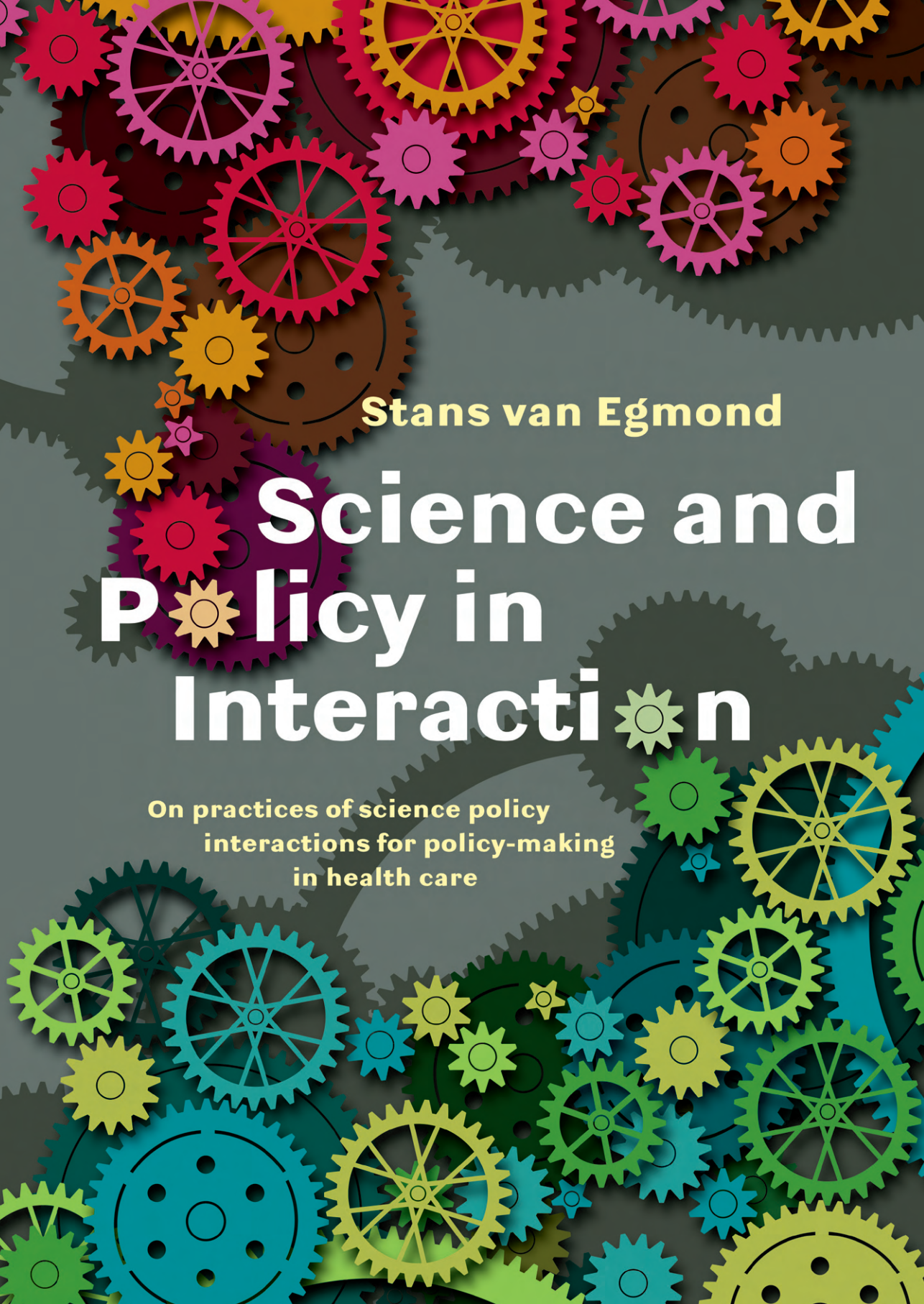

Stans van Egmond
Science and Policy in Interaction
On practices of science policy interactions for policy-making in health care

Stans van Egmond

Science and Policy in Interaction

On practices of science policy interactions for policy-making in health care

Funding

The research projects on which this thesis is based were financially supported by the Netherlands Organisation for Scientific Research (NOW) for the research program 'Modeling the Future. Rethinking boundary work for economic policy making: the CPB care' (dossiernummer 410-42-020), and by the RIVM.

Design & layout: Rob Westendorp (WSTNDRP), Amsterdam
Print: Optima Grafische Communicatie, Rotterdam

Science and Policy in Interaction

On practices of science policy interactions for policy-making in health care

Wetenschap en beleid in interactie

Over praktijken van wetenschap- en beleidsinteracties in gezondheidszorgbeleid

Proefschrift

ter verkrijging van de graad van doctor aan de Erasmus Universiteit Rotterdam op gezag van de rector magnificus Prof.dr. H.G. Schmidt en volgens het besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op donderdag 9 december 2010 om 9.30 uur

door

Constance van Egmond

geboren te Assen

Promotiecommissie

Promotor:
Prof.dr R.A. Bal

Overige leden:
Prof.dr K. Putters
Prof.dr. T.E.D. van der Grinten
Prof.dr R. Hoppe

Table of Contents

CHAPTER ONE **Science and Policy in Interaction** 7

Introduction 8

Science in policy-making 9

Science and policy interactions as boundary work 14

Research thesis 18

Structure of the thesis 20

CHAPTER TWO **Exploring the Future of Health Care: how science advisors struggle with the policy boundary in Dutch public health policy** 31

Introduction 32

Health in the Netherlands: from public health to health care 38

The Future of Public Health: forecasting the public health status of the Dutch 41

The CPB – modeling the economy of health care 51

Comparing science / policy interactions: different levels at work 59

CHAPTER THREE **Boundary Configurations in Science-Policy: modeling practices in health care** 67

Introduction 68

Boundary work in science-policy practices 69

Emerging boundary configurations in modeling practices for policy making 73

Boundary configurations in modeling for health policy making 81

CHAPTER FOUR **Connecting Evidence and Policy: Bringing researchers and policy makers together for effective evidence-based health policy** 89

Introduction 90

Research synthesis as a scientific problem 91

The VTV: from phonebook to succesful informer of policy 94

Coming to useful facts: acting on tensions in the interaction with policy makers 96

EBHP as a dynamic interactive process 101

CHAPTER FIVE **Modelling for Policy: science-based models as performative boundary objects in Dutch policy-making** 107

Introduction 108

Scientific models as boundary objects 109

Connecting social worlds through models – care and LARCH as boundary objects 115

Models as performative boundary objects 122

Conclusion 126

CHAPTER SIX **Analysing Policy Change: the performative role of economics in the constitution of a new policy programme in Dutch health care** 133

Introduction 134

Towards affordable health care: competing policy programs for conflicting stakes 135

Explaining policy change in health care 137

Investigating the role of science in policy change 138

Performativity of economics 140

From a health care sector to a health care market 141

Discussion and conclusion 149

CHAPTER SEVEN **Conclusion** 155

Introduction 156

Science and policy interactions as forms of boundary work 157

Performativity of science 160

Acting on stage and backstage 162

Dealing with the reality of science and policy interactions in health care 165

Concluding remarks 166

Summary 169

Samenvatting 175

Dankwoord 181

About the author 184

CHAPTER ONE
Science and Policy in Interaction

Introduction

The reactions of experts and politicians to the outburst of the Icelandic volcano Eyjafjallajökull in the spring of 2010 exposed the close ties between policy measures and scientific knowledge. The volcanic eruption and the resulting uncertainty about the safety of flying through the ash cloud posed huge problems for (European) aviation. In a first reaction to expert opinions, the European Aviation Safety Agency (EASA) closed the airspace above Europe for more than five days, as the volcanic ash drifted slowly over Europe. However, as the economic and social consequences of the closed airspace became increasingly apparent, the expert opinion of the EASA was openly disputed both by aviation companies and politicians from several member states. The KLM, the Royal Dutch Airlines, concluded that "the airspace situation is different throughout Europe and local solutions are needed"[1] after aircraft were sent out for 'problem-free' test flights.

As political attention was directed to the economic and social consequences of the closed airspace, the problem eventually boiled down to the issue of how to come to workable solutions that satisfy both experts and policy makers; a solution that guaranteed the safety of flying while leaving enough 'space' necessary for air traffic. The London-based Volcanic Ash Advisory Centre (VAAC) met these demands by coming up with six-hour predictions of the ash cloud in high, middle and low cloud. These local predictions provided a workable solution between safety and economic mobility and settled albeit temporarily the controversy between scientists, policymakers and air-carriers over the volcanic ash problem. The controversy not only laid bare a crisis of governance in the EU, as it took political leaders five to six days to come into action, but also made visible that workable solutions for such an economic, social and safety problem is found in a concertation of both science and policy. This concertation takes place in a complex and dynamic reality and is difficult to orchestrate.

In times of crisis, such as in the case of the volcanic ash cloud, the role of science in policy-making processes becomes more apparent than in 'normal', less controversial times. There is, however, hardly a policy area imaginable where science is not involved – even though that role, in general, stays hidden from the public at large. In the Netherlands, policy programmes such as the financial reform in the health care sector or those that support health promotion rely upon scientific knowledge. In less controversial times as well, on the smaller scale of policy programmes and single policy measures, policy makers do not act without

[1] KLM CEO Peter Hartman at http://nos.nl/artikel/151324-klm-voert-testvlucht-uit.html; and, Van Nieuwstadt, Michiel. Ad Hoc Asnormen. In NRC Handelsblad 29 mei 2010: 13.

the involvement of scientists. Scientific input is needed to answer policy questions such as: How can we keep citizens healthy and safe, how can we safeguard affordable health care among ageing Dutch citizens, and how can we maintain good quality of health care while increasing the efficiency of health care practices?

The growing need for scientific knowledge brings along tension between the need for more evidence-based policy, and the fear of a technocratic and uncritical or uncontrollable role of science in policy-making. This paradox of scientific authority, as Bijker, Bal and Hendriks (2009) put it beautifully – needing knowledge for policy-making processes versus a critical attitude towards using science in policy-making – emphasises the importance of questioning the role of science in policy-making: How can we understand this role? What are the consequences of close interaction between science and policy? And, if we want to improve the effectiveness of scientific evidence in policy, how can we achieve this? This thesis addresses these questions, taking health care and economic thinking on health care as its focus of investigation.

Science in policy-making

From criticism of technocracy to evidence-based policy

Science in policy-making is embodied in many shapes and forms, from the individual expert who provides short-term expertise to big science advisory institutions that deliver assessments and reports on a regular basis. Science advisory institutions are but one means of offering scientific input to policy-making. In the Netherlands many institutes provide input in the form of expert opinions, reports and models, and occupy various positions in the policy field. Some offer science advice on demand, while others voluntarily (without being asked) contribute their advice to government. Science advisory bodies in their turn use different forms of scientific knowledge to come to their advice. For example, many disciplines are involved in the health care sector, including medicine, epidemiology, sociology, economics, as well as policy science.[2] Many of these advisory institutes integrate and assess existing scientific findings from

[2] Well known examples of science advisory bodies in the health care sector are the National Institute for Public Health and the Environment (RIVM), the Netherlands Institute for Health Services Research (NIVEL), the Council for Public Health and Health Care (RVZ), the Scientific Council for Government Policy (WRR), the Social and Cultural Planning Agency (SCP), the Health Council (GR). The Netherlands Institute for Economic Policy Analysis (CPB), as well as universities, also provide input about health care.

other places. They can be characterised as boundary organisations wherein the scientific and the political meet in one way or another, and where translation of the scientific and the political takes place.

Many institutes have a longstanding relation with their affiliated policy fields and a long history of providing science advice on policy issues. The science advisory field saw a huge rise after World War II, in an era where science was looked upon as the rational solution to political problems, building on "the Enlightenment idea of rationality of scientific knowledge as the way towards the solution of all social and personal problems" (Hoppe, 2002:7). Peter Weingart (1999:275) described the involvement of science advisory institutions in policy-making as "a dialectical process of the scientification of politics or policy and the politicisation of science". In short, in the technocratic approach, the problem with science advice is presented as a struggle between two rationales, the scientific rationale of the objective and the political or policy rationale of the normative. They should be kept separate or at least traceable in discussions between science advisors and politicians or policy makers.

The longstanding involvement of science advisory bodies in policy-making has led to criticism of the role of science as a technocratic power, in that science has (far too) much influence and power over formal democratic decision-makers (Fischer and Forester, 1993; Hilgartner, 2000). Bader and Van den Berg (1993) have, for example, criticised the technocratic role of Dutch science advisory institutes for constituting a democratic deficit. This deficit originates from the presentation of scientific findings as a 'black box' that leaves implicit theoretical and normative presumptions, as well as the empirical uncertainties in research findings and prognoses. It has been suggested that science for policy should be more explicit and open about the assumptions and limitations of research. Others such as Halffman (2003) and Maasen and Weingart (2005) have also argued for a democratic approach in regulatory science for policy.

This criticism of the technocratic role of science in policy-making and the call for a more democratic approach is a consequence of both a rationalist take on the involvement of science in policy-making (Weingart, 1999) and the complex technical nature of contemporary policies (Jasanoff, 1990). For Jasanoff (1990), the technocratic reproach results from the sheltered position of science advisory bodies in the policy-making landscape, and hence the unfamiliarity with the role of such science advisory bodies. Indeed many science advisory bodies operate cautiously and with discretion in their field, and are anxious about attracting unwanted attention to their way of working and their recommendations. As Jasanoff argues, "given the prominent role in policy-making, the activities of scientific advisors are poorly documented and their impact on policy decisions

is difficult to understand or evaluate" (1990:1). The problem is thus not whether these institutes contribute to a politics of technocracy or to a politicisation of science. The key issue is that the role these science advisory bodies play as translators of science for policy-making is relatively unknown and therefore hard to understand. Recent work on science and policy-making has taken up this call for further investigation of the role of science advisory bodies.[3] This thesis is part of this work.

Towards evidence-based policy

The debate on the role of science in policy was given a new dimension recently in the public health field, which has expressed a wish for greater involvement of scientific knowledge in policy-making. Delays and a lack of (or too much) government action on international and national incidents regarding citizen's health, such as the BSE epidemic in (UK) cattle, the threat of a pandemic outbreak of the swine flu in the autumn of 2009 and the Q fever outbreak[4] in the south of the Netherlands, have led to criticism of the neglect or misuse of scientific evidence in policy in order (not) to take action.[5] Structural problems in public health, such as the obesity trend in children and high incidence of alcohol abuse in the baby boom generation,[6] also demand more knowledge of what can work to solve these issues.

Moreover, as evidenced-based medicine has become the gold standard for public health in many industrialised countries, the call for evidence-based health policy has been picked up by many public health scholars and is brought back to the policy makers, in line with the new public management standards for more accountability in government policy:

---

3 Dutch examples are the work of Bijker, Bal and Hendriks on the Dutch Health Council, well presented in their book The Paradox of Scientific Authority (2009), the work of Annick De Vries (2008) on how uncertainty is dealt with in the work of the CPB, the work of Esther Turnhout, and the other projects that were part of the Rethinking project. These exceptions seem to confirm the rule that there are still not many empirical descriptions or analysis of the workings of science advisory bodies

4 Another example is the HPV vaccination programme introduced in 2009. The government and RIVM were criticised for being too forward with a vaccination programme that had been tested for only six years.

5 This also incorporates the critical blasting of individual scientists by journalists, as for example happened in an interview with virologist Ab Osterhaus in an interview in Vrij Nederland on June 2010 (Martijn, M., and Vanheste, T. 2010. "Ik geloof heilig in wat ik doe". Vrij Nederland June 19th).

6 In Volkskrant, September 10th 2010. Meer alcoholproblemen onder babyboomers.

> If doctors are expected to base their decisions on the findings of research surely politicians should do the same, (...) the case for evidence-based policymaking is difficult to refute (Ham, Hunter and Robinson, 1995)

The general lack of evidence-based intervention is shown by many public health professionals at many levels in the public health field. It ranges from a need for proven local interventions at the individual level for Municipal Health Services (GGD'en) and local government to evidence about the effects of nation-wide programmes focused on health promotion at the collective level (Black, 2007; Lomas, 2003; Puska, 2007; WHO, 2009).

In the public health field this call for evidence-informed or evidence-based policy (EBP) has brought up the question of how to increase the use of existing evidence in health policy-making. The use and uptake of evidence in health policy-making is, however, not easy, and critical supporters of EBP agree that research has as yet had little direct influence on health services and governance policies (Black, 2001; Hunter, 2003; Lomas et al, 2003; Reijmerink and Hulshof, 1997). In 2008, for example, the Dutch Health Council concluded, in an advice to the government, that there is enough health services research but that improvement and sustainability of the *use* of results is needed.[7] But also international organisations such as the World Health Organisation call for a better evidence base in policy (WHO, 2009).

Bridging the gap

Scholars in the public health field have sought input from concepts developed in knowledge utilisation studies (KU). KU scholars investigate science-policy interactions as a form of science advice to politics (e.g. Gibbons, 1994; Lindblom and Cohen 1979; Weiss, 1991) and have accordingly focused on the question how this relationship should be organised and why. Problems encountered on the research policy interface are often interpreted as a lack of understanding between the social worlds involved and as a lack of infrastructural support to get research findings to the policy-maker's desk (e.g. Hutchinson and Estabrooks, 2009; Lomas, 2003; Smee, 2006; Straus, Tetroe and Graham, 2009). Consequently, much effort is put into developing strategies to bring research and

---

[7] See: Health Council. 2008. Http://Www.Gezondheidsraad.Nl/Nl/Adviezen/Gezond-Zorgonderzoek-De-Toekomst-Van-Het-Gezondheidszorgonderzoek-Nederland; and Raad voor de Gezondheidszorg (Health Council). Gezond Zorgonderzoek. De Toekomst Van Het Gezondheidszorgonderzoek in Nederland. Den Haag: Gezondheidsraad.

policy together and bridge the gap between science and policy. New frameworks have been developed for infrastructural support for science-policy interaction, to support changes in attitudes of both researchers and policy makers, and in the conduct of more research (Bekker et al, 2010; Hunter, 2009; Nutley et al., 2010). The Lomas framework[8] for linkage and exchange of research evidence (Lomas, 2000; Lomas et al, 2003) is an often used source of inspiration for other scholars, as it provides an elaborate and detailed model to enhance the translation of research findings into politics.

Maria Jansen (2007) has pointed to the under-theorised character of the public health field in thinking about science-policy relations. Indeed, many KU concepts used in the public health field do not question the standard model of science production. This standard model makes a Popperian distinction between the context of discovery – the realm which produces scientific knowledge – and the context of justification – the realm which proves the usefulness and impact of scientific evidence in relation to political or societal problems (Boon and De Vries, 1989; De Vries, 1995). In this tradition, science and policy are separate realms with divergent objectives that should be kept apart. KU scholars argue that policy should be given a more influential role in the context of justification; that is, in the realm where science enters the 'real' world and is judged on its merits in relation to policy problems. Yet, policy makers are kept from the context of discovery, where scientific knowledge is produced. Consequently, such understanding of science-policy interactions, while focusing on their mutual interdependence, reifies instead of overcoming the boundaries between them. The public health field has arrived at the point where such conceptualisation of the science-policy boundary has become insufficient, as scholars such as Hunter (2009), Horstman (2010), Lin and Gibson (2003), and Nutley et al. (2010) have argued. Likewise, there is a need for new understanding of the policy process and the role of research, as well as new conceptualisation of the science-policy relation.

8 The aim of the Lomas framework for linkage and exchange is to closely connect science and policy in an early stage of research and bring together three domains involved in the production of useful evidence; institutional and formal structures for decision making, informal structures of stakeholders and coalitions, and information production structures including interaction between research and media. It does so with the help of a checklist of questions that raise awareness among policy makers, stakeholders and scientists in order to bring the relevant parties together and keep them together through all stages of research (Lomas, 2000; Lomas et al, 2003).

Science and policy interactions as boundary work

In policy science (PS) and science, technology and society (STS) studies, recent work on the relationship between science and policy-making offers new insights into science-policy relations. Recent work focuses on the boundary work performed in interactions between science and policy makers (see for instance Bijker, Bal and Hendriks, 2009; Halffman, 2003; Hoppe, 2010; Huitema, and Turnhout, 2009; Jasanoff, 1990, and 2005; and others). Both PS and STS scholars have gradually moved from classifying science and policy relations towards analysing science and policy practices as forms of boundary work. This interpretation of science-policy relations enables researchers to move away from earlier more rigid conceptions of science and politics as two essentially different fields of human endeavour.

STS studies have long focused on science and how science comes about: that is, it concentrated on such questions as how scientific facts are created, how scientific knowledge becomes authoritative and how scientists distinguish science from non-science, that is, perform 'boundary work'. Such studies have brought the insight that the production of scientific knowledge is a human endeavour, that it takes place within a certain debate or discourse (or a repertoire or regime) and that science therefore creates its own truths and untruths, instead of simply representing an 'objective' and 'natural' state of things (Collins, 1985; Foucault, 1980; Latour 1987; Woolgar, 1988). Science is itself a culture that can be studied (Law, 1986). These studies go a step further in showing how science is intertwined with society and how they are often co-produced: knowledge and the societal contexts in which it is produced cannot be seen as separate entities but are intertwined at many levels. Such studies provide space for the social, cultural and political implications of science and policy interactions.

These insights are embodied in the notion of boundary work, which relates to the cultural construction of what science is and what it is not. As the American sociologist Gieryn neatly points out, the quest for the answer to what is science has moved gradually from "essentialist studies of demarcation" (what is science, and what not), "to constructivist studies of boundary work" (how science is defined in action by attributing characteristics that segregate it from non-science) (Gieryn 1995: 407). Constructivist studies of boundary work seek "explanations for things at the top of that discipline's agenda: uneven distribution of authority, power, control, and material sources" (Gieryn 1995: 441). The way scientists mark their scientific paths gives insight into how scientific discourses are constructed, and how science gains its authority.

Gieryn's discursive approach has been extended by others who show that boundaries are constructed through discursive, material and social arrangements

(Bal 1999; Bijker, Bal, and Hendriks, 2009; Halffman, 2003; Hoppe, 2010). In Halffman's definition, based on work by Shapin and Schaffer (1985), boundary work "structures the division of labour between experts and policy makers" (2003: 417). It does this by demarcation: that is, protecting science from unwanted participants and interference with the help of prescriptions for proper behaviour by participants and non-participants; and by coordination: that is, defining proper interaction between these practices to make such interaction possible and conceivable. Halffman locates such practices of boundary work in both language (discourse) and matter: it can be found in texts (like protocols or specific formulations of tasks), objects (models or machinery) and in people (experts) (2003:58). Scientific facts are the result of both science-policy interactions and of social and material elements involved in this interaction. Yet, Halffman (2003) emphasises that STS studies tend to focus on the science side of the interactions, under analysing what happens the interactions with policy makers.[9]

The notion of boundary work is extended by PS scholars whose studies show science and policy interactions create bridges between different epistemic cultures in the form of 'interlocking networks of knowledge and power' or 'discourse coalitions' and in which the interdependencies between many parties play an important role, as well as the role of culture (Hajer and Wagenaar, 2003; Hoppe, 2010; Wittrock, 1990). The focus lies in solving questions on how to legitimise decision-making democratically, under conditions of uncertain knowledge, and within changing political systems (e.g. Fischer, Miller and Sidney, 2007; Hajer and Wagenaar, 2003; Jasanoff, 2005; Stone et al, 1998; Stone, 2007), such as in the formulation of social problems, the (public) perception of policy problems, and the (scientific) instruments used to tackle those problems (Maasen and Weingart, 2005; Yanow and Schwartz-Shea, 2006).

In the study of science and policy relations attention has thus shifted from classifying science-policy relations to empirically describing and explaining what happens in science and policy interactions, how these interactions are organised and what consequences they have on the way the world is perceived, by scientists, policy makers and others. This thesis parts from this take on investigating science and policy relations.

---

9 Halffman (2003) argues that STS scholars either under analyse the boundary work that takes place, or portray these negotiations as trivial, and overall miss out on the role of political theory in conceptualising the interaction between science and policy. This last point, however important, does not belong to the scope of my research.

Studying models as material locations of science and policy interactions

One place to study practices of science and policy interaction is in the construction of models. Models play an increasingly important role as scientific tools for policy-making, in scientific advice and in the constitution of policy facts (see e.g. Edwards, 1999; Jasanoff, 1990; Morrison and Den Butter; 2003; Yearley, et al, 2003; Zeiss, 2004).[10] Studies on the use of models – such as in STS studies and in the philosophy of science– show how models are both the result of scientific and professional interaction (van Daalen, Dresen, and Janssen, 2002; Edwards, 1999; Evans, 2000; Morgan and Morrison, 1999; Shackley & Wynne, 1995). That is why models occupy not only a unique place in the study of many scientific phenomena (Morgan and Morrison, 1999), but also offer unique places to study the interaction between science and policy.

The focus of much STS and philosophy of science research on models is on climate models. This research illustrates how climate policy and climate research are co-produced through the use of models, and how this makes drawing the distinction between the 'science' and the 'policy' difficult. Paul Edwards (1999) argues, for example, on the basis of his study of General Circulation models[11] that the conceptual distinction between models and data is misleading and hence requires another conception of the nature of scientific work. The same is argues by Morgan and Morrison (1999) and Sismondo and Gissis (1999). Others have stressed how models encourage negotiations between model makers and policy makers, for example on uncertainty (Shackley and Wynne, 1995), as a democratic tool amongst various groups people (Yearley 1999), in interdisciplinary projects (Galison, 1999), and in macro economic policy (Evans, 2000). Critical comments argue that the increased use of sophisticated scientific models affects the authority of science, and tends to exclude scientific practices that do not build upon sophisticated models (e.g. Shackley and Wynne, 1995; Yearley, et al, 2003; Zeiss, 2004).

Models bring together political worlds and scientific worlds, and offer good places for boundary work between science and policy. In bringing together social worlds, a new kind of scientific knowledge is created, scientific facts that are 'packaged for policy processes' (e.g. Edwards, 1999; Jasanoff, 1990; Zeiss, 2004). In this, models are seen not just as passive instruments, that "have to be put to

---

10 Most of the literature concentrates on models that aid policy-making; in Jasanoff's (1990) terms the literature concentrates on models in 'regulatory science'. However, there are also models that aid compliance with policy; Ragna Zeiss calls this 'regulated science' in her PhD dissertation (Zeiss, 2004).

11 General Circulation Models are key components of global climate models that serve as input for global climate policy (Edwards, 1999).

work, used or manipulated" (Morgan and Morrison, 1999: 32)[12] by both scientists and policy makers in order to gain effect but as active constituents of the social worlds in which they function. STS scholars emphasised the role of materiality in constituting scientific facts (Collins, 1985; Foucault, 1980; Halffman, 2003; Latour 1987; Latour 1993; Woolgar, 1988), as in contemporary society scientists build upon already existing networks, theories, and software. Models thus have a materiality that determines and limits the choices and actions and the knowledge that is produced through these models.

Performativity of economic thinking

In recent years the attention of STS studies has shifted towards economic thinking and how we can understand the role of economic science in society. This shift follows the rise of neo classical economic policy in governance strategies in many EU countries, for example, the introduction of a market-based policy programme in Dutch health care in 2006. This shift in economic thinking in health care has tempted many Dutch scholars to critically investigate the origins of market-based policies and its consequences for health care and health policy (Helderman et al, 2005; Trappenburg, 2005; Grit, and Dolfsma, 2002).

Social studies of economic markets have captured science not only as a mode of investigation and classification of social phenomena, but also as an actor that *actively* brings these phenomena to life, through this investigation and classification. Understood this way, scientific knowledge is an 'actor' able to bring things into, or out of, action by its own being, an idea referred to as the 'performativity' of science. These studies recognise performativity of scientific knowledge in, for example, economic models, and in their role in creating markets. Such 'material embeddedness' of economic science in societal institutions – such as macro-economic models – provides essential elements in constituting new ways of economic thinking (Barry and Slater, 2002; Callon, 1998; MacKenzie and Millo, 2003; Zuiderent-Jerak, 2009). In this perspective economic 'laws' are not naturally given events that can be studied and described by economists in an economic theory but are instead actively constructed by economists and economic science.

The historical account by MacKenzie (2007) is a good example of the role of the Nobel-prize winning Black-Scholes-Merton (BSM) model in the transformation of the derivatives market at the Chicago Board Options Exchange in the 1970s and

[12] Sismondo (1999) also argues that models and simulations can be regarded as tools and representations (as objects and ideas) and that they cross otherwise well-established boundaries as between theory and experiment.

1980s. Up until the 1970s, options prices[13] were generated by immensely complex mathematics that proved little better in predicting prices than calculations based on rules of thumb. Although other models were developed to capture this complex mathematics, the BSM model became the leader, not only because it overcame some of the complexities of earlier option theories used to generate the option prices, it also made it attractive to programme computers with this model to produce these prices and deliver more accurate price lists. On the computer the model worked faster too. This case illustrates how economic theory provides the tools to institute elements for particular markets, by building upon already existing social and material relations. The BSM model is performative because it transforms the actions on the exchange market floor into the parameters of the model.

In this example economic science is an important constitutor of an exchange market. Not only is the model performative in the actions on the exchange market floor: what it changes becomes embedded in institutions and economic theory (Callon, 1998). Hence the representation of reality is also changed. The notion of performativity of science captures economic theory as a kind of independent materiality that enacts specific notions of a market by its own account. Not merely the interactions between economists, the state and other agencies – mobilisers of human actions – are also important in shaping the economy. The mobilisation of economic theory and the kind of mobilisation are important too. This new take on the role of economic science offers a framework for looking closer at the social, political and cultural implications of the involvement of economic science in policy-making, for example in the introduction of the new market-based policy programme in Dutch health care.

Research thesis

The general focus of this thesis lies in investigating practices of science and policy interactions as forms of boundary work with a focus on economic thinking in health care. From this, the following research questions emerged:

How are practices of science and policy interactions organised?
What are the social, cultural and political consequences of this organisation?
And what is the role of materiality in these interactions?

13 These are called Black-Scholes prices (Mackenzie, 2007).

These questions form the main focus of this thesis. During the case studies these questions have been specified to investigate and better understand what happens in the specific practices of science policy interactions investigated in this thesis, and are addressed in separate chapters. In chapter two and three I investigate questions about the organisation of science policy interaction processes in relation to the science advisory bodies introduced in the case studies:

— How can we understand the way science advisory organisations mediate in the health field? And how can these differences and similarities between these institutes be understood as practices of boundary work?
— What practices of boundary work characterise the modeling practices of the scientists and policy makers involved in the construction of the care model for the Dutch health care sector? And to what consequences?

Chapter four investigates the construction of policy messages for public health policy from a theatrical perspective on science and policy relations and focuses in the following question:

— How is the relation between science and policy organised in order to come to useful information for public health policy? And how can this relation to be understood as a re-conceptualisation of science policy interactions as an interactive and reflexive practice?

Chapters five and six investigate the concepts of performativity and materiality in relation to science and policy interactions, and start from the following questions:

— What is the performative nature of computer models as boundary objects? And how do these models shape and change the social worlds they coordinate?
— How do material manifestations of science-policy interactions – such as policy tools or models – come about as a result of science policy interactions concerning Dutch health care? How do such material devices shape and configure policy change?

The case studies

The chapters of this thesis deal with different issues of science and policy interaction. Each chapter discusses the specific issues that derived inductively from four empirical cases and addresses the questions posed above. The first study captures the construction of an econometric model for the health care sector (ramingsmodel gezondheidszorg, further: care model) developed by a multi-

disciplinary team of science advisors from three leading Dutch science advisory institutes. The second study focused on the construction of Public Health Status and Forecasting (Volksgezondheid Toekomst Verkenning, further VTV) reports developed by the Centre for Public Health Status and Forecasting (CVTV), located at the National Institute for Public Health and the Environment (RIVM). The third study closely examined the role of health economics, as a separate discipline, in developing health measures, specifically the role and structure of the Dutch risk adjustment fund for the health care sector. The fourth study investigates the construction of the LARCH model, which was developed in the early 1990's at the department of Quality Landscape Ecology at the State Institute for Nature Management (RIN). This study was carried out and analysed by Ragna Zeiss. The cases studies are examples of 'normal' science and policy interaction. Although the people involved in these cases did run into quarrels and disputes, the cases were not controversial as such or hot topics of political debate. As examples of 'normal' science and policy interaction, they offered the opportunity to investigate 'normal' interactions to gain insight into daily science-policy practices.

For each case study a reconstruction was made of the development of the models.[14] Given that a large part of these practices took place a number of years ago we used in depth semi-structured interviews and complemented this with a document analysis. The case study of the care model, covering the period 1994-1999, included 23 semi-structured interviews with key actors, and a document analysis. The VTV case study, covering the period 1995-2006, included 30 open interviews with key actors in public health, and archive research. For study of the risk adjustment model that covered the periods 1995 and 2005, seven extra interviews were held. The LARCH case study, carried out by Ragna Zeiss, covered the period 1990-2006, and involved interviews held with 21 actors and a document analysis. The data collection took place between February 2004 and September 2007.

Structure of the thesis

The following chapters of this thesis address the issues mentioned in this introduction (Chapter 1) and draw from the empirical cases listed above. The second

[14] In order to insure the anonymity of the interviewees, all interview material is coded; a list of interviewees is obtainable with the authors. The interviews include members of the project groups from the respective science advisory bodies, and policy makers from the departments of the affiliated Ministries as well as members of scientific committees, and employees from other organisations. Some of the actors were interviewed more than once. A full account in Dutch for the VTV case study can be found in (Van Egmond et al, 2006)

chapter presents two case studies which provide detailed accounts of science and policy interactions and starts from the typology or boundary arrangements developed by Tennekes. The third and fourth chapters discuss two case studies in depth from the perspective of boundary work. The next two chapters (five and six) take the conceptualisation of the science-policy boundary a step further by addressing the role of models as materialities and the notion of performativity of science. Although tempting, I do not provide definitions of what science and policy are. Instead I discuss what goes on in actual science-policy relations, and how science and policy are given shape in action and finally, in chapter seven I present my conclusions.

CHAPTER TWO **Exploring the Future of Health Care: how science advisors struggle with the policy boundary in Dutch public health policy**

This chapter looks at and compares the different types of boundary work carried out by three science advisory institutes. As starting point, it questions the organisation of science-policy interaction processes. How can we understand the way scientific institutions mediate in the health field? What do these institutions do to sustain their own positions in this field? How can we understand the differences and similarities between these?

For a better understanding of these questions, two examples of science and policy interaction – the macroeconomic care model constructed by an interdisciplinary project team, and the construction of policy messages in VTV reports – are compared with regard to the interactions between the science advisory bodies and care policy makers. I discuss the differences in institutional location in both case studies and how this is reflected in the organisational set up of the science advisory institutes with the policy makers. This has the effect of bringing into focus the various roles played by the science advisory institutes, in that the CVTV producing these reports seems to fulfil an advocacy role in the public health sector, while the CPB fulfils a more technocratic role in the economic advisory field. However, I argue that characterising single institutions according to one model is superficial. Instead, the case studies show that different science-policy interactions are at work, at different moments in the advisory processes, and at different places in the organisational structure. Instead, it is helpful to distinguish between the on stage *image* of the role of these science-based organisations in the policy-making process, and the backstage *ways* of performing their role as science advisory institute for policy-making in constituting and maintaining credibility and authority (see also, Bal, Bijker, and Hendriks, 2002; Hilgartner,

2000). On stage and backstage cannot be seen as separate entities; they are two sides of the same coin, strategies to maintain their current positions.

CHAPTER THREE **Boundary Configurations in Science-Policy: modelling practices in health care**

This chapter discusses a boundary configuration in the making. It starts from the following research questions: which practices of boundary work characterise the modelling practices of the scientists and policy makers involved in this interdisciplinary project? How does that affect the shaping of model parameters?

Based on a case study of the care model project I investigated the interactions and negotiations that the economic experts and public policy makers in the project employed in order to come to a workable model. Through a detailed account of these interactions and negotiations I discuss how science advisory bodies are entangled with some of the policy actors they advise in what I call *boundary configurations.* These strongly situated interconnections between science advisory institutes and policy institutions share a specific approach to problem definitions and methods and that are embedded in (and at the same time embed) social, discursive, and material elements. Boundary configurations build upon existing relationships that preceded the interdisciplinary project, shape the kind of science, and relatedly, the kind of social and political theories about health care. Over the course of the project, these interconnections became stronger and began to have consequences for the inclusion of other experts. In this chapter, I show how the model was not as successful as hoped for at the start of the project but that it did succeed in other ways. It provided one participating institute with a new tool for assessing economic policy measures for the care sector. As such the model extended the work of this institute to the care sector, and filled in a space that was not yet claimed by other science advisory institutes. In this chapter I also illustrate how the process of model construction forged new liaisons between the CPB and the Ministry of Health, thus enforcing the boundary configuration between economists at the ministry and the experts at the economic science advisory institute.

CHAPTER FOUR **Connecting Evidence and Policy: bringing researchers and policy makers together for effective evidence-based health policy**

This chapter investigates an attempt to create a tool for evidence-based public health; successful in terms of the undisputed information it provides. It starts from the following questions: How is the relation between science and policy

organized? And how can this interaction be understood as a re-conceptualisation of science policy interactions?

Regarding the growing need for evidence-based policy in the health care sector, few tools actually contribute to the use of research findings and health information in health policy. The VTV reports have grown into authoritative resources of information that are used as input for policies relating to health promotion. The question is how to understand this. Moving beyond current theories about knowledge utilisation often employed in public health, I offer a reconceptualisation of science and policy interactions as interactive and reflexive processes wherein science and policy are not taken as separate worlds but are seen as two ends of a continuum. I discuss the role of materiality in these interactive processes. This study of the processes of the VTV reports over a ten-year period suggests that the success of the reports in informing policy depends largely on the institutional infrastructure that has been created over the years. This infrastructure supports and manages in many ways and on many levels both formal and informal contacts between scientists and policy makers. I argue that this infrastructure takes into account the fact that science and policy interactions are multidimensional and thus have to take place in both formal and informal settings. Dividing science-policy practice between on stage representations and backstage action offers space for reflexive interactions between scientists and policy makers. It also offers an effective way out of the current trend towards a stricter separation of the scientific and the politic in the light of the accountability trends.

CHAPTER FIVE **Modelling for Policy: science-based models as performative boundary objects in Dutch policy-making**

This chapter discusses the role of models for policy by drawing on and exploring the tensions between the notions of boundary objects offered by Star and Griesemer (1989) and performativity (e.g. Callon, 1998). The central questions focus on the performative nature of computer models as boundary objects and how o these models shape and change the social worlds they coordinate?

The concept of boundary object proves useful in gaining a better understanding both of the hybrid character of science-based models and their role in the coordination between different social worlds. However, such a sociological or symbolic interactionist's account of the functions of models in science and policy interactions tends to stick with the assumption that although these worlds need to interact, they remain stable throughout the interaction. Building on the idea of science as a performative tool, the case studies illustrate how models are constituted by negotiations between scientists and policy makers and at the same

time constitute, (re)configure and reform social worlds. I argue that models not only actively coordinate social worlds but also contribute to changing them. The performativity of models ranges from generic (instrumental) to substantial as they influence social worlds to the extent that these worlds start behaving the way models describe.

CHAPTER SIX **Analysing Policy Change: the performative role of economics in the constitution of a new policy programme in Dutch health care**

This chapter extends the notion of performativity by investigating the role of economic science in health policy development. Here I focus on the role of economic science in the creation of material devices – policy tools – used by policy makers and politicians in political decision-making regarding health care reform. The following questions are posed: How do material manifestations of science-policy interactions – such as policy tools or models – come about as a result of science-policy interactions concerning Dutch health care? How do such material devices shape and configure policy change?

Market solutions implemented in previous years for 'better' governance of the public sector have been thoroughly analysed in policy science, and explanations for policy change are often sought in deliberative and discursive practices through methods such as discourse analysis. I put emphasis on *material* manifestations of science-policy interactions and how they shape and configure public policy change. I investigate the role of economic science and economists in the construction of material devices that in turn configure and frame health care as a market. Building on Callon's notion of performativity of economics, and on the basis of case study research, I demonstrate how science-policy interaction co-constructs material devices that frame the health care sector and its actors as parties within a 'regulated competitive' market.

CHAPTER SEVEN **Conclusion**

Here I finish with a general discussion of the practical and theoretical consequences of the conclusions drawn in this thesis for our understanding of science-policy relations in regard to health care. The main conclusions are that scientific advisory organisations employ different strategies to come to effective and authoritative knowledge for policy, contingent strategies of inclusion and strategies for 'staying out but keeping near' or more rationalist strategies of exclusion. Which strategies get are employed depends partly on the institutional context, and partly on the boundary configurations in which these organisations are situated.

Important in practices of science and policy interactions are materialities such as models, as expressions of scientific knowledge. Materialities can be performative in that they shape reality to resemble more the descriptions of that reality in those representations. Moreover, materialities are also political actors.

Moreover, it can be useful to understand the interaction of science and policy and the way it is organised from a theatrical metaphor. Science is *on stage* in presentations of reports and messages to policy makers, for example in the form of reports, white papers and debates in media. The backstage is the realm where the reports and messages are constructed in interaction with policy makers. The presentation on stage is in its turn the outcome of backstage processes, and is at the same time a representation of the role science advice is to play in policy making: objective and distant and non-political, or involved and political as in the case of futurists. With respect to the on stage role of science advice, science advisory bodies that use the contingent strategy of inclusion seem to benefit from opening up backstage processes. Certain openness about backstage processes contributes to its authoritative position in the field. Science advisory bodies that employ the strategy of exclusion and expansion seem to benefit from closed backstage processes with respect to its role in science advice, whereas they benefit from openness about their tools.

References

Bader, V., and H. Van den Berg. 1993. Simulatiemodellen En De Maakbare Toekomst. In *Het Centraal Planbureau in Politieke Zaken*, edited by H. Van den Berg, G. Both and p. Basser, 63-79. Amsterdam: Wetenschappelijk Bureau Groen Links.

Bal, R.. 1999. *Grenzenwerk*. Edited by Mumford reeks. Enschede: Twente University Press.

Barry, A., and D. Slater. 2002. Introduction: The Technological Economy. *Economy and Society* 31 (2): 175-93.

Bekker, M., S. van Egmond, R. Wehrens, K. Putters and R. Bal. 2010. Linking research and policy in Dutch healthcare: infrastructure, innovations and impacts. *Evidence & Policy* 6 (2): 237-254.

Bijker, W., R. Bal, and R. Hendriks. 2009. *The Paradox of Scientific Authority. The Role of Scientific Advice in Democracies*. Cambridge Massachusetts London, England: The MIT Press.

Black, N. 2001. Evidence Based Policy: Proceed with Care. *British Medical Journal* 323: 275-9.

——. 2007. UK Health Services Research Network: At Last, a Health Services Research Organization. *Journal of Health Services Research and Policy* 12(1): s1-2.

Boon, L., and G. De Vries. 1989. *Wetenschapstheorie. De Empirische Wending*. Groningen: Wolters-Noordhoff.

Callon, M. 1998. (eds) *The Laws of the Markets. The Sociological Review*. Oxford: Blackwell Publishers.

Collins, H.M. 1985. *Changing Order: Replication and Induction in Scientific Practice*. London: Sage.

De Vries, A. 2008. Towards Do-Ability. Dealing with Uncertainty in the Science-Policy Interface. Universiteit Twente.

De Vries, G. 1995. *De Ontwikkeling Van Wetenschap. Een Inleiding in De Wetenschapsfilosofie*: Wolters-Noordhoff.

Edwards, P.N. 1999. Global Climate Science, Uncertainty and Politics: Data-Laden Models, Model-Filtered Data. *Science as Culture* 8(4): 437-72.

Evans, R. 2000. Economic Models and Economic Policy: What Economic Forecasters Can Do for Government. *Empirical Models and Policy-Making: Interaction and Institutions*, edited by Frank A.G. Den Butter and Mary S. Morgan. London and New York: Routledge.

Fischer, F., and J. Forester, eds. 1993. *The Argumentative Turn in Policy Analysis and Planning*. Durham / London: Duke University Press.

Fischer, F., G. Miller, and M. Sidney. 2007. (eds) *Handbook of Public Policy Analysis. Theory, Politics and Methods, Public Administration and Public Policy* / 125: CRC Press.

Foucault, M. 1980. *Power / Knowledge: Selected Interviews and Other Writings 1972-77*. New York: Pantheon.

Fujimura, J.H. 1992. Crafting Science: Standardized Packages, Boundary Objects, And 'Translation'. *Science as Practice and Culture*, edited by A. Pickering, 168-211. Chicago, London: IL: The University of Chicago Press.

Gibbons, M. 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: Sage.

Gieryn, T.F. 1995. Boundaries of Science. In: *Handbook of Social Sciences*, edited by S. Jasanoff, G.E. Markle, J.C. Petersen and T. Pinch, 393-443. Thousand Oaks: Sage Publications.

Grit, K., and W. Dolfsma. 2002. The Dynamics of the Dutch Health Care System--A Discourse Analysis. *Review of Social Economy*, 60(3) 377 – 401.

Hajer, M., and H. Wagenaar. 2003. (eds) *Deliberate Policy Analysis: Understanding Governance in the Network Society*. Cambridge: Cambridge University Press.

Halffman, W. 2003. *Boundaries of Regulatory Science, Eco/Toxicology and Aquatic Hazards of Chemicals in the Us, England and the Netherlands, 1970-1995*. Universiteit van Amsterdam, 2003.

Ham, C., D.J. Hunter, and R. Robinson. 1995. Evidence Based Policymaking. *British Medical Journal* 310: 71-2.

Helderman, J-K, Schut, F.T.S, Van der Grinten, T. and Van de Ven, W. 2005. Market-Oriented Health Care Reforms and Policy Learning in the Netherlands. *Journal of Health Policy, Politics and Law* 30: 189-209

Hilgartner, S. 2000. *Science on Stage. Expert Advice as Public Drama*. Stanford: Stanford University Press.

Hoppe, R. 2002. Rethinking the Puzzles of the Science-Policy Nexus: Boundary Traffic, Boundary Work and the Mutual Transgression between Sts and Policy Studies. 1-52. Enschede.

——. 2002. Van Flipperkast Naar Grensverkeer, Veranderende Visies Op De Relatie Tussen Wetenschap En Beleid. Den Haag: Adviesraad voor Wetenschaps- en Technologiebeleid.

Hoppe, R. 2010. Lost in Translation? Boundary work in Making Climate Change Governable. In *From Climate Change to Social Change*, edited by P. P. J. Driessen, P. Leroy and W. Van Vierssen. Utrecht: International Books Utrecht.

Horstman, K. 2010. Dikke Kinderen, uitgebluste werknemers en vreemde virussen Filosofie van de publieke gezondheidszorg in de 21e eeuw. Inaugural speech.

Huitema, D, and E. Turnhout. 2009. Working at the science-policy interface: a discursive analysis of boundary work at the Netherlands Environmental Assessment Agency. *Environmental Politics* 18 (4) 576 - 594.

Hunter, D.J. 2003. Evidence-Based Policy and Practice: Riding for a Fall? *Journal of the Royal Society of Medicine* 96: 194-96.

——. 2009. Relationship between Evidence and Policy: A Case of Evidence-Based Policy or Policy-Based Evidence? *Public Health* 123: 583-86.

Hutchinson, A.M., and C.A. Estabrooks. 2009. Theories and Models of KTA: Cognitive Psychology Theories. In *Knowledge Translation in Health Care: Moving from Evidence to Practice*, edited by S. Straus, J. Tetroe and I. Graham. Mississauga, Ontario: Wiley-Blackwell.

Jansen, Maria W.J. 2007. *Mind the Gap. Collaboration between practice, policy and research in local public health*. Thesis.

Jasanoff, S. 1990. *The Fifth Branch: Science Advisors as Policy Makers*. Cambridge, Mass. London, England: Harvard University Press.

——. 2005. *Designs on Nature: Science and Democracy in Europe and the United States*. Princeton University Press.

Law, J. ed. 1986. *Power, Action and Belief. A New Sociology of Knowledge?, The Sociological Review* London, Boston and Henley: Routledge & Kegan Paul.

Latour, Bruno. 1987. *Science in Action. How to Follow Scientists and Engineers through Society*. Cambridge, Mass: Harvard University Press.

——. 1993. *We Have Never Been Modern*. Cambridge Mass, USA: Harvard University Press.

Lin, V., and B. Gibson (eds). 2003. *Evidence-Based Health Policy: Problems & Possibilities*. Victoria: Oxford University Press.

Lindblom, C.E., and D.K. Cohen. 1979. *Usable Knowledge: Social Science and Social Problem Solving*. New Haven: Yale University Press.

Lomas, J. 2000. A Framework for Linkage and Exchange of Research Evidence. *Health Affairs* 19 (3).

Lomas, J., N. Fulop, D. Gagnon, and P. Allen. 2003. On Being a Good Listener: Setting Priorities for Applied Health Services Research. *The Milbank Quarterly* 81 (3): 363-88.

Maasen, Sabine, and Peter Weingart (eds). 2005. *Democratizarion of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*. Dordrecht: Springer.

MacKenzie, D. 2007. Is Economics Performative? Option Theory and the Construction of Derivates Markets. In *Do Economists Make Markets? On the Performativity of Economics*, edited by D. MacKenzie, F. Muniesa and L. Siu. Princeton and Oxford: Princeton University Press.

MacKenzie, D., and Y. Millo. 2003. Constructing a Market, Performing Theory: The Historical Sociology of a Financial Exchange. *American Journal of Sociology* 109 (1): 107-45.

Martijn, M, and Vanheste, T. 2010. 'Ik geloof heilig in wat ik doe'. Vrij Nederland June 19th

Morgan, M.S., and F.A.G. den Butter (eds). 2000. *Empirical Models and Policy-Making: Interaction and Institutions*. London and New York: Routledge.

Morgan, M.S., and M. Morrison (eds). 1999. *Models as Mediators, Perspectives on Natural and Social Science*. Cambridge: Cambridge University Press.

Nutley, S., S. Morton, T. Jung, and A. Boaz. 2010. Evidence and Policy in Six European Countries: Diverse Approaches and Common Challenges. *Evidence & Policy* 6 (2): 131-44.

Puska, P. 2007. Health in All Policies. *European Journal of Public Health*. 17 (4): 328.

GR (Health Council). 2008. Gezond Zorgonderzoek. De Toekomst Van Het Gezondheidszorgonderzoek in Nederland. Den Haag: Gezondheidsraad.

Reijmerink, W., and J. Hulshof. 1997. Volksgezondheid Toekomst Verkenning 1997. Een Stap Dichter Bij 'Evidence-Based Halth Policy Making'. TSG, *Tijdschrift voor Sociale Geneeskunde* 75 (6): 359-60.

Shackley, S., and B. Wynne. 1995. Global Climate Change: The Mutual Construction of an Emergent Science-Policy Domain. *Science and Public Policy* 22 (4): 218-30.

Shapin, S., and S. Schaffer. 1985. *Leviathan and the Air Pump: Hobbes, Boyle, and the Experimental Life*. Princeton: Princeton University Press.

Sismondo, S., and Gissis, (eds). 1999. *Modeling and Simulation, Science in Context*.

Smee, C. 2006. Improving Policy-Making in a Ministry of Health. *Journal of Health Services Research and Policy* 11 (1): 2-3.

Star, S.L., and J.R. Griesemer. 1989. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19: 387-420.

Stone, D. 2007. Recycle Bins, Garbage Cans or Think Tanks? Three Myths Regarding Policy Analysis Institutes. *Public Administration* 85 (2): 259-78.

Stone, D., A. Denham, and M. Garnett, eds. 1998. *Think Tanks across Nations: A Comparative Approach*. Manchester and New York: Manchester University Press.

Straus, S., J. Tetroe, and I.G., D, (eds). 2009. *Knowledge Translation in Health Care: Moving from Evidence to Practice*: Wiley-Blackwell.

Trappenburg, M. 2005. *Gezondheidszorg En Democratie*. Inaugural Speech, Erasmus MC. Leiderdorp: Demmenie Grafimedia.

Van Daalen, C. E., Dresen, L. & Janssen, M. A. 2002. The roles of computermodels in the environmental policy life cycle. *Environmental Science & Policy*, 5: 221-231

Van Egmond, S., R. Bal, M. Bekker, and T. van der Grinten. 2006. Wetenschap Voor Beleid. Over De Rol Van De Volksgezondheid Toekomst Verkenning in De Beleidsvorming. 1-65. Rotterdam: IBMG / EMC.

Van Niewstadt, M. 2010. Ad Hoc Asnormen. NRC *Handelsblad*, 29 mei.

Weingart, P. 1999. Scientific Expertise and Political Accountability: Paradoxes of Science in Politics. *Science and Public Policy* 26 (3): 151-62.

Weiss, C.H. 1991. Policy Research: Data, Ideas, or Arguments? In *Social Sciences and Modern States*, edited by Peter et al. Wagner, 307-32. Cambridge: Cambridge UP.

WHO. 2009. Improving Children's Health and the Environment: Examples from the Who European Region. Copenhagen.

Wittrock, B. 1991. Social Knowledge and Public Policy: Eight Models of Interaction. In *Social Sciences and Modern States. National Experiences and Theoretical Crossroads*, edited by P. Wagner. Cambridge: Cambridge University Press.

Woolgar, S. (ed). 1988. *Knowledge and Reflexivity*: Sage.

Yanow, D. and P. Schwartz-Shea. 2006. *Interpretation and method. Empirical research methods and the interpretive turn.* London: Scharpe.

Yearley, S., S. Cinderby, J. Forrester, P. Bailey, and P. Rosen. 2003. Participatory Modelling and the Local Governance of the Politics and Uk Air Pollution: A Three-City Case Study. *Environmental Values* 12: 247-62.

Yearley, Steven. 1999. Computer Models and the Public's Understanding of Science. *Social Studies of Science* 29(6): 845-66.

Zeiss, R. 2004. Standardising Materiality. Tracking Co-Constructed Relationships between Quality Standards and Materiality in the English Water Industry. University of York.

Zuiderent-Jerak, T. 2009. Competition in the Wild: Emerging Figurations of Healthcare Markets. *Social Studies of Science* 39 (5): 765-92.

CHAPTER TWO
Exploring the Future of Health Care

How science advisors struggle with the policy boundary in Dutch public health policy

Van Egmond, Stans

Exploring the future of health care: how scientists struggle with the policy boundary

Book chapter in Hoppe and Halffman (eds). Rethinking Political Judgment and Science-Based Expertise (working title), *forthcoming*.

Introduction

The Dutch government has since long played a leading role in public health and health care issues. The past centuries the role of the government has expanded from the regulation of public health issues (focussed on environmental and hygienic aspects, e.g. epidemiology), to the (financial) organisation of the care sector. For these tasks it has relied and built upon the input of scientific advisory bodies and policy assessment institutes in the process of health policy making. Examples are the Netherlands Institute for Public Health and the Environment (RIVM), as well as the Netherlands Institute for Health Services and Research (NIVEL), the Health Council (GR), the Council for Public Health and Health Care (RVZ), the Social and Cultural Planning Office (SCP) and recently the CPB, among others.

Although in the every day processes of public policy making the use of knowledge and expertise of numerous experts and expert organizations has become a routine event, actual processes and interactions between scientists and policy makers often remain rather concealed. Although both the CPB and RIVM are bureaucratically situated within the policy realm, their role in policy making processes has often been described as a technocratic one (Bader et al, 1993; Hoppe, 2002a; Hoppe, 2002b; Pesch, 1999; Van den Berg et al, 1993). This implicates that although formally both institutes work in service of the government as deliverer of 'facts', their influence on day-to-day policy making processes is much stronger than many regard desirable. Some research has shown that behind these more traditional pictures of the organisation of the science policy nexus a much more subtle and refined image of science policy interactions arises in which for instance the fact-value distinction, or even the research – policy distinction looses ground (Fischer, 2003; Jasanoff, 1995; Van den Bogaard, 1999; Weingart, 1999; Latour, 1987).

The importance of expertise in policy making processes, and lack of empirical research on the topic raise questions about how these processes are actually organized. How can we understand the way scientific institutes mediate in the health field? What do these institutes do to sustain their own positions in this field? Moreover, how can we understand the differences and similarities between these institutes? For a better understanding of these questions, this chapter focuses on the interactions between these science-advisory bodies and health care policy makers. We have focused on the construction of Public Health Status reports by the RIVM and the development of an macroeconomic model for the care sector in an interdisciplinary project in which the CPB, the Social and Cultural Planning Office and the RIVM have partaken. The focus of this chapter lies with the role of the CPB.

The first section[15] discusses theoretical perspectives on science policy interactions. The second section gives an overview of the developments of the health care system in the Netherlands, as well a characterisation of the (political) discussions surrounding health care policies. The third section addresses the organisation of the Public Health Status and Forecast Reports (VTV report) of the RIVM. In the fourth section the development of the Care Model is discussed. The last section compares the two cases.

Models on the interaction between science and policy

The relation between science and politics or policy making has been described by many scientists, from public policy scientists (PPS) to sociologists of science to STS-scholars (Hoppe, 2002b; Jasanoff, 1990, and 1995; Weingart, 1999; Latour, 1987). The relationship between science and politics has since WWII shifted from a position in which scientists operated rather autonomous in the political process, to a position in which scientific knowledge and the input of scientists is no longer taken at face value; the relation between science and politics is more often built on negotiated trust or recurring trust-crises (Hoppe, 2002b; Hoppe, and Huijs, 2003). Both the RIVM and the CPB are institutes that mediate between science and policy making; the RIVM has as its main objective to deliver scientific facts to policy makers in the field of health care, whereas the CPB assesses policy proposals with the help of science-based mathematical models. As such both institutes fit rational models of science-policy interactions; especially bureaucratic models or technocratic models. However, the relation between science and policy is more ambiguous than these rational models suggest. This proves even more true in the public health policy field, that is characterized by its hybrid management structure in which contradicting values from both the professions as well as the government are interwoven, and struggle for power prevail (Van der Grinten, and Helderman, 2005; Helderman et al, 2005).

Models that presume primacy: for science or for policy

After WWII in many Western countries models of science policy interaction were developed based on notions of rational behaviour of organisations; the decisionist or bureaucratic model based on ideas of Weber, and the technocratic model

15 This chapter benefitted tremendously from comments by Dean Niewsma, Rob Hoppe, and Stuart Blume. Previous versions have been presented at the 4S conference in Vancouver in October 2006, at the NOB conference in November 2006, and at the WTMC graduate school in March 2007.

of the relation between politics and scientific knowledge. Although both models assume a distinction between objective knowledge and subjective values, between the factual and the normative, these models are often depicted as opposites in regard to the primacy of policy makers over scientists and scientific knowledge and vice versa. Both also differ in the roles assigned to science and politics, as either diverging or converging with each other. The technocratic model, based on ideas of Bacon, attracted much more attention in continental Europe, while the US depended more on bureaucratic decisionist Weberian models. The technocratic model was, however, believed to lead to an increasing 'scientification' of politics, whereas the bureaucratic model leads to an 'politicisation of science'.

Other rational models are the enlightenment model and the engineering model. The enlightenment model emphasizes the divergence of policy and science, with a leading role for science. In this model scientists deliver value-free facts while politicians deal with normative considerations and decision making. This model depicts a rather naïve or romantic notion of the role of science in society. Scientists are portrayed as independent but ingenious experts who discover and develop new knowledge, and help progress our knowledge of the world for the benefit of society, independently of wishes and interference of policy makers and politicians (Hoppe, 2002b; Hoppe, and Huijs, 2003). Moreover, scientific knowledge is thought to slowly trickle down to society through newspapers, and popular scientific journals and TV programs, to be picked up by politicians. The engineering model depicts the exact opposite. It depicts, as is described by Hoppe, the relationship between scientists and policy makers as politicians on top and scientists on tap; science or knowledge is mobilized by the recruitment of knowledge producers to answer knowledge demands articulated by politicians and policy makers or administrative management (Hoppe, 2002b). Scientists are staged as engineers, who, with little initiative and creativity, merely apply existing scientific knowledge for the production of local solutions to local problems. These engineers remain external to government structures, in contrast to the scientists in the bureaucratic model.

These four models have been criticized by many social and policy scientists for the oversimplified depiction of the relations between science and policy, and the over-exaggeration of the influence of science on political decision making (see e.g. Fischer, 2003; Lindblom, 1979; Woodhouse, and Nieusma, 1997; Weingart, 1999). According to Weingart these rational models "not only render[s] problematic the legitimacy of irrational decisions, but also reduce[s] the range of options to an objectively determined singular best decision" (1999:154). It thus limits the explanatory ability of these models in policy fields that are more hybrid in nature such as the healthcare sector. For such hybrid policy fields only second-best solutions are available (Arrow, 1963). Collingridge and Reeve (1986) point to four

problems that are encountered with the use of scientific results as the basis for political judgement and policy making; (1) the high costs and (2) the length of time involved with gathering scientific data, (3) the irrelevancy of the findings for acute policy problems, (4) and the co-ordination of all relevant scientific data for the policy questions. These problems led them to argue that "the role of scientific research and analysis is therefore not the heroic one of providing truths by which policy may be guided, but the ironic one of preventing policy being formulated around some rival technical conclusions" (1986:151).

Others have criticized the assumption that science delivers value-free-facts while the normative decisions are left to politicians; an assumption that has been proven a myth (Jasanoff, 1995; Latour, 1987; Weingart, 1999). Nonetheless this assumption is still widely accepted by followers of the traditional models, scientists as well as policy makers. According to Weingart there is an "obvious connection between a positivist concept of science and a decisionist model of scientific advice" (1999:152-155). This implies however, that policy scientists as well as other scientists who play a role in the policy making process and political decision processes tend to hold on to this model, because it secures their authority and the role of science in the political realm. This has proven so for the institutes analysed in this chapter. Moreover, scientists themselves are in fact active actors in sustaining an active role in policy making, as Jasanoff has shown (Jasanoff, 1990). The political neutrality and disinterestedness of scientists cannot be upheld anymore, and exemplifies a 'politicization of science' paralleling the 'scientification of politics' (Weingart, 1999; Hoppe, 2002b). However, these models are still in effect if only to legitimise existing science-policy relations.

Models that presume dialogue

These critiques have led to a generation of more incremental models that grant the scientific community more influence on the public perception of policy problems, and that presuppose a dialogue between scientists and policy makers or politicians on the formulation of social problems as well as on the (scientific) instruments to tackle those problems. The four models that are distinguished differ in their interpretation of politics as an arena in which different stakes are fought over (the advocacy model and the dispositional model), or as an agora in which these stakes are discussed (the policy learning model and the policy coping model). Advocacy models depict the political process as a non-violent struggle in which each interest mobilizes its own science-based expertise. Scientists and policy analysts are like lawyers, and their business is advocacy analysis. The dispositional model holds the notion of a discourse-structuration

and interaction conceptualization of knowledge use. The discourse coalitions identified in this model work as bridges between different epistemic cultures creating 'interlocking networks of knowledge and power' or 'discourse coalitions' (Wittrock, 1990:333; Hajer, and Wagenaar, 2003; Hoppe, 2002b), between politics and scientific disciplines.

Policy learning and policy coping models regard the aims and workings of science and policy making as roughly analogous. The policy making process in these models is viewed upon as a process in which the interdependencies between many parties play an important role, as well as negotiating, cooperating and coordinating with many different parties involved. Moreover, policy oriented models hold the presumption that there is an equal status between scientists and policy makers. The policy process functions as a sort of research process in which policy measures are regarded as sets of hypotheses, and policy making as a form of social experiment. However, policy oriented models are more relevant for situations in which a certain amount of (political or scientific) agreement is reached on the nature and solution of the problem; in other words they work only for problems that have been tamed, not for complex and untamed problems. See figure 1 for a clearer overview of the characteristics of the six models. We have used the typology of boundary arrangements depicted by Tennekes (2005).

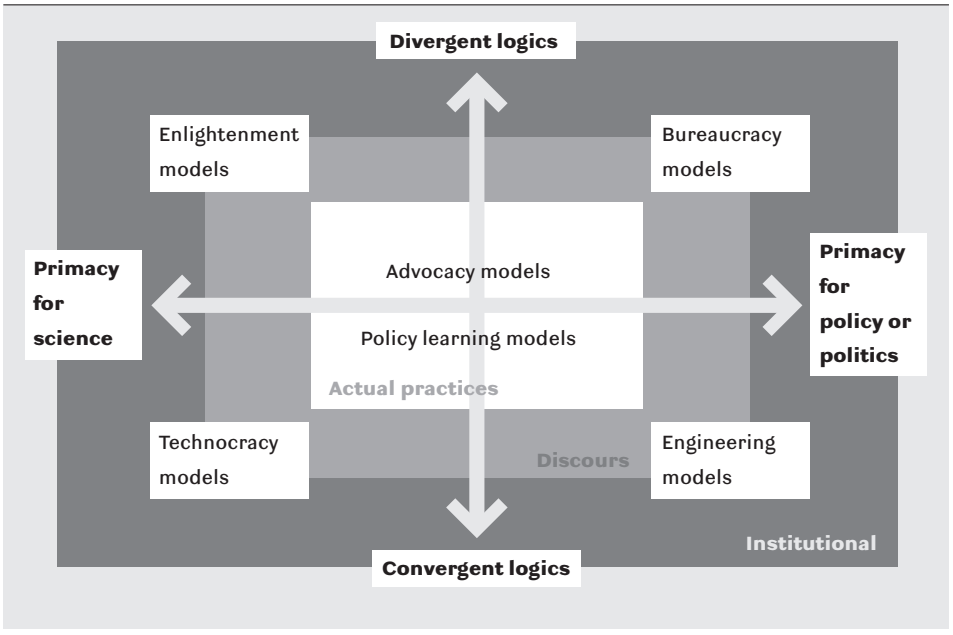
Science / policy models: performative power on different levels

These models have performative power on different levels. The bureaucratic and technocratic models are often presented as wished-for organisations of science-policy interactions, so that at the discourse level these models may stay mere condensed theoretical or wished-for representations. However, discursive notions can also influence the organisational shape of the science-policy interactions. Both the CPB and RIVM are originally typical bureaucratic organisations of the science-policy boundary; embedded in the organisational structure of the government with a sharp focus on policy problems. The case studies conducted in this chapter reveal, at closer looks, that the above-mentioned models seem to dissolve on the level of actual practices, thus leaving room for new insights into the relation between science and policy making.

Science-based expert organisations are faced with difficult and multiple roles; they are mediators between scientific knowledge and policy processes; they have to be close to politics without being too close; they have to depoliticize policy problems without doing away with the normative choices associated with them; and importantly, they have to sustain their authoritative positions and credibility in order to perform these roles (Bal et al., 2002; Hilgartner, 2000; Weiss, 1991).

However, both institutes have similar and different ways in which they perform these roles and sustain their positions. We find these differences and similarities on three levels (see figure 1). The first the level of discourse: how are the relations between science and policy discussed and talked about in the political and public realm? The second level of analysis is the institutional organisation of the institutes in the policy field. It addresses questions as how advisory practices and trajectories are arranged in organisational structures and its consequences. The third level is an analysis of the advisory trajectory at the level of actual practices. This section focuses on the way scientists and policy makers interact with each other in the day to day policy making and science advice and the tools used for

Figure 1 **Typology of science / policy interactions, model characteristics (Tennekes, 2005).**



this. In the analysis of these science / policy interactions a few key dimensions have been incorporated: how these institutes deal with value issues, how they deal with (sharp) disagreement and conflict between different types of knowledge, and how uncertainty issues are being dealt with.

An insight into these dimensions offers an understanding of how scientific institutes mediate in the public health field, and how institutes sustain their own

positions in this field. What seeps through when having such a closer look is the notion that the role of the RIVM and the CPB and the organisation of the science-policy nexus can be defined differently at different levels that at the same time contradict and reinforce each other and can be captured at three levels; at the level of the boundary discourse, at the level of the organisational boundaries, and at the level of advisory practices. These are three aspects that are not mutually exclusive, but complement each other in understanding science-policy boundaries. At the same time, the three levels represent both the front stage image of the role of these science-based organisations in the policy making process, and back stage ways of performing their role as science advisory institute for policy making. Therefore the interactions between the front stage images of science policy boundary and the backstage work that is done on stage 02, is an empirical question, we seek to understand.

Health in the Netherlands: from public health to health care

Modern health policy in the Netherlands started with the 1865 laws on public health, supported by a core group of hygienists. These laws, instigated by the wish to control epidemic outbreaks of infectious diseases, such as cholera and typhoid, regulated the outlines of the tasks of the government regarding public health; protection of the health of citizens due to poor environmental conditions in cities at that time. These laws laid the first foundations of a notion of a care for public health by (1) substantial government supervision of public health, and (2) a professionalizing of the medical profession (Van Zon, 1990). Shortly into the twentieth century the focus of the government shifted away from control of infectious diseases and the development of epidemiology (public health) to the treatment of chronic diseases such as cancer and coronary diseases, and individual health care (Van der Grinten, and Helderman, 2005; Mackenbach, and Van der Maas 2004).

This transition was accompanied by a major shift in the approach of public health problems; from the focus on public health and prevention to a focus on the organization and financial structure of the health care sector. Since, three contradicting values have played a key role in both the organisation of and political discussions about health care; the quality, accessibility and affordability of health care and health services. The possibilities and impossibilities of the government to meet these three values have shaped the organisation of the health care system into a complex system, with both public and private involvements (Van der Grinten, and Helderman, 2005).

Recently, the Dutch health care sector underwent its probably most profound reform since the introduction of the national health plan in 1941.

Dutch healthcare: public and private arrangements

Before WWII the health care system was characterized by privately funded organisations and health care providers divided along the lines of existing class differences at that time. In 1941 the occupying government[16] laid the basis for a national health plan, the Sickness Fund Act (Ziekenfondsbesluit). Most importantly, this act instigated the foundation of a fund available for a larger part of the Dutch citizenry, and coverage of hospital care. In 1966, this process was finalized by the introduction of the Sickness Fund Law (Ziekenfondswet 1966). With this a national and obligatory health care insurance was constituted. From the sixties onwards, the health care sector has been financed partly through the tax system, to support the special insurance scheme created for long-term care, the AWBZ (the General Law on Special Health Expenditures). Partly, it has been financed through individual (private or public) insurance schemes.

From 1970s onwards health care costs began to rise[17], and the affordability of health care became topic of governmental policy making. Instigated by notions of new public management (Walsh, 1995), government control became the new policy approach for the moderation of the growth in costs of public health care in what Helderman et al describe as an etatist policy program (2005). This etatist policy program that aimed at cost containment succeeded, but brought about reverse problems such as increasing waiting lists for health services (Schut, 2003, 2004). It led to the infamous Dutch 'Stalinist system of public health', referring to its highly bureaucratic way of operating, and to many critical comments from the professional realm.

Towards a market based policy program

A new solution was sought in restructuring the health care sector, supported by the adoption of a more economic view on public health and its management systems. This trend can be seen throughout many Western countries. Ashmore, Mulkay and Pinch for example have shown that in the UK a trend of economization and the formation of communities of health economists can be distinguished from

16 In 1941 the Dutch government was not officially in charge due to the occupation of the Netherlands by Germany.

17 The costs increased steadily over the years, from 3.9 percent of the Gross National Product in 1960 to nearly 9 percent in 2000 (VWS, 2001; CPB 2001B).

the seventies onwards (Ashmore et al, 1989). In the Netherlands the famous 1987 Dekker report[18] (Dekker, 1987) laid the foundation for a financial system of regulated competition, inspired by the US health economist Enthoven (Enthoven, 1988). Although the Dekker plan was not effectuated in the Netherlands for many years, it strongly inspired the 2001 White paper on the future of the health care system written by the Ministry of Health. In the paper a market based policy program for a more effective system for the governance of public health was presented (VWS, 2001; CPB, 2001; Marktwerking Projectbureau, 2000). The market oriented plans contained a twofold effort for reform. Firstly, the Ministry of Health designed a system of demand regulation. An example of this is the personal health budget (PGB) introduced in 2000, that enables individuals to buy care themselves with little interference of insurance and care companies (in the context of the former AWBZ care) in any form, ranging from (some forms of) medical care to help with housekeeping. Secondly, the government proposed a health insurance market reform based on the notion of regulated competition. This new insurance market was introduced in January 2006.

With the effectuation of the new health insurance law in January 2006, the political debate about the effects and desirability of competition in health care has gotten a new boost. As it took up centre stage at the November 2006 elections, it seems that the last words about the health care system and the insurance market have not been spoken yet. Moreover, the current governmental shift towards a decentralisation of public health policy to regional and local government, with the new Social Support Act (WMO, wet maatschappelijke ondersteuning) in 2007 and the Collective Prevention and Public Health Act (WCPV: wet collectieve preventie volksgezondheid), will instigate more public and political discussions on the 'most effective' health care system in future years.

These debates roughly show an input both from the side of public health professionals, who hold a professional attitude towards public health policy making, based on epidemiological knowledge of (public) health and values deriving from the medical profession (Kasdorp, 2004; Putters et al, 2004), and from a health care sector governance point of view. The latter regards the organisational and financial structures of the health care sector as key elements in supporting effective health policy, and in securing the core values of health care. Adherents to the first standpoint have often ventilated the critique that health policy in the Netherlands

---

18 The Dekker plan succeeded the 1973 Report from the committee Hendriks. Since the publication of the Dekker plan in 1987 modified versions of the plan have been published every couple of years; the plan Simons in 1990, a policy report by the Ministry of Health in 2001 (*Vraag aan Bod*), and advice from the SER and the RVZ both in 2000 (see Schut, 2004).

has developed rather unilateral, from the organization of health care point of view, without substantial improvements for health care regarding the three central values of the public health care sector (Van der Wal, Klazinga, and Post, 2004).

Science advisory bodies and knowledge institutes have played a significant role in recent reforms of the health care sector: the shift towards more competition in health care.

In the midst of these health care reforms both the CPB and the RIVM have taken up new roles regarding the policy making process in health care and public health. The CPB (Netherlands Bureau of Economic Policy Analysis) developed an economic model to support macro economic modelling of policy proposals for the health care sector. The RIVM has since 1993 released four Public Health Prospect and Forecasts (VTV) reports; reports that hold extensive information on public health issues, and the health status of the Dutch population. These reports are used for the development of prevention policy regarding public health issues.

The role of both institutes has changed with the developments of these new instruments; the CPB has entered the health care sector with the construction of a Care model, whereas the RIVM has expanded its status in the realm of public health issues. This, and their important contribution to public health and health care policies required a closer look into how both institutes play their role as science advisory bodies within policy processes.

The Future of Public Health: forecasting the public health status of the Dutch[19]

The RIVM has supported policy-makers and professionals on issues in Dutch public health and the environment for almost a century. Originated in 1909 as the Central Laboratory, over the years it merged with other institutes as the National Institute for Serology, the National Institute for drinking-water facilities and the

[19] The findings of both case studies reported in this chapter (CPB and RIVM) are based on 45 interviews held with actors involved, and on documents and archive material from both institutes, such as research accounts and reports, minutes of meetings, informal and formal correspondence between the project members, and between project members and the Ministry, with related scientists and other partners. People interviewed involve project leaders and members of the project groups of both the CPB and the RIVM, several policy makers at the Ministry of Health, members of expert groups and scientific and policy boards. References to archive documents such as informal letters and project proceedings are not referenced in the literature list, but in the main text. Some of the names of respondents have been anonymized for privacy reasons.

Institute for Waste Research into what is since 1984 called the National Institute for Public Health and Environment[20] (RIVM). The new institute benefited from the mutual expertise in multi-disciplinary research groups, without overlap of financial and material means (Van Zon, 1990). It now fell under the heading of several Ministries; the Ministry of Health, Welfare and Sport (VWS), the Ministry of Housing, Spatial Planning and the Environment (VROM), and the Ministry of Agriculture, Nature and Food Quality (LNV).

At present the RIVM accommodates four divisions; (1) the Centre for Infectious Diseases Control, (2) the Public Health and Health Services Division, (3) the Nutrition, Pharmaceuticals and Consumer Safety Division, and (4) the Environment and Safety Division, and it employs about 1500 people. In 2006, the sub-sector Environmental research parted from the RIVM, and merged with the Planning bureau for Nature into Netherlands Environmental Assessment Agency (MNP), a new planning bureau that falls within the range of the 'protocol for planning bureaus'. It resides solely under the heading of the Ministry of VROM. The remaining parts of the RIVM no longer fall within the scope of the planning bureau protocol; and work in service of the Ministries VWS, LNV and VROM as an agency. Over the years the RIVM has constituted a large network in many policy fields concerning the environment and public health, and it holds an authoritative scientific position and reputation both nationally and internationally.

The centre of Public Health Status and Forecasts (centre VTV) supports and advices the government on public health issues. The centre has published four Public Health Status and Forecasts reports (VTV) for the Dutch government since 1993 concerning developments in the health status of the Dutch population for the coming years. The activities of the centre have over the years expanded from the manufacturing and presentation of these four-yearly reports to the frequent release of special issues of the VTV report concerning pressing public health matters, and the design of two national, public websites; the National Compass for Public Health and Health Care, and the National Atlas for Public Health and Health Care. The centre employs almost one hundred persons. Issues addressed are, among others, major causes of death in the Netherlands, 'healthy life expectancy', differences in health and disease between rich and poor, urban and rural dwellers and among ethnic groups (RIVM, 2006; website www.rivm.nl/en/, October 2006). For the discussions of the institutional and discourse levels, we will also discuss the RIVM to broaden the argument.

---

20 In Dutch, the institutes' names are Centraal Laboratorium, Rijksserologisch Instituut, Rijksinstituut voor Drinkwatervoorziening en het Instituut voor Afvalstoffen Onderzoek, Rijksinstituut voor Volksgezondheid en Milieuhygiene respectively.

The centre VTV: the future of public health[21]

The Report 2000, a White paper published by the Ministry of Health in 1986, provided the starting point for a succession of policy measures leading up to the start of a centre VTV. The report gave an overview of (1) the public health status of Dutch citizens, and (2) formulated policy measures to be taken in the future to ensure continuing monitoring of the public health status of citizens by the government (Boer, 1986). The report argued that the government should focus on (a) prevention and policy measures aimed at specific parts of public health (eg the effects of the use of alcohol and tobacco), (b) the level of health provisions in the Netherlands, (c) the financial system, and (d) information on public health developments (Boer, 1986). Concretely, an "investigation into the possibilities of research of health promotion, protection and prevention", is proposed as well as a "consultation with statistical organizations on the implications for [...] data collection on public health and the health care sector" (Boer, 1986:132; Nationale Raad voor de Volksgezondheid, 1987). It nevertheless took another few years until the first VTV report was released in 1993. These developments, instigated with the government White paper 'Nota 2000', show some developments counteracting the professional critiques on the underdeveloped focus on public health discussed before, as it enlarged the role of the RIVM in public health policy making.

The centre VTV publishes, among others, the Public Health Status and Forecast reports (VTV), that provides an integrative and analytical overview of trends in the health of Dutch citizens, such as exposure to health risk factors (e.g. smoking, fast food, physical inactivity), incidence of illnesses, use of health care services, and related costs. The aims of the centre have gradually shifted from explaining differences in health status between Dutch citizens towards the need for comparisons between the Netherlands and other EU countries, with the help of health indicators (RIVM, 2006). More importantly are recent trends of decentralising political responsibility and accompanying changes in the health care system. Recently the Social Support Act (WMO: wet maatschappelijke ondersteuning) and the Collective Prevention and Public Health Act (WCPV: wet collectieve preventie volksgezondheid) have shifted the attention on the public health policy making and prevention politics away from the central Government towards local governments and public health organisations. The role of the centre VTV in these decentralised health policy processes will change accordingly. The local health policy will be based on Government White papers, build upon VTV expertise. This

[21] For this paragraph many archive documents have been used as well as many official reports released by the RIVM over the years among which; RIVM, 1995; RIVM, 1997; RIVM, 1999; RIVM, 2002; RIVM, 2003a; RIVM 2003b (together with Nivel); RIVM 2004.

will lead to shifts in emphasis in the set-up of the reports and maybe the data collection routines, as well as in the social network in which the VTV is shaped. However, at this point the new role of the centre VTV in supporting local governments is still in development.

Institutionally the formal relation between the RIVM and policy makers is organized along the lines of the bureaucratic model, as it facilitates the primacy of the policy makers over research questions and assignments. As the position of the RIVM within the governmental policy making process changed to that of an agency of the affiliated Ministries, the relation has become that of a principal – agent, facilitating a more formalized relation of the policy makers with the research questions and assignments. As such the RIVM and the Ministries have many project-bound relations. The relation between the Ministry of Health and the centre VTV is organised such that policy directorates formulate a research or knowledge question in the form of a detailed quotation or offer, which the centre VTV uptakes for research. After some time the centre VTV formally reports back to the Ministry. It leaves the centre VTV formally with little space to initiate research questions itself and define which public health issues it deems warranted for further investigation or advice. In that sense the centre VTV has become more dependent of the Ministry and its needs, and the division of tasks between the institute (deliverer of facts) and the Ministries (for the normative considerations) is formally strictly arranged.

In order to organize the use of the VTV, the release of the summary report is directly linked to the policy cycle of the Ministry. Both the policy makers and the VTV experts focus on keeping the VTV report in line with the policy cycle, as this extents the use of its messages in the governmental prevention reports. The organisation of the science policy boundary thus fits the bureaucratic model, because the VTV report is in these instances a loyal instrument for policy development by the government. Consequently, the relation between the centre VTV and the Ministry of health is characterised by claused trust or as an ambivalent relationship; trust is renegotiated each time a new project is taken up.

Dealing with uncertainty

The background of the RIVM may lead to the belief that the role of the institute within Dutch policy making has been fairly unproblematic. And, as the absence of political discussion on the position of the centre VTV shows, for the reports of the centre VTV this may well be so. However, over the years the RIVM has been the focal point of a few controversies over the presumed technocratic use of scientific knowledge for policy making, albeit focused on the environmental pillar of the

RIVM, such as the De Kwaadsteniet affair in 1999. The De Kwaadsteniet was a dispute over the use of mathematical models for environmental policy making, instigated by allegations by an RIVM employee De Kwaadsteniet. The RIVM took up the dispute to review their dealings with uncertainty in general. In 2003 the RIVM published the MNP / RIVM Guidance for Uncertainty Assessment and Communication (RIVM, 2003a), consisting of a number of reports, quick scan tools and a website, to assist MNP experts with environmental assessments (RIVM, 2004)[22]. The reports provide a range of possibilities and tools to deal with uncertainty, from assessing and providing democratic entrance, problem definitions and use of specific mathematical techniques in quantitative research methods. As the uncertainty reports promote self-education and good practice, they are factually designed instances of policy learning (Van Asselt et al, 2001).

Two important shifts have taken place as an effect of these reports on uncertainty assessment. Firstly, these reports constitute the implicit outlines to deal with the fact / value distinction, and knowledge conflicts. The uncertainty report written by Van Asselt et al in 2001, offers a few methods to assess uncertainty on the systems level[23]. The RIVM has translated these suggestions in their quick-scan as the first step in the identification of the kind of uncertainties playing a role in specific reports; at the level of problem framing and the involvement of stakeholders (RIVM, 2003a). This classifies the fact / value distinction as part of the uncertainty debate. Secondly, as uncertainty has become a temporary or at least solvable problem through 'the thorough and systematic treatment' of it in writing reports, it plays an important role in settling knowledge conflicts. As such the fact value distinction and knowledge conflicts have been absorbed by the uncertainty discourse, a technical solution to prevent too much uncertainty to become a political dispute. Moreover, the discussion regarding uncertainty has sharpened the boundary between science and policy, in the sense that the realm of normative considerations has grown at the expense of scientific input, and has shifted towards policy makers and the public.

Interestingly, the reports dealing with uncertainty issues hardly find resonance in the VTV reports. Publicly, a discussion on the role of the VTV in policy making

22 The De Kwaadsteniet affaire was not the starting point of a new thinking about uncertainty, but rather highlighted the importance of thinking about uncertainty. In that sense it functioned as an accelerator. The MNP/RIVM Guidance for Uncertainty is based in the 2001 research report written by the Maastricht University in commission of the RIVM. It synthesises the research carried out on uncertainty since 1997. The research report main conclusion is that the RIVM needs to develop a protocol for uncertainty (Van Asselt, et al, 2001).

23 For example the NUSAP method (Van Asselt, et al, 2001).

is surprisingly absent. Discussions among health scientists about the role of the VTV reports in public health policy making usually focus on the question how to bring the important messages under the attention of the policy makers. Reviews of the VTV reports usually take place in Dutch public health journals, and focus on the usefulness of VTV reports as instruments that can 'rationally support the process of rational policy development', a step closer to evidence-based health policy development (Reijmerink, and Hulshof, 1997). Over the years the VTV reports have become more political in that the reports, as a member of the scientific committee argued, 'have over time become more involved with and focused on policy-issues' (Interview, 20050926), due to shift in focus towards international comparisons and focus on performance indicators. However, political discussions as have taken place with the CPB, on the desirability of the reports or the monopoly position (regarding public health information) have not taken place with regard to the VTV. As such the VTV reports are rhetorically assigned an enlightenment status at the discourse level, as scientists are portrayed as bringers of messages for policy makers, who in their turn should listen well to the experts. This is illustrated by the organisation of the VTV practices on the level of actual practices.

The VTV in the making

The Public Health Status and Forecast reports (VTV) provide an integrative and analytical overview of trends in the health of Dutch citizens. The VTV reports focus, furthermore, on social-economic factors that explain differences in health status between Dutch citizens, which have shifted more and more towards a comparison between the Netherlands and other EU countries (RIVM, 2006). The VTV consists of threefold products; the comprehensive summary report that is released approximately every four years, specific theme reports focused on single topics, and two websites. In this paragraph we focus on the construction of the four-yearly comprehensive summary reports, and the theme report Health Care in the Large Cities of the Netherlands, released in 2003.

The centre VTV collects and integrates data gathered from many sources. Data from various scientific sources is collected and measured based on a conceptual model for public health based on the public health model developed in the 1970's by the Canadian minister Marc Lalonde (RIVM, 2006; De Leeuw, 1986). The Lalonde model recognises various determinants of health, as well as organisation and quality of health care; hereditary factors, lifestyle factors and environmental factors. The conceptual model of the VTV has extended Lalonde's model; it recognises exogenous factors such as lifestyle, physical and social environment; personal

factors that are divided in hereditary, psychological and acquired personal characteristics; and health care and prevention as separate factors. The outcomes, which are manifold, are used for the formulation of overall policy messages for the summary report. These messages provide policy makers of the Ministry of Health with information for the formulation of (prevention) health policy.

The formulation of messages for policy makers proves a rather sensitive endeavour for the centre VTV. Repeatedly interviewees go in length about the difficulties that were met in presenting the findings:

> "At the start [of the project in 1993] we were not allowed to give policy advice, because the Ministry held the opinion that 'we were the researchers and should deliver the facts' and 'they were the Ministry and make policy'. In later stages the critique was that the report was too much an encyclopaedia, and should focus more on the problems experienced by the Ministry" (interview, august 9th 2005).

This remark points towards the unstable balance in trust between the centre VTV and policy makers from the Ministry of Health. A lot of work goes into creating and maintaining a trustworthy relationship with policy makers. The VTV easily runs the risk of entering the normative and political realm formally ascribed to the Ministry and the government. At this point the clear but subtle front stage fact / value distinction between the centre VTV and the Ministry becomes visible: the centre VTV delivers facts and the Ministry sets out the normative outline. In this, the primacy of the policy makers becomes visible.

The front stage fact / value distinction requires a subtle balance between policy-orientedness and policy distance for the messages in the VTV report. This demands constant and subtle weighing of how to proceed; with the information, with the experts involved and policy makers' demands by the VTV project leaders. The products of the centre VTV derive from the scientific realm, but need to be translated into messages usable for policy problems encountered by policy makers of the National government. To meet this twofold need the centre VTV has set up an organisational infrastructure that provides a back stage space for open and informal negotiations firstly with the relevant policy makers, and secondly with the scientists and experts involved. This structure allows the project managers of the centre VTV a constant going back and forth between the front stage and the backstage that is required to write good products.

Firstly, the most difficult task for the project team lies in the composing of the messages in such a manner that they are acceptable for the policy makers. The VTV reports most of all signals the developments and key issues in public health that will face the government over the course of 10 to 15 years (RIVM, 1997; RIVM,

2002; RIVM, 2006). Although the centre VTV, with its knowledge of public health, can be expected to be well informed of effective measures, it has to be very careful when phrasing messages in the form of policy solutions. This balance first entails putting a lot of time and effort in creating intensive contacts with key figures at the Ministry of Health, policy makers as well as heads of directorates. For every policy question asked by the Ministry the project team will follow a certain *organisational routine* that enables them to meet the policy standards, as well as the scientific standards, an involved process that is well illustrated by one of the project leaders in an interview;

> "The approach followed concerning the expert groups and board of policy makers differs per product. Per theme report we put together a new board of policy makers and a new expert group, depending on the research question asked by the Ministry. As project leader you are asking yourself constantly who's in the board, who should be in the board and whether the people that are in it still comply, and if someone should be replaced and by whom if someone leaves the board" (Interview, June 22nd 2005).

These close contacts are necessary for writing useful reports, but also for the creation of the 'right momentum' for the presentation of the political messages of the report. The head of the directorate Public Health of the Ministry of Health had for example agreed with VTV 2002 project team to present the findings in such a way that the Ministry could "come up with the political answer to the [VTV] straight away, in the form of the governmental report Living Healthier Longer, to reinforce the impact of the VTV, and to be able to translate the messages into policy action" (interview, 14 September 2005)[24]. For this reason the centre VTV has permanently located two project leaders at the Ministry of Health, as liaisons between science and policy, in the directorate Information and Analysis that was formed for this purpose. These liaisons work intensively with the head of the directorate Public Health, to get other directorates involved in the process of formulating the research questions. More importantly, these liaisons involve the

[24] Unfortunately, unforeseen and unique political events paralleling the presentation of this particular VTV hampered the public presentation, and minimized the political impact of the VTV messages. In the week before the elections in May 2002, the Populist politician Pim Fortuyn, who had been the leader of a new right winged and fast growing political party, was murdered. In the political mayhap that followed a Cabinet was formed with his party in it, which came to a halt about four months later, and new elections were issued. These political events strongly influenced and hampered continuing governmental work. Nevertheless, the messages from this report have been used in the second governmental prevention report, albeit with much less publicity than was hoped for.

policy makers during the writing process in articulating questions, and during the data collecting phase and during the writing of the reports. This is necessary to make sure the messages fit the policy questions and the prevention reports of the Ministry, and to be able to convince other departments of the importance of the VTV reports. For this a general board of heads from public health directorates is installed, that regularly monitors the writing phases of the reports by means of presentations to this board. This has proven successful in that VTV messages have been used extensively the past years for governmental prevention reports.

Secondly, the process of writing the summary report entails many contacts with the scientists, and the putting together of many scientists for deliberation on the meaning and usefulness of the data. Although the VTV project team includes a relatively small number of persons, the team draws on hundreds of scientists to participate in the VTV process; either as authors, as experts in the expert groups, as part of the extensive literature reviews, as data deliverers, or as scientists working in commission of the centre. This becomes visible in the prominent place of the literature list and the supplements with the names of all the experts (and institutions) involved in the process that cover many pages in the VTV (summary) reports. Because the messages in the report are the outcomes or the sediments of a very long process of collecting, shifting, measuring information, and debating, negotiating, and rewriting texts generated by hundreds of experts, the *process* of developing reports functions as a scientific and political consensus platform for the public health sector in the Netherlands. It is in this consensus platform, as a back stage negotiation space, that knowledge conflicts are sorted out.

In this way the centre VTV and the VTV reports have gained an authoritative position both in the standardisation of health indicators, and regarding the reputation for scientists working in the field of health care. The VTV has become a trustworthy source for scientists when working outside their field, for teaching reasons as well as for background information;

> 'I presume that when the RIVM provides me with a suggestion, that is how I see it, well because it is the RIVM and it is their job to assemble this information, I presume it is a trustworthy suggestion, more trustworthy actually then when I receive it from the university library' (Interview, August 15th 2005)

The process of manufacturing the VTV reports is at the same time an obligatory point of passage (Callon, 1986) for health scientists; research findings receive more standing, or become more true, when they can be found in the VTV. In this sense the centre VTV fits the policy learning models in which knowledge conflicts, the fact value distinction and uncertainty are dealt with by designed occasions

for settling possible disputes (Hoppe, 2002). The organisational set-up and the obligatory point of passage provide these occasions, so that knowledge conflicts and uncertainty debates stay within the realm of the VTV organisation, and do not enter the front stage arena. This strategy of conflict avoidance, in the form of an advocacy coalition with scientific experts and organisations, shows some characteristics of the enlightenment model of science policy interactions.

The organisation of the relation between the centre VTV and the Ministry of Health fits the principal-agent relation described in the engineering model, and according to the wishes of the Ministry of Health to have more control over the knowledge that is produced for the use of answering policy questions. This could potentially endanger the policy learning process of the institute, and the initial aim of the institute to signal future trends in public health developments. The centre puts a lot of effort in possible policy learning. The construction of the summary report is evaluated each time, internally as well as with the help of external reviewers. The main question at this level is; did the VTV report deliver a workable message, and why (not)? Furthermore, the centre VTV has become part of the development towards evidence-based public health policy. For this the centre needs to guarantee a 'collective memory', since problems that occur in public health tend to stretch over long periods of time, and solutions or prevention strategies are not easily found or implemented. The example of the fast increase of obesity and the related impending increase in people with diabetes type II in the Netherlands proves only so much (see e.g. RVZ, 2002). These problems cannot be solved in a short period of time, or by a single party in public health, but require enduring action by many parties involved.

This need for a collective memory – in the form of longstanding experts working for the VTV or the Ministry – in order to sustain effective policy measures applies just as well or even more so to the Ministry of Health, since many policy makers circulate every two to three years between different directorates and Ministries. This could potentially lead to fragmentation of knowledge within the Ministry of Health and could hamper the efficacy of policy measures. More importantly, despite its formal relation to the Ministries, the centre VTV forms a monopoly, since no other institute comes close to creating a kind of network and the expertise such as situated at the centre VTV. In certain respects the new, formalized relationship might therefore lead to an artificial relationship that could hinder effective use of the expertise at the centre, for instance in cases where the centre has a signalling function and reports messages that do not get picked up by the Ministry, requiring informal intermediary structures.

The CPB – modelling the economy of health care

The longstanding role of the CPB has gained the institute a role of economic arbiter within the playing field of policy making. The CPB was established immediately after the end of WWII to provide the government with economic indications in order to enhance much needed economic growth in the period of economic recovery in the aftermath of WWII (Passenier, 1994). At present the Bureau has a central position in Dutch policy making, in more than one way. The CPB is an economic research institute for the Government, carrying since 1989 the objective to make "independent economic analyses that are both scientifically sound and up-to-date, and relevant for government policy, Parliament and NGO's, such as political parties and the industry" (CPB website, April 2nd 2007; Passenier, 1994:350). The CPB addresses a wide range of policy fields, such as the National Budget, labour market developments, energy markets, inflation, infrastructure, and developments in the budget deficit, the welfare state, education, pensions and Europe (CPB, 2006; Passenier, 1994). Moreover, by way of the yearly National Budget presentations in the Central Economic Plan (CEP) and the Macro Economic Outlook (the MEV), it has an important directive role in the Dutch policy making process at the national level, stipulated by law. Moreover, the CPB participates in government councils and consultative bodies. Only quite recently the CPB has started to work on health care issues as a singular policy issue, with the construction of a Care model that started in 1995, and the release of a growing number of reports on health care issues[25].

For its analyses the CPB uses many economic models. Many of these models are unique in the world. Assessment procedures are often preceded by many years of model development. A large part of its work and its expertise therefore involves the construction of models. Although in the public eye the assessment trajectories are most visible and seem most important, the more invisible stage of model construction offers as much or even more insight into how the CPB shapes its role as intermediate between the scientific world and the world of decision making and policy.

Dealing with distrust

In the literature the role of the CPB is often described as technocratic (Pesch, 1999; and 2002; Hoppe, 2002, Van den Berg et al, 1993), pointing at the informal power the CPB has over governmental decision-making, as it is hard for policymakers to

[25] e.g Healthcare scenarios 2003-2006, and a growing body of reports on the effects of the new insurance system, pharmaceutical policies and more, see eg www.cpb.nl for more.

by-pass CPB analyses. The CPB is granted the power to "make and break" cabinets, making its decisional power resemble that of the technocratic model. However, the institutional position of the bureau reveals the more bureaucratic nature of the position of the CPB vis-à-vis the National Government, in which policy makers have the last word. Institutionally, the CPB is part of the Ministry of Economic Affairs. This Ministry executes staff matters, such as wages and other financial affairs of the CPB, as far as the formal relationship is concerned. However, to guarantee a minimum amount of independence, the CPB is situated at another location, away from the Ministry of Economic Affairs. Accordingly, there is a division of labour between employees who deal with staff matters with the Ministry and employees that maintain relations concerning content with the Ministry of Economic Affairs. The experts working at the CPB are formally civil servants, in service of the National Government.

The authoritative position obtained by the CPB over the years, was in great part due to its' capability to move beyond the pillarized situation that characterized the Dutch political system during most of the 20th century (Lijphart 1975; Van den Bogaard, 1998). As is shown by Van den Bogaard (1998:8), the CPB's mathematical approach to economic planning proved "a solution for the potential threat of conflicts among pillars". The mathematical-statistic model, as introduced first by Tinbergen, could be seen, according to Wilts as a "neutral *a priori evaluation* of the effects of policy measures on economic parameters and thus on the functioning of the Dutch economy as a whole" (Wilts, 1997:147), an important instrument in seeking consensus in the pillarized Dutch politics (Van den Bogaard, 1998).

These scientific standards used by the CPB have had manifold effects in Dutch society. With the foundation of the CPB, the government provided itself with scientifically skilled experts in economic matters. In its turn the CPB influenced the development of statistical economics as a scientific discipline, due to the model approach developed by its founders, as is shown by Wilts (1997). Accordingly, combined with its sixty years of involvement in many sectors of Dutch policy making, the CPB has had great authority in shaping the Dutch economy.[26] This partly explains the critique on the technocratic position of the CPB in policy processes. Formally the CPB has a bureaucratic relation with politics (science on tap, politics on top). In practice however this relationship displays technocratic

[26] Although not a line of argumentation followed here, one could argue that both influences of the CPB – shaping the economy and shaping the science of economics in the Netherlands – are heavily intertwined. See (Callon 1998) for an explorations of the intertwinement of economics and society; see (van Egmond and Zuiderent-Jerak, forthcoming) for an analysis of the role of the CPB in the healthcare sector that leans strongly on Callon's approach.

tendencies (Den Butter, and Kronjee, 2003) as CPB reports prove hard to put aside by policy makers; for example because policy makers lack the expertise for alternative options.

Despite efforts to be transparent in methods, their econometric models are often difficult to understand for people who are not econometrically trained. Their models have the tendency to become black boxes, which contributes to the role of technocratic authority that is often assigned to the CPB. It is precisely this element in the technocratic bureaucracy institutional form that constitutes a form of distrust between the CPB, policy makers and politicians, and between the CPB and scientists, that becomes most visible at the front stage. This notion has found expression in the rigid and the limited definitions that have been developed by the CPB about what is scientific and what is political, and accordingly about what is a fact and what a normative consideration. The words of F. Hartog (one of the founders of the CPB), spoken in 1970, illustrate CPB's awareness of its role in technical uncertainty reduction as the aim of its institutional position: "when the CPB has spoken all possibilities are still open, but we know to what extent" (Passenier, 1994:363). Three and a half decades and many disputes later, the website of the CPB leaves no mistakes to the limits of the activities regarding its role in the assessment of policy proposals. The board secretary of the CPB, explains it in the following words:

> The CPB does not engage itself in political decisions. What we rather do is, we look at all kinds of political issues and examine those in relation to the economic motives and consequences. We provide arguments pro and contra certain policy proposals; and we provide possible alternative routes. But ultimately the choice for a proposal is not ours to make, but is a task for politicians (Interview 040210).

This remark (and numerous similar expressions) made in public appearances point to the effort the CPB has to put into the front stage a display of its political independence, and its bureaucratic inclinations.

A modeling trajectory – the care model

Although at the front stage we see that the CPB behaves according to a bureaucratic organisation with technocratic influence, the construction of the care model shows that in the backstage this it not at all self evident. Political discussions often permeate and determine advisory trajectories of the CPB. The distinction between what is normative and what is not, between facts and values is not always easy to make, especially in an interdisciplinary project such as the

care model construction. Science advising in a political environment can quickly lead to epistemological and territorial conflicts, as the case study shows. However, planning bureaus use many strategies to solve such conflicts.

In 1994 the CPB started the development of a macro economic model concerning the health sector, together with the Social and Cultural Planning Office (Sociaal en Cultureel Planbureau, SCP) and the National Institute for Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieuhygiene, RIVM). The project took place in the context of governmental worries over rising health care costs at the end of the 1980s and the beginning of the 1990s, as discussed previously. In this sense the need for this model is an illustration of the shift towards a more accountable government, influenced by ideas of New Public Management, and instigated by the 1986 White paper on the future of public health, the famous report 2000. The project took place under the authority of the macro economic department of the Ministry of VWS (Health, Welfare and Sports)[27]. The need for such a model, as described in the official assignment letter by the Assistant Secretary for Health, emanated from the need for a "clear starting point for the support of the formulation of policy goals for a four year Cabinet period" (CPB, letter Simons, 1994).

The model was expected to provide the government with clear measures, in order to set a framework of terms of references for the yearly health care budget. The three institutes, the CPB, the RIVM and the SCP, it was thought, not only provided enough expertise to develop the model, but were held capable of making an integrated model for the healthcare sector. The RIVM and the SCP facilitated extensive scientific expertise in public health and health care related phenomena, and experience in micro economic modelling of public health and health care. Combined with the macro economic model experience of the CPB, it allowed for the integration of both econometric and epidemiological knowledge. More importantly, the model needed to address three policy questions. First, it needed to explain past developments in the use and costs of healthcare on the macro economic level. Second, it needed to calculate the future effects of possible financial-economic policy options on the macro economic level. And third, it needed to show effects of possible healthcare and prevention policy options on the demand and supply of healthcare and its consequences for healthcare costs (CPB, SCP and RIVM, 1994). The stakes in the cooperation project were high, as the words of Simons in the same letter illustrate;

---

27 In 1995 the Ministry changed its name from Ministry of Welfare, Health and Culture (WVC) into its current name.

> I am aware of the enormous ambitions that are at stake to come to an integrated calculation model for the health care sector. [...] The collaboration between the CPB, RIVM and SCP will provide valuable insights into the structure and dynamics of the health care system. (Simons, 1994).

The attempt to integrate an epidemiological, a socio-economic and a macro economic approach in one model soon proved too ambitious.

At the end of 1994 the project team produced a preliminary report, in which the outline of the model was discussed. Based on a years' work of preliminary (literature) research and consultation, the project team argued that it would prove near impossible to meet all the wishes of the Ministry. The combination of the three policy questions in one model raised fundamental problems. The first two questions required an *economic* modeling of *costs of the healthcare system* whereas the third question required modeling of *public health developments* (eg epidemiological trends). However, integrating the two paradigms proved impossible in one macro economic model. As the CPB project leader at that time explained:

> 'For the planning bureau (CPB) it was paramount that the model needed to be based on economic theory first (...). Well, the SCP had approximately the same starting point although slightly more focused on the empirical part. And the RIVM had a much more bottom up approach, individual diseases and all, and this approach could never be united with the economic theoretical approach.' (041006, CPB)

In practice, the parameters that were used for economic modeling were limited to 'age' and 'gender', whereas modeling public health included a whole range of other healthcare parameters besides age and gender, such as the indicators described in the Lalonde model (see page 16), and other indicators such as role of medical technology, social economic position of patients, advancing medical opinions etc.

This delivered many difficulties. Firstly, modeling economically healthcare cost developments on a macro scale for a period of four to five years using more than the two indicators age and gender proved challenging. Secondly, the inclusion of healthcare policies as an indicator for developments in public health in a model that *assesses* healthcare policies for their effects on cost development proved not possible. Typical for regulations aimed at prevention is that the effect of these cannot be measured within four to five years, the extent of the desired model. Therefore, the project team decided to give priority to the modeling of *the costs of the* healthcare *system* over a model that could answer all three questions. As was said during one of the project meetings:

> "the aim of the project is to develop a model for *costs* and not a model for *health*." (Meeting notes, 960513).

To avoid a priori conflicts over the purpose and outline of the model, the project team restricted the extent of the model. Consequently, part of the knowledge deemed necessary lost its meaning in this stage of the modeling trajectory. The RIVM left the project team as a full member in this stage of the development of the Healthcare model.

Solving knowledge conflicts: epistemologically and territorially

Hidden behind epistemological problems are often questions of normativity; what is considered a fact in the matter and what as a normative issue? Obviously, different disciplines answer this question differently. Soon after the project team had started modeling the patient part, and other parts of the model, the group experienced a series of conflicts that seemed epistemological in nature. Firstly, there was the question of representation; what elements constitute a better representation of the health care sector? The second question was how these representations would fit a macro economic model, a more methodological question. However, these knowledge conflicts were fuelled by underlying political discussions, and accordingly differing ideas on what constitutes a better representation of the health care sector. Moreover, these conflicts are solved though epistemological and territorial coping mechanisms.

Illustrative of epistemological differences is discussion on the modeling of the demand side of health. At a certain point the project team had to decide which effects to incorporate within the demand side of health. As the organisation and planning report shows:

> Not taking into account demand effects would imply that we impose on the model that certain policy measures such as own payments for doctor consults have no effect on the production of health care provisions. Considered the prominent place of own payments in the [political] discussion over cost-containment, it seems irresponsible to leave such an assumption out. It would be more logical to have the empirical data determine if and how own payments influence the production of health provisions. (In: CPB / SCP, RMZ 1995).

This remark exemplifies that the more political an issue is the more careful the planning bureau has to be in defining the matter. As the model needed to be a representation of the policy field, the question what counts as political issues

and what as an uncontested fact should in this case be determined in the political realm. Other normative assumptions were more easily put in the model, as long as it concerned politically unproblematic matters. The discussion on demand was solved by splitting the demand for health provisions in two; the demand is determined by (1) the patients when they first visit their General Practitioner, and (2) by doctors for follow-up consults. Although not mentioned in discussions concerning demand, this choice implied a more market oriented solution, even though other solutions were available. However, this effect was not under political scrutiny and thus it was not discussed.

In the case of modeling the medical specialist a territorial coping mechanism was used. The political delicacy of longstanding plans to restrict specialists' incomes partly explains how a seemingly inconspicuous matter as a medical specialist became a controversial obstacle in the project. Parties disagreed about whether the medical specialist could be modelled as a combination of "ethical" and "money grubbing" characteristics or if more detailed representations were necessary. Both institutes held different approaches towards health care – an econometric theoretical approach, and an empirical micro economic approach – combined with a lack of empirical data suitable for micro-based macro economic modelling. SCP project members for instance found a single description of medical specialists inappropriate, firstly because of lack of empirical information on the behaviour of medical specialists, and secondly because one description could never accurately represent overall medical specialists behaviour. For CPB project members, however, more than one description of the behaviour of medical specialist was difficult to fit in a macro economic model. The project team coped with these differences by renouncing the collaboration with the SCP, in December 1996 (CPB, 961212). The project went further with a consultancy role for the SCP for specific elements of the model, similar to the contribution of the RIVM (CPB, 961224). The CPB became the main contractor of the model[28]. In 1999 the project team released the first edition of the Care Model, and it was used first for a CPB report on the future of health care costs 2003-2006 in a 2001 report (CPB, 2001). Remarkably, the interdisciplinary work that was the objective of the project, was transformed into one in which there was a hierarchical relation between the three kinds of expertise.

---

28 Worth mentioning in this respect is that on the cover of the official publication of the model the authors make a reference to the way these issues were solved in this interdisciplinary project by using the very particular words ´in collaboration with´, which point to the fact that the SCP has substantially contributed to the model but is not the main contractor of the project.

Scientific standards as credibility builders: the role of the protocol

The role of the CPB as technocratic authority has often led to a political distrust that is often shown toward CPB reports and standpoints, resulting in political debates on the truth value of CPB findings. In reaction the CPB creates a kind of transparency in how it deals with expected uncertainty in policy proposals, as well as in the use of scientific knowledge. The protocol for planning bureaus serves a role in this. The protocol thus functions as a boundary object, a transparency tool that leaves no mistakes as to whom is in charge of the normative deliberations – politics – and to the tasks of the CPB – deliver scientific facts and analyses.

Over the years the CPB has developed reports in which the 'scientific' is defined, and has used scientific boards to assess its functioning and to accompany its projects. The self-assessment report "Scanning CPB", published in 1997 (CPB, 1997) concerns the research methods and data use. It focuses on the extent to which the research conducted at the CPB is reproducible by others, even within the CPB. The CPB is very open about the limitations of the reproducibility of its models, and has accordingly required documentation "as exactly, completely and justifiably as possible with regard to how the disposable data material has led to the results presented" (website www.cpb.nl, September 13th 2006). This open display of scientific standards and its limitation adds to trust and credibility of the planning bureaus' front stage performance, by applying bureaucratically organized rules and regulations in the form of the protocol and the texts on the websites. However, as the modeling trajectory shows, this seemingly open attitude front stage towards trust and credibility can lead to a limited focus or a limited openness or limited reflexive attitude towards other kinds of economic knowledge and theory backstage.

A recent international report about the CPB – the Beleidsgeorienteerde toetsing CPB (BTC) report – mostly points towards the complicated relation between neutrality and independence, referring to situations in which preferred policy measures unavoidably arise from research findings. The report argues that in those cases the CPB should not withhold its opinion on preferred policy measures, because that would lead to;

> the paradox that the Planning bureau for the sake of its independence refrain[s] from the policy makers, but at the same time because of this, unintentionally influence[s] the direction of the policy discussion. (Commissie BTC, 2001:12)

These remarks support the findings of the case study that point toward a paradox in CPB's ways of dealing with its authoritative position in the Dutch policy field. On the one hand the CPB actively shapes the Dutch economy and economic

policy. On the other hand, the CPB deals poorly with its authoritative position by emphasising its independence and scientific credibility. Remarkably, although the protocol for the planbureau function formally arranges the independence of all bureaus and the playing field of the institutes, both organisationally and content-wise, it proves less useful in solving knowledge conflicts between planning bureaus during actual projects such as the Care Modeling project. In this project scientific standards of other science advisory institutes were called into question, even though these standards are widely used and tested in the respected scientific areas.

Comparing science / policy interactions: different levels at work

Although in the every day processes of public policy making the use of knowledge and expertise of numerous experts and expert organizations has become a routine event, what goes on during the actual processes and interactions between experts and policy makers remains rather concealed. The ubiquitousness of expertise in policy making processes, however, demands a closer look at how the relations between scientific advisory bodies and the policy making processes are actually organized, and to what consequences. It raises questions as how we can understand the mediating role of scientific institutes in the health field, and what these institutes have to do to sustain their own positions in this field. Moreover, it raises the question how we can understand the differences and similarities between these institutes in sustaining their authoritative positions.

We started the research with the idea that the science policy interactions between the CPB, RIVM / centre VTV and policy makers can be characterized according the bureaucratic and technocratic organization of science policy interactions as found in PPS and STS literature. Although these notions still hold, from the research a more subtle and refined image of science / policy interactions arises. It is difficult to characterize single institutes according to one model. Instead, we have seen different science policy interactions at work, at different moments in the advisory processes, at different places in the organizational structure. At each moment front stage images of the role of these science-based organisations in the policy making process, and the back stage ways of performing their role as science advisory institute for policy making play an important role in how both institutes present themselves, and in constituting and maintaining credibility and authority (Bal et al., 2002; Hilgartner, 2000).

A bureaucratic presentation on stage

The institutional space both institutes take up in the Dutch policy realm can be characterized, as we have argued, by a bureaucratic organisation of the science policy nexus. This implies a primacy for policy makers and politicians in the relationship with both science advisory bodies. However, as both institutes have a monopoly position in their policy field, this provides both institutes with a substantial authority and say over their involvement in policy processes.

Although they both fit the bureaucratic model and have substantial authority over their roles, there are clear differences between both institutes. The bureaucratic institutional organisation of the CPB, combined with its complex technical instruments, provided the CPB with the kind of *organizational learning* which enabled the CPB to develop into a technocratic authority. As the CPB has had a great influence on the development of economic science since the 1950s, and accordingly the shaping of the Dutch economy after WWII, this technocratic position has raised lots of criticism over the years. In opposition, the role of the centre VTV in the public health field is quite young and still developing. In this respect the centre VTV has hardly had a chance to develop into a technocratic power in this field. Moreover, as the centre VTV does not have the planning bureau status, and the Ministry of Health formally determines the research agenda for the centre VTV, it will probably take more effort to develop a technocratic relation with the Ministry of Health and the health field at large. The VTV's research agenda is much more determined by its relation with the Ministry than the research agenda of the CPB, especially since the CPB works independently for all Ministries, and the VTV first of all for the Ministry of Health.

Dealing with conflict, uncertainty, and values

More importantly, even as both institutes formally have a bureaucratic relation with their policy makers, both institutes have different degrees of freedom in dealing with knowledge conflicts, uncertainty and normative issues, eg the fact / value distinction. The environmental division of the RIVM deals with uncertainty in technocratic way by providing a broad range of possible uncertainties, and strategies to act on uncertainty. However, the centre VTV has more degrees of freedom than the environmental division of the RIVM. The centre VTV solves uncertainty issues in the backstage area, through negotiations with involved institutes, health scientists and experts. As such the centre VTV is able to act as spokesperson on behalf of the public health community. The CPB, however, is able to articulate uncertainty in technical terms. Scenario studies published by the CPB usually cover variants within the same model, instead of using different models.

At the front stage the CPB has to deal with the image of a technocratic organisation, embedded in political discussions and disputes over the role of the institute. Not surprisingly the CPB uses a very strict rhetoric to meet the criticism from economists or political parties. At the front stage the CPB keeps a strict regime, as to secure its independent status as impartial arbiter for all governmental policy fields, towards other planning bureaus and towards all Ministries, through the use of the protocol for the planning bureaus, the OPD and the yearly work programme. Interestingly, this strict protocol has in a sense contributed to the technocratic image of the institute, as it could hinder open discussions about the parameters of their models. Recent years the CPB has opened up about the use of their models, and the way the institute deals with uncertainty issues. The CPB depicts since a more transparent attitude towards its' technical and scientific tools, and the limitations of these tools. However, it renders the question whether such transparency is enough to soften the image of technocratic power. Moreover, the way the CPB deals with conflicting knowledge claims it seems as if the CPB really is in no need to shed the image of a technocratic power, since this fits their position in the policy field really well.

The uncertainty debate and related actions undertaken by the RIVM show that especially the environmental part of the RIVM (MNP) deals with similar issues as the CPB. In opposition, the position of the centre VTV is, as we have argued, surprisingly uncontested, politically as well as scientifically. The centre secures its status directly with the Ministry of Health, in their negotiations on the research agenda, and is hence involved in an intensive relation with the policy makers at the Ministry of Health. Moreover, it is able to act as spokesperson for the public health community. Interestingly, the location of the front stage is different to that of the CPB. Whereas CPBs' front stage involves both political, and public elements, the centre VTV has a front stage role in the policy cycle, but less so to other parties.

There is a subtle interaction between wished-for roles of both institutes and the actual roles. Both institutes work different strategies to secure their front stage performance. However, the CPB performs more work to keep its authoritative and independent position to the world outside the policy processes and political decision making processes. The centre VTV seems to have more control over the front stage role its plays in the public realm, as it is also less involved in political issues. More interesting, though, is the freedom both have in portraying some normative choices as technical and others as political. Both institutes mediate between science and policy, they select, order and assess existing information for several scientific and non-scientific sources to make it suitable for policy makers. Both institutes have, as discussed before, to talk to the policy makers as well as with scientists extensively in order to produce useful products. They do deliver

facts, because once a message is in a report, it becomes a fact. In that sense both institutes have the authority to create facts, and to depoliticize political discussions. The CPB does that with help of the protocol, and the models. However, the centre VTV has to undertake more negotiating work with policy makers than the CPB.

Modeling science advice

These diverting positions materialize in the particular institutional shaping of the relations of both institutes with the policy field, and the mutual relations and status of both fields of expertise. CPB's position within government arrangements is that of a planning bureau, which provides it with a legal position within the policy process. Furthermore it has a vote in powerful councils on the highest levels of the government, and concerns many policy areas that are affected by or affect the economy. Even when the CPB focuses on a specific field within the economy, namely health care, with the care model, it still addresses the macro economic effects of health care on the economy as a whole. Consequently, its reports are bound to have more political impact, although this has partly to do with the timelines and nature of the reports: financial impact becomes visible much sooner than the future predictions in public health done by the centre VTV. The role of the centre VTV is limited to an advisory role, and its reports and statements can be ignored by the Ministry of Health. The RIVM thus needs to undertake other routes and measures to acquire the same effect on the policy process, if at all.

However, as these two positions formally seem to fit existing models of science policy interactions, the usefulness of this classification blurs when used to explain day to day work practices of the experts at both institutes to keep their effective and authoritative position. The VTV is able to maintain its authoritative position as advisory body in the public health policy field, because it is able to form an advocacy coalition with the public health sector. As such it can speak for large parts of the public health community. The centre VTV has designed a strong organisational infrastructure that provides a 'negotiation space' for informal contacts both with the policy and the scientific fields. This space is necessary to perform the work that is needed for the front stage image of the role of the VTV in public health policy making. The CPB maintains its authoritative position in the public health policy field, through *using its authoritative position* within the political arena in general to constitute authority at another policy area. Its focus is much more on maintaining transparency and its independence in the political field in relation to the Ministries, than on creating a widely supported network of experts or a knowledge infrastructure for the building of the model, and further doings in the field of health care.

References

Arrow, K. 1963. Uncertainty and the Welfare Economics of Medical Care. *The American Economic Review*, T LII, 941-973.

Ashmore, M., M. Mulkay, and T. Pinch. 1989. *Health and Efficiency. A sociology of Health Economics*. Philadelphia: Open University Press. Milton Keynes.

Bader, V., and H. van den Berg. 1993. Simulatiemodellen en de Maakbare Toekomst. In *Het* CPB *in Politieke Zaken*, edited by H. Van den Berg, G. Both and P. Basser, 63-79. Amsterdam: Wetenschappelijk Bureau Groen Links.

Bal, R., W.E. Bijker, and R. Hendriks. 2002. *Paradox Van Wetenschappelijk Gezag. Over Maatschappelijke Invloed Van Adviezen Van De Gezondheidsraad*, edited by De Gezondheidsraad. Den Haag: Reproka Amersfoort.

Boer, E.J. 1986. *Gezondheid als uitgangspunt: Nota 2000 in het kort*. Staatsuitgeverij, 's-Gravenhage, Den Haag.

Callon, M. 1998. Introduction: The embeddedness of economic markets in economics. In *The Law of the Markets*, edited by M. Callon. Oxford: Blackwell.

Callon, M. 1986. The sociology of an Actor-Network. In *mapping the Dynamics of Science and Technology*, edited by M. Callon, J. Law and A. Rip. Bastingstoke, MacMillan.

Collingridge, D., and C. Reeve. 1986. *Science Speaks to Power. The Role of Experts in Policy Making*. London: Frances Pinter (Publishers).

Commissie, Beleidsgeorienteerde Toetsing van het CPB. 2001. Met Beleid Te Werk. 1-22. Den Haag: Commissie Beleidsgeorienteerde Toetsing van het Centraal Planbureau.

CPB. 1992. *Zorg Op Lange Termijn*. Den Haag: Centraal Planbureau.

——. 1994. *Naar Een Ramingsmodel Voor De Zorgsector*. Den Haag: CPB ism RIVM en SCP.

——. 1995. *Ramingsmodel Zorgsector. Organisatie En Planning*. Den Haag.

——. 1997. *Scanning* CPB, *a View from the Outside*. Den Haag: Centraal Planbureau.

——. 2000. *Regulated Competition in Health Insurance Markets*. Den Haag: CPB Netherlands Bureau for Economic Policy Analysis.

——. 2001. *Een Scenario Voor De Zorguitgaven 2003-2006*. Den Haag: CPB ism SCP en RIVM, 2001.

——. 2006. http:// www.cpb.nl/eng/org/cpb/.

De Leeuw, E.J.J. 1986. *An exploratory inquiry into the development of policy for the new public health in the Netherlands*. De Tribune, Maastricht.

Dekker, Commissie Structuur en Financiering Gezondheidszorg. 1987. Bereidheid Tot Verandering. edited by Dekker. Den Haag.

Den Butter, F., and G. Kronjee. 2003. Doelgericht en met kennis de toekomst verkennen. *Beleidswetenschap*

Enthoven, A.C. 1988. *Theory and Practice of Managed Competition in Health Care Finance*, edited by Professor Dr. F. de Vries, *Lectures in Economics. Theory, Institutions and Policy*. Amsterdam: Elsevier science publishers b.v.

Fischer, F. 2003. Beyond Empiricism: Policy Analysis as Deliberative Practice. In *Deliberative Policy Analysis*, edited by M. Hajer and H. Wagenaar. Cambridge: CUP.

Hajer, M., and H. Wagenaar. 2003. *Deliberate Policy Analysis: Understanding Governance in the Network Society*. Cambridge: Cambridge University Press.

Helderman, J-K., F.T. Schut, T. van der Grinten, and W. van de Ven. 2005. Market-Oriented Health Care Reforms and Policy Learning in the Netherlands. *Journal of Health Policy, Politics and Law* 30: 189-209.

Hilgartner, S. 2000. *Science on Stage. Expert Advice as Public Drama*. Stanford: Stanford University Press.

Hoppe, R., and S.W.F. Huijs. 2003. Werk Op De Grens Tussen Wetenschap En Beleid: Paradoxen En Dilemma's. Universiteit Twente.

Hoppe, R. 2002a. Van Flipperkast Naar Grensverkeer, Veranderende Visies Op De Relatie Tussen Wetenschap En Beleid. 1-66. Den Haag: Adviesraad voor Wetenschaps- en Technologiebeleid.

——. 2002b. Rethinking the Puzzles of the Science-Policy Nexus: Boundary Traffic, Boundary Work and the Mutual Transgression between Sts and Policy Studies. 1-52. Conference paper EASTT.

——. 2003. Werken Op De Grens Tussen Wetenschap En Politiek: Naar Een Typologie Van Grensarrangementen. *Beleidswetenschap* 2003/2.

Jasanoff, S., G.E. Markle, J.C. Petersen, and T. Pinch. 1995. *Handbook of Science and Technology Studies*. Revised edition. Thousand Oaks: Sage Publications.

Jasanoff, S. 1990. *The Fifth Branch: Science Advisors as Policy Makers*. first ed. Cambridge, Massachusetts, London, England: Harvard University Press.

Kasdorp, J. 2004. Rivaliserende Waarden, Eisen En Wensen in De Gezondheidszorg. *Beleid en Maatschappij, tijdschrift voor beleid, politiek en maatschappij* 31: 211-21.

Latour, B. 1987. *Science in Action*. Milton Keynes: Open University Press.

Lijphart, A. 1975. *The Politics of Accommodation: Pluralism and Democracy in the Netherlands*. Chicago: University of California Press.

Lindblom, C. E. 1979. Still Muddling: Not Yet Through. *Public Administration Review*, 39, 517-526.

Marktwerking, Projectgroep. 2000. Meer Markt, Minder Regels, Betere Wetten. 1-23. Den Haag: Ministerie van economische zaken en het Ministerie van Justitie.

Mackenbach, J.P., and P.J. van der Maas. 2004. *Volksgezondheid En Gezondheidszorg*. Maarssen: Elsevier gezondheidszorg.

Nationale Raad voor de Volksgezondheid. 1987. *Kantekeningen bij de Nota 2000*. NRV, Zoetermeer.

Passenier. 1994. *Van Planning Naar Scanning. Een Halve Eeuw Planbureau in Nederland*. Groningen: Wolters-Noordhoff.

Pesch, U. 2002. Het CPB Als Argument – Het Planbureau En De Pluraliteit Van Het Politieke Debat. *Beleidswetenschap* 4.

Pesch, U. 1999. Het Centraal Planbureau En De Sjablonen Van Het Economisch Beleid. Universiteit Twente.

Putters, K., J-K. Helderman, and T. van der Grinten. 2004. Stelsel-Matig Hervormen. *Beleid en Maatschappij, tijdschrift voor beleid, politiek en maatschappij* 31: 242-47.

Reijmerink, W, J. Hulshof. 1997. Volksgezondheid Toekomst Verkenning 1997. Een stap dichter bij 'evidence-based halth policy making'. TSG, 75: 359-360.

RIVM. 1995. Evaluatie van de Volksgezondheid Toekomst Verkenning 1993. Bilthoven, RIVM: 1-45.

——. 1997. Volksgezondheid Toekomst Verkenning 1997. De som der delen. Bilthoven, RIVM: 1-251.

RIVM. 1999. Definitie voor de opzet van de studie Volksgezondheid Toekomst Verkenning 2002. Bilthoven, RIVM: 1-34.

——. 2002. Gezondheid op koers? Volksgezondheid Toekomst Verkenning 2002. Bilthoven, RIVM: 1-293.

——. 2003a. Evaluatie van de Volksgezondheid Toekomst Verkenning 2002. Bilthoven, RIVM: 1-31.

——. 2003b. Zorg in de grote steden. Bilthoven, RIVM: 1-167, 2003b.

——. 2004. De Volksgezondheid Toekomst Verkenning 2006. Opzet van het samenvattend rapport. Bilthoven, RIVM: 1-31.

——. 2006. "Zorg Voor Gezondheid." In *Volksgezondheid Toekomst Verkenning*, edited by RIVM, 1-348. Bilthoven: RIVM.

RIVM, and Utrecht University. 2003. RIVM / MNP Guidance for Uncertainty Assessment and Communication. Detailed Guidance." 1-65. Bilthoven, Utrecht: RIVM / MNP / University Utrecht, 2003.

RVZ. 2002. Gezondheid en Gedrag: debatten en achtergrondstudies. Achtergrondstudies bij het advies Gezondheid en Gedrag. Zoetermeer.

Schut, E. 2004. Rivaliserende Sturingsconcepten in De Gezondheidszorg. *B en M* 31: 222-31.

Schut, E. 2003. *De Zorg Is Toch Geen Markt? Laveren Tussen Marktfalen En Overheidsfalen in De Gezondheidszorg*, Oratie Erasmus Universiteit Rotterdam.

Simons, H. J. 1994. Letter concerning Toekomstverkenning volume en kosten van de gezondheidszorg. Rijswijk, Ministerie van Volksgezondheid, Welzijn en Sport.

Tennekes, H. J. 2005. Wat donoren zien in good governance. Dicsoursanalyse van het ontwikkelingsbeleid van Nederland en Duitsland. Enschede, Universiteit Twente.

Van Asselt, M., R. Langendonck, F. van Asten, A. van der Giessen, P.H.M. Janssen, P.S.C. Heuberger, and I. Geuskens. 2001. Uncertainty & Rivm's Environmental Outlooks. Documenting a Learning Proces. 1-156. Bilthoven: RIVM.

Van den Berg, H., G. Both, and P. Basser. 1993. *Het CPB in Politieke Zaken*. Amsterdam: Wetenschappelijk Bureau Groen Links.

Van den Bogaard, A. 1998. Configuring the Economy. The Emergence of a Modelling Practice in the Netherlands, 1920-1955. UvA.

——. 1999. The Cultural Origins of the Dutch Economic Modeling Practice. *Science in Context* 12:333-50.

Van der Grinten, T., and J-K. Helderman. 2005. De Gezondheidszorg: De (on)Draaglijke Traagheid Van Een Stelselwijziging. In *Moderniteit En Overheidsbeleid. Hardnekkige Beleidsproblemen En Hun Oorzaken*, edited by M. Arentsen and W. Trommel, 85-108. Bussum: Coutinho.

Van der Wal, G., N.S. Klazinga, and D. Post. 2004. Bouw En Werking Van De Gezondheidszorg. In *Volksgezondheid En Gezondheidszorg*, edited by J.P. Mackenbach and P.J. Maas, 193-235. Maarssen: Elsevier gezondheidszorg.

Van Egmond, S., and T. Zuiderent-Jerak. Analyzing Policy Change – on the Performative Role of Economics in the Constitution of a New Policy Program in Dutch Health Care. *Public Administration* (forthcoming).

Van Zon, H. 1990. *Tachtig Jaar Rivm*, edited by RIVM. Assen / Maastricht: Van Gorcum.

VWS. 2001. Vraag Aan Bod. Welzijn en Sport Minister van Volksgezondheid. Den Haag.

Walsh, K. 1995. *Public Services and Market Mechanisms. Competition, Contracting and the New Public Management*. Edited by Colin Fudge and Robin Hambleton, *Public Policy and Politics*. London: Macmillan Press Ltd.

Weingart, P. 1999. Scientific Expertise and Political Accountability: Paradoxes of Science in Politics. *Science and Public Policy* 26: 151-62.

Weiss, C.H. 1991. Policy Research: Data, Ideas, or Arguments? In *Social Sciences and Modern States*, edited by P. et al. Wagner, 307-32. Cambridge: CUP.

Wilts, A. Economie Als Maatschappijwetenschap. Een Sociologische Geschiedenis Van De Economische Wetenschap in Nederland (Ca. 1930-1960), University of Amsterdam, 1997.

Wittrock, B. 1991. Social Knowledge and Public Policy: Eight Models of Interaction. In *Social Sciences and Modern States. National Experiences and Theoretical Crossroads*, edited by P. Wagner. Cambridge: Cambridge University Press.

Woodhouse, E.J, and D. Nieusma. 1997. When Expert Advice Works, and When It Does Not. IEEE *Technology and Society Magazine* volume 16: 23-29.

CHAPTER THREE

Boundary Configurations in Science-Policy

Modeling practices in health care

Van Egmond, Stans, and Roland Bal

Boundary Configurations in Science-Policy: Modeling Practices in Health Care
Available from august 2010 @ http:// intl-sth.sagepub.com/.

Forthcoming. *Science, Technology and Human Values*, Vol.00 (0): 1-23.

Introduction

Recent work on the relationship between science and policy focuses on boundary work that is performed in interactions between scientists and policy makers. The study of such boundary work offers valuable insights in the organization of science-policy relations for policy making, and in how the division of labor between science and policy is realized and to what consequences for the substantive issues at hand, such as what may pass for a fact and what as a value, what issues should be left to politics and what to science and what is left out altogether. Most research on boundary work focuses on (the role and organization of) regulatory science in environmental issues (Bal, 1998; Edwards, 1999; Halffman, 2003; Jasanoff, 1990; Miller, 2001; Wynne, 1992). In this article we focus on economic science in relation to health care policy making.

Although the role of economic science in policy making has been studied by scholars such as Evans (1999, and 2000), Van den Bogaard (1999, and 2002), economic models as policy instruments are left rather underexposed as research sites (see Evans, 1999; Kraemer et al, 1987; Mackenzie and Millo, 2003; Callon, 1998; Garcia-Parpet, 2007). Such models provide, in Evans' words "the sociologically fascinating nexus of an activity that brings together, legitimates, and quantifies political and moral theories about the world" (Evans, 1999). The value of economic models for policy makers is found in their ability to legitimize policy choices that in their turn express a political wish to actively shape the world. This requires open and transparent processes in which the parties involved remain accountable for the choices they make for or against certain models. Economic and econometric models however often become black boxes and are extremely difficult to understand for 'lay' persons, with the exception of the handful of experts involved in the model construction. This makes the study of economic modeling practices very relevant and raises questions as: what happens in those modeling practices? How do scientists translate theories of the world into model parameters? And what is the role of policy makers in this?

In this article[29] we seek to answer these questions by a detailed investigation of a unique governmental project in which an econometric model for the health care system (further: care model[30]) was developed in a multi-disciplinary team

[29] This article greatly benefitted from the critical comments of the members of the Health care Governance group at the Department of Health Policy and Management, the Rethinking project and the WTMC winterschool, as well from the critical comments of Rob Evans, Marjolein van Asselt, Babette Mueller-Rockstroh, Antoinette de Bont, Jan Seijbel, Marc Berg, and the anonymous reviewers of STHV.

[30] All translations of Dutch texts as well as interviews have been made by the authors.

of science advisors from three Dutch science-for-policy institutes. Our analysis of these practices of model construction offers insights in economic models as specific sites of science-policy interactions. We show that processes of modeling provide a necessary discursive space where different disciplines meet, and where negotiations between these disciplines take place. Furthermore, we show that science advisors are entangled with policy actors that they advise in what we call *boundary configurations*; strongly situated interconnections between science and policy institutions that share a specific approach to problem definitions and methods and that are embedded in, and at the same time embed, specific social, discursive and material elements. In this article we discuss the social, discursive and material elements that make up these boundary configurations, and show how these have shaped the incorporation of specific types of knowledge and associated norms and values, while leaving out others, and to what consequences to how health care is organized. That is, the boundary configuration involving the economic science advisors and economic policy actors allowed for the construction of a specific version of the care model in which the health care system is depicted as a (regulated) market.

Boundary work in science-policy practices

Social scientists have tried for decades to describe interactions between science and politics, and how science is put to use in political decision making processes. Fields that have traditionally studied this relation fell short of providing good explanations for the interplay between science and politics. Traditional models, such as the knowledge utilization model or the technocratic model, portray science as the producer of objective knowledge that policy makers can more or less easily find and use. A major drawback of this model is that it presupposes a strict boundary between science and policy, as well as a unidirectional movement from fundamental to applied knowledge (Halffman, 2003; Jasanoff, 1990; see also Sabatier, 1999; Weingart, 1999; Wildavsky, 1987; Wittrock, 1991; Woodhouse, and Cozzens, 1995).

The concept of boundary work as described by the American sociologist Tom Gieryn avoids the pitfalls of these traditional models and offers instead a concept to search for methods that interpret "changing allocations of power, authority, control, credibility, expertise and material resources among groups and occupations" in science and in policy making fields (Gieryn, 1995:440). Through boundary work, scientists try to *demarcate* science from non-science. Gieryn describes four reasons for scientists to demarcate science from non-science; (1) the monopolization of

knowledge, (2) the expansion of boundaries into knowledge spaces owned by other scientists, (3) the expulsion of non-scientists from knowledge spaces, and last, (4) the protection of knowledge from politics; "staying near but keeping out" is how Gieryn refers to this last type of boundary work (Gieryn, 1995:434; Gieryn, 1983). Studying boundary work offers insight into the normative implications of such demarcations.

Interactions between science and politics, the challenge for involved people and organizations is to establish productive relations, in spite of different networks, separate disciplines and cultures. This requires "hybrid management" (Miller, 2001). As such, boundaries that are made in those practices, on the one hand demarcate science from non-science, while they also provide ways in which those differentiated domains can interact. That is, boundary work allows one to move "beyond these boundaries, and to create hybrids of science and non-science" (Bal, Bijker, and Hendriks 2002: 323). Boundary work is social, material and discursive in nature; protocols, policy or advisory reports, models, jargon, buildings and other objects can have demarcating and coordinating consequences (Halffman, 2003; Star, and Griesemer, 1989; Bal, Bijker, and Hendriks 2002; Cash, Borck, and Patt, 2006; Jasanoff, 1990; Miller 2001). Boundaries tend to become harder when they become routinized in such discursive, social and material practices (Halffman, 2003). This makes it harder to overcome boundaries between sciences, and those between science and policy, and makes it more difficult to manage such hybrids.

In her study of science advisory agencies in the US, Jasanoff describes boundary work as a "hybrid activity that combines elements of scientific evidence and reasoning with large doses of social and political judgment" (Jasanoff, 1990: 229). Building consensus, weighing interests, and depolitization of political issues are central in the boundary work of such institutes. Policy making often involves choosing between theoretical models of the world, which are typically developed by science-based institutes that are to inform the government about what model to use.

Science advisory institutes are neither fully scientific, nor fully policy-oriented. The models (ands other tools) that are often employed by them for policy assessments have to be scientifically sound yet useful for policy makers. However, being useful entails that a model meets a broad set of criteria. Kraemer at al have shown that both technological, and organizational elements, and the connection to policy have to be taken into account in the modeling processes (Kraemer et al, 1987). Others have shown that models as boundary objects contribute to the interpretation and translation of scientific knowledge for policy-making and decision making processes by simplifying and stretching the world into useful models (Sismondo, 1999: Morgan, and Morrison, 1999; Star, and Griesemer, 1989).

Modeling practices provide the necessary discursive space in which negotiations between experts and policy makers can take place.

The three science-advisory institutes that participated in the care project, have authoritative expertise respectively on socio-economic issues in Dutch society (SCP), public health issues (RIVM) and macro economic modeling (CPB), and are typical places where such boundary work takes place. Although these institutes are science advisory bodies, as 'planning bureaus' their role in decision making processes is more authoritative than other science advisory bodies in the Netherlands; they have powerful positions as 'arbiters' of the playing field of policy makers. They are often criticized as typical Dutch phenomena, and exponents of a technocratic organization of science and policy making (Halffman, and Hoppe, 2005), as they simultaneously legitimize Governments' attempts to redirect and depoliticize political problems. They often are engaged in modeling practices directed at sensitive political issues. Special about the case that we describe in this article is that they were to cooperate on constructing the same model.

The article is based on a case study in which a reconstruction was made of the development of a macro economic model that covered a period between 1994 and 1999. 23 semi-structured interviews[31] were held with persons involved in the development of the Care model, including members of the project group from the respective science advisory bodies, and concerned departments of the Ministry of Health. Furthermore, some members of the scientific committee that advised on the development of the model were interviewed, as well as an employee from a large data provider. Some of the actors were interviewed more than once. Furthermore a document analysis was done based on archives of the health care model at the Netherlands Bureau for Economic Policy Analysis, and the Ministry of Health (containing official letters, proposals, minutes of meetings, notes, progress reports, and evaluations of the project). The data collection took place between February 2004 and June 2005.

The need for one economic model for health care policies

The care model project started officially in January 1994 when the Minister of Health sent the installation letter of the care model project to the three participating science advisory bodies (VWS, 1994). Reasons behind the need for such macro economic model, derived firstly from the neo-liberal turn in Dutch politics in the 1980s, which brought the existing arrangements of the welfare state under

[31] In order to insure the anonymity of the interviewees, all interview material is coded; a list of interviewees is obtainable with the authors.

attack (Helderman et al, 2005; Kickert, 2000). Rising costs of the health care sector especially contributed since the 1970s to the Government's rethinking of its mode of governing the health care sector. In 1987 a government commission proposed a market based system for the health care sector, in the report 'Willingness to Change' (Dekker, 1987), as a best way to secure the contradicting values in health care such as quality, equal accessibility, affordability and distribution of health care. This report sparked many public debates on the effects of such a market-based policy program (Helderman et al, 2005). Critics feared that market competition in health care would undermine the solidarity of the Dutch health care system; that it would lead to contradicting effects such as lesser quality of health care, higher costs of care, adverse risk selection of (unhealthy) people, and that it would contribute to a deterioration of civilized society.

These debates for one thing emphasized that clear measures about the public health status of Dutch citizens and the costs of the system, necessary to develop health policies, were lacking. Based on a government White paper, the 'Report 2000' published in 1986, the government had commissioned the National Institute of Public Health and the Environment (RIVM) to develop a structural overview of the public health status of Dutch citizens, which was first published in 1993 (Boer, 1986; NRV, 1987; Van Egmond et al, 2007). Although with this report the government possessed a tool that provided insights in public health trends, it lacked an instrument to rationalize the financial policy choices in the health care system. The macro economic section of the Ministry of Health, with its focus on macro economic and labor market policy making in health care, had tried for years to develop tools that could connect public health information with analysis and prediction of development of health care costs at the macro economic level, and the volume of health care services. The project secretary from the Ministry of Health reflected on this period:

> ....in the past we made estimations based on simple demographic patterns. For example if we wanted to lower the fees for medical specialists, in the past we simply decided to cut down with a couple of ten guilder notes [10 guilder equals about 4.5 euros]. With a simple estimation we could calculate that one hundred-thousand consults times ten guilders, that's quite a cut-down. Based on such simple estimations we proposed health policy to the Minister (040512, VWS)

But the attempts to develop tools by the macro economic section of the Ministry proved unsuccessful (CPB and SCP, 1997). The political pressure to provide transparent numbers on (economic) developments in health care tempted some Members of Parliament in 1993 to suggest a new planning bureau for health care

issues. Both the Ministry of Health and other science advisory institutes, however, did not desire another authoritative institute so close to their own field of expertise; an interdisciplinary project with three authoritative institutes could just as well provide unambiguous policy answers for many parties as a new science advisory body. Therefore, the Social and Cultural Planning Office (SCP) took part, for its expertise on micro economic modeling and its focus on socio-economic issues in Dutch society, such as effects of health policy measures on e.g. the accessibility of health care for individuals[32] (Trommel, 2003). Also the National Institute for Public Health and the Environment (RIVM) was asked, because of its expertise on public health issues[33] (Van Egmond et al, 2007). And the Netherlands Bureau for Economic Policy Assessment (CPB), was asked for its' expertise in economic modeling and its authoritative position in Dutch economic policy analysis[34] (Den Butter, and Mosch, 2003; Pesch, 1999; Van den Bogaard, 1999).

Emerging boundary configurations in modeling practices for policy making

Bringing together experts

After the official installation of the project team, a project team was formed. Firstly, three experts from each organization, carried out the literature review, and wrote a pre-study. After this the project continued with a core of experts from SCP and CPB, who all had a background in modeling, albeit in different fields. The two SCP experts were trained in micro-economic modeling of the service industries. CPB experts were trained in macro economic modeling. Importantly, the project leader was a highly trained (PhD level) macro economist from CPB. A data analyst from the CPB supported the project with statistical analysis in the computer. During the project between 1994 and 1999 CPB held the same project leader, and

32 Its bi-annual Social and Cultural Report is a key publication for long-term strategic planning in socio-economic policy (Trommel, 2003).

33 The RIVM publishes among other the aforementioned Public Health Future Prospect (published every four years), and the Environmental Outlook (see (RIVM, 2002; Van den Bogaard, 2002; van Egmond et al, 2007).

34 The government relies on CPB's estimations of economic development and adjusts its policymaking in economic, financial and most other policy fields based on these estimations (see e.g. den Butter and Mosch, 2003; Pesch, 1999; Van den Bogaard, 1999).

modeling expert. SCP however had more alterations in staff; the experts that had started in 1994 had all been replaced by other experts at some point during the project. Besides the core group of experts, project members often invited in other experts, from their own organization and from outside, to model specific parts of the health care system.

The project team was supported by a scientific committee. This committee, installed for peer review and to support the project group in thinking about modeling the Dutch health care sector, represented as much as possible the diversified conceptions of the health care system. At the start, fourteen experts and scientists from several universities and of various backgrounds in health care had a seat in the committee; economists, health economists, a mathematician, a public health professor, one expert from a large data collecting organization in health care, and high positioned policy makers from the Ministries of Health, Economic Affairs, and Financial Affairs (RMZ-1); although over the years some alterations took place and the committee became smaller. Between January 1996 and April 1999 the committee conferred about twice a year, to comment on versions of the model.

Last was the involvement of the section of Macro Economic and Labor Market Issues (MEEVA) of the Ministry of Health. This section carried out secretarial assistance such as the meetings with the scientific committee, the financial affairs of the project, and the monitoring of the project. For CPB, that had no prior experience with health care modeling, the involvement of MEEVA meant a great support for their way of working, as both CPB employees and the MEEVA secretary shared similar views on macro economic modeling, the role of economic theory, and a shared educational, and social background[35].

Negotiating the models' scope

When the project group and supporting scientific committee had been installed, a small group started working on a pre-study, to formulate the focus of the model: what parts of the health care system should it address and how should it address these? This involved translation of the aims set by Government and the bringing together of the three approaches of the health care system by the three institutes involved, which differed both theoretically and empirically. The aim of the care

35 When we looked at and asked about the career developments of the persons we interviewed, we especially noted that a good amount of the persons we interviewed and that studied econometrics have worked for either the CPB or MEEVA in the past, and have shifted to other key positions within the network of the care model, such as to a key position within the data provider Prismant, from the CPB to MEEVA and vice versa. We have also seen these exchanges between MEEVA and the SCP and the health care section of the RIVM.

model as formulated in the commissioning letter was to provide the government with "the tools to set the policy agenda for the yearly health care Budget" (VWS, 1994). The model needed to make "useable and trustworthy assessments of possible effects of financial and economic policies for the Dutch health care sector for periods of four to five years", based on public health information (CPB, 1994; CPB, SCP, RIVM: Pre-study, 1994). Moreover, the model should be based on behavior descriptions instead of simple demographic patterns, and it was to represent the whole health care system, that is, as the system is regarded by the Ministry of Health, encompassing both the financial organization of the system, and the organization of the system, and all the types of cure and care that the Dutch care system has to offer (Interview, 040512).

In the pre study, presented four months later, three modeling goals were formulated by the project team in close interaction with the project secretary from the Ministry of Health. They concluded that, first, the model needed to explain *past developments* in the use and costs of health care on the macro economic level. Second, it needed to calculate the *future effects* (four to five years) of possible financial-economic policy options on the macro economic level. Finally, it needed to show the (long term) *effects of possible health care and prevention policy options* on the demand and supply of health care and its consequences for health care costs (Pre-study, 1994). With these three goals the project met Governments' wishes and the project team was set up in January 1995.

Interestingly, these goals act in this instance as boundary objects (Star, and Griesemer, 1989) in that they both tie together different social worlds – scientific as well as policy related – and coordinated specific tasks to each of these worlds: who is responsible for what. The firmness of such boundary objects has a certain disciplinary effect for the actors involved, in that actors can be held accountable for (not) meeting these goals, and such goals form the footing or basis for negotiations about how to use theoretical perspectives on health care in order to set up the care model. The specificity of the formulation of the goals gave space for an integrated modeling with micro and macro economic theory as well as epidemiological and demographic data; a rather complex integration of macro economic theory on health care (e.g. what constitutes demand of health care), micro economic theory on public health issues (e.g. what does illness mean for individual incomes or groups of people), and modeling based on public health or epidemiological information (e.g. how often does an illness occur, in which sectors of society, and to what costs). An example of its complexity is the question what the financial benefits for government expenses are, when an investment is made in the prevention of smoking. An answer requires integration of knowledge from different scientific disciplines, economic, socio-psychological as well as

epidemiological, about the amount of smokers, the kinds of illnesses that are related to smoking, effects of prevention programs, and finally the costs involved. Such assessments are very complex because the information is needed from different aggregation levels; the macro level (e.g. demand effects), the micro level (what does it mean for smokers and / or patients?), and on the policy level (e.g. what policy measure to take? Or, when and how does one speak of effective policy measures?).

Through these goals the model had now become 'a model of' an integration of micro economic theories, macro economic theories and public health theories of health care, in order to support health policy. This turned the care project into a unique attempt to firstly bring together micro-economic knowledge (e.g micro-simulation modeling), knowledge about public health trends (epidemiological approaches), and macro economic knowledge, and secondly to touch a broad and politically sensitive policy field.

Renegotiating the goal of the model

For a large part the outline of the model had been negotiated on within the project team and the expert group but these negotiations took place at the discursive level; a literature surge was carried out and no actual modeling had been done. The next step for the project team was to operationalize these broad goals and to start with the theoretical descriptions of the health care system. In this phase true defining decisions were made regarding what theoretical descriptions are the 'best' representatives of the health care system, and what the model should be a model of. A couple of months after the start in 1994, the project team concluded that the goals formulated in the pre-study could not be achieved: macro economic modeling practices, and micro-economic practices based on epidemiological and demographic public health information proved impossible to combine in one model. The project leader at that time explained:

> For the planning bureau [CPB] it was paramount that the model needed to be based on economic theory first [...]. And the RIVM had a much more bottom up approach, individual diseases and all, and this approach could never be united with the macro economic theoretical approach. (041006, CPB)

The project team, together with the Ministry of Health, decided to shift the model's focus to explanations of past developments in costs of health care, and predictions of four to five years of economic assessments of future policy proposals, as these could be done with lesser epidemiological information (Pre-study,

1994). The effects of policy on public health were thus proposed to be left out of the model. As a consequence, RIVM was relocated from the project team to the scientific committee where it took on a much smaller role (SCP, 1994). The authority of the institutes was at stake, and in that sense the process of writing the pre study provided the project team with enough good reason to coordinate part of the team away without a fight. Moreover, this decision shifted the model from a model incorporating three theories of health care, to a model incorporating two theories of health care. During one of the project meetings, the project secretary remarked: "the aim of the project is [now] to develop a model for *costs* and not a model for *health*." (Meeting notes, 960513).

Materiality in modeling

Models are stylized or simplified representations of reality. This makes models into forms of organization of bias. Moreover, because models capture certain ideas of the world (and leave out others), it matters who does the modeling. Models for policy making need to be a description of the policy 'reality' (see also Kraemer et al, 1987; Edwards, 1999), therefore close contacts between the modeling experts and the policy makers is necessary. In this project some productive work relationships, or boundary configurations were created. Such boundary work is, as we show, at the same time material, social and normative in nature. It provides for a bringing together of several networks of experts and managers from specific educational backgrounds and disciplines, but also specific locations for meetings and model building, as well as tools for communication and modeling. Some of these materialities, however, support the negotiating ability of certain actors in modeling processes whilst closing negotiating abilities of others. The similarities in background between CPB scientists and MEEVA policy makers provided for a context in which the expertise of the CPB and their culture of working were better understood by the Ministry than that of the RIVM and SCP. The project secretary at MEEVA commented:

> We prefer to talk with the CPB because they understand our language. We as financial economic policy makers are able to talk with the planning bureau and they just understand what we are saying. But the issue with the SCP is that it's just a different world, that is, the policy-oriented sections [of the Ministry] are very able to deal with the SCP, but we, the financial economic types, deal with the SCP poorly. (040512B, Ministry of Health)

One project member mentioned that "one of the more complicated issues with the project was that both the CBP and MEEVA think in economic terms while we [SCP] and other policy-directorates at the Ministry of Health think more in terms of care" and individual effects (040422, SCP). Apparently, the project team had had no time or opportunity to develop some kind of shared language to understand the different standpoints, something that usually takes many years (Duncker, 2001).

Additionally, when the modeling finally started, the modeling practices were more difficult for SCP experts than for CPB experts because the software that was used for the modeling of the Care Model was located only at the CPB[36]. Modeling requires a continuous tinkering with data and theory (see e.g. Evans, 1999; Morgan, and Morrison, 1999). Tinkering requires, however, tacit knowledge and skills to do so, as well as the ability to develop tools that allow tinkering. Having the software nearby, CPB employees were able to try out their parameters and equations immediately, while SCP employees had to make an appointment at the CPB before they could have their findings tested, or have CPB staff test their parameters. This hindered SCP experts to tinker with solutions for certain model parameters. Because SCP experts 'didn't really understand the language in the model', they were 'already far behind', when they finally got the computer software (040630, SCP). Moreover, the model constructor from the SCP indicated that because 'the model was [at the CPB] (...) and we couldn't check our calculations with the model' (...), the CPB 'felt more entitled to speak to the Ministry on behalf of the project' (040630, SCP). The physical proximity to the model, as well as the proximity in terms of being experienced with the software that runs on the computer, advantaged CPB employees, and disadvantaged SCP experts, and had serious consequences on how health care practices were modeled, as we will see next.

Modeling practices: muddling with the medical specialist

Models, as simplified representations of reality, are built with both theories and data. Models for policy are restricted in the use of both theory and data (see Edwards, 1999; Sismondo, 1999; Kraemer et al, 1987; Morgan, and Morrison, 1999; Boumans, 1999). Too much theory makes a model unsuitable for assessment of policy options, while at the same time too much empirical information makes a model slow and unfeasible. One member of the scientific committee said about this that "models become giants-on-clay-feet if behavior equations are not

[36] We have no information on why this choice was made at first. Later during the project SCP also gained a copy of the software.

empirically founded" (Van der Zee, 1996). Modeling practices for policy provide in that sense a 'boundary zone' (Galison, 1996) where weighing and simplification of theory and data against the policy questions is done until a workable solution is found. So what kind of representation of the world a model becomes, depends partly on the availability of theoretical descriptions of that reality, and datasets that provide numbers about that reality. This is at the same time a technical and normative exercise. Moreover, negotiations on use of theory and data, and related problems with lack of theory or data, are often used as boundary tools, to exclude some expertise and include others.

The care project had suffered from both lack of economic theory and good quality datasets. Both institutes held different ideas on how to treat this problem, which also pointed at different ideas on what kind of theory of health care they wanted the model to represent. SCP, with its focus on effects of policy on the (financial and social) position of vulnerable groups of people (elderly people, people with low socio-economic status or suffering from chronic diseases), preferably used empirically-based parameters with well-described behavior patterns, because of "the incompleteness of the macro information" (RMZ-20; CPB 1996a), and because "micro information provides better insights into the processes for providing care at the individual level" (RMZ-20). Because of the lack of data CPB was in favor of theoretically sound parameters, which also fitted their macro economic expertise. They argued that "it is very important that, in this project in which the datasets are of a lesser quality than in other projects, the theory plays an important role." (RMZ-20). The incompatibility of both standpoints came to the fore when a politically tense subject was modeled; the role of the medical specialist in the constitution of demand of health care.

The medical specialist was both a crucial parameter, as doctors' behavior constitute a large share of health care costs[37] (see Scholten, Roex, and Sindram, 1998), and a highly politicized element of the model. In the Dutch health care system, the general practitioner acts as the gatekeeper for the health care system; the GP decides whether a patient sees a doctor just once or enters the medical system

[37] As Scholten et al argue, in the mid-nineties the government tried to reduce health care costs by replacing the fee-for-service system for medical specialists (which lead to higher medical costs due to its open end character) with a more effective system. Dutch medical specialists, who feared a reduction of their income, organized themselves into a countervailing power. This resulted in a new payment system, in negotiation with the medical specialists, both securing the medical specialists' income, and enabling hospital boards to control both quality and costs of health care. However, these developments are not unique for the Dutch system, but can be seen elsewhere as well (see Scholten, Roex, and Sindram, 1998; or Ashmore, Mulkay, and Pinch, 1989; Harrison and Pollitt, 1994).

for follow-ups. Once in the hospital, medical specialists' behavior is crucial in deciding for health care use. Thus, not patients, but doctors form a decisive factor for demand for health care. As such their role in allocating health care provisions and rising costs has been part of fierce political debates for years.

The inert political nature of the parameter 'medical specialist', as most interviewees agreed, required more empirical data, as more empirical data delivers more solid model outcomes, a solution to solve political disputes (see also Jasanoff, 1990). This was also favored by SCP. However, the problem of insufficient data required a more theoretical approach, favored by CPB. SCP proposed to model several kinds of doctors that are each differently motivated to perform their job: at least one doctor that is inertly motivated by the quality of his or her professional judgment, and doctors who are more focused on material concerns as income and spare time, more in line with empirical information on medical specialists' behavior; "the quality of his actions, his professional honor, his income and his spare time" (040517, SCP). The CPB experts proposed to model one type of specialist, one that is motivated by financial concerns, because as one member of the team remarked "as the model gets too detailed, *that* leads to an argument. Therefore you say 'let's stick to one type" (040708, CPB). The MEEVA secretary agreed with CPB's solution.

This solution, however, rose critical comments from some members of the scientific committee, as they "did not recognize this in practice" (CPB, 040708). This argument became so fierce that some of the critical members of the scientific committee left because of this. More importantly, CPB used this (and similar) disputes as an argument to write a letter, in December 1996, to the project secretary at the Ministry, to request to coordinate SCP away from the project referring to SCP's "limited experience with macro economic modeling" (CPB, 1996b; CPB, 1996c). The secretary granted this request[38]. Naturally, this partly solved the (still existing) problem to integrate micro-economic and macro economic modeling techniques / approaches.

---

38 Recent years have shown new interdisciplinary projects and reports that involve SCP, CPB and RIVM, and this can to some respect be regarded as continuations of the (then unfeasible) third aim formulated in the preliminary study in 1994; the (long term) effects of possible health care and prevention policy options on the demand and supply of health care and its consequences for health care costs. An example is the report Geneesmiddelen en medische hulpmiddelen: Trends en dilemma's. [Medicines and medical appliances. Trends and dilemma's] 1-234. Bilthoven: RIVM, 2002; and minor participating roles of CPB experts in many SCP reports. Both the SCP and CPB, moreover, had a supporting role in the RIVM's Public Health Status and Forecast Report of 2006.

Modeling managed competition

Instead of a collaborative between science advisory bodies, both SCP and RIVM became involved in the project in consultancy roles. With both SCP and RIVM experts away from the project, CPB experts, with the help of health economists from the Erasmus University, modeled one type of medical specialist. This theoretical doctor is a neo-liberal one; he or she is able to work according to the theory of managed competition in health care. This solution was chosen because it was the best described theoretical solution, not because it best described the actual situation in the Netherlands (CPB, and SCP, 1995:7). Two other options, a model of the short end of the market, which lacked an empirical basis, and a more realistic negotiation model, that would lead to an "exceptionally complicated" model (CPB, and SCP, 1995:7). However, the first choice allowed the assessment of policy proposals based on the policy program of managed competition; a policy program originally proposed in the 1986, which the Ministry of Health tried to implement for some time but had abandoned in the mid 1990s as it was too controversial, only to embrace it again in the early 2000s (Helderman et al, 2005). The model (CPB, 1999) not only became a model of the macro economic aspects of the health care sector, but also made possible the idea of competition in health care, or the idea of health care as a market, a new step within the Dutch neo-liberal economic thinking.

Boundary configurations in modeling for health policy making

This case study shows a boundary configuration in the making. It shows that science advisors in interdisciplinary projects are often as much influenced by strong alliances with specific policy-makers in the same policy field, as with other science advisors in the same project. Such strong interrelations are not new; they are discussed by others as part of a given discipline's need to guard against others from taking over authority (Abbott, 1988; Gieryn, 1983; Edwards, 1999). However, to gain a better understanding of the consequences of such interrelations in relation to other interrelations of science and policy, we referred to these as boundary configurations.

These strongly situated interconnections between science and policy institutes share similar approaches to problem definitions and research methods, and become stronger by boundary work that is material, discursive, and social in nature. In the network of experts that were involved in the care model project

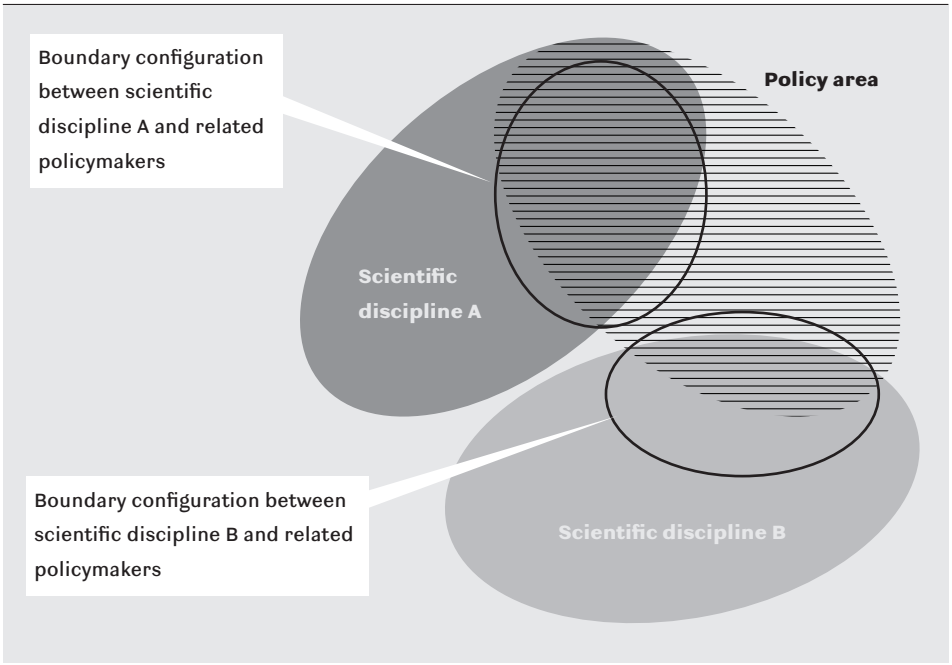
the macro economic experts from CPB got along better with the macro economic section of the Ministry, speaking the 'same language' and resulting in a better understanding of the work that was performed by CPB experts than the work of the experts from the social and cultural planning agency (SCP) and the public health experts from the RIVM. This alliance was strengthened by changes in the scientific committee, by the location of the software, in an absence of clear goals, and the lack of knowledge on the integration of macro economic and micro-economic modeling. Modeling processes provide spaces to negotiate between theory and data, and likewise between theoretical worlds and policy worlds. As such, models for policy act as boundary devices between policy and science, and modeling practices in interdisciplinary projects are forms of necessary boundary work that define what values and perspectives on a subject are able to be modeled and are thus prioritized. Despite the initial aims of the project to construct an integrated model, in which public health and socio-economic insights were combined with a macro economic overview, the care model today is a macro economic description of the health care system.

The concept of boundary configurations (see figure 2) also allowed us to unpack the consequences of these alliances; to show how these have shaped the incorporation of specific types of knowledge and associated norms and values, while leaving out others. Although the configuration involving both MEEVA and the CPB is constructed, that is, not an inevitably occurring event, and the building of the Care model was an important phase in this construction process, it is nevertheless real in its consequences. The boundary configuration involving the Ministry and CPB holds more than disciplinary or scientific similarities. The similarities stretch to the political realm in that it incorporates shared values and political goals. In this case macro economic norms and values are more centrally incorporated in the model than socio-economic and public health ones. Although referred to as a failure by involved persons, because of the failing integration of the three perspectives, our analysis shows that the project was successful too in other ways.

First, the CPB successfully 'monopolized' the model by portraying SCP and RIVM experts as incompetent and less relevant to the building of the model. However, this outcome was never certain from the start of the model, but was the result of boundary work. Secondly, the model filled a space that was not taken up or claimed by the SCP or the RIVM, nor by other science advisory bodies in the Netherlands; namely, a macro economic understanding of the health care system. Moreover, the interdisciplinary project has resulted in "changing allocations" (Gieryn, 1995:40) of power, authority, expertise and material resources. It

has provided the CPB with a new model[39], and with new authority over health care issues, as well as control over naming and framing health policy problems in macro economic terms and in terms of the market-oriented policy program. Also it forged new liaisons between the CPB and the Ministry of Health. Thirdly, the macro-economization of the health care system by means of this model,

Figure 2 **Boundary configurations in science / policy interactions.**



makes the health care system assessable according ideas of managed competition. In this way it provided the Ministry of Health with a new policy tool, for the assessment of policy proposals for the health care sector.

Science advisory bodies are often deployed by governments to build consensus, as Jasanoff has argued, to weigh interests and to depoliticize political issues (Jasanoff, 1990). What we have shown, in line with this, is that modeling

39 The CPB has used the care model for numerous publications, see for example the CPB report 2001/3. Den Haag, 2001A; the CPB Report 2001/007 *Een scenario voor de zorguitgaven 2003-2006*. Den Haag: Centraal Planbureau, 2001B; and CPB memorandum 148. *Zorg in Model: algemene structuur en varianten*. Den Haag: Centraal Planbureau, 2006a.

practices are political processes, as in these practices important decisions about what 'theories of the world' are incorporated and left out are taken, that have implications for the policy measures and decisions that are based on such models. A care model built in an interdisciplinary environment can be viewed upon as a 'depoliticizing' tool for the Minister of Health to use in turbulent political debates concerning health care reforms, but instead turns science advisory bodies into political actors.

Our research tends to portray the result of the interdisciplinary project as problematic because of boundary configurations involving specific science and policy alliances, while leaving out others. Such close interconnections between scientists and policy makers limit the value of input from other science-based experts in policy making processes (see also Halffman, 2003). The price of this could be that in the Dutch health care system, other values than macro economic ones suffer in importance and are not or badly incorporated in macro economic and market-oriented policy measures. Following endless political debates on how to secure conflicting values of health care – accessibility, affordability and efficiency – this development has given further legitimacy to 'regulated market' types of solutions which favor specific political positions over others.

In a way, however, the failure of the model in integrating the different perspectives into one health care model can also be seen as a success for democracy, as both the SCP and the RIVM have remained important actors within Dutch health care policymaking, presenting their own models and analysis from perspectives differing from the one embedded within the health care model of the CPB. Differences between the perspectives and between the boundary configurations in which they are embedded thus remain in the open and lend themselves to a *re* politicization of health policymaking.

References

Abbott, A. 1988. *The System of Professions*. Chicago, London: The University of Chicago Press.

Ashmore, M., M. Mulkay, and T. Pinch. 1989. *Health and Efficiency.* Philadelphia: Open University Press: Milton Keynes.

Bal, R. 1998. Organizing boundaries: standard setting for occupational chemicals in the Netherlands. In *The Politics of Chemical Risk: Scenarios for a Regulatory Future*, edited by R. Bal & W. Halffman. Dordrecht etc.: Kluwer Academic Publishers; 75-103.

Bal, R., W.E. Bijker, and R. Hendriks. 2002. *Paradox van wetenschappelijk gezag.* Den Haag: Gezondheidsraad.

Boer, E.J. 1986. *Gezondheid Als Uitgangspunt: Nota 2000 in het kort*, edited by Staatsuitgeverij. Den Haag: Staatsuitgeverij, 's-Gravenhage.

Boumans, M. 1999. Built-in Justification. In *Models as Mediators. Perspectives on Natural and Social Science*, edited by S.M. Mary and M. Morrison. Cambridge: Cambridge University Press.

Callon, M. 1998. *The Laws of the Markets*, *The Sociological Review*. Oxford: Blackwell Publishers.

Cash, D, J. Borck, and A. Patt. 2006. Countering the Loading-Dock Approach to Linking Science and Decision Making. *Science, Technology and Human Values* 31: 465-94.

CPB, RIVM, and SCP. 1994. Pre-study: Naar Een Ramingsmodel Voor De Zorgsector. Den Haag: CPB, RIVM, SCP.

CPB. 1994. Overzicht Literatuur T.B.V. Zorgmodel. 1-20. Report 154. Den Haag: Centraal Planbureau.

——. 1996a. meeting notes, 12 juli 1996.

——. 1996b. Letter Concerning Ramingsmodel Zorgsector. 4. Den Haag: Centraal Planbureau.

CPB. 1996c. Letter Concerning Ramingsmodel Zorgsector II. 2. Den Haag: Centraal Planbureau.

——. 1999. *Ramingsmodel Zorgsector. Eindraport tweede fase*. Den Haag: CPB in samenwerking met SCP.

——. 2001a. CPB Report 2001 / 3. Den Haag: Centraal Planbureau.

——. *Een scenario voor de zorguitgaven 2003-2006*. CPB Report 2001 / 007. Den Haag: Centraal Planbureau, 2001B.

——. 2001b. *Zorg in Model: algemene structuur en varianten*. CPB memorandum 148. Den Haag: Centraal Planbureau.

CPB, and SCP. RMZ-20. 1998. Report progress and aim of the project care model. November 26th 1998.

CPB, and SCP. 1995. *Ramingsmodel Zorgsector: Organisatie en Planning*. Werkdocument: Den Haag.

CPB, and SCP. 1997. *Ramingsmodel Zorgsector. Afronding eerste fase; een tussenrapportage*. Den Haag: CBP en SCP. Document 93.

CPB, and SCP. 1998. *Voortgang en richting van het project Ramingsmodel Zorgsector.*

Dekker, Commissie Structuur en Financiering Gezondheidszorg. 1987. Bereidheid Tot Verandering. edited by Dekker. Den Haag

Den Butter, F.A.G., and R.H.J. Mosch. 2003. The Dutch Miracle: Institutions, Networks, and Trust. *Journal of Institutional and Theoretical Economics* 159: 362-91.

Duncker, E. 2001. Symbolic Communication in Multidisciplinary Cooperations. *Science, Technology and Human Values* 26: 349-86.

Edwards, P.N. 1999. Global Climate Science, Uncertainty and Politics: Data-Laden Models, Model-Filtered Data. *Science as Culture* 8: 437-72.

Evans, R. 1999. Economic Models and Policy Advice: Theory Choice or Moral Choice? *Science in Context* 12: 351-76.

Evans, R. 2000. Economic models and economic policy: what economic forecasters can do for government. In *Empirical Models and Policy-Making: Interaction and Institutions*, edited by F.A.G. den Butter and M.S. Morgan. London and New York: Routledge.

Galison, P. 1996. Computer Simulations and the Trading Zone. In *The Disunity of Science. Boundaries, Contexts, and Power*, edited by P. Galison and D.J. Stump, 118-57. Stanford: Stanford University Press.

Garcia-Parpet, M.F. 2007. The Social Construction of a Perfect Market: The Strawberry Auction at Fontaines-En-Sologne. In *Do Economists Make Markets?*, edited by D. MacKenzie, F. Muniesa and L. Sui: Princeton University Press.

Gieryn, T.F. 1983. Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists. *American Sociological Review* 48: 781-95.

Gieryn, T.F. 1995. Boundaries of Science. In *Handbook of Social Sciences*, edited by S. Jasanoff, G.E. Markle, J.C. Petersen and T. Pinch, 393-443. Thousand Oaks: Sage Publications.

Halffman, W., and R. Hoppe. 2005. Science / Policy Boundaries: A Changing Division of Labour in Dutch Expert Policy Advice. In *Democratization of Expertise? Exploring novel forms of scientific advice in political decision-making*, edited by S. Maasen and P. Weingart, 135-51.

Halffman, W. 2003. Boundaries of Regulatory Science, Eco / Toxicology and Aquatic Hazards of Chemicals in the Us, England and the Netherlands, 1970-1995. Universiteit van Amsterdam.

Harrison, S., and C. Pollitt. 1994. *Controlling Health Professionals: The future of work and organization in the National Health Service*. Buckingham and Philadelphia: Open University Press

Helderman, J.K., F.T. Schut, T. van der Grinten, and W. van de Ven. 2005. Market-Oriented Health Care Reforms and Policy Learning in the Netherlands. *Journal of Health Policy, Politics and Law* 30: 189-209.

Jasanoff, S. 1990. *The Fifth Branch.* Cambridge, Massachusetts: Harvard University Press

Kickert, W. 2000. *Public Management Reforms in The Netherlands. Social reconstruction of reform ideas and underlying frames of reference.* Eburon.

Kraemer, K.L., S. Dickhoven, S.F. Tierney, and J.L. King. 1987. *Datawars: The Politics of Modeling in Federal Policymaking*, edited by K.L. Kraemer and R. Kling, *Corps (Computing, Organizations, Policy, and Society)*. New York: Columbia University Press.

NRV. 1987. Kanttekeningen Bij De Nota 2000. Zoetermeer: Nationale Raad voor de Volksgezondheid.

MacKenzie, D., and Y. Millo. 2003. Constructing a Market, Performing Theory: The Historical Sociology of a Financial Exchange. *American Journal of Sociology* 109: 107-45.

Miller, C. 2001. Hybrid Management: Boundary Organizations, Science Policy, and Environmental Governance in the Climate Regime. *Science, Technology and Human Values* 26: 478-500.

Morgan, M.S., and M. Morrison. 1999. *Models as Mediators.* Cambridge: Cambridge University Press.

Pesch, U. 1999. Het Centraal Planbureau en de Sjablonen van het Economisch Beleid. Universiteit Twente. Master Thesis.

RIVM. 2002. Gezondheid Op Koers? Volksgezondheid Toekomst Verkenning 2002. 1-293. Bilthoven: RIVM.

Sabatier, P.A. 1999. *Theories of the Policy Process.* Boulder, CA: Westview Press.

Scholten, G.R.M., A.J.M. Roex, and J.W. Sindram. 1998. Cost-Control and Medical Specialist Payment: The Dutch Alternative. *International Journal of Health Planning and Management* 13:69-82.

SCP. 1994. Letter concerning care-model. October 14th 1994.

Sismondo, S. 1999. Models, Simulations, and Their Objects. In *Science in Context*, edited by Sergio Sismondo, 247-60.

Star, S.L., and J.R. Griesemer. 1989. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19: 387-420.

Trommel, W. 2003. Zekere verbanden? Over de onderzoeksmethode van het SCP. *Beleid & Maatschappij*, 30: 42-45.

Van den Bogaard, A. 1999. *Configuring the Economy.* Amsterdam: Thelathesis.

Van den Bogaard, A. 2002. *De verwevenheid tussen toekomstverkenningen en beleid.* Den Haag: WRR.

Van der Zee, J. 1996. Letter Concerning Ramingsmodel Zorgsector. 2. Utrecht: NIVEL.

Van Egmond, S., M. Bekker, R. Bal, and T. van der Grinten. 2007. De VTV Als Infrastructuur Voor Evidence-Based Gezondheidsbeleid. TSG – *Tijdschrift voor gezondheidswetenschappen* 85: 399-409.

VWS. 1994. Letter Concerning Toekomstverkenning Volume En Kosten Van De Gezondheidszorg. 2. Rijswijk: Ministerie WVC, January 1994.

Weingart, P. 1999. Scientific Expertise and Political Accountability: Paradoxes of Science in Politics. *Science and Public Policy* 26: 151-62.

Wildavsky, A. 1987. *Speaking Truth to Power: The Art and Craft of Policy Analysis.* New Brunswick: Transaction.

Wittrock, B. 1991. Social Knowledge and Public Policy: Eight Models of Interaction." In *Social Sciences and Modern States. National Experiences and Theoretical Crossroads*, edited by P. Wagner. Cambridge: Cambridge University Press.

Woodhouse, E.J., and S.E. Cozzens. 1995. Science, Government and the Politics of Knowledge. In *Handbook of Science and Technology Studies, Revised Edition*, edited by S. Jasanoff, G.E. Markle, J.C. Petersen and T. Pinch, 533-53. Thousand Oaks: Sage Publications.

Wynne, B. 1992. Carving out science (and politics) from the regulatory jungle. *Social Studies of Science*, 22: 745-758.

CHAPTER FOUR

Connecting Evidence and Policy

Bringing researchers and policy makers together for effective evidence-based health policy in the Netherlands

Van Egmond, S., and Bekker, M., Bal, R.A., and Van der Grinten, T.E.D., Forthcoming

Connecting Evidence and Policy: *bringing researchers and policy makers together for effective evidence-based health policy in the Netherlands: a case study*

Submitted for review to *Evidence & Policy*

Introduction

Priority setting in health promotion and prevention demands evidence of 'what works' (Donald, 2001; Hunter, 2003; Lomas et al, 2003; Nutley et al, 2007; Van der Grinten, and Kasdorp, 1999). The use of evidence in health promotion is however claimed to be problematic. Critical supporters of evidence-based public health (EBPH) argue that, on the one hand, evidence is lacking, while on the other hand, research findings have a hard time finding their way to policy makers (Black 2001; Brownson et al, 2009; Fielding, and Briss, 2006; Glasby et al, 2007; Lurie et al, 2006; Waters, 2009). Despite the many attempts to develop tools to increase the use of evidence in public health, this uptake remains incidental rather than structural (e.g. Goldstein, 2009; Luck et al, 2006). However, many such attempts start from a linear perspective on research evidence and policy. This seems to limit explanations that focus on the more softer aspects that play an role in the use of scientific evidence in policy such as the nature of the policy field and the many uncertain and political factors that surround policy making in general (Cummins, and Macintyre, 2002; Hunter, 2009; Lin, and Gibson, 2003; Marmot, 2004). Analysts have therefore argued for a paradigm shift in thinking about research and policy that conceptualizes the translation of research evidence into a process of co-creation or co-constructing (Hunter, 2009; Lin, and Gibson, 2003; Lomas, 2000). This paradigm shift is welcomed, especially in regards to the development in European countries towards more accountability and transparency of public health policy. Moreover, concrete strategies that employ the interaction of science and policy as a process of co-construction are limited.

In this paper[40], we investigate a successful information tool for Dutch public health policy as an instance of co-construction between science and policy. The Dutch Centre for Public Health Status and Forecast (Centrum Volksgezondheid Toekomst Verkenning, CVTV) is part of the National Institute of Public Health and the Environment (Rijks Instituut voor Volksgezondheid en Milieu, RIVM). The centre VTV currently offers information and insights about the health status of Dutch citizens and the effect of preventive and health care provisions on their health. It is comparable to the U.S. National Institutes of Health. The reports are used as official input for priority setting in policy for disease prevention and health promotion for Dutch Government, and have since the first publication in 1993 grown into an authoritative and structurally used source of information for

[40] This paper greatly benefitted from the critical comments of Sam Adams, Katharina Paul and other members of the Health Governance Group at the BMG. Earlier versions were presented and discussed at the RIVM in May 2007, and at the EASTT conference in August 2007.

government agencies and the public health sector more generally (Reijmerink, and Hulshof, 1997; Van Egmond et al, 2007). This raises the question of how we can understand the centre's success as an information tool for public health policy.

We argue that the infrastructure set up by the Centre VTV is a successful information tool because it anticipates on the problems experienced in research translation for priority setting in public health policy. It does so by explicitly bringing together and separating scientists and policy makers during several stages of the writing process in closed procedures. We understand these closed procedures – backstage – that enables a front stage manifestation of the centre as an authoritative, neutral and scientific organisation. In this article, we show that these backstage processes and the front stage presentation have a dialectical relationship and are not mutually exclusive. As well, we contribute to a re-conceptualisation of the relation between science and policy making as a process of co-construction. Lessons from our case study can be very useful to improve concrete initiatives that support evidence based public health.

Research synthesis as a scientific problem

Many scholars have reflected on the question how and if the use of research evidence, for example epidemiological research, in public health policy can be improved. Much effort is put in developing strategies to bring research evidence and policy together to develop new frameworks for infrastructural support for science-policy interaction and to support changes in attitudes of both researchers and policy makers towards the value and need for evidence (Bekker et al, 2010; Hunter, 2009; Lomas, 2000; Lomas et al, 2003; Nutley et al, 2007). Recently, scholars identified problems with the uptake of research evidence as a problem of often employed linear perspective on science and policy relations – the thought that evidence finds its way to policy makers on its own merits through diffusion – drawn from notions developed in Knowledge Utilization studies (KU). As Black argues, this linear perspective often leads to tools that focus on a quantification of research impact (2001), and to the development of endless checklists that should raise awareness about the inclusion of policy makers in early stages of research. These checklists seem however to have limited effect in the uptake of evidence in policy making. The linear perspective moreover fails to act on insights that problems in the uptake of evidence in policy are constituted by many uncertain factors, such as the specificities of the policy field (Hunter, 2009), the health problems at hand (Cummins, and Macintyre, 2002; Marmot,

2004), paradox of prevention[41], and how the relation between research and policy is perceived and organized institutionally regarding existing power relations (Gibson 2003; Jasanoff, 1990; Lin, and Gibson, 2003).

Discussions on how to bridge the gap between research and evidence conclude that a paradigm shift towards more interactive science-policy models is needed (Black, 2001; Hunter, 2009; Lin, and Gibson, 2003). This call for a more reflexive stance towards the relation between research evidence and policy making has led to the development of new understandings of the policy process – in which research and policy are taken as reflexive interactive processes in which research and policy are co-constructed. From this stance, problems encountered in the research and policy interface are interpreted as a lack of understanding of each other's position and lack of infrastructural support (Bekker et al, 2004; Black 2007; Cookson, 2005; Gibson, 2003; Hanney et al, 2004; Lomas et al, 2003), and recently to emphasize the political context as an important contributor to the use of evidence (Wright et al, 2007). Consequently, public health scientists have put effort into developing interactive models of science policy relations; an often used model is the Lomas Framework for Linkage and Exchange (Lomas, 2000). Alongside, strategies to bring research and policy closer together are developed, as well as supportive tools for effective science policy interaction such as science networks and databases (Hutchinson, and Estabrooks, 2009; Lomas, 2003; Nutley et al, 2010; Smith et al, 2009).

The focus in research synthesis research lies however with describing the ideal relation between research evidence and policy and in developing tools that alternate both worlds of science and public health policy in order to bring these worlds closer together. In other words, the abandoned linear perspective seems to have been replaced by a similar notion that science and policy are two opposite worlds. However, to take science and policy as interactive and reflexive processes also requires a need to rethink this opposition and to reconceptualise existing relations between research and policy in public health. We argue that knowledge and the societal contexts – the policy realm – in which the knowledge is produced, cannot be seen as separate entities (Bourdieu, 1992; Giddens, 1994; Jasanoff, 1995; Tsekeris, and Katrivesis, 2008). Science does not simply represent an 'objective' and 'natural' state of things but is instead constructed in interaction with that

[41] The nature of health prevention and promotion complicates the use of evidence in the development of public health policy: collective gains or benefits require individual behavior changes, while individuals do not necessarily benefit from these collective gains. The effects of interventions on future health status of citizens often only become visible at the long term, and are surrounded with uncertainty. This is often referred to as the prevention paradox.

context. As this take on science and policy interactions could lead to discussions about the value of science and the political nature of science, scientists construct a front stage in which science is portrayed as objective and detached. Moreover, this requires a new understanding of how scientists and policy makers create this front stage and backstage and to what consequences for the interactions between science and policy and the construction of 'scientific policy facts'. With our case study, we hope to contribute to this re-conceptualisation of the interactions of science and policy making as interactive and reflexive practices.

Method

We have focused on the 'how' as well as on the 'consequences' of science policy interactions as interactive and reflexive interactions. In other words, how the relation between science and policy is organised in specific instances is taken as the starting point to investigate what is going on there and how we can understand these processes in the light of evidence-based policy making. To do so, we used a qualitative case study design. Because large part of these practices took place in former years, we have used in depth semi-structured interviews and a document analysis[42]. We interviewed among others high ranked civil servants of the Ministry of Health and the Centre VTV. Our research is further limited to practices that were documented on paper and that were part of people's personal recollections of 'how things went'. Analysis was done inductively. Early results have been presented and discussed with the interviewees, at the institute of Health Policy and Management in Rotterdam, and at the 2007 EASTT conference.

[42] The interviews were held with diverse actors affiliated with making and using the reports. Interviewees included staff of the centre for Public Health Status and Forecasting and members of the scientific and the policy advisory boards of the centre VTV, among which the (former) director of the centre for Public Health Status and Forecasting, and the project leader of the 2006 report. Furthermore, we interviewed policy makers and directors from the Ministry of Health, and a few directors and professionals from regional public health centres, and a staff member of a large health insurance company in the Netherlands. See for more information about the interviews the research report, van Egmond S, Bal R, Bekker M, van der Grinten T. Wetenschap voor Beleid. IBMG/EMC; 2006(22).

The VTV: from phonebook to successful informer of policy

The centre as a learning network organization

The Centre for Public Health Status and Forecast (further Centre VTV) is an intermediary organisation between research evidence and government policy established at the beginning of the 1990s by the Ministry of Health[43], specifically to collect, measure, and classify numbers and research evidence on public health issues. Its' reports are used for priority setting in public health policy. In this it fulfills five functions. First, the reports are used in the policy cycle of the Ministry of Health. Second, the summary reports are agenda-setting tools for the government. Third, the reports contribute to the development and use of standardised compounded health measurements[44]. Fourth, the report has an authoritative reputation among scientists. Finally, the VTV report is increasingly used as policy evaluation instrument, as it monitors the health status of Dutch citizens for almost 20 years now.

The centre VTV started in the early 1990's with the development of an information tool for policy makers based on the model of health indicators developed by Lalonde (Lalonde, 1974). Although the publication of the first report in 1993 was welcomed by policy makers, its' use in public policy making was taken to be incidental rather than structural; it resembled according to many in the field, an 'epidemiological phone book'. The centre has come a long way since this first report and has grown into an authoritative institute whose reports are received well in the field (Van Egmond et al 2007; Reijmerink, and Hulshof, 1997). The question remains how the centre has pulled this off.

The centre can be understood as a network organization aimed at creating advocacy coalitions (Fischer et al, 2007), in that it brings together many disciplines in public health. This has been a main aim since 1991 when the centre kicked off with a conference during which a discussion was held with 50 public health experts and representatives from the Ministry of Health about the formulation of the main outlines of information tool for policy makers (VTV, 1995). This way the

---

43 The Dutch name is Ministerie voor Volksgezondheid, Welzijn en Sport – Health, Welfare and Sports (VWS).

44 Measures such as the DALY (disability-adjusted life years), the QALY (quality-adjusted life years), Years of Lost Life (YLL), Years Lived with Disability (YLD), Burden of Disease (BD), Life Expectancy with Disability (LEWD), Healthy Life Years (HLY), and Integrated Cost Effectiveness measures.

centre ensured that a policy information tool was acknowledged and carried by key players in the public health field. However, the resulted 1000-page report was received with mixed emotions in the field; although the assembly of the material constituted a thorough piece of work (IGZ, 1994; Health Council, 1995; RIVM, 1995), others perceived the report as an 'epidemiological phone book' lacking useful and concrete messages for policy makers (Reijmerking, and Hulshof, 1997; Van Egmond, et al., 2007). The information presented proved not as useful for policy makers as hoped for during the conference. This called for a revision of the centre's way of working.

Building an infrastructure to connect researchers and policy makers

The project team VTV started off with the help of three boards. First, a permanent general policy advisory board (GAB) in which high-ranking civil servant from the Ministry of Health completed with high-ranking employees from the Health Inspection (IGZ) and the Ministry of Social Affairs and Welfare (SZW) take a seat. This board comes into action only a few times per year and serves to provide general Ministerial and political input for the centre's main aims for future. The discussions focus on the long term and macro developments in public health. Second, the VTV is supported by the scientific board in which high standing experts of the collaborative partners have a seat to provide for substantial support. The scientific advisory board consists of experts deriving from several public health disciplines such as health policy, epidemiology, health economics, medical technology assessment, and health organisations. Over the years, the focus of the scientific board shifted to consultations about general public health issues that could be relevant for policy makers and to provide the scientific arguments why this could be so. It now advises the management team of the centre on what messages work best and how these can formulated effectively, regarding the policy impact of the messages. The scientific board focuses less on the scientific rigour of the evidence – this is left to employees of the centre that perform systematic reviews and discuss these findings in project groups and the policy advisory boards – but translates this to the policy impact. The scientific board serves in this sense as a hybrid that contains knowledge of both the scientific and the policy realm. Third, the centre VTV uses a policy advisory board (PAB) for policy makers affiliated with specific public health issues. The composition of these boards change often, depending on the public health theme that is discussed. These boards however gradually became more defined and were completed with other tools.

Moreover, to extent its knowledge base the centre installed several project groups that focus on specific health related issues, such as elderly care or health and healthcare in larger cities. These groups consist of many experts from different institutes in the field such as universities, expert and umbrella organizations and change per project. In close collaboration with the project leaders from the centre and in close contact with policy makers from the Ministry, these experts sort out available data from all available sources and research, discuss why specific data and related health issues are most relevant and why. The experts contribute also to the writing process of the chapters in the reports. This specific form of involvement of experts adds to the centre's core business of gathering and assessing scientific evidence, for which it uses systematic literature reviews based on generally accepted scientific methods such as the guidelines used by the Cochrane Collaboration. This way, softer or 'grey' data is separated from hard data and after the initial selection, many of these findings are translated to and interpreted for the Dutch situation.

Finally, the centre put more effort into the development of standardized health measurements or risk yardsticks, such as measures for Disability-Adjusted Life Years (DALY), the Quality-Adjusted Life Years (QALY), Healthy Life Years (HLY), and Integrated Cost Effectiveness Measures, as well as others. These measures have in their turn lead to a standardisation of epidemiological information. Epidemiology as a scientific discipline has since become more affiliated with delivering such information. These measures provide a broader insight into the elements that determine the health of Dutch citizens.

Coming to useful facts: acting on tensions in the interaction with policy makers

Between facts and policy messages

As the centre VTV expanded its knowledge network and the reports gained a larger role in the policy cycle[45], some tense interactions between the centre as

[45] As a consequence of these infrastructural changes the centre changed the set up of the reports. The second report, released in 1997, held three lines of inquiry; (1) the renewal of core data, (2) an extension with additional theme-reports, and (3) an integration of collected data, and considered further the relationship between the health status of citizens and the use and costs of health care. As such, the 1997 Report moved beyond the display of an overview and analysis of available public health data, and received well with the actors in the field, including the Ministry of Health (23, 24). In 2002 and 2006 the centre extended the core

deliverer of evidence and policy makers became apparent and came down to finding the right distance between the centre and the policy desired by the Ministry of Health. On the one hand, the centre needs to be close to policy in order to come to useful messages. One official from the Ministry of Health mentioned that the Ministry tries to dig up numbers since "numbers are decisive, since they are not susceptible to political motions, from the left, the right or anywhere. Numbers are just numbers" (20051005). Thus, numbers decrease political discussions (Weiss, 1991). Moreover, the feasibility of policy measures also contributes to the use of certain. The incentives for policy measures need to be clear, although it is not always easy to see what the incentives are of specific policy measures. As the official explained, "you have to be careful that you don't overstress certain issues because if you don't have a solution, you're stuck with it" (20051005). An example of this is diabetes; the centre VTV can calculate exactly what the societal costs of diabetes are, and where cut backs can be made. This knowledge is, however, in itself not enough for the government to act on. As explained by another (former) official from the Ministry of Health stated, "hospitals receive a certain amount of money each year, and if they spent less, this money does not automatically flow back" [to health insurance companies or the government] (20050906). Thus, knowing how to cut back costs regarding an illness, such as diabetes, does not automatically imply that these cutbacks are deemed useful or that they can and will be made. Therefore, the centre needs provide the Ministry with useful facts: that is, facts that give the Ministry enough reason to develop policy for. To come to such useful facts, researchers have to be closer to the policy makers; as the former head of the centre VTV mentioned, "the centre needs to know what goes on at the Ministry and the Ministry needs to know what knowledge is available and what is not, [as it is] a two-way road" (20050913).

On the other hand, however, the centre cannot come too close to the Ministry. A project member illustrated that the centre was, at first, not allowed to provide policy advice "because at the Ministry, they held the idea that 'we at the Ministry develop policy and you at the centre are the researchers and present the facts'" (20050809). The Centre cannot tread on the domain of the Ministry; this is perceived as threat to the role of the Ministry as policy maker in public health. However, these were the same policy makers that critiqued the first report because it "resembled an encyclopaedia and it was too broad, and the report needed to

report and theme reports with websites that are continuously kept up to date, and that invite citizens to react on the information. This enabled the larger role for the reports in de policy cycle of the Ministry. Comparable websites in the UK are the medirect.co.uk website or the nhs.co.uk websites. The difference is that the VTV has no commercial or medical incentive.

come closer to the problems the Ministry deals with" (20050809). Thus the centre has to walk a thin line between staying close but keeping distance; a close distance is needed to come to messages for policy makers that are, at the same time, not policy messages. This effectively becomes 'closeness' to policy and policy makers, while simultaneously serving as a safe distance to policy makers. Such close distance, moreover, is a kind of tool that takes into account the sensitivities implied in the power relations between the Ministry as contractor and the centre as agent. Because this close distance depoliticizes the information brought about by the centre VTV, it also contributes to the scientific credibility of the centre and the presentation of science 'speaking truth to power'.

Establishing close distance

The central problem in research synthesis for policy, to establish the right distance to policy makers, is not a straightforward task. Rather, it is a complex interplay between researchers and policy makers, during which many political interests and normative considerations have to be taken into account as well. This is seen in discussions at the centre about the use and value of standardized health measures. These may seem neutral but instead emphasize specific health issues while leaving out others and because they compare between groups of citizens. De Hollander and Hanemaaijer (2003) show for example for the choice for 'healthy life years' that this measure values young healthy people more than elderly people and those that suffer from a chronic disease when policy measures have to be taken. The measure 'death per year' for example measures elderly, adolescents, poor and rich equally. Although this seems fair, it also implies that the early passing away of severely ill elderly people with a few days measures equally to the death of healthy adolescents. But if 'lost life expectancy' is the measure for policy than this favours adolescents above elderly, as elderly have less life expectancy to loose. De Hollander and Hanemaaijer rightly argue that "there is no universal risk measurement; the choice for a risk measurement is always a derivative of the normative standpoints we wish to express" (2003:74). These discussions emphasize that the centre needs to put much effort in establishing close distance. The centre deploys a few strategies to create a close distance.

Disentangling the political from the scientific

First the centre disentangled the political from the scientific by reorganizing different kinds of input at different times during the writing process of the reports. The first director of the Centre argued that because the interests of both policy

and scientific groups are so different, he became wary of putting scientific representatives and policy representatives in one board, because "you'd get discussions you don't want to have, for instance about numbers that displease the Ministry" (20050913). And these discussions could lead to "influence from the Ministry on numbers that are brought about by the experts" (20050913). It is for this reason that the centre installed ad hoc expert groups that are installed on specific topics for the duration of the writing of one topic. Policy makers are not welcome in these expert groups. Therefore, the centre reformed the Policy Advisory Board (PAB) into two types of boards in which experts and policy makers are explicitly separated. Secondly, the centre has placed project leaders from the centre inside the Ministry, as 'liaisons'. These liaisons work in the Ministry in a separate unit, the Unit Information and Analysis (DIA). The DIA unit helps to develop the contacts between the Ministry and the centre VTV into a more structural form to accommodate the more formal aspects of the relation between the Ministry and the centre. They do this by building contacts that form a small but effective source of information for the Ministry and a source of influence for the centre. As the former head of the division Public Health stated, "all correspondence [goes] directly to the directors, (...) and if people don't show up at meetings, we play on their sense of responsibility by referring to our status as commissioner and the amount of money involved" (interview 20050914). These sources work formally on structuring 'knowledge questions' from the Ministry and the related research protocols, and informally on agenda setting at different levels within the Ministry and on settling agreements between policy makers and the centre.

These liaisons are very important especially since the relations between the Ministry and the centre has become more formalized the past eight years. The Ministry of Health and the centre VTV use formal research protocols to organize their relationship, and the centre receives external visitations every few years. The research protocol works dually: it formalizes the knowledge questions that the Ministry articulates through a formal proposal round and contractual negotiations and it provides close interactions between the policy makers and the researchers at the centre to make the writing process easier and more efficient. In other ways, this formalization demands more interaction between the centre and the Ministry; knowledge gaps do not present themselves by themselves. Moreover, the knowledge gaps are not a given in advance and are hard to establish.

Creating a backstage

In the wake of the trend towards evidence based public health policy, many public health scientists propose a re-conceptualisation of the relation between

research and policy and in line with this, have proposed suggestions to link research and policy earlier and closer. The Dutch example – the VTV centre – is successful in providing the Dutch government with an information tool for policy. It brings researchers and policy makers closer together in a new and innovative way. Our research reveals that this newly developed interaction between scientists and policy makers is however more complicated than suggested in the literature.

It consists of bringing researchers and policy makers together in several arenas and at several levels in the organisation; in advisory boards and expert groups. What makes these boards and the expert groups so effective is their *informal character.* The scientific board serves as a bridge between the scientific world and the policy world at the level of the directors, the political level. The policy boards and expert groups are bridges between policy makers and scientists at the middle and micro level of policy making. Moreover, these boards and groups form a kind of *back stage* negotiation spaces where open discussions about the value of numbers and the possibility of policy measures take place.

But the interaction between scientists and policy makers does not only consist of getting them closer together, but also of separating scientists and policy makers at the right time in the process to avoid political discussions and to provide trust in the reports as a credible source. Moreover, to come to useful messages, the centre creates official distance, while it organizes at the same time closer contacts between policy makers and experts in the project groups. At the front stage, the centre keeps up the image of science and policy as two separate communities; the research domain and the policy domain that both have a different task.

The centre does this so that the reports can contribute to the policy process by de-politicizing public health issues and discussions on the value of evidence. In this way, the centre and its reports function as consensus platforms for both policy makers and researchers. Moreover, the centre's infrastructure works as a scientific negotiation space in which a science for policy is created. Importantly, this set-up provides a situation of trust between the different producers of data and the users of these sources. That is, the evidence provided and assessed by researchers has value to policymakers only when science speaks with one voice. This happens only in a situation of trust between the different producers of knowledge (Gibson, 2003). This kind of trust takes a lot of effort and maintenance but pays off in regard to the authority given to the centre's products. The centre draws on an extensive network of data sources and experts. The list of experts that participate in one way or the other in the writing process of the reports often covers over one hundred names. This trust is reciprocal in nature, as the report is front stage given the status of credible source of knowledge, even in scientific circles. The reputation of any involved researcher or expert is weighed in this infrastructure.

Creating scientific policy facts

In these negotiation processes between the experts in the groups and the policy makers, hybrid facts are produced to 'bridge the gap' between science and policy. These hybrid facts – or scientific policy facts – are acted upon by policy makers because there is an incentive to act upon. Examples are the standardized compounded health measurements that incorporate all kinds of (invisible) normative assumptions that have to be taken into account for policy making, as discussed earlier. These scientific policy facts result from the interplay between researchers and policy makers but are valued backstage in open discussions between researchers and policy makers. In this we can argue that some facts are more factual than others and these facts are in turn related to the possibility for the Ministry to act on them, that is, to develop policy measures based on these facts.

EBHP as a dynamic interactive process

in this article we have examined the relationship between evidence and policy, in the light of Evidence Based Health Policy (EBHP). As the Public Health Status and Forecast reports have become widely known and used in the public health policy process by the Dutch government, it raises the question how the centre VTV and its reports have come to be successful deliverers of evidence for policy making, and how can be investigated from a reflexive perspective.

The idea of science policy relations as a linear one, based on notions of rational behaviour of organisations and a rationalist epistemology, has been criticized by many scholars (Fischer et al, 2007; Lindblom, and Cohen, 1979; Jasanoff, 1995; Hunter, 2009; Gibson, 2003). Although it has been replaced by a more a reflexive attitude towards science policy relations, the rational model is still widely used to describe and organise the relation between science and policy. Moreover, even tools that have been built with the idea in mind to better connect research and policy and start from a more enlightenment perspective, such as the Lomas Framework, often start from the idea of research and policy as two separate worlds. Such a notion overlooks the particularities of (existing) science policy interactions, such as trust, reciprocity of the interactions and the political nature of scientific knowledge.

The centre VTV currently produces reports that are taken as successful informers of public health policy. This happens through a process of learning and adapting to the needs of both policy makers that use the reports and the researchers that are involved in delivering data. We analyse the centre as a reflexive organisation because it acts upon its mediating role in science and policy making with great

awareness of the specificities of both practices. This way it enables a productive interaction between researchers and policy makers. Our research also suggests that this productive interaction is built on an infrastructure that supports formal and informal contacts between researchers and policy makers. These contacts are provided by a simultaneous bringing together and a separation of the political and the scientific. This simultaneous movement is established through the creation of safe negotiation spaces. These spaces are a kind of 'backstage' (Goffman, 1990; Hilgartner, 2000) that is invisible to the public but crucial to produce a specific form of science that is usable for policy. This backstage does not exist by accident nor has it grown organically; instead, it is managed. This also becomes visible in the evaluations performed by the centre about the construction process, perceptions and effectiveness of the reports for the users (the Ministry). Evaluations deliver lessons for the future and provide input for the external visitations.

On stage 02 (Goffman, 1990; Hilgartner, 2000), the relationship between the Ministry and the centre is formalized through the formal proposal rounds, visitations and the role of the reports in the policy cycle. In order for research to contribute significantly to the policy process, in the sense that policy makers are able to act on this kind of information (rephrase), such formal and informal processes are a prerequisite. Informal contacts need to take place between researchers, in order to come to unambiguous and useable numbers. As such, the VTV reports function as a consensus platform for scientific knowledge enabling science to 'speak with one voice'. The reports not only 'bridge the gap'; they also produce a specific form of science that we refer to as scientific policy facts. Examples are the compounded health measures and the useful messages.

Only when the condition is met that policy makers and scientists can negotiate the available evidence and interpret the value of this evidence for policy making, can knowledge effectively contribute to policy processes. Evidence is then able to contribute to evidence based health policy and functions as an *agenda setting tool for policy makers*. The notion of a clear division of labour between researchers and policy makers is, as we suggest, rather a *front stage* presentation of the role of science in policy. To make this front stage presentation possible many issues need to be addressed *backstage* in close and informal contacts with policy makers of the Ministry of Health. Such open and closed procedures are not opposites, but have, according to Bal, Bijker, and Hendriks, a "dialectic relation and are not mutually exclusive" (Bal, Bijker, and Hendriks, 2004). In the current policy debate, with its stress on accountability and transparency, calls to act on a strictly rational perspective on the science policy relationship are increasingly dominant. This development could strongly hinder the effectiveness of knowledge for policy

makers as in this formal version of the process the separation rather than the bridging of science and policy are sought.

Investigating science policy relations as reflexive and dynamic processes starts from actual practices and takes into account the rational take on science policy relations. As we have shown, however, the rational perspective on decision making and the role of scientific knowledge in it as the basis for policy making could never function *on its own*. The idea that a more formal organisation of knowledge in the policy cycle will better effectuate the use of knowledge rings through such strategies. This position also suggests that policy makers have a clear idea of existing knowledge gaps. Establishing what kind of knowledge is missing or lacking is not a straightforward task and is determined in the interaction between scientists and policy makers. The difference between 'need to know' and 'nice to know' is made in daily negotiations and is not a given in advance. Thus, a re-conceptualisation of the relationship between research and policy making supports a better understanding of these interactions. It could enhance the effectiveness of knowledge instruments in public health, in that it takes potential scientific and policy conflicts as starting points for evidence-based health policy, instead of endpoints.

References

Bal, R., W.E. Bijker, and R. Hendriks. 2004. Democratisation of scientific evidence. *British Medical Journal*, 329: 1339-41.

Bekker, M.P.M., K. Putters, and T.E.D. van der Grinten. 2004. Exploring the relationship between evidence and decision-making. A political-adminstrative approach to health impact assessment. *Environmental Impact Assessment Review*, 24: 139-149.

Bekker, M., S. van Egmond, R. Wehrens, K. Putters, and R. Bal. 2010. Linking research and policy in Dutch healthcare: infrastructure, innovations and impacts. *Evidence & Policy*, 6: 237-253

Black, N. 2001. Evidence based policy: proceed with care. *British Medical Journal*, 323: 275-9.

Black, N. 2007. UK Health Services Research Network: at last, a health services research organization. *Journal of Health Services Research and Policy*, 12: s1-2.

Bourdieu, P. 1992. *Invitation to a reflexive sociology*, Chicago: University of Chicago Press.

Brownson, R.C., J.F. Chriqui, and K.A. Stamatakis. 2009. Understanding Evidence-Based Public Health Policy. *American Journal of Public Health*, 99: 1576-1584.

Cookson, R. 2005. Evidence-based policy making in health care: what it is and what it isn't. *Journal of Health Services Research and Policy*, 10: 118-121.

Cummins, S., and S. MacIntyre, 2002. Food deserts – evidence and assumption in health policy making. *British Medical Journal*, 325: 436-8.

De Hollander, A.E.M., and A.H. Hanemaaijer. 2003. Management van gezondheidsrisico's. Mogelijkheden en beperkingen van kosten-batenanalyses. *Justitiële verkenningen*, 29: 70-82.

Donald, A. 2001. Commentary: research must be taken seriously. *British Medical Journal*, 323: 278-279.

Fielding, J. E., and P.A. Briss. 2006. Promoting Evidence-Based Public Health Policy: Can We Have Better Evidence And More Action? *Health Affairs*, 25: 969-977.

Fischer, F., G. Miller, and M. Sidney, Eds. 2007. *Handbook of Public Policy Analysis. Theory, Politics and Methods*, CRC Press

Gibson, B. 2003. Beyond 'two communities'. In *Evidence-based Health Policy: problems and possibilities*, edited by V. Lin and B. Gibson.

Giddens, A. 1994. *Beyond Left and Right. The Future of Radical Politics*, Cambridge, Polity Press.

Glasby, J., K. Walshe, and G. Harvey. 2007. What counts as 'evidence' in 'evidence-based practice'? *Evidence & Policy*, 3: 325-7.

Goffman, E. (1959)1990 *The Presentation of Self in Everyday Life*, London etc., Penguin.

Goldstein, H. 2009. Translating Research into Public Policy. *Journal of Public Health Policy*, 30: 16-20.

Hanney, S., J. Grant, S. Wooding, and M.J. Buxton. 2004. Proposed methods for reviewing the outcomes of health research: the impact of funding by the UK's 'Arthritis Research Campaign. *Health Research Policy and Systems*, 2.

Health Council. 1995. Commentaar op de Volksgezondheid Toekomst Verkenning. Gezondheidsraad. Den Haag.

Hilgartner, S. 2000. *Science on Stage. Expert advice as public drama.* Stanford: Stanford University Press.

Hunter, D.J. 1997. *Desperately Seeking Solutions. Rationing Health Care*, Harlow: Pearson Education Limited.

Hunter, D.J. 2003. Evidence-based policy and practice: riding for a fall? *Journal of the Royal Society of Medicine*, 96: 194-196.

Hunter, D.J. 2009. Relationship between evidence and policy: A case of evidence-based policy or policy-based evidence? *Public Health*, 123: 583-586.

Hutchinson, A.M., and C.A. Estabrooks. 2009. Theories and models of KTA: Cognitive psychology theories. *Knowledge Translation in Health Care: Moving from Evidence to Practice*, edited by S. Straus, J. Tetroe and I. Graham. Mississauga, Ontario: Wiley-Blackwell.

IGZ. 1994. De Zorg als determinant van gezondheid. Rijswijk.

Jasanoff, S. 1995. Product, process, or programme: three cultures and the regulation of biotechnology. *Resistance to new technology. Nuclear power, information technology and biotechnology*, edited by M. Bauer. Cambridge: Cambridge University Press

Lalonde, M. 1974. A new perspective on health of Canadians: a working document. In: Canada, G. O. (Ed.), Ottawa.

Lin, V. & B. Gibson, Eds. 2003. *Evidence-based Health Policy: Problems & Possibilities.* Victoria: Oxford University Press.

Lindblom, C. E., and D.K. Cohen. 1979. *Usable Knowledge: social science and social problem solving.* New Haven: Yale University Press

Lomas, J. 1997. A Framework for Linkage and Exchange of Research Evidence.

Lomas, J. 2000. A framework for linkage and exchange of research evidence. *Health Affairs*, 19

Lomas, J., N. Fulop, D. Gagnon, and P. Allen. 2003 On being a Good Listener: Setting Priorities for Applied Health Services Research. *The Milbank Quarterly*, 81: 363-388.

Luck, J., C. Chang, R. Brown, E, and J. Lumpkin. 2006. Using Local Health Information to Promote Public Health. *Health Affairs*, 25: 979-991.

Lurie, N., J. Wasserman, and C.D. Nelson. 2006. Public Health Preparedness: Evolution of Revolution? *Health Affairs*, 25: 935-945.

Marmot, M.G. 2004. Evidence based policy or policy based evidence? Willingness to take action influences the view of the evidence-look at alcohol. *British Medical Journal*, 328: 906-907.

Nutley, S., S. Morton, T. Jung, and A. Boaz. 2010. Evidence and policy in six European countries: diverse approaches and common challenges. *Evidence & Policy*, 6: 131-44.

Nutley, S., I. Walter, and H.T.O. Davies. 2007. *Using Evidence*, Bristol The Policy Press.

Perleth, M., E. Jakubowksi, and R. Busse. 2001. What is 'best practice' in health care? State of the art and perspectives in improving the effectiveness and efficiency of European health care systems. *Health Policy*, 56: 235-250.

Reijmerink, W., and J. Hulshof. 1997. Volksgezondheid Toekomst Verkenning 1997. Een stap dichter bij 'evidence-based halth policy making'. TSG, *Tijdschrift voor Sociale Geneeskunde*, 75: 359-360.

RIVM. 1995. Evaluatie van de Volksgezondheid Toekomst Verkenning 1993. Bilthoven: RIVM

Smith, K.E., C. Bambra, K.E. Joyce, N. Perkins, D.J. Hunter, and E.A. Blenkinsopp. 2009. Partners in health? A systematic review of the impact of organizational partnerships on public health outcomes in England between 1997 and 2008. *Journal of Public Health*, 31: 210-221

Tsekeris, C., and N. Katrivesis. 2008. *Reflexivity in sociological theory and social action*. Facta Universitatis.

Van der Grinten, T.E.D., and J.P. Kasdorp. 1999. Choices in Dutch health care: mixing strategies and responsibilities. *Health Policy,* 50: 105-122.

Van Egmond, C., R. Bal, T. van der Grinten, and M. Bekker. 2007. Science for Policy. The VTV as coordination-instrument. TSG (85): 399-406.

Waters, E. 2009. Evidence for public health decision-making: towards reliable synthesis. *Bulletin of the World Health Organisation,* 87: 164.

Weiss, C. H. 1991. Policy Research: Data, Ideas, or Arguments? In Wagner, P.E.A. (Ed.) *Social Sciences and Modern States.* Cambridge, Cambridge UP.

Wright, J., S.F., J. Parry, and J. Mathers. 2007. What to do about political context? Evidence synthesis, the New deal fro Communities and the possibilities for evidence-based policy. *Evidence & Policy,* 3: 253-69.

Modelling for Policy

Science-based models as performative boundary objects in Dutch policy-making

Van Egmond, Stans, Ragna Zeiss. 2010.

Modelling for Policy: Science-based models as performative boundary objects for Dutch policy making

Science Studies, Vol. 23 (1): 58-78

Introduction

Scientific knowledge in policy making processes is often applied in the form of simulation models. Such models have since long been used by governments to predict e.g. (financial) consequences of policy measures. The past decades have shown an increasing use of such models as important tools to support policy making and policy decisions in many national and international policy fields (e.g. Morgan & Den Butter, 2000; Edwards, 1999; Hordijk, 1991; Sundberg, 2007; Van den Bogaard, 1998; Van Egmond and Bal, forthcoming). The growing importance of simulation models in policy making processes leads to the question of how scientific knowledge, policy questions and demands are brought together in such models and the consequences thereof for the social worlds of both policy and scientific research.

Philosophical discussions around models have centred on epistemic issues, with little attention to relations between modelling practices and policy practices. Other studies on models show how models for policy making are the result of scientific, professional and policy interaction (e.g. Shackley, and Wynne, 1995; Van Daalen, et al., 2002; Evans, 2000; Mattila, 2005). The notion of a boundary object, first discussed by Star and Griesemer in 1989, has proven useful to draw attention to the hybrid nature of scientific tools such as models. Boundary objects coordinate between social worlds, e.g. on the interface between science and policy (Bal, 1998; Halffman, 2003), and therefore allow these social worlds to remain stable. This paper contributes to this body of literature by drawing on the notions of boundary object *and* performativity.

We suggest that boundary objects often 'do' more than bring together and coordinate social worlds. Boundary objects play a role in establishing facts as parts of standardized packages (Fujimura, 1992). Therefore, they are active constituents of social worlds and may change those they function in (Callon, 1998; MacKenzie, and Millo, 2003). In assuming that the value of the concept of boundary object lies in the idea that different social worlds can communicate, interact, collaborate and, at the same time, remain dissimilar and relatively stable, analyses of boundary objects often conclude at the moment the boundary object has been established. What a boundary object 'does' is then taken for granted (Zeiss, and Groenewegen, 2009). The performative nature of these boundary objects and the way in which they change the social worlds they coordinate has thus been under-explored. It is therefore crucial to understand their performative nature to understand the increasingly important role of models in policy making.

This paper contributes to a better understanding of the performative nature of boundary objects. In showing the boundary object character of two models

as well as their performative nature, we also explore the tensions between these notions: how are boundary objects performative? As most literature focuses on 'single model' studies, this paper provides a unique comparison of two detailed empirical accounts of two simulation models. These were developed in different (Dutch) policy context – a macro economic model for the health care system and an ecological model for landscape planning and assessment – by different science advisory bodies. Both models are used for policy planning and assessment by the Dutch government.

We start with a discussion of the literature on models. After introducing the two policy fields and models, we investigate how negotiations between scientists and policymakers constitute models and show how models themselves can constitute the reality in which they are at work. In exploring the tensions between the notions of boundary object and performativity, we argue that science-based models for policy as boundary objects are not only performative in the coordination of socials worlds on what we call a simple or generic level, but can also be performative on a more substantial level, as they do affect actual practices and the behaviour of social worlds[46].

Scientific models as boundary objects

models, in the broadest sense of the word, are formal or informal simplified representations, descriptions or imitations of (potential future) 'realities'. Increasingly, scientific models are run on computers. Two such computer models are explored in this paper. These models, as we will explain later, are both simulation models. They are used to explain complex and dynamic systems; these models can be dynamic or static. We call them science-based or scientific models because they are products of scientific research and are subject to common scientific practices such as quality assessment and peer review (Yearley, 1999). Yet, although these models are science-based, they also contain policy elements.

[46] This paper comes out of a larger project on 'Rethinking Political Judgement And Science-Based Expertise: Boundary Work At The Science/Politics Nexus Of Dutch Knowledge Institutes' funded by the Netherlands Organization for Scientific Research (NWO). We wish to thank the respondents of our interviews and both the CPB and Alterra for hosting us and opening up their archives. Moreover, we would like to thank the anonymous reviewers, as well as Roland Bal, Teun Zuiderent, and other colleagues of the BMG institute of Health Policy and Management for their comments on previous versions, and Jennifer Gaultney for editing the text. We are also grateful to the attendants of the boundary object workshop in Trondheim in May 2007 at which we presented a first version of this paper.

Many studies have concentrated on explaining the role of (the construction of) models in the utilization of scientific knowledge. Much attention has been given to the use of models in the production of scientific knowledge (e.g. Morgan, and Morrison, 1999; Mattila, 2005; Knuuttila, and Voutilainen, 2003). Philosophical discussions on models have centred around epistemic issues, with little focus on the relationship between modelling practices and policy practices.[47] This relationship has been explored in more detail by social science and policy scholars who have concentrated on the role and importance of models for political decision making processes and policy development (e.g. Shackley, and Wynne, 1995; Edwards, 1999; Bal, 1998; Halffman, 2003; Jasanoff, 1995), evidence-based policy making, and the accountability of policy programs (e.g. Yearley, 1999; Evans, 2000; Jasanoff, 1990; Yearley, 2003). Simulation models, as Merz (1999) argues, can be epistemic objects and technological things at the same time and have, thus, different meanings to different users. Moreover, models provide 'discursive spaces' in which uncertainties are negotiated and shared understandings are created[48] between developers and policymakers (Evans, 2000). These studies show the role of science and policy interactions in relation to the constitution of policy facts, and they show that the distinction between 'science' and 'policy' is often difficult to make.

The notion of a boundary object has proven useful to draw attention to the hybrid character of science-based policy tools such as models (e.g. Agrawala et al, 2001; Halffman, 2003). Boundary objects are used to manage the "central tension" that exists in the interaction between social worlds (Star, and Griesemer, 1989: 392). They "inhabit several social worlds, (...) *and* satisfy the informational requirements of each of them" (Star, and Griesemer, 1989: 393). Because such objects are flexible, they can have different meanings to different social worlds: their structure remains "plastic enough to more than one world to make them recognizable" (Star, and Griesemer, 1989: 393) to each world. They are "simultaneously concrete and abstract, specific and general, conventionalized and customized" (Star, and

---

47 An exception is a study by Mattila (2005) that discussed the elements of interdisciplinary modelling projects that provide for such insights; the dynamic relation between expertise, collaboration and the research object in which scientific development and mutual learning can take place.

48 Evans (2000) notices an absence of this particular way of using models in his case study on UK economic policy. He states that the 'translation' of the needs of policymakers into economic models depends on whether economic agents accept the 'roles' that are designed for them in macroeconomic models. In this sense, models function as legitimations of political and moral theories about the world. Increasing the plurality of models allows for discussion about underlying assumptions and the actors and institutions one wants to involve, instead of producing some sort of self-fulfilling prophecy machine.

Griesemer, 1989: 408). This enables different social worlds to connect, while remaining concurrently accountable to both worlds. In other words, the boundary object has the ability to adjust to the needs of both worlds, while the social worlds remain intact.

The value of the notion of a boundary object lies in the idea that different social worlds can communicate and at the same time remain dissimilar and relatively stable. Most Science and Technology Studies (STS) literature on boundary objects has concentrated on the process with which an object becomes a boundary object: [a] 'boundary object is regarded as the *result* of something becoming successful (the explanandum) rather than the *cause* of its success (the explanans)' (Zeiss, and Groenewegen, 2009: 93). Once it is established, the coordinating nature is taken for granted and not further explained. Models as boundary objects, however, do more than provide negotiation spaces for the social worlds involved; they can coordinate worlds in different ways and they carry in them facts that have been the result of negotiations. As such, models are also a way of creating facts.

This feature of boundary objects has been described beautifully by Fujimura (1992) as a means to combine notions from social worlds-theory and actor network theory. Fujimura discusses boundary objects as part of a standardized package, which is described to include ambiguous concepts and standardized tools of methods and theory, such as data collecting and processing tools, computers, etc, that "help to explain how [a] theory can be continuous across time and space through different social worlds" (1992: 204). A standardized package differs from a boundary object in that it is used "to define a conceptual and technical work space which is less abstract, less ill-structured, less ambiguous, and less amorphous" (Fujimura, 1992: 169). However, we argue that the difference between boundary objects and standardized packages is not as clear-cut with regard to models. Simulation models can, on a smaller scale, be regarded as standardized packages themselves, as they contain some of these elements of standardized packages (e.g. theory, standardized methods, computer tools). Conversely, standardized packages can themselves be regarded as boundary objects, for instance, in situations where separate social worlds have to cooperate or come to workable models and yet have to remain accountable to their own social world. This is the case for scientific models used for policy making that need to be accountable to both scientific standards and policy usefulness.

We show that boundary objects, like standardized packages, can become embedded in particular practices and become stable in the sense that they have been used as policy tools over a long time. Boundary objects are not necessarily more easily reconstructed and are, thus, not 'disadvantageous' for providing stabilization (Fujimura, 1992: 169). More importantly, as facts are constructed in

the process of modelling, models are active constituents of the society or culture they are embedded or developed in. Models carry in them 'ideal' representations of the world positioned by the experts that develop the model (see also Knuuttila, 2005; Weisberg, 2003). In that sense, we argue that models as boundary objects create a new world. As such, they can be performative beyond coordinating social worlds; they can change the social worlds they function in since these worlds have to relate to the ideal world presented in a model.

This article describes two case studies in which reconstructions were made of two models which were developed in different (Dutch) policy contexts – health care economics and ecology – and by different science advisory bodies. Our case studies are based on sixty semi-structured interviews[49] that were held with persons involved in the development of the models, including members of the project groups from the respective science advisory bodies, concerned departments of the Ministries, and involved data providers. Some of the actors were interviewed more than once. Furthermore, document analysis was done based on archives of the Netherlands Bureau for Economic Policy Analysis, the Ministry of Health, Alterra, and the Ministry of Agriculture, Nature, and Food Safety (further: LNV). This analysis contained official letters, proposals, minutes of meetings, notes, progress reports, and evaluations of the projects. The data collection took place between February 2004 and September 2007.[50]

Two policy fields – two models

Both the health care and the ecological model are used for policy planning and assessment by the Dutch government. They are developed by science advisory bodies which represent a particular instance of the use of scientific knowledge in governmental policy making that is typical for the Netherlands. The different science advisory bodies have a central and formalized position in science based policy assessment for the government, albeit on different policy domains. They make use of scientific knowledge and insights (e.g. economic, sociological, epidemiological, and ecological insights), including the use of models, in their analysis and publications. As typical examples of places where such interaction takes place, these institutes form a perfect place to study the interaction between science and policy. These institutes involve actors from several social worlds, for instance during the construction of simulation models that are often used for

49 In order to ensure the anonymity of the interviewees, some interview material is coded.

50 The analysis of the data was done based on a research protocol that was developed for the Rethinking project in which seven researchers participated.

the assessment of policy proposals, and exist at the boundary of both policy and science, though having distinct lines of accountability to each (Guston, 2001: 401).

The care model was developed by the Netherlands Bureau for Economic Policy Analysis (further: CPB), which is regarded as being an expert in economic modelling and policy assessment (e.g. Den Butter, 2003; Van den Bogaard, 1999), in cooperation with the Social and Cultural Planning Office (SCP), which is regarded as being an expert in micro economic modelling with a focus on socio-economic issues in Dutch society, such as effects of health policy measures on e.g. the accessibility of health care for individuals (Trommel, 2003). The third party was the National Institute for Public Health and the Environment (RIVM) that deals with many public health issues (Van Egmond, et al., 2007). These three science advisory institutions[51] are authoritative in the use of simulation models for the assessment of policy proposals for the Dutch National Government.

The need for a care sector model derived from political and economic circumstances in the 1980s that caused Dutch politicians to be faced with structurally rising costs in the health care sector. The economic models used by the Ministry of Health proved both insufficient in explaining why and how health care expenditures increased so quickly and what could be done about this (VWS, 2004, interview 040512). Moreover, the Ministry of Health lacked knowledge about epidemiological trends (Boer, 1987). Politically, the government shifted towards a new public management of governmental policy making; more accountability and transparency of public policy and its effects, which was a trend visible in other European countries as well (e.g. Hunter, 1997; Walsh, 1995; Ashmore, et al., 1989). The succeeding Cabinet proposed market based policy programs to fundamentally change the (financial) organization of the sector (Helderman, et al., 2005). These were, however, badly received, both politically and within the sector, sparking many heated political debates. Under these circumstances, an interdisciplinary project was commissioned by the Minister of Health. The choice to ask these three science advisory bodies to work together on one project was

[51] The SCP focuses on social and cultural issues in Dutch society, and its two-yearly Social and Cultural Report is a key publication in long term strategic planning (Trommel, 2003). The RIVM plays a similar role concerning both environmental and health issues, commissioning for example the four-yearly Public Health Future Prospects and the Environmental Outlook (RIVM, 2002). The CPB has an authoritative position in the Netherlands when it comes to economic policy analysis and economic predictions. The government relies on CPB estimations of economic development and adjusts its policy making in economic, financial and most other policy fields on these estimations. Together they were fit to develop a new model for the assessment of policies for the healthcare sector.

not self-evident. However, the involvement of these three authoritative institutes was required to provide the Minister with unambiguous policy answers for many parties.

The LARCH model – LAndscape ecological Rules for the Configuration of Habitat – is used to assess the viability of animal populations in fragmented landscapes and thus the potential of biodiversity (Van der Sluis, et al., 2003). It simulates whether a certain landscape is able to support a sustainable animal population. The model will show where a landscape is too fragmented and what the effect will be of, for instance, an ecoduct on the viability of a population (Alterra, 2007). It was developed in the early 1990s at the department of Landscape Ecology at the State Institute for Nature Management (RIN). RIN later became part of the Directorate Agricultural Research (DLO) of LNV and, in 2000, part of the research institute Alterra.

The Netherlands is one of the smallest and most densely populated countries in the world, and due to increasing urbanization and industrialization the landscape has progressively been fragmented. Nature protection in the Netherlands from the 1960s until the 1980s mainly consisted of the maintenance of existing nature areas and the purchasing of new areas. This shifted in the 1980s when ecologists, working at LNV, framed landscape fragmentation as a public policy problem inspired by theories of island biogeography and metapopulations (Turnhout, 2009; MNP, interview 051029). The idea is that if landscapes become more fragmented, the number of populations and the possibilities for migration decrease. Since smaller populations become extinct more easily than large populations, nature policy had to focus on creating large nature reserves that are joined together or otherwise linked by corridors or stepping stones.

In the 1990 Nature Policy Plan, the notion of 'national ecological network' (NEN) became the basis for nature policy in the Netherlands. Alterra researchers had been engaged with questions concerning landscape fragmentation and the metapopulation theory from an early stage. When field studies showed that animal populations in the Netherlands were affected by nature fragmentation and that this was a generic problem, the idea to build a model that assesses whether a population is viable in a certain landscape, was born (Alterra, 2005, interview 050217).

Connecting social worlds through models – care and LARCH as boundary objects

Creating a priori standards for modelling

Models can often be regarded as boundary objects that bring together several social worlds. They are "discursive" spaces where social worlds can meet. This enables negotiations between scientists and policymakers about the parameters of the model (Evans, 2003) and to put scientific as well as non-scientific elements together to create a model to support policy making. It is in fact this feature that enables models to mediate effectively between 'theory' and the 'world' (Sismondo, 1999). There are no general rules for the construction of models, but it involves "elements of theories and empirical evidence" (Morgan, and Morrison, 1999: 15). As is argued by Boumans, these ingredients are integrated in such a way that the model meets a priori set standards (Boumans, 1999).

Interestingly, these a priori set standards however, differed in both models. At the start of the care model construction, the project team formulated three goals with regard to the models' content. This was done with the help of a fourth party in this interdisciplinary project, the Macro Economic Labour Section (MEEVA) of the Ministry of Health. This section had taken up the task to host the project and provided a project secretary who was responsible for the financial organisation of both projects.[52] The specific formulations of the aims of the project connected the scientific worlds of the science advisory bodies with the policy world of the Ministry. It connected the social aspects of government policy and health through the SCP, RIVM's expertise on health trends, and CPB's expertise on macroeconomic modelling with the macroeconomic policymakers.

The model firstly needed to explain past developments in the use and costs of health care on the macroeconomic level. Second, it needed to calculate the future effects of possible financial-economic policy options on the macroeconomic level. Finally, it needed to show the effects of possible health care and prevention policies on the demand and supply of health care and its consequences for health care costs (Pre-study, 1994). The first two questions required the economic modelling of the structure of the health care system, whereas the third question required the modelling of public health issues and epidemiological trends. The project team was also faced with the difficult task of integrating these three approaches to modelling health care. Because there had previously been no such attempt, the care project

52 The project secretary was also responsible for the progress of the project, as well as for secretarial support in meetings with the scientific committee.

became a unique attempt to bring together micro-economic knowledge (e.g micro-simulation modelling), knowledge about public health trends (epidemiological approaches), and macro-economic knowledge for the first time at this scale.

LARCH was developed by a team of ecologists, and had no explicit policy question at the basis of the model, as did the care model. However, the theoretical basis for the LARCH model was much stronger. The issue of landscape fragmentation had become a prominent issue both in the ecological theories taken up by Alterra researchers and in the 1990 Nature Policy Plan based on these theories. The LARCH model was built on two developed theories: the island theory and the concept of 'metapopulation'. The island theory was developed by MacArthur and Wilson – *The theory of island biogeography*. This theory states that the number of species on an island depends on a balance between the rate of extinction on the island and the rate of species immigration or colonisation of the island (Begon, and Harper, 1996). This balance is influenced by, for instance, the size of the island and the distance to the mainland; islands closer to the mainland with larger habitat areas tend to have greater species diversity than islands further from the mainland. This theory cannot, however, comment on the question of which species could be expected in a certain area.

The concept of metapopulation (Levins, 1969) – a group of spatially separated (sub) populations of the same species which interact through migration – helps to address this problem. An individual population lives in relative independence of other populations and can go extinct, but a population as a whole is often stable because immigrants from one population can re-colonize the habitat of the extinct population. The connectivity between seemingly isolated populations that guarantees the survival of the species as a whole is thus central to the idea of 'metapopulation'. The ecologists working at LNV in the early 1980s advocated an ecological network consisting of nature reserves in which no agricultural activity would take place and presented this in a policy document on nature development (Baerselman, 1988; Turnhout, 2003).

On the basis of these theories and the policy document, an adjusted ecological network was designed, including 'cultivated' landscapes in order to mobilize (bureau) political and public support for the idea (Visser, 2006). LNV ecologists provided policy advice on how to build the national ecological network (NEN). LARCH was built in this context to assess the viability of animal populations in fragmented landscapes and thus the potential of biodiversity. Policy questions developed as researchers and policymakers continued working on the construction of the NEN but were strongly supported by available theoretical concepts on animal populations.

Science-based models that are developed by advisory institutes, such as the LARCH and the care model, are neither fully scientific nor fully policy-oriented. However, our cases show that some models can be less science based at the outset than others. In the care model project, clear aims were formulated for the model based on policy wishes rather than based on available theory. LARCH, however, could be developed on the basis of the available theoretical concepts and empirical field research. It developed in parallel with the articulation of nature ecology networks as public policy problems but was not steered from the policy side. The Dutch health care sector at this stage lacked such a supportive theory.

Model construction: negotiating health economics – negotiating ecology

Models that are often employed by experts for policy assessments have to be scientifically sound yet useful for policymakers. However, being useful entails that a model meets a broad set of criteria. Models carry in them bits of theory and bits of the 'world' (data) as representations of the reality that it needs to represent (be that theory, the world or something in between) and other elements such as tacit knowledge and experience of the model-builder (Evans, 2000; Morgan et al., 1999). The actual process of model building is, as Bouman has argued, like a "trial and error process till all the ingredients, including the empirical facts, are integrated" (Boumans, 1999: 95). Modelling is thus a constant shifting from data to theories and back, which occurs several times until something 'useful' has come up and is negotiated by the experts involved.

The care project team struggled with the need to be simultaneously scientifically sound and policy-oriented because of the combination of three different epistemological, theoretical approaches. This was made more difficult by the need to use as much empirical data as possible. A project member explained that "to simultaneously connect micro level derived demand and supply with demand and supply at an aggregated macro level is extraordinarily complex and will in practice lead to immense practical problems" (SCP, 2004, interview 040422). Outcomes on the macroeconomic level are as of yet very hard to derive from micro data analysis.[53] The solution that was sought was to limit the focus of the model to explaining past developments in costs of health care and to first make an 'accurate' description of the policy field (CPB, SCP, and RIVM, 1994). This solution was endorsed by both State Secretary Simons and the project secretary from the Ministry of Health.

[53] Within economics this is known as a major challenge that many have tried to solve. It also addresses the question how to accurately perform econometric science to answer policy questions. One of the more famous econometrists that performed good work in this field is the Nobel prize winner Heckman.

This, nevertheless, reduced the role of the RIVM and the public health approach and, consequently, limited the scope of the model to an economic one.

Moreover, at this stage of the project, political discussions and scientific discussions began to intertwine more openly. Now that the RIVM's role was reduced, the role of macroeconomic policymakers from MEEVA became more important, influencing the kind of 'reality' that was represented in the model. This became most visible when demand was modelled. At first, three options were available to model the parameter demand. The first option of the team was to not take into account the demand side of health care by treating demand as an exogenous factor. This choice, however, was not in line with political discussions on how demand can be influenced. The authors argue that:

> The not taking into account of demand effects would imply that we lay on the model the fact that own payments for CP consults or specialist consults do not have any effect on the production of health care. Given the prominent place of the issue of own payments in the [political] discussion on cost containment in health care, it seems irresponsible to not build such an assumption into the model (In: CPB, and SCP, 1995:6).

Here we see that the political context of the model – the content of political discussions – directly influenced the shape of the model.

The second option, favoured by SCP, was to develop a dynamic model based on actual descriptions of the behaviour of the actors in the field. Such a model would be in line with the aim to incorporate microeconomic notions with macroeconomic modelling practices. However, a dynamic model requires lots of data and would make the model very large and prone to uncertainties and fluctuations, especially as the available data – as is true in this case – was of a poor quality. The third option, favoured by CPB, and eventually put in the model, was to develop a structural model that provided a description of the structure of the policy field based mostly on the theoretical notions of economics in the field.

LARCH was developed by a very stable research team – the people who were involved in the construction of LARCH are still part of the team fifteen years later – and with only one main disciplinary background involved (ecology). Due to the similar academic backgrounds of the researchers involved, problems with combining different theoretical approaches rarely occurred.[54] Problems encountered

---

54 The team used to be called 'Spatial Models' but is now 'Ecological Models and Monitoring'. This team discusses how models can be coupled, but further model construction often takes place in project teams which work on specific applications of the model. They may adjust the databases with which the models work for a specific application of the model.

focused not so much on theoretical problems but on 'contextual' elements such as modelling skills, computer capacity, how to model dispersion of species, and what arithmetic methods should be used. For example, according to one individual, 'we used to wish that we could calculate the distances between all nature areas, but in the beginning we couldn't do the calculations for the distances between one thousand or 10.000 swamp areas; now we have a table of these areas and we don't have any problems with calculating distances' (Alterra, 2004, interview 041020).

Although the model was initiated and developed by researchers, they wanted the model to be useful for policy and sometimes tried to involve policymakers in the decision making about parameters needed for the model. One such example is the definition of a 'viable population'. The output of the model consists of data about the viability of populations and therewith the extinction probability. However, to assess network cohesion and viability, an index is needed which involves both ecological and political decisions: 'It entails decisions regarding whether one sustainable network is enough, whether 50% should be sustainable, or even all networks' (Opdam et al., 2003:120). It also includes political decisions regarding the set of target species included in the assessment (i.e., which species are seen as more valuable) and about e.g. what percentage of area with at least what percentage of the species should be sustainable. These decisions inform the outcome of the model in terms of what can be defined as viable populations. Researchers maintained that these decisions should be made by policymakers. Namely, 'the question of what risk level should be used is not one for ecologists to answer but rather one for managers' (Verboom, 2001), and instead 'the policymaker should decide whether the consequences of such decisions are acceptable' (Alterra, interview 050217). Yet, the researchers received little input from policymakers; consequently, they themselves chose a definition of population viability with a risk level of 5% per 100 years. Out of every 20 species, they were willing to risk losing one every 100 years.

The model was first applied in 1995 in the project 'Ecological networks in river rehabilitation scenarios: a case study for the Lower Rhine' (Reijnen, 1995). However, the model remained continuously in development. Despite little involvement of policymakers in the definition of parameters and assumptions for the model, the changing context in which the researchers worked and particular policy questions increasingly influenced the shape and content of the model. The period following the first application of the model in 1995 was characterized by the externalization of the in-house expertise from the Ministry of LNV and increasing project-based and output-centred research. The research team that developed LARCH had been part of LNV and had worked as civil servants until the year 2000 when the DLO institutes were legally privatised and Alterra was founded. Formally, Alterra and

the researchers were now independent from policy, but research projects could now only be carried out when research was commissioned – often by LNV. As a result, LNV could commission any institute to carry out the research that they deemed important for policy making. As a consequence, it is claimed that:

> Researchers at institutes of Wageningen UR work differently than they did in the 80s: project-based, output-centred. (...) The new procedures result from the changes around the management and financing of the institutes: at a distance, demand driven output funding rather than input driven funding, in the form of a Public Limited Company [plc] rather than as a government institute. (Grin, 2004.)

This is confirmed by the Alterra researchers, one of whom states that the 'freedom' the researchers used to have changed when Alterra became a market based institute that needed to acquire funding for research:

> When I started working here [IBN-DLO], 16, 17 years ago everyone worked on what he / she thought was interesting. Today we need to account for all our time and can only work on something when a paying commissioner is in involved. We do what for instance the Netherlands Environmental Assessment Agency finds important and is willing to pay for. This is due to the privatisation of Alterra and the decrease of government subsidy. (Alterra, 2004, interview 040928).

Researchers could no longer build the model according to what they thought desirable. Instead, they had to take a more pragmatic approach: what is feasible within the time and money constraints that we have and what policy purpose should the model serve?

As in the case of the care model, this raised the issues of balancing scientific and policy needs, of what needed to be represented and of the translation of politically sensitive issues. Uncertainty in the form of lack of available data, for example, represented a problem for researchers in some cases with regard to the scientific status of (the outcomes of) the model. For policymakers, however, this uncertainty could be irrelevant: 'small uncertainties in a model are not likely to influence for example the decision to extend the NEN with robust corridors; uncertainties in policy making and with regard to other uses of land and nature, such as recreation, are of a different scale than the uncertainties in science and in the model' (Alterra, 2004, interview 041027). Since the research was often project-based, questions about how to deal with uncertainty were negotiated on a case-by-case basis. The issue of representation is illustrated by the choice for specific indicator species. In order to work with the model in the context of the

NEN, indicator species had to be chosen which would represent other species in the distances it travels, the habitat it lives in, etc. LARCH would then assess the viability of these indicator species in various nature reserves. Much knowledge needed to be available about these species, but to create political legitimacy, they also needed to be furry and cuddly (MNP, 2005, interview 051029).

These seemingly scientific discussions concerning the respective data-versus-theory-ladenness of models that was present in both modelling processes tend to mask their political dimension. Thus Edwards argues that the model / data relationship should be viewed as "symbiotic, rather than oppositional" (Edwards, 1999:454). The reason for this is that "the purpose of simulation models is not to explain or theorize, but to forecast by creating analogues based in both theory and data" (Edwards, 1999:454). Edwards shows empirically that data and theory are constituted by each other: facts (or data) are theory-laden, and theory is data-laden. The question of whether the data or theory is sufficient enough for the occasion is, thus, not a technical discussion but an epistemological discussion. Facts provide scientific credibility for theories. Theory-laden models, however, provide experts with control over the presence of certain facts in a model: which facts you put in a model, and which ones you leave out. The care model team chose to rely on theory by building a structural model and to test it with data as it became available in later years. The LARCH modellers, however, chose furry and cuddly animals as their indicator species (MNP, 2005, interview 051029), relying on specific facts, while leaving out others.

The care and LARCH models as boundary objects

Models that are used for the assessment of policy proposals act as boundary objects between policy questions and scientific practices; they simultaneously keep together and keep apart social worlds. Moreover, as we have seen, seemingly scientific discussions are often disguised political discussions situated at the "interface between science and policymaking" (Edwards, 1999: 462). This is, as our cases show, especially so for science-based models for policy making, as these have to account for scientific and policy worlds concurrently. Interestingly enough, in our case, economic experts seem to lean more towards the needs of policymakers and less to the scientific world, whereas the ecologists seem to account for both worlds more equally. The models described here are in that sense boundary objects with different consequences.

The care model is a boundary object for different scientific disciplines in that it provides a negotiation space to 'depoliticise' political problems (Jasanoff, 1995). However, its ability to serve as a boundary object between scientific disciplines

proved limited; instead, it acted as a division tool for the scientific parties involved. It contributed to endorsing existing differences between the SCP, CPB and RIVM, The Ministry of Health and related institutes concerning how to cope with health care issues such as efficiency, scarcity, and solidarity. It did, however, bring together macroeconomic modellers and specific health policymakers. The idea behind the care model was to either use it for the assessment of policy measures developed by the Ministry of Health regarding the regulation of costs of health care or to gain a sense of what parts of and to what extent the health care sector would be financially affected by certain financial policy measures. The initial use of the 1999 version of the model was, however, limited. Involved policymakers questioned its usefulness for policy assessment, as it was said to be "only a distribution model" (Ministry of Health, 2004, interview 040512A). Accounts from previous years were put in the model to see where changes would occur, as opposed to using it as a simulation model to predict future developments.

LARCH, like the care model, incorporates politically normative standpoints and contains elements of both science and policy. LARCH provided not necessarily a space to depoliticize problems but certainly a space to tinker with policy questions related to the NEN. Interestingly, the boundary nature of LARCH is found in its 'stable variations'. Since LARCH has often been used for ad hoc projects and different applications, a number of building blocks (modules) of the model have been developed, which we call 'stable variations'. LARCH-SCAN is, for example, based on the dispersal capacity of species and delivers species' specific results, whereas LARCH-EUROPE assesses the biodiversity potential in fragmented European ecosystems. The stable variations of the model provide the model its boundary object features, allowing it to be flexible enough to be used to investigate certain policy questions, yet stable enough to prevent the high costs and time involved in adjusting the model.

Models as performative boundary objects

In discussing simulation models that have come to play an important role in policy making, we argue that mainly pointing to the coordinative role of models as boundary objects is not sufficient to understand the much more performative character of models. Models are tools for scientists and policymakers to provide negotiation spaces for the social worlds involved in modelling practices and coordinating these social worlds; they carry in them facts that have been the result of negotiations that took place during the model construction. As such, models are also a way of creating facts. Moreover, models are active constituents of the

context they are constructed for, be it the scientific world, the policy world, or another world. Callon and others have referred to this as performativity (Callon, 1998; Callon, and Muniesa, 2005; MacKenzie, and Millo, 2003; Garcia-Parpet, 2007). Although these authors investigate performativity in relation to economic models and theory in economy (Callon, 1998; MacKenzie, 2007; Garcia-Parpet, 2007; Zuiderent-Jerak, 2009), this quality or property of theory does not apply to economic models alone. The notion of performativity may, thus, aid us in understanding how models – in this case they can also be regarded as boundary objects – also actively change practices and social worlds. Interestingly, the idea of a boundary object as introduced by Star and Griesemer can be seen as an attempt to integrate both theories with the help of a material device, the boundary object.

However, the concepts of boundary objects and performativity also create an interesting tension. The notion of boundary object, which originates from social worlds theory, refers to ways in which different social worlds can interact and relate without having to change, for instance, through the flexibility and coordinative role of objects (such as models). The notion of performativity derives from the context of actor network theory and focuses on the role of materiality in the shaping and forming of facts (Latour, 1999). Thus, while boundary objects are about how dissimilar, already existing social worlds can relate without having to change, performativity is about how such objects shape and form the world in which they are to operate.

Although these concepts seem mutually exclusive, in engaging with MacKenzie's levels of performativity, we aim to do justice to the boundary object nature of science-based models for policy as well as to their performative character that goes beyond their function as a boundary object. Scientific models for policy making, on the one hand, bring together social worlds and enable these worlds to work together and to negotiate knowledge and policy. However, as we show, these models are at the same time also material actors. They bring with them a new social world made out of elements of the social worlds involved in constructing these models. As such, they are tools through which facts – reality – are made; they are performative.

MacKenzie's classification of performativity has been helpful in unravelling performativity as a theoretical concept. Performativity is explained in several steps. Generic performativity happens when an aspect of economics or another discipline, be that a "theory, model, concept, procedure, data-set, etc." (MacKenzie, 2007: 55), is used in daily life. He uses the term effective performativity when the use makes a difference to this reality. These two forms of performativity are, however, superficial enough to keep the social worlds involved in their place. The care model project, for instance, brought together different disciplines that had not

worked together previously on health care. The project did not succeed as a collaboration project at the time, and the parties involved fell apart, while the project continued as a one-disciplined project occasionally consulting other experts. Effective performativity was evident for the reason that the different parties were involved and became acquainted with each other's epistemologies.

However, the model as a boundary object effectuated more than this alone. It also provided the CPB with a new knowledge tool for a policy area it previously had refrained from. As such, the model has extended the CPB's authority in the Dutch policy arena and created a new authoritative institute in health care alongside others (such as the SCP and RIVM). In this respect, the model also works as a disciplining tool for other actors in the field in a few ways; the model has forced data providers to register data that formerly was not registered. Other actors in the field of health care now have to relate to the macroeconomic perspective provided by the CPB. In that sense, the model also actively shaped social worlds in health care. MacKenzie describes this as Barnesian performativity. This takes place when the use of theory or models makes reality – in any form – behave more like the depiction of that reality in theory, such as a model.[55]

The care model has in that sense also contributed to a shift in the science-policy boundary in health care towards a more economic approach to health care. Although the government had used a cost containment strategy of supply regulation since the 1980s, the model incorporated a market oriented approach that was visible in the demand parameter. This limited the use of the model for policy assessments based on the supply regulation system. Although the notion of a market oriented health care system was not seriously being considered in the debates concerning a new policy program until the beginning of 2000[56], the model incorporated a market based notion long before the government. As the model incorporates a market oriented policy program, it helped to articulate, make stronger and put on the agenda a market based policy program (Van Egmond, and Bal, forthcoming). Once a policy approach has permeated many governmental institutions, it becomes more difficult to argue against such a policy approach. As such, the model has served to legitimate new governmental policy directions regarding the health care system.

---

55 This event is well described by Garcia-Parpet for the Soulogne strawberry market (Garcia, 2007).

56 Since 2000 the Government has worked on the introduction of a new policy program for the governance of health care, based on the notion of managed competition by Enthoven (VWS, 2001), which was introduced in 2006. Alongside, the CPB published a revised version of the model in 2006. This version is better suited to deal with the assessment of policy measures taken within the market oriented care sector, and for the tri-annual release of the health expenditures prognoses reports.

The use of LARCH can also be analyzed through the notions of generic and effective performativity. The externalization of the 'in-house' expertise of LNV into Alterra provided LARCH with an opportunity and necessity to more consciously bridge and coordinate the scientific and policy world which strengthened its function as a boundary object. LARCH has been used for ad hoc projects, often in relation to quick policy recommendations and quick scans for LNV and other Ministries (Verboom, 2006). It has, for example, been used in a project by the LNV to assess the ecological effectiveness of 'corridors' between nature reserves; on the basis of which, it was decided whether each corridor should be funded or not. The ecological corridors that had originally been drawn by LNV had been heavily criticized for the lack of scientific input to assess their ecological efficacy. These corridors, with the exception of those with legal commitments, administrative commitments, robust corridors which were ecologically sound, and those that were expected to soon be finished, were tested for ecological importance with LARCH (Alterra, 2005, interview 291005). LARCH and the ecological criteria within LARCH, thus, shaped policy decisions.

In addition, LARCH is extensively and systematically used by the Netherlands Environmental Assessment Agency (MNP), one of LARCH's largest customers (Verboom, 2006). Amongst others, LARCH is employed for the redrawing of boundaries of the NEN and for projects related to the European Bird- and Habitat Directive and Natura 2000, a European network of protected nature areas. Since it operates in a changing institutional and political environment of increasing decentralization ranging from national to regional levels and towards decision making as a participative, multilevel, process with a number of stakeholders, the model is itself continuously being evaluated and further developed. LARCH has now also become an interactive tool that is used in these processes as a tool for deliberation and group decision support in provincial / local stakeholder consultative processes (Alterra, 2007). In this respect, it has also become a performative boundary object between diverse groups of stakeholders.

Whereas LARCH and its use are constantly in development, the modules remain relatively stable simply because it would be too expensive and time-consuming to adjust them for every new commissioned project, nationally or internationally. In some cases data is lacking to run LARCH in detail; whether there is funding for obtaining these data or whether LARCH should work with rougher data is then a decision that needs to be made. In this respect, the model often directs the research and the results which lead to policy decisions. Policy questions may be adjusted to the possibilities of the model. In assessing ecological corridors and projects related to Natura 2000, LARCH helps to shape what nature will look like in the future and this can be regarded as Barnesian performativity. The use of

LARCH has been classified as having a middle to high policy risk because of the money involved and the large societal concerns that are at stake (Jansen, et al., 2004): if the corridors may not have the predicted effect or even a counter effect, the reputation of the Ministry of LNV and its relation with stakeholders could be at stake.[57]

Both models legitimate decision making and have influenced both the context and form in which certain knowledge is constructed and used for policy processes. They have been constituents of the (political) reality by selecting, providing, and structuring information that then sometimes became an 'obligatory point of passage' (Callon, 1986) in decision making processes. In this, they have also become disciplining tools: they legitimate the use and form of certain data over others, they determine what research and policy questions can be (easily) answered and which ones can be left out. More importantly, once models have been developed and are used for the making or evaluation of policy, they often result in routinized patterns in research and, moreover, in policy making, and therefore, also in the coordination and demarcation of science and policy. Yet, they do this in different ways with different consequences.

Conclusion

Models play an increasingly important role in the use of scientific knowledge for policy making processes. This paper argues that it is insufficient to concentrate on the boundary object character of models to understand this ever-increasing role and stresses that also the performative character of models needs to be investigated. Although the notions of performativity and boundary object have different origins and a tension seems to exist between them, connecting these notions together facilitates a more complete understanding of the role of models in policy.

This paper has demonstrated that both the care and the LARCH model can be regarded as boundary objects *and* demonstrate several levels of performativity. These levels do not necessarily co-exist at all times. Whereas both models show some form of Barnesian performativity, it can be argued that the care model became increasingly performative with regard to this stronger form of performativity. In contrast, LARCH is used in a more varied range of settings. In its

[57] Mackenzie distinguishes a counterperformativity as well when the use of models, or theory, makes processes in reality look less like their depiction by models, or theory. In both events, however, the use of theory, or a model, intervenes in the social world to such extent that it changes that reality.

increasing function as a tool for deliberation and group decision support, the generic and effective forms of performativity are dominant. On the other hand, its role in deciding which ecological corridors will be established can be classified as a feature resembling more closely Barnesian performativity.

Models can be regarded as a special kind of boundary object in their performative nature. Models 'commonly exert a compelling persuasiveness; they are designed to look 'real' – particularly to those beyond the model-constructing community' (Yearley, 1999: 846). In addition, models incorporate some aspects of what Fujimura (1992) calls standardized packages, e.g. theory and standardized tools. Both the care and LARCH model have become relatively stable objects and are strongly embedded in both the research (CPB, and Alterrra) and the policy context. They have been used as policy tools for a long time, which has led to routinized patterns in both research and policy in which their function as a boundary object is crucial. This makes it increasingly difficult to reconstruct them. These features and their embeddedness make their performative features stronger *and* do not diminish their boundary object character.

By illustrating and making explicit that performative science-based models go beyond their role as boundary objects, we aim to obtain a better understanding of how models shape practices, social worlds and lived realities. Moreover, in order to acquire a more thorough understanding of how models shape our (policy) worlds in an era in which models play an increasingly important role in the use of scientific knowledge for policy making processes, we contend that a more systematic investigation of the performativity of models as boundary objects is needed. A next question would be to more extensively explore the differences and tensions between the two concepts during the construction of models, and to focus on the tension models bring with them between remaining a boundary object that coordinates between relatively stable worlds and becoming a performative object that changes the social worlds.

References

Agrawala, S., K. Broad, and D.H. Guston. 2001. Integrating Climate Forecasts and Societal Decision Making: Challenges to an Emergent Boundary Organization. *Science, Technology and Human Values* 26(4): 454-77.

Alterra. 2007. Is Your Landscape Climate Proof? *Biodiversity Analyses with Larch*. Wageningen: Alterra.

Ashmore, M., M. Mulkay, and T. Pinch. 1989. *Health and Efficiency. A Sociology of Health Economics. Milton Keynes*. IL: Open University Press.

Bal, R. 1998. Boundary Dynamics in Dutch Standard Setting for Occupational Chemicals. *The Politics of Chemical Risk*, edited by R. Bal and W. Halffman. Dordrecht: Kluwer Academic Publishers: 75-103.

Baerselman, F., and F.W.M. Vera. 1988. Nota Natuurontwikkeling: Een Verkennende Studie. Den Haag.

Begon, M., and J.L Harper. 1996. *Ecology – Individuals, Populations, and Communities*. Oxford: Blackwell Science.

Boer, E.J. 1987. Gezondheid Als Uitgangspunt: Nota 2000 in Het Kort. Staatsuitgeverij: 's-Gravenhage.

Boumans, M. 1999. *'Built-in Justification', Models as Mediators. Perspectives on Natural and Social Science*, edited by M.S. Morgan and M. Morrison. Cambridge: IL: Cambridge University Press.

Callon, M. 1986. Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay. *Power, Action, and Belief: A New Sociology of Knowledge?*, edited by J. Law. London: Routledge.

Callon, M. 1998. *The Laws of the Markets*. Oxford: Blackwell Publishers.

Callon, M., and F. Muniesa. 2005. *Economic Markets as Calculative Collective Devices, Organization Studies* 26(8): 1229-50.

CPB, RIVM, and SCP. 1994. Pre-study: Naar een Ramingsmodel voor de Zorgsector. Den Haag: CPB, RIVM, SCP.

CPB, and SCP. 1995. Ramingsmodel Zorgsector. Organisatie En Planning. Den Haag: CPB & SCP.

Den Butter, F.A.G. 2003. The Dutch Miracle: Institutions, Networks, and Trust. *Journal of Institutional and Theoretical Economics* 159(2): 362-91.

Edwards, P.N. 1999. Global Climate Science, Uncertainty and Politics: Data-Laden Models, Model-Filtered Data. *Science as Culture* 8(4): 437-72.

Evans, R. 2000. Economic Models and Economic Policy: What Economic Forecasters Can Do for Government. *Empirical Models and Policy-Making*, edited by F.A.G den Butter and M.S. Morgan. London, New York: Routledge: 206-28.

Fujimura, J. H. 1992. Crafting Science: Standardized Packages, Boundary Objects, and 'Translation'. *Science as Practice and Culture*, edited by A. Pickering. Chicago, London: IL: The University of Chicago Press: 168-211.

Garcia-Parpet, M.F. 2007. The Social Construction of a Perfect Market: The Strawberry Auction at Fontaines-En-Sologne. *Do Economists Make Markets?*, edited by D. MacKenzie, F. Muniesa and L. Sui. Princeton University Press.

Grin, J., and F. Felix. 2004. The Praxis of Reflexive Design: Lessons from a Dutch Programme on Sustainable Live-Stock Systems. *Technikfolgenabschaetzung. Theorie und Praxis* 13(4): 99-107.

Guston, D. H. 2001. Boundary Organizations in Environmental Policy and Science: An Introduction. *Science, Technology & Human Values* 26: 399-407.

Halffman, W. 2003. *Boundaries of Regulatory Science: Eco/Toxicology and Aquatic Hazards of Chemicals in the US, England and the Netherlands, 1970-1995.* Amsterdam: University of Amsterdam.

Helderman, J.K., F.T. Schut, T. van der Grinten, and W. van de Ven. 2005. Market-oriented Health Care Reforms and Policy Learning in the Netherlands. *Journal of Health Policy, Politics and Law* 30(1-2) : 189-209.

Hordijk, L. 1991. Use of Rains – in Acid Rain Negotiations in Europe. *Environmental Science & Technology* 25(4): 596-603.

Hunter, D.J. 1997. *Desperately Seeking Solutions: Rationing Health Care.* Harlow: Pearson Education Limited.

Jansen, J.M.L., J.M. Halbertsma, J.A.P. Heesterbeek, H. Houwelink, and M.J.W. Jansen. 2004. Kwaliteitsborging Databestanden en Modellen. *Balanceren Tussen Chaotische Dynamiek En Geordende Stilstand.* Wageningen: Alterra.

Jasanoff, S. 1990. *The Fifth Branch: Science Advisors as Policy Makers.* Cambridge, Massachusetts London, England: Harvard University Press.

Jasanoff, S. 1995. Product, Process, or Programme: Three Cultures and the Regulation of Biotechnology. *Resistance to New Technology. Nuclear Power, Information Technology and Biotechnology*, edited by M. Bauer. Cambridge: Cambridge University Press: 311-31.

Knuuttila, T., and A. Voutilainen. 2003. A Parser as an Epistemic Artifact: A Material View on Models. *Philosophy of Science* 70: 1484-95.

Knuuttila, T. 2005. *Models as Epistemic Artefacts: Toward a Non-Representationalist Account of Scientific Representation.* Helsinki: University of Helsinki.

Latour, B. 1999. Pandora's Hope. *Essays on the Reality of Science Studies.* London: Harvard University Press.

Levins, R. 1969. Some Demographic and Genetic Consequences of Environmental Heterogeneity for Biological Control. *Bulletin of the Entomology Society of America* 71: 237-40.

MacArthur, R.H., and E.O. Wilson. 1967. *The Theory of Island Biogeography.* Princeton: Princeton University Press.

MacKenzie, D., and Y. Millo. 2003. Constructing a Market, Performing Theory: The Historical Sociology of a Financial Exchange. *American Journal of Sociology* 109(1): 107-45.

MacKenzie, D. 2007. Is Economics Performative? Option theory and the construction of derivatives markets. *Do economists make markets? On the performativity of Economics*, edited by D. MacKenzie, F. Muniesa and L. Siu. Princeton, IL: Princeton University Press.

Matilla, E. 2005. Interdisciplinarity 'In the Making': Modeling Infectious Diseases. *Perspectives on Science* 3(4): 531-54.

Merz. M. 1999. Multiplex and Unfolding: Computer Simulation in Particle Physics. *Science in Context* 12(2): 293-316.

Morgan, M.S., and F.A.G. den Butter (eds). 2000. *Empirical Models and Policy-Making: Interaction and Institutions.* London, New York: Routledge.

Morgan, M.S., M. Morrison. 1999. Models as Mediators, Perspectives on Natural and Social Science. *Ideas in Context*, edited by Q. Skinner. Cambridge University Press.

Opdam, P., J. Verboom, and R. Pouwels. 2003. Landscape Cohesion: An Index for the Conservation of Landscapes for Biodiversity. *Landscape Ecology* 18(2): 113-26.

Reijnen, R., W.B. Harms, R.P.B. Foppen, R. de Visser, and H.P. Solfert. 1995. *Rhine-Econet. Ecological Networks in River Rehabilitation Scenario's: A Case Study for the Lower Rhine*. Lelystad: RIZA, Institute for Inland Water Management and Waste Water Treatment.

RIVM. 2002. *Gezondheid Op Koers?* Bilthoven: RIVM.

Shackley, S., and B. Wynne. 1995. Global Climate Change: The Mutual Construction of an Emergent Science-Policy Domain. *Science and Public Policy* 22(4): 218-30.

Sismondo, S. 1999. Models, Simulations, and Their Objects. *Models and Simulation*, edited by S. Sismondo. Cambridge, IL: Cambridge University Press: 247-60.

Star, S.L., and J.R. Griesemer. 1989. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* 19: 387-420.

Sundberg, M. 2007. Credulous Modellers and Suspicious Experimentalists? Comparison of Model Output and Data in Meteorological Simulation Modelling. *Science Studies* 19(1): 52-68.

Trommel, W. 2003. De Onderzoeksmethode Van Het Sociaal En Cultureel Planbureau. *B en M* 30(1): 42-54.

Turnhout, E. 2003. *Een Brug over De Kloof. Het Natuurplanbureau En De Relatie Tussen Kennis En Beleid*. Wageningen: Natuurplanbureau.

Van den Bogaard, A. 1998. Configuring the Economy. *The Emergence of a Modeling Practice in the Netherlands, 1920-1955*. Amsterdam: Thelathesis.

Van den Bogaard, A. 1999 Past Measurement and Future Prediction. *Models as Mediators*, edited by M.S. Morgan and M. Morrison. Cambridge: Cambridge University Press, 1999: 282-325.

Van Daalen, C.E., L. Dresen, and M.A. Janssen. 2002. The Roles of Computermodels in the Environmental Policy Life Cycle. *Environmental Science & Policy* 5: 221-31.

Van Egmond, C., R. Bal, T. van der Grinten, and M. Bekker. 2007. Wetenschap Voor Beleid. De VTV Als Coordinatie-Instrument. TSG (85): 399-406.

Van Egmond, C., and R. Bal. (forthcoming) Boundary Configurations in Science-Policy: Modeling Practices in Health Care. *Science, Technology and Human Values*.

Van der Sluis, T., and R.G.H. Bunce. 2003. *Corridors for Life: Ecological Network Analysis for Cheshire County UK*. Wageningen: Alterra.

Verboom, J., R. Foppen, P. Chardon, P. Opdam, and P. Luttikhuizen. 2001. Introducing the Key Patch Approach for Habitat Networks with Persistent Populations: An Example for Marchland Birds. *Biological Conservation* 100: 89-101.

Verboom, J., and R. Pouwels. 2006. *Strategisch Plan Larch – Van Strategische Visie Naar Plan Van Aanpak*. Wageningen: Alterra.

Visser, H. 2006. *Ecologische Verbindingszones, Een Reconstructie Van Het Beleidsproces*. Wageningen University.

VWS, Ministry of Health. 2001. Vraag Aan Bod Den Haag: VWS.

Walsh, K. 1995. Public Services and Market Mechanisms. Competition, Contracting and the New Public Management. *Public Policy and Politics*, C. Fudge and R. Hambleton. London: Macmillan Press Ltd.

Weisberg, M. 2003. Challenges to the Structural Conception of Chemical Bonding. *Philosophy of Science Assoc. 20th Biennial Mtg*. Vancouver.

Yearley, S., S. Cinderby, J. Forrester, P. Bailey, and P. Rosen. 2003. Participatory Modelling and the Local Governance of the Politics and UK Air Pollution: A Three-City Case Study. *Environmental Values* 12: 247-62.

Yearley, S. 1999. Computer Models and the Public's Understanding of Science. *Social Studies of Science* 29(6): 845-66.

Zeiss, R. Standardising Materiality. *Tracking Co-Constructed Relationships between Quality Standards and Materiality in the English Water Industry*. University of York.

Zeiss, R, and P. Groenewegen. 2009. Engaging Boundary Objects in Oms and Sts? Exploring the Subtleties of Layered Engagement. *Organization* 16(1): 81-100.

Zuiderent-Jerak, T. 2009. Competition in the Wild: Emerging Figurations of Healthcare Markets. *Social Studies of Science* 39: 765-792.

Analyzing policy change

On the performative role of economics in the constitution of a new policy program in Dutch health care.

Van Egmond, C. and T. Zuiderent-Jerak

Analyzing policy change – On the performative role of economics in the constitution of a new policy program in Dutch health care.

Accepted for publication in *Public Administration*

Introduction

This article[58] investigates the role of economic science in the creation of material devices – policy tools – and their role in constituting health care reform. Recent market solutions that aim for a 'better' governance of the public sector have been studied by many scholars (Balle Hansen, and Lauridsen, 2004; Hunter, 2005; Pierson, 1994; Pierson, 2004; Porter, and Olmsted Teisberg, 2004; Ranade, 1995; Walsh 1995; and others), and explanations for public policy reforms have delivered insights into the meanings and legitimacy of policy change from a contextual interpretative stance (Fischer, 2003; Hall, 1993; Hajer, and Wagenaar, 2003; Rhodes 2000; Yanow, 2006). Though this empirical turn has been a welcomed shift in the policy sciences, the study of science-policy interactions as an explicit research focus has until recently been left untouched in the analysis of policy changes. Where science-policy interactions *have* been included in the analysis, scholars have focused on defining the usefulness or efficiency of knowledge to policy makers (see Maasen, and Weingart, 2005; Sabatier, and Jenkins-Smith 1993) or on knowledge as instrumental component in the policy learning processes (see Hall, 1993; Weiss, 1991), thereby depoliticizing the role of science in the policy making processes. Moreover, through its focus on deliberative and discursive practices and through methods like discourse analysis, the new policy sciences fails to analyze how *material* manifestations of science-policy interactions – such as policy tools – shape and configure policy change.

Policy tools used by policy makers are often the result of interaction with scientists through hybrid science policy practices – examples are the many policy assessment tools such as effectiveness studies and economic models and the use of knowledge instruments in the form of reports, think tanks or (international) negotiation structures (Stone, 2007). Such tools are, however, not just technical instruments for policy makers or politicians, as is often stated, but are practices in which normative assumptions are built in that often remain outside the political debate. The study of policy practices should therefore broaden its scope to the role of science in creating such material devices and their role in policy change. In this article we address this issue by investigating the role of economic science in the creation of such material devices for policy making. We focus on how such material devices come about as a result of science policy interactions concerning Dutch health care and how we can understand these devices in relation to the legitimacy of health policy change in the Netherlands.

---

58 The authors wish to thank the members of the Healthcare Governance group of the BMG, John Law and the anonymous reviewers for their very useful comments on earlier versions of this article.

In our analysis of the role of economic science in the making of material devices we use the notion of performativity of economics offered by Callon (1998) and extended by others, such as MacKenzie and Millo (2003), Çalişkan and Callon (2009) and Zuiderent-Jerak (2009). This concept captures the idea that economics not only investigates and classifies (social) phenomena but also actively brings these phenomena to life through these investigations and classifications. As such, it deconstructs the central idea within economics that 'naturally competitive' markets can be discovered by economic scientists and replaces it with the notion that markets are actively configured by economists and economic theory and other material tools.

We argue that health care markets are actively configured by material devices constructed in processes of close interaction between scientists and policy makers. We show that constructing material market devices is crucial for this act of configuration. Moreover, we argue that the importance of studying the role of economics (or other scientific practices for that matter) in policy change lies in the fact that economics and market devices are important constituents of policy programs. Hence, both have far-reaching normative implications for the actors involved in and the people affected by that policy program. The inclusion of market devices and scientific practices in policy analysis leads to a relocation of political discussions from the explicit policy processes to the scientific domain. This relocation has consequences for the accountability and legitimacy of political decision making regarding the development of health care markets. The implications of our analysis go beyond the health care sector and can be generalized across other policy sectors.

Towards affordable health care: competing policy programs for conflicting stakes

In 2006, the health care system in the Netherlands was profoundly reformed with the introduction of the new health insurance law. The health care sector reformed from a corporatist health care system in which private bodies have been responsible for the provision of most health care facilities and a financial structure that has predominantly been publicly arranged to a market-oriented policy model with a larger role for health insurers and health providers as market parties (Schut, and Van de Ven, 2005; Van Hout, and Putters, 2004; Van der Grinten, and Kasdorp, 1999). The new system, based on the idea of managed

or regulated[59] competition developed by Enthoven, stimulates competition between health insurers, health providers and health users.

The reform of the health care sector has resulted in new modes of governing and controlling health care, allowing the central government to withdraw from directly steering health care price and quality. These changes are accompanied by other fundamental changes in the health sector at several levels, with the most prominent change being the shifted responsibility of insurance companies to allocate means and to deliver high quality care as well as an involuntary insurance scheme where consumers have the freedom to choose level of coverage, the installation of a Health Authority and Inspection Authority and new contracts and laws that should secure open information exchange and free entrance to the health care market (Enthoven, 2006; Enthoven et al., 2007; Schut, and Van de Ven, 2005).

This reform followed three decades of fierce political discussions and policy proposals about the need and desirability to reform the health care system in order to restrain the rising costs of health care that had begun to consume a substantial portion of public expenditures[60] from the 1970's onwards. Although since the 1970s proposals were developed for policy programs based on market notions[61], the government held on to the supply regulated cost containment strategy, until it was faced with the emergence of new problems in the late 1980's and early 1990's. Increased access times for health care services and a growing complexity of the system led to a growing societal uneasiness with this policy program and to a renewed public debate in which the 'Stalinist' health care system of supply regulation was critiqued (Van der Ploeg, 1992). Despite three decades of opposition against policy change in health care, in 2001 the government presented a blueprint for plans based on market ideas that was executed in 2006. This seemingly fast change has presented policy analysts with the possibility to consider the question of why and how this quite profound policy change has been possible despite much political and societal resistance.

---

59 Both terms are used equally throughout different publications and seem to point to the same theoretical concepts. Enthoven consequently uses the term 'managed' competition, and in recent years this term seems to have replaced the term 'regulated' competition.

60 From 5.5 percent of BNP in 1968 to 6.7 percent in 1972 – a rise of more than 1.2 percentage points in four years (Schut, 2003:214).

61 The structure report was published by the committee Hendriks in 1974, in which the importance of future cost containment was stressed and the solution was found in a fundamental governance restructuring with a more directive role for the government in cost containment (Schut, 2003; Kasdorp, 2004) The 1987 plans of the Dekker commission (VWS, 2001) suggested a market for health care based on regulated competition.

Explaining policy change in health care

Public sector reforms under the heading of New Public Management and the paradigm of the market as a solution for the perceived ineffectiveness of the public sector, especially the health sector across Europe and other Western countries, have been analyzed and criticized by many (e.g. Balle Hansen, and Lauridsen, 2004; Hunter, 2005; Pierson, 1994; Pierson, 2004; Porter, and Olmsted Teisberg, 2004; Ranade, 1995; Walsh 1995). Within these ongoing discussions concerning the position of health care as a public good throughout the Western world, the late shift towards a market-based policy program in the Netherlands has been described by Dutch scholars as deriving from the inefficiency of the old policy system of supply regulation and cost containment (e.g. Enthoven et al., 2007; Helderman et al., 2005). Developments such as increasing waiting lists and rapid growth in health care expenditures put into perspective the effectiveness of the supply regulation politics and challenged, according to Helderman et al. (2005), the principle that a 'market' is unsuitable for ensuring a public good such as health care.

The idea of regulated competition as a solution for the public sector released a profound fear by opponents, as it was viewed as an assault on health care as a public good and the central values and solidarity of Dutch health care – that is the quality, equal accessibility and distribution and affordability of health care. Many negative side effects were associated with market regulation such as adverse selection of unhealthy people and fear of a growing gap between citizens with a low socio-economic status and people with a better socio-economic status (Trappenburg, 2005), the undesirability of a perception of health care in more economic terms (Kasdorp, 2004). In reaction to the statement of the president of the Health Insurance Board that "health care is like cars" – some are willing to pay for an expensive car while others are satisfied with a smaller and cheaper car – Trappenburg pointed to contradictions in this line of thinking because "we would like to pay for other people's need for health care, but not for other people's need for a car" (Trappenburg, 2005:26, translation SVE). A closer look at the critiques shows that the disagreement with the reform plans did not so much question the need for restructuring the health care system, as for most involved the need for this seemed apparent. The disagreement centered on the question of whether or not health care as a public good could be left to the market. Namely, could regulated competition secure the core values of health care and combine them with market notions?

Proponents argued that market regulation would be able to provide better quality and more efficiency in health care provision (see e.g. Brouwer et al., 2006;

Schut, 2003; Schut, and Van de Ven, 2005), although some worries were expressed about leaving a public good such as health care to market parties instead of to government parties. In a 2002 Manifesto, many Dutch economists pointed to twenty possible problems within the system if the government would neglect to take the right technical measures for this new system in time (IBMG, 2002). In this manifesto economists frame problems in the health care market as a lack of knowledge about health use and the role of the individual in such use. Other economists do likewise. Arrow, for instance, has argued that most problems in the health care sector stem from uncertainty regarding risks for diseases at the individual level and related the importance of information and the location of information in health care markets (Arrow, 1963). The solution that is often proposed is to come to more knowledge of individual economic behavior.

Discussions within (health) economics show that the idea that markets need active configuration is widespread. Enthoven for example argues that "the markets for health insurance and health care are not naturally competitive like the markets for transportation, financial services, automobiles or jogging shoes" (Enthoven, 1988:87). The solution is to develop theories that frame health care in terms of 'normal' markets and accordingly develop instruments and tools that support the market idea. Examples of tools often considered a necessity to constitute a market (in health care) include transparent product classifications, appropriate consumer information on insurance companies and performance indicators of (health) providers, free entrance to the market and free choice (Brouwer, et al. 2006; Enthoven, 1988; Arrow, 1963), and the aforementioned measures as an Health Authority and an Inspection Authority and new contracts and laws for information exchange and free entrance to the health care market. In that sense, economists do acknowledge an extensive role for economists and economic science in creating tools that constitute policy programs such as managed competition in Dutch health care.

Investigating the role of science in policy change

The role of science in policy making has been investigated mostly in its form as scientific advice to politics, for instance in knowledge utilization studies (see Lindblom, and Cohen 1979; Weiss, 1991; Giddens, 1994; and others). In such studies, scholars focused on solving questions concerning the legitimacy of democratic decision making under conditions of uncertain knowledge and within changing political systems (Maasen, and Weingart, 2005). The main goal of such research is to acquire precise descriptions of the differences between science and policymaking and to develop heuristics of science-policy interactions. In

such studies, science has largely been depoliticized and scholars have focused on finding definitions of how knowledge can be useful or efficient to policy makers (see Maasen, and Weingart, 2005; Sabatier, and Jenkins-Smith 1993) or on knowledge as an instrumental component of the policy learning process (see Hall, 1993; Weiss, 1991). Analytically, however, the dichotomy between science and policy as part of separate worlds is often maintained, as is the normative stance of science as the deliverer of facts and politics as the realm of values and protector of public interests.

Such positivist claims are rejected by deliberative policy analysis that departs from the notion that contemporary politics is situated in dynamic networks and calls for a new understanding of shifting locations of power and legitimacy. Thereby, these scholars focus on studying such networks, particularly how such changing networks relocate and redefine issues of power and interests in society (Fischer, 2003; Hajer, and Wagenaar; 2003; Hall, 1993; Yanow, 2006). Regarding the role of science, Fischer has argued that the new take on policy analysis should understand the role of science "as a more subtle interaction between physical and social factors" (Fischer, 2003:215). Thus, the focus should lie on investigating changing manifestations of policy making and politics and the role of scientific knowledge in these manifestations (Hajer, and Wagenaar, 2003). Although these scholars do take into account the consideration that scientific research can be recognized as a social practice that contextually and continually comes about in specific historical and linguistic contexts (Fischer, 2003), their research has yet to explicitly focus on science-policy interactions, nor have they analyzed what this new role of science actually means for studying science-policy relations or policy change.

Despite these insights, many policy scientific explanations on decision making and its interaction with science do not go beyond the limited explanation that decision making is unpredictable and ambiguous, hence arriving at concepts such as 'windows of opportunity', 'resistance', and 'slowness' that often mask the soft irrational, unexplainable elements of change or non-change in the political decision making process. Moreover, through its focus on deliberative and discursive practices and through methods like discourse analysis, the new policy sciences fails to analyze how *material* manifestations of science-policy interactions shape and configure policy change.

The role of (scientific) materialities in policy change, such as the formulation of the leading principles of the health care system by means of laws and rules or the creation of tools to support markets, is often only taken as a technical matter to be solved by issuing new technical measurements (Helderman et al., 2005; Kooiman, 2009). Even where the materialities of market development *are* put centre stage in the analysis, as in Helderman (2005), they are seen as preparations

in infrastructural terms rather than as a normative playground where what regulated competition *is* and what values are built into it are practically shaped by economists and health policymakers *through* these material tools. As a consequence, in these explanations the role of (economic) science in the constitution of public policy programs remains highly underexplored.

Performativity of economics

In recent years, social studies of markets have recognized the performative role of economic science and the material embeddedness of economics in societal institutions as essential elements in constituting (new) ways of economic thinking (Porter, 1995; Callon, 1998; Barry, 2002; MacKenzie, and Millo, 2003; Zuiderent-Jerak, 2009). The notion of performativity of economic science captures economic science not only as a mode of investigation and classification of (social) phenomena, but also as an actor that actively brings these phenomena to life through this investigation and classification. In this perspective, economic laws are not naturally given events that can be studied and described by economists through an economic theory but are instead actively constructed by economists and economic science through economic theory and economic classification. Within this theory, the idea of naturally competitive markets should be replaced with the notion of actively configured markets.

A focus on the role of economics in the constitution of markets provides, according to Callon, insights into how "notions such as that of supply and demand, or those of interconnected markets, imperfect competition or incentives, have been formulated in constant relation to practical questions which, in turn, they help reformulate" (1998:2). Competition, in this line of argument is not the starting point but the endpoint, and competition occurs when the technical options have been selected, developed and made fit for use. To ensure competition or to make a market, economic actors use a heterogeneous set of tools such as contracts, laws, and material devices in the form of scales, forms and models. These provide actors with *calculative agency*; that is, the ability of agents to calculate on an aggregated level according to the needs of markets. Such calculative agency cannot be possessed by individuals because it builds on complex and aggregated information[62].

---

[62] An example is the existence of money. Money as a calculative agency is not given *a priori* but is actively brought into life by economics. This is built upon and maintained by historically grown traditions and conventions; for instance, by the classification work of Adam Smith and the work of National Trusts. The

Economic theory provides the framework to institute the elements for particular markets. As such, economic science is brought up as an important constitutor of the economy in that tools, theories or descriptions of economic behavior become available for its advocates – economists, the State and other institutions. Such *embeddedness of markets* (Callon, 1998) in institutions and economic theory offers a perception of economic science as a technological tool (Osborne, and Rose, 1999) or a kind of materiality that enacts specific notions of a market. MacKenzie and Millo (2003) show that economics as a technological tool is itself a result of negotiating practices by the users of these tools. Their research on the emergence of derivatives markets in the United States – the Chicago Board Options Exchange (CBOE) and the International Monetary Market (IMM) in Chicago – shows how economics and its associated practices "simplify and disembed [economics] to the extent that economics becomes *applicable*" (2003:138) (emphasis added). Not only the interactions between economists, the State and other agencies – the mobilization of human actions – are important in shaping the economy, the mobilization of economic theory and the kind of mobilization is as important as research shows. Such an analysis on the performativity of economic science offers a way out of a technical or instrumental perception of the role of science in society as presented by policy analysts and allows for a study of the consequences of involving economi*cs* in the constitution of economi*es*.

In the next section we will elaborate on instances of economization and the role of economists in the establishment of managed competition as the dominant health policy program in the Netherlands.

From a health care sector to a health care market

From the 1980s onwards the health care sector has been interwoven with an increasing economization of health care. The term economization in public policy in the Netherlands has pointed to several trends of economization, from the interpretation of health care in terms of part of BNP (Kasdorp, 2004) and the introduction of economic language that describes health care, such as clients, outcomes, and care processes (Van Hout, and Putters, 2004), to the growing attention created by the government for the role of the market as a problem-solver under the heading of the New Public Management movement (Walsh, 1995;

value of money is, therefore, the result of highly complex calculations done by complex models that work across countries and cannot really be understood or acted upon by individuals.

Kickert, 2000)[63]. This adoption of a more economic view on health care was paralleled by the emergence of health economics as a separate scientific discipline, a trend that can be seen throughout many industrialized countries (Ashmore et al., 1989; Hunter, 1997; Pierson, 1994). These instances of economization of health care enabled health care to be thought of and talked about in economic terms and to become part of the economic debate in general.

Educating society about the market for health care

The role of health economists in economic discourse has been extensive through educating society about health care markets. Since the 1980's, when two Dutch universities – Maastricht University and Erasmus University Rotterdam – undertook the initiative to develop a curriculum in health care economics and management[64], health economists have educated an increasing number of students on health economics (Moen, 1989)[65]. The institute Health Policy & Management (IBMG) at the Erasmus University Rotterdam, with which the economists discussed in this article are affiliated, employs about 80 health economists and a significant

63 Kasdorp (2004) describes the interpretation of health care in terms of part of BNP as an *economization* of health care. Others see the growing attention created by the government for the role of the market as a problem-solver during the 1990s as a form of economization (Van Hout, and Putters, 2004) when the notion of total control of society had lost the better part of its appeal. In this, the government followed the discussion in the US under Reagan and the UK under Thatcher about the future of the steering role of the government and the extent of the government's tasks (Kasdorp, 2004; Kickert, 2000; Pierson, 2004; Pierson; 1994; Walsh, 1995). The 1987 Dekker report on the future of the Dutch health care system showed the first signs of the New Public Management movement. Also the chairman came from the business community – he was a former CEO of the Philips Company. Two other seats were taken by experts in economics. This was an unparalleled event for the health care sector where chairmen and seats tended to be chosen from the policy field itself.

64 Maastricht University set up a new chair in health economics situated in the medical department, and in 1982, the Institute of Health Policy and Management (IBMG) was established at the Erasmus University in Rotterdam. The IBMG offered an interdisciplinary curriculum based on economy, sociology, law and public administration, taking as a starting point the perspective of health providers.

65 In 1983, the Dutch-Flemish Health Economics Association was founded. At the start of the eighties, handbooks on the subject and the first scientific journals on health economics and related subjects appeared, such as the Journal of Health Economics published by Elsevier since 1982. Health economists in the Netherlands and Flanders have written a number of Dutch handbooks on economics and health care issues since halfway through the 1990s. The first international Handbook of Health Economics (by Cuyler, and Newhouse) was published only in 2005. Since 1996, a growing number of health economists have attended the international Health Economics Association (IHEA) conferences (Rutten, 2004).

number of health policy scientists and health sociologists and educates more than one hundred students a year. The importance of this is illustrated by one of the founders of the iBMG, professor in health economics Van de Ven:

> The fact that we have in the Netherlands a small group of people working, thinking, communicating and lecturing in managed competition in a very consistent way, for about twenty years now, is significant. Let's not forget the importance of the education we offer. Each year we deliver about fifty students, in twenty years. That makes about one thousand people working in health care, for the Government, for insurance companies, for advisory boards that have been educated about managed competition and are very familiar with it. As far as I know we've been the only country so consistent in this. (Interview Van de Ven, 060425)

Consequently, the iBMG has been actively involved in discussions concerning a workable system for the governance of public health care and the development use and distribution of economic theories regarding health care. In fact, regarding the new policy program, health economists are very well informed, as the (former) head of the BMG has acknowledged:

> On many issues we know exactly what is going on and we have well-founded advice to offer. Take for instance the 2002 manifesto in which we expressed our worries regarding the new system. That has become our business card! Even the Ministry complimented us on the manifesto. The story covers many aspects of the new system. (Interview Rutten, 060329)

This position is emphasized by involvement of iBMG in the recently published evaluation of the health insurance law and the care gratuity law.

The active engagement of economists with health care not only created an economic discourse regarding health care. It also led to material manifestations of this economization such as newly developed theory and policy tools that framed the economics of health care in terms of managed competition or a regulated market.

Building an economic theory on health care as a market: a risk adjustment system

The theory of managed competition, first developed by the American economist Allen Enthoven, was introduced in the Netherlands by the health economists Van de Ven and Rutten in an article published in a leading Dutch Journal for Economy

and Statistics (ESB) in the early eighties[66]. Since then the theory on managed competition has been refined, and necessary tools have been developed to make the notion of managed competition as a policy program possible. Managed competition was introduced as a way to safeguard the solidarity of Dutch health care through market regulation. In theory, managed competition is seen as a tool to control both market failure – quality and accessibility of health care – and government failure – the efficiency and affordability – in health care. As stated previously, health care markets differ from other markets, such as the market for jogging shoes – or cars – according to economists (Arrow, 1963; Enthoven, 1988, 2006), because demand for health care, the amount and length of health care and technological and demographic developments in care are all uncertain factors in this market (Lapré et al, 2004; and also Arrow, 1963; Enthoven, 1988). Therefore, price mechanisms that regulate 'normal' markets play a minor role in the health care market. In economic theory, these uncertain conditions and lack of effective price mechanisms effectuate a higher consumption in health care – an effect known as moral hazard or government failure. Moreover, health markets suffer from market failure: (1) health providers and health insurers have conflicting interests towards health demand and consumption; and (2) doctors are at the same time agents for patients as well as their own economic actor while health insurers have to provide good services and make a profit. This mechanism is enhanced by information asymmetry between doctors, patients and insurance companies, with the latter trying to avoid contracts with ill persons (Arrow, 1963; Enthoven, 1988; Schut, 2003). This market failure can, according to economists, be controlled by specific tools that influence the health behavior of the involved actors.

Risk adjustment: building a tool for solidarity in health care markets – influencing health behavior

In the Netherlands solution was sought in building a risk adjustment fund as the best way to safeguard Dutch health care of market failure, or to secure solidarity[67]. The current Dutch fund has existed since the 1990s when (limited) competition in the Sickness Funds was introduced. It works two-fold. First, as an insurance scheme for insurance companies, it settles financial differences between

66 The first had spent time as a visiting research associate at the RAND Corporation in California where he became acquainted with the theory of managed competition (Interview van de Ven, 060425).

67 This is underlined by recent publication lists of health economists and the partaking in societal debates on the desirability of the new system.

insurance companies caused by uneven distribution of *predictable* costs of medical expenses. Thus, it prevents insurance companies from the potentially negative financial consequences of (accidentally) insuring an unequally high amount of people that claim medical expenses in comparison to other insurance companies (CPB, 2006; Schut, 2003). Second, the fund is used by insurance companies to set the prices of the insurance schemes for the following year. With these interlinked functions, the fund ideally safeguards solidarity in the health insurance market, as it protects the consumer against risk selection by insurance companies while simultaneously protecting insurance companies against consumer moral hazard. Moreover, economists created with this fund a calculative device for the health care market that enables economists to talk about *and* act upon health behavior in terms of risks while it simultaneously attempts to limit this market failure.

Because it brings together opposing behavior of actors the Dutch risk adjustment fund is a complex calculative device. It is built upon health indicators that constitute the main reasons for an individual's health care demand in the Netherlands. At its commencement in 1993, the risk assessment fund took only age and gender into account as indicators for health care use, as this accounted for 95% of shortages in insurance funds (interview Van Vliet, 060529). In later years, the risk adjustment fund was refined by the indicators 'region', 'medicine use', 'diagnosis' and 'means of income' (Douven, 2005; Van Kleef, 2007; Interview Van Vliet, 060529). Together these indicators sum up to about one hundred health indicator groups that determine one's (future) need for medical services and the costs involved in these services. These indicators are based on aggregated medical information taken from many sources such as health insurance companies, health care providers and related umbrella organizations, health care related NGO's, and Statistics Netherlands. Data are collected from insurance companies that deliver about 170 codes according to the ICD coding system. A committee of health care experts critically assesses the codes that represent chronic illnesses. This procedure delivers detailed and highly aggregated and consented information. Moreover, the refined fund controls insurance companies better than the simple Fund because insurance companies' claims are subjected to more detailed demands; they can claim a refund but as the demands for claims are more refined it is a claim has to be more precise in its description to receive approval.

Ideally the fund should function as an incentive for insurance companies to work more efficiently. All the same, this complex system is selective and imperfect because of the lack of knowledge and model limitations. However, as recent developments in Switzerland have shown, imperfect Funds contribute to the unequal treatment of persons within the health market (Beck et al., 2003; Van de Ven et al., 2003; Van Kleef, 2007). In that sense, the imperfectness of the fund frames

the fund as a political tool in disease selection and in the interaction between the insurer and the insured, for instance, by the indicator for future health care use. A careful analysis of this indicator reveals the normative considerations about the worth of illnesses that are built into the system. This indicator is established through the diagnosis of illnesses. Although an obvious way to establish future use of health care, it does raise the question of where to measure diagnoses. For example, should diagnosis be measured based on visits to the GP, admissions to hospital, information from the insurance companies that pay the bills during treatment or based on the discharge letter from the hospital after the disease has been treated? Currently, the data are collected from information on declared diagnosis retained by insurance companies. However, not all diagnoses represent the true illness. The introduction of the Diagnose and Treatment Combinations systems (DBC systems) demands translation of illnesses and treatments into well defined terms. Especially for non-illness related diagnoses the DBC system will probably deliver problems in tracing chronic illnesses at least for some more years[68].

The fund is not only used for tracing illnesses but also for tracing differences in use of health care due to socio-economic status of individuals. However, the change in set up of this indicator has shifted responsibility for health from the government to health insurance companies and individuals. The risk adjustment system is built on the indicator 'use of health care'. As previous research on the effect of income on health showed income and health are related; the lower the income the greater the health care consumption. In 2004, for example, individuals with public insurance spent about 400 euro's more on health care than privately insured individuals. Although there are good explanations for about 90% of this amount, about 10% remains unexplained. This last 10% is often explained by the lower socio-economic status of those individuals who were covered by the public insurance scheme. This research was based on information concerning means of income that was used in the fund until 2006. In the old system, public insurance companies delivered information about means of income. Researchers and politicians used this information to justify developing a socio-economic policy.

---

[68] Another example is the use of medication which represents consumption of prescription pharmaceuticals by consumers in the Netherlands. The idea behind this is that the nature of diseases can be determined by the kinds of medicine that are prescribed (e.g. insulin for diabetes). Because this indicator is limited to the category of persons using medicines for 180 days a year or more, it distinguishes groups of people suffering from chronic illnesses from those with other medicine use or disease related medicine use. Furthermore, in many cases one form of medication can be prescribed for more than one disease; for example, prednisone is used for the treatment of several chronic diseases.

In the new health insurance system this division no longer exists and information on health status related to income level is no longer provided by insurance companies, also due to privacy standards. In fact, income-related health differences have disappeared with the new insurance system as the information regarding income status has become unavailable. Nevertheless, insurance companies that insure a large amount of individuals with a low income run the risk of having to pay more fees than expected based on the general population. Especially companies that were previously public insurance companies may have over one million or more insured individuals with a low socio-economic status. The new indicator may therefore also be understood as an incentive for insurance companies to act on the health behavior of the insured individuals for instance by enlarging the own payments or providing health programs for insured. Moreover, since information on the relation between income and health use has become more much more difficult to retrieve[69], researchers and the government will have more difficulties maintaining or developing a socio-economic policy.

The care model for macroeconomic policy making

Whereas the risk adjustment fund is developed to frame health care as a 'fair' market and to control the health behavior of individuals and insurance companies, the care model frames patients and doctors as market actors who pursue economic interests. The care model – a macro economic model for the health care sector – was built by three authoritative science advisory bodies and was commissioned by the Ministry of Health in 1994 to three authoritative science advisory bodies for the government: the Netherlands Bureau for Economic Policy Analysis (CPB), the Social and Cultural Planning Office (SCP) and the National Institute for Public Health and the Environment (RIVM). The model was commissioned to fill the gap in health policy assessments; its purpose was to describe and assess macroeconomic policy measures regarding health care. Although at the time the government carried a policy program based on supply regulation with no obvious intention to reform the health care sector into a market model, the model builders created a model that enabled early assessment of a market-based policy program.

This comes to the fore most in the indicator for 'demand'. Although other options were available, the project members used neo-classical labor supply theory to model the patient and medical specialist for the parameter 'health care demand'.

---

69 Now other sources have so be searched for information regarding income, such as the tax department, Statistics Netherlands and the UWV (social benefit payments company); hence, its calculation has become even more complex (interview Van Vliet, 060529).

Two alternative options were considered but deemed insufficient. The first option had been *not* to take into account the demand side of health care. This choice, however, would keep the model from assessment of policy proposals associated with notions of managed competition, such as the introduction of incentives for patients to reduce demand. In the document the authors argue the following:

> The not taking into account of demand effects would imply that we impose on the model that individual payments for GP consults or specialist consults do not have any effect on the production of health care. Given the prominent place of the issue of own payments in the discussion on cost containment in health care, it seems irresponsible to build such an assumption into the model (In: CPB and SCP, 1995:6).

The first option, moreover, was also not proven in reality (1995:7). The second option was to assume a negotiation model, in which both the doctor and the patient negotiate on the need for health care. Although deemed more 'realistic' by the modelers, it would lead to what was called an "exceptionally complicated" dynamic model. This was deemed unrealistic for modeling practices due to the lack of data to fill the dynamic model. Hence the third option was left. This option assumed that demand for the health care market is derived from a) the first visit by the patient and b) the referral written by the medical specialist or the GP. This option was based on existing theoretical work. The project members chose the third option, as it corresponded with the notion that the "demand for health care is less determined by the patient as the patient gets more involved in the medical system" and with the Dutch situation where the GP functions as the gatekeeper of the health care system (CPB, and SCP, 1995:7), and it thus an important actor in constituting demand.

The introduction of the specialist and GP as an agent for the patient allowed the portrayal of the patient as a rational actor in the health market by capturing the patient's behavior as being dependent on financial incentives, which was a revolutionary act at the time. Although health care was not considered a market at the time, the model builders took these political discussions regarding health behavior into account and enabled the model to follow these political discussions. Moreover, the introduction of incentive-dependent behavior provided both the Ministry of Health and the CPB with a tool for assessment of policy measures based on managed competition (see for instance in CPB, 2000; CPB 2003). Because one macro economic model in itself does not effectuate a behavioral change of individuals, other disciplining tools need to be developed, such as the risk adjustment system discussed and in which insurance companies and individual health behavior are upfront as the main actors in constituting demand.

Discussion and conclusion

In this article, we have investigated the role of material devices in the constitution of policy reform in Dutch health care as well as the role of economic science in this process. The central question focused on how material devices come about through science and policy interactions in Dutch health care and how we can understand the role of devices in relation to the legitimacy of health policy change in the Netherlands. In our analysis, which is based on qualitative case study research concerning the role of scientific knowledge in policy making processes in the health care sector, we have used the notion of performativity of economics. This notion deconstructs the central idea of economics that 'naturally competitive' markets can be discovered by economic scientists through investigating and classifying economic phenomena and replaces it with the notion that markets are actively configured by the work performed by economists, economic theory and other material tools. Such an analysis on the performativity of economic science offers a way out of a technical or instrumental perception of the role of science in society as offered by policy analysts and allows for a study of the consequences of involving economi*cs* in the constitution of economi*es*.

Our empirical examples show that economic science has formatted health care as a market in several ways. From the seventies onwards, the emergence of health economics paralleled an economization of health care. Health economists have since been actively involved in the articulation of health care in more economic terms and in the articulation of health care in market terms. Since the constitution of new schools of health policy, many former students – educated in health care economics and regulated competition as market solution – found their way into governmental institutions, insurance companies and other institutes related to the health care sector. Slowly, the idea of managed competition with its focus on individual responsibility has gained ground in the Netherlands.

Besides contributing to thinking and talking in economic terms, health economists developed material devices that framed the health care sector as a regulated competitive market that ensured contrasting public interests by capturing individuals' health behavior in economic terms. The first tool – the risk adjustment fund – framed health as the behavior of individuals and insurance companies and thus portrayed the regulated competitive health care market as a 'fair' market in which both market failure and government failure are diminished by controlling health behavior. *Because of* this fund, a regulated market secures open entrance to the market and patients' choice, and enables economists to talk and act upon health in terms of risks. The other calculative device we discussed – the care model – has framed individuals as market actors who pursue

economic interests and thus provided the government and economists with a tool to assess macroeconomic policy proposals in health care and to have more insight into the effects of financial policy on individual behavior. In this way both calculative devices are more than technical tools. Both devices are shaped according to normative assumptions of behavior of actors in a market, and at the same time these devices enable this behavior to take place. For instance, in order for the health care market to work, an active framing of patients and doctors as market actors that pursue certain economic interests was needed. Precisely this assumption of economic behavior by individuals is built into the care model and therefore contributed to a configuration of these actors' behavior as described in economic theory. The model is not the best representation of 'reality', but the best representation of a health market.

Although we have described two material devices, if market devices are no longer preconditions for but enactments of the idea of a health care market, these devices become central actors in the production of policy consequences. In this manner, the introduction of tools that support a specific market are not policy actions geared towards an *ideal* of the market described, for instance, theoretically by economists but *are themselves* acts of a specific form of marketization, as in the care model and how demand is constructed in it. Our research shows that some of the modeling activities performed by both the CPB and health economists concerns defining which theories are most useful and which ones are not and creating new theories and data collection devices in support of a specific health care system. Hence, normative considerations that require political discussions are relocated to these hybrid science-policy practices.

Although the market-based policy program originates from the idea to create a smaller role for the government, at the same time that same government exerts great effort to frame markets in ways that articulate certain core values in health care that are in line with policy programs. It accomplishes this with the help of economic science. Although in the market ideal the government seems to be taking up a more distant role in public policy, we show that this leads to the paradoxical situation that market solutions for the public sector require hardly less government control. It is the moment and location of government control that has changed, rather than the quantity. Framing markets in, for instance, material devices has become a crucial site for carrying out health policy. The market in health care is, in that respect, not the endpoint but rather a relocation of government, and the starting point for other tools that support the market idea, such as open information sources, free entrance of the market and free choice.

More importantly, as economists and economics contribute to a large extent to the framing of markets by constructing material devices that carry in them

many normative and, hence, political decisions, the development of such devices for health care markets warrants their inclusion in the study of science-policy interactions and analyses of the construction of legitimate policy, as it relocates political discussions to these hybrid science-policy practices. Although policy analysis studies focus on accountability and legitimacy of policy making processes and policy reforms, their departure from deliberative analytical concepts overlooks the role of materiality of science in policy change because these analyses are constructed at sites that are not yet taken into account by many policy sciences. Namely, policies are analyzed *before* policy reform takes place or are regarded as mere *technical* applications instead of instances of a specific policy reform.

Moreover, market practices need to be included in the accountability of political decision making in order for policy processes to maintain their legitimacy. The importance of this consideration is illustrated by health economists themselves; for a market-based policy program that fully acts upon and incorporates competing public values, many measures must still be taken. As Enthoven stated at the health economic conference in Rotterdam in November 2006 that "the next step is to explore how competing insurers can engage doctors and hospitals in the creation of efficient and improving health care delivery systems" (2006). The problem here seems to be that the current framing of insurers has not led to optimal competing behavior of insurers. However, the market has always been promoted based on the idea that a regulated market can also protect competing public interests. At this point the market apparently does not adequately serve the public interests. This casts serious doubts as to how effective a market can be in protecting public interests, and more importantly it calls into question the legitimacy of the current market for health care.

References

Arrow, K. 1963. Uncertainty and the Welfare Economics of Medical Care. *The American Economic Review* T LII, 5: 941-73.

Ashmore, M., M. Mulkay, and T. Pinch. 1989. *Health and Efficiency. A Sociology of Health Economics*. Philadelphia: Open University Press: Milton Keynes.

Balle Hansen, M., and J. Lauridsen. 2004. The Institutional Context of Market Ideology: A Comparative Analysis of the Values and Perceptions of Local Government Ceos in 14 Oecd Countries. *Public Administration* 82, 2: 491-524.

Barry, A., and D. Slater. 2002. Introduction: The Technological Economy. *Economy and Society* 31, 2: 175-93.

Beck, K., S. Spycker, A. Holly, and L. Gardiol. 2003. Risk Adjustment in Switzerland. *Health Policy* 65, 1: 63-74.

Brouwer, W., J. van Exel, P. van Baal, and J. Polder. 2006. Economics and Public Health: Engaged to Be Happily Married! *European Journal of Public Health* 17, 2: 122-24.

Callon, M. 1998. *The Laws of the Markets*. Oxford: Blackwell Publishers.

Çalişkan, K., and M. Callon. 2009. Economization, part 1: Shifting attention from the economy towards processes of economization. *Economy and Society*, 38, 3: 369-398.

CPB. 2006. Memorandum 149. Zorg in Model: Algemene Structuur En Varianten. Den Haag: Centraal Planbureau.

——. 2003. 'Healthy Competition: An Analysis of the New Health care System'. Den Haag: Centraal Planbureau.

CPB. 2000. 'Regulated Competition in Health Insurance Markets'. Den Haag: Centraal Planbureau.

CPB, and SCP. 1995. Ramingsmodel Zorgsector. Organisatie En Planning. Den Haag: Centraal Planbureau.

Dekker, Commissie. 1987. Bereidheid Tot Verandering. Den Haag.

Douven, R.C.M.H. 2005. Kwaliteit Risicoverevening Hangt Af Van Marktontwikkelingen. ESB: 290-92.

Enthoven, A.C, and W.P.M.M. van de Ven. 2007. Going Dutch – Managed-Competition Health Insurance in the Netherlands. *New England Journal of Medicine* 357, 24: 2421-23.

Enthoven, A.C. 2006. Consumer Choice of Health Plan. Connecting Consumers and Providers in Systems. Rotterdam: VGE Conference.

——. 1988. *Theory and Practice of Managed Competition in Health care Finance.* Amsterdam: Elsevier Science Publishers b.v.

Fischer, F. 2003. Beyond Empiricism: Policy Analysis as Deliberative Practice. *Deliberative Policy Analysis*, edited by M. Hajer and H. Wagenaar. Cambridge: CUP.

Giddens, A. 1994. *Beyond Left and Right. The Future of Radical Politics*. Cambridge: Polity Press.

Hajer, M., and H. Wagenaar. 2003. *Deliberate Policy Analysis: Understanding Governance in the Network Society*. Cambridge: Cambridge University Press.

Hall, P. 1993. Policy Paradigms, Social Learning, and the State: The Case of Economic Policy Making in Britain. *Comparative Politics* 25: 275-96.

Helderman, J.K., F.T. Schut, T. van der Grinten, and W. van de Ven. 2005. Market-Oriented Health care Reforms and Policy Learning in the Netherlands. *Journal of Health Politics, Policy and Law* 30, 1-2: 189-209.

Hunter, D.J. 1997. *Desperately Seeking Solutions. Rationing Health Care*. Harlow: Pearson Education Limited.

——. 2005. The National Health Service 1980-2005. *Public Money & Management* 25: 209-12.

IBMG. 2002. Manifest, Twintig Zorgpunten over Het Toekomstige Zorgstelsel. Rotterdam: Institute for Health Policy and Management.

Kasdorp, J. 2004. Rivaliserende waarden, eisen en wensen in de gezondheidszorg. *Beleid en Maatschappij, tijdschrift voor beleid, politiek en maatschappij* 31, 4: 211-221.

Kickert, W. 2000. *Public Management Reforms in the Netherlands: Social Reconstruction of Reform Ideas and Underlying Frames of Reference*. Delft: Uberon.

Kooiman, J, and S. Jentoft. 2009. Meta-Governance; Values, Norms and Principles, and the Making of Hard Choices. *Public Administration* 87, 4: 818-36.

Lapré, R. 2004. Health Economics in the Netherlands: The Beginning. In *Health Economics. Adding Value to Health care?,* edited by W. Brouwer, R. Janssen and D. Larmuseau. Rotterdam.

Lindblom, C.E., and D.K. Cohen. 1979. *Usable Knowledge: Social Science and Social Problem Solving*. New Haven: Yale University Press.

Maasen, S., and P. Weingart. 2005. *Democratizarion of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*.

MacKenzie, D., and Y. Millo. 2003. Constructing a Market, Performing Theory: The Historical Sociology of a Financial Exchange. *American Journal of Sociology* 109, 1: 107-45.

Moen, J. 1989. *Innovatie in Universitair Onderwijs. Organisatie- En Curriculumontwikkeling in Een Nieuwe Universitaire Opleiding*. Rotterdam: Erasmus Universiteit.

Osborne, T., and N. Rose. 1999. Governing cities: notes on the spatialisation of virtue. *Environment and Planning D: Society and Space*, 17: 737-760.

Pierson, P. 1994. *Dismantling the Welfare State? Reagan, Thatcher, and the Politics of Retrenchment*. Cambridge: Cambridge University Press.

——. 2004. *Politics in Time. History, Institutions, and Social Analysis*. Princeton and Oxford: Princeton University Press.

Porter, M.E., and E. Olmsted Teisberg .2004. Redefining Competition in Health Care. *Harvard Business Review*: 65-76.

Porter, TH. 1995. *Trust in Numbers*. Princeton: Princeton University Press.

Ranade, Wendy (1995). The theory and practice of managed competition in the National Health Service. *Public Administration* 73, 2: 241-262.

Rhodes, R.A.W. 2000. 'Governance and Public Administration'. In: Pierre, Jon (ed) *Debating Governance. Authority, Steering and Democracy.* Oxford: Oxford U P, 2000.

Rutten, F. 2004. 'The Nineties', In: Brouwer, Werner, Richard Janssen and David Larmuseau (eds), *Health Economics. Adding Value to Healthcare?*, 57-60. Rotterdam.

Sabatier, P.A., and H.C. Jenkins-Smith. 1993. Policy Change and Learning: An Advocacy Coalition Approach. Boulder: Westview Press.

Schut, E. 2003. De Zorg Is Toch Geen Markt? Laveren Tussen Marktfalen En Overheidsfalen in De Gezondheidszorg. Inaugural Speech. Rotterdam: Erasmus University.

Schut, E., and W.P.M.M. van de Ven. 2005. Rationing and Competition in the Dutch Health Care System. *Health Economics* 14: 59-74.

Stone, D. 2007. Recycle Bins, Garbage Cans or Think Tanks? Three Myths Regarding Policy Analysis Institutes. *Public Administration* 85, 2: 259-78.

Trappenburg, M. 2005. Gezondheidszorg En Democratie. Inaugural Speech, Erasmus MC. Leiderdorp: Demmenie Grafimedia.

Van der Grinten, T.E.D., and J.P. Kasdorp. 1999. Choices in Dutch Health Care: Mixing Strategies and Responsibilities. *Health Policy* 50: 105-22.

Van der Ploeg, R. 1992. De consensus-economie. Is de econoom een vijand van het volk? Amsterdam: Prometheus.

Van de Ven, W., K. Beck, F. Buchner, D. Chernichovsky, L. Gardiol, A. Holly, L. Lamers, E. Schokkaert, A. Shmueli, C. van de Voorde, R.C.J.A. van Vliet, J. Wasem, and I. Zmora. 2003. Risk Adjustment and Risk Selection on the Sickness Fund Insurance Market in Five European Countries. *Health Policy* 65: 75-98.

Van Hout, E.J.Th., and K. Putters. 2004. De Waarde Van De Norm. In *Economisering Van Zorg En Beroepsethiek*, 113-62. Zoetermeer: RVZ.

Van Kleef, R.C., K. Beck, W.P.M.M. van de Ven en R.C.J.A. van Vliet. 2007. Does risk equalization reduce the viability of voluntary deductibles? *International Journal of Health Care Finance and Economics*, 7: 43-58

VWS, Ministerie van. 2001. Vraag Aan Bod. The Hague: Ministry of Health.

Walsh, K. 1995. *Public Services and Market Mechanisms. Competition, Contracting and the New Public Management*. London: Macmillan Press Ltd.

Weiss, C.H. 1991. Policy Research: Data, Ideas, or Arguments? In *Social Sciences and Modern States*, 307-32, edited by p. Wagner. Cambridge: Cambridge UP.

Yanow, D. and P. Schwartz-Shea. 2006. *Interpretation and method. Empirical research methods and the interpretive turn.* London: Scharpe.

Zuiderent-Jerak, T. 2009. Competition in the Wild: Reconfiguring Health care Markets. *Social Studies of Science* 39(5): 765-792.

CHAPTER SEVEN 155
Conclusion

Introduction

The aim of this thesis was to investigate practices of science and policy interactions for policy-making in health care as forms of boundary work, and to analyse the performativity of science in policy. These general questions were elaborated on in the following research questions: how are practices of science and policy interactions organised? What are the social, cultural and political consequences of this organisation? And what is the role of materiality in these interactions? In this last chapter I return to the original research questions and describe the insights that this research has brought to the practices of science and policy in policy-making in health care.

This focus of the research helped me make choices in selecting the case studies and in analysing the data from the cases. Based on an ethnographic approach I focused on what scientists do when they make policy messages and assessments, and how they do this in interaction with policy makers, and how we can understand this in relation to ideas of the role of science in policy-making. This focus on actual practices of science and policy interactions led to new and more specific questions, which were elaborated in the previous chapters. Along the way, these questions evolved into specific themes that emerged from the case studies, and which helped me to better understand the practices of science and policy interactions. The boundary work theme helped me to understand the way science advisory organisations mediate in the health field. This theme derived from my wish to understand what science advisory organisations do to sustain their positions in this field, including the differences and similarities between several strategies. The theatrical metaphor of science and policy interactions in terms of on stage and backstage performances derives from my initial puzzling over the persistent presence of the dichotic thinking about science and policy as two separate realms, either technocratic or bureaucratic. This dichotomy remained strongly present, even though in practice policy makers and scientists alike were often quite aware of the limitations of this line of thinking, and also contested this dichotomy. On the other hand, often other interviewees proved very capable of drawing lines between science and policy, as if they had invented and guarded these boundaries themselves. These themes provide insight into why and how science-policy practices and thinking about these practices often differ.

How experts come to scientific advice for policy in interaction with policy makers can be divided in two parts: the first is on stage, where scientists and policy makers work according to formally set boundaries and formalised structures of the idea how science and policy should relate to each other, with clearly defined division of work. The second is backstage, where these formally set boundaries

and clearly defined division of work are temporarily lifted, and recreated, during consultations and negotiations about the value of scientific knowledge and policy problems. The boundary work performed both on and backstage in science and policy interaction, I explain in this thesis with the help of the following concepts:

— Strategies of authoritativeness
— Boundary configurations
— Materiality in science and policy interactions

Science and policy interactions as forms of boundary work

Strategies for authoritativeness

Throughout the previous chapters I have shown that the role science advisory organisations play in policy is in part the result of the institutional contexts in which they operate, as well as the outcome of the roles they (can) employ. The institutional context in which these science advisory bodies operate is, thus, not a given in advance but is a dynamic process in which the science advisory bodies themselves play a role. Science and policy interactions are not static procedures but dynamic processes that take place in oftentimes politicised environments, and are hence not easy to map. What's more, a large part of such interactions takes place behind closed doors, often literally. Moreover, as discussed in earlier chapters, political debates often permeate and determine the advisory trajectories of the science advisory bodies that this thesis investigates.

In the cases included in this thesis the model building started from a political wish for a specific (policy) tool. Political desirability at this level of interaction is, however, often local and small-scale, and comes down to concrete and practical questions such as: how to prevent the minister from making mistakes with inaccurate figures (number of smokers)? Or, does the government earn back money with the prevention of illnesses (diabetes)? How large is the role of specialists in constituting demand? Or, how is means of income valued as part of constituting health? Or, what animals are cute enough to serve as examples in policy advice? Such questions are political but at the same time get posed to science advisory bodies with the intention to come up with a scientific justification. In such questions the distinction between what is normative and what is not, and between

facts and values is not always easy to make and in many cases this distinction cannot be made. Science advising in a political environment is hence often expressed through epistemological and territorial conflicts, as the case studies show. My investigation of science and policy interactions in the case studies demonstrates that science advisory bodies use many strategies to solve such conflicts. These strategies often commence to build or maintain the authoritative position of these organisations towards politics and policy makers, but also to maintain authoritativeness towards other scientists.

As the CPB provides assessments for all policy fields and all ministries, it has the important task of standing above all parties. The CPB does much work, in which scientific authority is an important element to achieve this. The CPB uses its math-based statistical approach, in the form of models, as a strategy in seeking consensus, as Van den Bogaard (1998) and Wilts (1997) have also pointed out. The CPB used the outcomes of model assessments to maintain a precise understanding of its role towards the ministries: the CPB presents options, while policy makers and politicians make choices. This rational repertoire is also visible in the care model project: the CPB used its macroeconomic expertise as a way to keep other scientists at bay. Moreover, the epistemological differences between the CPB and other science advisory bodies are used by the CPB to exclude other experts, rather than taking these differences on as a starting point for discussions. This is what I call the *strategy of exclusion*. This strategy has, in the case of the care model, led to an expansion of the boundaries of the CPB's work into a field previously reserved for other expert organisations. But it also led to the creation of a new knowledge space not claimed by other science advisory bodies; namely that of a macroeconomic understanding of health.

In contrast to the CPB, the VTV's position seems unproblematic to the public eye: the messages presented by the VTV are rarely put up for discussion in public, and its information and messages are often used without question by policy makers. The CVTV also uses a contingent repertoire in its involvement with policy makers: *the strategy of 'staying out, but keeping near'*, also described by Gieryn (1995; and discussed in chapter three) as a way to protect knowledge from the influence of politics. Hence this strategy is used to give the messages of the VTV the proper authoritative status for policy makers, while appearing non-political. The CVTV puts a lot of effort into its relationship with the Ministry of Health. The centre continuously has to (re)establish its position towards policy – not too close and not too far – to come up with information and messages for the ministry to use, employing many instruments to do so; the liaisons, the policy and scientific boards, the ad hoc project teams. Specific formulations are important too: the CVTV delivers policy messages, not policy advice, to emphasise its non-political

role in public health policy. And even as the relationship between the ministry and CVTV has been formalised, this formalisation is used to constitute the best 'close distance', by employing research protocols. The CVTV also uses *strategies of inclusion and expansion* to maintain its authority over other scientists and expertise that contribute to VTV reports. In its research process the CVTV includes as many parties and expert opinions as possible. This inclusion makes VTV messages more authoritative for policy, but also to other scientists, as large parts of available knowledge and opinions are assessed and taken into account. This also contributes to the depoliticising of issues as far as possible. Moreover, the contingent strategy of inclusion employed by the CVTV can contribute to a more democratic take on scientific evidence, and the question of how to act on it or with it.

The inclusion strategy differs from Gieryn's strategies of monopolisation and expansion of boundaries in that Gieryn's strategies seem to include the notion that knowledge comes into the possession of the expander and becomes part of the knowledge base of the expander. This strategy is seen in the care model project, where the CPB became the owner of the model and all its parts, even the parts developed by other experts elsewhere. In the inclusion strategy employed by the CVTV the knowledge employed to write the reports, remains the ownership of the individual experts involved in the writing process. In other words, the CVTV does not become the owner of this expertise, in contrast to for example the CPB that became the owner of the expertise used to develop the care model.

Boundary configurations in science-policy interactions

In chapters two, three and four I showed that the science advisory organisations discussed in this thesis are strongly allied with the policy makers at the ministries for which they work. They form boundary configurations with these other parties. Boundary configurations are, as chapter three explains, strongly situated interconnections between science advisory institutes and policy institutions, as well as other actors involved in the science advisory trajectories. These configurations share a specific approach to problem definitions and methods and are embedded in (and at the same time embed) specific social, discursive, and material elements. A boundary configuration is made up of the networks of experts and policy makers that share similar backgrounds for example in education, in speaking similar languages from which to understand the societal problems at hand, or in preference for a political party. The actors involved in this configuration share the same epistemologies and methodologies.

These configurations are constructed, that is, they are not inevitably occurring events. Moreover, as the examples in this thesis show, the organisations perform

much work to create and maintain their boundary configurations, by using either inclusion or exclusion strategies to other experts, institutes and networks. Such boundary configurations contribute to the inclusion of specific kinds of science, and the kind of social and political theories about health and illness, and hence reinforce the discourse it represents. Boundary configurations are dynamic as they change shape over time and per project. As seen in the care model case, new boundary configurations can create new knowledge fields, and thus constitute new discourses. These experts and organisations share a scientific and policy language and vocabulary in how to understand problems in the policy field. Together these parties produce written and printed reports that serve as input for policy. Again, the choice of words can be important to underline a specific involvement of organisations outside the configuration, as for example in the formulation on the cover of the care model report that stresses the involvement of other organisations.

Boundary configurations are constituted through such and other material elements. Something as seemingly mundane as the possession and location of software and the availability or absence of theory to model parameters can provide a boundary for other experts to enter such a configuration, as for example happened in the care model project first for the RIVM and in a later stage the SCP.

Performativity of science

Science as materiality

At a more substantial level such materiality becomes even more important as materialities, such as economic theory, models, and software, support the negotiating abilities of some and close that of others. Models play an important role in science and policy interactions, and science advisory bodies draw substantially on them. Models enable authoritative assessments of policy proposals that would have been impossible without them (see Morgan and Den Butter, 2000). Models are also tools that provide credibility to science advisory practices. They do this as simplified but negotiated realities; models are thus the outcomes of long processes of negotiating data and theory by model builders. The interesting feature of models is that modelling practices provide a *discursive space* (Evans, 1999) where various disciplines meet, and where negotiations between these disciplines take place, and where weighing and simplification of theory and data against the policy questions is done until workable solutions are found. Models are thus nodal points or junctions of several networks, networks that are not necessarily engaged in the

same specific issue of that specific model (Fujimura, 1992) but prove useful in this instance. Importantly, models are not just negotiated representations of specific scientific and policy realities, but also *material arrangements* of these negotiations.

As all the chapters show, modelling experts gather and develop theoretical concepts and bits of data from many places. These elements are tangible, they can be touched, lifted, written on and put to use. These elements can be data on paper or on a CD ROM sent through the post. It can be computer software, the specific theoretical components of a model that are handed over or developed by other experts or the modules of the model that are transferred to other models. It can be handwritten notes, books filled with formulas, and meetings with peers and end-users of the models. All these elements are assembled to construct a specific model that is itself a representation of a certain reality. Models – such as the LARCH model, the care model and the risk adjustment system – thus contribute to a reconfiguration of the social worlds in which they operate. These models bring together, as said above, social worlds and enable these worlds to work together and to negotiate knowledge and policy.

In this, these models have become disciplining tools: they legitimate the use and form of certain data over others, they determine what research and policy questions can be (easily) answered and which ones can be left out. More importantly, once models have been developed and are used for the making or evaluation of policy, they often result in routine patterns, or standardised packages (Fujimura, 1992) in research and in policy-making, as well as in the coordination and demarcation of science and policy. Models are, in this way, constituents of the (political) reality by selecting, providing, and structuring information. Models, as expressions of scientific knowledge, can thus be performative in that these scientific representations can shape reality to resemble more the descriptions of that reality in those representations. Moreover, some of these materialities become this reality. For example, the models used by the CPB are often granted the status of 'arbiter' or starting points for policy-making instead of an expedient in policy development (Passenier, 1994). The same could be said for the standardised compounded health measures developed by the CVTV, and the modules of the LARCH model. Chapter six illustrates how the active engagement of economists in health care has led to an understanding of health care in more economic terms, and through the construction of material tools – in this case the risk adjustment system and the care model – contributed to the construction of a regulated competitive market in health care.

These tools do not do perform regulated competition alone, but are part of sets of tools that make competition in health care possible. This thesis suggests that the idea that competition in health care is a natural state of things is inaccurate;

instead, creating competition involves much work and many material devices that each in themselves is a specific enactment of that kind of competition. If market devices are no longer preconditions *for*, but enactments *of* the idea of a health care market, these devices become central actors in the production of policy consequences, instead of mere instrumental tools in a policy programme geared towards an ideal of the market. In fact, a market is as 'naturally competitive' as the tools that allow it to be.

Acting on stage and backstage

This research developed the insight that it can be useful to understand the interaction of science and policy and the way it is organised from the theatrical metaphor brought up by Goffman (1990) and specified by Hilgartner (2000). Hilgartner states that " the theatrical perspective offers a means to examine how credibility is produced in social interaction, rather than treating it as a pre-existing property of an advisory body" (2000:7), and he characterises the interaction between science and policy in terms of on stage and backstage, both of which are managed realms. These terms refer to the ways in which science advisory bodies position themselves in relation to ministries, policy makers, politicians and media that use this advice. On stage is the realm of the presentation of reports and messages to policy makers, for example in the form of reports, white papers and media debates. The backstage is the realm of construction for reports and messages. The meaning of on stage in relation to backstage can, however, differ per organisation. Bijker, Bal, and Hendriks (2009) have extended these concepts by showing how for the Health Council the backstage enables a constructivist notion of science and policy interactions, as fuzzy and non-linear, whereas on stage science is portrayed as a unified, objective and non-political exercise. In opposition van 't Klooster (2007) has shown that for futurists at the National Environmental Assessment Agency the exact opposite counts: futurists often mask their quite positivist approach to futurism by portraying on stage uncertainty discussions in constructivist terms.

The strategies the CPB and the CVTV employ to remain their authoritative position in the field and carry out their work are partly organised institutionally by their formal relation with the ministries and their formal role in policy cycles, and is partly shaped by the boundary configurations in which the institutes are located. These on stage appearances are in their turn the outcome of backstage processes, and are at the same time representations of the role science advice has to play in policy-making: objective and distant and non-political, or involved and

political as in the case of futurists. Hence, what constitutes credible sources of information differs for each organisation. To come to useful and credible advice or 'scientific policy facts', much work has to be done backstage. Both institutes put great effort into including networks of experts in health issues upon which they explicitly and extensively draw. Both institutes employ strategies, albeit different, to come to authoritative reports. The backstage provides, however, both institutes with a necessary discursive space where discussions can take place without immediate repercussions for the experts involved. This backstage is necessary in the Netherlands, where many experts at one and the same time are involved in the policy process; as policy makers, as members of government committees and councils, as members of municipalities, provincial government and parliament and a host of other ways. The roles of science and policy are often interwoven in multiple ways and that calls for tools that can restore the image of independence and objectivity. The backstage of science advice provides such a tool.

A closed or open backstage

Both strategies employed in the cases described in this thesis contribute to the status of the organisations as credible and authoritative sources, but do that in different ways in relation to their role in the policy cycle. Backstage processes should be kept out of sight, because an open backstage could influence the credibility and authority of science advice (Bal, Bijker, and Hendriks, 2004). Many examples of public disputes between scientists influencing public opinion and undermining scientific authority, such as happened in the swine flu epidemic[1], seem consistent with Bal, Bijker and Hendriks' argument. Based on their distinction of process transparency and content transparency, these authors argue that backstage itself should not always be open, but that science advisory bodies should be open about the fact that there is a discursive or negotiation space where discussions can take place. If science advisory bodies cannot be totally open about what happens backstage, they can at least be open about the processes taking place in it, for example by providing a list of invited experts invited and by being open about the procedures followed.

---

[1] Experts differed in opinion about the extent of the swine flu epidemic, and its consequences in terms of deaths and the way it could disorganise society. Especially Ab Osterhaus, Professor of Virology at Erasmus MC and head of the Department of Virology at the Erasmus MC was fiercely attacked in the media for his biased position regarding vaccination; e.g. in Maurits, and Vanheste. Ik Geloof Heilig in Wat Ik Doe. Vrij Nederland, 19 juni 2010 2010, 34-39, and other (digital) media, for example NUzakelijk.nl.

This thesis suggests, however, that this might not count for all advisory bodies to the same extent. The organisations discussed in the chapters here employ opposing strategies to achieve the same aim, namely to produce credible output and maintain their authoritative positions. The CVTV uses contingent strategies (Bal, 1999) in the presentation of its reports and 'policy messages', and employs an inclusion strategy to bring together many expert opinions. Thus, the centre seems more open about the processes and discussions that take place in backstage. It often openly reflects upon its role and limitations in public health policy and how it struggles with the most efficient distance to the ministry and its policy. The CVTV builds upon an open and qualitative model of health indicators – the Lalonde model – that offers a backstage room for discussion and debate. The CVTV's credibility and position in the public health field seem to benefit from this openness, and its reflexive attitude towards research seems to add to its authority. The position of the CVTV is, as said before, surprisingly uncontested, politically as well as scientifically, all the more remarkable because the National Institute for Public Health and the Environment, to which the CVTV belongs, has been under scrutiny about their models in relation to uncertainty, as is discussed in Chapter three. Hence, science advisory bodies characterised by a dialectical or contingent take on science and policy interactions, such as the CVTV, may have to be more open about their backstage processes. These contingent strategies of inclusion contribute to the authority of its science advice, and contribute to its independent and impartial position in the health field.

The CPB seems to take in a more difficult position. In contrast to the CVTV, the CPB uses a stricter, more rationalist, strategy to meet criticism from economists, politicians and other commentators. It keeps a strict regime on stage towards other parties to secure its independent status as impartial arbiter for all governmental policy fields. The CPB employs strategies of exclusion and expansion when it is faced with knowledge conflict, in order to maintain authority. Models are tools in this rationalist repertoire, adding to the CPB's credibility. This use of models, however, makes the CPB vulnerable to critical appraisal of its role in policy-making, despite the fact that it has somewhat opened up about their models (most are available on their website or can be ordered by mail). Because models tend to become 'black boxes', and much of the modelling work remains invisible to the public eye, open discussions about model parameters is limited. In recent years the CPB has opened up about the use of their models and the way the institute deals with uncertainty issues (De Vries, 20082), under pressure in the uncertainty debate and the need for transparency. The CPB has since depicted

2 See also Klooster, 2007 for more on uncertainty in relation to planning bureaus.

a more transparent attitude towards its technical and scientific tools, and the limitations of these tools. Uncertainty, however, remains articulated by technical terms – in terms of statistical uncertainty and model limitations.

Dealing with the reality of science and policy interactions in health care

To summarise, science and policy interactions are organised in different ways. In the cases discussed in this thesis, the science advisory organisations use two opposing strategies. On the one hand, *contingent strategies of inclusion*, and *staying out but keeping near* are employed, which hear all possible expert opinions, and an on stage absence of both the rational model of science, and the use of mathematical models. In this, the contingent strategy of inclusion can contribute to a more democratic take on scientific evidence, and the question is how to act on it or with it. Contingent strategy offers ways to include many voices, and to be nuanced. This way (health) problems can be taken seriously in all their breadth, and leads to understanding that there are no 'simple' solutions to change behaviour, only localised and situated solutions that may be 'simple' in form but still take into account the complexities of human life.

On the other hand, a *strategy of exclusion and expansion* is employed in a rationalist repertoire that builds heavily on the rational model of science by using the mathematical-statistical approach. Both strategies seem opposites, while both strategies aim at creating authoritative and impartial science advice for policy. With respect to the on stage role of scientific advice, science advisory bodies that use the contingent strategy of inclusion seem to benefit from opening up backstage processes. A certain openness about backstage processes contributes to their authoritative position in the field. Science advisory bodies that employ the strategy of exclusion and expansion seem to benefit from closed backstage processes with respect to their role in science advice, whereas they benefit from openness about their tools. Maintaining a rationalist approach can, however, lead to a further societal distrust in scientific advice (Halffman, 2003; Horstman, 2010), and to a further gap between scientific evidence and the public, whereas, as both Halffman (2003) and Horstman (2010) argue, in the light of societal developments, a shift towards a more democratic take on the role of science is needed.

Science advisory bodies are organised by boundary configurations which build strong alliances with other actors. Strong boundary configurations thus seem a prerequisite for the authority and credibility of scientific advice for policy. These

configurations built on specific ontologies and epistemologies of reality. Hence these configurations influence decisions that are taken on which 'theories of the world' are incorporated or left out, and influence the kind of policy measures and decisions that are taken by policy makers and politicians. Such close interconnections between scientists and policy makers thus limit the value of input from other science-based experts in policy-making processes and possibly hinder open democratic debate (see also Halffman, 2003; and Fischer, 1990; Shackley and Wynne, 1995; Wynne, 1992). More importantly, my research shows that boundary configurations are also political actors instead of merely instruments to build consensus and depoliticise policy problems (Jasanoff, 1990, 2005; Hilgartner, 2000). This is partly true also for the cases discussed in this thesis. Many tricky (or untamed) political issues are first transported to science advisory bodies for sorting out before they return to the political realm. However, in and between boundary configurations political discussion is ongoing, even in a depoliticised environment, and this lends boundary configurations to *re*-politicisation of (health) policy-making. This emphasises the impossibility of depoliticising political problems by transporting these problems to the scientific realm. A technocratic organisation of the science-policy boundary would not help overcome or mute political discussion. Instead, political discussion goes on with other means in another setting. The consequence of transporting political problems to science advisory organisations is that politicians lose sight of the normative considerations that are made in modelling practices and in constructing policy messages. And this would give science advisory organisations too much the role of arbiter of the playing field.

Concluding remarks

In Chapter one I promised to provide more insight into science and policy interactions, the organisation of science and policy interactions, and the consequences of such organisation. The case studies presented in this thesis are by no means representative of other practices of science and policy interactions in the Netherlands. However, I do think that the strategies described in this thesis, as well as the emphasis on the importance of material arrangements of knowledge, can be found in other practices of science and policy interactions. This can be helpful in understanding in what happens in science and policy relations, and in understanding the role of science in policy-making.

In conclusion, experts and policy makers should be aware of the limitations of transporting tricky policy problems to the scientific realm, as political discussions

are not actually stopped by technical means. Although the market-based policy program originates from the idea to create a smaller role for the government, this thesis shows that market solutions for the public sector require hardly less government control. It is the moment and location of government control that has changed, rather than the quantity. Hence, politicians should be more aware of science and policy practices, and should be more involved in them. Moreover, policy makers, politicians and science advisors should be aware of importance of the materiality of science, for example in (policy) tools. Such tools are not innocent items that help policy makers carry out specific policy, but are in themselves specific enactments of that kind of policy. They become central actors in the production of policy, and have consequences of their own. The development of such devices for markets demands their inclusion in the study of science-policy interactions and in analyses of the construction of legitimate policy.

References

Bal, R. 1999. Grenzenwerk. Over het organiseren van normstelling voor de arbeidsplek. Thesis.

Bal, R., W.E Bijker, and R. Hendriks. 2004. Democratisation of Scientific Evidence. *British Medical Journal* 329: 1339-41.

Bijker, W.E., R. Bal, and R. Hendriks. 2009. *The Paradox of Scientific Authority. The Role of Scientific Advice in Democracies*. The MIT Press.

De Vries, A. 2008. Towards do-ability. Dealing with uncertainty in the science-policy interface. Enschede, Universiteit Twente.

Evans, R. 1999. Economic models and policy advice: theory choice or moral choice? *Science in Context*, 12, 351-376.

Fischer, F. 1990. *Technocracy and the Politics of Expertise*: Sage Publications.

Fujimura, J.H. 1992. Crafting Science: Standardized Packages, Boundary Objects, And "Translation" . In *Science as Practice and Culture*, edited by Andrew Pickering, 168-211. Chicago and London: The University of Chicago Press.

Gieryn, T.F. 1995. Boundaries of Science. In *Handbook of Social Sciences*, edited by Sheila Jasanoff, Gerald E Markle, James C Petersen and Trevor Pinch. Thousand Oaks: Sage Publications.

Goffman, E. 1990. *The Presentation of Self in Everyday Life*. 8 ed. London etc.: Penguin, (1959).

Halffman, W. 2003. Boundaries of Regulatory Science, Eco / Toxicology and Aquatic Hazards of Chemicals in the Us, England and the Netherlands, 1970-1995. Universiteit van Amsterdam.

Hilgartner, S. 2000. *Science on Stage. Expert Advice as Public Drama*. Stanford: Stanford University Press.

Horstman, K. 2010. Dikke Kinderen, uitgebluste werknemers en vreemde virussen Filosofie van de publieke gezondheidszorg in de 21e eeuw. Inaugural spreech.

Jasanoff, S. 2005. *Designs on Nature. Science and Democracy in Europe and the United States*: Princeton University Press.

Jasanoff, S. 1990. *The Fifth Branch: Science Advisors as Policy Makers*. Harvard University Press.

Klooster, S.A., van 't. 2007. Toekomstverkenning: Ambities en De Praktijk: Een Etnografische Studie Naar De Productie Van Toekomstkennis Bij Het Ruimtelijk Planbureau. Maastricht University.

Martijn, M., and T. Vanheste. 2010. Ik Geloof Heilig in Wat Ik Doe. Interview met Ab Osterhaus in *Vrij Nederland*, 19 juni 2010, 34-39.

Morgan, M., S. and F.A.G. Den Butter. 2000. *Empirical Models and Policy-Making: Interaction and Institutions*, London and New York, Routledge.

Passenier. J. *Van Planning Naar Scanning. Een Halve Eeuw Planbureau in Nederland*. Groningen: Wolters - Noordhoff, 1994.

Shackley, S. and B. Wynne. 1995. Global Climate Change: The Mutual Construction of an Emergent Science-Policy Domain. *Science and Public Policy* 22: 218-30.

Van den Bogaard, A. 1998. *Configuring the Economy. The Emergence of a Modeling Practice in the Netherlands, 1920-1955*. Amsterdam: Thelathesis.

Wilts. A. 1997. Economie als Maatschappijwetenschap. Een sociologische geschiedenis van de economische wetenschap in Nederland (ca. 1930-1960) Amsterdam, University of Amsterdam.

Wynne, B. 1992. Carving out Science (and Politics) in the Regulatory Jungle. *Social Studies of Science* 22: 745-58.

Summary

Policy-making is difficult without scientific knowledge. Therefore it is important to gain more insight into science and policy interactions and practices. On the basis of case studies, this thesis investigates how scientists and policy makers come to useful facts and how they negotiate the processes involved in applying scientific knowledge in policy–making. The emphasis lies on strategies scientists use in their interactions with policy makers, and on the consequences for the shaping of Dutch health policy.

CHAPTER ONE **Science and policy in interaction**

The first chapter introduces some theoretical perspectives that capture the relation between science and policy, and some concepts from which we can understand this relation. Up until the 1990s it was often understood as a technocratic relation and as such science advisory bodies were criticised for their influence on policy decision-making. However, the past decade has heard a call for a larger role for science, especially in public health. This concerns local and small-scale interventions carried out by Municipal Health Services as well as national policy regarding the (financial) organisation of the entire health care sector. Government policy must be evidence-based. The problem with evidence-based policy is that on the one hand there is lack of knowledge about the effects of that policy. On the other hand existing evidence has a hard time finding its way to policy-makers. In this line of thinking policy-makers and scientists experience a gap between scientific knowledge and policy where science is positioned as objective and independent, while policy-making is in the realm of the normative. The solutions offered by scientists to overcome this gap are limited and ineffective and have raised the question of how to understand the role of science in policy-making.

Policy science and STS offer the insight that policy processes are not linear but erratic social interactions. Thus the role of science in policy-making is ambiguous, most of all in relation to the way facts come into being and the way facts are valued. Scientific knowledge is understood in this line of thinking as the outcome of a process of negotiation or 'boundary work' that takes place between scientists and policy-makers, and also as the result of the social context in which it is developed. This situatedness of scientific knowledge highlights the importance of the interactions that produce scientific knowledge which in turn brings to the fore the importance of studying such interactions. The boundary work between scientists and policy makers is influenced by material manifestations of scientific knowledge, such as data, theory, software programs, and

models. Such materialities can also have their own effect, a performativity. This take on the role of science in policy offers new insights into the organisation of science and policy interactions. I use these insights to analyse the case studies investigated in this thesis.

CHAPTER TWO **Exploring the future of health care: how science advisors struggle with the policy boundary in Dutch public health policy**

This chapter looks at and compares the various types of boundary work and their consequences that are carried out by several science advisory institutes. As starting point, it questions the organisation of science-policy interaction processes. How can we understand the way scientific institutions mediate in the health field? What do these institutions do to sustain their own positions in this field? How can we understand the differences and similarities between these?

For a better understanding of these questions, two examples of science and policy interaction – the macroeconomic care model built by an interdisciplinary project team, and the construction of VTV reports at the RIVM – are compared with regard to the interactions between these science advisory bodies and health care policy makers. The chapter provides a short account of the institutional history of both the CPB and the RIVM. It connect the institutional organisation of the science-policy boundary, in which each science advisory body is embedded, to the specific organisational set up of each science advisory institute. This has the effect of bringing into focus the links between the different roles played by science advisory institutes– the CVTV produces reports that seem to fulfil an advocacy role in the public health sector while the CPB fulfils a more technocratic role in the economic advisory field – both on stage in their field of expertise and backstage in the organisation of the processes they use in coming up with science-based advice for policy. Likewise, the differences in institutional organisation on either side of the science-policy boundary extends to the strategies that the institutes employ in dealing with values, knowledge conflicts, uncertainty, and with political trust or distrust. I argue that characterising single institutions according to one model is superficial. Instead, the case studies show different science-policy interactions at work at different moments in the advisory processes, and at different places in the organisational structure. At each moment, both the on stage *image* of the role of these science-based organisations in the policy-making process, and the backstage *ways* of performing their role as science advisory institute for policy-making influence the way the institutes present themselves and in constituting and maintaining their credibility and authority. At different moments in these processes the science advisory bodies also use their on stage presentations as an

argument to maintain their authoritative positions. In that sense the on stage representations and backstage practices cannot be seen as separate entities, but as two sides of the same coin; they are strategies to maintain authority and remain spokespersons of their field of expertise.

CHAPTER THREE **Boundary configurations in science-policy: modeling practices in health care**

This chapter focuses in greater detail on the construction of the care model as a boundary configuration in the making. Using this case study of the care model project I investigated the interactions and negotiations that the economic experts and public policy makers in the project employed in order to come to a workable model. Through a detailed account of these interactions and negotiations I discuss how science advisory bodies are entangled with (some of) the policy actors they advise in what I call *boundary configurations.* These strongly situated interconnections between science advisory institutes and policy institutions share a specific approach to problem definitions and methods and that are embedded in (and at the same time embed) social, discursive, and material elements. Boundary configurations build upon existing relationships that preceded the interdisciplinary project. Over the course of the project, these interconnections became stronger and began to have consequences for the inclusion of other experts in the project. Importantly, as the case study illustrates, such boundary configurations shape the kind of science, and relatedly, the kind of social and political theories about health care, that are effectuated in modelling practices. Moreover, because the model is based upon a neo classical theory of demand it contributed to the articulation of health care in terms of a market-based policy programme for the health care sector. In this chapter, I also show how the model was at first not as successful as hoped for at the start of the project – but that it did succeed in other ways. It provided one participating institute with a new tool for assessing economic policy measures for the care sector. As such the model extended the work of this institute to the care sector, and filled in a space that was not yet claimed by other science advisory institutes. Also in this chapter I illustrate how the process of model construction forged new liaisons between the CPB and the Ministry of Health, thus enforcing the boundary configuration between economists at the ministry and the experts at the economic science advisory institute. The care model also created new links between the CPB, the SCP and the RIVM on issues related to health care.

CHAPTER FOUR **Connecting evidence and policy: bringing researchers and policy makers together for effective evidence-based health policy**

This chapter investigates a tool for evidence-based public health. VTV reports have grown into authoritative resources of information that are used as input for policies relating to health promotion. The question is how to understand this from the idea of science and policy interactions as interactive and reflexive practices. Moving beyond current theories about knowledge utilisation often employed in public health, I offer a reconceptualisation of science and policy interactions as interactive and reflexive processes in which science and policy are not taken as separate worlds but are seen as two ends of a continuum. I discuss the role of materiality in these interactive processes. An investigation of the processes of the VTV reports over a ten-year period suggests that the success of the reports in informing policy depends largely on the specific institutional infrastructure that has been created over the years. This infrastructure supports and manages in many ways and on many levels both formal and informal contacts between scientists and policy makers. I argue that this infrastructure takes into account the fact that science and policy interactions are multidimensional and thus have to take place in both formal and informal settings. Dividing science-policy interactions between on stage representations and backstage action offers space for reflexive interactions between scientists and policy makers. It also offers an effective way out of the current trend towards a stricter separation of the scientific and the politic in the light of the accountability trends.

CHAPTER FIVE **Modelling policy: science-based models as performative boundary objects in Dutch policy-making**

This chapter discusses the role of models for policy by drawing on and exploring the tensions between the notions of boundary objects offered by Star and Griesemer (1989) and performativity (e.g. Callon, 1998). This central question is what is the performative nature of computer models as boundary objects and how do these models shape and change (or not) the social worlds they coordinate? The concept of boundary object proves useful in gaining a better understanding both of the hybrid character of science-based models and their role in the coordination between different social worlds. However, such a sociological or symbolic interactionist's account of the functions of models in science and policy interactions tends to hold the assumption that although these worlds need to interact, they remain stable throughout the interaction. Building on the idea of science as a performative tool, the case studies illustrate how models are constituted by negotiations between scientists and policy makers and at the same time constitute,

(re)configure and reform social worlds. I argue that models not only actively coordinate social worlds but also contribute to changing them. The performativity of models ranges from generic (instrumental) to substantial as they influence social worlds to the extent that these worlds start to behave in the way described in the models.

CHAPTER SIX **Analysing policy change: the performative role of economics in the constitution of a new policy programme in Dutch health care**

This chapter extends the notion of performativity by investigating the role of economic science in health policy development. Here I focus on the role of economic science in the creation of material devices – policy tools – used by policy makers and politicians in political decision-making regarding health care reform. These devices configure and frame health care as a market. Building on Callon's notion of performativity of economics, and on the basis of case study research in the Netherlands, I demonstrate how science-policy interaction co-constructs material devices that frame the health care sector and its actors as parties within a 'regulated competitive' market. I conclude that the notion that competition in health care is a natural state of things is inaccurate. Creating competition involves much work and many material devices, such as the care model and the risk adjustment system. Each tool is a specific enactment of that kind of competition. This also makes market tools central actors in the production of policy consequences. An example is the specific way 'demand' is constructed in the care model; this enables assessments of policy proposals that contribute to the idea of managed competition in health care, long before the government agreed with this policy reform. Markets are as 'naturally competitive' as the tools that allow them to be. This also argues for more political monitoring of such devices.

CHAPTER SEVEN **Conclusion**

Finally I return to the general questions posted in the introduction (Chapter 1) concluding with a general discussion of the practical and theoretical consequences of practices of science-policy relations in health care. The main conclusions are that scientific advisory organisations employ different strategies to come to effective and authoritative knowledge for policy, contingent strategies of inclusion and strategies for 'staying out but keeping near' or more rationalist strategies of exclusion. Which strategies get are employed depends partly on the institutional context, and partly on the boundary configurations in which these organisations are situated. A boundary configuration is made up of the networks of experts

and policy makers that share for example similar backgrounds in education, who speak the same language to understand the societal problems at hand, or share a preference for a political party. The actors involved in this configuration share epistemologies and methodologies, and scientific tools such as models. Important in practices of science and policy interactions are materialities such as models, as expressions of scientific knowledge. Materialities can be performative in that they shape reality to resemble more the descriptions of that reality in those representations. Moreover, materialities are also political actors, and should also be treated this way.

Moreover, it can be useful to understand the interaction of science and policy and the way it is organised from a theatrical metaphor. Science is *on stage* in presentations of reports and messages to policy makers, for example in the form of reports, white papers and debates in media. The backstage is the realm where the reports and messages are constructed in interaction with policy makers. The presentation on stage is in its turn the outcome of backstage processes, and is at the same time a representation of the role science advice should play in policy-making: objective and distant and non-political, or involved and political as in the case of futurists. With respect to the on stage role of science advice, science advisory bodies that use the contingent strategy of inclusion seem to benefit from opening up backstage processes. Certain openness about backstage processes contributes to its authoritative position in the field. Science advisory bodies that employ the strategy of exclusion and expansion seem to benefit from closed backstage processes with respect to its role in science advice, whereas they benefit from openness about their tools.

Samenvatting

Zonder wetenschappelijke kennis zou beleid er heel anders uitzien. Op het terrein van de (openbare) gezondheidszorg speelt wetenschappelijke kennis een belangrijke rol. Daarom is het van belang om inzicht te krijgen in de wijze waarop wetenschap en beleid met elkaar omgaan. Aan de hand van een aantal concrete casussen waarin wetenschappelijke kennis wordt ingezet voor beleid verken ik in dit proefschrift hoe wetenschappers en beleidsmakers tot bruikbare beleidsfeiten komen ten aanzien van de (openbare) gezondheidszorg. De nadruk ligt daarbij op de vraag naar de strategieën die wetenschappers hanteren, de consequenties die dat heeft voor de rol van wetenschap en wetenschappers in beleid, en voor de inhoud van het beleid ten aanzien van de zorg. Deze vragen vormen de kern van dit proefschrift.

Hoofdstuk één gaat in op de verschillende theoretische perspectieven die er bestaan over de relatie tussen wetenschap en beleid en worden de verschillende wetenschappelijke concepten waarmee de relatie tussen wetenschap en beleid bekeken kan worden uiteen gezet. Tot aan de jaren negentig bestond er veel kritiek op de technocratische rol van wetenschap in beleid. Wetenschappelijke adviesorganen zouden te veel invloed hebben op de besluitvorming van de overheid, hetgeen leidde tot een pleidooi voor de democratisering van wetenschappelijk advies. De laatste jaren wordt de roep om beter onderbouwd beleid in de publieke gezondheidszorg steeds groter. Dit gaat niet alleen over kleine en lokale interventies die bijvoorbeeld door GGD'en worden uitgevoerd, maar dit strekt zich ook uit tot het nationale overheidsbeleid ten aanzien van de (financiële) organisatie van de zorgsector, zoals die bijvoorbeeld in preventienota's en de rijksbegrotingen (voorheen de zorgnota's) van het Ministerie VWS wordt geformuleerd. Overheidsbeleid moet onderbouwd worden met bewijsvoering van het nut en de effectiviteit van bepaald beleid waarbij beleid wordt gecontinueerd of stopgezet. Een complicerende factor bij het wetenschappelijk onderbouwen van beleid is dat er weinig onderzoek bestaat over de effecten van beleid. Bovendien vindt bestaand onderzoek onvoldoende de weg naar diegenen die beleid maken. Kortom, er bestaat een kloof tussen wetenschappelijke kennis aan de ene kant en beleid aan de andere kant. Hierbij wordt aan wetenschappelijke kennis vaak een objectieve en onafhankelijke positie toegeschreven, terwijl binnen het beleid de normatieve afwegingen worden gemaakt. Oplossingen die door wetenschappers worden aangedragen om deze kloof te overbruggen blijken minder effectief als gehoopt en vragen om een andere conceptualisering van de relatie tussen wetenschap en

beleid. Bovendien roept het vragen op over wat de specifieke rol van wetenschap in beleid nu zou moeten zijn.

Wetenschap en techniek onderzoek evenals beleidswetenschappen bieden het inzicht dat beleidsprocessen geen lineaire processen zijn maar bestaan uit sociale interacties die nogal grillig kunnen verlopen. In het verlengde hiervan is de rol van wetenschap in beleid ook niet eenduidig. Dit heeft vooral betrekking op de manier waarop 'feiten' tot stand komen en de waarde die vervolgens aan die feiten wordt gegeven. Wetenschappelijke kennis kan ook worden gezien als de uitkomst van een onderhandelingsproces, van grenzenwerk tussen wetenschappers en beleidsmakers. Zo bezien kan wetenschappelijke kennis nooit losgezien worden van de sociale context waarin deze tot stand komt. Deze gesitueerdheid van wetenschappelijke kennis maakt dat de manier waarop kennis tot stand komt van belang is bij het begrijpen van wetenschaps- en beleidsinteracties. Daarin zit meteen de noodzaak om deze interacties nader te bestuderen en beter te begrijpen. Daar komt nog bij dat het grenzenwerk tussen wetenschap en beleid en de uitkomsten van dit grenzenwerk, bepaald wordt door fysieke manifestaties van wetenschappelijke kennis, ook wel de materialiteit van wetenschappelijk kennis genoemd. Dergelijke materialiteiten kunnen zijn: beschikbare theorie, beschikbare data, modellen, software programma's, enzovoorts. Uit onderzoek naar economische modellen blijkt dat materialiteiten zelf ook als actor kunnen optreden. Dat wil zeggen dat zij ook acties kunnen genereren op zichzelf. Dit kan plaatsvinden zonder inmenging van mensen. Modellen hebben kortom performativiteit. Dit perspectief op de rol van wetenschap in beleid levert nieuwe inzichten op over de organisatie van dergelijke interacties en over de rol van wetenschappelijke kennis in beleid. Deze gebruik ik om de casussen die in het proefschrift worden besproken te analyseren.

Hoofdstuk twee is een bespreking van de analyse van twee casussen, de constructie van het zorgmodel voor de bepaling van de macrokosten van de gezondheidszorg in een interdisciplinair team en het tot stand komen van de Volksgezondheid Toekomst Verkenning (VTV), een vierjaarlijks rapport waarin de gezondheidstoestand van de Nederlandse bevolking wordt beschreven. De nadruk ligt op de strategieën die ingezet worden door de verschillende wetenschappelijke adviesorganen om te komen tot voor hen werkbare samenwerking met verschillende disciplines en beleidsorganen. Ik zet de metafoor van het theater in om deze strategieën beter te begrijpen. De institutionele plaats van beide organisaties in de beleidswereld beïnvloedt de manier waarop in beide organisaties gewerkt wordt, de zogeheten *backstage* van het wetenschappelijk advies, en op de manier waarop beide organisaties hun boodschappen presenteren aan de buitenwereld,

front stage. Aan de VTV wordt vaak de rol toegeschreven van vertolker van de belangen van de openbare gezondheidszorg, terwijl het CPB juist vaker technocratische macht toegeschreven krijgt. De manier waarop beide organisaties hun rol in beleid begrijpen, heeft direct invloed op de organisatie van het werk binnen beide organisaties als op de manier waarop beide organisaties hun boodschappen brengen. Beide organisaties gebruiken verschillende strategieën, zowel backstage in de werkprocessen als op het podium naar de buitenwacht om de betrouwbaarheid en autoriteit van hun uitspraken in stand te houden of te verhogen.

In hoofdstuk drie analyseer ik de constructie van het zorgmodel door een interdisciplinair team als een voorbeeld van grenzenwerk tussen verschillende disciplines binnen de wetenschap en betreffende beleidssectoren. Dit grenzenwerk wordt gekenmerkt door het bestaan van grensconfiguraties. Deze grensconfiguraties zijn gesitueerde en in elkaar grijpende verbindingen tussen wetenschappers, wetenschappelijke instituten en beleidsmakers die dezelfde probleemdefinities en (theoretische) oplossingsrichtingen met elkaar delen. Daarnaast worden deze verbindingen versterkt doordat deze ingebed zijn in specifieke sociale, talige en materiële zaken. Voorbeelden hiervan zijn het volgen van dezelfde studies, het spreken van dezelfde (theoretische) taal, het werken bij dezelfde werkgevers, en het beschikken over bijvoorbeeld dezelfde wetenschappelijke gereedschappen zoals modellen. Hierdoor hoeft men weinig moeite te doen om elkaar te begrijpen. Binnen de casus van het zorgmodel bleek al snel dat het macro economisch denken de overhand kreeg binnen de onderhandelingen die werden gevoerd tussen de drie partijen. Dit werd versterkt doordat de macro economische experts een sterke grensconfiguratie vormden met macro economisch geschoolde beleidsmakers van Ministerie van Volksgezondheid, Welzijn en Sport die de opdracht tot dit model hadden gegeven. Daarnaast beschikten de macro economische experts, in tegenstelling tot de micro economische en epidemiologische experts, over instrumenten die hen in staat stelden om sneller en vaker modelparameters te testen. Dit versterkte de macro- economisch insteek van het model. Uiteindelijk viel het interdisciplinaire project uiteen, en kwam het model geheel onder de verantwoordelijkheid van het CPB tot stand. Hoewel het zorgmodel project niet als een geslaagd voorbeeld van samenwerking van planbureaus kan worden bestempeld, heeft het wel zeker bijgedragen aan het expliciteren van de verschillende rollen van de verschillende planbureaus binnen de zorgsector. Zo heeft het CPB expertise opgedaan op een beleidsterrein waarop het vóór dit project niet of nauwelijks werkzaam was. Bovendien bestaat er nu een kennisinstrument waarmee de zorgsector macro economisch kan worden begrepen. Het zorgmodel vult hiermee een kennisleemte waarin niet eerder door andere planbureaus werd voorzien.

In hoofdstuk vier begrijp ik de VTV als kennisinstrument voor overheidsbeleid op het terrein van publieke gezondheid als een voorbeeld van wetenschap en beleidsinteracties als reflexieve en interactieve praktijken. Het uitgangspunt is inzicht te verkrijgen in de reikwijdte van deze nieuwe relatie tussen wetenschap en beleid. Hoewel in discussies over *evidence based* werken in de publieke gezondheid veel wordt gesproken over een reconceptualisering van de relatie tussen kennis en beleid, bestaan er in feite maar weinig voorbeelden die kunnen dienen als input voor een dergelijk reconceptualisering van wetenschap en beleidsinteracties. Aan de hand van de analyse van het werk van de VTV laat ik zien hoe zo´n reconceptualisering van wetenschap en beleidsinteracties eruit zou kunnen zien. Daarbij zet ik inzichten uit het wetenschapsonderzoek in om het werk van de VTV te duiden. De VTV heeft kunnen uitgroeien tot een krachtig en effectief beleidsinstrument doordat het een zeer groot netwerk om zich heen heeft gecreëerd waarmee zowel wetenschappelijke als beleidsmatige input is verzekerd. Bovendien kunnen er tussen deze wetenschappelijke kennis en de beleidsmatige input op verschillende manieren interacties plaatsvinden. Interessant genoeg worden wetenschappers en beleidsmakers zelden rechtstreeks met elkaar geconfronteerd om discussies te vermijden en de aandacht niet af te leiden van de beleidsprioriteiten en de belangrijkste beleidsboodschappen.

Deze manier van confronteren van beleid met kennis leidt in veel gevallen tot het ontstaan van nieuwe wetenschappelijke beleidsfeiten. De kennis die de VTV aanlevert is daarom hybride van aard; het is zowel wetenschappelijk als beleidsmatig gevormd en komt tegemoet aan de eisen van beide werelden. In die zin is de VTV als reflexief instrument in staat om enerzijds tegemoet te komen aan het idee dat wetenschap en beleid verschillende werelden zijn die moeilijk nader tot elkaar komen, terwijl het anderzijds uitgaat van het idee dat wetenschap alleen iets kan brengen aan beleidsmakers als de beleidsvragen en de kennisproductie hand in hand gaan. Het instrument VTV bouwt voort op een interactief en reflexief begrip van de rol van wetenschap in beleid; wetenschap–beleid interacties kunnen alleen effectief zijn als zij lokaal en gesitueerd zijn. Het beleidsprobleem en het wetenschappelijk probleem zijn zodanig geformuleerd dat deze de beleidsmatige elementen en de wetenschappelijke elementen evenredig en werkbaar in zich dragen. Zonder dit uitgangspunt is de kans groot dat de uitkomsten van onderzoek in een la verdwijnen en beleid wordt gemaakt zonder evidence.

In hoofdstuk vijf wordt ingegaan op het effect dat wetenschappelijke modellen kunnen hebben op beleidsvorming. Ik doe dat in dit hoofdstuk door enerzijds modellen te zien als grensobjecten die verschillende sociale werelden aan elkaar verbinden. Anderzijds laat ik zien hoe deze grensobjecten zelf ook de werelden

die zij aan elkaar verbinden gewild of ongewild veranderen. Ik ga hierbij uit van het idee van grensobjecten dat Star en Griesemer in 1989 hebben geïntroduceerd, en het idee van performativiteit dat door Callon is uitgewerkt. Het begrip grensobject is nuttig als het gaat om het begrijpen van het hybride, of samengestelde karakter van wetenschappelijke modellen en de rol die deze modellen hebben bij de coördinatie van verschillende sociale werelden. Daar staat tegenover dat een dergelijke sociologische of symbolisch interactionistische opvatting over de functie van modellen in de interacties tussen wetenschap en beleid uitgaat van het idee dat, hoewel sociale werelden met elkaar kunnen interacteren, zij door de interacties niet veranderen maar juist stabiel blijven. De case studies laten nu juist zien dat modellen twee functies kunnen hebben: ze zijn in de eerste plaats zelf de uitkomst van onderhandelingen tussen wetenschappers en beleidsmakers, en van het samenbrengen van netwerken en materialiteiten zoals bestaande theorie, en data. Tegelijkertijd scheppen modellen een bepaalde werkelijkheid die toe bijdraagt dat deze geconstrueerde werkelijkheid als startpunt, als een waarheid dient voor verdere actie. In die zin zijn modellen in staat om sociale werelden te verbinden en deze ook te veranderen.

Hoofdstuk zes gaat verder in op het idee van performativiteit van wetenschappelijke kennis door aan de hand van drie casussen te laten zien welke invloed materiële verschijningsvormen van wetenschap kunnen hebben in de vormgeving van in dit geval de zorgsector. De vooronderstelling dat de markt de problemen in de zorg oplost, ondanks de vele bezwaren uit de zorgsector zelf, is in 2006 omgezet tot een beleidsprogramma. Deze beleidsverandering wordt vaak verklaard als een proces van *policy learning*. Dit uitgangspunt van *policy learning* wordt in dit hoofdstuk aangevuld met het inzicht dat materiële manifestaties van wetenschap eveneens belangrijk zijn in het slagen van een dergelijk beleidsprogramma. Uitgaande van Callons idee van performativiteit en de cases studies, laat ik zien hoe wetenschap- en beleidsinteracties bijdragen aan de co-constructie van materiële gereedschappen die op hun beurt bijdragen aan het bouwen van een macro economisch of ´gereguleerd competitief´ raamwerk voor de zorgsector. Ik concludeer dat het idee van competitie in de zorg geen natuurlijke gegeven is. In tegendeel, het creëren van competitie in de zorg vereist veel werk en veel materiële gereedschappen zoals het zorgmodel en het risicovereveningsysteem. Elk gereedschap is een specifieke verwezenlijking of materialisering van deze vorm van competitie. Om deze reden zijn materiële gereedschappen centrale actoren binnen de productie van een markt voor de zorgsector. Een andere conclusie die hieruit volgt is dat een markt zo competitief is als de gereedschappen die deze markt mogelijk moeten maken.

Hoofdstuk zeven keert, op basis van de eerdere hoofdstukken, terug naar de vragen die werden gesteld in het eerste hoofdstuk; hoe komen wetenschappers en beleidsmakers tot vruchtbare samenwerking? Welke strategieën hanteren wetenschappers daarbij en welke consequenties heeft dat voor de rol en functie van wetenschap en wetenschappers en voor de inhoud van het beleid ten aanzien van de zorg? De belangrijkste conclusies zijn dat wetenschappelijke adviesorganen verschillende strategieën inzetten om tot effectieve en betrouwbare kennis voor beleid te komen. Zo worden exclusie en inclusie strategieën ingezet, en strategieën om nabij het beleid te blijven, maar ook weer niet te dichtbij. Welke strategieën ingezet worden is deels afhankelijk van de institutionele context van adviesorganen in het politiek-bestuurlijke bestel, maar is tegelijkertijd afhankelijk van de grensconfiguraties waarin deze adviesorganen zich bevinden. Grensconfiguraties bestaan zoals gezegd uit gesitueerde en in elkaar grijpende verbindingen tussen wetenschappers en wetenschappelijke instituten en beleidsmakers. Zij delen bovendien dezelfde probleemdefinities en (theoretische) oplossingsrichtingen. Daarnaast worden de verbindingen versterkt doordat deze ingebed zijn in specifieke sociale, talige en materiële elementen. Wetenschappelijke modellen bijvoorbeeld, scheppen een bepaalde werkelijkheid waarna mensen die met modellen werken de geconstrueerde werkelijkheid in de modellen als startpunt aannemen. Daarmee krijgt deze specifieke geconstrueerde werkelijkheid meer gewicht ten opzichte van een eventuele andere (nog niet) geconstrueerde werkelijkheid. Dergelijke materialiteiten hebben politieke gevolgen en moeten als zodanig behandeld worden.

Daarnaast kan het nuttig zijn om de interactie tussen en de organisatie van wetenschap en beleid te begrijpen vanuit de eerder besproken theater metafoor. De presentatie van wetenschap op het podium vindt plaats in de vorm van beleidsboodschappen, rapporten en debatten in verschillende media. In de backstage vinden de onderhandelingen plaats over de beleidsboodschappen samen met beleidsmakers. De manier waarop wetenschap wordt gepresenteerd is een uitkomst van de onderhandelingen in de backstage en representeert tegelijkertijd de wenselijke rol van wetenschap in beleid, namelijk als objectief, afstandelijk en non-politiek of andersom juist wel politiek geëngageerd. Wetenschappelijke adviesorganen hebben er baadt bij om open te zijn over wat er gaande is in de backstage, omdat dit bijdraagt aan hun betrouwbaarheid. Deze openheid strekt zich uit van openheid over de constructie van de gebruikte modellen tot openheid over de inclusie van expertise.

Dankwoord

Het uitvoeren van een promotie onderzoek is net zo goed de uitkomst van een onderhandelingsproces, als de rol van wetenschappelijke kennis is beleid dat is. Dat geldt in elk geval voor mijn onderzoek. Die onderhandelingen gingen over de opzet en de inhoud van het onderzoek, maar ook over de hoeveelheid tijd die ik voor dit onderzoek nodig had. Op de plek wil ik iedereen bedanken die mij de afgelopen jaren heeft geholpen bij deze 'onderhandelingen', of die er gewoonweg voor mij waren!

Allereerst wil ik Mark Berg en Roland Bal bedanken omdat zij mij aannamen op het CPB project en omdat zij mijn begeleiders waren. Mark Berg nam als eerste de rol van promotor op zich. Hoewel je rol kort duurde, heb ik je inspirerende en kritische opmerkingen altijd als zeer behulpzaam ervaren. Bovendien zijn je opmerkingen gedurende het hele project een bron van inspiratie geweest. Roland Bal, als copromotor heb je me in de eerste jaren veel steun verleend in de onderzoeksfase, en bij het vinden van analytische begrippen om de hoeveelheid en de strekking van het empirisch materiaal te ordenen. Roland, als geen ander kun je conceptueel denken integreren met het echte leven: voor mij ben jij het levende voorbeeld van hoe je als mens privé en beroep STS-style kunt combineren: maak van je woonkamer tegelijkertijd je werkkamer! Dank voor je vertrouwen in mij.

Ten tweede wil ik hier de verschillende planbureaus –het Centraal Planbureau, het Sociaal en Cultureel Planbureau en het centrum Volksgezondheid Toekomst Verkenning van het RIVM– bedanken voor hun gastvrijheid en hulp bij het uitvoeren van dit onderzoek. Dit promotieonderzoek kwam voort uit een academische interesse naar de specifieke rol van Nederlandse planbureaus bij het tot stand komen van beleid. Nederlandse planbureaus hebben een unieke plek in Nederlands beleid, en wellicht zijn nergens ter wereld experts zo nauw verweven met beleidsmakers als in Nederland. Deze unieke rol maakt planbureaus ook kwetsbaar voor kritiek vanuit velerlei richtingen. Juist daarom was het spannend om een kijkje te mogen nemen in de keuken van deze planbureaus. Ik wil speciaal de volgende mensen bedanken: ten eerste de vorige directeur van het CPB, Henk Don, voor zijn tijd en scheppen van de mogelijkheid om bij het CPB rond te lopen, Jacqueline Timmerhuis die zeer veel werk heeft verricht om mij wegwijs te maken in de archieven van het CPB. Er was weinig dat aan haar aandacht ontsnapt als het gaat om het CPB. Verder wil ik hier de verschillende projectleiders en (oud) medewerkers bedanken voor hun tijd en bereidheid om steeds weer (schijnbaar) dezelfde vragen te beantwoorden. Verder wil ik de directeur van het SCP, Paul Schnabel, bedanken voor zijn bereidheid commentaar te leveren op een eerste analyse van de casus over het zorgmodel. Ook wil ik de verschillende projectleiders en (oud)

medewerkers van het SCP bedanken die ik heb mogen interviewen. Bij het RIVM wil ik graag Hans van Oers en Guus de Hollander bedanken dat zij het mogelijk maakten dit onderzoek te doen. Ook wil ik alle medewerkers bedanken die ik de afgelopen jaren heb gesproken en geïnterviewd. Zonder hun tijd, openheid en vertrouwen was dit proefschrift nooit mogelijk geweest.

Een proefschrift is in veel opzichten een eenzaam proces, maar gelukkig zijn er veel mensen geweest die mij zeer hebben bijgestaan de afgelopen jaren. Ik heb zeer goede herinneringen aan de 'Torentje overleggen'. De vele discussies over grenzenwerk en andere symbolisch interactionistische begrippen waren soms confronterend maar altijd inspirerend. Dank aan allen die daar regelmatig bij waren: Willem Halffman als de coördinator van het Rethinking project (waarvan mijn project een onderdeel was), en verder in alfabetische orde, Dave Huitema, Esther Turnhout, Peter Scholten, Peter Stauvermann, Ragna Zeiss, en Udo Pesch. Annick de Vries, jou wil ik ook bedanken, ook omdat je erg fijn conferentie gezelschap bent. Verder wil ik Annemiek Nelis en Paul Wouters bedanken voor hun rol als coördinatoren van WTMC voor de vele inspireerde en leerzame bijeenkomsten. En natuurlijk iedereen die daar als PhD student aanwezig was, en speciaal Babette Mueller-Rockstroh en Susan van ´t Klooster voor de inhoudelijke bijdragen aan mijn denkproces.

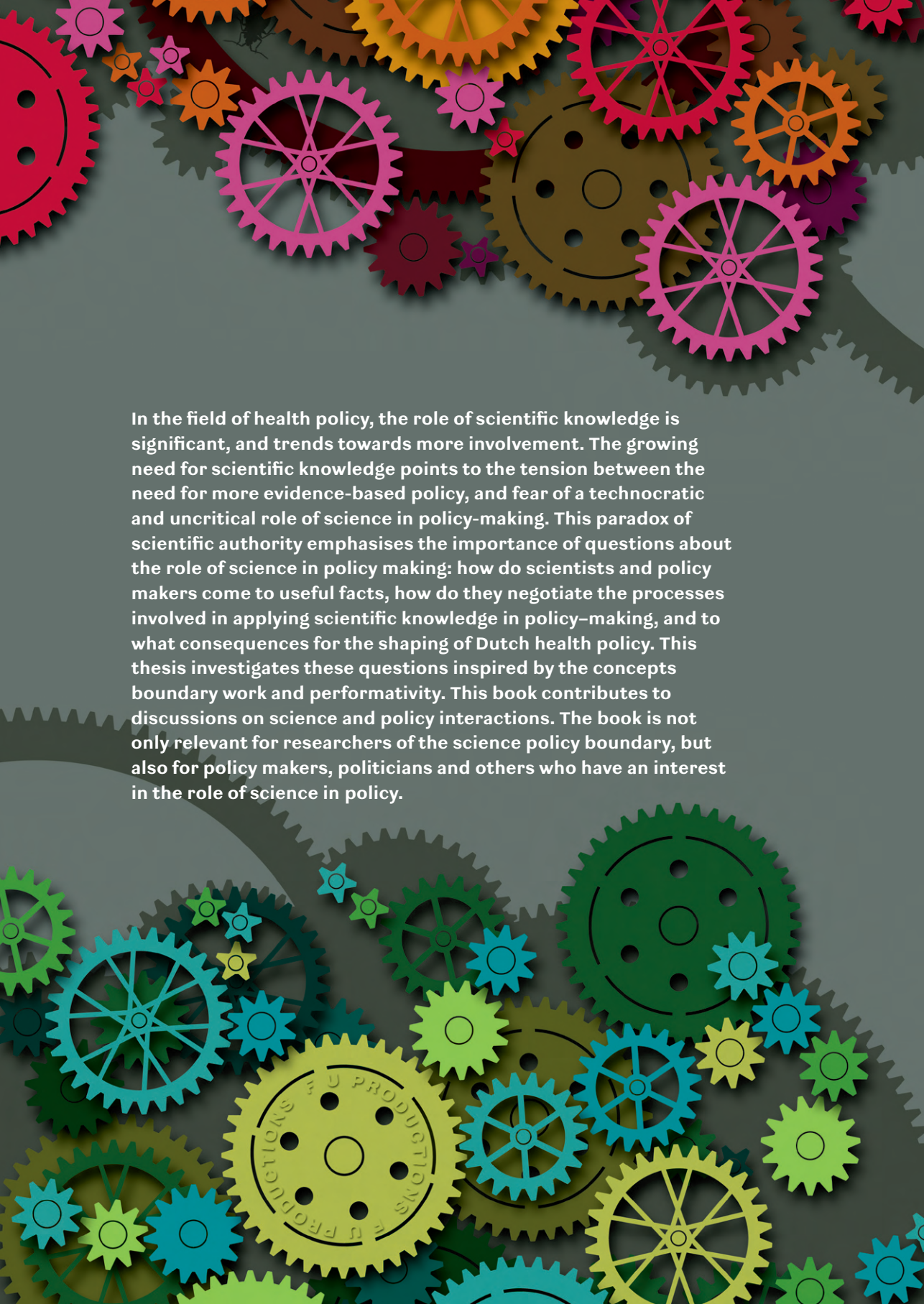
Verder wil ik hier graag al mijn naaste colleges van Healthcare Governance bedanken voor de vele inspirerende maandaglunches. En speciaal Sam Adams, Katharina Paul, Kim Putters en Tom van der Grinten voor kritische en behulpzame opmerkingen waarmee ik mijn artikelen kon verbeteren, Teun Zuiderent-Jerak en Sonja Jerak-Zuiderent voor discussies over Callon en performativiteit, en Annemiek Stoopendaal voor alle andere discussies. Ook wil ik hier graag mijn (oud) kamergenoten Semiha Denktas, Yvonne Jansen, Marleen de Mul bedanken voor hun emotionele steun. Dat geldt ook voor Hester van de Bovenkamp, en Jolanda Dwarswaard: omdat er naast promoveren nog zoveel meer is dat om serieuze aandacht vraagt. En Anuska Chote, omdat promoveren wel belangrijk is! Iris Wallenburg, voor het lezen van de 'laatste' versie van mijn conclusies. Verder wil ik speciaal bedanken Marja Wille-Buurman voor haar professionele interesse en steun in de eerste jaren van mijn project, en Rolph Pagano voor zijn enthousiaste en kritische steun tijdens de laatste fases van mijn proefschrift. En Rigini Werner voor de laatste verbeteringen aan het Engels.

Zoals gezegd, het schrijven van een proefschrift is ook een onderhandelingsproces over tijd. Gelukkig kan een proefschrift niet geschreven worden zonder tijd vrijaf. Daarom wil ik iedereen bedanken die mij deze tijd heeft gegeven voor hun liefhebbende en gezonde (des)interesse in mijn proefschrift! Zonder jullie was dit allemaal nooit gelukt en was het allemaal een stuk saaier geweest. In het

bijzonder: Nienke Maseland, de wijnclub, Josien Pieterse, Sandra Langendijk, Huong Ngo, Petra de Vries, Cas Bool voor hulp met de referenties, Rob Westendorp voor de lay out en de omslag, Gordon Phillips voor hulp bij het Engels, mijn broers en zussen Maartje, Thomas, Joep, Liselot and Joris van Egmond (voor alles natuurlijk) en Roosmarijn van Egmond in het bijzonder voor je hulp met de referenties, en Annuska Overgaag en Arnie Theel als schoonfamilie. Verder natuurlijk mijn ouders en ouderachtigen: Anna Huisman en Paul Ditiecher, Piet van Egmond en Nellie van Egmond- Priester, Ben Gerrits van den Ende en Martha Esvelt voor al jullie vertrouwen, en Jan Seijbel voor je commentaar op eerdere versies van artikelen in dit proefschrift. Verder mijn schoonouders Erik Kriek sr en Eeva Kriek Tuovinen, ook omdat jullie altijd bereid waren om op Clovis te passen. Natuurlijk eerst en vooral mijn levenspartner Erik Kriek en mijn zoon Clovis Kriek. Erik, dank voor al je steun en vertrouwen! Clovis, gewoon voor het feit dat je er bent. Zonder jullie zou het leven kaal en leeg zijn.

About the author

Stans van Egmond was born on September 21st 1973 in Assen in the Netherlands. She studied political sciences and gender studies at the University of Amsterdam between 1995 and 2000. She also holds a certificate in Law. In her thesis she discussed the effects of 20 years of emancipation policy in Hoorn. After her graduation she combined work as political assistant for the PvdA Noord-Holland with project work at the Institute for Political Participation (IPP). Among others, she took part in a project that focused on strengthening the political participation of migrants. From 2001 until 2002 she worked as a policy maker at the province Noord-Holland. As a policy maker she was responsible for the program Actieplan Cultuurbereik. From 2002 until 2003 she continued as policy maker for the Municipality Amsterdam in the project organisation IJburg. In this role she supported both the Amenities and the Quality Committtees for IJburg. In 2003 she started as PhD student in the Institute of Health Policy and Management at the Erasmus University Rotterdam, in the NWO funded project `Modeling the Future. Rethinking boundary work for economic policy making: the CPB care'. The project attracted her interest because of its focus on economic science and the interaction with (health) policy, and its focus on actual practices. During her PhD research she participated in the graduate school for Science Technology and Modern Culture (WTMC). In 2006 she spent three months as a visiting scholar in the Department of Sociology at the Lancaster University in the UK. Since 2007 she also works as a researcher on other projects, the ZonMw funded project on Dutch Academic Collaboratives, and for the National Institute for Public Health and the Environment. In addition she teaches and coordinates undergraduate courses in qualitative research methods and philosophy of science. In addition to her academic activities she is also involved in municipal politics in Amsterdam for Groen Links. She is married to the Dutch illustrator Erik Kriek, and together they have a son, Clovis Kriek (2008).



In the field of health policy, the role of scientific knowledge is significant, and trends towards more involvement. The growing need for scientific knowledge points to the tension between the need for more evidence-based policy, and fear of a technocratic and uncritical role of science in policy-making. This paradox of scientific authority emphasises the importance of questions about the role of science in policy making: how do scientists and policy makers come to useful facts, how do they negotiate the processes involved in applying scientific knowledge in policy–making, and to what consequences for the shaping of Dutch health policy. This thesis investigates these questions inspired by the concepts boundary work and performativity. This book contributes to discussions on science and policy interactions. The book is not only relevant for researchers of the science policy boundary, but also for policy makers, politicians and others who have an interest in the role of science in policy.