Engaging scientists : organising valorisation in the Netherlands

Jong, S. de

2 Scientists' response to societal impact policies: a policy paradox[9]

Stefan P.L. de Jong[1], Jorrit Smit[2]. and Leonie van Drooge[1]

[1] Rathenau Instituut, Department of Science System Assessment ,The Hague, The Netherlands

[2] Utrecht University, Utrecht, The Netherlands

Abstract

Many countries have amended legislation and introduced policies to stimulate universities to transfer their knowledge to society. The effects of these policies on scientists are relatively unexplored. We employ principal-agent theory to increase our understanding of the relationship between impact policies and scientific practice. Our methodology includes the analysis of policy documents and of data gathered in focus groups. We conclude that there is a gap between policy on the one hand and how scientists perceive it on the other. Policy documents put forward a broad notion of impact, but scientists perceive them as focusing too narrowly on commercial impacts. Scientists are further puzzled by how societal impact is evaluated and organized, and their perceptions frame their behaviour. Our policy recommendations focus on improving the interaction between intermediaries, such as universities and research councils, and scientists so as to include the latter's perspective in policy-making.

2.1 Introduction

The Vannevar Bush (1945) report 'Science – the endless frontier' to president Roosevelt of the US lists some of the achievements of science at that time: a decrease in death rate for all diseases and the successful battle against the U-boat. Future benefits concerning health, security and welfare are promised if basic research is adequately funded. Bush recommended the establishment of a new agency to distribute funding for basic research. He advised the agency *'should have stability of funds so that long-range programs may be undertaken. It should recognize that freedom of inquiry must be preserved and should leave internal control of policy, personnel, and the method and scope of research to the institutions in which it is carried on. It should be fully responsible to the President and through him to the Congress for its program.'* (Bush 1945: pp 8-9).

Clearly, the autonomy of science advocated by Bush is no longer obvious. In recent decades, many countries have amended legislation and introduced policies to stimulate universities to transfer their knowledge to society. Since the 1970s, governments in the Western world have increasingly emphasized the benefits to society of their financial investment in science, using

9 A revised version of this chapter has been published as Jong, S.P.L. de, J. Smit & L. van Drooge. (2015). 'Scientists' response to societal impact policies – a policy paradox?'. In: *Science and Public Policy.* Published via advance access on 25-05-2015

such labels as the third mission (UK) or valorisation (the Netherlands). Since the late 1990s, funding councils around the world have introduced the societal impact criterion in funding procedures (Dance 2013). Societal impact is also an important aim of the European framework programmes, for example the current Horizon 2020 programme (http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020, accessed 10-07-2014), and it is further included as a criterion in research assessments (http://www.ref.ac.uk/panels/assessmentcriteriaandlevel-definitions/ accessed 10-07-2014; VSNU *et al.* 2014).

There is a rich body of literature studying the characteristics of those involved in impact processes by means of interviews, surveys or existing databases (D'Este *et al.* 2013; Lam 2011; Jensen *et al.* 2008). Another strand of literature provides insight into impact dynamics, based on interviews with academics as informants, in order to reconstruct impact pathways (e.g. Olmos-Peñuela *et al.* 2014; De Jong *et al.* 2014; Spaapen & Van Drooge 2011). A third collection of studies deals with methods and indicators for assessing societal impact (e.g. Donovan and Butler 2007; Meagher *et al.* 2008; De Jong *et al.* 2011). These studies involve academics and support staff testing and reflecting upon methods and indicators. Although these types of studies have resulted in valuable insights for improving and monitoring societal impact, the way scientists respond to impact policies appears to receive little attention.

The increasing emphasis on societal impact provides us with an interesting case that can contribute to our understanding of how scientists' perception of science policies frames their behaviour and thus the efficacy of these policies. The research question we aim to answer is: How do scientists cope with the increased policy emphasis on societal impact? Thus, we put the position of the agents at the centre and aim to explore their ideas and opinions by tapping into their realm of thought in a social setting. We will focus on their experience with societal impact activities to gain an idea of the issues that are relevant to them and the way they discuss them.

The structure of this paper is as follows. In the next section, we briefly discuss principal-agent theory as our theoretical framework. We then present our methodology, which combines document research with focus groups. In the third and fourth sections we discuss societal impact policies and the responses by the participants in the focus groups, respectively. In the conclusion and discussion, we answer the research question and reflect on the implications of our findings for principal-agent theory and societal impact literature and policy.

2.2 Theoretical framework

As Hessels *et al.* (2009) conclude, societal relevance nowadays is a central element of the 'contract' between governments and science (Guston 2000). This development can be described as a change in the principal-agent relationship between governments and science. In such a relationship, a principal and an agent exchange resources. In the case of science, government (the principal) has financial resources but lacks the skills to develop new knowledge, while scientists (the agents) have the skills but lack the financial resources. In exchange for financial resources from government, science develops new knowledge (Braun & Guston 2003).

However, the information asymmetry in this contractual relationship raises two concerns. The first is whether the principal is able to select the best agents to do the job ('adverse selection').

The second is whether the agent is pursuing the principal's goals ('moral hazard') (Guston 1996). Van der Meulen (1998) links principal-agent theory and game theory to explain how government and science strategically react to one another and both develop strategies to maximize their outcomes. Government can introduce monitoring systems, usually based on peer-review, to address adverse selection and moral hazard (Fernandez-Carro 2007). Leisyte (2007) describes the strategic options of the agent as compliance (adapting to new demands), symbolic compliance (successfully pretending to adapt to new demands without actually changing), and negotiation (trying to change the new demands). The costs involved in monitoring will reduce the resources for science's core tasks, which is neither in the interest of government, nor of science (Van der Meulen 1998.)

Intermediaries play a significant role in creating a balance between the principal's and agent's goals (Guston 2000). Important types of intermediaries are research councils (to address adverse selection (Caswill 2003; Van der Meulen 2003); research assessment systems (to address moral hazard) (e.g. Barker 2007) and research programmes (to address both adverse selection and moral hazard) (Shove 2003; Wardenaar *et al.* 2014). University departments are another type of intermediary. Morris (2002) finds that scientists perceive departments as an important mediator between them and government's research priorities, research councils and the national research assessment. She suggests that departments are able to broker between research practice and research policy because – despite their managerial function – they are close to researchers.

Literature suggests that scientists are able to cope with new policies by selectively complying or not complying and because of the existence of additional sets of professional rules. Morris (2004) addresses the relatively unexplored position of the agents by studying the strategies that scientists develop to cope with new or changed policies. She concludes that scientists comply as much as required, rather than fully, to cope with a new policy environment in which research funding and research freedom can no longer be taken for granted. De Boer (2003) studies the effects of a Dutch law meant to modernize governance at universities. He concludes that the new law is not very effective because a considerable number of full professors 1) ignore it and 2) indicate that informal rules provide leeway for professional autonomy.

Literature thus shows multiple relations should be concerned in order to understand the response of scientist's to new policies: government-agent, government-intermediary, intermediary-agent and relations between multiple agents.

2.3 Methodology

We have limited our empirical study to the changing relationship between government and science in the Netherlands. There, societal impact has been included as a core task of universities since the reform of the Higher Education and Research Act (WHW) in 1992. It is referred to in this Act as 'knowledge transfer for the benefit of society' (WHW, Article 1.3). Our analysis begins in 2004, the year in which the Minister of Science made societal impact a core issue in government science policy, using the label 'valorisation'. As valorisation currently appears to be the most commonly used term in impact discussions in the Netherlands, we will use valorisation rather than societal impact in sections 2.4 and 2.5 below.

In the implementation of the policy, two phases can be discerned. In the first phase, government and intermediaries negotiate about the meaning of valorisation and the way intermediaries should implement the policy in their agenda's. The (intermediate) results of this negotiation phase can be found in documents. Another reason to consider documents is that in response to questions by scientists, intermediaries refer to policy documents.

In the second phase, the policies are institutionalized within the academic community. This leads to responses within the research community. These responses are not systematically documented and have to be collected in interaction with academics. We opt for focus groups for two reasons. Since academic research is a collective and social activity and since theory suggests that agents develop strategies to cope with new policies, we expect that academics do not deal with the increasing demand for societal impact in isolation, but in discussion with peers. The other reason to opt for focus groups is that they make it possible to gather data on the attitudes and opinions of participants in a dynamic social context (Morgan 1988, cited by Sim 1998). Focus group participants have to explain themselves to and query other participants (Morgan 1996). We believe that this is a relevant strength of the focus group methodology, since we are studying a topic about which many scientists are still forming their own opinion.

2.3.1 Document research

Document research is used to summarize policy developments concerning the principal's impact goals and how the intermediaries articulate these goals. We identify government as the principal. Four intermediaries are identified: 1) the Dutch research council (NWO) as the intermediary that reduces adverse selection uncertainties, 2) the national research assessment as the intermediary that reduces moral hazard uncertainties, 3) the Association of Universities (VSNU) as the representative of the universities and 4) the Royal Netherlands Academy of Arts and Sciences (KNAW) as the 'the forum, conscience, and voice of the arts and sciences in the Netherlands'[10] (http://www.knaw.nl/en/about-us/taken accessed 23-07-2014). Documents published after the focus groups were held have not been included, since they could not have contributed to the responses of participants. An overview can be found in Table 2.1. In the result section, we have translated quotes from Dutch to English where relevant.

10 The Royal Academy (KNAW) has three functions by law: 1) a learned society 2) an advisory body to government and 3) a management body for national research institutes (http://www.knaw.nl/en/about-us/taken).

Table 2.1 Overview of policy documents studied

Title[11]	Year	Organizations involved
Focus on excellence and added value: Science Budget 2004	2004	Ministry of Education, Culture and Science
Valorisation of research as a task of the universities	2005	Ministry of Education, Culture and Science
Valorisation agenda: knowledge must circulate	2008	KNAW, NWO, VSNU, Association of Large Technological Institutes, Technology Foundation STW, Netherlands Organization for Applied Scientific Research TNO, Netherlands Association of Universities of Applied Sciences, Ministry of Economic Affairs, Ministry of Agriculture, Nature and Food Quality, Ministry of Health, Welfare and Sport, Ministry of Education, Culture and Science, Confederation of Netherlands Industry and Employers VNO-NCW, Royal Association MKB-Nederland.
From resolutions to taking the lead: knowledge must circulate	2009	idem
Standard evaluation protocol 2009-2015	2009	KNAW, NWO and VSNU
Evaluating the societal relevance of academic research: A guide	2010	KNAW, NWO, VSNU, Rathenau Institute and Netherlands Association of Universities of Applied Sciences
Response of Leiden University to the strategic agenda of the Ministry of Science	2012	Leiden University
A proposal for performance agreements	2012	Eindhoven University of Technology
A guide for knowledge utilization in the innovational research incentives scheme	2013	NWO
A framework of valorisation indicators	undated	VSNU Focus groups

Rathenau Instituut

We used focus groups to gather data about how scientists and support staff, as the agents, respond to the policy environment. A focus group interview is 'a group interview – centred on a specific topic ('focus') and facilitated and coordinated by a moderator or facilitator – which seeks to generate primarily qualitative data, by capitalizing on the interaction that occurs within the group setting' (Sim & Snell, 1996 p.189). We follow the guidelines discussed in literature to prepare the focus groups, structure the discussions and analyse the results (Morgan 1996; Zeller 1993; Webb 2002; Stewart & Shamdasani 1990, cited by Sim 1998; Sim 1998; Kitzinger 1995; Barbour 2005; Kidd & Marshall 2000).

The overall population of participants was homogeneous in the sense they all have experience with societal impact, as defined by government and intermediaries. Furthermore, each focus group was assembled to be homogenous in terms of type of research field and academic rank, and heterogeneous in terms of sub-discipline, organizational affiliation and job (researcher or support staff). We included those with a supporting role, such as policy staff members, technology transfer officers and communication advisors, because they play a role in achieving societal impact too.

11 Where relevant translated from Dutch into English.

We selected four types of fields, covering the diversity of fields identified by Whitley (2000). In this way we aimed to capture a wide variety of opinions and experiences. The fields are the fragmented adhocracies (represented by the social sciences and humanities) at one extreme and technologically and conceptually integrated bureaucracies (represented by chemistry and physics) at the other. In the middle are professional adhocracies (represented by biomedical sciences, engineering, climate sciences and computer sciences). This gave us three series of focus groups. Within these fields, we aimed to maximize the number of sub-fields and universities represented.

Participants were invited by e-mail. In addition to the goal of the focus group, we mentioned some of their societal impact activities and explained that these were the reason to invite them. Table 2.2 lists the number of participants. The compositions of the group differ to final moment cancellations.

Table 2.2 Number of individuals per focus group

	Social Sciences and Humanities (November 2013)		Chemistry and Physics (April 2014)		Biomedical Sciences, Engineering, Computer Sciences and Climate Sciences (April 2014)		Total
	Senior group	Junior/ Intermediate group	Senior group	Junior/ Intermediate group	Senior group	Junior/ Intermediate group	
Researchers	8	6	6	6	7	7	40
Support Staff	1	2	4	1	2	3	13
Total number of Participants	9	8	10	7	9	10	53

Rathenau Instituut

The focus groups began with an explanation of the goal of the focus group, after which participants briefly introduced themselves. Participants were also asked for permission to record the focus group. Finally, we told them how the research results would be disseminated to them and other audiences.

The core of each focus group consisted of three rounds of discussions. In the first round, each participant introduced a personal example of a societal impact activity or strategy and explained why he or she defined this is as 'valorisation', as well as described the elements of success. Other participants were invited to ask questions. In the second round, we divided the focus group into subgroups so that we could multiply the number of discussions and thus expand our data collection. Each subgroup designed, visualized and discussed a desirable future in which achieving societal impact was seen as a regular core task of universities. They were asked to think about the conditions and knowledge required in order to attain this future. Then, in a plenary setting, one member of each subgroup presented their future. Members of other subgroups were able to ask questions. In the final round, the knowledge needs were prioritized and discussed further.

Full transcripts were made of the recorded discussions. The transcripts were analysed using Atlas.ti. Only the issues discussed in the majority of the focus groups are presented in section 2.5 below. As our study is exploratory and we organized six focus groups, we will not be able to analyse differences per type of field or academic rank. However, by analysing six focus groups we will be able to capture overall dominant issues in the way scientists and support staff respond to impact policies.

For privacy reasons, in the result section, the focus group serves as the source of any quotes or narratives. Table 2.3 lists the captions. For example, JI-SSH refers to a quote or narrative provided by (a) participant(s) in the social sciences and humanities focus group consisting of junior and intermediate-level researchers. For readability reasons, the focus groups with participants from the biomedical sciences, computer sciences, climate sciences and engineering are referred to as Professional Adhocracies (PA).

Where narratives are presented, participants are coded 'P1', 'P2' etcetera in order of their contribution to the discussion. The codes are unique for each narrative in the sense that 'P1' generally does not represent the same individual across two different narratives. Contributions by the moderator are coded 'M'. Lastly, all quotes have been translated from Dutch to English.

Table 2.3 Overview of quote captions

Type of field	Level	Caption
Fragmented adhocracies (social sciences and humanities)	Junior and intermediate	JI-SSH
	Senior	S-SSH
Professional adhocracies (biomedical sciences, computer sciences, climate sciences and engineering)	Junior and intermediate	JI-PA
	Senior	S-PA
Technologically and conceptually integrated bureaucracies (chemistry and physics)	Junior and intermediate	JI-CPh
	Senior	S-CPh

Rathenau Instituut

2.4 Valorisation in policy

In this section we describe the valorisation policies developed by government and the intermediaries as the background for interpreting the responses presented in the following section. Two steps can be discerned in policy development: the introduction of valorisation as an explicit goal in government policies and subsequent negotiation between government and the intermediaries.

In 2004, the Ministry of Science published a policy document in which it identified the utilization of research results as one of five priorities in science policy. The notion of 'valorisation' was introduced to emphasize the importance of universities collaborating with private organizations in order to close the 'knowledge gap' (Ministry of Education, Culture and Science 2004). One year later, in a letter to the boards of the universities, the Ministry broadened the meaning of

valorisation to include societal impact and dissemination in addition to economic impact. The Minister defined valorisation as science and technology communication, educating people, informal contacts, collaboration with public organizations and publishing research results (Ministry of Education, Culture and Science 2005).

The next step can be considered the negotiations between government and the intermediaries about the content of valorisation policies. In 2007, the government appointed a committee to improve the valorisation environment. In 2008, the committee presented the valorisation agenda that had resulted from the negotiations between the government, the intermediaries in the Dutch science and higher education system, and representatives of knowledge users (Nederland Ondernemend Innovatieland 2008). Among the 15 supporters of the agenda were the research council, the academy of arts and sciences and the association of universities. One year later, the committee published a more detailed agenda (Nederland Ondernemend Innovatieland 2009). It included a definition of valorisation: *'the process of creating value from knowledge by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes and entrepreneurial activity'* (Nederland Ondernemend Innovatieland 2009, p. 8). The Government has used this definition up to the present day, although it omitted the word 'competitive'.

In the agenda, the organizations involved agreed on the development of additional policies to anchor valorisation in the Dutch science system. The agenda included follow-up steps for universities, the research council and the academy of arts and sciences. Universities agreed to develop valorisation strategies and to include valorisation achievements in their annual reports and research assessments. They also agreed to show appreciation for and reward employees active in valorisation and to include valorisation in employees' job profiles. The research council and academy agreed to develop policies to improve the valorisation awareness of researchers.

The result of the negotiation was reflected by policy documents published by intermediaries shortly after the valorisation agenda was released. In 2009, the Dutch research council introduced a 'knowledge utilization paragraph' in its funding applications. There, knowledge utilization is defined as *'a process that promotes the use of academic knowledge outside the academic domain and/or by other scientific fields. The process generally demands interaction between researchers and intended knowledge users, and this contact may appear in all phases of research: from developing research questions to disseminating results*' (NWO 2013, p. 2). Initially, the paragraph was optional, but from 2014 onward it became mandatory in all funding schemes. It now accounts for twenty per cent of the final score of a proposal. However, there is an opt-out for basic research. If an applicant convincingly argues that knowledge utilization is unlikely to be realized and if the review committee agrees, a full score is awarded for the paragraph.

The research council, the academy and the association of universities are jointly responsible for the Standard Evaluation Protocol (SEP). The SEP is used to guide the mandatory six-yearly assessment of each research institute. Central to the assessment is the site visit by an international peer review committee. Over the years, societal impact has gained importance under the label 'relevance.' According to the 2009 protocol, relevance *'covers the social, economic and*

cultural relevance of the research'. The committee is asked to consider one or more of the aspects 'societal quality', 'societal impact' and 'valorisation'. The first refers to policies and efforts to interact with societal partners, the second to actual achievements and the third to *'making research results available and suitable for application in products, processes and services'* (VSNU *et al*. 2009).[12]

Also by agreement, the VSNU association of universities included valorisation in the framework that provides job descriptions of academic ranks. Scientists are expected to *'create value* [of] *acknowledged scientific knowledge and insights for science, society and where possible for government and private parties.'* Although doctoral students in the Netherlands have the legal status of university employees, the description applies to all academic ranks except them.

In 2012, all universities concluded performance agreements with the national government in which valorisation was included as a priority. Examples of such agreements are: to adhere to the agreement in the valorisation agenda of spending 2.5 per cent of the university's financial resources on valorisation activities (Leiden University 2012) and encouraging science communication by means of *'demonstrations, exhibitions, lectures, popularizing publications, the university's website and social media'* (Eindhoven University of Technology, 2012).

Currently, the association of universities is developing a framework of indicators that defines valorisation largely the same as government does: *'the process of creating value from knowledge by making it suitable and/or available for economic and societal use and making it suitable for translation into competitive products, services, processes and entrepreneurial activities'* (VSNU undated). The development of the indicators is explicitly presented as a bottom-up process, to create wide support within universities. In 2015 there should be a long list of indicators from which universities can select those most appropriate for their research.

The academy of arts and sciences is involved in the development of the SEP and in the public debate about valorisation, but has not developed its own definition. Although it promotes valorisation in the institutes it manages, we have not found any related policy documents (VSNU 2014). The academy generally emphasizes the value of basic and autonomous research.[13] However, the academy is involved in developing methods to assess research on its full merits (e.g. KNAW 2010; 2011; 2013) and societal impact in specific (ERiC 2010).

12 In May 2014 an updated protocol was published. Research is assessed on three criteria: scientific quality, societal relevance and viability. A definition of societal relevance is absent, yet it is described as *'The committee assesses the quality, scale and relevance of contributions targeting specific economic, social or cultural target groups, of advisory reports for policy, of contributions to public debates, and so on. The point is to assess contributions in areas that the research unit has itself designated as target areas.'* Research groups are expected to make a case for their relevance with the committee using narratives (VSNU, KNAW & NWO 2014).

13 For example, members of the junior branch of the academy wrote an opinion letter in a national newspaper ('Munt slaan uit wetenschap is te kortzichtig'), *NRC* 7-06-2010.

In addition to the valorisation agenda, the government introduced the 'top sector policy' in 2011. The goal of this policy is to intensify collaboration between public research and industry in nine sectors (http://topsectoren.nl/home accessed 10-07-2014). Since then, a significant part the research council's budget has been earmarked for collaboration with private partners from these sectors. For example, the government earmarked 225 million euros of the research council's total 2013 budget of 628 million euros (http://www.nwo.nl/en/about-nwo/what+does+nwo+do/funding/budget accessed 10-07-2014).

Excluding the first task description by the government, there are major similarities between the descriptions used by government and the intermediary organizations (see Table 2.4), such as the process-like nature of valorisation, the variety of forms it takes and the specification of societal use in addition to economic. This suggests a certain consensus, although multiple terms and descriptions are used. In the next section we will see whether and how government policies and the outcomes of the negotiations between government and the intermediary organizations affect scientists and support staff involved in valorisation.

Table 2.4 Task descriptions used by government and intermediaries

Actor	Term	Task Description
Government	Valorisation	'The process of creating value from knowledge by making it suitable and/or available for economic and/or societal use and translating it into competitive products, services, processes and entrepreneurial activity' (Nederland Ondernemend Innovatieland 2009)
Research Council (NWO)	Knowledge utilization	'A process that promotes the use of academic knowledge outside the academic domain and/or by other scientific fields. The process generally demands interaction between researchers and intended knowledge users, and this contact may appear in all phases of research: from developing research questions to disseminating results' (*Handreiking kennisbenuttingsimpuls* 2014)
Association of Universities (VSNU)	Valorisation	'The process of creating value from knowledge by making it suitable and/or available for economic and societal use and making it suitable for translation into competitive products, services, processes and entrepreneurial activity' (*Raamwerk Valorisatie Indicatoren* undated)
Standard Evaluation Protocol (SEP)	Valorisation (as an aspect of relevance)	'The activities aimed at making research results available and suitable for application in products, processes and services. This includes activities regarding the availability of results and the interaction with public and private organizations, as well as direct contributions such as commercial or non-profit use of research results and expertise' (VSNU, NWO & KNAW 2009)

2.5 Valorisation in practice

In this section we present the three main issues that emerged during discussions between the participants of each of the six focus groups. These are the task description of valorisation, how it is appreciated, and how it is organized. We will explore how these issues are related in the responses of the participants.

2.5.1 Task Description

Although participants appeared to be familiar with the relevant policy terms, almost none of them found the definition of valorisation self-evident. This may explain why attempts to develop a task description were common in all focus groups. When discussing potential descriptions, some participants found to their surprise that they had excluded their own valorisation activities. Although consensus was generally reached, some activities were not readily considered valorisation by all participants.

In the focus groups' attempts to describe the valorisation task, two issues emerged. The first was whether valorisation is a separate task or whether it is part of the other core tasks of universities, namely research and education. A situation in which the three tasks are integrated was regularly presented as the ideal. The perfect research project was said to be in collaboration with a societal partner, to generate new scientific knowledge and to provide a practical context for educating students. This makes it difficult or even artificial to separate the three tasks. Below, two participants from the S-CPh group discuss this issue in one of the subgroups. They are clearly struggling to position valorisation in relation to education and research.

P1: '*That* [drawing a separate box for valorisation] *is a bit funny though, because the social responsibility is covered by these two* [pointing to research and education], *it does not stand on its own.*'
P2: '*Exactly, exactly. I fully agree with you. But it is also a matter of definition, right? Because you can define education as teaching your students…but of course it is already partially part of the university and it is also partially aimed at society. And in the latter case it is part of your social responsibility.*'

The second issue was the task description of valorisation as such, regardless of whether it is part of the other core tasks. Although task descriptions are provided by government and the intermediaries, this does not mean researchers are familiar with them. The moderator asked a participant from the JI-CPh group whether she had read the explanation provided by the research council. The participant could not remember the explanation in detail, but recalled that she had *'read it with scepticism, because I already knew…something is being imposed on us which did not originate from us. Without any motivation.*'

If it were up to the participants, what would the task description of valorisation be? First, participants describe valorisation as a process, not as products. For example, a patent was not considered valorisation, it was considered a means to achieving valorisation. Another recurring element used to describe valorisation was 'translating knowledge'. This included translating for the public, but also for other scientific disciplines. For instance, when a post-doctoral researcher from the JI-PA group explained that he used his (ICT) knowledge to solve problems in CERN's LHC reactor, other participants did not question whether or not this was valorisation. Third, commercial activities were almost always regarded as valorisation. Yet a widely shared view was that valorisation is about more than making money, although some participants seemed not to have considered this option before. The discussion below in one of the JI-PA subgroups illustrates this:

P1: *'And valorisation is not only about making money.'*
P2: *'No…'*
P3: '*That's a very interesting point you raise.*'

A potential explanation for participants emphasizing that valorisation is about more than commercial activities, is the perception that government and the intermediaries value science for its contributions to the economy instead of knowledge development. This is discussed in the JI-CPh group in the following way:

P1: *'I do see considerable hypes about which fields get money. Yes, that is influenced by the current political climate. So that is where you notice a large effect.'*
P2: *'Also, there are more programmes now that only allow you to submit a proposal if a company joins in and finances half. In cash.'*
P1: *'I think they are making a mistake about valorisation…that knowledge transfer…you easily get the feeling that only money…financial considerations matter instead of knowledge transfer.'*

Participants also get this message from their university departments. There is an emphasis on acquiring external funds. For example, a participant from the S-SSH group said his vice-chancellor recently set a target of acquiring sixty per cent of funds externally. The following quote by a participant in the S-CPh group illustrates that it is not only national politics which are perceived to focus on commercial valorisation: *'I think that is the direction of thought* [of the department's dean] *at the moment. Not: how can we valorize? But: how can we make money?'*

Still, even researchers who are engaged in commercial valorisation activities do not always recognize these activities as valorisation. This had already become clear when inviting participants. We had to convince one of the JI-SSH participants to accept the invitation. This researcher is the director of the commercial bureau of an archaeology department. In this role, the researcher was involved in multiple commissioned excavations and in reconstructing an historical building commissioned by a theme park. He did not identify these commissions as valorisation, and during the focus group he explained why:*'We decided to link it* [the commercial bureau] *to scientific research. That is why initially I did not think of it as valorisation. For us it is about collecting building blocks for scientific research.*'

Another SSH researcher is part of a research group whose members give public lectures and, based upon their scientific expertise, serves on the boards of several associations. He questioned whether he or his colleagues would be appropriate participants, because he felt they were not involved in valorisation. Due to other commitments, this researcher could not join the focus groups. Nevertheless, we will include part of his response because it is indicative of the confusion that reigns about the task description of valorisation: *'I looked at www.valorisatie.nl, but it did not help much. We are not really making money from our scientific results, but we do share our knowledge with society. However, isn't that just dissemination?'* Note that although his colleagues do not commercialize their findings, the activities he described fit the descriptions used by government and the intermediaries.

In the focus groups, a JI-PA participant involved in explaining results to lay audiences and a participant from the S-CPh group whose research is funded by a charity foundation and who collaborates with physicians and gives lectures to patients and their families reacted in comparable ways. They were unaware that these activities can be considered valorisation, for example by the research council. Also, when confronted with the official task descriptions, they remarked these were things that they had been doing for a long time.

In addition to participants who were unaware they were actively valorizing their research, there were also participants who questioned whether the activities mentioned by other participants were true examples of valorisation. Please note that all the participants were invited based on their having experience that fit the task descriptions used by government and the intermediaries. The following exchange was a discussion between two participants in the S-CPH group. Their descriptions of valorisation differed. The first participant initially considered valorisation include only activities aimed at applying research findings. The second participant used a broader description. Although the first participant seemed willing to revise his idea, he was not immediately convinced.

P1: *'So what do you consider valorisation?'*
P2: *'Valorisation is knowledge transfer. Making knowledge accessible for the world outside science.'*
M: *'The general audience?'*
P1: *'General audience?'*
P2: *'Yes...'*
M: *'It is nice to have the definition...'*
P1: *'Yes, because I never thought about valorisation in that way, to be honest.'*
P2: *'No?'*
P1: *'Telling people.'*
P2: *'Yeah, well, knowledge transfer. What I mean is…*[interrupted by P1]
P1: *'Whether or not they use it?'*

A participant in the S-SSH group questioned whether the examples given by two fellow participants could be considered valorisation. One of the examples was about work in collaboration with pharmaceutical companies and patient organizations; the other example concerned a consortium involving a number of public and private organizations. Notably, the consortium was funded by the research council and explicitly aimed at solving societal problems. *'I question whether this is valorisation. If you are doing commissioned work, isn't impact inherent to the research then? Someone is waiting for it, so in that case it isn't a problem at all, is it? Valorisation is effortless in that case.'*

The discussions concerning the task description of valorisation show that there is no widely shared description and that the participants were unaware of the task descriptions provided by government and the intermediaries. To resolve this situation, the participants in each of the focus groups expressed a need for examples. The lack of a widely shared task description has made it difficult for them to recognize their own and others' valorisation and achievements. Participants linked this to the topic of appreciation, as we will see in the next section.

2.5.2 Appreciation

The second topic that came up in all the focus groups was how to appreciate valorisation. We have chosen the term 'appreciation' rather than evaluation or assessment because it does more justice to the motivation of participants to engage in valorisation. Some felt a moral obligation to give something in return for tax payers' money, while others felt a need to fascinate, educate or help society, even if their efforts went unrewarded. The following narrative from the S-SSH group is illustrative for the motivation of scientists.

P1: *'Yes, it* [publishing a popular science book] *is like charity work. Like many tasks other than research and teaching. I'm also on the board of a foundation which awards a prize for the best translation from* [a specific European] *language. Translations create more exposure for* [that European culture and its language].'
M: *'What drives you do to those things?'*
P1: *'I am like a missionary. …There is a third task, being a knowledge broker.'*
M: *'Who else considers themselves a missionary or advocate? It may sound a bit theatrical. Many of you say it in one way or another.'* [many nodding heads and vocal agreements]

However, internal motivation is not sufficient to stimulate valorisation. Gaining recognition based on valorisation is perceived as problematic. Those who are evaluated face the challenge of presenting a convincing strategy without knowing what is expected of them, while those who evaluate face the challenge of assessing strategies they feel unequipped to assess. The following experience of a participant in the S-PA group illustrates the difficulties of evaluating valorisation strategies in research proposals. It also shows that the Dutch struggle is not restricted to the borders of the country, but also challenges foreign scientists involved in peer reviews.

'I also see that…paragraph in research proposals as a member of [a review committee of the Dutch research council] *and then we get a mathematical proposal with the most abstract mathematics imaginable and then suddenly there is…what should he fill in?! He can't say "I'm collaborating with a company" because I know for sure he won't be and he certainly shouldn't. So he says something like "I'm going to lecture to high school students." Yes, ok. In this case the committee will say "We accept it". And the international reviewer has no idea what we mean by it* [knowledge utilization], *absolutely no idea. They say "This is irrelevant". They won't fill it in.'*

Whereas the current policies of government and the intermediaries do not attribute different values to different types of valorisation, the quote above reveals the perception of an implicit hierarchy in valorisation activities. Collaboration with companies is perceived as more important than other activities. A participant from the JI-CPh group warned about this hierarchy:

'We have to make sure that there are no first-rank and second-rank third mission activities. So that…at least there is the perception…first rank of course is with industry, cash, patents, you name it. And second rank, well if that is not possible…then you can go for the pulpit, then we go fascinate high school students [sarcastic tone]. *Whereas if you acknowledge both are very valuable, perhaps of equal value…'*

Along with the difficulties inherent in evaluating valorisation in its own right, participants

experience a tension in the appreciation for scientific excellence and valorisation. The general perception is that valorisation is considered an extra at best. Scientific excellence is what reputations are predominantly based upon in evaluation settings, as an S-SSH participant explained. The quote shows that societal impact is ignored, although it is an explicit criterion in research assessments and job performance appraisals.

'We are dealing with the same issue. There is a tension. For the Dutch research council valorisation is important, but often the members of assessment committees are older hotshots. So, there is a generation gap. What I saw is this: the groups that are not involved in valorisation score very high. For all groups there is the heading "relevance", under which a number of researchers are given the score "reasonable", although their contribution to valorisation in some cases is very small. For other groups with high valorisation performance the scientific relevance is assessed lower. Another point: It should be an issue in job performance appraisals, but in practice this criterion does not play a serious role. However, it should be an issue in every job performance appraisal'

This implicit hierarchy also has questionable effects on the selection of researchers, according to the participants. They share the opinion that academic researchers are selected through incentives that stimulate scientific excellence, while they feel that additional skills relating to valorisation are required for a full professor, such as networking and acquiring funds from societal actors. Currently, they believe that these skills cannot be developed because they are not rewarded and indeed are even neglected in evaluation procedures. The following narrative originates from the JI-PA group and illustrates this view:

P1: *'I feel committees* [within the Dutch research council] *take a broad view of CVs, and also look at other activities* [i.e. other than scientific activities].'
P2: *'Only secondary I would say.'*
P1: *'Only secondary…ok…'*
P3: *'Let's look at the H-index… ok!'* [sarcastic tone]
P4: *… I just think you can train future professors much better and more efficiently by taking into account what they will have to do in the end in each step in their career.'*
P1: *'Are you saying it* [valorisation] *is not rewarded?'*
P4: *'Yes.'*
M: *'Or stimulated, because that is what you actually provide, an answer to* [P5's] *contribution, who does not see how you can develop the skills required to be a full professor within the university.'*
P4: *'Look, valorisation is just an extra skill that we expect of full professors. So how do you make them develop the skills that valorisation requires? In part by stimulating them to do so in their career. It should be included in reward systems.'*

Summarizing, the participants observe difficulties in how valorisation is appreciated. Because there is no clear task description, it is hard to prepare or perform evaluations and assessments. There is also a perception of implicit hierarchies. Scientific excellence is believed to have a higher status than valorisation and commercial valorisation is believed to have a higher status than other forms. Participants share the opinion that the lack of a reward for valorisation makes

it less likely to contribute to a scientific career. Many participants believed that improving the situation would require field-specific valorisation indicators. In the next section we will look more closely at the position of valorisation in the organization of scientific work.

2.5.3 Organization

The final topic that emerged was the division of labour concerning valorisation. It included issues such as additional workload and whether or not all individual scientists should be involved in valorisation.

Valorisation was perceived as an extra task, in addition to research, education and administrative work. Scientists and support staff members were aware of this issue. Adding extra working hours does not appear to be a viable strategy for coping with the additional task. Concerns were expressed in several of the focus groups:

'And the second, the second question is "Will there be enough time for teaching if we all start a third mission, in the sense of collaborating with companies and lecturing the public?"'- S-PA participant

And:

P1: *'Just like saying "You can clock hours for this* [valorisation]" *and then, perhaps, if there can't be additional costs, it will be at the expense of education, which nowadays takes up fewer hours because of developments in...'*
P2: *'Yeah, that's a good point, isn't it? How do you...education versus research versus the third mission. In terms of hours, there has to be a measure for that.'* – S-CPH participants

Also:

'It does not even fit into a 38-hour a week contract, what we ask of our employees. So if you want the opportunity to take a step back and interact with society then the world will say "That's a nice thing to do in your spare time!" All fine and well, but in that scenario you are asking people to constantly chase their own tails.' – JI-PA participant

However, nearly all the participants referred to valorisation as the third task of universities, suggesting that it should be done. Nevertheless, they acknowledge some researchers are better equipped to perform these activities than others. For those who are poorly equipped, valorisation is described as problematic. Nevertheless, these scientists still play a role in valorisation, as participants in the S-SSH group discussed:

P1 [explains a group visualization]: *'We would like to spare the goose that lays the golden eggs. We all know people, brilliant individuals in their field, who you should not bully about valorisation. You should not cause them sleepless nights. I'm dramatizing a bit.'*
M: *'Yet the goose is within the network.'*
P1: *'Yeah, with a certain degree of immunity.'*

M and P2: *'And the network has someone else who explains things on primetime television on behalf of the goose?'*
PI: *'That is the same differentiation issue that* [P3, presenter of another subgroup] *brought up.'*

Group members shared some specific examples of task division, although this is uncommon. In the S-PA group, one participant explained he is employed in an 'innovation track'. His job appraisals are based not on scientific achievement but on innovation achievement. A participant in the JI-CPh is employed in a dual track: *'Back then,* [a certain full professor] *supervised me during my PhD and he asked me to return for a job, which is part-time research and part-time outreach employee.'*

What these two examples have in common is that previous success creates the freedom to take the less conventional route. The previous achievements of the S-PA participant resulted in substantial royalties for the university. The JI-CPh participant's dual track was enabled by a prestigious national grant awarded to his full professor. Still, the question is what the effects of such constructs will be on the careers of these researchers in the long term, since scientific quality still dominates in most selection procedures.

It should also be noted that this division of labour was not to everyone's liking. One participant suggested a valorisation dean who can assign valorisation duties, just like educational duties, and apportion time over the three tasks. Others referred to their university's policy documents or to the research assessment protocol. These approaches were questioned by others:

P1: *'You are saying that one of the questions...for everyone employed by a university...do you really think so?'*
P2: *'That is what we are being told, this is the new core task. The evaluation protocol says in so many words "What are you doing about valorisation?" Education, research, valorisation.'* – S-PA

In short, participants believed that valorisation is a new and additional task, demanding extra time and skills. It is not clear how valorisation should be organized in relation to the other tasks of universities and in relation to personal strengths and preferences. These uncertainties have led to many questions concerning the way valorisation is organized, such as: How can valorisation be integrated on a practical level, alongside education and research? How should research groups be organized if valorisation becomes a goal? How can a change of culture be achieved in which valorisation (and teaching) is as important as research? Nevertheless, there seem to be modes for appointing specific valorisation researchers.

2.6 Conclusion and discussion

The aim of this paper is to help us understand the effects on scientists of government's increasing demand for science to have societal impact by tapping into their realm of thought. To this end, we have studied the introduction of impact policies by government and policy documents by intermediaries resulting from negotiations with government. We have also collected data on the responses of scientists and support staff members involved in the quest for impact. Our expectation was that if intermediaries successfully create a buffer between government and research, scientists will be able to cope with the policies that emphasize societal impact.

Looking at those policies, our impression is that of consensus between government and the intermediaries. This confirms the path dependency of 'mediating through' or consensus as a strategy in Dutch science policy (Van der Meulen 1998.) The first indication is that the intermediaries execute the agreements with government to include societal impact in their policies, and the second is that the task descriptions used by the intermediaries are largely similar to the description of government. Government and intermediaries all state that impact includes not only commercial activities but also activities aimed at public organizations or the general public. The research council even includes other research fields as potential beneficiaries and provides an opt-out for basic research. Impact criteria are included in funding procedures, research assessments and human resource management, and university job profiles include impact responsibilities.

In the focus groups, a picture emerged of a confused academic community. It is realized an additional formal task is introduced and academics are trying to fulfil this task or position their usual activities in terms of this task. The downside of the institutionalization is that symbiotic activities are artificially drawn apart, which results in confusion. Participants articulated the need for a clear task description. They quite often did not recognize either their own or their peers' activities as societal impact, even though these activities could be categorized as such according to the different policies. It requires little imagination to see that this will result in contra-productivity when societal impact is assessed in proposals submitted within socially relevant research programmes. Moreover, participants indicated that they had been involved in these types of activities for a long time, but never realized that they could be labelled as societal impact. In evaluation procedures, it was unclear to them how impact should be presented and assessed. There was the perception that scientific excellence is more important than impact and that commercial impacts are more important than other impacts. The organization of societal impact activities also puzzled the participants. Who should be involved? Where should the necessary time come from? How should the appropriate skills be developed?

Remarkably, the task descriptions used by government and the intermediaries are in line with the descriptions formulated by the participants of the focus groups. The response to policies seems like a paradox. Coming back to our research question, we have found little evidence of coping mechanisms, unlike De Boer (2003) and Morris and Rip (2006). In fact, we found overwhelming evidence of a struggle (Hessels 2010). Nevertheless our participants succeeded in fulfilling the impact task in accordance with the policies but without being aware of it. We believe that this cannot be considered as (symbolically) complying with policy, because the perception of the policies does not reflect the actual content of the policies. We have also found no evidence of organized negotiation between the agents and the intermediaries or government.

In addition to compliance, coping and negotiation, there seems to be another option: apathy. This is a response rooted in the conviction that behaviour theoretically should have an effect, whereas no effect is expected in practice. Tummers (2012) has described this as 'policy alienation'. Policy alienation is common among professionals and is defined as *'the general cognitive state of mind of a psychological disconnection with policy'* (Tummers 2012 p. 14). In our focus groups, we encountered multiple expressions of policy alienation. Participants seem to have

lost faith in university managers and government and intermediary policy-makers, and they read policy documents with scepticism.

Our findings have two implications for the application of principal-agent theory to the relationship between government and scientists. First, one has to be careful about assuming that scientists are familiar with the policies of government and the intermediaries. This supports Morris' (2003) conclusion that principal-agent theory provides a limited view of scientific practice because it fails to capture the agent's perception of the relationship. Second, we find that the agent's reactions to policies are more diverse than previously suggested in principal-agent theory. The relationship between government and science has been conceptualized as a game in which both rationally seek strategies to stabilize the situation (Van der Meulen 1998). We question whether apathy or policy alienation can be considered a rational strategy on the part of the agent. If agents do not understand the rules of the game, or even refuse to take notice of the rules of the game, it is difficult to maintain that they are using a strategy or are even playing a game.

This study has certain limitations. One is that our selection of participants is biased: to evoke experience-based discussions, we deliberately included only participants who were experienced in targeting societal impact. This means that we must be careful about generalizing our findings. A different picture could have emerged if we had studied those not experienced in societal impact or even those opposed to it. We can hypothesize two situations: 1) such scientists will find themselves in an even bigger struggle since they are faced with an increasing demand for something they are not doing, or 2) they will be able to develop coping strategies by focusing on academic excellence, since they are not internally motivated to be involved in societal impact activities,.

Also, our study is exploratory and concerns a limited number of focus groups. We are able to get an impression of important issues in the scientific community as a whole (Morgan 1996.) However, six focus groups does not allow us to compare between types of research fields nor between academic ranks. Stemerding and Nahuis'(2014) study within biotechnology suggests there are indeed disciplinary differences, even between sub fields. Further explorations per type of research field or academic rank and comparisons between them could be a direction for future research.

Furthermore, focus groups don't allow for analysis on the individual level. Nevertheless, our data suggests three responses to valorisation policies, that are not mutually exclusive: 1) the realization the policies entail activities that have been part of daily work for a long time, 2) the fear for tensions with academic excellence and 3) neglecting policies. In depth interviews could provide further insight of responses on the level of the individual academic (Morgan 1996).

Our study has an important implication for science policy too. From the principal-agent perspective, we learn that if scientists are puzzled by the intentions of government's policy, task fulfilment is problematic. After the negotiations between government and the intermediaries, the time has come for both to invest in their relationship with scientists concerning impact policies. On a positive note, the picture that emerges from our focus groups is of a community

that in general is very motivated to have an impact on society. We recommend engaging with them as soon as possible to improve the results of impact policies.

We have two further recommendations that require a joint effort by science policy-makers, science policy scholars and the academic community as a whole. First, during the focus groups participants indicated knowledge needs. Each of the focus groups expressed a need for examples of societal impact in order to get an idea of the meaning and to find inspiration. Approaches such as SIAMPI (Spaapen and Van Drooge 2011; Molas-Gallart &Tang 2011 and De Jong et al. 2014) have proven to be useful in providing examples and process insights. Although we had invited participants so that *we* could tap into their experiences and thoughts, many thanked us for the new insights *they* had gained during the focus groups. They planned to discuss societal impact with their colleagues and include it in research strategies. Indeed, focus groups are known for their empowering value (Morgan, 1996). The learning process concerning impact appears to benefit from a social setting and we recommend that debates should be organized, for example by the staff members of research councils or university departments. Science policy scholars are essential in translating policy into practice. Again, in our experience, there are generally scientists who like to be involved in organizing debates. In fact, they are needed to adapt the debate to the needs of a specific research community.

Second, participants expressed a need for impact indicators. It cannot be stressed enough that these should be research-context-specific indicators. Some participants suggested that scientists should be involved in developing these indicators. Indeed, this seems a fruitful approach, as we have discussed elsewhere (De Jong et al. 2011). However, before developing new indicators, policy-makers and science policy scholars should discuss the value of existing indicators with scientists, as they appear to be unaware of them.

Our final recommendation concerns our own peer community. The focus groups put forward a diverse range of questions related to the organization of societal impact. We believe these are important questions for the field of science policy studies and we know that there is already a huge body of knowledge available. Like the content of impact policies, we found that participants are also unaware of the knowledge developed in our field. We should realize that other scientists are among our most important stakeholders and work on improving our impact on them.

Acknowledgements

The authors would like to thank the participants of the focus groups for their time and openness. Paul Wouters, Laurens Hessels, Barend van der Meulen and participants of track 7b of the 2014 EU-SPRI conference are thanked for their valuable comments on earlier versions of this paper.

References

Barbour, R.S. (2005). 'Making sense of focus groups'. In: *Medical education* 39, pp. 742-750.

Barker, K. (2007). 'The UK Research Assessment Exercise: the evolution of a national research evaluation system'. *In: Research Evaluation* 16, no. 1, pp. 3-12.

Boer, H. de (2003). *Institutionele verandering en professionele autonomie: een empirisch-verklarende studie naar de doorwerking van de wet 'Modernisering Universitaire Bestuursorganisatie.* Enschede: University of Twente.

Braun, D. & D.H. Guston. (2003). 'Principal -agent theory and research policy: an introduction'. In: *Science and Public Policy* 30, no. 5, pp. 302-308.

Bush, V. (1945). *Science – The Endless Frontier*. Reissued in 1960. Arlington, VA: National Science Foundation.

Caswill, C. (2003). 'Principals, agents and contracts'. In: *Science and Public Policy* 30, no. 5, pp. 337-346.

Dance, A. (2013). 'Pack a punch'. In: *Nature* 502, pp. 397-398.

D'Este, P., P. Tang, S. Mahdi, A. Neely & Sánchez-Barrioluengo. (2013). The pursuit of academic excellence and business engagement: is it irreconcilable? In: *Scientometrics* 95, pp. 481-502.

Donovan, C. & L. Butler. (2007). 'Testing novel quantitative indicators of research 'quality', esteem and 'user engagement': an economics pilot study'. In: *Research Evaluation* 16, no. 4, pp. 231-242.

Eindhoven University of Technology. (2012). *Voorstel voor prestatieafspraak*. Eindhoven: Technische Universiteit Eindhoven.

ERiC.(2010). *Evaluating the societal relevance of academic research: A guide*. Den Haag: Rathenau Instituut.

Fernandez-Carro, R. (2007). 'A principal-agent model of public research with a retrospective payoff rule'. In: *Science and Public Policy* 34, no. 5, pp. 317-328.

Guston, D.H.. (1996). 'Principal-agent theory and the structure of science policy'. In: *Science and Public Policy* 23, no. 4, pp. 229-240.

Guston, D. H. (2000). *Between Politics and Science: Assuring the Integrity and Productivity of Research*. Cambridge, UK: Cambridge University Press.

Hessels, L. K., H. van Lente & R.E.H.M. Smits. (2009). 'In search of relevance: the changing contract between science and society'. In: *Science and Public Policy* 36, no.5, pp. 387-401.

Hessels, L.K. (2010). *Science and the Struggle for Relevance*. Utrecht, Utrecht University.

Jensen, P., J.B. Rouquier, P. Kreimer & Y. Croissant. (2008). 'Scientists who engage with society perform better academically'. *In: Science and Public Policy* 35, no.7, pp 527-541.

Jong, S.P.L. de, P. van Arensbergen, F. Daemen, B. van der Meulen & P. van den Besselaar. (2011). 'Evaluation of research in context: an approach and two cases'. In: *Research Evaluation* 20, no. 1, pp. 61-72.

Jong, S.P.L. de, K. Barker, D. Cox, T. Sveinsdottir & P. van den Besselaar. (2014). 'Understanding societal impact through studying productive interactions: ICT research as a case'. In: *Research evaluation* 23, no. 2, pp. 89-102.

Kidd, P. & M. Parshall. (2000). 'Getting the focus and the group: Enhancing analytical rigor in focus group research'. In: *Qualitative Health Research* 10, pp. 293-308.

Kitzinger, J. (1995). 'Introducing focus groups'. In: *British Medical Journal* 311, pp. 299-302.

KNAW. (2010). *Kwaliteitsbeoordeling in de ontwerpende en construerende wetenschappen. Een systematisch kader*. Amsterdam: Koninklijke Nederlandse Academie van Wetenschappen.

KNAW. (2011). *Kwaliteitsindicatoren voor onderzoek in de geesteswetenschappen*. Amsterdam: Koninklijke Nederlandse Academie van Wetenschappen.

KNAW. (2013). *Naar een raamwerk voor de kwaliteitsbeoordeling van sociaalwetenschappelijk onderzoek*. Amsterdam: Koninklijke Nederlandse Academie van Wetenschappen.

Lam, A. (2011). 'What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'?'. In: *Research Policy* 40, pp. 1354-1368.
Leiden University. (2012). *Reactie Universiteit Leiden op strategische agenda OCW*. Leiden: Universiteit Leiden.
Leisyte, L. (2007). *University governance and academic research: case studies of research units in Dutch and English universities*. Enschede: University of Twente.
Meagher, L., C. Lyall & S. Nutley. (2008). 'Flows of knowledge, expertise and influence: a method for assessing policy and practice impacts from social science research'. In: *Research Evaluation* 17, no. 3, pp. 163-173.
Meulen, B. van der (1998). 'Science policies as principal–agent games: Institutionalization and path dependency in the relation between government and science'. In: *Research Policy* 27, no. 4, pp. 397-414.
Meulen, B. van der (2003). 'New roles and strategies of a research council: Intermediation of the principal-agent relationship'. In: *Science and Public Policy* 30, no.5, pp. 323-336.
Ministry of Education, Culture and Science. (2004). *Focus op excellentie en meer waarde: Wetenschapsbudget 2004*. Den Haag.
Ministry of Education, Culture and Science. (2005). *Valorisatie van onderzoek als taak van de universiteiten*. Den Haag.
Morris, N. (2002). 'The Developing Role of Departments'. In: *Research Policy* 31, no. 5, pp. 817-833.
Morris, N. (2003). 'Academic researchers as 'agents' of science policy'. In: *Science and Public Policy* 30 (5), pp. 359-370.
Morris, N. (2004). *Scientists responding to research policy: A multi-level analysis of the situation of life-scientists in the UK*. Enschede: University of Twente.
Morris N. & A. Rip. (2006). 'Scientists' coping strategies in an evolving research system: the case of life scientists in the UK'. In: *Science and Public Policy* 33, no. 4, pp 253-263.
Molas-Gallart, J. & P. Tang. (2011). 'Tracing 'productive interactions' to identify social impacts: an example from the social sciences'. In: *Research Evaluation* 20, no. 3, pp. 219-226.
Morgan, D.L. (1988). *Focus groups as qualitative research*. Newbury Park, CA: Sage.
Morgan, D.L. (1996). 'Focus Groups'. In: *Annual Review of Sociology* 22, pp. 129-152.
Nederland Ondernemend Innovatieland. (2008). *Valorisatieagenda: kennis moet circuleren*. Den Haag: Inderdepartmentale Programmadirectie Kennis en Innovatie.
Nederland Ondernemend Innovatieland. (2009). *Van voornemens naar voorsprong: kennis moet circuleren*. Den Haag: Inderdepartmentale Programmadirectie Kennis en Innovatie.
NWO. (2013). *Handreiking kennisbenutting vernieuwingsimpuls 2014*. Den Haag: NWO.
Olmos-Penuela, J., J. Molas-Gallart & E. Castro-Martinez. (2013). 'Informal collaboration between social sciences and humanities researchers and non-academic partners'. In: *Science and Public Policy* 41, no. 4, pp. 493-506.
Shove, E. (2003). 'Principals, agents and research programmes'. In: *Science and Public Policy* 30, no. 5, pp. 371-381.
Sim, J. (1998). 'Collecting and analyzing qualitative data: issues raised by the focus group'. In: *Journal of Advanced Nursing* 28, no. 2, pp. 345-352.
Sim J. & J. Snell. (1996). 'Focus groups in physiotherapy evaluation and research'. In: *Physiotherapy* 82, pp. 189-198.

Spaapen, J. & L. van Drooge. (2011). 'Introducing 'productive interactions' in social impact assessment'. In: *Research Evaluation* 20, no. 3, pp. 211-218.

Stemerding, D. & Nahuis, R. 2014. Implicit and explicit notions of valorisation in genomics research. *New Genetics and Society* 33 (1): 79-95.

Stewart, D.W. & P.N. Shamdasani. (1990). *Focus groups: theory and practice.* Newbury Park, California: Sage.

Tummers, L. (2012). *Policy alienation. Analyzing the experiences of public professionals with new policies.* Rotterdam: Erasmus Universiteit Rotterdam.

VSNU. (Undated). *Een raamwerk valorisatie-indicatoren.* Den Haag: VSNU.

VNSU, KNAW & NWO. (2009). *Standard Evaluation Protocol 2009-2015.* https://www.knaw.nl/nl/actueel/publicaties/standard-evaluation-protocol-sep-2009-2015

VNSU, KNAW & NWO. (2014). *Standard Evaluation Protocol 2015-2021.* http://www.vsnu.nl/files/documenten/Nieuwsberichten/SEP_2015-2021.pdf

Wardenaar, T., S.P.L. de Jong & L.K. Hessels. (2014). 'Varieties of research coordination: a comparative analysis of two strategic research consortia'. In: *Science and Public Policy* 41, no. 6, pp. 780-792.

Webb, B. (2002). 'Using focus groups as a research method: a personal experience'. In: *Journal of Nursing Management* 10, pp 27-35.

Whitley, R. (2000). *The intellectual and social organization of the sciences.* 2nd edition. Oxford: Oxford University Press.

Zeller, R.A. (1993). 'Combining qualitative and quantitative techniques to develop culturally sensitive measures'. In: D. Ostrow, and R. Kessler (eds.). *Methodological issues in AIDS behavioral research*, pp. 95-116. New York, NY: Plenum.