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Preprint / Preprint
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:
Dinges, M., Biegelbauer, P., & Wilhelmer, D. (2018). The tower of Babylon in the governance of research, technology and innovation: participatory foresight as a method of policy coordination. *Futures : the journal of policy, planning and futures studies*, *100*, 34-44. https://doi.org/10.1016/j.futures.2018.03.018

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https://nbn-resolving.org/urn:nbn:de:0168-ssoar-58440-7

Futures 100 (2018) 34–44

Contents lists available at ScienceDirect

Futures

journal homepage: www.elsevier.com/locate/futures

The tower of Babylon in the governance of research, technology and innovation: Participatory foresight as a method of policy coordination

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1. Introduction

With increasing numbers of governmental but also non-governmental organisations taking part in the governance of cross-cutting policy fields such as research, technology and innovation (RTI) policy, the coordination of diverse sets of organisations becomes ever more important. A large number of measures has been tried for enhancing government coordination (Peters, 1998, Peters, 2001; Verhoest et al., 2007; Lindner, 2012; Biegelbauer, 2013; Laegreid et al., 2015) for both the policy and administrative levels, including:

- formalisation of partnerships and communication channels between organisations,
- at least partial centralisation of planning and strategic functions of organisations,
- mechanisms to solve turf issues such as neutral facilitators,
- institutionalisation of e.g. interdepartmental working groups and central coordination units,
- organisational mergers of administrative units or ministries.

Problems, however, are persistent in many cases, since partnerships have to be created and upheld, mechanisms and organisations filled with life and the coordination of organisational actors in general is not a trivial task. Indeed the coordination of organisations featuring differing functions and goals is complicated to begin with, since organisations draw their legitimation from serving these respective goals which may or may not be congruent with the goals of other involved organisations (Peters, 2013). Complications furthermore stem from the fact that organisations are varying with respect to norms, values, cultures, clientele and practices developed to navigate the daily tasks specific to each organisation (March & Olsen, 1989; Hall & Taylor, 1996; Wagenaar, 2004). The uniqueness of this set of variables characteristic for an organisation is an important reason for the failure of inter-organisational communication, cooperation and coordination. Problems with the coordination of political actors to persist, many studies thus ending with a call for “more coordination” (Peters, 1998, Peters, 2001; Hustedt & Veit, 2014).

Recent literature on coordination in the public sector emphasised the importance of a number of factors for achieving coordination. Amongst these most important are a perception of the necessity of coordination, an appropriate sharing of costs and benefits, a certain flexibility in terms of frames utilised to depict what the problem actually is and the existence of a lead agency, a policy entrepreneur or other political leadership (Peters, 2013). It has been also pointed out that there is no single best solution for coordination problems and that the ways in which successful coordination may take place is very much sensitive to the framework conditions under which it takes place. The historically contingent development of political systems, governmental structures and civil service cultures with concomitant norms and values open the possibility to use some forms of coordination and make others an unlikely choice (Laegreid et al., 2015).

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https://doi.org/10.1016/j.futures.2018.03.018
Received 6 July 2017; Received in revised form 29 March 2018; Accepted 30 March 2018
Available online 31 March 2018
0016-3287/ © 2018 Published by Elsevier Ltd.

Additionally our societies face grand challenges such as rapid demographic change, climate change, the need for sustainable food and sustainable energy production to be answered by coordinated actions of policy makers, scientists, and managers of diverse industries. Grand challenges are by nature complex and largely impervious to top-down rational planning approaches. Any attempts to address them must span a number of long-standing organisational, epistemic, and sectoral boundaries (Cagnin et al., 2008, 2012).

In this paper we want to present participatory foresight as a process- as well as future-oriented alternative or supplement to the more structural-institutional solutions presented afore.

Foresight is a conceptual framework as well as a process of prospective analysis and informed decision-making that includes long- to mid-term considerations of likely, possible, or even just thinkable futures (Miles, 2008). It joins experts and decision makers from different sectors such as politics, economy, research and civil society to create channels for communication and to develop a sufficient basis for shaping a desired or avoiding an undesirable future (Könnölä, Scapolo, Desruelle, & Mu, 2011). To this end, participants arrive at a deeper and shared understanding of impact factors, drivers and their dynamics influencing the future (Amanatidou & Guy 2008; Da Costa, Warnke, Cagnin, & Scapolo, 2008).

Foresight is about anticipating change and transformation in whatever realm considered (e.g., technological, social, socio-economical, ecological, or political) and outcomes of foresight are expected to deserve the label of innovative quality. Such complex processes of change and transformation make it essential to combine foresight methodology with principles and techniques from organisational development (Wilhelmer et al., 2010).

Consequently, for the implementation of a foresight there is a demand for a new complementary approach of methodology, with content and research related foresight expert advisory and organisational development counselling functions, the latter providing a neutral mediator. Considering the complexity of social dynamics, the complementary approach supports collective learning and decision-making processes, creates awareness of unintentional misunderstandings as well as conflict escalations within and in-between different types of social systems, and addresses them constructively (Quist & Vergragt, 2006; Wilhelmer, 2009).

In this article we want to analyse a case of government coordination in Austria in the field of RTI policy, which featured a number of adverse conditions including the location in a crosscutting policy field, unavailable additional funds, missing political leadership, a hierarchical civil service culture and unclear problem frames. We show that the development of an advanced set of tools, including most importantly a foresight, allows creating preconditions necessary to go ahead with difficult coordination tasks and development of distinct RTI policy measures.

The case was interesting since RTI policy in most countries is characterised by crosscutting competences, with the situation in Austria being exacerbated by the fact that politicians there usually display a very limited interest in the policy area. Civil servants therefore are largely on their own, when it comes to coordinating the activities of different ministries in the policy field. In the analysed case this is becoming transparent, as it deals with the efforts of a working group of the federal government's RTI strategy, which erroneously has as its main goal the streamlining of the activities of the Austrian federal RTI related ministries.

Our contribution has the main goal to show how a specific set of measures developed and deployed by external experts has helped government actors in improving coordination efforts in RTI policy-making. We also want to highlight some of the conditions necessary for government coordination in RTI policy-making under the described adverse circumstances, and show that the methods used can be transferred to other cases.

Existing literature on governmental coordination is primarily dealing with case studies of such efforts – and most often how this went awry (e.g. Mayntz, 1980; Edler & Kuhlmann, 2008; Koch, 2008). Other strands of literature describe general mechanisms of coordination and their relevance and appropriateness (Huxham, 2010; Peters, 2013; for an overview, see Hustedt & Veit, 2014). There is however only scarce literature on successful coordination efforts and even less on such cases in which external experts were utilised in order to achieve appreciable outcomes under adverse conditions. By characterising the conditions and the approaches implemented to facilitate policy development, we want to make a contribution to a better understanding of how government coordination can be supported in a policy field featuring such a high degree of interlinkage of policy sub-fields as is the case with RTI policy.

1.1. RTI policy and strategy in Austria

The RTI policy field is characterised by its rising importance in most OECD countries, including Austria (BMWFW/BMVIT, 2017). The general recognition of the importance of RTI leads to a low level of ideological conflict, e.g. all Austrian political parties adhere to the overall goal of increasing R&D spending to 3% of GDP, and thus also to accelerate the pace of innovation. Whilst party politics is not dominant in an atmosphere in which the overall relevance of research and technology is not being questioned, struggles frequently arise over policy goals before the background of limited budgetary resources and institutional structures, as well as policy tools as means to reach ends. Instead of party politics, it is mostly institutional politics, i.e. the rivalry between the different ministries in charge of various RTI policy domains, which dominates RTI policy in Austria (Zinöcker & Author1, 2009; Biegelbauer, 2016; Pichler, Stampfer, & Hofer, 2007).

Against this background, the setting up of the federal government's RTI strategy in 2011 was also an attempt to streamline the activities of different ministries (BKA et al., 2011). Comparable in its major goals to initiatives of other countries, such as the German High-Tech Strategy (Bauer et al., 2012), the Austrian RTI strategy was the result of a comprehensive evaluation of the Austrian RTI system (Aiginger, Falk, & Reinstaller, 2009) and a two-year long discussion process of a number of interministerial working groups under the auspices of the federal chancellery. The discussion process was plagued by different perspectives of the five involved ministries (innovation, science and economics, education, finance and the chancellery), thus following the path dependency of Austrian RTI policy (Griessler, 2003; Pichler et al., 2007; Biegelbauer, 2007, 2013).

Moreover, although the RTI strategy was presented in 2011 in a press conference by several ministers, no further interest in the initiative was shown from the side of politicians. Typical for Austrian RTI policy, this meant that the civil service was left to (coordinate) itself. An inter-ministerial committee, the "Task Force FTI", was set up, which was supposed to better coordinate RTI policy between ministerial borders. Nine inter-ministerial working groups were founded, which were to fill the RTI strategy with life. These working groups were planned as a medium-term coordination instrument and were renewed after the coalition government was voted into office again in 2013. The working groups dealt with the areas of Human Potential (1), Climate Change and Natural Ressources (2), Quality of Life and Demographic Change (3), Research Infrastructures (4), Knowledge Transfer and Start-Ups (5), Research in Enterprises (6), Internationalisation and foreign RTI policy (7a), an Action plan for Austria within the European Research Area 2020 (7b), and International Rankings (8). Only a few working groups published the results of their work and all of these working groups made use of some sort of stakeholder consultation and expert advice.

The working group 3 had focused on "quality of life and demographic change", an issue broader than that of the other working groups. The fact that the topic of the working group is crosscutting and vague, had made it difficult for the group to come to terms with its work. In fact, it had already turned out to be difficult to define common goals, since the five involved ministries (innovation, science and economics (both ministries were fused into one in 2013), social affairs, health and the chancellery) had different understandings what "quality of life and demographic change" actually meant for them, leading to a Babylonian confusion of terminology.

In order to speed up the process, in 2013 the Ministry for Transport, Innovation and Technology decided to commission a pilot study on a subset of the issues the working group was to address, i.e. quality of life, demographic change and mobility of persons. For both the financing ministry and the inter-ministerial working group the study had specific goals. The key objectives were to a) create a shared and common understanding of the terms quality of life, demographic change, and mobility and their interdependencies, and b) contribute to setting up the foundations for a research and innovation policy roadmap for the future development of mobility research and innovation which firstly tackles the grand societal challenge of demographic change, and secondly incorporates an emphasis on quality of life in all its actions.

The authors have been part of the project team providing the working group with study and accompanying process. Pursuing the above aims, the study was divided into interlinked tasks, which will be described in the next section.

2. Methods and results

Before describing how the study was carried out, we shall shortly depict in which ways we have described and analysed the case study at hand. In order to create generalisable results we have started off with a literature review of scholarly work on policy coordination, paying special attention to more recent work in policy analysis and public administration. Next, we went through the piles of materials accrued during the lifetime of the project, including e.g. official documents, informal policy papers, meeting notes, workshop outlines and documentation. We also followed up on the effects of the study by carrying out Internet recherche, employing document analysis (Mayring, 2015) regarding e.g. the Austrian RTI strategy and engaging into informal communication with civil servants part of the working group we had supported with the study, but also beyond. Finally, when producing this article we have utilised a six eyes principle in critically assessing what the other two authors have written before and engaging into a number of meetings during the writing process.

As part of the study itself, we have employed the following methods, which are described further in this section:

- Based upon literature reviews, an extensive state of the art report regarding working definitions of quality of life, demographic change and mobility was established.
- On the basis of the literature review a heuristic was created, in order to structure the foresight process and a policy analysis. The policy analysis on existing measures was carried out by utilising literature research, policy document analysis and interviews in order to find first indications on strengths, weaknesses and opportunities of the Austrian research and innovation system.
- Most importantly, a future oriented foresight and dialogue process including regular meetings with the inter-ministerial working group was chosen as main approach for coordination in the course of the policy development process. The main objective of the foresight process was to create a common understanding concerning a "desirable future in the year 2035", and to assess possible policy actions in the field of research, technology and innovation as regards plausibility and feasibility.

2.1. Creation of common understanding

As was pointed out before, the concrete objectives of the working group were only vaguely defined. It was not clear on which policy fields such a strategy should jointly focus on and which measures it should emphasize. Furthermore, the working group did not reach consensus concerning working definitions for "quality of life" and "demographic change" and whether "quality of life" or "demographic change" should be the focal point of action for the working group.

It was therefore necessary to assist the working group in structuring the discussion. By means of a literature survey various concepts and interdependencies of quality of life, demographic change and mobility were analysed.

Starting point for the analysis concerning quality of life was the international debate on measuring welfare, which has considerably gained momentum in the last couple of years (Spörel, 2013). The debate rests upon the findings that traditional, monetary indicators only provide limited information concerning relevant dimensions of welfare, non-material aspects of well-being and underlying social and political conditions. Recent coordinated research efforts trying to operationalise and measure quality of life at

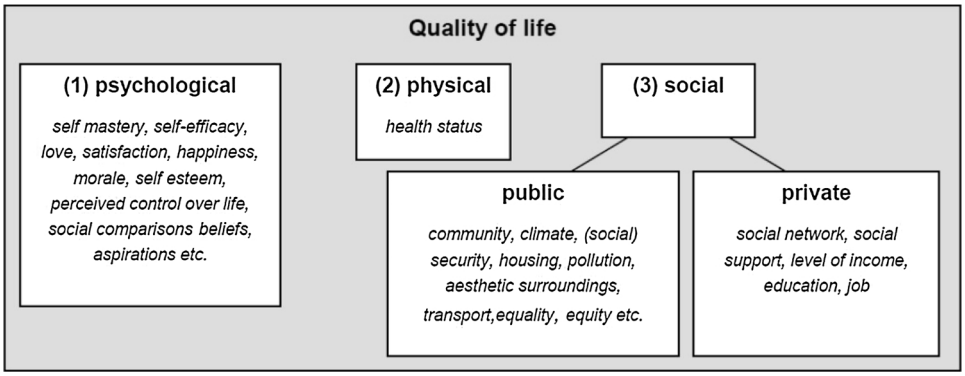

Fig. 1. The three dimensions of quality of life.
Source: Risser et al., 2005

European and international levels helped to inform the working group that quality of life cannot be operationalised by single indicators and highlighted current practices that allow for cross-national comparisons in welfare measurement (OECD, 2013; European Commission, 2009; UNECE, 2014).

Moreover, literature stemming from psychology helped to show that quality of life is composed of three higher-ranking dimensions, to which distinct life context or life domains can be attributed (Risser, Kaufmann, & Forward, 2005): physical (i.e. the health status of an individual), psychical (e.g. self mastery, self-efficacy, love, satisfaction, happiness, morale, self-esteem, perceived control over life etc.) and social, whereby the social dimension is further divided into a public and private domain (Fig. 1).

In simple statistical terms, demographic change can be defined as the net rate of births minus deaths plus the net rate of immigration minus emigration, leading (usually) to slow but continuous changes in the structural composition of a population (e.g. age composition, sex, ethnic composition, languages). However, inherent to this composition change, is a societal transformation process (cf. Schimany, 2007), in which new values, attitudes and demands concerning health systems, mobility systems, educational systems, work systems etc. emerge. Therefore, demographic change was identified as a major societal challenge that reaches far beyond the issue of an ageing society, having an impact on various sections of society, economy and politics.

Finally, for research in the area of personal mobility we could show that mobility is not only relevant for an independent, autonomous life. Rather mobility research increasingly includes aspects of physical health, social norms, networks and values (Oxley & Whelan, 2008), as these interrelate with mobility patterns and appreciation of different forms of mobility. Accordingly, also related questions concerning access to and use of different forms of transport have gained momentum (Suen & Sen, 2004).

Through the literature review stemming from different, but inherently linked research areas (economics, mobility research and psychology), the project team could provide the interministerial working group with a basis for discussions on its goals. In the ensuing debates, which were taking part in the interministerial working group meetings, the complexity of the domains of the working group goals were discussed.

Following the suggestions of the project team “quality of life” was seen as the overarching objective of policy interventions and “demographic change” was interpreted as driver that will have an impact on a number of life contexts to which policies have to respond to. Based upon the findings from the literature review, the key question for the subsequent actions was formulated: Which directions should RTI strategies follow in the area of mobility in order to sustain or increase quality of life, against the background of demographic change?

2.2. Development of an analytical model that structures the analysis

A second task of the project team was to devise a heuristic that allowed structuring the analysis and the policy planning progress. Therefore, the project team distinguished between four relevant life contexts or action areas in the field of mobility and functional classifications of research and innovation policy instruments in the area of mobility based upon a literature review (Fig. 2). The action areas served as a starting point for performing a status-quo analysis concerning existing RTI policy measures and provided the frame for conducting the future oriented analysis, in which the foresight process was embedded. By integrating determinants of quality of life (i.e. life contexts) into the heuristic, it was possible to incorporate the overarching quality of life aspect into the analysis.

The chosen life contexts have a close relationship to both demographic change and mobility:

- Self-determination and health are essential prerequisites for personal, active mobility and the use of different means of transport. The increase of life-expectancy and an ageing society do not only pose challenges for health systems, but also raise RTI policy relevant questions concerning options on how to stay mobile in different phases of life and how to induce changes concerning mobility preferences in early life-time.
- Working conditions as well as leisure preferences are subject to constant change. In particular technological developments in the area of ICT are expected to have distinct impact on personal mobility in the working life. Being able to be mobile in one's leisure time is an important aspect for personal well-being. Affordable access to different means of transport, in urban and peripheral

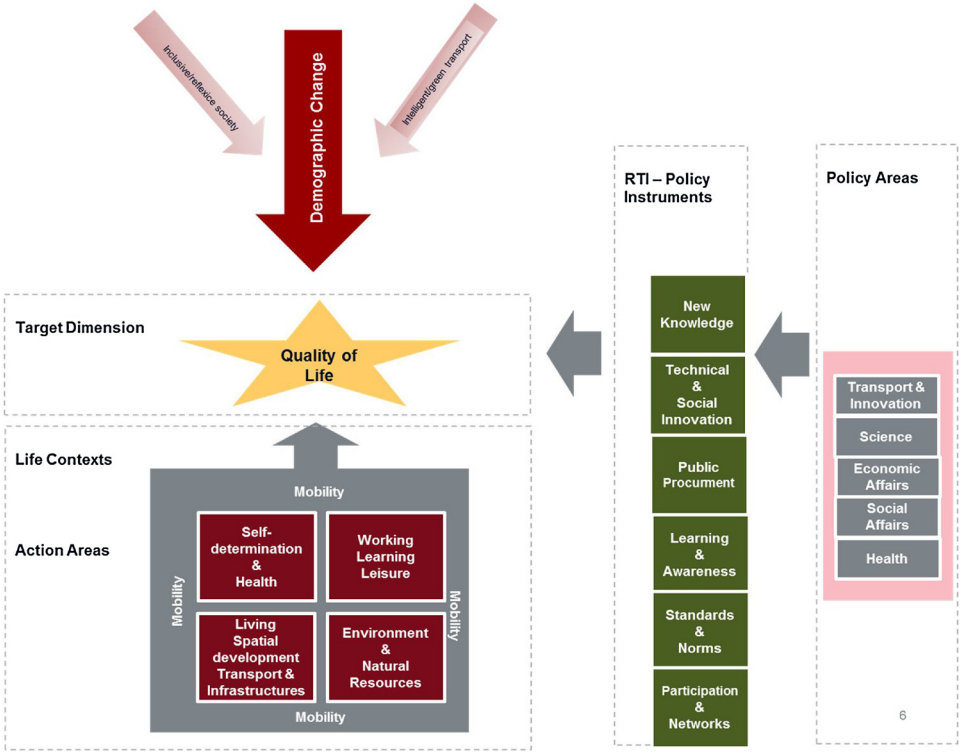

Fig. 2. Heuristic for structuring the policy planning process.
Source: Dinges et al., 2015.

regions is a main challenge for public authorities and requires both technological and social innovations.

- Preferences concerning living conditions in society are subject to constant change. Structural change in society in urban and rural areas poses new challenges regarding an adaptation of living areas and public means of transport.
- An intact environment is a major precondition for economic and societal well-being. In particular the automotive traffic has a distinct negative impact on environment, natural resources, personal health and mobility options of other people asking for a combination of technological developments and structural changes in attitudes towards personal mobility.

At the same time a policy analysis was carried out by the means of literature research, document analysis and expert interviews in order to detect first indications on strengths, weaknesses and opportunities of the Austrian innovation system. Based upon the collected evidence base, potential actions were analysed revealing added value, costs and synergies of existing measures, and need for additional coordinative actions and future measures.

2.3. Foresight: a process of policy coordination

At the heart of the project team's efforts to support the interministerial working group was a foresight process. The foresight process was structured around two forums which brought together about forty stakeholders from industry, public transport, health services, non-gonvernmental organisations (NGOs) as well as research. The overall design of the foresight process is illustrated in Fig. 3.

The stakeholders from research organisations and NGOs operating in the field of demographic change and mobility were mainly selected by means of desk research. Stakeholders from policy, industry, public transport and health services were identified by making use of the expertise of the members of the interministerial working group as well as the project team members. In order to be able to balance participation, stakeholders were mapped according to their institutional affiliation and their potential contribution to the action areas of the study.

Members of the interministerial working group also joined the stakeholder forums for (a) participating in the sense-making during the overall process, (b) serving as "hosts" within dialogue rounds, (c) discussing with stakeholders strategic targets and optional measures at eye level as well as (d) actively involving themselves in a creative visioning and scenario building process.

The project team decided to apply a normative visioning process in order to support the creation of a bottom-up developed vision allowing participants mutual learning on their own terms. Desirable as well as undesirable futures should serve as a future oriented baseline for a subsequent road mapping exercise for designing/adapting RTI policy measures and related other policy measures.

The main objectives of *Forum 1* were to a) give stakeholders all relevant information regarding the project objectives and project

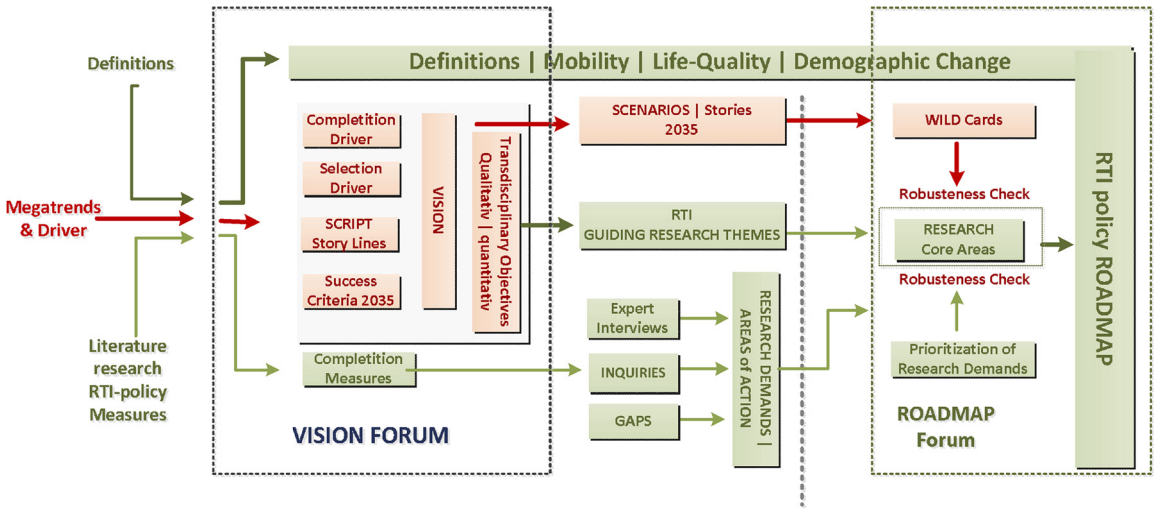

Fig. 3. Foresight Process.
Source: Dinges et al., 2015.

set-ups and to b) provide them with basic information about both participatory foresight approach and foresight concept. Further objectives were to c) assess and finalize a harmonised working definition of quality of life, demographic change and mobility for the working group, and to prioritize key drivers for quality of life and mobility 2035. Additionally the objectives of d) developing five visions addressing life quality and e) strategic relevant objectives for 2035, 2025 and 2015 should jointly be derived.

Thus Forum (1) saw the identification of main societal, technological, economic, environmental and political drivers in each life context (STEEP analysis): drivers were discussed and selected with respect to the four action fields "self-determination & health", "working and leisure conditions", "living conditions & infrastructure" and "environment and natural resources". A mental time travel method (Cuhls, 2017) enabled stakeholders to direct their views from the present to the future of 2035 and thereby to define long term qualitative objectives for desirable futures. These objectives subsequently served as a guiding framework for combining the selected drivers for each action field in order to imagine story lines for probable futures within these fields. The elaborated story lines provided a paradigmatic base for developing story boards embedding "personas" in concrete, (un-)desirable life scenarios of 2035. The performance of five sketches – four utopias with respect to the four action fields and one dystopia – precisely addressed key messages of the four visions and of a dystopia to the stakeholders and subsequently allowed both a humorous working atmosphere in the large group as well as the deduction of qualitative objectives from the jointly developed, desirable (normative) vision (Wilhelmer & Nagel, 2013, 95). Last but not least, the vision as well as the objectives were contrasted with an analysis of existing policy measures in order to classify and identify gaps in the policy landscape and prioritize demand stemming from the policy analysis carried out before the foresight.

The transdisciplinary approach starting from visions of concerned participants from different stakeholder groups did not only contain technological objectives, but consequently pointed towards the relevance of societal, health related, spatial planning and regulatory objectives. Thereby the forum demonstrated effectively that RTI support for increasing quality of life may only be effective, if various measures from various policy fields are put in place.

Nevertheless, the stakeholders were able to delineate lines of action that provided clear orientation for creating future RTI policy measures in the area of mobility. In particular, the stakeholders pointed towards the relevance of research and innovation yielding a higher attractiveness of active mobility (e.g. cycling, walking), development of innovative measures that ensure provision of mobility in rural areas, the creation of experimental multi-functional living areas, and re-design of existing areas, as well as measures that contribute to a reduction of motorized individual traffic.

The main objectives of *Forum 2* taking place several months after *Forum 1* were to a) put forward cross cutting research domains for b) developing future oriented specific key research questions and bundles of measures for the RTI policy roadmap in the areas of mobility and demographic change, and c) to assess the robustness of these bundles of measures. In addition d) robust measures – deriving from empirical findings of the policy analysis that rested on expert interviews with researchers, policy makers and industry concerning research demand as well as the analysis focussing on existing policy measures – should be finally evaluated with respect to quick wins and strategic issues that should not be forgotten in future implementation efforts.

In contrast to the creativity driven Forum 1, Forum 2 mainly focused on analytical steps allowing assessment, completion and robustness check of intermediate research results: Thus Forum 2 opened with a plausibility check of interim results (driver gallery, story lines and scenarios, cross-cutting research domains) performed by about 40 stakeholders. This step allowed newcomers to quickly gain an overview about the progress made in the process, thus getting ready to join the ongoing discussion and allowed experienced stakeholders to identify how their own inputs were translated into jointly elaborated outcomes.

The introduction was followed by an alternation of presentation and dialogue rounds: Thereby research demands were compared with already existing activities of civil society and research programs, both deriving from the policy analysis of the project team.

Stakeholder's assessment and this comparison served as a common ground for the joint evaluation and completion of key research questions in the four action areas.

Finally, jointly identified and prioritized research issues allowed to elaborate a robust RTI roadmap by firstly addressing objectives and actors for each research issues and secondly using prioritized wild cards for checking robustness and completeness of elaborated research issues. Last, but not least, identified robust research issues were jointly critically questioned by all stakeholders with regard to the potentially highest impact as well as possible barriers expected to occur during the future course of implementation.

Based upon the results of Forum 2, the project team was able to delineate the concrete research demand in each action area, to optimize formulation of specific objectives and to identify relevant research policy measures together with the interministerial working group. Major cross-cutting domains for elaboration research policy measures in the action areas included 1) city and regional planning, 2) social inclusion and diversity, 3) paradigm-change, 4) governance, and 5) ICT, e-government and logistics.

- Ad 1. Public spaces in urban and rural areas need to be designed as to contribute to (keeping alive) a sustainable maintenance of physical and psychological health, including more active mobility. Research that contributes to an improvement of public transport infrastructures and social infrastructures is an important cornerstone in this regard. Prioritized measures concern: 1) analysis of mobility patterns and mobility demand of different sections of the population in urban, sub-urban and rural areas, 2) the configuration of public spaces and the impact on mobility patterns.
- Ad 2. The main objective of mobility research regarding social inclusion and diversity is to grasp the different needs of society in order to be able to adapt transport systems to the different mobility needs of the population. Prioritized measures concern: 1) research that enhances the mobility of the population, 2) new concepts for inclusive mobility, and 3) new, affordable forms of mobility.
- Ad 3. The main objective of mobility research as regards the facilitation of paradigm change concerns research that generates new practical examples that can contribute in particular to an increased health competence of the population and the creation of incentive schemes for using non-motorized transport means for different user groups (pupils, workers, migrants etc.). Prioritized measures are 1) research that contributes to an increased use of active mobility and 2) research that contributes to a transformation of social systems.
- Ad 4. The main objectives of mobility research in the area of governance and change processes is to generate new knowledge that contributes to self-organised sustainable mobility and develop new concepts of inter-sectoral co-operation.
- Ad 5. The main objective of mobility research in the area of ICT, e-government and logistics is to contribute to a reduction of externally induced motorized mobility. There is a concrete demand to develop new ICT-tools, devices and services that have potential to reduce motorized, individual transport.

For aligning the foresight process with the work of the interministerial working group, a Strategic Steering Board was set up, consisting of all members of the working group and the project team leaders. This allowed the members of the interministerial working group 1) to be steadily informed about the overall status of the study, 2) to maintain the strategic ownership of the overall policy process, and 3) suggest adaptations to the process according to the needs of the working group.

The Strategic Steering Board flanked the overall process: A workshop with steering board members taking place before Forum 1 allowed a joint definition of overall goals and the concepts "quality of life", "mobility" and "demographic change". Due to the intensive and controversial discussions, impulses for developing the before described analytical model emerged within this first collaboration. The steering board also evaluated the overall outcomes of the process in a closing Strategic Steering Board workshop, in which identified measures were discussed and last refinements were addressed to the project team.

In addition an *Advisory Group* was invited to assess the outcomes of each of the stakeholder forums: researchers from universities as well as applied research organisations, specialized in the issues of mobility, health and social innovation, met after each forum. As at least two representatives of the interministerial working group also were included in each of these evaluation meetings this set-up offered a mutual learning space for civil servants of the five ministries.

Future will tell if these building blocks will suffice to successfully coordinate the activities of several ministries in the framework of the RTI-Strategy. Yet regardless if this will be the case or not, the one year process has led to a communication between the interministrial working group members regarding their raison d'être and the way forward, which by itself is already a nontrivial communication and coordination task. In addition, the inclusion of working group members in the stakeholder forums deepened already existing relations to representatives of industry and civil society as well as allowed for building new alliances, which in the future can support policy implementation.

3. Discussion

Summing up, we would like to stress six critical success factors serving as strategic guidelines for enhancing the coordination of diverse RTI policy organisations through a process such as the one described here.

3.1. Future-oriented approach

Dealing with incommensurable, i.e. insolvable contradictory logics, demands triangulation (Simon & Stierlin, 1984) in the sense of introducing future perspective as a "third party" being attractive for all actors included.

A foresight process invites all stakeholders to take a future perspective lying in a long distance from now (e.g. 2035). This allows both to jointly define a vision of a desirable future and to free oneself from daily obligations and constraints interlinked with the individual, specific function of the organisational/institutional background. The benefit of participatory foresight is to open a space for developing a trustful collaboration culture between all stakeholders: Future approaches replace competition between organisations with cooperation aiming at partial realisation of desirable futures (Wilhelmer, 2017).

Regarding our case study this approach worked well: Representatives of ministries as well as of NGOs and industry jointly developed story lines and story boards before playing sketches addressing key messages of the joint desirable future.

A stumbling block with respect to this future approach may be the degree of novelty of the jointly developed, desirable future. Visions include wishes and demands deriving from people's experiences in the past. The de-contextualization of these wishes can positively be seen as the extrapolation of principal human needs providing both sense and motivation of human lives. On the other hand visions also reflect images of possible futures stemming e.g. from diverse public and private media or neighbourhood communication, thus reflecting the common mind-set as well as blind spots of the people included. Regarding this challenge, the project team had to add complementary perspectives to the jointly elaborated visions resulting in narrative stories of future scenarios.

Policy advisors should not underestimate this step as the challenge here is to transform knowledge and expertise deriving from alternative future studies and research into the specific creative format of future stories without changing the key messages of the scenarios stemming from the stakeholder process.

3.2. trans-disciplinary approach

A user centred approach in policy design (Giesecke, 2009) requires resigning from familiar "expert talks" and instead developing a joint language e.g. regarding the definition of key terms, key objectives and cross-cutting issues. This requires getting beyond expert driven competition amongst scientific disciplines and between advisors and experts from other domains with respect to "truth" and "relevance" allowing a focus on multiple dimensions of the social system. Researchers as well as experts from public authorities, NGOs and industry have to change their communication mode from "telling" to "asking" and from "claiming" to "mutual learning", which often turns out to be a challenging exercise.

Policy advisors should recognise the importance of including diverse perspectives of the interministerial as well as stakeholder groups inside their team, thus mirroring diversity and complexity of their environment (Königswieser/Exner 2002; Biegelbauer, 2015). This demands an investment of more time than usual in clarification processes within the project team itself. Project teams often are challenged since expert organisations frequently are not really used to intensive team work and it is difficult to invest more time because of organisational circumstances. Risk-management in this case has to focus on a forward looking project plan in order to avoid misunderstandings and conflicts deriving from short cuts in communication processes.

3.3. Participatory approach

Foresight projects are not per se participatory. In post World War II discussions technology forecasts were the predominant modes of foresight processes (Cassingena Harper & Georghiou, 2005). For the first time the 1980s saw participatory foresight processes in the sense of co-creating desirable futures (Keenan, 2000). Aiming at policy coordination however, the participatory approach allows the inclusion of multiple stakeholders' perspectives and contributes to broaden the impact of RTI policy outcomes.

The main asset of a participatory approach is to experience inspiring mutual learning processes thus allowing the transformation of mental models and mind-sets resulting in the change of daily practices. Ideally by doing so, a system transformation on a social level has already taken place before results of foresight study are fed in policy design and implementation processes. This fosters the quality and sustainability of subsequent implementation efforts as multipliers have already changed their view from critical questioning to active support of new programs and policy actions. Last but not least this approach increases the legitimation of policy design outcomes generated within the framework of a representative democracy (Wilhelmer & Nagel, 2013).

A disadvantage of participatory processes is that they require more time compared to traditional top down policy design processes, often going by enlarged costs (staff, venues, catering etc.). Besides, these processes need open minded, engaged policy makers not being afraid to get in touch with e.g. citizens, NGOs and industry. This serves as both requirement for and enabler of the change of traditional mind-sets of policy makers and stakeholders included.

3.4. Organisational development approach

The organisational development approach allows to build an appreciative cooperation culture (Schmidt, 2004) as well as to tailor the concrete multi-method approach (Janes, Prammer, & Schulte-Derne, 2000) by answering the needs of the specific framework of a foresight process (e.g. objectives, target groups, previous knowledge basis, available research results etc.). This allows implementation of both creative and interactive methods for engaging and empowering people concerned as well as the implementation of analytical methods deriving from research and policy design/evaluation processes.

Thus the organisational development process initiates *meta*-reflection and self-organisation (Wimmer, Glatzel, & Lieckweg, 2014) of the project team by navigating through contradictory logics and power struggles. This allows both expertise and analytical methods as well as social mediation and negotiation to be utilised as equal by valued parts within participatory policy design (Wilhelmer, 2017).

RTI policy design processes often are supported by applied research organisations or universities serving as political advisors. The

primary aim of these expert organisations is to generate new knowledge regarding content. This is why they often are not used to implement participatory stakeholder processes or miss skills required for conducting (trans-)organisational processes. Expert organisations often underestimate organisational development being a social research discipline by itself. Advisors then try to utilize its methods by means of manipulation: in the sense that organisational development methods should help to increase acceptance of their expertise by policy makers and end-users without taking into account the necessity of mutual processes allowing innovation deriving from co-creation processes.

Advisors are recommended to integrate a neutral organisational development expert and mediator in their interdisciplinary team either as a member of the expert organisation or as a freelancer supporting the project team by overcoming obstacles such as those mentioned above.

3.5. Complementary approach for a research design

Transdisciplinary and multi-method oriented policy coordination and policy design processes require a context tailored, complementary combination of both content point of view or mediation/social process (Königswieser & Hillebrand, 2006; Wilhelmer, 2009; Wimmer et al., 2014).

In our case the policy analysis laid bare strengths, weaknesses and opportunities of the Austrian research and innovation system. Through expert interviews important policy issues were detected, which were not yet targeted by government policies. Without gaining an overview of strengths and weaknesses no recommendation of enhanced interministerial coordination within cross-cutting research areas could have been suggested (Wilhelmer, 2017)

The expertise of the stakeholders included in the participatory foresight process allowed assessments on plausibility as well as completeness and up-to-dateness checks: after all policies are not carried out by policy makers, but by e.g. the civil service, experts of companies, NGOs as well as care and research organisations. This demands legitimation of decision making via participation and horizontal, cross-sectoral coordination (Whitelegg, 2009). Moreover participatory processes are able to use tacit knowledge of stakeholders (Nonaka & Takeuchi, 1995) related to present and future programs, projects and actions thus serving as an additional information source as well as quality check for foresight study outcomes (Wilhelmer, 2012).

Thus successful policy making requires advice including and balancing scientific analysis as well as creation and usage of appreciative and trustful relationships between all actors (Giesecke, 2009). This requirement often challenges expert organisations which – because of their main objectives and history – primarily focus on the generation of know-how and content (Holste, Kubeczko, Schartinger, Helmreich, & Wilhelmer, 2010).

3.6. Special framework

Successful policy coordination needs amongst other things an organisational framework such as the Austrian RTI strategy, which provides for a reason to engage into coordination activities and a set of norms and rules for the coordination process. Also very helpful is funding for supporting activities such as a foresight process. For the coordination in general, but especially for participatory activities the presence of the ministerial decision makers is of utmost importance (Whitelegg, 2009). In the case of the presented foresight process the willingness of decision makers from the ministries to engage into this process was a sine qua non condition for fostering policy coordination between the ministries.

Often enough interministerial working groups are not implemented, due to lacking joint objectives or the willingness to compromise on problem perceptions, goals and shared costs. In these cases the implementation of participatory policy advice exercises with the goal to start or intensify coordination activities is not possible (Wilhelmer, 2017).

4. Conclusion

Our overall conclusion is that coordination of diverse organisations as part of RTI governance needs both a) learning and transformation of policy makers and political institutions and b) learning and transformation of advisors and university/research organisations in the field of policy advice. Especially the mental models of policy makers, i.e. the way they see their social and institutional environment, partaking in coordination activities, have to change in order to overcome well-established practices embedded in institutional rules, norms and values.

Yet coordination can only be enhanced if all included partners are willing to critically question their own mental models and knowledge developed over the years as well as to change their roles in policy advice from top-down and expert approaches to an enhancement of co-creation and mutual learning.

Revisiting the factors listed in the introduction as necessary for successful policy coordination (Peters, 2013), we find all of them important. A perception of the necessity of coordination is part of the motivation actors need to engage into coordination efforts, which may question their mental models and long held beliefs as discussed above.

Linked to the issue of a felt need to coordinate is the impression that costs and benefits of the coordination activities are appropriately shared. Had the innovation ministry in our case study not carried the costs of tendering a contract with policy advisors, most likely nothing would have changed. In game theoretical terms since the task was to get a cooperation going, it was important to create a cooperative game resting on a positive sum strategy (Hargreaves, Heap, & Varoufakis, 2004). Put differently, to overcome negative coordination, as part of which actors protect their stakes by not crossing the borders to other actors' competence fields, and arrive at positive coordination, in which actors are ready to change their perceptions and engage into cooperation, trust in

cooperation and coordination has to be built (Braun, 2008).

Another important issue is the flexibility to change frames, which are utilised to depict what the policy problem, i.e. the reason for coordination activities, actually is. We have pointed out already before that amongst the first and foremost problems of the analysed case was to come to terms with the mission of the interministerial RTI policy working group to develop policies in the area of quality of life and demographic change. In an Babylonian confusion of terminology, quality-of-life meant very different things to different civil servants coming from different ministries. Indeed, the term combines a number of different elements, ranging from dimensions such as intact environment to income equality, material well-being and physical and psychological health. The representatives of the different ministries would offer differing understandings of which elements would be more or less important, with natures and functions of their home institutions playing an important role in their preferred definitions: somebody from the innovation ministry might think about policy goals in terms of technologies relieving people of burdens induced by health problems, an official from the economics ministry might imagine a more competitive economy allowing for a more affluent society and the representative of the social ministry might envision acceptably priced goods and innovations for persons part of an ageing society. To create a common ground by meaning-making, i.e. arriving at definitions largely shared by the group, was an important step and not easy for most of the members of the interministerial working group as it afforded the above flexibility to work on the problem frames of the group.

Another important factor for achieving government coordination pointed out in the introduction was the existence of a lead agency, a policy entrepreneur or other political leadership. Incidentally this is probably the biggest problem of the Austrian RTI strategy: there is no sustainable interest from the side of politicians, which means that there is also no political leadership. Furthermore, although the ministry for innovation and the ministry for science and economics share the responsibility for the working group, they are just primi inter pares.

It has been also pointed out that in case of coordination failure, it can make sense to revert to hierarchy as governance element in order to create framework conditions more inducible to coordination (Laegreid et al., 2015; Voets et al., 2015). Yet in the case of the Austrian RTI strategy, the civil servants do not have the option to call on the hierarchy in order to come to solutions – as has been just pointed out, different from the stance of the German government towards the German High-Tech Strategy, there is no active political backing of the initiative. This fact makes it also relatively less attractive for top level civil servants to intervene into the working groups' doings and carries the danger of making the Austrian federal RTI strategy meaningless.

The final proposition regarding governmental coordination put forward in the introduction was that coordination processes are highly sensitive to framework conditions (Laegreid et al., 2015). We believe that this describes very well what we found. The enactment of the Austrian RTI strategy in the interministerial working group was very much an outcome of the historically grown rivalry between the Austrian ministries in the policy field. The project group regularly reverted in internal discussions to the historical contingency of the relationships between the different institutions in the policy area. In fact, the limited interest of politicians in RTI policy is an important framework condition and indeed a structuring element of the policy field, which is dominated by the civil service and administrative policy-making (Biegelbauer, 2013).

Following from these insights, we pertain that all the five factors listed by Peters (2013) have been important to understand why policy coordination could be supported with the proposed set of methods in this case. We nevertheless strongly believe that the specific configurations of factors are case specific, with the missing political leadership being emblematic in the described case study. We furthermore propose that since the factors important for successful policy coordination are generalisable, this is also the case for the preconditions for success we have described before in the discussion section. Yet we are convinced that despite all efforts to create tools supporting coordination efforts, the concrete coordination processes have to take the specific configuration of environmental conditions of the respective processes into account in order to be successful.

Funding

This work was supported by the Austrian Research Promotion Agency(FFG) under the "Mobilität der Zukunft" programme.

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