

Karaulova, Maria; Edler, Jakob

Working Paper

Bringing research into policy: Understanding context-specific requirements for productive knowledge brokering in legislatures

Fraunhofer ISI Discussion Papers Innovation Systems and Policy Analysis, No. 77

Provided in Cooperation with:

Fraunhofer Institute for Systems and Innovation Research ISI

Suggested Citation: Karaulova, Maria; Edler, Jakob (2023) : Bringing research into policy: Understanding context-specific requirements for productive knowledge brokering in legislatures, Fraunhofer ISI Discussion Papers Innovation Systems and Policy Analysis, No. 77, Fraunhofer-Institut für System- und Innovationsforschung ISI, Karlsruhe, <https://doi.org/10.24406/publica-857>

This Version is available at:

<https://hdl.handle.net/10419/269873>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Fraunhofer ISI Discussion Papers *Innovation Systems and Policy Analysis* No. 77

Bringing Research into Policy: Understanding Context-specific Requirements for Productive Knowledge Brokering in Legislatures

Maria Karaulova, Jakob Edler

Place: Karlsruhe

Date: February 2023

Responsible for content

Maria Karaulova, maria.karaulova@isi.fraunhofer.de; Jakob Edler, jakob.edler@isi.fraunhofer.de
Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe

Recommended citation

Karaulova, M.; Edler, J. (2023): Bringing Research into Policy: Understanding Context-specific Requirements for Productive Knowledge Brokering in Legislatures, Fraunhofer ISI discussion Paper, No. 77. Karlsruhe: Fraunhofer ISI.

Published

February 2023

ISSN

1612-1430

Doi

10.24406/publica-857

Contents

Contents	I
Figure and Tables.....	II
Abstract	1
1 Introduction.....	2
2 Theoretical Background	4
2.1 Knowledge Brokering in Policy	4
2.2 Legislative Science Advice	5
2.3 Challenges of Legislative Knowledge Brokering	7
3 Research Context and Methods	9
3.1 Case Study: Parliamentary Office of Science and Technology.....	9
3.2 Research Methods	11
4 Organising for Impartial and Impactful Legislative Knowledge Brokering.....	13
4.1 Parliamentary Research Briefing Standards.....	13
4.2 The Place and Purpose of POSTnotes	14
4.3 POSTnote Planning, Preparation and Dissemination.....	16
5 Discussion: Towards a Functional Competence Framework of Legislative Knowledge Brokering	19
6 Conclusions.....	23
Appendix 1	25
Appendix 2	26
Literature.....	27

Figure and Tables

Figure 1: Functional competence framework for legislative brokering 19

Table 1: Science advice in the executive and the legislative branches..... 6

Table 2: Interview data collection results 12

Table 3: In-house sources of advice in Parliament..... 14

Table 4: Key strategies of legislative knowledge brokering20

Table 5: POSTnotes selected for in-depth analysis25

Abstract

This paper examines the influence of the institutional setting on knowledge brokering work in legislatures. We argue that legislative brokers face three specific challenges: heightened legitimacy requirements for the brokered knowledge, the need to cater for a wide range of topics and different audiences, and the need to compete with other suppliers of research. Based on the in-depth interpretive case study of the UK Parliamentary Office of Science and Technology, we develop a functional framework for productive in-house legislative knowledge brokering. We argue that in order to survive and thrive in the challenging legislative science advisory ecosystems, knowledge brokers need to develop a broader range of competencies than brokers in government do, in particular, the ability to organise for impact of their work. This paper contributes to the view of knowledge brokering as the involved, strategic, context-dependent activity and offers lessons for practitioners to improve research utilization in legislatures.

1 Introduction

Although the value of research for policy debate and policy making is widely recognised, the relationship between science and policy remains ambiguous and even strained, as starkly illustrated by efforts to mobilise scientific expertise to address the climate emergency and the global pandemic (Cairney 2021; Capasso et al. 2019; Holtz et al. 2020; Viola et al. 2021). Research struggles to reach policy, while policymakers and politicians struggle to absorb and use research. Research-informed advice can be lost among the high volume of other information and general noise of the policy making process. Research needs to be salient, credible and legitimate to be taken seriously, and even then it is often outweighed by other types of knowledge and value-based arguments (Bozeman and Sarewitz 2005; Cash et al. 2003; Gluckman and Wilsdon 2016; Molas-Gallart and Tang 2011; van der Arend 2014).

In-house knowledge brokering is increasingly suggested as one of the means to improve productive use of research-based knowledge in policy organisations (Duncan et al. 2020; Holmes and Clark 2008; MacKillop et al. 2020; Reinecke 2015; Sarkki 2017; Turnhout et al. 2013; Ward et al. 2009). Knowledge brokers are intermediaries who gather, analyse, and synthesise information, adapt it for policy audiences, and facilitate more frequent in-depth engagement of policymakers with research. Brokers also actively influence the knowledge transfer process, e.g. they co-shape and manage boundaries on research-policy interfaces, co-produce norms of knowledge transfer (Duncan et al. 2020; Jasanoff 2004; Meyer 2010).

In this paper, we ask: how does an institutional setting influence knowledge brokering work? Knowledge brokering is context-dependent, however its empirical research has been limited to a few policy areas and predominantly to middle-level government organisations (Michaels 2009; Saarela et al. 2015). The narrow knowledge base has inhibited comprehending the role and activities of knowledge brokers, the scope of brokering strategies, and the effects of knowledge brokering on policymaking more generally (MacKillop et al. 2020). We address these nascent criticisms by examining knowledge brokering in legislatures.

Legislatures are public policy arenas with constantly evolving requirements for science advice¹ (Akerlof et al. 2019; Kenny et al. 2017b). In recent years, the shifting relations between science, policy and the public, legislatures have led to the emergence of new types of advisory roles in addition to parliamentary technology assessment (PTA), the traditional form of science-policy knowledge exchange (Bauer and Kastenhofer 2019; Hennen and Nierling 2019). In this paper, legislative knowledge brokering is examined in the context of these ongoing processes. Starting with the assumption that the institutional and organisational setting prescribes specific requirements for advice, we formulate three specific challenges of knowledge brokering in a legislature: the heightened legitimacy requirements, the need to perform PTA on a wide range of themes and cater for different users, and the need for legislative knowledge brokers to compete with other sources of advice.

¹ In this paper, we focus on the use of research in legislatures paying particular attention to scientific research. The term 'science advice' is used here and in sections 2.2 and 2.3 as the term established in the literature that describes particular advisory roles in policy organisations.

We then empirically analyse how these challenges could be resolved and which strategies knowledge brokers employ when they operate in the legislative setting. We draw on the case study of the UK Parliamentary Office of Science and Technology (POST). A small bicameral unit in Parliament, POST has provided research support to parliamentary audiences since 1989. POST conducts PTA, drafts research briefings, organises events, offers research training, works internationally, and coordinates a programme of academic fellowships. Our in-depth interpretive case study uses POSTnotes, flagship research briefings, as the focus of enquiry. The study was carried out in 2019 and included participant observation, document analysis, as well as 34 interviews with POST staff, parliamentary stakeholders and parliamentarians. Linking the deductive challenges with the empirical findings we develop a conceptual framework for competencies and strategies of productive in-house knowledge brokering in legislatures.

2 Theoretical Background

2.1 Knowledge Brokering in Policy

The extent and quality of research uptake in policy remains unsatisfactory despite the steady growth of scholarship explaining its conditions, mechanisms and instruments (de Goede et al. 2010; Gagliardi et al. 2008; Haynes et al. 2012; Kogut and Macpherson 2011; McCright and Dunlap 2010; Muhonen et al. 2020; Penfield et al. 2014; Rudd 2011; Smith 2013; Strassheim and Kettunen 2014; Wall et al. 2017). Knowledge brokering has been suggested as the instrument to improve the uptake of research in policy, following its successful implementation in evidence-based healthcare (Chew et al. 2013; Dobbins et al. 2009; Lavis et al. 2002; Lomas 2007; Long et al. 2013; Sarkies et al. 2017). There, systematic reviews consistently report positive association between knowledge brokering and research uptake. Armstrong et al. (2013) found that access to a broker improved the quality of decision-making in public health settings. Similarly, Elueze (2015) report that knowledge brokering is an effective translation strategy, especially when brokers are embedded in user settings.

In policy, diverse actors in the advisory system adopt broker roles, ranging from individual scientists to think tanks² (Halligan 1995; Lentsch and Weingart 2011; Pielke Jr 2007). In-house knowledge brokers support policymaking in their organisations by gathering, appraising and summarising relevant information (Moore et al. 2017). It is shown how knowledge brokers in policy improve research uptake in three key ways: (i) via knowledge management; (ii) by improving linkages and the exchange between research and practice, and (iii) by improving decision-makers' capacity to use research over time (Ward et al. 2009).

With regard to knowledge management, brokers are aware of specific knowledge needs in their policy area. They search and acquire relevant evidence, or commission research if none is available (Bogenschneider and Corbett 2010; Cherney et al. 2015). They are able to investigate the reliability of the evidence and sift through the ever increasing volume of information (Horton and Brown 2018). Knowledge brokers then adapt evidence by performing assessments and syntheses, conducting their own desk research, presenting research results in formats suitable for their target audiences (Holmes and Clark 2008; Pannell and Roberts 2009). As insiders, brokers are aware of the windows of opportunity during policy cycles and can provide relevant research to policymakers at the right time (Notarianni et al. 2016). With regard to facilitating linkages, brokers are in a position to nurture common understanding between researchers and policymakers by setting up contacts between them and by using boundary objects (Meyer 2010; Turnhout et al. 2007). With regard to capacity building, over a period of time brokers can improve policymakers' research skills and their ability to understand research evidence (Duncan 2008; Spruijt et al. 2014).

Further research has pointed out that the role of brokers is broader than simply processing information and bridging knowledge gaps. Knowledge brokers are active, involved agents that shape complex, messy and political processes of knowledge transfer. As they operate on

² Due to the limitations of space, we will restrict our review to knowledge brokering and will not cover other types of boundary spanning and intermediation (see Neal et al. 2021 for a review of these concepts).

science-policy interfaces, they co-shape and co-manage the boundaries separating various communities and knowledge domains (Callon 1984; Meyer 2010; Turnhout et al. 2013). The boundaries are fuzzy and changeable, they can be raised, dissolved and redrawn by the actors involved in knowledge production and transfer (Wehrens 2014). Knowledge brokers co-shape the standards and expectations of knowledge transfer, including the notions of credibility, legitimacy and relevance of research in policy³ (Hoppe et al. 2013; Sarkki 2017). Duncan et al. (2020) illuminate the tension between the prescribed idealised 'neutral' stance and the actualised involved work of knowledge brokers, even when the brokers themselves aspire to be disinterested intermediaries.

In advancing research on knowledge brokering, it is necessary to question how the institutional setting influences knowledge brokering work. Although various actors may perform knowledge brokering, the scope of their ability to shape the knowledge transfer process, the activities they undertake to do so and the goals they pursue may be vastly different (Craft and Howlett 2013). In-house knowledge brokers are influenced by the institutional logics of their organisations and are directly subordinate to policymakers, while independent brokers may have more freedom, but may struggle to reach knowledge users. The role, activities and strategies of brokers will be different depending on the nature of the issue and the characteristics of the policy area. For example, Michaels (2009) differentiates between different roles and strategies of knowledge brokers in routine, incremental, fundamental and emergent decision regimes. Building on this work, Saarela et al. (2015) developed a typology of contextual factors that affect knowledge brokering, which include dimensions ranging from characteristics of the policy issue and organisational norms to the legal context of knowledge transfer.

The focus of the current literature on researchers acting as knowledge brokers, on the narrow scope of policy areas and on government domains is the major limitation, as has also been noted in recent reviews (Akerlof et al. 2019; MacKillop et al. 2020). If knowledge brokering work is context-dependent, the role, activities and strategies of brokers will be influenced by their institutional setting, e.g. structures, processes and power relationships, which enable and constrain them. In the sections below, we analyse conditions of science advice in the legislative setting, its requirements for in-house knowledge brokers and the means by which an in-house broker seeks to fulfil them.

2.2 Legislative Science Advice

Legislatures are an essential part of democratic deliberative governance and have the role to make laws and keep the governments in check. Lawmakers may use research evidence to aid their debates and decision making. The role of in-house knowledge brokers could be significant in providing the basis for research-informed legislative debates. Yet currently there is only a limited understanding about existing legislative science advice, how they compare to each other and the role of knowledge brokers in them (Akerlof et al. 2019; Ganzevles et al. 2014).

³ We use conventional definitions of these terms in this paper. Credibility refers to the "(perceived) quality, validity and scientific adequacy of knowledge exchanged at the interface" (Sarkki et al. 2017) and characterises the intrinsic qualities of research. Saliency refers to the relevance of knowledge to policy discussions. Legitimacy refers to the "(perceived) fairness and balance" of the knowledge transfer process, including "inclusiveness of stakeholders, transparency, fairness in handling divergent values, beliefs and interests" (ibid.)

In this section, we formulate challenges for knowledge brokering specifically in the legislative institutional setting. To do this, we begin by analysing the differences between the conditions for science advice in the legislative compared to the executive. We distinguish between the differences in scale, scope, purpose, and nature of advice, the range of targets and the overall knowledge exchange dynamics (Table 1).

Table 1: Science advice in the executive and the legislative branches

Dimension	Executive Branch	Legislative Branch
Scale of advice	Higher ratio of advisers to policy-makers	Lower ratio of advisers to policy-makers
Nature of advice	Directive (often specific policy alternatives)	Evidential (non-directive)
Scope of advice	Specific to the policy area	Wide range of policy areas
Purpose of advice	Few, specific uses (e.g. as evidence to inform policymaking)	Multiple, various uses (e.g. formulate arguments in debates, ask forensic questions in scrutiny)
Range of users	Narrow	Broad
Knowledge exchange	Fewer opportunities	More opportunities

Source: Authors extending Kenny et al. 2017b

Kenny et al. (2017a) offer a first comparison between the executive and the legislative branches using the case of the UK Parliament. In terms of scale, the executive is large, with multiple clearly defined levels of hierarchy. In contrast, the legislature is much smaller, with flatter, changeable hierarchies. The civil service typically has resources to appoint more advisers proportionate to the number of policymakers in order to source research evidence at the level appropriate to the decision-making hierarchy. Such advice can be directive, tailored to offer specific policy options. In a legislature, elected politicians rely on their own sources of science advice or on the very small number of in-house advisers that need to cater to all levels of research literacy.

Further, science advice in ministries and agencies often needs to align with background ideas of the elected party, otherwise it might be rejected (Schmidt 2008). Legislatures, on the contrary, by design are arenas where diverging perspectives clash in debate. In-house science advice must be non-partisan to these value positions and therefore be evidential, not directive, in nature. Kenny et al. (2017b) also consider different targets of advice: for limited specific purposes in the executive, e.g. informing policymaking, and for a much broader range of purposes in the legislature, e.g. to argue in a debate and ask forensic questions during scrutiny; as evidence to underpin legislation; as the basis to select research community representatives to give oral testimony, and others.

In terms of scope, issues addressed in the executive branch tend to belong to a thematic area, for example, housing, conservation, or international affairs. Civil servants develop deep

expertise pertaining to their area of work, and science advice is supplied from a pool of regular experts (Nutley et al. 2007). Hence, stakeholders involved in science advice can nurture lasting linkages with each other. In contrast, the law making process is characterised by a rotation of policy themes. With each rotation, lawmakers and in-house advisers need to seek out new theme experts and build links with new stakeholder communities.

There are also differences on the science-policy boundary. Politicians in legislatures have multiple points of contact with a number of actors that supply evidence, which can range from scientists to lobbyists, to citizens. These interactions take place at various knowledge exchange interfaces and cut across knowledge communities. In the executive, policymaking processes open fewer possibilities for stakeholder consultation, typically at certain points of time during the policy cycle and via clearly defined channels, such as calls for evidence or commissioning research. There are typically fewer, institutionalised knowledge exchange interfaces (Bozeman 2000; Webster 1994).

2.3 Challenges of Legislative Knowledge Brokering

The institutional conditions of legislative science advice place specific requirements for the skills, competencies and strategies of brokers and therefore have direct implications for how knowledge brokering is organised in a legislature. Reflecting the scale of the difference, legislative knowledge brokering is typically referred to as parliamentary technology assessment (PTA). We identify at least three distinctive brokering challenges instituted by the legislative context.

First, legislative brokers face heightened legitimacy requirements for both the knowledge brokered into the legislature and for the broker itself. The specific value of knowledge brokered into the legislature is that it is evidential, does not advocate for a particular policy alternative and can therefore be used by politicians with different value positions. Lawmakers who engage in debate are especially sensitive to any underlying agendas in the sources they use, and therefore in-house knowledge brokers need to ensure that the possible value-leadeness of research is questioned and made transparent, the opposing views are treated fairly and balanced against each other (Kenny et al. 2017b; Lawrence et al. 2017).

In performing these actions, brokers need to manage their own active role in the knowledge translation process. Hennen and Nierling (2019) note that PTA has been strongly "bound to and legitimated by the "neutrality" narrative": the perception that legislative knowledge brokers are apolitical, disinterested intermediaries that move knowledge and provide non-partisan advice. Yet legislative brokers regularly make decisions that influence the PTA process: they select the topics to work with, stakeholders to consult (Delvenne and Parotte 2019). They engage in societal deliberation, mediate discussions between the spheres of parliament, government, researchers and broader society (Ganzevles et al. 2014; Grunwald 2006). In that sense, the brokering work is never truly neutral, but needs to be perceived as "sufficiently neutral" by other actors. Legislative brokers are challenged to assure their "sufficiently neutral" status, because if a broker transgresses the neutrality narrative, the legitimacy of their brokered knowledge will also be compromised.

The second challenge is the requirement for legislative brokers to perform PTA on a wide range of regularly changing themes, cater to various possible uses of the brokered knowledge by lawmakers with different levels of research literacy. As the range of issues discussed in a

legislature covers the whole spectrum of science and technology, brokers regularly need to work with complex knowledge, which is outside of their direct scope of expertise. The brokered knowledge then needs to be useful to both the legislators who only know a little about the topic, as well as to the audiences with higher levels of understanding. The brokering devices also need to be adaptable to the various types of use by the various actors. This work needs to be completed within time and resource constraints.

The third challenge is about the utilization of brokered knowledge. In the legislative, knowledge brokers do not typically have an exclusive communication channel with lawmakers and need to compete for their attention with other internal and external advisory actors (Sanz-Menendez and Cruz-Castro 2005). In legislatures, besides in-house sources, evidence can be supplied by pressure groups, think tanks, arms-length bodies, individual scientists, citizens, and other stakeholders. Furthermore, individual lawmakers rely on their own knowledge networks, or they can employ staff to search for relevant information. Therefore, it may not always be straightforward for the legislative broker to reach lawmakers. Furthermore, even if the lawmakers consult brokered knowledge, this may not directly result in political action because research evidence is always considered alongside societal, ethical and religious concerns (Monaghan 2014). Especially in those settings, the aim of brokering for policy is to inform and enable stakeholders to constructively reflect on the evidence provided when arriving at their own conclusions (Edler et al. 2021).

In the following, we examine in-depth one legislative knowledge broker in order to illustrate these challenges and to derive the strategies employed to navigate the UK legislative environment. This empirical case shall support the development of the functional competency framework for legislative knowledge brokering.

3 Research Context and Methods

3.1 Case Study: Parliamentary Office of Science and Technology

The decision to set up a technology assessment office in the UK Parliament in 1989 was inspired by arguments regarding the need for more specialised support in legislatures so that parliamentarians can better understand the challenges brought about by rapid technological change (Norton 1997). POST was established as a demonstration project and in 2001 became a permanent bicameral office. Although its initial set-up was modelled after the US Office of Technology Assessment, over the years, POST's strategy and activities evolved in response to the broader discourse regarding the value of (research) evidence in policy.

Since the late 1990s, evidence-based policy approach (EBP) to public services, encapsulated in the idea that policy decisions should be made based on rigorously collecting and evaluating the best available evidence, has become mainstream in British politics (Head 2016; Nutley et al. 2003; Nutley et al. 2007). The debates about the benefits and limitations of EBP facilitated, over a period of time, a broad agreement in UK policy circles about the value of evidence, in particular scientific research evidence. Over time, significant resources have been invested in understanding research needs of policy domains, setting up standards for good practice, building networks and infrastructures, and in establishing accountability mechanisms (Donnelly et al. 2018; Mulgan and Puttick 2013).

The legislative context has also been examined through the EBP view, which found that academics struggle to understand how legislative processes work and how their research could inform parliamentary debate (Geddes et al. 2018). Parliamentarians, on the other hand, often have limited ability to understand research evidence, especially when navigating issues about which scientists disagree (Lawrence et al. 2017). They also prefer short summaries written in an accessible way to longer scientific papers and reports (Kenny et al. 2017b). The discussions around the place and purpose of legislative knowledge brokering were influenced by these reflections about disconnect and the lack of mutual understanding between research and Parliament. POST's initial mission to inform parliamentary debate by supplying scientific information, especially about emerging and current S&T issues and their policy implications, gradually shifted to include more linking and enlightenment activities, e.g. facilitating linkages between research and parliamentary communities and developing competencies, in both academia and Parliament, to interact more effectively with each other (POST 2010). This role was explicitly acknowledged in the recent rebranding of POST, with the new motto "Bridging Research and Policy" (POST 2018).

At the time of the study, POST's work was organised in four thematic sections: Biology and Health, Energy and Environment, Physical Sciences and ICT, and Social Sciences. The work programme was carried out by 12 staff and was overseen by the POST Board, which consisted of fourteen Members of both Houses of Parliament (ten MPs and four Lords Members), reflecting the balance of the political parties, representatives of the S&T community, and Ex Officio representatives from committee and research service teams in both houses. The goal of the Board is to ensure that POST's work reflects the current interests of Parliament. The

Board meets quarterly to assess POST's outputs, set out objectives and approve of its work programme.

Much of POST's resources are dedicated to preparing POSTnotes, anticipatory four-page briefings that review (research) evidence on a policy-relevant issue. POSTnotes' value lies in both direct knowledge transfer and in enabling POST's other activities. By writing POSTnotes, advisers gain the necessary depth of expertise on a topic, build links with stakeholders, alert and mobilise relevant parliamentary (e.g. committees, MPs and peers with particular interests, all party parliamentary groups) and societal actors (e.g. researchers, government agencies, businesses, citizens). Networks made during POSTnotes' preparation strengthen POST's position in-between Parliament and academia⁴. In addition to writing research briefings, POST invites scientists to Parliament, organises events for academics to inform them about the research needs of the Parliament, offers training courses for parliamentary stakeholders to develop research literacy skills, participates in international PTA networks, and coordinates the programme of research council fellowships that enables academics and doctoral scholars to spend time in Parliament.

⁴ POST occasionally publishes longer research briefing papers and rapid evidence assessments. It also organises public S&T consultations, for example, the Climate Assembly UK in 2019. However, these activities are not as regular as producing POSTnotes.

3.2 Research Methods

An interpretive process-oriented case study design was developed to examine POST's legislative knowledge brokering. The case study was performed as an engaged scholarship enquiry over nine months in 2019. The co-creative approach offers a way to generate useful organisational knowledge by involving stakeholders as active participants in the research process (Van de Ven 2007). This is particularly valuable in exploratory settings where there is no tradition of in-depth empirical work, such as legislative knowledge brokering. The research design and objectives were developed jointly with POST in order to focus on currently important issues, helping to overcome the inherent 'messiness' of organisational qualitative research (Sinkovics and Alfoldi 2012).

For the duration of the project, the lead author was part-time seconded to POST in order to obtain in-depth understanding about the everyday work in a parliamentary environment, which has been characterised as being dominated by unwritten rules and conventions (Crewe 2015; Geddes 2020). The lead author conducted interviews, observed three POST Board meetings, helped organise three events that brought researchers to Parliament and observed the preparation of POSTnotes in real time. The second author maintained distance from the empirical case and analysed the data from the neutral observer position.

POST's knowledge brokering was examined through the planning, preparation and impact pathways of POSTnotes, POST's flagship research briefings. We employed both backward tracing, whereby we examined past events, and process tracing, where we followed events as they unfolded. An analysis of preparation and subsequent use of nine completed POSTnotes was performed for the backward tracing. The preparation of two POSTnotes was observed in real time (Appendix 1).

POSTnotes from two thematic areas – Energy and Environment and Physical Sciences and ICT – were selected jointly with POST due to the distinctive ways in which their topics influence the way their POSTnotes are read in Parliament. Energy/Environment is a well-defined theme in Parliament, with dedicated select committees, interest groups and thematic sections. Energy/Environment topics have thematic continuity, e.g. they often address well known challenges such as climate change. In contrast, the Physical sciences and ICT section deals with diverse policy issues covering more or less the scope of the natural sciences. Research briefings often target separate user groups. The case research was attentive to both commonalities and differences between the two themes.

The data collection and analysis were carried out in 2019. In addition to document analysis, 34 interviews were carried out with stakeholders involved in developing and disseminating POSTnotes; with parliamentary stakeholders working in the relevant thematic areas as well as POST leadership and POST Board members (Table 2⁵). For the two POSTnotes shadowed during the project, three interviews with each POSTnote author were conducted in addition

⁵ Although we attempted to approach all relevant parliamentary stakeholder groups, MPs' researchers and staff were not interviewed for this study due to the lack of response.

to informal interactions and observations (not listed in Table 2). The interview questions differed depending on the type of stakeholder. The list of typical interview topics can be accessed in Appendix 2. Interview quotes used in this paper were slightly edited to aid readability. They were sent back to the interviewees, embedded in the surrounding text, when possible, to confirm the correct interpretation⁶.

Table 2: Interview data collection results

Stakeholder	Number of Interviews
Current and former POST staff	11
Current and former POST fellows	9
Select committee staff	7
Lords Members	2
Members of Parliament	2
Library Staff (Commons and Lords)	3
POST Board Member	1

Source: Authors

Primary, secondary, and participant observation data were analysed together in order to generate interpretive descriptions of how POSTnotes are produced by POST and used in Parliament (Martin 1993). Through the lens of the planning, preparation and use of POSTnotes, the analysis re-constructed the social world of British legislative knowledge brokering. POST staff were involved in an ongoing reflection about the emergent findings throughout the case duration. After the data collection and analysis were finished, the findings were discussed in a workshop with seven POST staff. These discussions further informed the analysis. All these actions taken together ensured that the data were interpreted reliably.

⁶ Except when interviewees stated that they did not wish to be contacted for this purpose.

4 Organising for Impartial and Impactful Legislative Knowledge Brokering

In this section, we explicate legislative knowledge brokering work in the UK Parliament via the lens of POSTnotes. We begin by examining parliamentary standards for knowledge transfer. We then highlight the specific niche POST occupies in the in-house advisory ecosystem, which shapes its mission and scope of activities. The final part of this sub-section explains, using the process view, POST's knowledge brokering strategies that enable it to respond both to the specific norms within the UK Parliament, and to the broader challenges created by the legislative institutional setting.

4.1 Parliamentary Research Briefing Standards

The UK Parliament has established standards for in-house (research) evidence briefings. Co-developed by POST and other parliamentary research support services, they reflect the experience, knowledge and best practices of the actors involved in handling research in Parliament. These norms cover many aspects of work ranging from the principles of information gathering to appropriate ways of writing. Most recently, they were codified in the Parliamentary Research Handbook as "impartiality, accessibility and relevance" (Bennett et al. 2017). Among them impartiality is of utmost importance. It refers to both non-partisanship (political neutrality) and to the understanding of, and distancing from, value positions of societal stakeholders, including scientists. Parliamentary research offices support all elected politicians and provide evidential advice that does not promote particular policy options. This is a widely perceived added value of in-house research briefings, which serve only the interests of Parliament and are free of underlying agendas. Against the perception that parliamentarians are bombarded with evidence from interest groups, in-house research briefings are neutral and therefore can be trusted, taken at face value.

In the quote below the interviewee explains how research briefings produced in the House of Commons library seek, select, and appraise information through the impartiality lens:

It's not our job to say, "The evidence is this." Full stop. Our job is to review everything that's available and we try really hard not to give a judgement on what's right and what's not right. So, maybe we would be trusted to say, "The scientific evidence shows this." And I think what the difference is, we always try and draw out what other people have said to show impartiality. What does somebody on the other side say? (R51, librarian)

Scientific research that crosses the parliamentary boundary is not excluded from impartiality checks. Parliamentary actors interviewed for the study were keenly aware that science is value-laden and that scientists advocate for their preferred policy alternatives. In the quote below a POSTnote author explains how scientific conclusions could be interpreted as advocating for certain policy alternatives:

There are a lot of climate science papers that state that emissions need to be reduced, which is kind of a logical consequence of the science but it's also an opinion, because you're saying this is a policy that we recommend to avoid catastrophic sea level rise" (R11, POST fellow)

To produce evidential research briefings, parliamentary analysts interrogate the value bias of scientific research by balancing it against other credible perspectives, "making sure that everything you say is a balanced reflection of the different sides of the argument" (R21, POST adviser). Parliamentary research services make an effort to identify underlying agendas and seek contrasting views from various communities. This type of work involves significant amount of expert judgement from the analysts and naturally, there are limitations to the ideal of impartiality. Research briefing authors need to be selective when they write about issues; there are always page limits, and every briefing requires a structure, illustrations and highlights, which are all dependent on individual judgement. One POSTnote author shared that writing impartially is about the author's mindset. Staying "mindful of being inclusive of all the stakeholder opinions" (R18, POST fellow) was her solution to the transition from academic to policy writing.

POST has further specific challenges with regard to achieving impartiality that stem from its deeper, direct interactions with stakeholders (and especially academics) compared to other in-house parliamentary research support units. In section 4.3, we review the additional strategies undertaken by POST to certify the sufficient impartiality of their research briefings.

4.2 The Place and Purpose of POSTnotes

Multiple in-house groups transfer knowledge to Parliament, including select committees, Libraries, and POST. Adhering to common standards of impartiality enables these groups to use each other's work in overlapping themes in order to save time and resources. However, these offices also need to ensure that they perform complementary, not overlapping, tasks in the diverse in-house parliamentary advisory environment. POST's niche in Parliament's advisory environment defines the expectations for the type of evidence provided in POSTnotes (see Table 3). POST's briefings are differentiated primarily by their in-depth examination of research evidence, the extensive balancing effort, and by their anticipatory outlook. Other parliamentary research services work mostly responsively by searching for information to answer parliamentarians' questions and enquiries. In contrast, POST identifies policy issues that will become important in the future and prepares its briefings in advance.

Table 3: In-house sources of advice in Parliament

Advice unit	Description of work
POST	Impartial bicameral service, in-depth anticipatory advice, PTA, training, events, coordination of fellowships
Parliamentary Libraries	Impartial quick turnaround responsive advice, confidential individual enquiries, training sessions
The Scrutiny Unit	Impartial legal and financial advice to MPs in the HoC
Party research units	Advice for party members via own research
MPs' and Peers' researchers	On behalf of their MP/Peer search for relevant information to answer constituents' questions, prepare for debates
Select Committees	Inquiries on topics of interest, impartial specialist advisers help collect and analyse relevant evidence

Source: Authors based on Parliament.uk (2019)

As mentioned in Section 4.1, POSTnotes are the main brokering device of POST and its linchpin resource investment. They serve as the foundation for POST's main mission of bridging the gap between research and policy. POST aims to achieve two related goals via POSTnotes: to move knowledge into the legislature and to ensure that it is picked up and used. Achieving goal one, moving knowledge, is conducted in compliance with the broader parliamentary standards for research briefing preparation. The distinctive value of POSTnotes is in offering both a review of evidence and a balanced account of different stakeholder views on the issue. Balanced representation of stakeholder views can become the main distinctive contribution of a POSTnote, especially if the issue is controversial, but also it creates additional challenges for assuring its impartiality. The following quote explains this point further:

The key selling point of POSTnotes is that they're not just syntheses of evidence, a really important part is reflection on the balance of stakeholder opinion. So we say, "Okay, so this is what the latest research is", but what is missing from a lot of briefings that don't have this external input, we then go on to say, "This stakeholder thinks this, this stakeholder disagrees. This stakeholder thinks that." <...> Expertise isn't always just academic, it's practitioners other than academics as well who have the expertise. Often their knowledge is tacit, it's not written down so that's why we need to speak to them. (R13, POST adviser)

Bringing together the information about how stakeholder groups interpret the issue can be used as a tool to navigate and manage scientific uncertainties. Sometimes societal positions are vague and are determined during the process of deliberation between societal groups and POST. At other times, reviewing evidence is more relevant if the POSTnote covers a highly scientific topic with emerging, novel results. The variability of contributions of each POSTnote, the use of the active, intrusive method of interviewing stakeholders to obtain information, and the limited time available to prepare the actual briefing require a number of strategies to assure the quality of the brokered knowledge and the legitimacy of the process through which is moved into Parliament.

The second goal, the uptake of the POSTnotes, is important for POST to ensure their work has an impact. POST is accountable for its performance and reports its quarterly impacts to the POST Board. Therefore, organising uptake is an important secondary goal. Ensuring that POSTnotes are used in debate is outside of POST's direct control: UK parliamentarians are not mandated to consult technology assessment reports and it was a common perception in Parliament that MPs in particular experience information overload, because they receive information from various sources:

There is very, very little time to stop and think. That's one of the biggest problems. <...> If you say there is a POSTnote, right, great, thanks, not interested anymore. You know, I'm glad it exists, that's wonderful, but I'm now too busy to have the time to mentally process it. It's a huge challenge communicating with MPs. Lots of people produce all sorts of reports and documents and everything. If I try to read everything that came in everyday myself, I would never get to do anything else. (R55, MP)

If parliamentarians are unlikely to read briefings such as POSTnotes without a specific purpose, simple dissemination would likely be ineffective. As the solution, POST undertakes a number of purposeful activities over the course of a POSTnote life cycle to increase the likelihood of their uptake in Parliament.

4.3 POSTnote Planning, Preparation and Dissemination

To increase the likelihood that each completed POSTnote achieves the two goals and adheres to parliamentary expectations, POST utilises a number of strategies over the POSTnote life cycle: planning, preparation, and dissemination.

The *planning* of a POSTnote starts with horizon scanning. POST advisers generally monitor academic, practitioner, and parliamentary discussions in their thematic area and draft long lists of potentially relevant topics. This planning is essential to match the relatively longer POSTnote production cycles with the relatively shorter periods of time when the themes of POSTnotes are relevant to debates in Parliament. Ideally, POSTnotes are published by the time the issue they tackle is debated because parliamentarians will be actively looking for relevant evidence. A POSTnote that is completed too early may not reflect the latest stakeholder opinion balance and would therefore have diminished value. A POSTnote that is completed late misses the targeted debate and loses relevance.

Occasionally, POST invites colleagues from other parliamentary groups to contribute the topics and comment on the long list. Such information exchange allows POST to align its work with other in-house research support services and better anticipate relevant issues, setting out the conditions for uptake:

I help review the proposals for POSTnotes and advise on what topics would be useful for us. And that means I know the long list of what might be coming. If there's one that I think would be really useful, I keep a closer eye on it coming out. (R19, committee specialist)

Each quarter, the POST Board decides on new POSTnotes from a short list prepared by POST advisers. Board members vote on proposals for new POSTnotes, amend their scope and may propose to investigate particular topics in future POSTnotes. Its decision-making serves as a mechanism to balance POST's active role in formulating and selecting the topics for the long list in order to assure that POST anticipates parliamentary interest rather than sets the parliamentary agenda.

Once a theme is defined, POSTnotes are prepared over a period of 12 weeks following a structured methodology. They are typically authored by doctoral students funded by a fellowship from one of the UK Research Councils. After a short period of desk research, a fellow writes a POSTnote proposal called 'scope', which is the first effort to relate research to policy issues. Then the fellow gathers in-depth information, usually by conducting around 30 interviews with representative experts from academia, government, industry and other stakeholder groups. The first draft of a POSTnote undergoes an internal review by POST advisers. The revised second draft is sent to a few selected interviewees for external review. Finished POSTnotes are signed off by the POST director.

During the preparation process, interviews lead the intellectual enquiry and scientific articles serve as supporting information. By interviewing stakeholders, POSTnote authors gain insights into both the nature of knowledge claims and the underlying interests. The interview-based methodology also enables POSTnote authors, who typically do not have extensive expertise in the topic, to learn about key findings, state-of-the-art ongoing debates, and where

stakeholders stand in relation to them. Special efforts are made to identify all credible positions and review related evidence. Conducting interviews is the first step in balancing the stakeholder views and assuring that POST takes an equi-distant position in relation to them.

Increasingly, POST advisers involve colleagues from other parliamentary research support services, such as relevant committees or library specialists, as interviewees and reviewers in POSTnote preparation. Including more perspectives in POSTnotes, broadening the scope of the sources increases the quality of content. For example, one of the POSTnotes shadowed, 'The Misuse of Civilian Drones', was prepared as the Department of Transport was getting ready to introduce the Air Traffic Management and Unmanned Aircraft Bill to Parliament. The authors of the POSTnote were in touch with the HoC Library staff who had written a briefing 'Civilian Drones' earlier that year (Haylen 2019) and also with parliamentary committees who were doing their own research. In doing so, the strategy of POST was to tailor the POSTnote to avoid duplicating work, and to share the insights it gained via interviews with other parliamentary research support services ahead of the POSTnote completion, as this was already a hotly discussed topic at the time.

At the *writing stage*, the accumulated knowledge is condensed into a 4-page document⁷. Such format contrasts the typically lengthy PTA reports and reflects the expectations about the use of POSTnotes: parliamentarians prefer concise, snappy briefings (see Section 4.1). Short sentences are used to deliver clear messages and break down technical terms into easier-to-understand language. Therefore, even if a parliamentarian only has a few minutes to scan through the briefing, they should be able to get a clear idea about the issue and the state of the evidence. Over the rounds of writing and re-writing, the POSTnote topic and focus are further adjusted. Fellows and advisers make selections about which information to include and to leave out, which information to highlight, the level of detail, and the order of presentation. These decisions are rarely straightforward:

Because you have to try and explain all the different viewpoints about a certain piece of evidence and the uncertainties associated with it, the space constraint becomes a real problem. If you think something a bit of sub-issue, you may end up just excising it from the Note completely as a way of dealing with it. But then other people may say, well, why hasn't the POSTnote addressed it? I think that's where the four-page constraint can really bite. <...> It becomes very difficult to represent the widely-differing views, where you don't have much space to do so. (R16, adviser)

After the draft is completed, it undergoes an internal review by POST advisers and is then further revised. The following external review once again tests the draft POSTnote's effort to synthesise the evidence and balance stakeholder views. The reviewers interrogate the choices and the selections POSTnote authors made during its preparation and writing. Most disagreements resurface at this point and need to be resolved by POSTnote authors:

When you're addressing the feedback and whether or not you choose to implement changes that have been suggested, it's largely dependent on what the comment or change is. Sometimes, a person who's reviewing will try and add or change something

⁷ Since 2022, POST started to move away from the 4-page format, which was the signature characteristic of POSTnotes since the 1990s. In order to improve accessibility, POSTnotes are permitted to be longer than 4 pages, but maintain the same word limit.

because they have an agenda. So you have to make a judgement call as to whether the information that they're wanting to add is coming from their commercial or background interests. And that's normally quite easy to judge. When it comes to conflicting stakeholder feedback, it's more difficult, because you have to get to the bottom of what the conflict is actually about. (R21, POST adviser)

Unlike in scientific articles, external reviewers cannot veto the publication of the POSTnote, and so the authors may choose to not address all comments. However, the decisions about reviewer comments are always discussed and the reasons for not addressing them are noted down. Not all disagreements raised by reviewers can be resolved or even addressed in the 4-page briefing and the authors use their own judgement when they finalise the POSTnote.

The completed POSTnotes are distributed in Parliament and externally. At this point, POST has already undertaken a number of steps to increase the likelihood that POSTnotes are used by their target audiences. Horizon scanning and consulting parliamentary research services enable POST to match the timing of POSTnotes release with relevant debates in Parliament when interest in the topic peaks. Co-creative activities, such as involving parliamentary research services in horizon scanning or as reviewers, alert them to POST's research programme, enables them to learn about research evidence and use it to guide their own analyses ahead of the POSTnote publication. Mobilising relevant societal stakeholders as interviewers and reviewers for the POSTnotes alerts them to the upcoming debate in Parliament and the relevant POSTnote can occasionally become a document that stirs debate in stakeholder communities.

Although parliamentarians are the primary audience of POSTnotes, dissemination to other internal audiences is also important, especially to select committee specialists and library analysts. Facilitating lasting linkages with research services that support MPs is a strategy to improve knowledge sharing and research evidence provision across Parliament. POST, librarians, select committee specialists and other parliamentary actors can build broker chains by sharing knowledge with each other and passing it on to parliamentarians. For example, a POSTnote can be used in preparing a committee report or added to a Library debate briefing pack. This way, POST can reach parliamentarians indirectly, by informing the work of other research services, or in cooperation with them.

5 Discussion: Towards a Functional Competence Framework of Legislative Knowledge Brokering

Previously we formulated three specific challenges for knowledge brokering in legislative environments compared to executive contexts: the heightened legitimacy requirements; the need to cater to a broad range of themes and audiences; and the need to compete with other actors who bring evidence to legislatures. All three challenges are manifest in the UK Parliament and POST employs a number of strategies to operate productively within this environment. We summarise these strategies in Table 4. Next, we generalise the findings of the case study to formulate a functional competency framework for legislative knowledge brokering.

We found that in the legislative setting, the core technical competence of knowledge brokers is supported by four further competencies: collaborative, organising for impact, knowledge certification and facilitating learning. These competencies are depicted in Figure 1. The technical competence serves as the axis of the rotating wheel, the four supporting competencies form the inner wheel and the 12 brokering strategies form the outer wheel. Each strategy will support more than one competence, although some will contribute more to certain competencies than others, and all strategies, directly or indirectly, influence the ability of the legislative knowledge broker to perform its technical work. Therefore, Figure 1 should be seen in a dynamic way as two rotating wheels, where various strategies come to prominence during different stages of the knowledge brokering process and influence the mobilisation of various competencies.

Figure 1: Functional competence framework for legislative brokering



Source: Authors

Table 4: Key strategies of legislative knowledge brokering

Strategy	Description and Significance
Employ mixed-methods in knowledge management	Combining various primary and secondary data collection and analysis methods helps save time and optimise the use of limited resources.
Co-develop knowledge transfer norms	Shared norms enable stakeholders to discuss KT with a reference to a jointly agreed standard. If brokers co-develop it, their perspective is represented.
Make knowledge brokering method transparent	Audiences can scrutinise openly available KB method for compliance with KB norms. The ability to do this increases the users' trust in brokered knowledge.
Secure external funding	Brokers may pursue opportunities to gain external funding to overcome budget constraints and improve the recognition of their value in the organisation.
Offer research literacy training	Through training, broker improves the research literacy standard, which is very important for elected lawmakers who come from a variety of backgrounds.
Facilitate researcher-lawmaker linkages	Facilitating direct contacts between parliamentarians and researchers helps foster the mutual understanding, direct knowledge exchanges and further learning.
Co-create knowledge	Involving prospective users in all stages of KT helps identify themes for research briefings, optimise the use of resources and set up their future uptake.
Mobilise external expertise	External expertise improves brokers' anticipation, data collection, opinion balancing, quality assurance, knowledge certification, dissemination activities.
Extend internal/external networks	Far-reaching networks enable brokers to tap into stakeholder communities to gather expertise and connect researchers with parliamentary audiences.
Build broker chains	Broker chains help diffuse information throughout the legislature. Subsequent users pass the brokered knowledge on or incorporate it in their own work.
Identify own niche in advisory ecosystem	Own niche in the advisory system helps brokers to cooperate, not compete, with other advisory actors and demonstrate their added value in the legislature.
Employ anticipation techniques	Horizon scanning and stakeholder consultations help match knowledge brokering work to the windows of opportunity in the legislature, contributing to its salience.

Source: Authors

Technical competence is the core competence of knowledge brokering: the broker's main task is to identify relevant sources and accurately assess the validity of their claims, transform acquired knowledge (summarise, adapt, synthesise) and select the parts relevant for the decision-makers. The particular value of this work is in identifying and correctly conveying information about disagreements, uncertainties and unknowns (Duncan 2008). In order to achieve this, brokers need to have a certain level of expertise to understand evidence across a range of topic areas. In contrast with brokers in government and public services, legislative brokers need to rely more on mobilising a broad range of external resources and creating complementarities across their various activities in order to stay agile and cover the breadth of themes and uses of brokered knowledge (Holmes and Clark 2008; MacKillop et al. 2020; Oliver and Cairney 2019; Sarkki et al. 2019; Turnhout et al. 2013). Thematic agility and the absorptive capacity of the brokering unit requires investing in human resources to allow for a critical size of the knowledge brokering unit (Banta 2009) and can be supported by outsourcing tasks (Grunwald 2006).

The technical expertise can be extended and leveraged by mobilising **collaborative competence**, the ability for purposeful, strategic deployment of these networks in order to achieve multiple goals. Collaborating and linking is typically regarded as one of the main functions of brokering. For example, the task of PTA involves consulting a wide range of stakeholders including scientists, industry associations, and government officials (Ganzevles et al. 2014; Hennen and Ladikas 2009). In our case study, POST collaborated extensively with stakeholders inside and outside Parliament, involving them in all aspects of their work. Smart positioning on the intersection of various boundaries enables POST to act as a mediator and gain further advantages from this in-between position. POST further leveraged these networks in various ways: to mobilise experts as interviewees and reviewers of POSTnotes, to recruit doctoral fellows on secondments to Parliament, to invite experts to parliamentary events and others. Internal parliamentary networks were also essential for POST, especially in horizon scanning and co-creation work. Although structurally POST is positioned to compete with other in-house advisory services for the attention of parliamentarians (Sanz-Menendez and Cruz-Castro 2005), the offices instead preferred to collaborate with the overall goal to improve research evidence uptake in Parliament. POST mobilised in-house networks to build broker chains through which knowledge that was initially brokered by POST could be diffused throughout Parliament and had a higher likelihood to reach all relevant audiences.

Knowledge certification competence describes the ability of knowledge brokers to assure the legitimacy of their brokered knowledge despite their active, intrusive role in the knowledge transfer process (Duncan et al. 2020). As demonstrated in the case study, POST's interview-based method for preparing research briefings pushes it far from the idealised perception of a knowledge broker as a neutral conduit of information. Both POST and parliamentary audiences were attentive to this intrusive role and developed a number of measures to assure that in-house briefings are sufficiently impartial. We regard this perception of sufficient impartiality as one of the key preconditions for uptake of research briefings by parliamentary audiences (Delvenne and Parotte 2019; Hoppe et al. 2013). In Parliament, many efforts of in-house research services to assure impartiality concentrated around clearly demarcating the boundary separating the in-house parliamentary environment from the outside. The existence of the clearly visible organisational boundary enables knowledge brokers to explicate the added value of brokered knowledge to the users. In the UK Parliament, moving

research, including scientific research, over the boundary means separating – as far as possible – evidence from underlying values and agendas. If the underlying values cannot be sufficiently separated, they are highlighted. These steps are clearly defined, agreed on by the legislative actors doing boundary work and are taught to newcomer parliamentary analysts. The oversight by the POST Board is another important factor, which enables POST's work as the impartial knowledge broker. The subordinate position of POST in relation to the Board means that POST's work is impartial and serves the interests of all parliamentary audiences. This is an additional mechanism through which POST's knowledge brokering work is made legitimate to users.

Organising for impact is the broker's ability to understand how, why, when, where and for what purpose audiences use their research briefings. In the UK Parliament, it was not sufficient for POST to produce excellent, technically accurate, balanced and impartial research briefings. There are multiple barriers to uptake of POSTnotes: parliamentarians already receive a lot of information, they may choose to consult other sources of evidence, or they simply may not be interested. In order to overcome these barriers, POST invested significant resources at the stages of planning and preparation to setting up conditions for the uptake of POSTnotes. This requires a clear understanding of which niche in the in-house advisory ecosystem POST occupies and where the added value of its briefings lies, not only for the end users (parliamentarians) but also for other parliamentary audiences. POST uses anticipation techniques such as horizon scanning to create salience and matches the release of POSTnotes to relevant debates in Parliament. By relying on collaborative external and internal networks, POST advisers raise awareness of their work programme and involve stakeholders in the knowledge exchange at the briefing preparation phase.

Given the significance of organising for impact of the UK legislative broker, it is surprising that this aspect of knowledge brokering work has previously not received much attention in the literature. Previously, efforts of knowledge brokers to disseminate their findings were reported in the context of knowledge diffusion in the organisation (Currie et al. 2014). Perhaps in policy organisations brokers would typically be integrated in management chains and the channels for their outputs would be better defined. In the legislative, on the contrary, knowledge brokers compete for the attention of lawmakers who are already overburdened with information (Lawrence et al., 2017; Sanz-Menendez and Cruz-Castro, 2005).

All activities outlined so far are underpinned by the legislative broker's competence **to facilitate organisational learning**. Previous research stressed the important role brokers play by building up policymakers' ability to understand research, its uses in their area of work, and its limitations (Belkhodja 2014). This is a longer term outcome that stems from policymakers' exposure to, and engagement with, brokered knowledge. The organisational learning competence within the legislature, the learning by Parliamentarians and their staff, supports all other processes of knowledge absorption and thus the functions of the broker. Informed lawmakers would be aware of brokers' niche in the advisory environment and the specific value their briefings represent, they would understand the concept of impartiality and how it is certified in the brokered knowledge, which would create trust and possibilities of deeper engagement. Overall, they would also be more aware of research and be more likely to seek and consider it when preparing for a debate.

6 Conclusions

In this paper we make a contribution to responding to an underexplored question: how does an institutional setting influence knowledge brokering work? We examine the specific case of legislative brokering work of the UK Parliamentary Office of Science and Technology using its flagship research briefings, POSTnotes, as the focusing device. This paper responds to the calls for conceptual improvement and the empirical diversification of policy knowledge brokering scholarship (Akerlof et al. 2019; Newman et al. 2020; Saarela et al. 2015). We regard knowledge brokers as influential agents in the knowledge translation process (Callon 1984; Duncan et al. 2020; Meyer 2010). Further, we approached knowledge brokering as a context-dependent activity, advocating for its examination in various empirical settings (Kenny et al. 2017b; Saarela et al. 2015). On the basis of the existing literature, we formulated three challenges of legislative knowledge brokering. The main contribution of this paper is in the development of a conceptual framework that can be used to analyse the work of legislative knowledge brokers. This framework helps to understand the specific requirements for productive knowledge brokering in a complex and thematically broad legislative setting.

However, conceptualising on the basis of one empirical example has limitations. Our case study was conducted in the UK, the country with a particularly adversarial political climate and a saturated policy advisory environment (Geddes et al. 2018; Harris 2001; Norton 1997). The bulk of the data was collected in 2019, against the heated negotiations regarding the UK's exit from the European Union. Perhaps, the attention to impartiality and non-partisanship was especially high during this period. We focused our attention on one particular written brokering device, the POSTnotes. Despite its advantages, we could not examine other brokering activities of POST in detail. Future research on knowledge brokering and science advice in legislatures could help elucidate the extent to which the dimensions of the functional competency framework are informed by the empirical setting of this study and to which extent they are relevant for legislatures in general.

We conclude our study by outlining several key insights for practice and policy.

First, the functional competence framework can be used as a tool to engage knowledge brokers in a dialogue about the overall purpose and remit of knowledge brokering in policy, as well as the necessary competencies required to achieve it. More broadly, we highlight the need to integrate knowledge brokering work in organisational environments with the appropriate sensitivity to the institutional context. Knowledge brokers in policy are always embedded in advisory ecosystems and therefore generate specific added value. As we have seen in our case and as is highlighted in the framework, achieving this is not a trivial task. The five key competencies of the brokering unit need investment as well as continuous learning and occasionally brokers may redefine their remit to adapt to the changing environment.

Second, each institutional set up and its productive use will depend on how all parties involved work towards maximising the legitimacy of what is transferred. Knowledge brokers always interfere in the translation process from knowledge providers to the users. Therefore, as our case has shown, utmost attention must be paid to the processes and provisions through which the most important qualities of brokerage in legislatures namely, technical

competency and impartiality, are achieved. Those processes and provisions must be monitored and ensured over time. Finally, as there are always multiple units and mechanisms to transfer and absorb knowledge, it is important to consciously create complementarity between those units and mechanisms of knowledge brokering in order to set up incentives for co-operation, not competition, among the actors with brokering roles.

Appendix 1

Table 5: POSTnotes selected for in-depth analysis

No	Title	Date	Section
<i>Completed POSTnotes</i>			
479	Civilian Drones	2014	P&ICT
525	Financial Technology (FinTech)	2016	P&ICT
528	Marine Microplastic Pollution	2016	E&E
543	The Water-Energy-Food Nexus	2016	E&E
549	Greenhouse Gas Removal	2017	E&E
554	Cyber Security of UK Infrastructure	2017	P&ICT
555	Rising Sea Levels	2017	E&E
559	Online Information and Fake News	2017	P&ICT
575	Fire Safety of Construction Products	2018	P&ICT
<i>Observed POSTnotes</i>			
603	Climate Change and UK Wildfire	2019	E&E
610	Misuse of Civilian Drones	2020	P&ICT

Source: Authors

Appendix 2

Interview questions varied by the type of respondent. Furthermore, interviews were conducted in a semi-structured format. The questions were adapted to each interviewee's circumstances. Additional questions not present in the questionnaire were also occasionally asked.

POST fellows were asked:

- About the reasons they decided to apply for the fellowship;
- How they prepared the POSTnote;
- How they launched the POSTnote, in particular, their launch or dissemination strategy;
- Whether they knew about how the POSTnote was received;
- Main issues and challenges they encountered during the process, anything they would have done differently.

POST advisers were asked:

- An opening question about what they wanted to share with the interviewer, given that they knew about the project and its aims;
- About how they judge the success of each POSTnote;
- About examples of particularly successful and unsuccessful POSTnotes and reasons for these;
- About current ways in which the impact of POSTnotes is measured;
- About how things can go wrong and how they are then fixed during POSTnote preparation, broader reasons that cause these difficulties.

Parliamentary staff were asked:

- To introduce themselves and their role;
- Whether they regularly need to consult research and how they usually do it;
- About their interactions with POST and POSTnotes, including potential for better engagement;
- About their opinions on POSTnotes, including suggestions for their improvement.

They were additionally shown printed copies of POSTnotes selected for an in-depth analysis and asked to comment on the ones they read, and on the overall look and presentation of the Notes.

MPs and Lords Members' interviews were unstructured and not recorded. The questions varied greatly, but included some common topics:

- The extent of their own engagement with research;
- Whether they were aware of POST and POSTnotes and how they usually used POSTnotes;
- Their observations of how the use of research in Parliament has changed over the years.

Literature

- Akerlof, K.; Tyler, C.; Foxen, S. E.; Heath, E.; Soler M. G.; Alegra, A.; Cloyd, E. T.; Hird, J. A.; Nelson, S. M.; Nguyen, C. T. et al. (2019): A collaboratively derived international research agenda on legislative science advic. *Palgrave Communications*, 5 (1), 108.
- Armstrong, R.; Waters, E.; Dobbins, M.; Anderson, L.; Moore, L.; Petticrew, M.; Clark, R.; Pettman, T.; Burns, C.; Moodie, M.; Conning, R.; Swinburn, B. (2013): Knowledge translation strategies to improve the use of evidence in public health decision making in local government: intervention design and implementation plan. *Implementation Science*, 8, 121.
- Banta, D. (2009): What is technology assessment? *International Journal of Technology Assessment in Health Care*, 25 (S1), 7-9.
- Bauer, A; Kastenhofer, K. (2019): Policy advice in technology assessment: Shifting roles, principles and boundaries. *Technological Forecasting and Social Change*, 139, 32-41.
- Belkhdja, O. (2014): Knowledge Utilization in Canadian Health Service Organizations: A Path Analysis. *International Journal of Public Administration*, 37 (6), 339-352.
- Bennett, O.; Bowers, P.; Hirst, D.; Hobbs, A.; Leveridge, T.; Newson, N.; Owens, C.; Oliver-Watts, Z. (2017): *Parliamentary Research Handbook*. London: Houses of Parliament 109.
- Bogensneider, K.; Corbett, T. (2010): *Evidence-based policy making*. New York: Routledge.
- Bozeman, B. (2000): Technology transfer and public policy: a review of research and theory. *Research Policy*, 29 (4), 627-655.
- Bozeman, B.; Sarewitz, D. (2005): Public values and public failure in US science policy. *Science and Public Policy*, 32 (2), 119-136.
- Cairney, P. (2021): The UK government's COVID-19 policy: assessing evidence-informed policy analysis in real time. *British Politics*, 16 (1), 90-116.
- Callon, M. (1984): Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. *The Sociological Review*, 32 (1_suppl), 196-233.
- Capasso, M.; Hansen, T.; Heiberg, J.; Klitkou, A.; Steen, M. (2019): Green growth – A synthesis of scientific findings. *Technological Forecasting and Social Change*, 146, 390-402.
- Cash, D. W.; Clark, W. C.; Alcock, F.; Dickson, N. M.; Eckley, N.; Huston, D. H.; Jäger, J.; Michtell, R. B. (2003): Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences*, 100 (14), 80-86.
- Cherney, A.; Head, B.; Poverly, J.; Ferguson, M.; Boreham, P. (2015): Use of academic social research by public officials: exploring preferences and constraints that impact on research use. *Evidence & Policy*, 11 (2), 169-188.

- Chew, S.; Armstrong, N.; Martin, G. (2013): Institutionalising knowledge brokering as a sustainable knowledge translation solution in healthcare: how can it work in practice? *Evidence & Policy: A Journal of Research, Debate and Practice*, 9 (3), 335-351.
- Craft, J.; Howlett, M. (2013): The dual dynamics of policy advisory systems: The impact of externalization and politicization on policy advice. *Policy and Society*, 32 (3), 187-197.
- Crewe, E. (2015): *The House of Commons: an anthropology of MPs' work*. London: Bloomsbury Academic.
- Currie, G.; Burgess, N.; White, L.; Lockett, A. (2014): *Health Services and Delivery Research, A qualitative study of the knowledge-brokering role of middle-level managers in service innovation: managing the translation gap in patient safety for older persons' care*. Southampton, UK: NIHR Journals Library.
- de Goede, J.; Putters, K. van der Grinten, T.; van Oers, H. AM (2010): Knowledge in process? Exploring barriers between epidemiological research and local health policy development. *Health Research Policy and Systems*, 8.
- Delvenne, P.; Parotte, C. (2019): Breaking the myth of neutrality: Technology Assessment has politics, Technology Assessment as politics. *Technological Forecasting and Social Change*, 139, 64-72.
- Dobbins, M.; Hanna, S. E.; Ciliska, D.; Manske, S.; Cameron, R.; Mercer S. L.; O'Mara, L.; DeCorby, K.; Robeson, P. (2009): A randomized controlled trial evaluating the impact of knowledge translation and exchange strategies. *Implement Sci*, 4 (1), 61.
- Donnelly, C. A.; Boyd, I.; Campbell, P.; Craig, C.; Vallance, P.; Walport, M.; Whitty, C. J. M., Woods, E.; Wormald, C. (2018): Four principles to make evidence synthesis more useful for policy. *Nature*, 558 (7710), 361.
- Duncan, R. (2008): Problematic practice in integrated impact assessment: the role of consultants and predictive computer models in burying uncertainty. *Impact Assessment and Project Appraisal*, 26 (1), 53-66.
- Duncan, R., Robson-Williams, M.; Edwards, S. (2020): A close examination of the role and needed expertise of brokers in bridging and building science policy boundaries in environmental decision making. *Palgrave Communications*, 6 (1), 64.
- Edler, J.; Karaulova, M.; Barker, K. (2021): Understanding the conceptual impact of scientific knowledge on policy: the role of policy-making conditions. *Minerva*, in press.
- Elueze, I. N. (2015): Evaluating the effectiveness of knowledge brokering in health research: a systematised review with some bibliometric information. *Health Information & Libraries Journal*, 32 (3), 168-181.
- Gagliardi, A. R.; Fraser, N.; Wright, F. C.; Lemieux-Charles, L.; Davis, D. (2008): Fostering knowledge exchange between researchers and decision-makers: Exploring the effectiveness of a mixed-methods approach. *Health Policy*, 86 (1), 53-63.
- Ganzevles, J.; van Est, R.; Nentwich, M. (2014): Embracing variety: introducing the inclusive modelling of (Parliamentary) technology assessment. *Journal of Responsible Innovation*, 1 (3), 292-313.

- Geddes, M. (2020): *Dramas at Westminster: Select committees and the quest for accountability*. Manchester: Manchester University Press.
- Geddes, M.; Dommett, K.; Prosser, B. (2018): A recipe for impact? Exploring knowledge requirements in the UK Parliament and beyond. *Evidence & Policy: A Journal of Research, Debate and Practice*, 14 (2), 259-276.
- Gluckman, P.; Wilsdon, J. (2016): *From paradox to principles: where next for scientific advice to governments?* Palgrave Communications, 2 (1), 16077.
- Grunwald, A. (2006): Scientific independence as a constitutive part of parliamentary technology assessment. *Science and Public Policy*, 33 (2), 103-113.
- Halligan, J. (1995): Policy advice and the public service. *Governance in a changing environment* 2, 138-172.
- Harris, S. (2001): Being politically impolite: extending politeness theory to adversarial political discourse. *Discourse & Society*, 12 (4), 451-472.
- Haylen, A. (2019): *Civilian Drones*, Research Briefing (House of Commons Library: UK Parliament).
- Haynes, A. S., Derrick, G. E.; Redman, S.; Hall, W. D.; Gillespie, J. A.; Chapman, S.; Sturk, H. (2012): Identifying trustworthy experts: how do policymakers find and assess public health researchers worth consulting or collaborating with? *PLoS One*, 7 (3), e32665.
- Head, B. W. (2016): Toward More "Evidence-Informed" Policy Making? *Public Administration Review*, 76 (3), 472-484.
- Hennen, L.; Ladikas, M. (2009): Embedding Society in European Science and Technology Policy Advice, in M. Ladikas (ed.), *Embedding Society in Science and Technology Policy – European and Chinese Perspectives* (Brussels: European Commission), 39-64.
- Hennen, L.; Nierling, L. (2019): The politics of technology assessment Introduction to the special issue of "Technological forecasting and social change". *Technological Forecasting and Social Change*, 139, 17-22.
- Holmes, J.; Clark, R. (2008): Enhancing the use of science in environmental policy-making and regulation. *Environmental Science & Policy*, 11 (8), 702-711.
- Holtz, D.; Zhao, M.; Benzell, S. G.; Cao, C. Y. Rahimian, M. A.; Yang, J.; Allen, J.; Collis, A.; Moehring, A.; Sowrirajan, T.; Ghosh, D.; Zhang, Y.; Dhillon, P. S.; Nicolaidis, C.; Eckles, D.; Aral, S. (2020): Interdependence and the cost of uncoordinated responses to COVID-19. *Proceedings of the National Academy of Sciences*, 117 (33), 19837-19843.
- Hoppe, R.; Wesselink, A.; Cairns, R. (2013): *Lost in the problem: the role of boundary organisations in the governance of climate change*. Wiley Interdisciplinary Reviews: Climate Change, 4 (4), 283-300.
- Horton, P.; Brown, G. W. (2018): *Integrating evidence, politics and society: a methodology for the science-policy interface*. Palgrave Communications, 4 (1), 42.
- Jasanoff, S. (2004): *Designs on nature*, Princeton, NJ: Princeton University Press.

- Kenny, C.; Washbourne, C.-L.; Tyler, C.; Blackstock, J. (2017a): Legislative science advice in Europe: the case for international comparative research. Palgrave Communications, 3.
- Kenny, C.; Rose, D. C.; Hobbs, A.; Tyler, C.; Blackstock, J. (2017b): The Role of Research in the UK Parliament. Volume One (London, UK: POST).
- Kogut, B.; Macpherson, J. M. (2011): The mobility of economists and the diffusion of policy ideas: The influence of economics on national policies. *Research Policy*, 40 (10), 1307-1320.
- Lavis, J. N.; Ross, S. E.; Hurley, J. E. (2002): Examining the role of health services research in public policymaking. *Milbank Quarterly*, 80 (1), 125-154.
- Lawrence, N. S.; Chambers, J. C.; Morrison, S. M.; Bestman, S.; O'Grady, G.; Chambers, C. D.; Kythreotis, A. P. (2017): The Evidence Information Service as a new platform for supporting evidence-based policy: a consultation of UK parliamentarians. *Evidence & Policy*, 13 (2), 275-316.
- Lentsch, J.; Weingart, P. (2011), *The Politics of Scientific Advice: Institutional Design for Quality Assurance* (Cambridge: Cambridge University Press).
- Lomas, J. (2007): The in-between world of knowledge brokering. *British Medical Journal*, 334 (7585), 129-132.
- Long, J. C.; Cunningham, F. C.; Braithwaite, J. (2013): Bridges, brokers and boundary spanners in collaborative networks: a systematic review. *BMC Health Services Research*, 13 (1), 158.
- MacKillop, E.; Quarmby, S.; Downe, J. (2020): Does knowledge brokering facilitate evidence-based policy? A review of existing knowledge and an agenda for future research. *Policy & Politics*, 48 (2), 335-353.
- Martin, M. (1993): Geertz and the Interpretive Approach in Anthropology. *Synthese*, 97 (2), 269-286.
- McCright, A. M.; Dunlap, R. E. (2010): Anti-reflexivity The American Conservative Movement's Success in Undermining Climate Science and Policy. *Theory Culture & Society*, 27 (2-3), 100-133.
- Meyer, M. (2010): The Rise of the Knowledge Broker. *Science Communication*, 32 (1), 118-127.
- Michaels, S. (2009): Matching knowledge brokering strategies to environmental policy problems and settings. *Environmental Science & Policy*, 12 (7), 994-1011.
- Molas-Gallart, J.; Tang, P. (2011): Tracing 'productive interactions' to identify social impacts: an example from the social sciences. *Research Evaluation*, 20 (3), 219-226.
- Monaghan, M. (2014): Drug Policy Governance in the UK: Lessons from changes to and debates concerning the classification of cannabis under the 1971 Misuse of Drugs Act. *International Journal of Drug Policy*, 25 (5), 1025-1030.

- Moore, G.; Redman, S.; D'Este, C.; Makkar, S.; Turner, T. (2017): Does knowledge brokering improve the quality of rapid review proposals? A before and after study. *Systematic Reviews*, 6 (1), 23.
- Muhonen, R.; Benneworth, P.; Olmos-Peñuela, J. (2020): From productive interactions to impact pathways: Understanding the key dimensions in developing SSH research societal impact. *Research Evaluation*, 29 (1), 34-47.
- Mulgan, G.; Puttick, R. (2013): *Making Evidence Useful: the case for new institutions*. (London: Nesta).
- Newman, K.; DeForge, R.; Van Eerd, D.; Wei Mok, Y. Cornelissen, E. (2020): A mixed methods examination of knowledge brokers and their use of theoretical frameworks and evaluative practices. *Health Research Policy and Systems*, 18 (1), 34.
- Norton, M. (1997): The UK parliamentary office of science and technology and its interaction with the OTA. *Technological Forecasting and Social Change*, 54 (2-3), 215-231.
- Notarianni, M.; Sundar, P.; Carter, C. (2016): Just in time: how evidence-on-demand services support decision making in Ontario's child and youth mental health sector. *Evidence & Policy: A Journal of Research, Debate and Practice*, 12 (1), 127-137.
- Nutley, S.; Davies, H.; Walter, I. (2003): Evidence-based policy and practice: cross-sector lessons from the United Kingdom. *Social Policy Journal of New Zealand*, (20), 29-49.
- Nutley, S.; Walter, I.; Davies, H. (2007): *Using Evidence: How Research Can Inform Public Services* (Bristol: Policy Press).
- Oliver, K.; Cairney, P.: (2019): The dos and don'ts of influencing policy: a systematic review of advice to academics. *Palgrave Communications*, 5 (1), 21.
- Pannell, D. J.; Roberts, A. M. (2009): Conducting and delivering integrated research to influence land-use policy: salinity policy in Australia. *Environmental Science & Policy*, 12 (8), 1088-98.
- Parliament.uk (2019): Ways to engage with Parliament, <https://www.parliament.uk/get-involved/research-impact-at-the-uk-parliament/ways-to-engage-with-parliament/>, accessed 25.11.2019.
- Penfield, T.; Baker, M. J.; Scoble, R., Wykes, M. C. (2014): Assessment, evaluations, and definitions of research impact: A review', *Research Evaluation*, 23 (1), 21-32.
- Pielke Jr., R. A. (2007): *The honest broker: making sense of science in policy and politics* (Cambridge University Press).
- POST (2010), 'POST Evaluation Report 2009', London: Parliamentary Office of Science and Technology.
- POST (2018): *Bridging Research and Policy* (POST publications).
- Reinecke, S. (2015): Knowledge brokerage designs and practices in four european climate services: A role model for biodiversity policies? *Environmental Science and Policy*, v. 54, 513-521-2015 v.54.

- Rudd, M. A. (2011): How research-prioritization exercises affect conservation policy. *Conserv Biol*, 25 (5), 860-6.
- Saarela, S.-R.; Söderman, T.; Lyytimäki, J. (2015): Knowledge brokerage context factors – What matters in knowledge exchange in impact assessment? *Environmental Science & Policy*, 51, 325-337.
- Sanz-Menendez, L.; Cruz-Castro, L. (2005): Explaining the science and technology policies of regional governments. *Regional Studies*, 39 (7), 939-54.
- Sarkies, M. N.; Bowles, K.-A.; Skinner E. H.; Haas, R.; Lane, H.; Haines, T. P. (2017): The effectiveness of research implementation strategies for promoting evidence-informed policy and management decisions in healthcare: a systematic review. *Implementation Science*, 12 (1), 132.
- Sarkki, S. (2017): Balancing credibility, relevance and legitimacy: A critical assessment of trade-offs in science–policy interfaces. *Science and Public Policy*, 41 (2), 194-206.
- Sarkki, S.; Heikkinen, H. I.; Komu, T.; Partanen, M.; Vanhanen, K.; Lépy, É. (2019): How boundary objects help to perform roles of science arbiter, honest broker, and issue advocate. *Science and Public Policy*, 47 (2), 161-171.
- Schmidt, V. A. (2008): Discursive institutionalism: The explanatory power of ideas and discourse. *Annual Review of Political Science*, 11, 303-326.
- Sinkovics, R. R.; Alfoldi, E. A. (2012): Progressive Focusing and Trustworthiness in Qualitative Research. *Management International Review*, 52 (6), 817-845.
- Smith, K. E. (2013): Understanding the Influence of Evidence in Public Health Policy: What Can We Learn from the ‘Tobacco Wars’? *Social Policy & Administration*, 47 (4), 382-398.
- Spruijt, P.; Knol, A. B.; ‘Vasileiadou, E.; Devilee, J.; Lebrecht, E.; Petersen, A. C. (2014): Roles of scientists as policy advisers on complex issues: A literature review. *Environmental Science & Policy*, 40, 16-25.
- Strassheim, H.; Kettunen, P. (2014): When does evidence-based policy turn into policy-based evidence? Configurations, contexts and mechanisms. *Evidence & Policy: A Journal of Research, Debate and Practice*, 10 (2), 259-77.
- Turnhout, E.; Hisschemöller, M.; Eijsackers, H. (2007): Ecological indicators: Between the two fires of science and policy. *Ecological Indicators*, 7 (2), 215-228.
- Turnhout, E.; Stuiver, M.; Klostermann, J.; Harms, B.; Leeuwis, C. (2013): New roles of science in society: Different repertoires of knowledge brokering. *Science and Public Policy*, 40 (3), 354-365.
- Van de Ven, A. H. (2007): *Engaged scholarship: A guide for organizational and social research* (Oxford University Press on Demand).
- van der Arend, J. (2014): Bridging the research/policy gap: policy officials' perspectives on the barriers and facilitators to effective links between academic and policy worlds. *Policy Studies*, 35 (6), 611-630.

- Viola, C.; Toma, P.; Manta, F.; Benvenuto M. (2021): The more you know, the better you act? Institutional communication in Covid-19 crisis management. *Technological Forecasting and Social Change*, 170.
- Wall, T. U.; McNie, E.; Garfin, G. M. (2017): Use-inspired science: making science usable by and useful to decision makers. *Frontiers in Ecology and the Environment*, 15 (10), 551-559.
- Ward, V.; House, A.; Hamer, S. (2009): Knowledge Brokering: The missing link in the evidence to action chain? *Evid Policy*, 5 (3), 267-279.
- Webster, A. (1994): Bridging institutions: the role of contract research organisations in technology transfer. *Science and Public Policy*, 21 (2), 89-97.
- Wehrens, R. (2014): Beyond two communities – from research utilization and knowledge translation to co-production? *Public Health*, 128 (6), 545-551.