Master Thesis Innovation Sciences

Towards Science *for* Society

A multicriteria mapping study on university policies for enhancing societal impact of Dutch academic research

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Summary

A lot has been written on the importance of societal impact of academic research within universities, and the proposed policy actions that should be taken to enhance this. Nonetheless, due to dominant structures and institutions, universities still struggle with adapting their organizational system accordingly. Uncontested university strategies and incentives to enable researchers in achieving societal impact of academic research are missing. Herein, finding a legitimate solution to this academic challenge is difficult because of its wicked character. In an attempt to tame its wickedness, this study explores the consensus on the performance of suggested university policy options that potentially help to transition towards a university regime embracing societal impact of academic research.

In total, 24 face-to-face interviews were executed with stakeholders from Utrecht University and related national organizations. By using a Multicriteria Mapping method, quantitative and qualitative data were gathered on the performance of university policy options representing four different perspectives from different levels: researchers from university niches, faculty staff and university staff at the regime level, and landscape interviewees from outside of the university. In total, based on criteria provided by the stakeholders themselves, university policy options were appraised on how well they could potentially contribute to enhancing societal impact of academic research.

Grouping the provided criteria together, expected organizational and external impact, and practical feasibility were used most often to appraise the university policy options. Also, many stakeholders assigned more weight to expected organizational impact and expected external impact criteria. However, results also show that some interviewees perceived the cultural feasibility of options as important. For the aggregated performance scores of the university policy options, incentivizing policy options providing researchers with time and appreciation for societal impact activities have the highest mean scores. Comparing different perspectives, results show that stakeholders did not always agree on the performance of the university policy options. Also, stakeholders expressed diversity in preference on how to implement the policies best.

Aside from many differences in the perceived performance of university policy options, patterns of conditions and interconnections of university policy options appear. All in all, stakeholders agreed on the necessity of all university policy options, but neither of them was considered ‘sufficient’ individually. Besides recognizing the need for an integrated policy approach, the outcomes also show that collaboration between several levels and a stepwise and reflexive implementation of university policy options is a prerequisite to successfully transition towards ‘science for society’.

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1. Introduction

Over the last ten years, discussions about universities' impact on society, and the societal impact of academic research in particular, have gained importance. In a recent report of the League of European Research Universities, van den Akker and Spaapen (2017) emphasize that "*Societal impact is high on the agenda of universities and will be even higher in the years to come*" (p.6). Although the importance is growing, universities struggle to achieve societal impact of academic research. Many suffer from the knowledge paradox: despite the availability of excellent scientific knowledge, further development, and use of this knowledge in society is often limited (van De Burgwal et al., 2018). Notwithstanding the intrinsic motivation of researchers to provide societal impact, deliberate university strategies, and robust evaluation procedures that equip them to do so seem to be an exception (De Jong, 2015).

For a long time science impact – aside from the impact science has *within* the scientific community - has been understood as *economic impact*, in terms of a linear model of production of knowledge (Trencher et al., 2013; van den Akker & Spaapen, 2017). Besides education and research, the university's 'third mission' aims to commercialize research (e.g., patents, licenses, or spin-offs) in order to stimulate the economy. Nowadays, there is an emerging academic response for a *societal impact* on the urgent societal challenges related to, for instance, the environment, healthcare, or food. Because of the complexity of these challenges, input from academia, government, industry, and civil society are seen as a prerequisite (Mazzucato, 2018; Whitmer et al., 2010). Not all challenges need academia as a knowledge input, but for the ones that do, universities have a huge potential to link expertise across society (Trencher et al., 2013). As a result, a growing call for change in focus of the universities' third mission is observed: from 'making a profit by the commercialization of knowledge' towards 'solving a problem by co-creation of knowledge' (Sarewitz, 2016; Trencher et al., 2013). Attention for such a co-creative problem-solving mode entails a broadening scope when it comes to what science impact consists of.

In practice, however, the broadening scope of science impact with both a scientific as a societal expectation related to research and its related set of activities can raise various tensions. Although in some cases the scientific and societal impact can be achieved jointly, this is not an automatic result (D'Este et al., 2018). According to D'Este et al. (2018), the combination of the contradictory logics behind achieving scientific impact and societal impact, *and* incentive structures governing the reward systems focusing on the peer recognition and academic reputation makes it difficult for scientists to achieve both scientific and societal impact of their research. Due to the focus of these measures and activities, the ultimate societal relevance of academic knowledge is still overlooked, resulting in insufficient use and application of knowledge for societal purposes (Dijstelbloem et al., 2013). As Dijstelbloem et al. (2013) state, much academic science is 'wasted'. In order to increase their relevance again, universities should change the manner they organize science, where science goes beyond the importance of scientific achievement or commercialization goals (D'Este et al., 2018).

Extending this debate towards science for society, what could universities do to ensure this change? In order to produce academic knowledge with a high societal impact, universities should start to engage more with society by collaboration, formulation of common goals, and joint achievement of results (van den Akker & Spaapen, 2017). However, it is difficult for universities to apply these solutions since they do not align with the current firmly established university system rooted in the traditional linear view on science. Currently, these dominating notions and patterns to support and promote the third academic mission seem to lag due to economic focus, compared to the recent academic trends to increase the universities' societal contribution by co-production of knowledge and academic engagement (Trencher et al., 2013).

The emerging situation is characterized by discussions in how university systems can accommodate a new turn in producing and disseminating societal-relevant knowledge. The latter raises the question what options and tensions apply to succeed on this account. Taking inspiration from transition studies,

one can regard the university system as an established regime, composed of a set of institutional structures, culture, and practices (Geels & Schot, 2007). Transition theory helps to describe the tensions and interactions between societal impact initiatives and the established institutional structures within academia (Trencher et al., 2013). Moreover, as the institutional theory stream within transition studies stresses, universities have rooted regulative, normative, and cognitive institutional pillars (Geels, 2004; Scott, 2008). Together, they determine the institutional logic of the university; i.e. the "*deep-structural rules that coordinate and guide actor's perceptions and actions"* (Fuenfschilling & Truffer, 2016, p.774). In order to guide the university towards a configuration more suited for 'science for society', it is crucial to understand the underlying connected institutional elements that must come together (Rotmans et al., 2001).

In transitions theory, a vital element of a regime is the policy paradigm, defined as a set of shared beliefs, values, activities, and principles related to a particular sector with related policy challenges (Andrews-Speed, 2016). For a *regime shift* to take place, usually several possible development paths exist; in this case, this would be *university policies* influencing the direction, scale, and speed of change (Rotmans et al., 2001). However, there is no golden strategy on how to do this: universities operate in different contexts determining the issues and values of strategies and their success (De Jong, 2015; Grimaldi et al., 2011). To provide the right policies, understanding the organizational complexity and research interests of universities is crucial (Bonaccorsi, 2017; Smith et al., 2005).

Within the complex university context, deciding on the right way forward is essentially a wicked problem in which relevant stakeholders have different perspectives. Although the term wicked is these days often found in relation to grand societal challenges, it can also apply to this academic challenge. Just like in societal challenges, the complex nature of this problem creates major obstacles for policymakers (Wanzenböck et al., 2018). According to Wanzenböck et al. (2018), lowering the contestation tames the wickedness of both the problem and solution. Herein, contestation refers to: "*the degree of normativity in terms of normative, often diverging claims, values and framings related to an issue, or the inherent conflicts of interest resulting from social pluralism and stakeholder divergence"* (Wanzenböck et al., 2018). Without a coherence between the stakeholders' perspectives on the suggested university problem and policies, it is unlikely that a regime shift occurs within the university system. Said differently, the *congruence of beliefs* of the collective audience determines the legitimacy of the problem and its possible solutions (Suchman, 1995). If the acceptance and awareness of the challenge and its solutions is missing, the targeted policies run the risk of limited legitimacy (Wanzenböck et al., 2018). Aligning the different perspectives is therefore crucial for legitimizing the possible university policies to ensure an academic regime that embraces societal impact.

This study tries to fill the gap of lack of understanding on the contestation of the possible ways forward, by opening up the assessment of different stakeholders' views on university policy strategies regarding achieving institutional change. By comparing the different appraisals of stakeholders, it aims to explore the degree of consensus on the future policy actions universities should take in facilitating the fulfillment of societal impact, and whether there are divergent visions on what institutional changes have most urgency. Accordingly, this research aims at answering the following research question:

To what extent is there a congruence of stakeholders' beliefs on the university policy options to enhance societal impact of academic research?

In order to answer the above research question, the current study explores contrasting perspectives between stakeholder types. Three sub-questions will guide this research in doing so:

1. What university policies are suggested by literature and experts that contribute to enhancing societal impact of academic research?
2. According to stakeholders, what university policies are better suited to enhancing societal impact of academic research?

3. Are the same university policies equally valued across (similar) stakeholders?

The first sub-question is answered by using literature review and five expert interviews. Subsequently, a Multicriteria Mapping analysis is applied to consolidate results for sub-questions two and three. The analysis provides a useful map of the different appraisals of 24 stakeholders, in and around the particular case of Utrecht University (a Dutch research university established in 1636), on the possible university policy options aiming to enhance societal impact of academic research in the knowledge society. To successfully move towards a 'science for society', it is vital to lower the contestation between stakeholders on the possible ways forward. The result of this research maps to what extent the appraisals are congruent, and what is needed to increase the congruence. Despite not always appealing for policymakers, it is essential to look at the reality with its messy, subjective factors in comparative appraisal (Stirling & Mayer, 2001). By using the results of Multicriteria Mapping, policymakers achieve a basis for robust decision making by observing how different perspectives are involved in the possible solutions and their implications. Consequently, the outcome is a valuable input for university policymakers to set a targeted plan to speed up the regime shift towards a university that embraces societal impact.

Aside from the societal relevance, this research adds to the existing literature on science impact. First, to provide a better understanding of this academic challenge, this study positions the thinking of scientific impact as an academic transition. The re-combination of the multi-level perspective and institutional theory to the context of the university system results in a framework that contributes to understanding the academic challenge in a transition context. Second, this study provides a comprehensive picture of the suggested university policies that help to enhance societal impact of academic research. By making comparisons between stakeholder types, this research aims to discover possible patterns that might help in determining what universities should consider when transitioning towards science for society. Here, the aim is not to generalize the findings to all Dutch universities, but to unpack the assessment by mapping the practical implications of the options, knowledge, contexts, and values of stakeholders within and around Utrecht University. Lastly, regarding the methodology used, Multicriteria Mapping has been employed in diverse fields such as transport, land-use planning, energy policy, waste management, healthcare policy, technology assessments, and climate change mitigation (Stirling & Mayer, 2001). This research is the first to employ the Multicriteria Mapping method for science impact within a transition context.

The remainder of this report is as follows. First, the theoretical background is provided to define societal impact of science and to explain the use of the multi-level perspective as a meta-framework as a means to understand the transition towards 'science for society'. What is more, this study's final conceptual framework includes institutional theory to deepen the understanding of the academic regime transition. Third, the chosen research design and Multicriteria Mapping approach are explained in detail. The results give the outcomes of the Multicriteria Mapping analysis, where the most important and striking results are provided by comparing the different interpretations of all stakeholder types. Finally, the discussion supports the outcomes by providing a broad reflection and final answer on the study's research question, including the theoretical implications, managerial and policy implications, limitations, and suggestions for future research.

2. Theory

This research does not look into the performance of different policy options but tries to capture the contextual reality with its messy, subjective appraisals. Studying the actual or expected performance of individual policy options would not do justice to the complex nature of the 'societal impact of science' issue. As the latest turn in academic missions is only just emerging, there is little experience about what directions are even feasible within university systems with all their routines, constraints, and ambitions. At this stage, in order to make sense of the problem and its possible ways forward, one must understand the issue and the complex context in which the stakeholders operate.

For this reason, this study on university systems in transition applies a combination of a multi-level perspective and institutional theory. The multi-level perspective serves to understand the relevant dynamics of the academic change on a meta-level, while the institutional theory defines the universities' institutional context and what to consider when aiming for congruence, normative support and cultural alignment for a move towards a 'science for society'. The final performance and legitimacy of a university policy option are dependent on the stakeholders' beliefs and implications related to the institutional context. This section explains the theoretical framework step by step.

2.1 The broadening definition of science impact

To find an answer to the research question, understanding what is meant by a shift towards 'science for society' and how it adds upon the first, second, and third mission of universities is essential. The third mission was introduced by Etzkowitz (1998), observing that universities were undergoing a 'second revolution' by incorporating economic and social development. Not only do universities have the first and second mission of education and research, but also take on an entrepreneurial role focusing on the capitalization of knowledge, where the aim is to improve environmental and economic performance (Etzkowitz, 1998). Though many universities have tried to adopt this entrepreneurial character, researchers state that a linear model of knowledge production with direct economic profit should not be the primary goal: economic productivity should be the by-product of teaching and research (Spaapen & van Drooge, 2011). Moreover, due to the pressing global and local societal problems, a move beyond the entrepreneurial university is needed: *"A broader and more ambitious function […]: that of a societal transformer and co-creator"* (Trencher et al., 2013, p.152).

This more ambitious function aims at making an impact in a much less narrow way (Trencher et al., 2013). Van de Burgwal, Dias, and Claassen (2017) provide a useful framework of the broad societal impact of academic knowledge. The authors state that different forms of academic knowledge production result in different forms of knowledge exchange and knowledge use. Each form of societal impact of knowledge targets different societal groups: the scientific community, civil society, industry or government. With this, the nature of the impact can range from impact on science to society's wellbeing, delivered by different academic activities. Broadly speaking, one can identify two forms of science impact of research: scientific impact that refers to achieving recognition within the science community, while societal impact refers to providing research contributions to the current and/or future societal needs outside academia (e.g. social, environmental, economic, and others) (D'Este et al., 2018). A recent corresponding Dutch definition of societal impact of research by the Royal Netherlands Academy of Arts and Sciences is:

"*The contribution in the short- and long-term of scientific research to change or development in societal sectors and societal challenges. Examples of these societal sectors are the economy, culture, public governance, and healthcare. Examples of societal challenges are issues such as climate change, immigration, quality of life, living environment, the rules of law and safety."* (KNAW, 2018, p.8)

Corresponding to this definition, the Dutch knowledge institute Rathenau Instituut, suggests a definition of the process needed to achieve societal impact of academic research, also known as 'valorization'. Van Drooge and de Jong (2015, p.1), state that, in essence:

- *Valorization is a process;*
- *Valorization concerns societal impact in the broad sense, including economic impact;*
- *Valorization is possible in all different disciplines;*
- *Valorization has many different appearances.*

Moreover, it is more than a process of *"knowledge, skills, and cash' […] It is an (interactive) process and no linear process."* (van Drooge & de Jong, 2015, p. 11)

The fact that the definition of science impact broadens, also means that academia should open up and transfer towards a 'dynamic model of knowledge production', and therefore be more entrepreneurial, engaged and responsive to stakeholders' needs that are nonacademic (D'Este et al., 2018; van den Akker & Spaapen, 2017).

Nevertheless, *how* to accomplish a shift towards an academic regime that generates more value for society? Academic institutions like universities have the potential to achieve societal impact in society, but due to established processes around knowledge dissemination, publication culture, the internal management around science, review and reward systems, funding mechanisms and values on science impact, fully grasping this potential is hindered (Whitmer et al., 2010). Putting it differently, the current academic regime is *locked-in* due to a set of interdependent institutional structures as well as organizational routines.

2.2 'Science for society' as a transition

A theoretical framework that helps understanding lock-in - and overcoming it – is that of transition management theory. In earlier research of Schneidewind and Augenstein (2012), Stephens and Graham (2010) and Trencher et al. (2013) transition management theory is already applied to describe the tensions and interactions of the established academic cultures and norms related to sustainability initiatives. It has been speculated that the theoretical framework is not only useful for sectoral analysis or sub-systems but also organization-level analysis (Stephens & Graham, 2010). Rotmans, Kemp and van Asselt (2001) explain how to apply the concept of transitions to different aggregation levels, including companies, sectors, regions, or countries. Within each of these aggregations, one could always think in terms of more than one domain, and different actors within different scale levels involved (for example, micro, meso, and macro levels). This view fits well to the multi-level perspective (MLP) describing changes in socio-technical regimes. Rotmans, Kemp and van Asselt (2001) state: "*Although this taxonomy originates from the study of changes in a function-oriented system related to energy and food production, it also appears useful for the analysis of broad social changes."* (p.19).

Likewise, the underlying theoretical underpinnings of the MLP are used *here* to explain the tensions between the traditional academic institutions and initiatives related to the societal impact of universities' academic knowledge. Applying transition management provides a framework to understand the dynamics of the universities' structural change and the interface between organizational change and social changes related to societal impact of science. The MLP explains that the transition of a regime results from the interplay between three levels (Geels, 2002). On the macro-level, tensions (economic, social, environmental, cultural) from the landscape can create windows of opportunity in the regime. On the micro-level, niche developments are creating tensions on the regime by innovative activities that are divergent from the regime. Due to these tensions, on the meso-level, the established regime suffers from internal issues. In order to deal with these issues, the regime can make a shift by overcoming regime barriers and utilizing regime opportunities (Geels, 2002). The tensions and contrasts between these levels are essential to understand when aiming to grasp the implications of the new societal impact function of the university (Trencher et al., 2013)

In accordance with the view of Stephens and Graham (2010), putting the MLP into the perspective of the research problem here, we can observe the following situation (see Figure 1). The regime refers to the *academic institutions (related to a university)* and their current established set of rules and

regulations, for example, how they reward academics or other policies they pursue. The overarching landscape relates to ministerial policies and the recent (political) debates on the societal impact of academia (in the emerging wide-spread attention for societal challenges related to climate, health, and food). Corresponding landscape pressures manifest themselves, for instance, as changes in (and attitudes towards) the accessibility of science, the politics of funding for education, research, and valorization or other society-wide conditions impacting the decisions within universities. Lastly, the niche developments are those actors within the academic system that experiment with innovative activities or behaviors not aligned with the current established regime. Examples are the Science in Transition movement or innovative societal impact research projects.

We can observe that from both the landscape *and* the niches, there are tensions, putting pressure on the academic regime to change. In these early cases of transition, the regime mostly has an inhibiting role (Rotmans et al., 2001). The academic regime can shift to an enabling role by aligning with the landscape developments and provide space for niche developments to flourish. However, this 'opening up' of the academic regime is easier said than done. The multi-level perspective serves well as a meta-framework but ignores the critical issues of agency of the actors in the regime (Andrews-Speed, 2016) and cultural heterogeneity (Stephens & Graham, 2010). The latter is crucial for understanding the transition dynamics of the regime (Fuenfschilling & Truffer, 2014). Several authors recognized this and used institutionalism systematically to analyze regimes (Andrews-Speed, 2016; Fuenfschilling & Truffer, 2014; Geels, 2004) For this reason; this research applies institutional theory to deepen the understanding of the different aspects of this university regime transition.

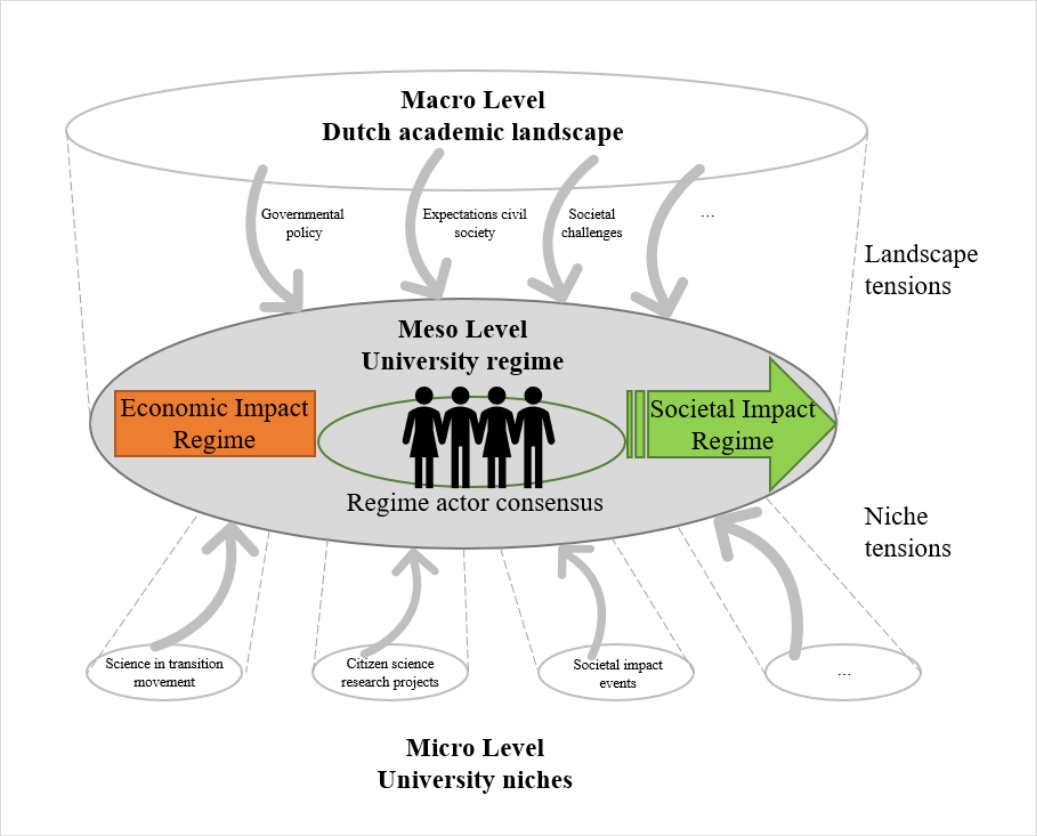

Figure 1: Conceptual meta-framework of the university transition from the theoretical underpinnings of MLP

2.3 The university regime through institutional theory

According to Fuenfschilling and Truffer (2016) "*The main challenges for a transition are to overcome the rigidities and path-dependencies of already existing, highly institutionalized systems structure and to build up new, more sustainable ones."* (p.774). They argue that institutional theory offers valuable

insights for understanding regime shifts within the MLP since the structural influences are a core aspect of institutional theory. By identifying the institution's degree of institutionalization and the current institutional logics, one can understand the core structure and the related issues for transitions to occur within the university regime. Both are useful to position 'science in society' as a transition.

For the first concept, Fuenfschilling and Truffer (2016) mention that there are three degrees of institutionalization: habitualization, objectification, and sedimentation. If an institution is normative and taken for granted, the institution is in the degree of sedimentation. Looking at the university system, this is the case for the first, second, and third missions of universities: education, research, and commercialization. Though recently, due to pressures from the landscape and the niches, the third mission is transforming in that of *co-creation for societal impact: a societal transformer* (Trencher et al., 2013). This broader interpretation of the third mission is still under development, and therefore in the objectification degree: although the importance of societal impact is growing, universities still struggle to achieve societal impact of academic research. In the objectification degree, the consensus on the *value* of the new institutional structure grows, but the *adoption* of the organization of this structure still needs much institutional work like making alliances or mobilizing resources (Fuenfschilling & Truffer, 2014).

So, by observing these different degrees of institutionalization of the third mission, one can identify two institutional logics in the university regime (see Table 1). Fuenfschilling and Truffer (2016) define the institutional logics as the *"deep-structural rules that coordinate and guide actor's perceptions and actions"* (p.774): they provide an *institutional context* influencing the actors. The first and older logic, referred to here as 'linear impact logic', focuses on the economic development of scientific knowledge. This logic, based on a linear model of production of knowledge (van den Akker & Spaapen, 2017), mainly applies a closed innovation model and short- to mid-term timeframes and has specialized scientific knowledge and technological innovations as the chief drivers (Trencher et al., 2013).

The second and newer form of institutional logic, in contrast, may be labeled as 'societal impact logic'. This institutional logic focuses on the societal impact of knowledge and societal transformations, is based on an open innovation model, co-creation and mid- to long-term research timeframes. The chief drivers are not only technological innovation but also social innovation, environmental transformations, and transdisciplinary mutual learning (Trencher et al., 2013). In a transition process, new field logic challenges a dominant one, where *institutional work* of actors lead to (de-)institutionalization processes of elements in both the old and new logic (Fuenfschilling & Truffer, 2014). With some university policies and practices, the new institutional logic will encounter tensions with the incumbent policies and practices of the old institutional logic, but it is also possible that the activities from the older and current logic can be compatible with the new institutional logic (Trencher et al., 2013).

Table 1: Overview of institutional logic characteristics of universities based on Trencher et al. (2013)

Characteristics	**'Linear Impact Logic'**	**'Societal Impact Logic'**
Function	Technology transfer	Co-creation for societal challenge
Objective	Economic development	Societal transformation
Approach	Closed-model innovation, device-oriented, linear value chain	Open-model innovation, stakeholder-oriented, system value chain
Time Frame	Short- to mid-term	Mid- to long-term
Chief Drivers	Specialized knowledge, technological innovation	Multi-disciplinary knowledge, technological and social innovation, environmental transformations

Related to the context of institutional logics, Scott (2008) was the first to identify three crucial institutional pillars that help to describe institutional pressures. The institutional context belonging to the institutional logic is based on the *regulative, normative and cognitive elements* (Scott, 2008). The regulative pillar stands for the legal systems within the university, that constrain and regulate behavior.

The university sets rules, monitors them, and carries out sanctioning activities in the form of rewards or punishments. Scott (2008) compares the regulative pillar as the 'rules of the game'. The second pillar, the normative pillar, is not about the rules and regulations, but about the values and norms within the institution. For example, these explain the preferred and desirable way how 'things should be done' in a particular role, and that they can empower and enable social action. Lastly, the cognitive pillar explains the 'shared mindset' that is leading within the institutional context: the institutional patterns of thinking, feeling, and acting of the institutional actors. Changing the institutional culture also means that institutional actors should change their cognitive beliefs. Table 2 shows examples of the institutional pillars for the two earlier defined university institutional logics.

Table 2: Examples of the three institutional pillars of the university regime based on Scott (2008)

Institutional Pillar	'Linear Impact Logic'	'Societal Impact Logic'
Regulative Pillar	Reward and incentive structures based on the number of publications; Time for education, and research in the researchers' core tasks and commercialization in the researchers' own time.	Rewards and incentive structures based on publications as well as societal impact activities; Time for education, research, and impact activities within the researchers' core tasks.
Normative Pillar	Research programs based upon faculty research groups; Linear Knowledge Transfer practices	Research programs focused on societal challenges/strategic themes; Boundary Spanning practices
Cognitive Pillar	The 'shared mindset' that universities should act like an 'entrepreneurial university' and 'linear production of knowledge'; Common knowledge about making an economic impact	The 'shared mindset' that universities should act like a 'transformative university' and 'dynamic production of knowledge'; Common knowledge about making a societal impact, co-creation, boundary spanning.

Each of the institutional pillars forms a basis for institutional legitimacy: *"a condition reflecting congruence with rules or laws, normative support, or cultural alignment"* (Palthe, 2014, p.61). Together, the pillars sustain each other, where the institutional arrangements combine the processes in the different pillars together (Scott, 2008). When institutional actors are dissatisfied with the current regulative, normative, and cognitive pillars, it is a drive for institutional change (Palthe, 2014). Accordingly, these actors want to move towards an adapted set of institutional pillars. Since one of the key components of the regime is the 'policy paradigm' (Andrews-Speed, 2016), the actors within the university can insert policies that set the new conditions of the institutional context (Lawrence & Suddaby, 2006). However, Palthe (2014) also emphasizes that institutional change is influenced by *change capacity* and *change resistance*. A university can insert a new policy paradigm, but without sufficient resources and with high resistance due to the university circumstances, this might not lead to successful institutional change (see Figure 2).

Concluding, it is likely that at this stage of transition, two institutional logics with different degrees of institutionalization exist within the university regime. The old institutional logic is in the degree of sedimentation, but the new institutional logic is still in development, and thereby in the degree of objectification. In order to facilitate an institutional change towards the new institutional logic, a shift within the institutional pillars is a prerequisite. Universities can provide a supportive structure for the new institutional logic by policy options focusing on the three institutional pillars. However, it is crucial to take into account the university's change capacity and change resistance. For example, what is the right balance in enabling societal impact and keeping the scientific objectivity and academic freedom of researchers? Merging the above theoretical insights results in a final conceptual framework, as shown in Figure 2. The framework serves as a basis to understand the complex university context determining the performance of university policy options for institutional change towards a 'societal impact logic' in the university regime.

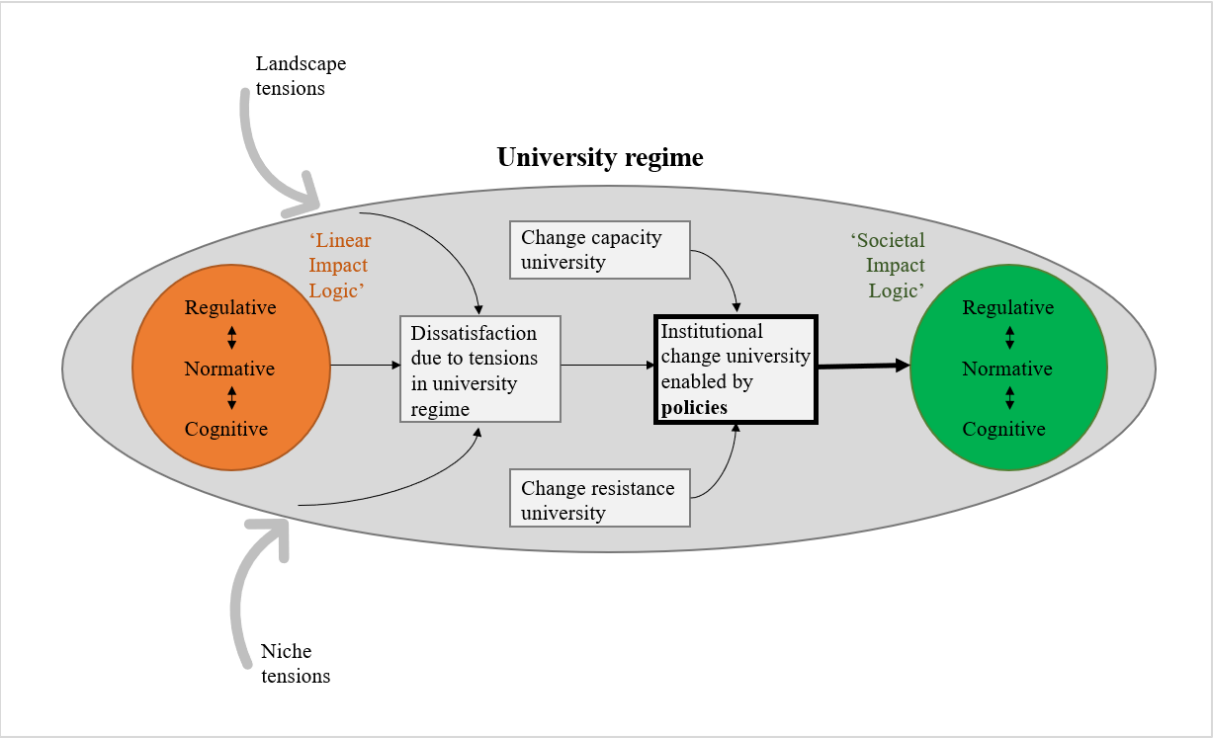

Figure 2: Conceptual framework of institutional change enabled by policies within the university regime

2.4 The focus of the university policies for societal impact

From Figure 2, we understand that university policy actions could enable universities to achieve the institutional change towards a 'societal impact logic'. In Appendix A, a brief explanation of the actors involved with these policy actions, and what policy instruments could be used to set up these policies. To make a shift towards an institution that embraces societal impact, the role of actors has enormous prominence. Institutional research also recognizes this.

Fuenfschilling and Truffer (2016) explain that for institutional change, institutional work is essential. Referring to Lawrence and Suddaby (2006), the authors explain that different forms of institutional work achieve either the creation, or maintenance, or disruption of institutions. Combined, they categorize these different forms of institutional work into two forms of institutional practices: (1) practices that aim at the mobilization of resources, and (2) practices that target the (de-)construction of rationales. Similarly, from a transitions theory perspective, Smith et al. (2005) recognize that there are two main leverages for guiding a regime change in a desirable direction: (1) the articulation of the selection pressures form the niches and landscape, and (2) the coordination of resources available inside and outside the regime in order to build the regimes' adaptive capacity. Equivalent to these two main lines of practices, recent literature explains the necessary actions in order to transfer towards a 'dynamic model of knowledge production'.

Recent literature emphasizes the need for a culture change within the university system and therefore, practices that aim for the (de-)construction of rationales and the articulation of the selection pressures around the university system. According to Sarewitz (2016), academia should 'manage research' in a different way: not telling scientists what they should do but making sure that the research makes sense for a greater *societal goal*. Science should not just be made accountable for scientists, but also the *end-users*. It means that research should be "*small, collaborative, and focused not on producing good science for its own sake, nor on making a profit, but on solving a problem."* (Sarewitz, 2016, p. 38). Sarewitz (2016) points out that instead of the thought that the very autonomy of scientists is needed to succeed, *direct engagement* with the real world is vital for science to be impactful. Similarly, van den Akker and Spaapen (2017) point out the need for '*productive interactions'*: mechanisms by which research will

lead to relevant societal applications. The authors recommend that universities should fully embrace societal impact on the research agenda, seek ways to create a supportive culture for co-production of knowledge and find ways to engage with other stakeholders across the broad spectrum of the research ecosystem (van den Akker & Spaapen, 2017).

Besides influencing the process of (de-)institutionalization by the means of communication, universities need tangible resources like political power, money, knowledge, skilled personnel to achieve change (Fuenfschilling & Truffer, 2016). The right resources will 'facilitate' and enable actors within the university to work on the co-production of knowledge for a societal impact. These resources can come from both in- and outside the university system. A recent article by Saarela (2019) states that universities should provide scientists with sufficient time and training for participatory knowledge production. Moreover, the development of interaction practices and events and the utilization of communication mediators is recommended (Saarela, 2019). Other scholars (Wowk et al., 2017) also argue that academic institutions are not yet structured to strengthen the impact of research by facilitating co-production of knowledge. Wowk et al. (2017) provide academic institutes several recommendations to tackle this problem, for example: providing internal guidance on research collaboration, leveraging partnerships for collaboration and problem solving and offering incentives and improved reward structures. Similarly, Trencher et al. (2013) strive for the installation of earmarked research funds to signal university actors, rewarding societal impact efforts and other incentives structures fostering co-creation and transformative efforts for societal impact.

Likewise, multiple other scholars have explained that direct engagement with society and opening up the knowledge system is vital to gain more societal impact (Cornell et al., 2013; De Jong, 2015; Sarewitz, 2016; Whitmer et al., 2010). Their suggestions to contribute to this aim align with earlier mentioned practices. To give some examples: developing a fair evaluation system that balances between fundamental research and activities responding to societal needs; providing new and innovative information systems and technical support to access knowledge; enabling the sharing of experiences and expectations; developing differentiating career strategies with a clear task description; providing different funding mechanisms; providing skills training for engaging in complex and socially relevant issues; providing mentoring to guide researchers in societal impact projects; and developing innovative curricula.

All in all, the above sub-set of recommendations focuses on changing the dominant institutional structure of the regime (Loorbach, 2007). With this, the university policy options should aim to lift barriers and to create opportunities in the academic regime that makes it possible for a transition to happen. Herein, some policies are more focused on the regulative institutional pillar: for example, the incentives and reward structures for academic researchers. Others are more focused on the normative institutional pillar like the implication of shared definitions, utilization of communication mediators, or providing research agenda's embracing societal impact. The policies that aim for changing the 'shared mindset', the cognitive institutional pillar, are, for example, providing training for participatory knowledge production or enabling other supportive activities for an internal culture of co-creation. Although all policy actions seem very fruitful, it is crucial to keep in mind that not all actions are equally possible, probable, and legitimate (Fuenfschilling & Truffer, 2016).

2.5 Towards a legitimate solution

For a transition to succeed, the interaction between the developments at the different levels is needed (Rotmans et al., 2001). Not only does a transition concern different scale levels (multi-level), but also different actors (multi-actor). Applying the transition management literature to this academic challenge helps to identify the various complex mechanisms, by including different actors influencing the transition in many ways (Stephens & Graham, 2010). Similarly, Smith, Stirling and Berkhout (2005) state that: "*The legitimate authority to push change through, or the resources available to build consent, to raise informed dissent, or even to block change, will depend on power relations across the network*

of actors involved in a regime." (p.1508) For a regime to change, it is necessary to have the actors' commitment to the policies, because the commitment shows that the regime actors have the legitimate power to an agreed solution (Smith et al., 2005).

Concluding, by going back to the meta-framework in Figure 1, an important characteristic of the governance of regime transitions is the dissent on the ranking of means and solutions of the problem (Kemp et al, 2007). For example, there can be a lack of consensus on what university policies mean in day-to-day practices. Referring to the conceptual framework in Figure 2, there might be lack of change capacity for the shift towards the new institutional logic to occur or change resistance from institutional actors (aligning with the earlier mentioned necessary forms of institutional work by the institutional actors: the mobilization of resources and (de-)institutionalization of rationale for a transition to occur). For this reason, implementing effective university policies for regime transformation cannot be determined in isolation (Smith et al., 2005): different actors have different appraisals on the right solution due to the visions they have on future regime transformations.

Additionally, in the context of institutional change, Suchman (1995) explains that organizational transformation lies in the concept of *legitimacy*. Suchman (1995) defines legitimacy as a social construct that reflects the congruence between behaviors in the shared beliefs and entity of a social group. Going even a step further, Suchman (1995) states that institutional researchers view legitimacy as a virtual synonym of institutionalization. Earlier theoretical explanation on the degree of institutionalization shows that the societal impact logic is in the degree of objectification. Similar to the framework of Wänzenbock et al. (2018), this institutional degree is comparable to a situation with a converging societal problem (where the problem has emerged and is close to being broadly accepted) but whereby the solution to the issue is not (yet) fully converging. In this situation, there are possibly different views on how to solve the challenge or achieve the transformation, resulting in a low output legitimacy (Wänzenbock et al., 2018). To increase the output legitimacy, one must lower the actors' contestation: making sure that the different actors agree on the best way to tackle the problem.

Still, how do we create a mutual understanding of the different actors about the regime transition and the best courses of actions to do so? According to Smith et al. (2005) *"The challenge here is to analyze how contrasting visions and expectations enroll actors into coalitions of support, come to define their interests, and shape the way they seek to respond to the selection pressures or shape their collective adaptive capacity"* (p. 1503). To do this, Smith et al. (2005) state that when innovating regimes, it is useful to open up the search directions and redefine the assessment of the performance of the regime. The latter is the challenge that this research aims to tackle. In the end, it is vital to know how to enable the involved actors to be aware of the impact of the academic processes, so that their actions can be better aligned to achieve a successful transition towards 'science for society'.

3. Methods

This research aims to understand the complex issue of valuing university policies for transitioning towards an academic system with an increased societal impact of academic research. A characteristic of complex issues is that multiple options can potentially serve as a solution. Moreover, in order to choose a legitimate solution, it is essential to consider different perspectives of stakeholders involved at different levels. For this reason, the goal of this research is to explore contrasting perspectives on the possible ways forward.

A suitable method used for this research aim is the Multicriteria Mapping (MCM) method, because "*the aim of MCM is to explore the ways in which different pictures of strategic choices change, depending on the view that is taken – not to prescribe a particular 'best choice'*" (Coburn & Stirling, 2016, p.9). The outcomes of MCM should be – how Coburn and Stirling (2016) call this – seen as a *'servant rather than the master'.* Compared to other multicriteria methods, the MCM method is used as a *heuristic* for 'mapping' assumptions, rather dan prescribing them (Stirling & Mayer, 2001): "*exploring the main dimensions of a risk issue and establishing their key characteristics, relationships, and relative importance"* (p.532). The approach makes explicit that for making a final decision, gaining legitimacy from multiple actors is key. The results of the MCM analysis help researchers and university policymakers to get a better understanding of the (shared or contested) preference on university policy options, and what to take into consideration – for example, issues with change capacity and the change resistance - when implementing them.

3.1 Multicriteria Mapping

MCM is a unique combination of a qualitative and quantitative method and known for its participatory analysis. In this way, the MCM method tries to span the divide between narrow quantitative methods that might overlook wider considerations and the broad qualitative methods that include diverse perspectives but have difficulties with focusing on the context of the issue (Lobstein et al., 2006). The MCM research process (See Figure 3) consists of four steps: (1) selecting policy options that might solve the complex issue, (2) selecting stakeholders to be interviewed, (3) conducting interviews with the MCM Tool and (4) proving results by data analysis.

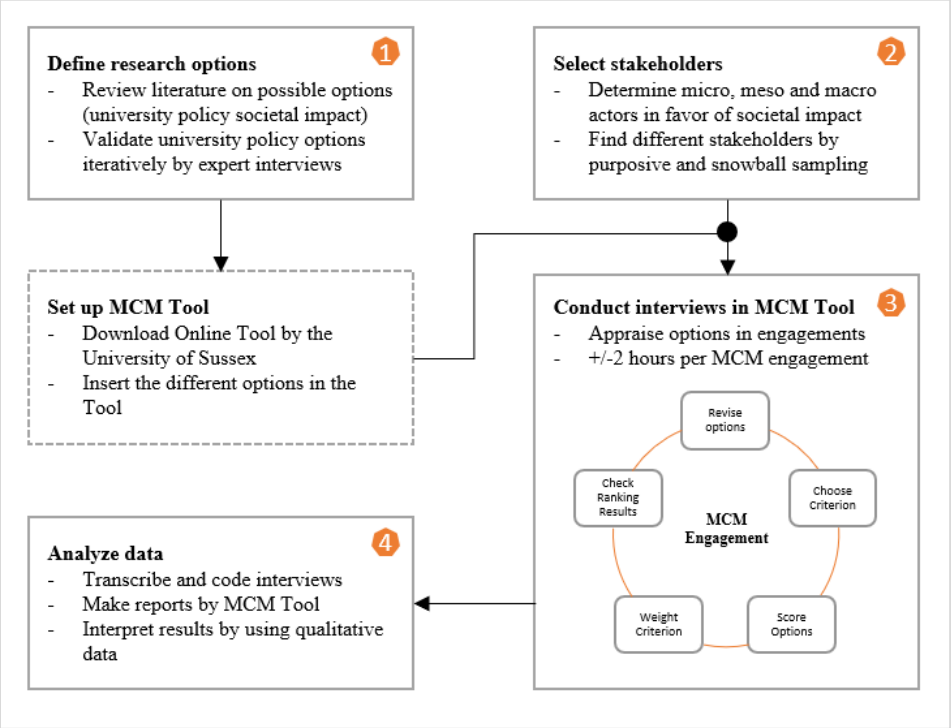

Figure 3: Schematic figure of the overall research steps of multicriteria mapping

The open-source web-based '*MCM tool'*[1], developed by the University of Sussex in 2015, assists in assembling both quantitative performance scores for options as qualitative comments of a stakeholder upon these scores. As a result, MCM provides not only information on the perceived performance of the different options, but also the associated framings, contexts, and reasons (Coburn & Stirling, 2016). Moreover, by using the 'MCM tool*',* both the interviews as the analysis are based upon a structured basis, which allows for transparency and comparability of the outcomes.

3.2 Case and stakeholder selection

By purposive *and* snowball sampling, 46 different stakeholders from the macro-, meso- and micro-level from Utrecht University and public organizations related to Dutch higher education in the Netherlands were contacted for potential MCM interviews. Utrecht University is established in 1636 and therefore one of the oldest universities in the Netherlands. The latter makes that the cognitive, normative and regulative aspects of the institution have a long-rooted history, making the transition of this university challenging and therefore interesting for this research. Moreover, Utrecht University has a variability of faculties which include alpha-, gamma- and beta-science. Al three have different possible forms of societal impact, and probably also different views on how to enable societal impact. These different stakeholder identities are important to include in the 'broad envelope' of relevant views.

The aim was to select key stakeholders who were, or should be, actively involved in the university policy issue. These stakeholders are of relevance in opening up the deliberative debate about the university policy options to ensure societal impact of academic research. The selection of the stakeholders is based upon their role in the university or public organization related to the university. The decision to only interview stakeholders that are *in favor of enhancing societal impact* of academic research – and therefore *to exclude stakeholders that are not* - is based on the fact that these stakeholders have the most experience with the opportunities and barriers within the university system to enable societal impact of academic research. Namely, the aim of this research is: when decided to enhance societal impact of academic research, what policy option would work best according to the stakeholders involved? Furthermore, according to the experts interviewed and (grey) literature research before the MCM interviews, universities should not expect that every researcher will provide equal societal impact. According to their opinion, universities should at least aim to enable those researchers that have the motivation to do so, of whom a few are also interviewed in this study.

In total, from the 46 contacted stakeholders, 24 interviews were executed to cover the different perspectives. For the scope of this research, two types of university regime stakeholders were interviewed within Utrecht University (excluding the faculty of medicine, UMC Utrecht): (1) seven (academic) faculty staff from all faculties of the university, involved with societal impact and/or knowledge valorization of the faculty, and (2) six support staff employees working from a university-wide level involved with the university's valorization practices and policy activities. Because of the UMC's academic institutional environment and its valorization processes, this faculty is excluded. Due to the inclusion of the hospital on the university campus, they differ from the 'normal' research faculties within Utrecht University.

Moreover, four micro-level stakeholders were interviewed since they have to deal with the effects of the university policies in day-to-day practices. These niche actors are the researchers within the different faculties of Utrecht University that are active with societal impact of academic research. Lastly, to take into account the macro-level perspective on this policy issue, seven landscape actors from Dutch public organizations related to the university regime were interviewed. These national organizations include the Association of Universities in the Netherlands (VSNU), Rathenau Instituut, Startup Delta, Ministry of Education, Culture and Science (OC&W), and Netherlands Organization for Scientific Research (NWO), the Advisory Council for Science, Technology and Innovation (AWTI), and the Taskforce for

[1] See for more information: https://www.multicriteriamapping.com/

Applied Research (SIA). Finally, from the above 24 stakeholders, 22 interviewees agreed to engage in the MCM process. Table 3 provides an overview of the 22 interviewed stakeholders and their role.

Table 3: Overview of all 22 interviewees agreed to engage in MCM interviews

Interviewee NR	MLP Level	Stakeholder type	Organization	Role Stakeholder	Sampling
1	Macro/ Landscape	Employees national public organization	VSNU	University policy advisor for Finance, Research and Valorisation (KTO)	Purposive
2	Macro/ Landscape	Employees national public organization	AWTI	Two senior policy advisors around science, technology and innovation	Purposive
3	Macro/ Landscape	Employees national public organization	StartupDelta	Employee Commercial and Breakthrough Technologies Lead	Snowball
4	Macro/ Landscape	Employees national public organization	Rathenau Instituut	Senior researcher on the organization and evaluation of societal impact	Snowball
5	Macro/ Landscape	Employees national public organization	NWO	Program officer department society, industry, and sustainability with focus area in valorization	Purposive
6	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Policy advisor and valorization officer Research Support Office Faculty of Social Sciences	Snowball
7	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Business developer within the Faculty of Veterinary Sciences	Snowball
8	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Management Coordinator and advisor societal impact within the Faculty of Geosciences	Purposive
9	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Policy advisor for impact and valorization Faculty of Humanities	Snowball
10	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Valorization Officer for public-private partnerships, contracts, and impact for Faculty of Science	Snowball
11	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Vice-dean and professor and operational management for Faculty of Science	Snowball
12	Meso/ Regime	(Academic) faculty staff societal impact	Utrecht University	Vice-dean Impact and Professor Faculty of Law, Economics, and Governance	Snowball
13	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	(Previous) Head of research and valorization policy UU	Purposive
14	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	Senior Business Developer Utrecht Holdings (and previous program leader of the 'Valorisatie Programma')	Purposive
15	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	Projectmanager Utrecht University Centre for Entrepreneurship	Purposive
16	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	Policy advisor for research and valorization strategy, and administrative information provision	Purposive
17	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	Projectmanager Public Engagement Team Utrecht University	Snowball
18	Meso/ Regime	Support staff (university-wide) societal impact	Utrecht University	Head of Research affairs of Academic Affairs' Office	Snowball
19	Micro/ Niche	Academics societal impact projects	Utrecht University	Researcher within the Faculty of Humanities	Snowball

20	Micro/ Niche	Academics societal impact projects	Utrecht University	Researcher and lecturer within the Faculty of Science	Purposive
21	Micro/ Niche	Academics societal impact projects	Utrecht University	Professor Geosciences within the Faculty of Geosciences	Snowball
22	Micro/ Niche	Academics societal impact projects	Utrecht University	Assistant professor within the Faculty of Humanities and Veterinary Sciences	Snowball

3.3 Data collection

Before any MCM interview took place, a selection of the *university policy options* was made based on intensive and careful (grey) literature review and five expert interviews. The experts were selected by purposive and snowball sampling. Every expert is (or was) actively involved with university policies and societal impact of academic research. These include: a societal impact expert working for the Royal Netherlands Academy of Arts and Sciences; a researcher that promoted on the topic societal impact of academic research; an employee working on embedding societal impact of academic research within the university system for many years; two university policy employees for societal impact and valorization and a university business developer from a Utrecht University science park.

As mentioned in the theory section, each of the *core university policy options* could influence one or more of the university's institutional pillars towards a 'societal impact logic'. The process of defining the core university policy option featured an iterative process based on a combination of open and closed coding. Based on recent literature on the societal impact of academia and transition management theory, the first list of possible university policy options was developed. After every expert interview, the list was reviewed and adapted, until a point of saturation was reached. The final list of university policy options was also discussed in multiple peer-review sessions. The list of university policy options is not exhaustive; instead, it identifies an important range of possible university policy action which is open for discussion and other inputs from MCM interviewees.

Besides the core options, *one discretionary option* was defined. Since all core policy options have a strong pro-active focus, one indirectly takes a normative starting point that 'something has to be done'. If a stakeholder felt that it is necessary to include a policy option that is not pro-active, he or she could add this discretionary option to the appraisal. This discretionary option assumes that universities could 'wait-and-see' and thereby not pro-actively implement policies into the university regime. Table 4 provides an overview of all core and discretionary options. As introduced in section 2.4, each university policy has either a more regulative, normative, or cognitive character.

Table 4: (Non-exhaustive list of) core and discretionary university policy options for MCM engagements

Option Name	Description	Option Type
Human resources (HR) policy impact	**Instrument –** Differentiation possibilities within academic human resources policy: the researcher can decide to have social impact activities considered as one of his or her core tasks, rewards and further promotions. **Example –** Researchers can choose not only to be provided with time and appreciation on publications, but also on societal impact activities such as public engagement, valorization projects or co-creation around research using societal impact indicators. These indicators should fit the type of research. A university impact track and team science are examples of this. **Expected effects –** Due to the possible differentiation in tasks, rewards and promotion among researchers, it is expected that both 'scientific excellence' and 'societal impact' will be valued equally. In this way, a barrier is removed for researchers - who want to spend more time on the societal valorization of research - to do this.	**Core** Regulative

Earmarked resources for societal impact activities, experiments, and projects	**Instrument –** When offering earmarked resources, resources are made available to help and support (risky) societal impact projects in various phases of societal impact projects (beginning, middle, end) **Example –** These resources can, for example, be given to public engagement projects, projects with no suitable financing model, or projects in which support is challenging to find due to the complexity of the collaboration and/or revenue model. **Expected effects –** By setting aside academic resources for these projects every year, the barrier for researchers to continue working on the valorization of high-risk projects with a potentially high impact is reduced.	**Core** Regulative and/or Normative
Facilitating boundary spanning intern and extern	**Instrument –** Facilitating 'boundary spanning' activities, a network, open events and open meeting places in and around the university campus to enable connections with knowledge seekers (for example, other knowledge institutions, public authorities, companies, government, civil society). **Example –** Examples include setting up strategic partnerships, knowledge ecosystems, organizing public debates, facilitating open living labs, shared meeting rooms, and shared academic workplaces. **Expected effects –** By facilitating boundary spanning and brokering of knowledge more openly, the university manages to guarantee an 'open innovation' ecosystem, so that the demand for knowledge and the supply of knowledge can find each other more easily.	**Core** Normative
Impact skills training and coaching	**Instrument –** Offering societal impact training and coaching programs for (Ph.D.) researchers within the university. **Example –** These training courses include, for example, project management, communication skills, stakeholder mapping, personal profiling, or other knowledge and skills that are required to execute societal impact projects. **Expected effects –** Using the training and coaching programs, researchers will possess the right knowledge and skills to increase societal impact of their research.	**Core** Cognitive
Communication policy	**Instrument –** Setting up an internal and external communication policy that values the social impact of research. **Example –** This could include the formulation of strategic research themes/communities around societal challenges, the appointment of societal impact projects/communities on website and/or newsletters, internal (non-financial) prizes for societal impact projects, communication support for impact projects et cetera. **Expected Effects –** By expressing the appreciation on societal impact of research both internally and externally in daily practice, a culture will emerge within the university that will take this seriously and appreciate it. Also, it is clear to the outside world what the university's societal profile and activities are.	**Core** Normative and/or Cognitive
Information provision policy	**Instrument –** Improving internal university information provision for researchers about the process around societal impact of research, funding mechanisms, and other administrative requirements for societal valorization. **Example –** Internal information provision for both sharing and gathering knowledge through internal information systems and knowledge management systems (for example an active intranet or other IT systems) around possible financial instruments, the social valorization process and administrative requirements for social impact projects. **Expected effects –** When information about the necessities and possibilities regarding societal impact of research is easy to find and can be easily shared, the threshold for researchers to delve into this will be lowered. Quickly obtaining the correct information saves time. Also, an excellent internal information system contributes to the "open innovation culture", because knowledge can be easily shared internally.	**Core** Cognitive and/or Normative

Innovative curriculum development	**Instrument –** The development of educational components in the curriculum of bachelor's and/or master's programs that take societal impact into account. **Example –** These components within the curriculum, for example, take multi-and trans-disciplinary cooperation, social valorization, citizen science, team science, open science et cetera as a starting point. Students can, for example, be assessed on the impact narrative or productive interactions. **Expected effects –** By implementing innovative curriculum developments that focus on societal impact, students (and therefore, possibly researchers) are trained to achieve societal impact of academic research. Also, the policy option will indirectly affect the direction and impact outcomes of research.	**Core** Cognitive
'Wait-and-see'	**Instrument –** No pro-active policy action but responding on institutional changes in the academic landscape and niches. A 'laissez-faire' approach. **Example –** For example, the university chooses to 'wait-and-see' and reacts on the actions of the government, other national public parties, niche initiatives, et cetera. **Expected effects –** No direct institutional university policy action towards societal impact of academic research.	**Discretionary** (optional)

The collection of qualitative and quantitative data was carried out by face-to-face MCM interviews. Each interview lasted around two hours, to be able to collect both the quantitative data as well as detailed qualitative data. During these interviews, the core (and, if preferred, discretionary and/or additional) university policy options were appraised by the stakeholders using an online MCM tool. The qualitative MCM data is in the form of criteria to appraise the options chosen by the interviewee, notes entered in the MCM software, notes extracted from the interviews' transcripts and (when occurred) provided documents by the interviewee to support his or her statements. The quantitative MCM data is in the form of the scores given to the university policy options based on the chosen criteria, and the weights provided to each criterion. To be prepared for the interview, each stakeholder received an interview briefing document with a description of the university policy options and the MCM interview process. Herein, it is explained that the MCM engagement is based on five steps (see Figure 3):

(1) *Revising options.* Every interviewee was asked to comment on the university policy options. For example, do they feel they are acceptable or not acceptable? Were there any uncertainties about the description and meaning of the university policy options? Also, the interviewee was free to decide to include the discretionary option or to add additional university policy options to the list that in their opinion were missing.

(2) *Defining criteria.* The criteria are the different factors the interviewee included to appraise the university policy options. It could also be the case that the interviewee used a 'principle' instead of a criterion, for example, when assessing ethical aspects of a university policy options. Interviewees were asked to determine three to five criteria that they felt are the most important to assess the performance of the university policy options with. Choosing three to five criteria challenged the interviewee to come up with the criteria that are most important from the interviewee's perspective. Furthermore, it also avoids fatigue during the interview and makes it is possible to finish an interview within two hours.

(3) *Assessing performance scores.* Hereafter, the interviewee was asked to determine, one-by-one, the relative performance of every university policy option under the selected criteria by providing an optimistic and pessimistic performance score between 0 and 100. Here, 0 represents that the policy option has a relatively low performance under the criterion, where 100 represents a high performance. The MCM allows the interviewee to give a range rather than a single number to include uncertainty about the relative performance. The latter can also be due to the sensitivity or variability of the performance of a university policy option under a criterion. Within the range, a realistic worst-case

scenario of the university policy option determines the lowest performance score and the expected best-case scenario determines the highest performance score. When it did not feel right for the interviewee to come up with a worst- or best-case scenario, the interviewee could also choose to give the same score to both scenarios.

(4) *Assigning weights to criteria.* To determine the final performance of each policy option, the interviewee had to assign the relative importance to the criteria based on a score between 0 and 100.

(5) *Reviewing final ranks.* Lastly, in the MCM tool, the final ranks were shown and discussed with the interviewee. The final ranking is based on the weighted sum of the scores and weights. If the final ranks did not match with the view of the interviewee, he or she could decide to adapt the scores and/or weights.

The MCM Tool guided the interviewees through the process of appraising the different policy options in a step-by-step and iterative manner. In de end, *all* interviewees appraised *all the core options*. Figure 4 presents a schematic overview of the final data structure. For every decision made during these steps, qualitative information based on the interviewee's opinion was included in a text box in the online MCM Tool after the interview. This step was essential and took most effort and time since this information is leading to the interpretation of the results. When allowed by the interviewee, the interview was also recorded to ensure accuracy of the interpretation of the results.

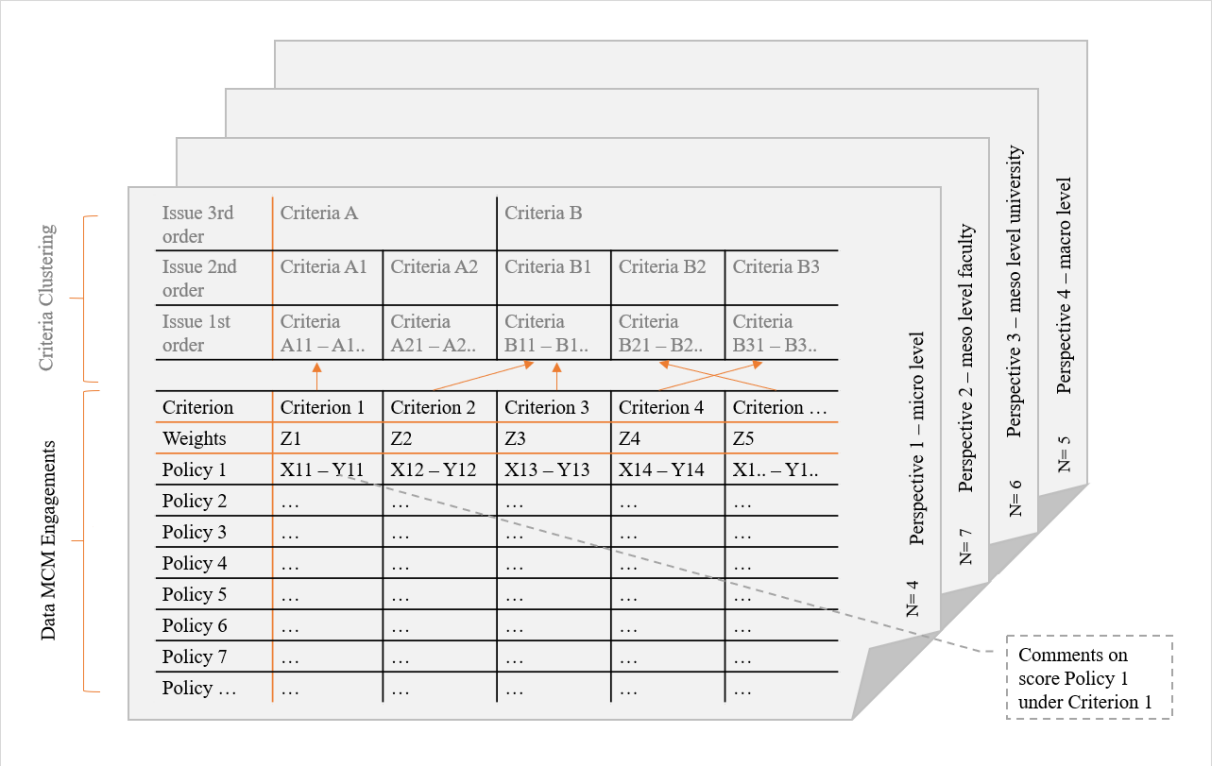

Figure 4: Schematic overview of final data structure based on MCM interviews

Note that interviewees were attended on the fact that no one policy option have to be 'the holy grail' to enhance societal impact of academic research. The results of the MCM appraisals are more about breaking open the value judgments on the policy options: what are the most important criteria that must be taken into account to determine the value judgment of a policy option? Are there certain preconditions for a university policy option to perform well? Perhaps a combination of the policy options? The Results section provides the outcomes of the appraisal according to the stakeholders.

4. Results

Based on the interviews, different analyses are executed, combining quantitative and qualitative data. In this way, the MCM analyses help to explore the different pictures of the situation. The quantitative data is mainly used for observing weights of issues, ranks, ambiguities, and uncertainties related to the scoring of options, taking in to account the pessimistic and optimistic scores associated with the individual options under specific criteria (Coburn & Stirling, 2016). The final interpretation of the engagement results from including qualitative information given by all the interviewees, which is more important than the quantitative information (Coburn & Stirling, 2016).

Besides saving qualitative data in the MCM Tool, all interviews are also transcribed and coded into an Excel file based on closed and open coding. In this Excel file, each quote belongs to one or more elements (a perspective, criterion and policy option) and/or topics related to that element (either a definition of one of the elements, or clarifications on the scoring of policy options and weights of criteria or on the overall context of the interview).

As presented in Table 3, four perspectives from different 'transition levels' are adopted to compare the criteria (weights) and university policy ranks: researchers involved in societal impact projects (micro-level), (academic) faculty support staff (meso-level), support staff at university level (meso-level) and national organizations outside the university (macro-level). Not only is it possible to gain insight into the performance of the university policy options under the different perspectives and criteria; more importantly, we gain a better understanding of the reasons *why* interviewees appraised specific options more favorable or unfavorable. Before discussing the final rank scores and their interpretations, section 4.1, 4.2, and 4.3 provide findings related to the MCM engagements and the options and criteria used in the appraisals.

4.1 The MCM engagements

As explained in the Methods section, from the 24 interviews, a total of 22 MCM engagements took place. One interviewee from the Ministry of Education, Culture, and Science (OC&W) did not feel comfortable to engage in the MCM process, where the interview focused the possible university policy options and their contextual issues without scoring in the MCM Tool. Moreover, another interview with stakeholders from the Taskforce for Applied Research (SIA) aimed to discuss the role of the university and the university of applies sciences in enhancing societal impact. Just like the five expert interviews prior to the MCM engagements, both interviews were still of help in interpreting the overall results of MCM outcomes from a macro perspective.

Of all MCM engagements, it was most challenging to find enough niche actors for the MCM engagements. Many niche actors mentioned to lack time to engage in an interview of two hours. Also, some potential niche actor interviewees canceled on the last moment due to time shortage. This observation emphasizes the result that human resources policy – providing the potential to appreciate societal impact and provide sufficient time for societal impact - is indeed necessary.

From the interviewees that did agree to engage in the MCM interview, the majority prepared well by reading the interview briefing document and defining (possible) additional policy options and criteria. A few, as we can put it, did not 'do their homework' before the MCM interview took place. In these cases, sufficient time was reserved explaining the process in detail and to answer fundamental questions of the interviewee. When needed, the interviewees were guided in defining criteria by providing criteria 'thought bubbles': a list of possible criteria to inspire the interviewees.

Most engagements lasted two hours, some one and a half hours, and some even two and a half hours. All MCM interviewees agreed on recording the interview during the engagement. Recording the interviews saved much time to make notes during the interview, whereby it was possible to focus entirely on the appraisal of the interviewee and guiding the interviewee where needed. During engagements, most interviewees had no trouble in working with the MCM Tool, felt comfortable with the process of

appraising the university policy options, and liked the method used in the engagement. Some interviewees also mentioned that it was very challenging to think so practically and detailed about the performance of the policy options, but either way found it very useful to do so. One interviewee stated to dislike the MCM method and found it confusing.

4.2 Options used in appraisal

After an interview introduction, every interviewee was asked to comment on the core policy options used in the appraisal. All interviewees indicated to feel comfortable with the provided core policy options and also recognized them as possible university policy actions. Three interviewees mentioned that they would aggregate or define the options a bit differently (interviewee 12, 2 and 5), but were happy to use these policy options in their appraisal after reviewing them. Remarkably, the majority of interviewees emphasized the relevance of all university policy options in enhancing and enabling societal impact of academic research. Therefore, in most cases, the question was not only what policy option functioned good or bad, but also how (the interplay of) options could be best set up and implemented to enhance societal impact of academic research. A quote from an interviewee supports this:

"As I said: this is the case of AND this AND this AND that [pointing to different policy options]. I think that you should pay attention to all the policy options. […] And when I look at all the options, I think that the element of 'societal impact inherent into the research itself' is very important to achieve success. Also, many aspects around that can help to facilitate that like HR, communication and so on." (Interviewee 13, Meso-level university). Section 4.4.5 provides more explanation on this matter.

Besides the above, a few comments from the majority of the interviewees clarify some nuances on a couple of the core university policy options. First, some interviewees stated to find the distinction between communication policy and information policy quite fuzzy. They emphasized that these options are connected and coherent. Others found the distinction between these two policies evident since communication policy is more about 'spreading the word' about societal impact within the university and outside the university, whereby information provision is more related to the university's data management systems and knowledge management systems.

Second, the majority of interviewees found that the communication policy option was very broad and could be implemented on different levels within the university. For example: on the university level providing a societal impact vision, strategic impact themes, a societal impact reference framework, and best practices, but also on a faculty level by providing communication support for societal impact projects. The communication could, for example, be spread by websites, newsletters, social media or presentations.

Third, everyone agreed on the fact that appreciating and rewarding societal impact within HR policy should not be obligatory for *all* researchers. Instead, HR policy should allow for diversity in researcher's roles within the faculties. Thereby, some researchers will be more involved with societal impact of research, while others are more involved with education or fundamental research. However, many interviewees still advocate to include societal impact elements in all yearly HR-evaluations to make societal impact a debatable and essential topic for every researcher. Also, interviewees discussed the way of measurement in this policy option: should we change the assessment indicators structurally for the whole university, or should we assess every researcher individually case-by-case and thereby provide more flexibility in the recent assessment indicators?

Fourth, interviewees provided examples for the many policy variabilities of earmarked resources. Earmarked resources could range from 'providing a whole back-office for societal impact within every faculty' to 'providing yearly seed money to potentially impactful research projects'. Plus, the destination of the earmarked resources (goal, theme, timeline, target audience, phase of the impact project) can vary. These variabilities of implementation play a role in the final performance scores.

Fifth, the majority of the interviewees emphasized that facilitating boundary spanning should not only focus on 'push' mechanisms (what can we do with our knowledge in the society?) but also 'pull' mechanisms (what does the society want from us?). Therefore, it is crucial to not only think from 'a university perspective' but from a broader societal perspective, embedding the university in a knowledge ecosystem.

4.2.1 Discretionary option

Besides the core university policy options, four interviewees (interviewees 10 and 6 from the meso faculty level, and interviewees 4 and 1 from macro-level) chose to include the discretionary option in the appraisal. One of the reasons to include the discretionary option was that societal impact of academic research is considered to be 'not that bad' under current policy circumstances:

"It really is not that things are going really bad at the university. So, you know, it is also… a lot is happening, people are involved." (Interviewee 6, Meso-level faculty).

"Yes, we will include this option… because it is also an option. [..] The assumption is that there should be more attention for it [societal impact], but that does not necessarily mean that you have to do this. So, it could also be that it will come naturally, that it is what we are here for as a university. It is the third core task, we train all those students…, so we have much impact." (Interviewee 4, Macro-level).

Also, two interviewees found it interesting to compare the discretionary option with the core options:

"I think it is interesting because the question is also whether everyone thinks you should do something… so I would like to see the difference compared 'to do nothing'" (Interviewee 10, Meso-level faculty).

The majority, consisting of the other 18 interviewees, chose to exclude the discretionary option. Generally, interviewees felt that universities are obliged to pro-actively enhance societal impact:

"Namely: it is not just because many researchers want to do it [achieving societal impact] and the fact that it also makes your work more enjoyable (I personally think). But it is also because people are left with questions and expectations. Students… but also society demands something from us. We have to be more open, we also have to make more connections, and ultimately that is also a question of legitimacy. You just have to play a new role in society." (Interviewee 12, Meso-level faculty).

"Yes, that is a difficult question. Because in the end, you get a bit stuck with the discussion that we also have with scientists: why are we here for as a faculty, or as a university? […] Why should we as a university want societal impact? […] And we also do research, and preferably research that benefits the society as well. Because hey, in the end, it's all tax money. And I think yes… in the end, we as a university have to, we are obliged to make societal impact." (Interviewee 8, Meso-level faculty).

Interviewees also considered pro-active policy action necessary, since making a societal impact involves a complicated process and, without pro-active action, will stall in the long run:

"I think that quite a lot has to be done. Let me put it this way: our project happened 100% on our own initiative without almost any support from the university. So, it worked, but it could have been much better if there was more policy for it." (Interviewee 19, Micro-level).

"No… if you do not do anything, I think it will go wrong. Looking at the university as a whole, it [societal impact] will disappear slowly. It is not yet in the DNA of many people yet, so if you let that go, then it [societal impact] will just disappear." (Interviewee 21, Micro-level).

"Action must absolutely be taken. If you don't do anything, then you will be helplessly behind the recent developments. So, 'no action' is not an option. I think if you are that type of researcher that could say: 'well, leave me alone and let me do my job', fine. But if you ask me my vision on university-wide policy… no, then you definitely have to do something." (Interviewee 15, Meso-level university).

4.2.2 Additional options

After discussing the core options and discretionary option, interviewees were asked if they felt any university policy options were missing. In total, nine interviewees suggested eleven additional university policy options, provided in an overview in Table 5. Besides the suggestion to professionalize the university's Knowledge Transfer Offices and to map the current societal impact activities of researchers, three additional options could aggregate to financial incentives on several university levels (individual, faculty, and university-wide). The remaining seven additional options focus on enhancing leadership, defining management tasks and providing vision within the university to successfully embed societal impact within its culture, practices, and regulations. Interviewees suggested doing this by assigning the right leaders (or professionals) within the faculty and/or department with a specific impact task. Cleary, the interviewees felt that monetary incentives and assigned leadership are two crucial elements to successfully move towards a university system that embraces societal impact of academic research.

Table 5: Overview of additional options used in MCM engagements

Inter-viewee #	**Option Name**	**Features**	**Supporting Quote**	**Option Aggregation**
7	Spin-off investment	As a university, support spin-offs when the idea is not yet in the market by becoming a shareholder	*"For an idea or a unique finding that is not yet in the market. As a university, help to invest in the company and become a shareholder of the company. For example, by using Utrecht Holdings."*	*Financial incentives*
20	Financial incentive faculties and departments	Provide faculties and departments with specific 'societal impact' resources that they must use to support societal impact within the faculty and/or department	*"Why would departments target their efforts on impact while no reward belongs to that? You can only spend the money once. It means that you should cut the amount of UD's and provide less education. They are never going to do that. So, you need a financial incentive. Not only on the level of the department but also on the faculty. […] This is one of the points that are not arranged well in this university."*	*Financial incentives*
15	Personal financial incentive	A personal revolving fund for impact activities	*"A policy option where you could think about is the financial support of researchers who do societal impact activities. Stimulate them to earn their own money they can also use for their follow-up research or projects."*	*Financial incentives*
14	Assign Research Support Office (RSO) Impact	Assign responsibility to the RSO to support and enable impact	*"The RSO is now mainly focused on support for the research part, but not on impact. But that research support goes way beyond grant support […] And many solutions do not have a revenue model but can be very valuable. And there is little expertise and capacity to coach these people [..] RSO's do not have enough understanding of this matter. […] This sometimes asks for specific expertise and 1-on-1 coaching."*	*Leadership and management*
20	New hiring policy university leaders	Initiate cultural change by hiring different university leaders	*"The other thing is, especially in this department, that the culture is not settled to make an impact. […] I observe that the culture is determined by the professors. Not to be disrespectful, but they come from a different time and work in a different way. So, you have to do cultural change at all levels. Certainly, with the people who… it has to be controlled from above."*	*Leadership and management*
3	Educating university leaders	Educate recent leaders within university departments	*"I notice that the university board needs a lot of input, and how they need to deal with this. […] But you still see a few administrators there who have knowledge about impact. I*	*Leadership and management*

			think if we help to develop a vision there, this can have a lot of impact."	
8	Appointing impact directors	Assign impact leaders within the different university departments	*"Assign leaders within the different departments. This is not only on the university level but also on the level of faculties – besides research and education, someone has to be responsible for the impact of the faculty."*	*Leadership and management*
21	Appointing impact directors	Assign faculty impact directors next to research, education and management assistants	*"I look at my own faculty, and what you have is an institute board of directors. You have director research, education, and a management assistant. But you don't have a director societal impact. And we could try that. […] Right now, these portfolios are being snowed under."*	*Leadership and management*
18	Appoint key person(s) impact	Assign vice deans impact in every faculty	*"I think that is an enormous statement because you know, you always have a dean and vice dean for research…"*	*Leadership and Management*
11	Define impact framework university	Define a reference system where impact becomes measurable	*"The question is now: what is good and what is bad? […] Everyone feels that we have to make more societal impact. But what kind of impact? And when do we know that we are doing the right thing? You have to have some sort of reference system, something measurable from which you can deduce whether it is right or not."*	*Leadership and management*
7	Mapping additional functions	Identify the additional functions of researchers in an evaluation interview	*"A lot has already been done, so start with mapping the societal impact activities from the university well. Then, take this into account in the evaluation interview in Human Resources. […] Creating consciousness."*	*Other professionali-zation*
3	Professionalization Knowledge transfer office (KTO)	Professionalize KTO's by focusing on long-term societal value and getting the knowledge towards the market	*"This is now a priority for the Ministry of Education – one of the few that they have. And therein it should focus namely on developing the long-term societal value, so, look more into how to get the knowledge to the market instead of focusing on the fact that you earn money with – for example-licenses."*	*Other professionali-zation*

4.3 Criteria used in appraisal

Summing up, 85 criteria and one principle[2] were used to appraise the university policy options. Before raking and interpreting the appraisals, the different types of criteria defined by the interviewees to appraise the university policy options are clustered to '*issues'* by the help of open coding. Three coding iterations took place before deciding on the final issue clusters. In each coding iteration, peer-review sessions provided feedback on the coding results. The final issue clusters consist of three aggregations: first-order, second-order, and third-order issues (see Figure 5).

In the first aggregation, the list of the 85 criteria and one principle aggregates in 20 first-order issues. The definition of the criteria provided by the interviewees is leading in determining this aggregation. For some criteria, the core definition of a criterion is – by any reason – fuzzy or unclear. For example, the necessary human capital within the university to successfully implement the policy options can be both interpreted as a *capacity issue*, but also a *financial issue.* To determine which issue fits best to this criterion, expressed nuances during the discussions and scoring of the university policy options helped

[2] The principle used is defined as 'step-by-step implementation' under the issue 'applicability'. The principle served as a 'filter' before scoring with all other criteria: if the policy option is considered unacceptable under the particular principle, this university policy is left out of appraisal. One principle was used in one MCM engagement, wherein all policy options turned out to be acceptable under the particular principle. Therefore, all university policy options were still included in this appraisal.

to elucidate the interviewee's interpretation of this criterion. The peer-review session in the coding iterations also assisted in this.

The second aggregation of the university policy options consists of five second-order issues: *expected organizational impact, expected external impact, practical feasibility, cultural feasibility and financial feasibility.* This issue aggregation was used in the MCM Tool to analyze the differences in university policy performance scores. Finally, the second-order issues divide into either *impact* or *feasibility issues* (third-order aggregation). Figure 5 provides the results of the criteria clustering, corresponding counts (also in percentages), and the second-order issues' definition.

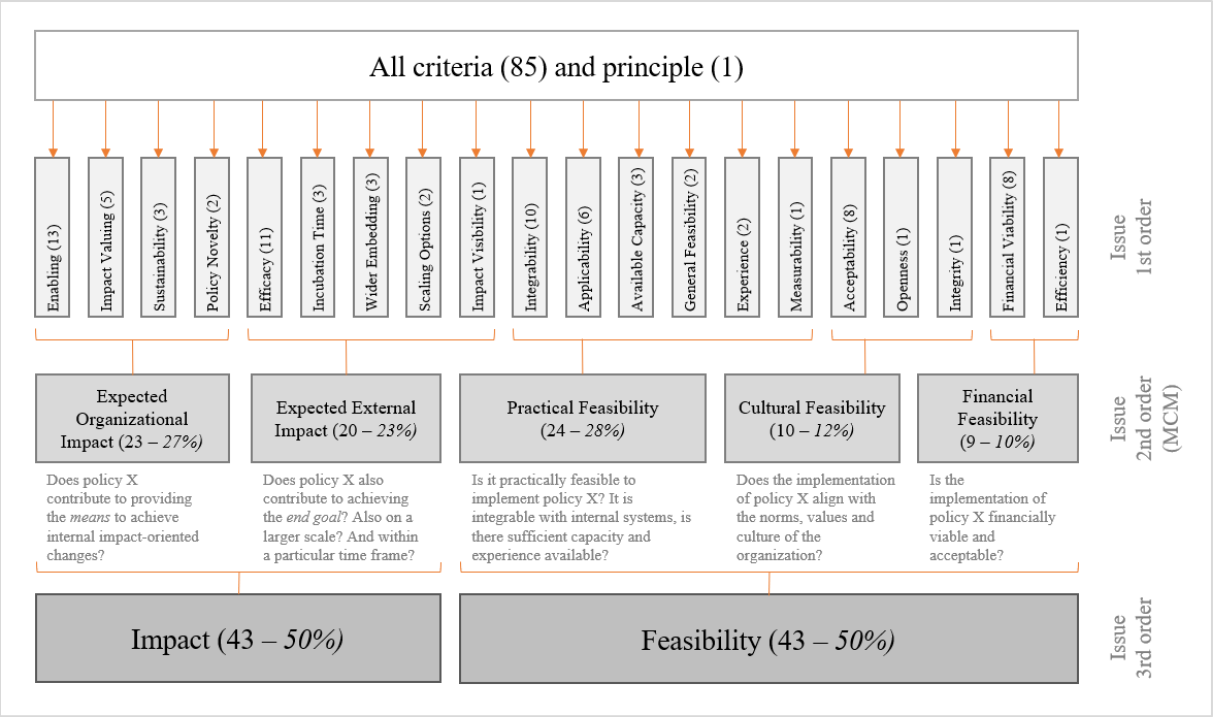

Figure 5: Criteria subdivision in issues based on open coding (including the count of the issues in every aggregation)

In the third-order issue aggregation, impact issues (50%) and feasibility issues (50%) were equally chosen to use in the appraisal. Within the second-order issue clustering, practical feasibility (28%), expected organizational impact (27%) and expected external impact (23%) were mainly used to appraise the policy options. Interviewees used cultural feasibility (12%) and financial feasibility (10%) less often. Looking at the first-order issues (that were used at least five times or more), we observe that within the expected organizational impact issue, 'enabling' and 'impact valuing' criteria often occur. These two first-order issues were used to determine the policy options' potential to enable researchers in achieving societal impact, but also to what extent the policy options contribute to appreciating researchers involved in societal impact activities. Within the expected external impact issue, criteria related to 'efficacy' also occur often. Many interviewees aimed to score university policy options on their effectivity, and to what extent the options could provide a broader contribution to societal impact.

Within the practical feasibility issue, the 'integrability' and 'applicability' were used most often during appraisal. Many interviewees found it relevant to determine to what extent a new and improved policy option could integrate with and apply to the university's current practicalities. Last, concerning the cultural and financial feasibility issues, criteria related to the 'acceptability' and 'financial viability' of university policy options often apply. A couple of interviewees felt that the academic acceptability on policy reforms could be determining factor in the final perceived performance of a university policy option. Also, a few interviewees felt that financial risks should not be ignored since universities already have to deal with financial shortages in education and research.

Referring to the theoretical framework presented in section 2.3, all criteria have a direct or indirect linkage to the *change capacity* and/or *change resistance* concepts influencing institutional change. The optimistic and pessimistic scores of an interviewee during appraisal tell something about the potential resistance or needed and/or available capacity of a university policy option under a particular criterion. For example: is the university policy option acceptable, useful and sufficiently novel? However, also, is the university policy option practically, financially, and culturally feasible? Although the concepts of *change resistance* and *change capacity* have an (in)direct link to the criteria used in appraisal, it was nonetheless challenging to use them as third-order issues for the issue clustering. Since many criteria could potentially subdivide in both change resistance as change capacity, this subdivision offered insufficient distinction for the used criteria. Therefore, open coding was applied to find an issue clustering fitting well to the content of the criteria used in the appraisal.

4.3.1 Criteria weights

After inserting the second-order issue cluster in the MCM Tool, weight reports show the relative importance of the second-order issues. The chart from the weight report (see Figure 6) displays the range of weights attached to the different issues by the participants. On the vertical axis, the chart displays the issues that have been used in the appraisal of the policy options by the participants for that perspective. On the horizontal axis, the chart displays a scale from 0 to 100 to present the value of weights for each issue. The mean value (orange line) of the weights is determined by taking the average of the normalized weights of the particular participants that have used criteria in their appraisal belonging to that particular issue. For each issue, the count of the participants that have included that particular issue is thereby indicated with '*n*=...'. Note that one participant could have used multiple criteria belonging to the same issue. The grey lines in the chart show the ranges between the highest and lowest weights of all criteria (belonging to that particular issue) from a particular participant.

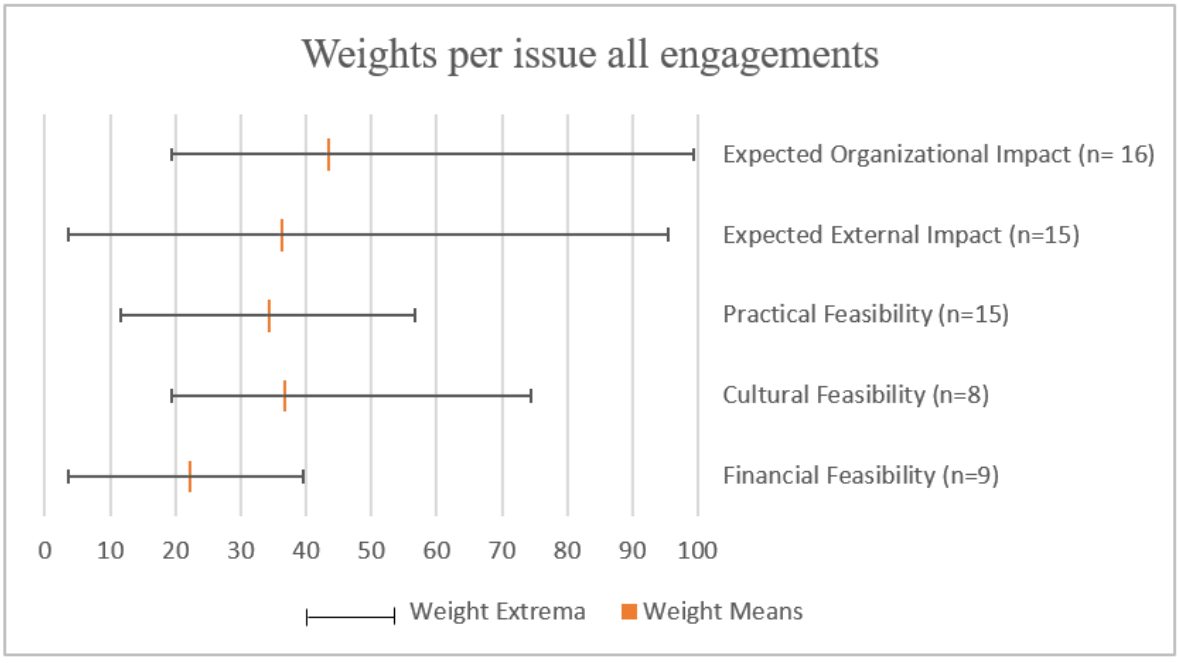

Figure 6: Weights per second-order issue, aggregated for all 22 MCM engagements

Aggregated for all interviewees (see Figure 6), the expected organizational impact has the highest relative importance. Also, one of the weight extrema ranges, for expected organizational impact, has a value of 100. The latter shows that there are (one or more) interviewees who choose only to include criteria belonging to the issue of expected organization impact, summed up to a weight of 100. The high weights of expected organizational impact align with the comments of the interviewees: to successfully enhance societal impact of academic research, the university policy options *should* in some way

sustainably enable (and motivate) the researchers and support staff to do so. Namely, in the end, the researchers are those actors determining the activity and success in achieving societal impact of academic research. Providing the right support, appreciation, and other enabling conditions are therefore considered to be crucial.

After the expected organizational impact, the weights of expected external impact, practical feasibility, and cultural feasibility issues follow with an almost equal relative importance. Besides providing enabling conditions on the organizational level, the final effectivity (including its long-term effects, scalability, visibility, etcetera) of university policy options are essential. Complementary, many interviewees emphasized one should not overlook the practical and cultural requirements when implementing potentially effective policy. A few quotes support this observation:

"*Human capital is important because these types of policy options really rely on the people who do it [executing and implementing the policy option]. You cannot do the project without people with passion and people with motivation for societal impact. If you don't have people who want to support this and see the value of societal impact, it is not going to work out to implement these solutions."* (Interviewee 19, Micro-level)

"*So, people say: when there is a motivation, there is also a way to the solution', but yeah, if there is no social support for it… and it is not executable… you also have to be able to execute it."* (Interviewee 18, Meso-level university)

"So, effectiveness is important, but the rest is more or less the same and quite close to each other. […] Because, I know that at a university, without support, it can still be practicable, but the overall political system is so unmanageable… that makes it really difficult." (Interviewee 15, Meso-level university)

At last, financial feasibility has the lowest relative importance. Interviewees also emphasized that financial risks should not be 'leading' in deciding on the performance of university policy options. For example, interviewees acknowledged that although investments in societal impact projects could lead to a financial loss on the short-term (for example by publishing fewer academic publications), it also has to possibility to have a high return on investment in the long-term. Therefore, financial risks are considered to be worth the effort and could also be dealt with creatively, with the help of external parties.

When comparing the issue weights between perspectives, other findings stand. These are explained in the following paragraphs supported by charts A, B, C and D in Figure 7.

Third-order issue 'impact'

The expected organizational impact is generally rated with higher relative importance. For both the micro-level interviewees as well as the meso-level interviewees (university-wide perspective) *expected organizational impact* is considered most important. Based on their own (negative) experiences, all micro-level interviewees made clear that university policy options should provide structural support to those researchers already active with societal impact but, as a bonus, could also be able to motivate those researchers that are not (yet) engaged with societal impact. The meso-level interviewees from a university perspective also emphasized this point, reasoning from a broader strategic perspective. For example, from a university perspective, a few interviewees emphasized the importance of their 'supporting' function for researchers. Therefore, the enabling conditions and support of university policy options are perceived to be a prerequisite to all other criteria.

As already pointed upon, the *expected external impact* of university policy options is also relatively important for all interviewees. Comparing the weights between perspectives shows that the macro-level perspective scored the weights of this issue relatively higher. The latter aligns with the observation that macro-level interviewees scored the university policy options form an external perspective, taking into account the developments and possible effects outside of the university. First-order issues like 'scaling options' and 'wider embedding' were used more often and weighted relatively high. Also, one macro-

level interviewee mentioned that a robust policy option should, in the end, contribute to a particular 'driving force'; initiating scalable movements and action for societal impact of academic research. The interviewee referred to this with the term 'flywheel effect'.

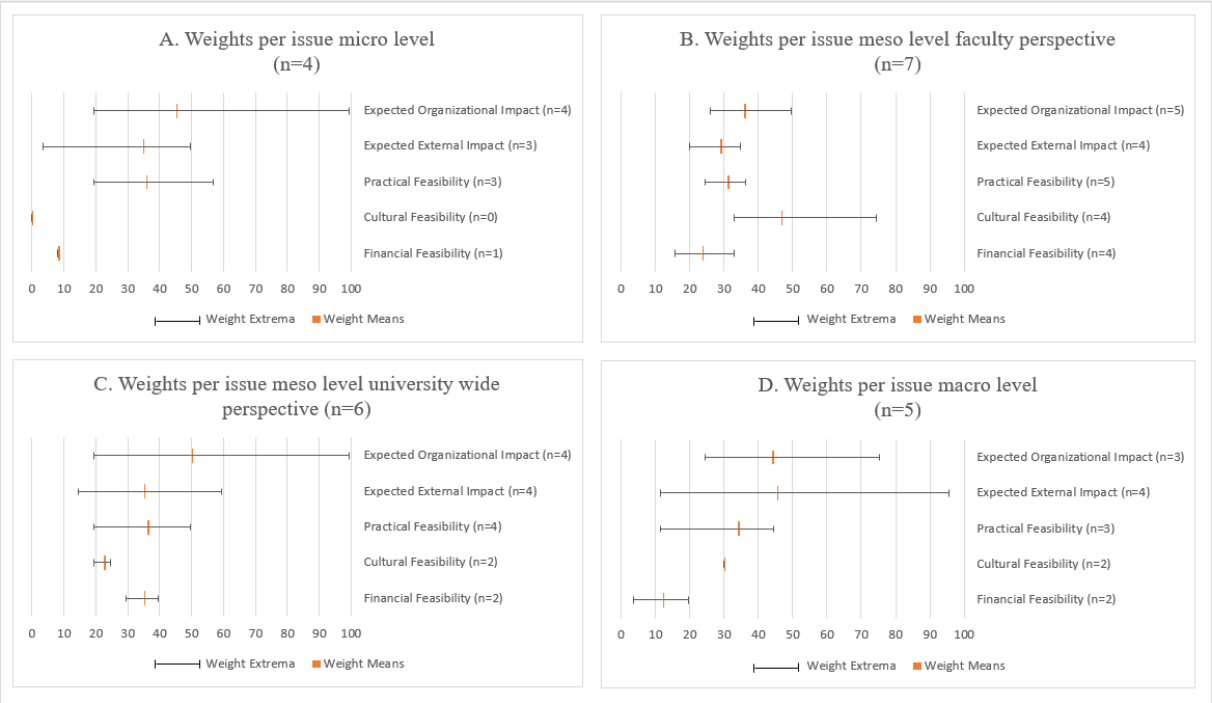

Figure 7: Weight means and extrema per issue per perspective

Third-order issue 'feasibility'

There are no striking differences (between perspectives) in the weights of the *practical feasibility issue*. On the contrary, *cultural feasibility issues* show variability in weight scores between perspectives. To begin with, micro-level interviewees *did not even use* cultural feasibility criteria in their appraisal: instead of worrying about the cultural acceptability and cultural fit of university policy options, they strived for an organizational cultural change. Therefore, instead of appraising the university policy options on their cultural feasibility, micro-level actors were more concerned with the policies' impact and practical feasibility.

However, meso-level actors did use cultural feasibility issues in their appraisal. From a faculty perspective, some interviewees provided cultural feasibility issues with relatively high weights. For example, faculty support staff interviewees showed to have full oversight of the faculty's overall day-to-day practicalities, culture, and systems. Aside from including the perspective of those researchers in favor of embedding societal impact in research processes (which most micro-level interviewees did), meso-level interviewees from a faculty perspective often *also* took into account the degree of support and acceptability on policy reform of other researchers and support staff within the faculty. When aiming to change the faculty's internal systems, faculty support staff emphasized that when implementing university policy options, once should take into account the internal cultural predominance and dilemma sensitivity related to these options.

Lastly, the *financial feasibility* issues have a relatively lower weight score for both micro-level as macro-level interviewees, but relatively higher weight scores for the meso-level interviewees. As became apparent during the interviews, meso-level interviews are more aware of – but also have more experience with - financial risks associated with the university policy options. For the financial feasibility issues used within micro and macro-level appraisals, some interviewees explained that universities should

creatively deal with monetary difficulties and, therefore, to put less weight on the potential financial risks. Therefore, the weight of this issue is lower for these two perspectives.

4.4 Mapping option performance

The rank reports visualize the scores of the appraisals for each university policy option based on the selected criteria by the interviewee(s). Both the MCM Tool and the Excel file (with coded quotes from the interviews) assisted in structurally comparing ranks and interpreting the results of all MCM engagements. Since not all interviewees chose to include the discretionary option or used (similar) additional policy options, the comparative analysis of the final ranks here only focuses on the *core options* (described in Table 4 in section 3.3).

Overall, interviewees mentioned that all the university policy options have the potential to enable or enhance societal impact of academic research by either improving current university policy or implementing new policy actions. While scoring the options, the aim of the engagement was thereby to identify the potential benefits and opportunities of a university policy option, and the potential pitfalls or difficulties coming across are when implementing them. During engagements, a few interviewees were very certain about the scores of a university policy options under a criterion and therefore felt more comfortable to score with very narrow ranges or without any ranges at all. However, most interviewees were less confident and therefore more comfortable in providing ranges consisting of diverging pessimistic and optimistic scores of the policy options under the criteria. Figure 8 provides the aggregated results of all performance scores (based on normalized rank scores between 0 and 100) of all MCM engagements and all criteria.

When looking at the mean scores aggregated over all engagements, *HR policy impact* has the highest mean performance score, followed by *earmarked resources*, *facilitating boundary spanning* and *impact training and coaching.* Said differently, these university policy options are considered to have direct benefits and also provide the needed supporting elements to enhance societal impact of academic research.

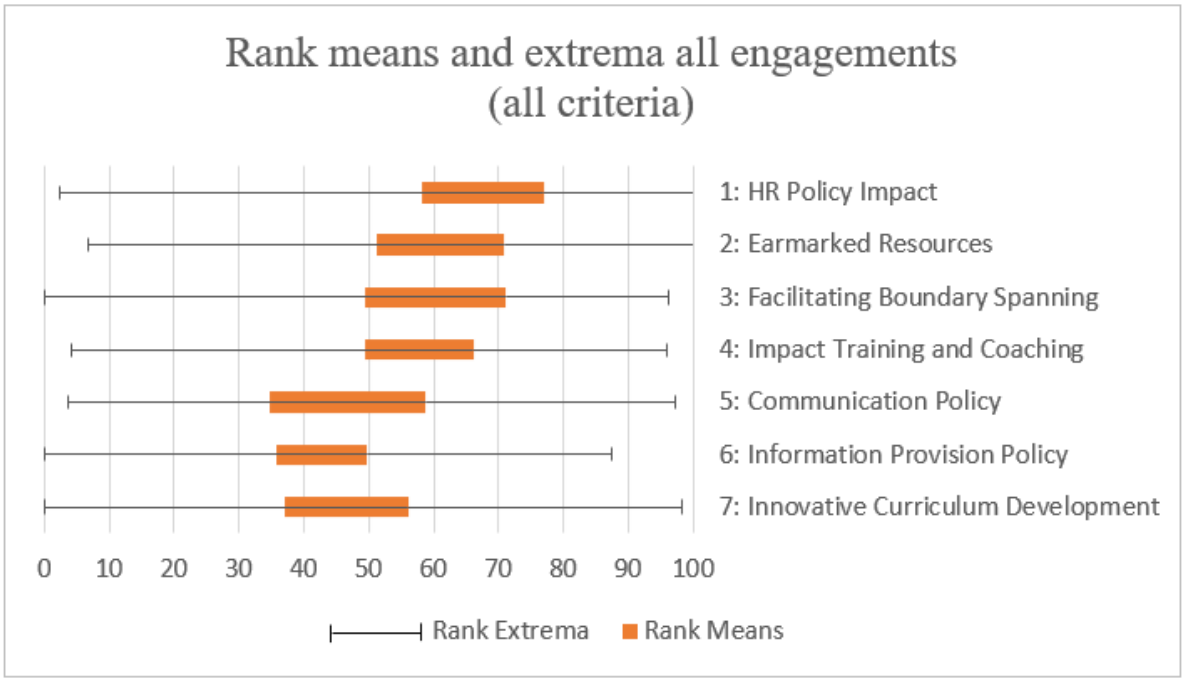

Figure 8: Rank means and extrema aggregated for all 22 MCM engagements

Communication policy, *information provision policy*, *and innovative curriculum development* have relatively lower performance scores, also with a pessimistic score below a 'neutral' score of 50. As

compared with the qualitative data of the interviews, these last three university policy options are considered to have potential downsides and pitfalls, whereby these policy options could potentially manifest themselves as a barrier. Also, compared to the first four university policy options, the potential impact (both external as organizational impact) of these last three options were perceived relatively lower.

To declare, communication policy is considered to be necessary and supportive of other policy options but does not have the power to be a 'changemaker' on its own compared to the first four policy options — the same accounts for information provision policy. Individually, both policies reflect that the university 'shows' and 'says' that societal impact is essential and necessary, but do not provide researchers with the supporting means to act on it accordingly. Moreover, for communication policy, interviewees expressed doubts about the cultural and practical feasibility. Right now, the communication department is considered to be very bureaucratic, with little flexibility and little understanding of societal impact. Therefore - besides effective communication on societal impact vision, strategy, and role models - did interviewees express doubts on the supporting value of the communication department towards researchers during societal impact projects and activities. Interviewees enforced the latter by addressing to have observed stiff collaboration between academics and the communication department so far. Also, for information provision policy interviewees expressed doubts if the university has the right capability to implement this successfully.

Last, innovative curriculum development is considered to be a necessary and effective policy option in the long-term but does have a lower performance on the short-term effects and has mixed expressions on its feasibility. The latter is also due to long-rooted cultural history and the perceived conservative nature of the university's education system. Besides these overall observations, it is tricky to make firm conclusions about the detailed information behind this chart, since the intervals of the rank means are not too different. Also, all scores of the university policy options have big extremes. For this reason, more detailed comparisons need to be made to understand the underlying patterns of consensus and disagreement.

4.4.1 Ranks per issue

To begin with, one could compare the rank reports under different issues. Striking differences, supporting the outcome of the overall ranks in Figure 8, occur between the two rank reports of the third-order issues (impact and feasibility). *Communication policy*, *information provision policy*, and *innovative curriculum development* have a relatively lower mean score on impact, which is also supporting by the first observations explained in section 4.4. On first sight, it looks like the overall mean scores of feasibility criteria are lower than the impact criteria of university policy options. This observation aligns with the interviewees' expression that institutional changes within universities are difficult because of its organizational complexity, bureaucratic character, and a long-rooted history of academic values, norms, and habits. Therefore, the implementation of all policy reforms has its difficulties.

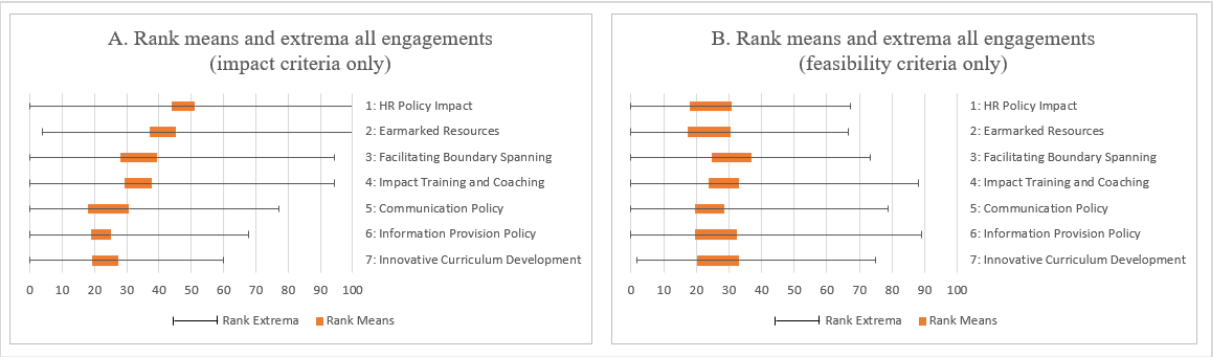

Figure 9: Rank means and extrema, aggregated for all 22 MCM engagements, per third-order issue

Under the impact issue in Figure 9A, *HR policy impact* and *earmarked resources* have relatively higher mean scores compared to the other university policy options. Providing time and appreciation for societal impact are considered to be very effective incentives for researchers to enhance societal impact. Second, earmarked resources provide additional support to do so. Besides, a shortage of research funding is also known as one of the more significant challenges of academia today. When comparing these scores with the rank means under the feasibility issue in Figure 9B, a big part of the rank mean of HR policy impact and earmarked resources are below 30. Although the impact of these two policy options is scored high, the interviewees scored these options relatively low on feasibility issues. In other words, the policies are believed to be (very) effective yet challenging to implement.

Although there are no extreme differences between rank means of university policy options under Figure 9B, interviewees perceived *facilitating boundary spanning* and *impact training and coaching* as relatively more feasible than the other options. Interviewees mentioned that universities already started experimenting a lot with facilitating boundary spanning and impact training and therefore are considered to have some experience with - and therefore little resistance against - both university policy options. Moreover, interviewees scored curriculum development with slightly higher feasibility. Although interviewees expressed themselves not always optimistic about the inclusion of societal impact activities in curricula, interviewees did touch upon the fact that this policy option is related to one of the universities' core tasks (education). Therefore, interviewees perceived innovative curriculum development for societal impact not as an easy task, but its feasibility is considered a little higher compared to HR policy or earmarked resources because of previous experiences.

4.4.2 Ranks per perspective

Next to comparing the ranks between issues, one could also compare ranks between perspectives. When observing all four charts in Figure 10, almost no rank means are below a score of 30. The only rank means that are below 30 are that of *improved information provision* and *innovative curriculum development* in the graph of the researchers at the micro-level (see Figure 10A). Generally, compared with the other perspectives, researchers from the micro-level strongly indicated that they felt that the *innovative curriculum development* and *improved information provision* would not provide the highest direct benefits (like appreciation, knowledge, time or money potentially do) for researchers. Moreover, according to interviewees, information provision could also accompany a higher administrative burden for academic researchers. Also, actively working on innovative curriculum development would costs the researchers much time, which they already lack.

Observing the university policy option with higher rank means, the adoption of *HR policy for societal impact* and the implementation of *earmarked resources for societal impact activities* are often in the top three in all four perspectives. As already clear from the previous rank charts, the adoption of *HR policy* is often considered as 'the missing element' and therefore as the often-prioritized university policy action needed to embed societal impact within the university system successfully. Also, interviewees made clear that financial incentives like earmarked resources (or other additional options) could be a good motivation for researchers to engage actively in societal impact activities, projects and experiments since there is currently a shortage of money for research projects.

However, earmarked resources do not have the highest rank mean scores in all perspectives. For example, meso-level (faculty staff) interviewees expressed the complexity of changing the destinations of faculty monetary resources. Within this meso-level perspective (faculty staff), *facilitating boundary spanning* has a relatively higher rank mean than earmarked resources, whereby interviewees expressed that this is a relatively complex task, and therefore perceive support for academics in this as necessary. Also, macro-level interviewees scored *facilitating boundary spanning* and *impact training and coaching* relatively higher, where impact training and coaching stands out. Funny is that micro-level interviewees – for whom the impact training and coaching is actually aimed at - did *not* provide *impact training and coaching* with the highest score. Although micro-level interviewees felt that impact training and

coaching could be useful, they expected the potential value of this university policy options to be relatively lower compared to macro-level interviewees.

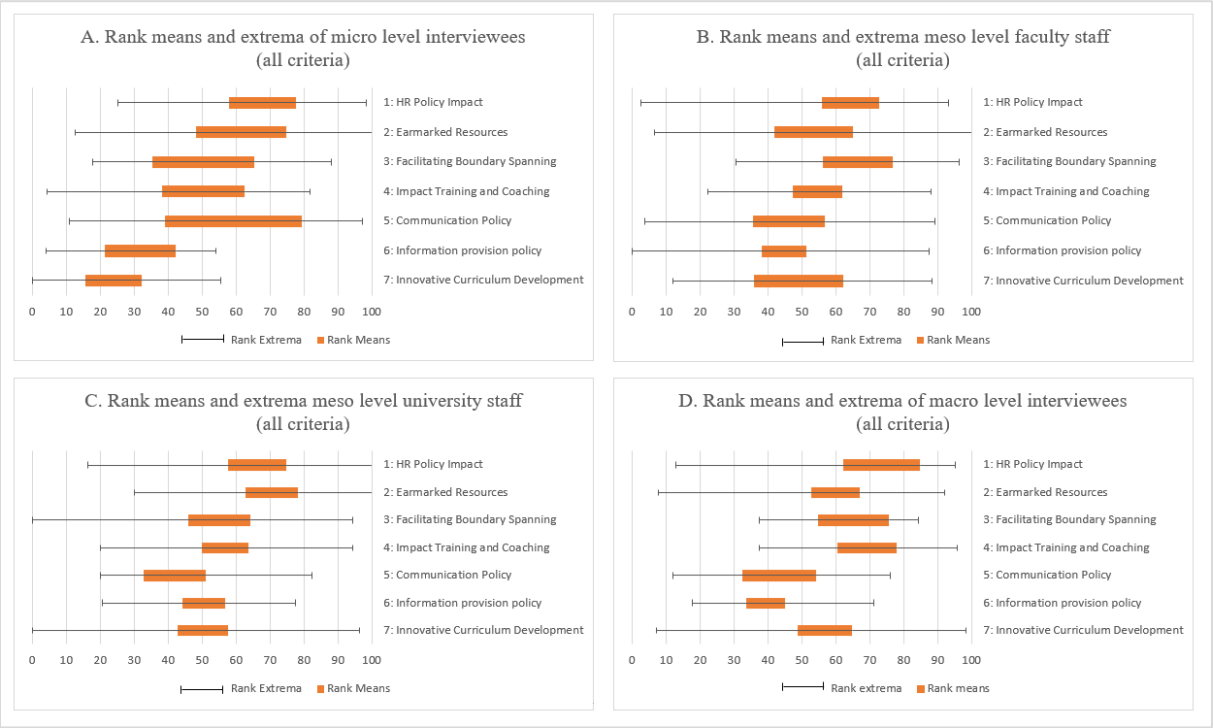

Figure 10: Rank means and extrema of all four perspectives (all criteria, core options only)

Another high rank mean is that of *communication policy* from the micro-level perspective. Interviewees from this perspective explained that communication policy could potentially be beneficial in supporting societal impact projects, but also provide appreciation towards the researchers. However, the range of this rank mean is quite big, since the researcher also doubt if the communication department has sufficient understanding of societal impact and how to support this. Moreover, is the communication department able to provide sufficient time for this matter? In some other perspectives, communication policy is perceived as a more strategic task, meaning that the executive board and communication department communicate the overall societal impact strategy, best practices and role models of the university. In these cases, the option is scored less optimistic.

Besides these prominences in scoring, there are no further outliers or surprising observations in rank means *between* perspectives. Most rank means range between a score of 30 and 75. What does stand out are the great rank extremes *within* perspectives, some even ranging from 0 to 100, implying a high variability between some participants' pessimistic and optimistic scores within a perspective. To unravel the reason behind this variability in scores, we again go a step further by analyzing the ranks of these perspectives under particular criteria. Moreover, we check for patterns of consensus and disagreement in scoring by comparing ranks per criterion as well as the individual ranks over all criteria.

4.4.3 Ranks per perspective under selected criteria

Referring back to the weight charts in Figure 7 and following on the overall ranks per perspective in 4.4.2, one could compare rank reports for particular criteria and identify differences or similarities in scoring. For each of the issues selected, only the ranks of the participants that used the particular issues are included in the rank reports. By observing the different rank reports under the selected issue, striking differences for the *impact issues* are identified, supporting other findings mentioned earlier.

Considering the *expected organizational impact* issue, micro-level interviewees generally scored the HR policy, earmarked resources, and communication policy more optimistic in comparison with the

other university policy options. The ranks of meso-level interviewees from a university perspective and the macro-level interviewees are comparable. Divergent from the micro-level interviewees, is that these interviewees (meso-level university and macro-level) scored communication policy less pessimistic and impact training and coaching and facilitating boundary relatively more optimistic. Quote examples on the policy option for impact training and coaching and facilitating boundary spanning support this:

"*Once you give training, and you only have five scientists who see the light and suddenly understand things better… The next time a company comes along, you collaborate better. And I think that there is a great need for this [training and coaching impact] among scientists for this. Certainly not all, but plenty. So, this is kind of an 'unmet need' among scientists."* (Interviewee 3, Macro perspective)

"*Yes, you have to do this [facilitating boundary spanning]. Also, in relation to impact by design [criterion of one interviewee]. And if a researcher is concerned with impact, he or she will also bring colleagues into such a network. So, facilitating such a network is important to my opinion. Because you will see as a researcher that achieving impact consists of various elements and also effects how to set up your research."* (Interviewee 13, Meso-level university)

Micro-level interviewees scored the expected organizational impact less high; HR policy and earmarked resources are more important from their perspectives compared to training and coaching. On the contrary, interviewees from the macro and meso-level perspective felt that it is necessary and useful to provide impact training and coaching and facilitate boundary spanning to successfully support researchers in societal impact activities, especially since they also consider those researchers less involved with societal impact activities. So, when aiming to motivate and support those researchers unexperienced with societal impact activities, impact training and coaching and facilitating boundary spanning score relatively higher on the expected organizational impact issues.

Looking at the rank reports for *expected external impact issues*, macro-level interviewees who used this issue in their appraisal, scored the expected external impact of all university policy options relatively higher compared to the other perspectives. As already shortly mentioned in section 4.3.1, this outcome could be influenced by the relative higher criteria weights on this issue, but also a better understanding and experience of macro-level interviewees on the possible external policy benefits of the university policy actions.

4.4.4 Patterns of consensus and disagreement on an individual level

Looking in detail to the individual engagements of the interviewees, both corresponding and contradictory performance scores and comments on the university policy options are found. The latter is not only the case between perspectives but also within perspectives. Aiming to understand these tensions better, this section provides the most important findings related to the *change resistance* and *change capacity* of the university policy options, supported by quotes from several MCM engagements.

Option 1: HR policy impact

Besides the complicated and risky character of changing *HR policy*, all interviewees agreed on the potential benefits and necessity of this university policy option. Many even agreed on the fact that this is *the missing element* right now, above all other policy options. However, this is on the condition that universities should not assess societal impact as something 'productive' and 'efficient' since it is not consistent with the definition and perceived characteristics of societal impact. Interviewees explained that impact is hard to measure and could potentially express itself years later. Moreover, multiple interviewees mentioned that the Research Excellence Framework (REF) in England is a bad example of how to interpret and measure impact. They perceived that the REF measures impact way too quantitatively and restrict societal impact to a definition with way too many conditions. Interviewees also agreed on the condition that societal impact should not be a mandatory core task for all academics. HR policy for societal impact is perceived effective - and does not lead to high resistance - when it allows for appreciating the diversity in the types of researchers and knowledge within faculties and

departments. This means that some researchers within a department will have more responsibility for the societal impact tasks of academic research, while other academics are more involved with education or fundamental research tasks. "*You say: there must be people in a team where everyone can use their qualities. You have to aim for team science, that is super useful."* (Interviewee 1, Macro-level).

Besides this overall optimistic view, some interviewees also shared their concerns about the implementation and effectivity of HR policy because of long-rooted cultural aspects within the university. For example, many academics with successful research careers and publications still have more prestige compared to researchers that publish less but are more involved in educational tasks: "*You can think: yeah whatever, in the end, you still make a career in research… but the HR policy has been saying for a long time: you have to ask researchers both about their education and research performance, but in the end, it does not matter for your career… so hopefully this is changing now."* (Interviewee 17, Meso-level university). Related to this, interviewee 5 (macro-level) mentioned that for researchers, the appreciation from outside is even more important than appreciation from within the university: "*I do think that if you get the appreciation from the outside world, that you have a much bigger stage as a researchers, that is a very different story.[…] Of course, societal impact is primarily aimed at the outside world, so you have to have the effect from there."* Some interviewees even felt that university HR policy appreciating societal impact could only be successful if the appreciation and rewarding for societal impact is also considered on a national (and even international) level. So, researchers will especially benefit from this policy option if it provides opportunities and prospects for the researcher's future career (on an international level): only then will societal impact within academic research be taken seriously.

However, other interviewees favored the idea that the university could already start with 'low key' HR policy actions, by focusing on embedding societal impact in the 'talent development' part in HR policy. Thereby, the faculty (dean) supports every researcher personally with the researcher's qualities and career goals: "*This is really essential and has to do with yearly assessment and development evaluations and formally really getting the time [for societal impact of academic research]. That you evaluate: what are you doing now? What can be done better? Where do you want to go? In the category of talent development, in the assessment, the development should be more important than the rewarding […] in the sense that: 'hey, you have only two publications this year, but you did all these impact activities, so we understand your situation'."* (Interviewee 22, Micro-level). Thereby, HR policy is not only about rewarding and providing the time (FTE's for researchers) but also about making the diversity of researcher's talents negotiable and appreciated within the organization.

Option 2: Earmarked resources for societal impact

Earmarked resources – reserved money for a specific societal impact goal and/or activity – is considered very necessary and, depending on its implementation, very beneficial to enhance societal impact of academic research. The majority of the interviewees scored this option somewhat optimistic under the impact criteria. Earmarked resources are considered as a direct financial incentive for researchers and can support the potentially impactful projects with seed money: "*If you say as a board, we are going to make a million available for our scientists to achieve societal impact, then very concrete projects will come out. And if you apply clear assessment criteria and define a clear goal, then that is almost a 1-on-1 effect. You force scientists to put time and energy in it."* (Interviewee 8, Meso-level faculty).

Besides the considered benefits, university staff on faculty and university-wide level also see some potential difficulties in the change resistance and available capacity at the university. Currently, many faculties do not have many options in shifting their money for other purposes: "*Resources are determined from a very high level, but also within faculties. And in these levels, recognition is needed that you indeed want to work on societal impact. You have to make a decision! Because the decision to do something, is always at the expense of something else […] for policymakers, it depends on so many things, that makes it very difficult."* (Interviewee 10, Meso-level faculty). When the university and

faculty decide to earmark more resources for societal impact purposes, this means that something else within the university should receive less. Also, what would this then be? Fundamental research, education, or even specific faculties? These decisions are very dilemma sensitive and should, therefore, be well-thought-out.

One interviewee even mentioned having doubts if the provision of earmarked resources for societal impact projects is even the task of the university. Also, how does the university determine whom to provide money with, and whom not? "*People are still struggling with the question: earmarked resources for what? What does and what does not qualify as impact? So, a concept like impact must have a concrete interpretation."* (Interviewee 17, Meso-level university). Other discussions also arise on the ways of implementation: to what specific goal should these resources be earmarked for? Seed money for a project, or to provide a robust 'societal impact back-office'? If so, then should we incentivize this on an individual level or a team level? Either way, when deciding to earmark resources for societal impact purposes, interviewees preferred the university to implement this in a structural way focusing on the long-term, preferably by the help of a societal impact fund (on either individual or faculty team level), with a clear goal, and with a minimum burden from application processes.

Option 3: Facilitating boundary spanning

Comparing the final individual ranks of *facilitating boundary spanning*, we observe few pessimistic outcomes. Interviewees mentioned that when aiming to enhance societal impact of academic research, going outside and engaging with society is a *must*. Unfortunately, researchers sometimes waste excellent opportunities for collaboration, which interviewees think is a pity. Reasons for this lack in engagement are for example researchers' beliefs, cultural norms and values, lack of time and incentives or lack of resources. Many interviewees mentioned that the university should take responsibility for creating awareness of engaging with society. However, as an important side note, this should not only be in the form of a push strategy (what knowledge can I bring to society?) but also a pull strategy (what knowledge does society need?). To achieve a sustainable impact by facilitating boundary spanning, interviewees mentioned that the university should develop strategies that aim to build a sustainable knowledge ecosystem: *"Mostly, they think from the perspective of the university… like: 'we offer you…', but you can also focus on working together with parties that you need to work with when valorizing your research: universities of applied sciences, knowledge institutions, financers, accelerators, incubators, societal organizations and working on building the ecosystem there. So how can you really work strategically together with other parties, where you do not only focus on: 'we have a medical discovery, and now we are going to…'"* (Interviewee 2, Macro-level).

Although there are differences between faculties on the way to implement this policy option, facilitating these boundary-spanning activities are mostly considered helpful and sometimes even necessary for sustainable embedding of societal impact. Though generally scored optimistic, some interviewees worried that researchers and universities underestimate the needed capacity to facilitate boundary spanning and the complexity to implement this university policy option successfully. *"You have to invest many interpersonal contacts before you could actually 'do' impact or joint research. And I found that very interesting to see. And then left or right, things are going pretty well. But it is a really different mentality for an academic researcher."* (Interviewee 21, Micro-level from Beta Sciences).

Also, the way the university chooses to facilitate this is considered to have an impact on the policy's effectivity. According to some interviewees, the university's potential pitfall is that they organize this policy from a too broad and high-level perspective, whereby the facilities are not relevant for researchers and stakeholders. Also, without clear incentives for researchers, facilitating boundary spanning considered not to be that effective. Several quotes represent these issues: *"Yes it [facilitating boundary spanning] is important, but there must be an intrinsic incentive for researchers. Because, as a university you want your researchers to work together, but shouldn't you leave that to the researchers themselves? Or should you start looking for cooperation partners for them? So… facilitating connections is therefore*

at all levels… My feeling says that it is better to facilitate and stimulate at the lowest level possible rather than very high." (Interviewee 16, Meso-level university), and: *"But it must be relevant for them. And if you [the university] are unable to make clear what the relevance for researchers or for stakeholders is… it does not matter. And that is often the problem because people think too big. You have to think from the perspective of small groups and topics."* (Interviewee 17, Meso-level university).

Besides emphasizing on facilitating on a low(er) level, a few interviewees also mentioned that facilitating of boundary spanning should not only focus on engaging in a collaboration, but more importantly, to maintain the network and making sure that this policy option is sustainably embedded within the organization. Boundary spanners within faculties could support in this: *"The continuation is what particularly determines the pessimistic and optimistic difference. So, you can organize a debate, but if it cannot be followed up, because scientists have no clue how it works, he is not trained, or he does not have the skills to do it. Or, the regulations and information provided are not good, it is not clear what the rules are. Then it crashes. That is often what happens now. A bridge is built, but there is no landing place."* (Interviewee 3, Macro-level).

Option 4: Impact skills training and coaching

Ranks show that interviewees generally scored the implementation of *impact skills training and coaching* moderately to very optimistic. For some interviewees, training and coaching felt like an 'unmet need' for academics: "*The contribution to cultural change is also important here. […] There is just little experience yet with societal impact: people were not educated and raised with this at the university. As with all change processes, you must provide training."* (Interviewee 3, Macro-level). However, others doubted if researchers will be enthused and motivated by these initiatives: "*It depends on people who naturally like it[training], and who think: I just want some more skills.[…]those people are going to do the courses, and people who are not… I have not found a stick where I can get them that way."* (Interviewee 8, Meso-level faculty). Most interviewees felt that it does not contribute directly to motivating all researchers to work on societal impact of research, but it does provide 'the willing' with the right mindset and tools to do so.

When not obligatory but open for all researchers (from Ph.D.'s to professors), this policy option is considered to contribute to embedding societal impact in the research system: "*It scores high on the impact by design because it allows you work on a different formulation of your research design and approach."* (Interviewee 13, Meso-level university). Moreover, interviewees indicate that training and coaching should be demand-driven and be provided in small groups to be effective and motivating for researchers. In this way, the policy option can be cost-efficient as well as effective on enhancing societal impact of academic research.

However, while all four researchers at the micro-level express themselves positively about the training and coaching, they do explain that time, and appreciation for societal impact is a prerequisite in order to make this policy option really effective: "*The incubator, where you follow courses to acquire entrepreneurship skills… the department said: you can participate in that, fine, but you pay for it yourself, and you do it in your own free time. That, of course, is not an incentive and motivation to go after it."* (Interviewee 20, Micro-level).

Option 5: Communication policy

The *communication policy option* shows variability in scores, both ranging from very optimistic, to very pessimistic and sometimes also with significant ranges within an individual rank report. From an optimistic perspective, interviewees explained that communication policy is *not* the most effective solution but does have a great potential to be effective in providing support for societal impact of academic research. This can be done by providing a clear vision on societal impact, role models and communication support for researchers during societal impact projects and activities. One interviewee even mentioned that communication strategies could be very effective in many ways, but that this is not

yet fully recognized by faculty deans: "*If only you would realize that if you… by investing in communication you can make a real difference, but there is no faculty director who sees that."* (Interviewee 17, Meso-level university).

There is a (partly) shared assumption that communication policy has potential benefits for both internal and external communication support of societal impact projects, but there are also doubts how this will work out in day-to-day practices in the current university system. Some interviewees felt that the communication department is very conservative, does not understand well what impact entails and are too far from understanding what it means in relation to academic research. A quote from interviewee 3 (macro-level) supports this: "*I am very biased about communication because my experience at university X is quite negative. And that communication is quite conservative: it took me years before they started communicating about the entrepreneurs of the university. […] So, I think this will not have that much impact, because people who do that, do not, in my view, understand it well."* Interviewees mentioned that when universities aim to improve the communication practices for societal impact successfully, researchers and science communicators should work together closely. However, due to the perceived conservative character of the communication department and perceived lack in human capital for societal impact communication, some interviewees are mostly pessimistic about this policy's feasibility. Are researchers willing to collaborate more? Does the university possess the right knowledge to do so? Funny is that a few interviewees from the more 'gamma sciences' faculty showed to score the performance of this policy option rather optimistic, explaining that the current communication of societal impact works well already.

All in all, there is little doubt about the potential benefits this policy option could provide. However, many interviewees expressed uncertainties on the university's capabilities and potential change resistance when aiming to implement a well-working communication policy for societal impact purposes. The latter could also depend on the faculty context the communication policy is implemented in.

Option 6: Information provision policy

When comparing to other core policy options, interviewees scored *information provision* generally more pessimistic. Information provision is many times provided with a 'neutral' performance score, or, as one interviewee perceived it as '*the general university hygiene'* (Interviewee 2, Macro-level). In this way, information provision is perceived to be supportive of the other policy options, but not considered to be a 'change maker' on its own. Moreover, two interviewees even mentioned that if the university would adopt a beneficial and innovative information provision strategy, a public institution like the university would *never* fully succeed in implementing this since they lack experience and flexibility: "*I estimate that this is unlikely to be feasible, because, in some way, ICT systems and governmental organizations do not match very well. I am afraid it will never work because they are 30 to 50 years behind on this topic."* (Interviewee 10, Meso-level faculty) and "*I think they have a problem with this, to organize this well. Right now, a research finder is being developed for this, it is almost ready. […] But apparently the universities themselves cannot do that, so we will provide input for that… that is quite an issue."* (Interviewee 5, Macro-level).

According to the researches at the micro-level, for what it is worth, the information provision policy should be of supportive value when easily accessible on demand. For example, when searching for specific information concerning societal impact, researchers should be able to find specific information or contact details related to societal impact topics easily. In the end, when set up well, it could save time instead of costing researcher time: "*I do not think this [information provision] is the reason to work on societal impact or not, but it ensures that the process behind it will go well, you spend less time on it and thereby becomes more fun. So, then you have the idea that is really supporting your project, rather than creating a barrier."* (Interviewee 19, Micro-level). When implementing information provision policy, universities should keep in mind that this policy should aim for taking away barriers rather than

creating them. According to researchers, a potential pitfall of information provision solutions is that it could provide researchers with extra administrative burdens.

Option 7: Innovative curriculum development

Finally, the individual ranks of innovative curriculum development vary from optimistic to pessimistic, with a couple of 'neutral' scores. It appears that the variability is based on two different perspectives that interviewees took during the engagements. About a quarter of the interviewees appraised the university policy option focusing on the short-term effects and direct benefits for academic researchers. While acknowledging potential benefits on the long-term, they appraised the innovative curriculum development more pessimistic since innovative curriculum development costs academic researchers much time (which they already lack) and does not directly support academic researchers achieving societal impact. *"You do need teaching hours for this. I think you should hire more teachers – we have too few people."* (Interviewee 19, Micro-level).

On the contrary, other interviewees appraised this option under a broader perspective taking into account the long-term effects of the policy option, especially. These interviewees mentioned that innovative curriculum development is a *must* to sustainably embed societal impact in the academic system, especially when aiming societal impact to be intertwined with both academic research as well as education systems: *"Yes, this receives a high score, because I think this is the university of the future and that this will make a difference also in which the university can distinguish itself from the university of applied sciences. I think that the university should by definition be the place where you work on topics in a multidisciplinary way, where you are working on major themes, where you really have students prepared for a leading role in society, instead of simply transferring knowledge and some skills. […] I do believe this is an investment for the long term because you ultimately also prepare your future researchers, I do believe that this is the basis you have to set."* (Interviewee 15, Meso-level university).

Next to the differences in potential benefits, interviewees also disagreed on the complexity of implementation of this university policy option. Besides the current time shortages of researchers, interviewees also mentioned that the implementation of innovative curricula is a complex task due to the conservative character of the education system: "*And this is super bureaucratic, because you also have to approve again at committees, and the university council and the Ministry of Education"* (Interviewee 19, Micro-level). However, a few interviewees believed that this policy option should not be too difficult for a university to implement since education is one of the university's core tasks and receives already a lot of attention.

Remarkably, one interviewee's results were opposite to all others. Here, the interviewee considered a pro-active curriculum development policy unnecessary, since curriculum development embracing societal impact activities will automatically come about when upcoming generations are in the university's leading positions: "*No, this is not necessary. Because it is the 'spirit of time' that will solve this… I already see differences between young and old researchers here, maybe that is the result of that this is already in the curriculum. I think it could be stronger, but it is already very beautiful, since even students who want to consider societal impact, they did not exist 30 years ago."* (Interviewee 10, Meso-level faculty).

Discretionary option

Chapter 4.2.1 discussed the decision to include or exclude the discretionary option. Yet, if an interviewee decided to include the discretionary option, how did the interviewees score them? Two interviewees appraised the discretionary very pessimistically and resulted in the policy option with the lowest score. Striking is that these interviewees chose to include the discretionary option because of curiosity to compare it with the other options. Two other interviewees scored the discretionary option more positively (around a performance score of 50-60). These two interviewees felt that societal impact is not 'that bad' at the university: a lot is happening, and people are involved.

Moreover, the latter also touches upon the discussion if universities really *need* to do something? Do academic the challenges not solve themselves when time passes, and new generations will lead within the university? The assumption is that there is more attention needed for societal impact but could question if pro-active policy action is a must.

Additional options

As explained in 4.2.2, seven additional options included in the appraisals focused on leadership, organizational responsibility and/or vision development. These leadership and management roles were especially considered necessary on the level of faculties but also a broader university level. From observing these individual ranks, we can conclude that these additional options are scored somewhat optimistic. The latter aligns with the fact that interviewees expressed it to be necessary to include additional policy option in the first place. For some interviewees, the success of all other university policy options was dependent on appointing responsible leaders and management on societal impact tasks. In some faculties, interviewees explained that the responsibility for societal impact activities is fragmented over diverging employees and that researchers do not know where to go or where to find the right support and information. Also, other interviewees explained that current management does not have sufficient expertise about how to support societal impact within the university best.

The additional policy options focusing on financial incentives has relatively less optimistic performance scores compared to the options focusing on leadership and management. Also, some of them have big ranges. Interviewees explained to be uncertain if a financial incentive is the 'right' and most sustainable incentive compared to other policy options. For example, compared to the *HR policy for impact*, other financial incentives do not provide researchers time to spend directly on societal impact activities. However, many interviewees do explain that financial incentives could be very supportive in 'pushing' researchers in the right direction when implemented structurally. Also, these interviewees showed there are multiple creative ways to provide financial incentives to support and motivate researchers in providing societal impact.

4.4.5 Conditionalities and interconnections

In both the rank charts per perspective, per issue, as within rank on an individual level, a variability of scores is observed. In some cases, this variability in scores indicates that the interviewee is uncertain about the scoring, or, in many cases, the interviewee chose to score with a range because of conditionalities related to that university policy option. In both cases, the appraisal of the policy options depends on other factors or the way these policy options are implemented. For every university policy option, an example quote from the interviews shows this:

Communication policy: *"This really depends on how you implement this policy. You can develop as much policy as you want, but if you have the wrong people carrying out this policy, then this won't work. Try to find the common denominator. For example, what do we want to pursue by communication policy as a group? Both on faculty level as on university level."* (Interviewee 21, Micro-level)

HR policy impact: "*Important here is that adjusting the valuation and rewarding (on impact, not on h-index et cetera) within the university, only works if it is introduced across all layers. This is because scientific excellence is now being assessed in all other layers. As long as this is the case, you cannot tackle this by yourself [university]"* (Interviewee 7, Meso-level faculty)

Impact skills training and coaching: *"This [just providing training] exudes very much, just like in communication policy: 'we demand this [societal impact] from you, and you now simply get a toolbox, and good luck with it'. But I do see potential in coaching when it comes to 'personal guidance of' and 'help with'."* (Interviewee 2, Macro-level)

Information provision policy: *"So I think that it is really important in the provision of information, that you have a good feeling of what is included in such a concept [societal impact]. And the people who*

have to think about it, that their understanding is clear and unambiguous enough, but it also leaves enough room for all those different parties to contribute to this information provision." (Interviewee 17, Meso-level university)

Earmarked resources: "*When earmarked resources are seed money, I think this will include a specific application procedure. You have to start applying, first round, second round… so in that case, it is not time efficient [for researchers] at all."* (Interviewee 9, Meso-level faculty)

Facilitating boundary spanning: "*So in that sense, when you say 'facilitating boundary spanning'... it will not work if you have a kind of ready-made group of companies or organizations that you push forward. So sustainable embedding really has to do with: are those your contacts? Do you remain you network? Do you know the network?"* (Interviewee 22, Micro-level)

Innovative curriculum development: "*For this [innovative curriculum development] you can also apply for a subsidy. So, if that works out, this will be feasible. However, we also have the problem of a high workload for researchers, so that adds on to this."* (Interviewee 6, Meso-level faculty)

Similarly, qualitative data shows interconnections and (sometimes) conditionalities *between* the suggested university policy options (including the additional policy options). When interconnected, policies are complementary to each other, when conditioned, a policy's success depends in some way on another policy's implementation. The wide variability in option scores combined with the corresponding comments from the engagements, point out to the *consensus* that all university policy options will not entirely successfully work on their own. The only way that the policy options provide optimal conditions to perform best is by *integrating them* into a broader societal impact vision where the university policy options support each other. So, for both lowering the *change resistance* and increasing the *change capacity* related to the university policy options, and thereby to be supported and accepted by its stakeholders, the options need to be integrated and combined. A quote from an interviewee from the macro-level, who has researched the impact of academic research for many years, supports this:

"My question every time was: what are the overall policy and the overall vision of the institution? Because, every single solution is possible, but also depends on what the integral vision is. Moreover, what I found important was with each of them: to what extent is it integral, and is it connected to the various policy domains? […] If the solutions do not transcend within that policy domain (e.g. HR or communication), or it is not in line with a larger impact policy, then this will not work. […] So, given my integrated approach, each of the options is important, but not all of them are equally important." (Interviewee 4, Macro-level).

Other quotes also shed light on the conditionalities between policy options:

"Without time, budget, and appreciation you make it [societal impact] very difficult. You just need those elements. If a department says: 'you can participate in courses to acquire entrepreneurship skills, but you pay for it yourself and you do it in your own free time'. That, of course, is not an incentive and motivation to go after it [societal impact]." (Interviewee 20, Micro-level)

"Whatever you do, it starts here [educating university leaders]. And with this condition, we link the information provision to communication and so on. Such a university leader could say: 'if we want to build bridges for societal impact, I want it to be in this order'. We need someone who is constantly working there. Now, that is not happening enough." (Interviewee 3, Macro-level)

"So, the university is working on that [facilitating boundary spanning]. I actually think that is not that effective right now. It is healthy, but it is, nevertheless, that an individual scientist who has followed his own path… does he or she want to reserve time for that [facilitating boundary spanning]? If an individual scientist does not have an incentive for that, he or she will not." (Interviewee 14, Meso-level university)

"*This is a 'sine qua non'; if you do not adjust this [HR policy impact] … if you do not take into account how employees perform on this [societal impact] … then they will never do that. Because if it comes at the expense of something on which you are billed, then it is only to your disadvantage."* (Interviewee 10, Meso-level faculty)

Conditionalities and interconnections in and between the policy options have been observed in an earlier MCM analysis of the UK National Report on possible policies responding on obesity (Lobstein et al., 2006) and is therefore not a new phenomenon. In this study, however, these observed also support the theoretical underpinning of the cognitive, regulative, and normative institutional pillars that form a basis for institutional legitimacy by Scott (2008) provided in section 2.3. As explained, each of the university policy options represents one or more of these institutional pillars, as presented in Table 4. Observing the need for integrating the university policy options aligns with Scott's explanation (2008) that the three institutional pillars sustain each other, where the institutional arrangements combine the processes in the different pillars together. Translated to this situation here: because of conditionalities and interconnections, university policy options are not *sufficient* on their own, but - based on the input of the interviewees' experience - definitely *necessary* to enhance societal impact of academic research together.

4.4.6 Extension: patterns in conditionalities and interconnections

The detailed qualitative insights on the interconnections and conditionalities in scoring provide a valuable basis for possible patterns *within and between* these university policy options. Table 6 provides a (non-exhaustive) overview of four types encountered conditionalities and interconnections from the MCM engagements. The performance of university policy options could either be conditioned by its internal university implementation details, other university policy options, or factors from outside the university. Also, besides the conditions, university policy options are strongly interconnected in a way that they are supporting each other.

Table 6: Mentioned conditionalities and interconnections in appraisals by interviewees

The performance of the policy option…	**…is *conditioned* by its internal implementation details:**	**… is *conditioned* by other policies:**	**…is *conditioned* by external factors:**	**…is *interconnected* with other policies:**
HR policy impact	Collaboration HR department and researchers, understanding and attitude HR employees on impact (processes and research systems), structural embedding at different levels, reflexivity of implementation, the conservative character of (sub-)system	Leadership impact faculties and university	(Inter)national impact reference framework, government policy, vision and actions on appreciation and rewards of researchers for societal impact, appreciation from 'outside' the university	Communication policy, impact skills, and training and coaching, innovative curriculum development
Earmarked resources	Type of knowledge faculty, structural embedding, flexibility finances earmarking, timespan (long-term), the conservative character of (sub-)system, the goal of earmarking resources	Leadership impact faculties and university	(Inter)national impact reference framework, governmental decisions on the division of the '*first flow of funds'* or '*second flow of funds'* other provided resources (first cashflow for universities)	Strategic themes (HUBS) from communication policy, impact skills training and coaching
Facilitating boundary spanning	Stakeholders' understanding of 'ecosystem thinking', type of knowledge faculty, infrastructure facilities for structural embedding, boundary spanners with the	Leadership impact faculties, earmarked resources, HR policy impact	Supply and demand stakeholders from the knowledge ecosystems	Strategic themes (HUBS) from communication policy, information provision

	right 'antenna' for both the inside (academia) as the outside world, understanding needs and interests of researchers			
Impact skills training and coaching	Type of knowledge faculty, structural embedding, understanding needs of researchers, the group size of training (small)	Leadership impact faculties, HR policy impact, earmarked resources,		Communication policy, information provision policy
Communication policy	Collaboration communication department and researchers, understanding and attitude communication employees on impact (processes), human capacity (quality), structural embedding, vision development (profile), conservative system	Leadership impact faculties and university	(Inter)national impact reference framework	HR policy impact, information provision, impact skills training and coaching, earmarked resources, facilitating boundary spanning, innovative curriculum development
Information provision policy	Knowledge of information provision ICT systems, understanding ICT employees impact systems, structural embedding	Leadership impact faculties	(Inter)national impact reference framework, government actions ICT systems	Communication policy, HR policy impact, impact skills training and coaching, earmarked resources, facilitating boundary spanning
Innovative curriculum development	Type of knowledge faculty, structural embedding, generation involved, human capacity, the conservative character of (sub-)system	Leadership impact faculties and university	Government decisions on the division of the '*first flow of funds'* or grants for curriculum development	Communication policy, HR policy impact

Since internal conditions, external conditions, and all university policy options are in some way related to each other, we can speak of *structural conditionality*. An overview of these relations is translated into a schematic framework in Figure 11. The illustrative 'university-policy-box' represents the structure of the related university policy options and their conditioning factors. The latter is further explained here.

To begin with, many interviewees also touched on the need for an integral societal impact vision, impact reference framework, and clear societal impact profile of the university. In order to successfully implement university policy options, the university must decide on policies for a long-term impact strategy and communicate this via multiple channels. Also, another long-term strategic policy action is concerned with innovative curriculum development. Although mostly not considered to be of direct benefit for researchers on the short-term, multiple interviewees emphasized not to ignore the development of innovative curriculum development. They argue that in order to embed societal impact within the university's second mission (doing research), curriculum development must be complementary to this. Alternatively, as interviewee 4 (macro-level) stated: *"You cannot do research and develop entirely new things for practice and forget to develop that in education as well. […] because otherwise, you will train an old generation. And not just that, it might also be a chance to bring about that change [transitioning towards science for society], and that it at least confirms what you want to do at an integral vision"*. Therefore, in the context of policy options for societal impact of research, these two are referred to as **(long-term) strategic policy actions** in Figure 11.

During the engagements, multiple interviewees emphasized that incentives for researchers are a prerequisite to effectively and efficiently enhance societal impact of academic research since the researcher has to be supported and motivated to do so. HR policy and earmarked resources turned out to potentially provide these incentives, whereby these policy actions refer to as **'incentivizing policy**

actions'. Other university policy options that provide the right skills, knowledge, information, expertise, network, and other supporting facilities are considered equally necessary, but not capable of incentivizing as effectively as HR policy and earmarked resources. Interviews emphasized the 'additional' characters of these university policies and are therefore referred to as **'add-on policy actions'** in Figure 11. The other way around, the success of incentivizing policy actions is also supported by add-on policy tools. Moreover, to refer to the strategic policy action, the implementation of the incentivizing and add-on university policy actions should connect with the university's strategic plans for both research and education.

However, besides the need for a long-term strategy, interviewees also emphasized the necessity to implement policies in a reflexive and stepwise manner. In the figure, a schematic visualization of the relation between the short-term policy actions and long-term policy vision is provided. There are two possible interpretations of this relation. First, the short-term implementation allows a university to 'start small' with a university policy option and scale-up in a stepwise manner. For example, in HR policy, all faculties could first provide small bonuses to researchers for societal impact activities, and later, pay researchers according to their time spend on societal impact activities (societal impact on pay-roll). Second, the short-term implementation steps also account for intermediate reflections on the performance of the policy action. For example, should we do something differently next time? Moreover; how? By combining a long-term vision with short-term implementation cycles, universities might allow themselves to enhance societal impact of academic research iteratively, in an incremental way, by applying trial and error.

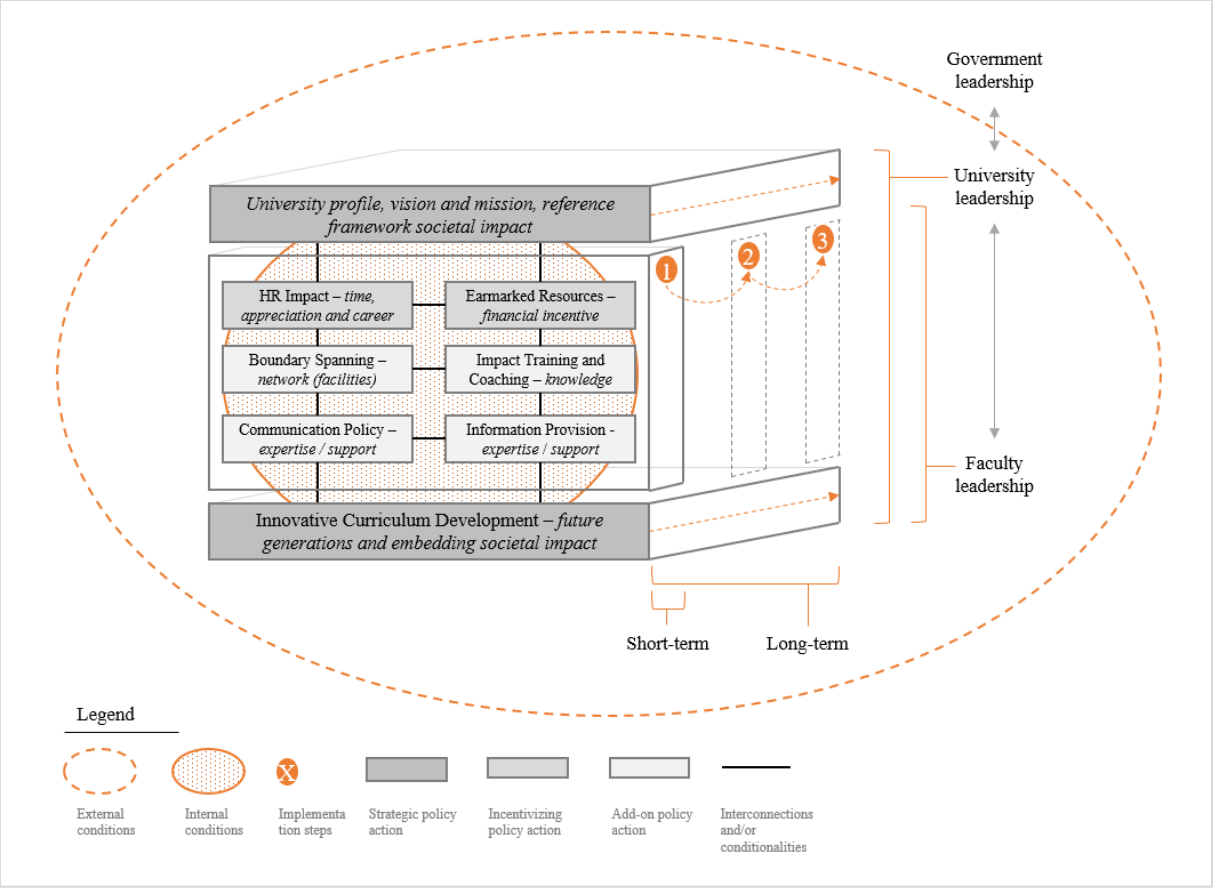

Figure 11: Schematic overview of conditionalities and interconnections of university policy options enhancing societal impact of academic research based on MCM engagements

Besides the conditionalities and interconnections between the different policy options, Figure 11 also visualizes the internal and external conditions. The small circle represents the internal factors and

implementation details of the university policy options. From Table 6 some encountered conditions are the type of knowledge concerned with impact (different per faculty), available (and quality of) human capital, experience with university policy options, perceived flexibility of department concerned with the university policy options, et cetera. Universities' internal institutional structure but also its culture, norms, and values influence the implementation of strategic, incentivizing, and add-on policies. Besides internal conditions, external conditions also affect the performance and implementation of university policy options. Examples from Table 6 are governments decisions on how to measure and reward societal impact activities, changes in the division of the 'first flow of funds' (direct government funding in the Netherlands), 'second flow of funds', or other decisions of government or other (public) parties on the supplies of any needed resources.

Another – critical - conditioning factor within the internal and external university system is that of assigned leaders and management concerned with the embedding of societal impact by university policy actions. For example, the diversity between faculty systems makes it difficult for support staff on the university level to provide the right incentives and tools for faculties and departments. Faculty leaders within a faculty board and/or and Research Support Office could take responsibility on the latter. Leadership and management can come in many forms and is necessary at the faculty level but is also considered necessary on university and government level. Together, actors assigned with responsibilities over societal impact tasks should collaborate to implement the societal impact policy strategy successfully.

5. Discussion

A lot has been written on the importance of societal impact of academic research within universities, and the proposed policy actions that should be taken to enhance this. Nonetheless, due to dominant structures and institutions, universities still struggle with adapting their organizational system accordingly. Uncontested university strategies and incentives to enable researchers in achieving societal impact of academic research are missing. Herein, finding a legitimate solution to this academic challenge is difficult because of its wicked character.

This study provides a (non-exhausted) overview of possible university policy actions that could potentially contribute to tackling this academic challenge. More important, by the help of the Multicriteria Mapping method, MCM engagements and analyses revealed the policies' accompanying conditions that could enable (or limit) to enhance societal impact of academic research within universities. In an attempt to fully understand the contested nature of this academic challenge, this study provides insight into the perspectives and motivations of involved stakeholders, but also the nature of the university policy itself. As a result, the outcomes show the points of consensus and disagreement concerned with the suggested university policy options to enhance societal impact of academic research. Thereby, this research aimed to provide an answer to the research question: *To what extent is there congruence of stakeholders' beliefs on the university policy options to enhance societal impact of academic research?*

Before addressing the performance of the university policy options, it is important to mention that not all interviewees reflected on the university policy options from the same perspective. Based on the interviewees' position, social values, experiences, and interests, they appraised the university policy options based on diverging criteria. Although the use of impact criteria and feasibility criteria are equally distributed, expected organizational impact (27%[3]), expected external impact (23%) and practical feasibility (28%) were used most often to appraise the university policy options with. Cultural feasibility and financial feasibility criteria were used less often. A remarkable finding is that of a potential 'paradox of cultural feasibility'. Herein, faculty staff perceived the cultural feasibility issues of university policy option as rather important. On the contrary, researchers themselves did not appraise university policy options on its cultural acceptability nor integrity, but on its potential to drive cultural change within the university system.

From the MCM analyses, we found that all university policy options are *necessary*, but *not sufficient* individually to enhance societal impact of academic research. However, comparing their necessity, interviewees expressed a preference for particular policy options based on the selected criteria. Moreover, there are recurring points of discussion are on *how to implement those* successfully taking into account the different issues. While appraising the university policy options, a variability of scores and conditions appeared both related to the expected impact as well as the feasibility of the university policy options. However, all policy options are considered to related to each other in some way and should therefore be considered in an integrated policy approach.

Related to this integrated policy approach, there are several *remarkable points of consensus*. First, while appraising the university policy options, interviewees emphasized that 'societal impact' should be strongly intertwined (and in balance) with the university's research and education tasks. However, they also expressed societal impact should not become 'another mandatory task' since not all researchers are talented and willing to play an active role in societal impact activities. Therefore, they should not be obliged to do so. Also, when measuring societal impact in policy options, interviewees showed the importance of qualitative measures (the narrative), instead of quantitative measures. Interviewees also agreed that impact comes in many forms, and this should not be ignored when deciding on the

[3] The count of criteria used in appraisal from a total of 85 criteria and 1 principle (in percentages), belonging to this specific issue aggregation

implementation of university policy options. Related to the above, interviewees also agreed on the necessity of a clear university profile, vision, and reference framework related to societal impact.

Second, next to the consensus on the position, definition, and measurement of societal impact within the university system, there is also consensus on the necessity to provide the (willing) researchers time and appreciation for societal impact activities. Mostly, these needs expressed themselves in a high performance score for HR policy and earmarked resources. Observing these preferences of interviewees, one could question if some policy options possess some sort of 'self-fulfilling element': although the implementation of both policy options is considered to be very challenging compared to other policy options, for most of ranks, the final performance of these options are very high due to interviewees beliefs on their perceived relevance and importance.

Third, interviewees also agreed that while implementing the university policy options, universities should not 'give up on policies' when they fail. Instead, universities must reflect on the process and output of policies with the help of short-time feedback loops. Continuous trial and error during implementation are key. Also, creating internal support for embedding societal impact in research is critical, whereby all interviewees mentioned (in some way) the need for collaboration between stakeholders. This could be either between researchers, academics and support staff, faculty and university level stakeholders, between universities, and between universities and governmental parties. It shows that interviewees generally felt that achieving institutional change by policy reform within the university is rather hard, especially without collaboration between – and support of - different stakeholders. This observation is also supported by the outcome that the expected feasibility score of the university policy options is generally lower than their expected impact score. For the latter, one of the reasons is the strongly complex (inter)national nature of this academic challenge. Aside from the perceived complexity of this academic challenge, interviewees did express themselves negatively on a 'wait and see attitude' and felt that the university is obliged to work on supporting societal impact within the university system.

Last, in order to implement all university policy options, interviewees emphasized that assigned responsibility and leadership within the organizational structure of the university is fundamental. Although not all interviewees mentioned leadership and management as an additional policy option, many interviewees also pointed on the conditioning factor (faculty) leaders can have in enabling (or limiting) societal impact activities. Therefore, implementing and monitoring the university policy options is preferably supported by the help of strong leaders, who are motivated to enhance and embed societal impact of academic research, but also have experience with the academic culture and its practicalities. Again, the collaboration between leaders at different levels is considered a prerequisite to successfully proceed in transferring towards a university system embracing societal impact.

But how to proceed *precisely*? Aside from these main points of consensus, *diversity in stakeholder's beliefs* appeared on the performance scores of the university policy options both between perspectives as well as within perspectives. Several remarkable contradictions arose during the analysis of the MCM final ranks of engagements. The first type of contradiction can be found on the performance score of the *expected (organizational and external) impact* of university policy options. Although there is a consensus on the necessity of all university policy options, a few contradictions occurred in the perceived order of 'how impactful policy options could be'. For example, the university policy options' expected usefulness, effectiveness, and enabling conditions, et cetera, can differ by either appraising from a long-term or short-term perspective. Some university policy options are only considered to be effective when steadily and continuously working on the implementation of these policy options. On the contrary, others felt that on the short-term, these options should also already be impactful. What is more, the performance score on impact criteria also shows that different (sub-)institutions could have diverging needs when it comes to policy support (e.g., beta versus social sciences).

The second type of contradiction is related the policies' feasibility of the implementation. First, when looking at the practical matters, interviewees showed to have diverging opinions on the required experiences, knowledge, and amount of human capital to carry out the policy options. Also, is the university already in possession of this experience and knowledge required? A few interviewees felt that the university lacks these resources, and therefore is not able to implement innovative university policy options without retraining current or hiring new employees. However, other interviewees were quite optimistic on these points. Likewise, a second point is that interviewees expressed diverging opinions on the costs and financial risks related to executing the policy options. And lastly, an interesting contradiction is the expressed need for university policy options to be integrable with other institutional systems, contrary to the perceived need to come up with something new that deviates from current university practices.

Moreover, interviewees also showed diverging claims on the best ways of facilitating a policy option. For example: to what extent should (a combination of) policy actions be facilitated top-down or bottom-up? Both ways have potential benefits: bottom-up actions potentially provide more creativity for faculties to adopt policies to their wishes, but top-down actions provide more structure and clarity for stakeholders involved. But also, to what extent should we oblige specific regulations in university policy options versus keeping it an option to employees? For example, should the university aim to provide a mandatory societal impact training to all researchers, or should this be only provided to those interested?

Additional to the findings above is that the lack of consensus on the performance of university policy options could be related to the *transition phase* the (sub)institution is in, *contextual factors* of the (sub-)institution, and the considered *implementation order or combination of the university policy options*. Contextual factors are for example the knowledge type considered (e.g., beta, alpha or gamma), the perceived dominant structures and institutions of the specific position in the organization (e.g., the department, faculty, university or outside of the university) but also interviewees' personal beliefs related to his or her position in the institution.

Concluding, enhancing societal impact of academic research is no 'one-size-fits-all'-issue; many solutions are possible. Herein, the quantitative and qualitative data of MCM resulted in consensus patterns that can help policymakers to understand how policy solutions may or may not effectively help to enhance societal impact. This does not only hold for this specific case analyzed here, but the application of this method could also be of use for other universities struggling with this academic challenge. It is then policymakers who should consider these views to increase the legitimacy on the possible policy solutions for the transition towards 'science for society'. Although a full commitment of all stakeholders is impossible to aim for, do the results of this study assist in understanding the university's current situation on this academic challenge.

5.1 Theoretical implications

By applying the combination of transition management and institutional theory to this academic challenge, the proposed theoretical framework aims to provide a comprehensive picture of the recent academic challenge to transform towards an institutional university system that embraces societal impact of academic research. The combination of these two theories has already been applied in analyzing transitions. However, combining those two with the Multicriteria Mapping method in the context of this academic challenge has not been done before. The theoretical contribution of this study fits in nicely with one of the suggestions for future research from Stephen and Graham (2012), who also applied the transition management framework to understand social change in the higher education systems:

"*A potentially interesting area of empirical research would be to survey different actors to gauge their perceptions of the phase of transition at which their university – or the system as a whole – currently sits. Understanding variation in perceptions of the magnitude of the past change as well as the potential for future change toward sustainability among different actors or sets of actors, i.e. administrators,*

faculty, staff, and students, could identify gaps in communication as well as provide guidance on the value of engaging in more shared visioning activities." (p. 615)

Because of the complexity of the education sector, Stephens and Graham (2012) emphasize the need to collect and understand the different perceptions of the transition challenges in higher education systems. Understanding the variation of perceptions helps to engage in a shared set of activities to change. The MCM method succeeds in including these perspectives of different actors within the university system and uncover its complex (practical) implications. In this way, the MCM method serves as a complementary method to both transition management and institutional theory analyses. The significant advantage of the MCM is that the analyses add a layer of detailed 'behind the scenes' information of these two theories. Here, MCM contributes by providing detailed and practical implications university policy options to enhance societal impact of research, and thereby contributes to the debated on the transition towards 'science for society'.

Aside from the innovative combination of current theoretical models to both the MCM method and to this current academic transition debate, some MCM analysis results also support well-known theoretical concepts. As for the theoretical frameworks included in this research, the MCM results shows to confirm the ideas of Scott (2008) and Lawrence and Suddaby (2006) on institutional change. Concrete policy implications based on these two theoretical frameworks are further discussed in section 5.2. As for a few theoretical frameworks *not* included in the theoretical framework here, some MCM results also show to support these.

First, the additional university policy options related to leadership and management, and the expressed need for a clear societal impact vision relates to the theory on *institutional entrepreneurship*. Apparently, these findings are not only relevant for this case, but also supported by other theoretical models on institutional change. According to Battilana et al. (2009), the institutional entrepreneur is the actor (or a group of actors) who leverage the willingness and resources to achieve institutional change. They take on leadership roles to initiate changes, but also actively participate in implementing these changes (Battilana et al., 2009). According to the model of the process of institutional entrepreneurship by Battilana et al. (2009), institutional entrepreneurs do this by creation of a vision for divergent change, and mobilization of allies behind the vision. Additionally, as for the university transition towards 'science for society', interviewees emphasized the need to structurally assigning responsibility to university actor(s) that are willing, experienced and motivated to support societal impact and therefore to be in the role of an institutional entrepreneur(s). Suggested actors to take on this role are, for example, (newly hired) faculty deans or (newly hired) employees within faculties' Research Support Offices.

Besides the observed need for institutional leaders, MCM results also suggest improving collaboration between several stakeholders during these institutional changes. These outcomes align with the ideas of Andrews, Pritchett, & Woolcock (2012) on avoiding capability traps by broad engagement between change agents. As observed from the results, universities could potentially lack the right capabilities or overestimate the required capabilities for the successful implementation of university policy options. To overcome the uncertainties on both the required as well as the perceived present capabilities, broad engagements between different stakeholders is needed to understand local situations within universities. Andrews et al. (2012) do not only draw on the importance of institutional entrepreneurship as Battilana (2009) did, but also the importance of *distributed agency* during the process of change and development. Both are critical when it comes to implementing policies that are viable, legitimate and relevant to specific contexts. Different agents at different levels should work together implementing solutions to the local university problems. The latter is also confirmed by the outcomes of this research.

Moreover, the outcomes of the MCM analyses could assist universities in avoiding '*the camouflage of isomorphic mimicry'*. Related to the above, Andrews et al., (2012) explain that with many policy reform processes, the interventions related to the policies look impressive, but are often unlikely to fit the particular contexts the policies should be implemented in. Andrews et al. (2012) refer to this as

isomorphic mimicry: *"the tendency to introduce reforms that enhance an entity's external legitimacy and support, even when they do not demonstrably improve performance."* (p.1). Avoiding the camouflage of isomorphic mimicry explains that for successful policy reform, it is required to understand the structure of systems supporting the policy (Andrews et al., 2012). The MCM functions as a useful method to understanding the university's internal systems, whereby it embraces the university's fuzzy reality and succeeds in showing the differences between the perspectives of university stakeholders. In this way, although some solutions might be perceived as legitimate 'from the outside', does MCM prove to be of help in the underpinnings of Andrews et al. (2012) to try to find legitimate policy solutions looking at the internal systems of the particular entity.

To conclude from a theoretical viewpoint, besides the very detailed and case specific findings presented in this research, this study does demonstrate that the application of a Multicriteria Mapping method is of use to stop 'keeping up the appearances' and shows how policy options could really support on changing institutions. Even though a policy reform remains complex, the Multicriteria Mapping method is able – with the help of transition frameworks – to contribute to converting the complex policy problem into a modular framework. This model can in turn be used strategically to determine which base-line interventions, add-on interventions and related parameters are relevant in implementing solutions for (societal impact) transition challenges. For the specific case considered here, the latter is explained in the next section.

5.2 Managerial and policy implications

For a policymaker charged with making decisions over societal impact of academic research at Utrecht University, what implications might be drawn from this study? The MCM outcomes mapping the policy option performance combined with the schematic overview of structural conditionality in the 'university-policy-box' (Figure 11) provide a solid starting point to understand the fuzzy reality of this academic challenge. However, a problem within the university-policy-box is the question of where to start. At each level (government, university, and faculty) decisions must be made. For example, on the government level: what is the reference framework of societal impact, and how are we going to measure it? How does it relate to higher education and research (according to universities)? On the level of the university: what is our long-term profile and vision on societal impact concerning our expertise? What is our societal role as a university in the knowledge ecosystem, also in comparison with other universities, universities of applied sciences and knowledge institutions? Moreover, on a faculty level: what kind of impact fits our type of knowledge? How does this align with our education and research? Also, how could we best support our researchers in this?

The above questions leave many room for discussion. Likewise, many uncertainties were expressed in the appraisals on university policy options either influenced by the stakeholders' perception on internal factors, external factors or possible ways of implementation of the university policy option(s). It all shows that as long as no clear *decisions are made at each level*, consensus on the correct implementation of university policy options is being held off. The other way around, one could also argue that, as long as all actors hold on to the missing consensus between different stakeholders, stakeholders are not entirely comfortable with deciding a particular point of view and implementation of university policy options. It seems that the structural conditionality acts like a vicious circle with no beginning and no end. For this reason, collaboration between involved stakeholders is a prerequisite to deal with these relations between policy options and to strive for a successful and integral societal impact policy strategy. Said differently: a legitimate solution to this contested problem will stay out as long as the actors avoid struggling together in finding (the beginning of) a solution.

For the specific case analyzed in this study, a strategic view on decisions that need to be made on different levels to break 'the vicious circle of structural conditionality' is provided here. Linking back to the theoretical framework outlined in Figure 1 and Figure 2, both frameworks help to understand what could be done on a strategic level. First, from the view of transition management, we understand that

macro-level stakeholders could provide 'windows of opportunity' for a regime to transition. Also, niches need to be supported at the micro-level to flourish. Similar observations result from the MCM analyses. From a macro perspective, governmental bodies are perceived to provide a clear vision and support to encourage universities to transition towards 'science for society'. Also, within the regime, universities and faculties themselves should find ways to support niche initiatives for societal impact of academic research. Multiple times, interviewees addressed that a robust vision and strategy from the government as well as the university are missing. A lack of vision is perceived to paralyze stakeholders to make clear decisions on follow-up actions. In connection with the previous points, leadership and assigned responsibility within faculties on societal impact are considered as fundamental. Both observations show that the first thing to do is to assign responsible and professional leaders and managers on all levels of the multi-level perspective, enabling to make decisions that do not oppose each other. Together, they must provide an integral vision on societal impact within academic research.

When we go to the level of institutional theory, Scott (2008) shows us that *complementary* regulative, cognitive, and normative actions are necessary to undergo successful institutional change. Linking this to the results of the MCM analyses suggests that university policy options are not sufficient on their own but should in some way be integrated into a broader societal impact policy strategy and also support each other in their implementation. As noted earlier in section 3.3, each of these university policy options is either characterized with a more regulative, cognitive, or normative nature. Incentivizing policy actions, displayed in Figure 11, are more regulative. Without clear regulations, researchers lack the right incentives to enhance societal impact of academic research. In this case, which was also validated by a joint session with interviewees, university investments should be primarily aimed at providing ('the willing') researchers with sufficient space and time to work on societal impact activities. This is seen as the potential lever which will also set the rest of the university system in the right shape.

Nonetheless, the cognitive and normative actions are just as important to support the regulative policy actions, since they provide the right mindset, norms, and values for societal impact. Therefore, the suggestion is to start with defining the regulative university policy options and aligned to those, how the cognitive and normative university policy should be designed to best support these regulations. Within the design and implementation of these policy options, start with the points of consensus, followed by carrying out interventions on the relevant points of discussion.

Furthermore, quoted from section 2.4, Lawrence and Suddaby (2006) explain that different forms of institutional work provide either the creation, maintenance, or disruption of institutions. Combined, all these different forms of institutional work are categorized into two forms of institutional practices: (1) practices that target the (de-)construction of rationales (*what are going to do and why?*), and (2) practices that aim at the mobilization of resources (*how are we going to do that?*). From the MCM analyses, we observed that there are many recurring points of discussion on *how to implement* the university policy options successfully considering the specific practical, cultural, and financial conditions within the faculties and university. At this side of the story, the question is how the policy reforms could have the best impact, and how to deal with the university's potential lack of capability to do so.

Taking inspiration from another research, outside from the used theory here, Andrews, Pritchett, & Woolcock (2012) suggests a theoretical framework to *overcome possible capability traps* and *really implement policy reforms:* The Problem-Driven Iterative Adaption (PDIA). The framework bases on four main principles that could assist universities in implementing university policy in a way to successfully enhance societal impact of academic research. To quote these four points from the abstract of their working paper (Andrews et al., 2012);

1. *Solving locally nominated and defined problems in performance (as opposed to implementing 'best practice' solutions)*
2. *Seek to create an 'authorizing environment' that encourages 'positive deviance' and experimentation (as opposed to implementing as exactly designed)*

3. *Embed experimentation to tight feedback loops that facilitate rapid experimental learning (as opposed to long learn times and ex-pos evaluation)*
4. *Actively engage broad sets of agents to ensure that reforms are viable, legitimate, relevant and supportable (as opposed to narrow 'top-down' diffusion of innovation)*

In the context here, this means that policymakers in the university context should closely analyze the different (sub-)institutions within the university, what problems occur concerning providing societal impact of research, and how they could be potentially solved. In order to provide an 'authorizing environment' that encourages 'positive deviance', the university could hire external agents and appoint internal agents to take responsibility over (change) processes over a longer period of time. Together, the agents support and enhance an ecosystem wherein incremental steps are taken to find the right solutions, and therefore support experimentation on the possible solutions. Especially in the locked-in and complex institutional context of the university, incremental steps are a prerequisite to successfully embed innovative policies. Last, in all layers of the policy design and implementation process, policymakers should engage with (and often bring together) a broad set of agents from a faculty level, university-wide level and outside of the university. With the help of these agents, interventions and tight and regular feedback sessions should be organized, whereby rapid experimental learning becomes possible.

Andrews et al. (2012) emphasize the implication that the four principles help to understand the underlying interests and motivations, but also the nature of the policy options itself. The latter is especially important in such uncertain and complex contexts as presented here. Hereby, PDIA is complementary to the MCM analyses by functioning as a practical tool assisting in this academic development activity. Concluding, the MCM analyses with the 'university-policy-box' as presented in Figure 11 (taking into account the insights of transition management and institutional theory), combined with the four main principles of PDIA, are of assistance for university policymakers to understand the contested nature of this academic challenge and how to find the legitimate way forward to transition towards 'science for society'.

5.3 Precautions and limitations

Besides this study's theoretical and managerial implications, this research also deals with several precautions and limitations.

5.3.1 Precautions

Several precautions were taken to ensure a high degree of research quality. First, to enhance the reliability and validity of the selection of the MCM interviewees and university policy options, expert interviews were conducted until saturation was reached. These interviews provided critical feedback on the selection of the university policy options and stakeholder types. Next to the validation of expert interviews on the university policy options, two review sessions with another researcher also assisted in iteratively defining the university policy options. Also, the MCM interview process, including the description of the university policy options, was piloted with two researchers before the actual MCM interviews took place.

Second, during the MCM engagements, the qualitative comments on interviewee's decisions are very important for the validity of the research, since they are necessary to make credible and inclusive conclusions about the MCM results. To have gathered the full appraisal and context of an interviewee's assessment, it was essential that the participant was in the 'driving seat' during the interview. Various aspects achieved this. To begin with, every participant had the freedom to add additional policy options to the MCM Tool or discuss the content of the core and discretionary university policy options. Also, the criteria for appraising the options were defined by the participant only, to make sure to have collected the participant's full perspective.

Furthermore, the participant had sufficient time to think about the answers and to move freely between the different steps of the MCM Tool. In this way, a participant was able to go back in the process and

adapt his or her answer when needed. Lastly, to make sure that all interviewees could express themselves fully, interviewees were executed in Dutch, where quotes were translated in English during data analysis.

Third, a characteristic of an MCM analysis is the complexity, magnitude, and variety of quantitative and qualitative data. Consequently, the interpretation of the data is complex and nuanced and dependent on the researcher's observations. The complexity of the analysis was (partly) overcome by using the MCM Tool in combination with an Excel file containing coded qualitative data from the transcripts of the MCM engagements. Both the MCM Tool as the Excel file provided structure and transparency on the data. Hereby, it was possible to compare different perspective accordingly. Moreover, open codes for criteria were checked with another researcher and iteratively adapted before using in analysis with the MCM Tool. Also, after analyzing the results, a joint validation session was organized to openly discuss the main findings with eight interviewees from either expert interviews or MCM engagements. This joint session assisted in validating the main outcomes but also left room for discussion on the possible managerial and policy implications, and suggestions for future research.

5.3.2 Limitations

Besides the precautions taken, this research still has limitations and therefore, critical notes related to the validity and reliability of this research. First, the MCM engagements focused on the interviewee's individual opinion, taking into account his or her particular thoughts and experiences related to his or her position. One could question to what extent the chosen stakeholders were able to speak on behalf of the whole stakeholder type, faculty, department or organization. Also, some interviewees made the impression to have a little bit more experience on the topic compared to others while scoring the university policy options. For example, some interviewees explained to have little insight into the financial feasibility of a university policy option. Although these options scores were provided with a neutral score or high ranges, one could still wonder if the scores of these options should be given less weight than the same options scored by more experienced interviewees. Funny is that this limitation could be interpreted as a paradoxical character of the MCM method: on the one hand you aim to bring out the different perspectives and personal beliefs, on the other hand you may wonder if the individual performance scores and perception of an individual are really correct? However, considered as a possible limitation, the results of the MCM engagements succeed in bringing out the fuzzy reality with its tensions that are experienced by the particular interviewees.

A second limitation of this research is the incompleteness of perspectives. Although the boundary condition of at least four interviewees per perspective was reached, not all faculty perspectives are included in the micro-level, and not all (aimed to include in advance) interviewees from the macro perspective are interviewed. The reasons are lack of time of interviewees to engage in the MCM interview. Besides a few missing stakeholders, another form of incompleteness of perspectives is that this research focused on the 'pro-societal impact' perspective, meaning that possible stakeholders with a less optimistic point of view on societal impact activities are excluded from this research. Although this research chose to focus on the 'pro-societal impact' side of the story (if we agree on enhancing societal impact activities in the university; how should we achieve this?), including the critical and less favorable perspective could be relevant and useful for the final result of this research, and therefore for policymakers. One could question, for example: what are the benefits of the traditional and linear way of doing research? Also, how far should we go went it comes to embedding societal impact within the university regime? Are there any risks we oversee right now? However, the (partly) consensus in views shows that the selected interviewees provide a proper presentation for pro-impact stakeholders aiming to improve the university systems upon this academic challenge.

Third, since the scope of the interviews focused on actors within and around Utrecht University, it is difficult to make conclusions about other less corresponding universities. For example, Utrecht University is described as a 'research university' focusing on studies related to natural sciences, health

science, economy, law, social sciences, and humanities (Chiong Meza, 2012). Universities with more technical and engineering studies like technical universities, acquire very different knowledge and therefore act in a dissimilar context. Since the university contexts may differ, it is incorrect to assume that the findings will be representative of all universities (in the Netherlands).

Fourth, due to the relatively small number of interviewees representing various stakeholder types, it was necessary to be discreet with making firm conclusions about the quantitative results. Analyzing the individual rank reports assisted in this: apart from the results per perspective, how do individual interpretations between interviewees differ (also within perspectives)? However, previous MCM analysis state that the quantitative data of uncertainty and variety in the scoring are less important (Stirling & Mayer, 2001): *"The implications are that 'technical' dimensions of uncertainty are less crucial than the more intangible qualitative aspects concerning the diverging interests, values, and framing assumptions adopted by different participants."*(p.545) Moreover, a second reason to be cautious with the quantitative results is that the final ranks reports are dependent on the accuracy and data analysis methods of the MCM Tool developed by the University of Sussex. For example, in the weight reports, participants are only included in the calculation for the weight means and weight extrema when they actually used the particular issue in their appraisal. Weight charts also show this. Interpreting these charts should, therefore, be done critically and cautiously.

Lastly, next to the limitations related to the selection of the case and stakeholders, missing stakeholders and individual viewpoints of stakeholders, another limitation is related to the conditionalities found in the results. The MCM method is not aimed to deal with conditionalities and interconnections between options: the conditionalities could also influence the optimistic and pessimistic scores of an option under criteria. Therefore, the MCM method did not identify a single policy, or a combination of policies that are sufficient to solve the academic challenge on its own.

Notwithstanding the last limitation, do the qualitative MCM results nevertheless provide valuable insight into these relations. This research shows that the mapping of the policy options performance could be used to provide a comprehensive picture of the conditionalities and interconnections between the university policy options, possibly useful for university policymakers. The MCM method does function as a beneficial approach to identify a set of (university) policy changes that, *while not being sufficient*, are *necessary* to successfully transfer towards a university system embracing societal impact of academic research. Concluding, this research provides a valuable outcome on exploring how the different stakeholders perceive the policy options, and in what situations solutions interviewees perceive them as legitimate and valid. Although supported by a quantitative element, MCM pays much attention to the sensitivities and framing assumptions of the stakeholders in appraising the options and '*it can be argued that MCM goes a long way towards mitigating many of these difficulties'* (Coburn & Stirling, 2016, p. 96).

5.4 Suggestions for future research

The results of this study provide several appealing suggestions for future research. To begin with, as addressed multiple times in this report, this research only included the perspectives of those stakeholders in favor of enhancing societal impact of academic research by pro-active policy actions. As also suggested by a few interviewees, future research could compare the perspective of the stakeholders 'in favor' with stakeholders 'less in favor' of embedding societal impact within universities research practices. What is their opinion on this topic? Also, how does it differ from what we have found here?

Second, the scope of this research focused on Utrecht University and a few related Dutch organizations from outside the university. During MCM engagements, many interviewees emphasized the diverse character of societal impact: every type of knowledge and research has its suitable ways of providing societal impact. The theory section also introduced this; different forms of knowledge production have different forms of knowledge exchange and knowledge use targeting different societal groups (van De Burgwal et al., 2017). The question here still is how the need for support on societal impact differs

between types of knowledge, faculties or universities. Not all institutional (sub-) systems deal with the same problems when it comes to enhancing societal impact of academic research. For example, when comparing the performance of university policy options between universities, possible case selection criteria are the type of university (research or technical), the location of the university (national or international) or other distinctive characteristics of universities.

Third, during interviews, some interviewees mentioned that Utrecht University is way behind in embedding societal impact within its research and education tasks. Other universities, for example, KU Leuven (Belgium), Massachusetts Institute of Technology (United States) and Maastricht University (the Netherlands), already adopted ways to implement incentives and strategies to enhance societal impact. Now that we know what kind of university policy options are needed to address this transition, case studies on the experience within these universities could help to clarify why and how university policy options have been (successfully) implemented. These outcomes could potentially serve as benchmarks or inspiration for universities struggling with the implementation of societal impact policies.

A fourth suggestion is to not only do research focusing on the university systems, but also research what the government and related public organizations (like The Association of Universities in the Netherlands) can do to support each other in enhancing societal impact. Several times, interviewees emphasized the (inter)national character of this academic issue, and the necessity to collaborate with governments, public organization, and other universities on an (inter)national level. Because lack of knowledge on the decisions taken on a national or international level, uncertainty under the stakeholders when deciding on the best next move is still high. Exploratory research on the possible governmental policies on this matter would provide potential benefits. Again, MCM could be applied in this context. Furthermore, another interesting topic for future research is to examine the future roles of the different knowledge institutions: universities, universities of applied sciences, PRO's (Public Research Organizations) or RTO's (Research and Technology Organization) and how the government, public organizations and the knowledge institutions themselves could take responsibility in supporting their roles and mutual collaborations.

Finally, under the guise of 'practice what you preach', a final recommendation is to not only do research and publish articles on this matter. Instead, aim for *making an impact on enhancing societal impact* within academic research. Therefore, it is crucial to test the potential policy actions in practice and pilot preferred options within the university. Providing 'real impact on enhancing societal impact' is fuzzy, non-linear, uncertain, (probably) frustrating, complicated, takes a great deal of patience, but are also all part of the process and therefore inevitably! By this study, I hope to have inspired stakeholders to act together accordingly.

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Appendices

Appendix A: Organizational structure and policy instruments university

Organizational Structure

According to The Young Academy of the Royal Netherlands Academy of Arts and Sciences (2018) the standard organizational structure of a Dutch university resembles the chart in Figure 12. Every university has an executive board, which determines the policies that concern the whole university. The decisions of the executive board are also influenced by the advice of the supervisory board and the policy actions of the Ministry of Education, Culture, and Science (OC&W). Moreover, national organizations like the Royal Netherlands Academy of Arts and Sciences (KNAW), the Association of Universities in the Netherlands (VSNU) and Netherlands Organization for Scientific Research (NWO) also influence university's strategy. Within the university, academic staff works within the different faculties. Every faculty has a faculty board responsible for the strategy of the faculty, for example, the types of research that will be conducted and whom to recruit. The academic staff is responsible for providing education to students, doing research and also ensure the valorization of research. The non-academic staff works to support and facilitate the academic staff and students, for example, the communication office, facility services or knowledge transfer office.

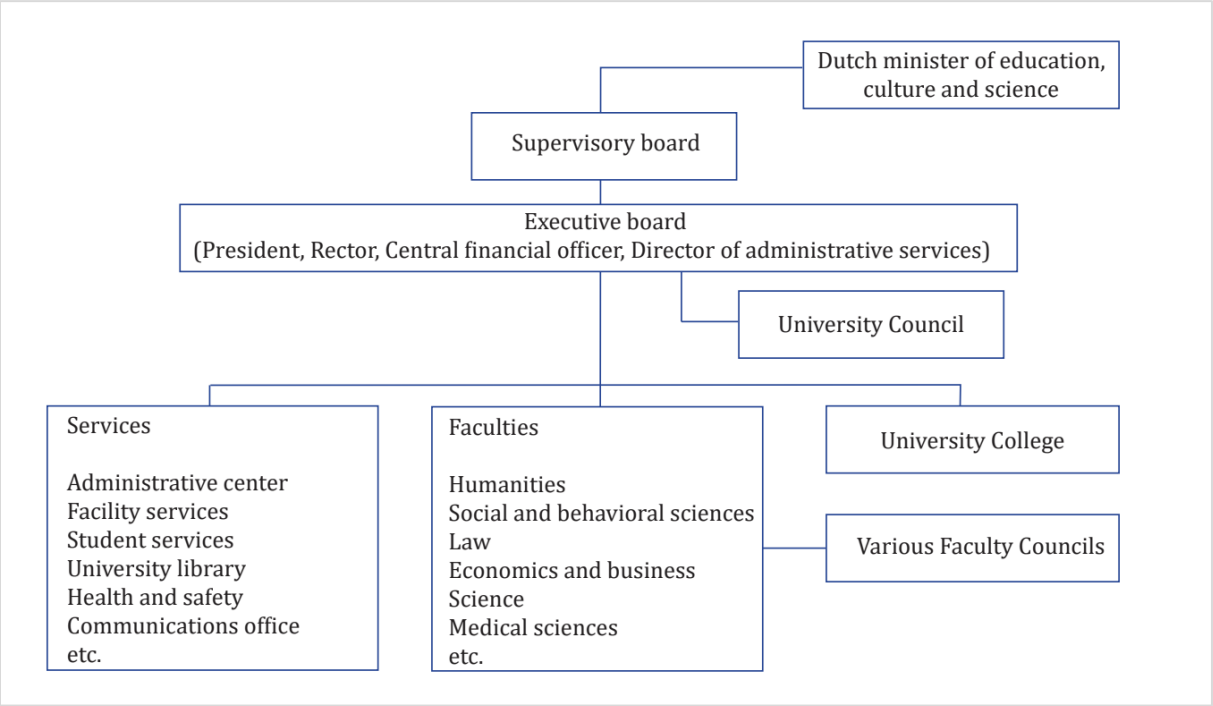

Figure 12: Standard organization chart Dutch University by The Young Academy of the Royal Netherlands Academy of Arts and Sciences (2018)

University policy instruments[4]

As mentioned in the Theory section, the university has several 'missions': the first, second and third mission referring to education, research, and commercialization. Also, the mission of co-creation for societal challenges is new, and, as is made clear in this proposal, under development. The societal impact of knowledge is mainly dependent on the activities of the academic staff (from Ph.D.'s to faculty deans), and what they decide to do or not to do with the research they carry out. Although the academic staff is responsible for the final actions considering societal impact of research, the university has a great responsibility to support and facilitate the academic staff in doing so. So, the executive board and the

[4] The information in this paragraph is mainly based on results of the expert interviews

support staff of the university can help to set an institutional context that supports the academic staff's activities around societal impact. Said differently: enable the academic staff to work on societal impact of academic research.

First of all, finding finances for executing research and societal impact valorization activities is key. For academics' research, there are three possible funding streams. Herein, the first funding stream comes directly from the university that is provided by the government for teaching and research activities. The universities can decide themselves how they divide the first flow of funds over the support staff and academic staff. In this way, the university could also decide to set up financial support mechanisms for academic staff working on societal impact of research. The latter could be for example on the level of human resources, or in the form of a separate financial fund.

Besides the financial incentives for research, the university is also responsible for the infrastructure within the university. For example: are there physical spaces where stakeholders can meet? Alternatively, spaces where academic staff can come together and experiment? Is there a proper internal information system and knowledge management system within the university? Next to providing the physical resources, the university can also support the academic staff by pursuing a specific strategy. Herein, the university determines how they want to present themselves for the outside world, but also what internal culture they want to achieve.

All in all, these examples are called *instruments* and can be combined into policy interventions. Think about financial support, providing information, raising awareness, offering training, deployment of human capital, consultation, rewards or sanctions, investing in specific tools. Besides the fact that they can focus on an institutional pillar, these instruments can also be subdivided in varieties of policy tools. A practical classification of these policy tools is provided by Schneider and Ingram (1990). They state that policy tools can either be classified as (1) authority tools, (2) incentives, (3) capacity tools, (4) using symbolic and hortatory proclamations to influence perceptions and values, and (5) by promoting learning (policy experiments) to reduce uncertainty (Schneider & Ingram, 1990). Altogether, the executive board and the support staff could use different instruments in university policy to enable academic staff to work on societal impact of academic research. In this way, policies help to set a direction of the university's resources to realize the goal of gaining more societal impact.