are researchers in neighbouring fields (and social impact is far away), in other fields (humanities) stakeholders are long time allies outside science (and social impact is almost part of the research process). Temporality understood as the length of the trajectory from basic research towards applications, is arguably influencing the possibilities to establish productive interactions that lead to identifiable social impact. The longer the trajectory (as in our nano cases) the more difficult it is to trace a given social impact back to a particular research group.

The real lesson of this is not that our approach cannot be used for these fields. The point is that attribution of impact becomes a useless concept, both for policy making and for evaluation purposes. While researchers and research organisations contribute to impacts beyond the productive interactions with stakeholders, the dynamics of these impacts cannot be attributed to the research projects itself. Like the weather in Europe cannot be ascribed to the butterfly in Brazil – notwithstanding the strength of the power of the idea that a butterfly causes a storm.

5.1 Implications for evaluation

Different assessment contexts

The possible impact of our own lessons and considerations depends on the purposes of evaluations or on the evaluation context. Evaluation of research is a phenomenon with many faces. In order to assess the real value of our own results we need to distinguish at least some of the different appearances of research evaluation. Three most prominent appearances are ex ante evaluation of proposals aimed at selective allocation of funding, ex post evaluation to account for research investments and learning evaluations of institutes and research programs. The three do not always appear in isolation but to discuss how our results can of use for research evaluation it is useful to look at these three separately. In the discussion we refer to the three tools developed in the project, a questionnaire, a list of performance indicators and an impact mapping tool, which are described in more detail in chapter 6.

In contexts of ex ante evaluation impact is never an accomplishment, but necessarily a promise or expectation. Sometimes impact is implied by the importance of the object of research. Climate research suggests impact easily through the social and political consensus on the climate issue, and health research on chronic diseases can easily link to a general opinion that burdens of chronic diseases should be minimized. Sometimes such implied impacts are articulated into expectations, linking new technologies like ICT and nanotechnologies to economic growth and regional employment. In all such cases, reviewers and evaluation committees can do little but look at the plausibility of the links between the researches proposed and social and economic expectations.

Our results suggest an alternative. Rather than linking research only to topical issues and grand challenges, it would be more useful to show what efforts the research project will make to contribute to stakeholder efforts dealing with e.g. the climate issue, chronic diseases or regional employment. Many research funders do so already by asking for dissemination plans and outputs towards non-scientific audiences. Often it is unclear whether such plans and outputs will indeed result in any productive interactions. From our perspective, research proposals should be more explicit on whether the research project is already embedded in networks of productive stakeholder interactions or, whether such productive interactions have to develop from scratch. For innovative research projects, the latter might be fully legitimate, but if contributions to impact are expected, the project proposal should set out whether and how these interactions are set up. If thinking in

contributions to impacts is still beyond the scope of a project, proposals should spell this out and be modest about social impact, rather than move into the grand social challenges.

Methodologically, our results are more useful for ex post evaluation contexts, as the tools developed are aimed at collecting evidence for contributions to social impact. In accountability contexts, evaluations are often guided by performance indicators. Our approach implies that these indicators refer to the actual efforts of researchers for productive interactions, as well as the impacts these interactions have had. The first set of performance indicators can be more easily developed, as the indicator list we developed in the context of our nanotechnology case shows (section 6.3), the latter requires structured interviews (section 6.1) or surveys can be used in case of larger numbers of stakeholders.

There is though a snake in the grass. In general researchers keep track of output data. These are the kind of data used in most evaluations; this is what researchers have to account for. Our case studies were hampered by the lack of systematic data on the productive interactions with stakeholders. Often though researchers claimed importance for specific forms of interaction, no systematic data on these forms were available as within current accountability evaluation contexts contributions to social impact are only of secondary importance.

However we did see a growing consensus that it is useful and necessary to collect data on other kinds of output, on outcome, and on the ways research is communicated with wider audiences as well. This last point is important, because we found that publications that reach wider audiences can lead towards productive interactions, simply because this is one way how people learn about particular research that might be relevant for them. In order to move beyond general claims of relevance of research, and show real performance on contribution to society, research organisations have to make serious efforts to gather more robust data on the productive interactions and impacts upon stakeholders. In the nanotechnology case the combination of the questionnaire and indicator list showed that this can be done.

Evaluation as a learning tool

While accountability is an important aim of evaluation especially as most basic research depends on public funding, many research organisations move beyond this aim and use research evaluation as a learning tool for strategic management purposes. Performance indicators may of value in such a context, but especially in dynamic contexts, often obscure to much of the real dynamics and values of the research organisations. In a learning evaluation context, the question is not just whether certain performances levels are met, but the real issues are what and how performances are met, and what can be learned from this for the future of the research program or institute. In such cases interviews with stakeholders (section 6.1) are not just useful to map actual impacts, but also the dynamics behind these actual impacts and feedbacks of stakeholders on the value of the contributions. Also for such evaluations it might be useful to assess relationships beyond the definitive stakeholders. Knowledge uptake of other stakeholders may give clues for further institutionalisation of productive interactions and broadening the networks of direct stakeholder relationships. In section 6.2 we describe a tool for mapping knowledge uptake through contextual response analysis.

6. Tools and methods for social impact assessment

Social impact in our definition is about behavioural change as a consequence of a research effort. The question then is what people do different because they came into contact with certain research results. We answer this question by looking at the three types of productive interactions and the audiences that are targeted with these interactions. A direct personal contact between a researcher and a stakeholder may lead to a behavioural change on either side, then we call the interaction productive, or it may lead to nothing, then there is interaction, but not productive. Through analysing interactions with stakeholders and interviewing stakeholders about the impacts upon their behaviour, we were able to identify a wide variety of social impacts for a number of research projects and research groups. Most of these impacts are relatively close to what researchers do, but we also explored further methods to map the productive interactions where social impacts appeared more remote from the research process. The applicability of the tools we suggest hereunder depends to a certain extent on constraints and requirements of the evaluation context. For example, in some evaluation contexts, like project evaluation or evaluation of research institutes where relationships with stakeholders are highly organised, the approach to interview the direct stakeholders might be sufficient for an evaluation of social impacts. In other contexts one might need to move further into the networks of stakeholder relations and trace impacts beyond the direct interactions.

Even though our definition of social impact and the methodology of identifying impacts through productive interactions implied that the results were close (in time and content) to the research project or group, social impact was sometimes unintended or unexpected. As a result, one has to include somehow in evaluations the possibility of unintended and unexpected impacts, and not limit the exercise to evaluating outcomes against expected impact. Raising awareness about these unexpected and unintended impacts already helps as we experienced in a number of cases. It appeared that there are instances of (potential) impact not known to the management and other researchers that were discovered through the interviews we conducted. In one case, with a clear example of change in behaviour, even the stakeholder was unaware of the impact. Through the interview the awareness was raised and the influence became clear to the stakeholder.

In this last section we present on the basis of our own research some tools for different aspects of social impact assessment. The first two of these tools are flexible and can be adapted in specific evaluation contexts. The third one is a bibliometric tool that arguably can be used in every evaluation context.

6.1 Stakeholder interviews

We have developed a questionnaire to conduct interviews for social impact assessments. This outline is structured in accordance with the conceptual framework set out in this synthesis report, in particular the productive interactions. The main purposes of such interviews are:

- To identify the types of interactions between researchers and potential users and beneficiaries elsewhere in society
- To trace the efforts that these stakeholders have invested to apply research results to social goals (i.e., identify productive interactions)
- To identify, and if possible, measure, the social effects of these efforts (i.e., identify the results of productive interactions)
- To identify instances where the stakeholder may have played a role in the definition of academic research questions, or the analytical methodologies used by researchers (feed back into the research process)

We envisage evaluations of both groups and institutions, and of specific activities conducted under specific national or European funding instruments. Therefore, the object of study varies: a group, an instrument, an organization. In every case, the entry towards possible social impacts is through interviews with individuals, starting with the researchers working in the group, organization or project under study.

Researchers Interview	
1. Background/context questions	1.1 Information about the interview 1.2 Interviewee profile including - involvement in research project/programme, - main area of work; - activities carried out since project/programme.
2. Context	2.1 What actors have been the most important in determining the uptake/impact of your research? Could you mention some concrete examples? 2.2 What type of influence do they have? Is there a recognizable influence on the research agenda? Do they offer expertise useful for you? In what way? 2.3 Are there differences in the ways in which these actors may influence the uptake and impact of the results (including knowledge and skills) of your research?
3. Mechanisms of interaction	3.1 Direct interactions (personal) - regular contacts with practitioners in advance of the research assessed. - participation of stakeholders in design of project/ programme etc. - direct contacts with stakeholders within project/program/ period of assessment. - influence of these contacts on research work - development of these contacts within and after the project / programme 3.2 Indirect interactions (text & artefacts) - production of specified outputs: academic papers and articles; popular texts; grey literature and reports, web contexts, exhibitions, guidelines, standards, models, patents, etc…. - role of stakeholders in creating these outputs 3.3 Financial interactions - Involvement of stakeholders in the work being assessed, e.g. through contract funding or joined projects. - Kind of work being conducted under the formal agreement.
4. Outcome/Impacts	4.1 Do you, in any systematic or non-systematic way, follow the results of your research in society? 4.2 Have you applied in a non-academic context the knowledge or skills that you gained thanks to your participation in this project/organization? 4.3 Which stakeholders benefited and in what ways? - as a tool to solve stakeholder problems? - as the basis for ideas or arguments to justify, confirm or develop actions? - have they been used to design/develop services or articles for popular consumption? 4.4 If not, did you analyse why not?

Beneficiary Interview	
1. Background/context questions	1.1 Information about the interview 1.2 Interviewee profile - Type of link/involvement with the researcher/project/organization - Main area of work and position within the organization
2. Context	2.1 What other actors/stakeholders are the most important in determining the uptake/impact of the research results you are interested in? 2.2 What kind of contacts do you have with these other stakeholders and what type of influence do they have? 2.3 Are there differences in the ways in which the different stakeholders we have discussed may influence the uptake and impact of the outcomes of academic research?
3. Mechanisms of interaction	3.1 Direct interactions (personal) - regular contacts with research organisation and researchers in advance of the research assessed. - participation in design of research project/programme etc. - direct contacts with researchers within project/program/ period of assessment. - development of these contacts within and after the project / programme 3.2 Indirect interactions (text & artefacts) - knowledge of specified outputs before, during and after the project: academic papers and articles; popular texts; grey literature and reports, web contexts, exhibitions, guidelines, standards, models, patents, etc…. - participation in creating these outputs 3.3 Financial interactions - Involvement of stakeholders in the work being assessed, e.g. through contract funding or joined projects. - Kind of work being conducted under the formal agreement.
4. Outcome/Impacts	4.1 Did the relationships we have discussed in this conversation affect in any way the activities of your organization? If so, how? - Has knowledge of specified outputs (3.2) had any impact - Have any results been implemented in the organisation through new contractual relationships with the researchers 4.2 Who benefitted from the effects of the interaction and in what ways? - Did you use the research as a tool (or to develop tools) to solve problems you were facing? - Did you use research results as the basis for ideas or arguments to justify, confirm or develop actions? - Did you use the research to design/develop services or articles for popular consumption?

When interactions exist, it is in most cases the researchers who will identify potential stakeholders for further interviews. We are therefore applying a “snowballing” technique with two different sets of questionnaires: one for researchers, another one for stakeholders.

6.2 Social impact assessment for university audits

Some of our cases in the Netherlands elaborated on an earlier project with research organisations to improve the evaluation of social impact of research in the context of research audits. Academic research in the Netherlands is audited every six years, and according to the protocol social relevance is one of the criteria. Research departments and peer committees alike find it difficult to assess research on this criterion: the interpretation is unstable and it is often unclear what data can be used as evidence for performances on social relevance.

Based on the SIAMPI assumptions that is social impacts results from productive interactions with stakeholders a four step approach was developed to make social relevance ‘evaluable’ for researchers and peer committees. These steps are synchronous with the procedures described in the Dutch protocols for universities and polytechnics.

The results of steps 1, 2 and 3 are presented in a self-evaluation report; step 4 concerns the assessment of the evaluation committee.

Step 1: Description of the research group’s mission and objectives to have social impacts
The mission statement reflects the context of the research. It is a good idea to specify the societal domains and professional practices targeted by the research. For example:

- Training for skilled researchers and professionals in the field of X and/or for sectors Y and Z.
- Improvements to procedures in a particular profession.
- Production of knowledge for industry and the commercial sector, or conversion of knowledge into new economic activity.
- Production of knowledge for public sectors such as health care, education and culture.
- Production of knowledge to support the drafting, implementation and evaluation of policy.

The mission statement should also indicate how the research group intends to achieve the mission by, for example, specifying what type of research the group performs, whether it is involved in partnerships with stakeholders (and which ones), and what output it plans to produce.
Sometimes the mission statement will be more specific, including quantified objectives such as a particular number of professional publications, financial resources to be acquired, or contributions to education and training.

Step 2: Description of the societal contribution having realised in the period assessed.
Looking back over the period under review, it is possible to describe the actual societal contribution made by the research. The following four questions provide a useful guide:

- Question 1: What substantive results did the research yield that could be of importance to society?
- Question 2: How has the knowledge been disseminated among societal stakeholders?
- Question 3: What evidence is there of interest and appreciation on the part of societal stakeholders?
- Question 4: What effects have the research results had?

Although the impact of research is sometimes not felt immediately, it is nevertheless wise to identify any impact, or, in other words, any observable effect of your research. This might include adjustments of specific policies, use of a new therapy that reduces the burden of illness on patients, or income from patents or a successful spin-off.

Step 3: Compile a list based on indicators of societal relevance
In the third step, use indicators to compile a list of the research group’s achievements in terms of societal relevance. Any specific results presented in step 2 can be aggregated by using indicators that are more generally applicable in your field or discipline.
The indicators reflect various aspects of societal relevance:

- the spread of research results,

- the degree of interest in and appreciation of the research among societal stakeholders,
- actual use of the research results.

Indicators are context-dependent, and can therefore differ from one research group and discipline to another. It is even possible that the indicators reflect dissemination of knowledge in one discipline, and stakeholder interest in another. By way of illustration, table 3 shows an example of indicators from an electrical engineering pilot study

Table 3: *example of indicators*

Aspect of social impact and productive interactions	**Indicators**
Dissemination of knowledge	PhDs in industry
	Master's graduates in industry
	Proofs of concept
	Presentations at specialist conferences
Interest of stakeholders	Joint road maps
	Presentations by invitation
	Knowledge exploitation grants
	Industry funding
	Staff exchanges
	Part-time professors from/in industry
	Consortiums with industry
Impact and use of results	Market launch and new products in industry
	Spin-offs with industry contacts
	Patents

Step 4: Assessment of the societal relevance of the research by the peer committee
The evaluation committee assesses the societal relevance of the research, based on the evidence presented in step 2 and 3. The peer committee may include stakeholder opinions through:

- Invitation of experts with an understanding of the societal issue or sector to sit on the evaluation committee,
- A round table discussion between stakeholders and the peer committee as part of the assessment process.
- Ask for an additional survey among stakeholders, e.g. using the interview protocol presented in 6.1.

6.3 A bibliometric tool: Contextual response analysis

Research embedded in broader (policy) networks may have impacts beyond productive interactions between researchers and their stakeholders. We have explored one way to map such interactions in a systematic way. Impacts of research results among stakeholders can be traced (measured) on the internet by using the so-called Contextual Response Analysis (CRA). This method records internet usage of publications, press releases and other online or written material using one or more search engines, and classifies the URL that refers to the publication or other sorts of output according to the domain or sub domain in which the user/URL operates. The results of the method allow an analysis of the response of specific documents and other products in terms of the intensity of use and of the origin of the users according to social domains or the subdivision thereof.

A contextual response analysis was performed of some of the NIVEL publications that have been produced in relation to the projects investigated in this case study. Figure 2 displays the origin of users in five main social domains of NIVEL. WET-002 through RAM-008 are NIVEL codes for various research projects each having different stakeholders and domains of interaction. As is apparent from this figure, usage is not restricted to academic stakeholders. Users are also found among hospitals, local health authorities, general practices, for-profit and non-profit advisory agents, professional organizations or health insurance companies (Health and Health Care). They are also found among the many websites and institutes that translate and transmit knowledge and information for wider audiences and among newspapers and news websites (Communication and

Dissemination). In the category of General or Other, various users can be found, such as (personal) blogs, and organizations and businesses in other domains than health.

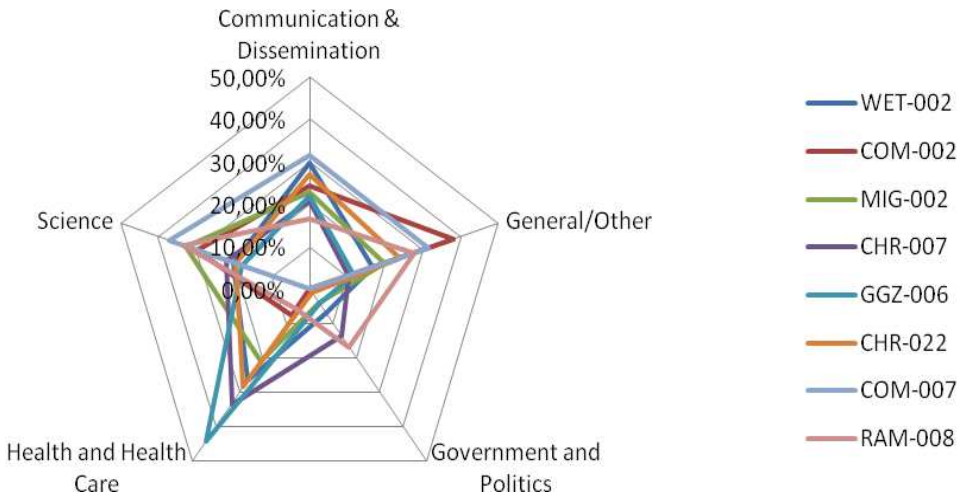

Figure 2: *Contextual Response Analysis*

Internet responses such as shown here are not arbitrary or superficial. In total, almost 30% to 50% of all references were found in the form of documents or PDF's, which indicates that many of the references are made in documents produced or listed by organizations.

In Health, interactions appear in part to be systematically organized and supervised in order to assure that productiveness and in the long run impact is ensured. In one case (NIVEL) the interaction with stakeholders shows a system of checks and balances. One type of interaction consists of yearly consultation rounds by the management of NIVEL, which is additional to the interaction taking place in the actual research project. The productiveness of this type of interaction is to inform the strategic agenda of the institution as well as providing input for individual projects. Also, in individual projects interaction with stakeholders takes place in a more or less formal way in user groups or supervising committees, which may lead to addressing issues relevant for the outcome or for the research questions, and to the management of expectations among stakeholders. In the LUMC case in Health, examples of such institutionalized organization of interactions can be found in external frameworks, such as in PPP consortia. Also, one of the main Dutch funding agents for medical research (ZonMw) poses requirements for maintaining productive interactions. These include plans for implementation, organizational forms for cooperation and requirements for the involvement of specific types of stakeholders at crucial phases in research in particular in the agenda setting and in the dissemination and implementation phases.

Type of interaction	Example	Effects (success)
Direct	Consultation rounds with stakeholders	Adaptation in research agenda
	User groups, supervising boards (PPP consortia)	Adaptation of research projects
	Presentations to health care professionals (conferences, meetings, post-academic teaching)	Sustaining relations with stakeholders, knowledge transfer
	Collaboration in research	Mutual adaptation in research projects
Indirect	Annual plans	Mutual agreements with funding agencies over future research agenda
	Implementation plans	Mutual agreements with funding agency over future implementation of project results
	Reports & medical guidelines, scientific publications	Knowledge transfer, Response (uptake of knowledge) by a wider variety of stakeholders than those involved in direct interactions
Financial	Contracts, Licenses, Project grants	Enabling completion of research projects
	Lump sum grants	Enabling independent research

Description of the potential and the main dissemination activities and exploitation of results

Introduction

The SIAMPI team was invited to present the results of the project in a workshop on "State of the Art in Assessing Research Impact," organised by Dr. Claire Donovan of HERG/Brunel university on March 31st and April 1st, 2011. Both peers as well as stakeholders were present. Dr. Claire Donovan formulated her reaction towards the final results as follows: *(The SIAMPI team) presents a novel slant on approaches to assessing research impact, and through a 'process-oriented' approach to understanding productive interactions is able to unravel perennial problems in assessing research impact such as serendipity and unpredictability, and attribution in terms of dealing with time-lags and a complex network of interactions. It also embodies a new philosophy of assessing social impact for learning and improvement, rather than for judging and accounting.*

Her feedback refers to 2 major changes that the SIAMPI team proposes as a result from the project:

1. Focus on the process of productive interactions instead of the actual impact itself. This solves a number of problems:
    a. The problem of identifying and capitalising specific social impacts
    b. The problems of attribution (what part of an impact can be attributed to a specific researcher or specific research) and temporality (it often takes years for an impact to become apparent); SIAMPI offers the concepts of contribution (what did the research(er) contribute and how) and uptake (first use, an intermediate endpoint) instead.
2. Use assessment to learn and improve instead of to judge and account for.

Having said that, we can now speculate about the potential impact as a result from the project. However, it seems more useful to describe the productive interactions that have taken place and that we will engage in, in the months to come. One specific reason to do so is that the proposed approach differs from what is the actual practice in research assessment. Without productive interactions, direct or indirect, it seems less likely that the approach is adapted, despite positive feedback in recent months from both peers as well as stakeholders.

We will follow the issues mentioned in our questionnaire:

1. Context of our research
2. Mechanisms of interaction
3. Examples of actual use of SIAMPI

Context of SIAMPI

Not without our stakeholders have we been able to develop an approach that will be used. From the start on we have collaborated with research organisations, science policy makers, research councils, Academies, and other bodies involved in the evaluation of research, in order to develop a useful approach.

- We have organised the stakeholder contacts in a separate Work package.
- We have established a reference group of stakeholders as well as peers. Members of this group are well informed of the subject and practice of social impact assessment. They have been very valuable in providing feedback on the project.
- We have invited members of the reference group to our methodological meetings, and we have discussed our ideas with them. These interactions have proven to be extremely useful to sharpen the framework, to understand the needs and to translate our empirical findings into useful results.

Basically there are three types of stakeholders in the SIAMPI project:

1. Organisations requiring and commissioning such evaluations, such as the European Commission and national Research Councils.

2. The case representatives; those involved in our case studies. The case representatives are involved in actual assessment situations, required by the funding bodies.
3. Other organisations that will undergo a social impact evaluation, such as research organisations.

Ad 1.
Most important actor in the SIAMPI project is the European Commission. The project is framed by the call for proposals and is funded by the European Commission. During the project, we had contact with both our project officer and others involved in social impact assessment. Their requirements, questions, concerns and clearly expressed needs all had an influence in the direction of the project and in the issues tackled.

The results of SIAMPI can be implemented by the European Commission in the assessment of FP7 projects and in the reporting tools. In the assessment, there are three main criteria: scientific quality, implementation, impact. We propose to distinguish two sub criteria for the impact criterion:

- Contribution to expected impacts, at the national and European level.
  One has not only to look at what researchers promise, but also find evidence of contributing activities to this promise, be it in terms of network activities or of intermediate endpoints
- Appropriateness of measures for dissemination and/or exploitation of results
  Use the productive interactions as a proxy for dissemination, and also include the strategies of researchers / institutes to achieve social impact.

In the final report, the description of the potential impact and the main dissemination activities and exploitation of results can be framed according to our questionnaire:

- Context (who are the stakeholders, what influence do they have, what are the differences between types of stakeholders)
- Mechanisms of interaction (direct-indirect-financial)
- Examples of uptake of impact

Furthermore, research councils and academies were involved in SIAMPI. As the EC, they formulated their needs and reflected upon the potential usefulness of SIAMPI. The ESRC (UK) advised us to involve their BRASS research centre in the SIAMPI project.

These stakeholders can introduce the SIAMPI approach in a top-down way. They have the power to set the rules for evaluations, and to formulate specific requirements.

Ad 2.
We have tested our approach in the case studies. The feedback from the case representatives was useful and necessary. Are we indeed developing an approach that is of use to those that are being evaluated? Is it practical? Do the results make sense?
Some of the organisations studied in the cases have indicated how useful the SIAMPI approach is for them.

- It is useful to highlight key aspects of the engagement activities, of the investment made by researchers in order to engage with users. In one case, BRASS, this helped to legitimise activities which researchers typically engage in, which are valuable for BRASS and for research users, but which traditionally are given little weight.
- SIAMPI was perceived as more useful than other approaches since it is non corruptible as long as the narrative is taken into account.
- In a number of cases, the SIAMPI approach is used for evaluations. Both Dutch organisations involved in the health care case and the Spanish organisation involved in the Social Sciences and Humanities case have all used or are planning to use SIAMPI.

These stakeholders can introduce SIAMPI in a more bottom-up way. In fact, they have (see Examples).

Ad 3.
Although these types of stakeholders were not officially involved in the SIAMPI project, they are involved in our productive interactions. See also the next section.

Mechanisms of interaction

During and after the SIAMPI project we have had and we will continue interactions with our stakeholders.

Direct interactions

- We have organised our stakeholder contacts in a separate Work package and we have established a reference group of stakeholders as well as peers.
- We have organised stakeholder workshops during the project. Both stakeholders from our reference group, as local stakeholders were invited to these workshops. The aim was twofold:
    - to receive indispensible feedback;
    - to inform the stakeholders of the project, to promote SIAMPI-type approaches and to encourage stakeholders to use such approaches
- The contacts with the case representatives during the case studies proved to be very valuable; the case representatives provided feedback and incorporated the SIAMPI approach in their evaluations.
- We planned to draw attention to SIAMPI in our networks of ESF, ALLEA and RTD-evaluation network; we succeeded to do so and present
- It was encouraged to promote the SIAMPI approach when meeting interested parties, contributing to meetings, or when involved in research assessment. See our List of Dissemination Activities for the presentations on SIAMPI. It should be noted that at scientific meetings on this subject, knowledgeable stakeholders are present.
- The coordinator, Jack Spaapen, was invited as a discussant based upon his experience in the SIAMPI project:
    - Brussels, 20 April 2009, workshop 'Multidimensional Assessment of University-based Research'
    - Brussels, September 2010, Stakeholders Workshop for the study of the impact of European policy on the Development of the ERA in the areas relevant to environment
- Members of the SIAMPI team remain involved in projects on assessment of social impact.
    - One example is the project commissioned by the Dutch national committee on valorisation, to KNAW/Rathenau Instituut. Aim of this project is to develop indicators for valorisation. Insights from the SIAMPI project have helped us steer away from the performance indicators, as required by the committee, and move towards process indicators.
    - The researcher involved in the health case study, Ad Prins, was appointed secretary for the assessment of the NIVEL. The influence of SIAMPI can for instance be seen in the stakeholder involvement.
- The results have been presented at above mentioned workshop on "State of the Art in Assessing Research Impact," organised by Dr. Claire Donovan of HERG/Brunel University on March 31st and April 1st, 2011.

Indirect interactions

- We have sent a press release, to gain attention for the project
- We have developed a website www.siampi.eu in order to communicate about social impact assessment. The website will be maintained and will be updated regularly. It will remain under the responsibility of the KNAW.
- An article was published on ERiC and SIAMPI in the Dutch journal for management of higher education institutes *Hoger Onderwijsmanagement*
- We will publish a stakeholder guide to assessment of social impact, based on the deliverables from WP7 – Synthesis.

- We will publish several articles in scientific journals; including a concluding article in the special issue of *Research evaluation*, on state of the art of impact assessment (Autumn 2011)

Financial interactions

Most important to mention is the financial contribution of the European Commission. The project has been shaped by the requirements in the call for proposals. During the project, the influence of the project officer as well as her colleagues steered the project towards clear definitions and useful goals.

Examples of actual use of SIAMPI approach

SIAMPI has been used in a number of instances. All use is within academia, since it SIAMPI is aimed at assessing the social impact of academic research. However, it is used in actual evaluation situations and therefore considered as "social." The approach is used by organisations that commission evaluations as well as by case representatives.

Some of the organisations involved in the case studies reported that SIAMPI is or will be used:

- The SIAMPI approach has been used for the design of the questionnaires in the study "Socio-economic impact of CSIC activities", carried out by the Spanish INGENIO and IESA for CSIC (October 2009-October 2011). The project addresses the whole of CSIC (a staff of over 12,000, of which 3,000 are tenured researchers). The researcher questionnaire was sent to the 3,000 researchers; the stakeholder questionnaire was sent to 1,890 organisations that have had contracts with CSIC over the last 10 years.
- SIAMPI has been used in the evaluation of the Netherlands Institute for Health Services Research NIVEL. NIVEL, 90 fte researchers, was involved in the health case. The case study report was part of the documentation the review committee received. The evaluation took place in the second half of 2010. http://www.nivel.nl/pdf/Assessment%20Report%20NIVEL%202010%20def.pdf
- SIAMPI will very possibly be implemented by the Dutch Leiden University Medical Centre, LUMC, involved in the health case. An important motive to do so is that SIAMPI is valued as non corruptible as long as the narrative is taken into account.
- The director of the UK based ESRC funded BRASS centre reported that involvement in SIAMPI was very valuable, since
    - It provided an additional vehicle through which to communicate some of BRASS's engagement activity to the ESRC, in a way that had greater credibility than simple self-reporting. The SIAMPI Report represented a useful tool for highlighting key aspects of the engagement activities.
    - It helped to legitimise activities which BRASS researchers typically engage in, which are valuable for BRASS and for research users, but which traditionally are given little weight. The notion of 'productive interactions' was one which BRASS researchers could easily relate to and recognise from their own work, and the very notion of such interactions as 'productive' provides a level of positive reinforcement which is helpful in encouraging researchers to engage with users.
    - The SIAMPI report has helped to kick start conversations with other parts of the University in ways which will most probably increase the recognition of the type of impact-orientated work that BRASS engages in and moves the debate about engagement in the direction of the BRASS approach.

The concept of productive interactions is introduced in the Dutch ERiC project. The stakeholders involved (KNAW, research council NWO, the associations of universities (of applies sciences) VSNU and HBO-raad) found the concept very useful and stressed that it should be included in the guide: ERiC (2010) *Evaluating the societal relevance of academic research: A guide* http://www.eric-project.nl/files.nsf/pages/NWOP_83CECZ_Eng/$file/ERiC%20guide.pdf This guide is part of the Standard Evaluation Protocol used by all Dutch universities and academic research organisations, as well as the Brancheprotocol Kwaliteitszorg Onderzoek used by all Dutch universities of applied sciences.

The Contextual Response Analysis tool developed and used in the health case is included in a proposal for the analysis of the impact of the Research and Documentation centre of the Dutch ministry of Security and Justice WODC (www.wodc.nl).

Issues to address

A part form the message about the SIAMPI approach in general, a number of issues should be addressed in the interactions.

- Research organisations have to make serious efforts to gather more robust data on productive interactions, social impact and research output and outcome to wider audiences. At present such data are scarce.
- There are differences - such as the mode of undertaking of research, the context of research, including the national context - that have to be accounted for in assessment procedures.
- Attention has to be paid to the influence of power differences in the network.
- Organisations should put more effort in gathering and disseminating best practices. Social impact can be shown through instances of success and of changes in behaviour in the socio-cultural domains of society.
- Social impact can be distinguished from other impacts such as economic, environmental, technical, but there are no clear borders between the concepts. Given the overlap between these types of impacts, it is preferred not to define social impact too narrowly, and allow for the identification of changes in behaviour in all the areas distinguished in the Ricci report.
- Discussing the issue of productive interactions and social impact might raise the awareness. It appeared in a number of cases that instances of (potential) impact were unknown to the management and other researchers; these instances were discovered through the interviews we conducted. In one case, with a clear example of change in behaviour, the stakeholder was unaware of this impact. Through the interview the awareness was raised and the influence became clear to the stakeholder.

Use and dissemination of foreground

In our proposal, we have mentioned the following:

- We will closely collaborate with science policy makers, research councils, Academies, and other bodies involved in the evaluation of research, in order to develop an approach that will be used.
    - We have organised stakeholder contacts in a separate Work package, we organised a reference group and we have invited stakeholders to our workshops.
- The case studies will be conducted in close collaboration with the funding bodies
    - We have arranged our case studies in a number of ways, including through the ESRC research council.
- At the beginning of the project, we will build a wiki-like website.
    - The website is online; and we will maintain the website www.siampi.eu
- Towards the end of the SIAMPI project, we will publish a manual.
    - This is based on our final reports that we have published on our website. We will make a public version of the manual.
- Towards the end of the SIAMPI project we will dedicate a workshop to transferring our SIAMPI methodology.
    - On December 10th, 2010, we organised our final workshop in Brussels.
    - The numerous meetings we have attended on invitation, where we presented the SIAMPI project, proved to be valuable in this respect as well.
- Finally, as much as we plan our stakeholder engagement, there will undoubtedly be more.
    - Indeed, and as concluded from our case studies, chance encounters were useful. The invitations to present the project, the involvement in new projects on impact assessment, whether as secretary in an evaluation, or as researcher in new projects on impact assessment, interactions with policymakers, research councils and research organisations are all examples of not planned but deliberately aimed for.

We have presented SIAMPI (or are invited to) in a number of ways:

- in a press release
- on a website www.siampi.eu
- on at least 3 scientific conferences
- in at least 25 oral presentations for a mixed audience, ranging from national audiences including Poland and Czech republic to international audiences including Southeast Asian countries.
- in a number of scientific articles, 1 published, 1 on invitation and a number in progress.