

# **Understanding and assessing the societal impact of sustainability research: From state of the art to a process-oriented assessment plan.**

With the case study of the Wuppertal Institute in Germany.

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## **Abstract**

Sustainability research builds upon its mutual relationship with the society to find future-oriented solutions to deal with societal challenges. In other words, it is a matter of research to produce societal impact. Furthermore, funders and researchers themselves increasingly desire for accountability, to show if societal impact is achieved. To deal with that, two adaptive questions have to be answered: How can societal impact be understood or defined? And what can be learned from theoretical and methodological approaches, as well as practical examples? Built on the answers through a comprehensive literature review and expert interviews, the third question is asked: How can the assessment of societal impact of sustainability-oriented projects look in practice? The result is the development of a holistic framework on the project-level and its operationalization. It was tested on three cases of the Wuppertal Institute, which has the mission to be a pulse generator for a sustainable societal transformation. The results show that the tool is implementable and a start of an assessment series. Nevertheless, the lack of consensus about the theoretical background influences the design of practical applications. One significant development is the focus shift of the assessment towards the project process and its productive interactions. This enables to collect data about whether societal impact is produced, but also how. The results suggest that clear assessment boundaries are required to deal with uncontrollable externalities. Furthermore, a practical question of the thesis is, if the integration of directly involved stakeholders into the assessment provide an added value. This can be answered positively. But it should be also observed that financial and human resources are key challenges about the extent, as well as the processing of the results. The analysis indicates that to assess societal impact is a suitable instrument and a key step to deal with societal challenges. The developed holistic framework and its operationalization can be used to inspire future research.

**Keywords:** Impact Assessment; Productive Interaction; Knowledge Exchange; Sustainability Research; Multi-method Approach; Boundary Partner

## **Executive Summary**

The complexity and interpretation of the relationship between the society and the scientific world and its social responsibility is highly discussed since decades. This is further pushed by the loss in trust that science has only best intentions towards humankind (Bornmann, 2013; Martin, 2011). The metaphor of sitting in an ivory tower to ensure independency changed to a negative meaning of isolation (Luederitz, pers. comm.). However, to be clear about the depending relationship is significant when thinking about the development of future-oriented solutions to deal with grand societal challenges. The claim that new formats within the scientific world are needed, is implemented within interdisciplinary and transformative sustainability research and its focus on a sustainable development within the society (Jahn & Keil, 2013; Grunwald, 2015). This background makes two interactive actions obvious: First, it is needed to produce societal impact by research (Meagher et al., 2008) and second, a suitable instrument is required for an assessment to deal with the claim of accountability towards the society (Penfield et al., 2014). Latter is demanded from various representatives within a multi-level system, especially when talking about the allocation of research funding by taxes: the EU, at the Federal State level and/or internal within institutions and researchers themselves.

To deal with these demands, it is not enough to measure the scientific impact within academia through well established instruments, like the counting of citations or commonly used bibliometrical analysis (e.g. Bell et al., 2011; Holmberg et al., 2015). Furthermore, economic indicators are only of limited value (Bornmann, 2013). The assessment of societal impact requires the extension of the scope towards the real-world. That is the reason why new approaches are needed. To structure the assessment, a basic logic model with the phases from input until outcomes/ impacts are commonly used (e.g. Penfield et al., 2014). Additionally, it requires a prioritization towards impact within this cause-effect model and the assessment of the quality and societal relevance of research. Nevertheless, this clear demand faces a disagreement about a commonly accepted definition of societal impact on the theoretical level, as well as the choice of an analytical method (Maas & Liket, 2011). The research questions build on each other and the first two can be described as applied questions to create a basis of understanding to be able to answer the third question:

- RQ1: How can societal impact, or the societal impact of scientific activity, be understood or defined?

Based on the lack of consensus about a definition and its understanding, various approaches are developed (e.g. Spaapen & van Drooge, 2011; Donovan & Hanney, 2011). The thesis has the objective to answer the following question to provide a comprehensive overview:

- RQ2: Which theoretical and methodological approaches are discussed in literature and on this basis, what can be learned from practical examples with regard to opportunities and challenges?

The review of various data collection methods and theoretical discourses show clear challenges of an assessment (e.g. time-lack, attribution, causality, data collection, etc.) (e.g. Bell et al, 2011; Bornmann, 2014a; Derrick & Samuel, 2016). These do not only limit the operability, but also influences the design. Combined with the results of the literature review and comprehensive expert interviews, these findings are used to develop a theoretical framework and its operationalization in a tool, which is tested on three cases in the study of the Wuppertal Institute, Germany. This provides an answer to the third question:

- RQ3: Based on the theoretical findings, how can the assessment of societal impact of sustainability-oriented projects look like in practice? Does the integration of directly involved stakeholders into the assessment provide an added value?

Nevertheless, the thesis has also a limited scope, because first the discourse about the assessment of societal impact is in its early stages and a consensus about basic principles is far away. Second, the geographical scope is the European Union to show a multilevel system and its various demanders to demonstrate societal impact. And third, the test-phase includes three cases, which causes a restriction in generalization. However, it should be seen as a start of an assessment series.

Getting more into detail about the research process, it contains out of three stages:

**1<sup>st</sup> Stage** - The scope of the topic is explored through a comprehensive literature review. It includes an analysis of the theoretical and analytical approaches, as well as the review of practical examples within a multilevel system. To show the various approaches of an assessment in reality, significant examples are the EU program Horizon 2020 with the demand to demonstrate future societal impact during the application process of research funding allocation (European Commission, 2015a), and the Research Excellence Framework 2014 in the United Kingdom (REF, 2011; Samuel & Derrick, 2015). The Higher Education Funding Council for England assesses the societal impact with the help of the framework from a historical perspective to allocate funding to universities. Another example is the internal assessment of societal impact to increase the learning-effect and use it as an adaptive management tool, like the Stockholm Environment Institute does (SEI, 2013).

**2<sup>nd</sup> Stage** - A deeper designed research examination is reached through nine interviews with experts from the theoretical and practical fields, which enriches the theoretical background. It finalizes the theoretical part of the thesis with the benefit to gather personal opinions about the topic by practitioners and researchers. The findings are used for the development of a theoretical framework and its operationalization in a tool with a mixed-method approach (e.g. ESF, 2012).

**3<sup>rd</sup> Stage** - The results are put together as a plan for assessing the societal impact in cases deeply. It includes the categorization of indicators of the assessment, documentary analysis, interviews with directly involved stakeholders in the specific project. The collected data are summarized in a final project report. The operationalized approach is examined in three cases of the Wuppertal Institute in Germany: CASCADE, SusLabNWE and Cleverer Kiez. The institute has the overall goal to be a pulse generator for a great transformation of the society, mostly through applied sustainability research (Wuppertal Institute Report, 2011).

Coming to the findings of this thesis, these should be split into a theoretical and practical part. First, as already mentioned, there is clear lack of consensus about the definition which causes consequently various approaches. On the basis, it is clear that impact is the consequence of a cause, a change, but there exists no clear line how to assess societal impact. Nevertheless, current trends can be detected. The case study is the most common method (Bornmann, 2013; Wiek et al., 2014), which is operationalized through the basic logic model from input to impact. Generally speaking, it is visible through the literature review and the expert interviews that there is a clear focus-shift within research assessment away from resources (input) to activities within the process, its outputs and outcomes. Building on that, another significant finding is to focus on productive interaction between various stakeholders on different levels within the project is the most promising in present. It is accepted as a precondition, or indicator of societal impact (Spaapen & van Drooge, 2011). The focus on the interaction confirms the importance to integrate various directly involved stakeholders to complete feedback loops and to assess the

process from different perspectives. The pilot-phase shows that this approach is sufficient to create an added information value. This trend also signalizes that the assessment of societal impact in the real-world is currently a vision. To be able to create a standardized format, clear boundaries of influence of a project have to be drawn to avoid the influence of uncontrollable forces from the outside. The focus on the project process and the included productive interactions offer a convenient solution. Nevertheless, one major finding is the difficulty of a qualitative empirical evaluation. In the case of an impact measurement, empirical evidence is required. Other research fields use control groups for that, like in the medicine. But this is not possible in the social sciences because of ethical and financial purposes (Stockmann, 2000; Schmidt, pers. comm.). Furthermore, a laboratory situation is needed, which is impossible to realize. To sum up the findings, the thesis shows that not only accountability is a major driver, but also to increase the internal learning and the establishment of an solution-focused management approach. For that, a more detailed assessment of the process phases within small steps is useful to gather precise data about the process (Spaapen & van Drooge, 2011) and the productive interaction of directly involved stakeholders.

To conclude, it is obvious that a liveable discourse about how to define and understand the societal impact exists. This is pushed by external and internal interests of the demands of stakeholders to show that changes in the society are the objectives in the long-term. Nevertheless, various perspectives about the theoretical principles, beginning with the relationship between science and the society, make it impossible to determine a consensus, only a general tendency. This and other uncontrollable forces causes the shift from the assessment of societal impact to the focus on the quality of the project process, especially the included productive interactions between stakeholders. Overall, transparency and replicability of an approach are essential to use the assessed data effectively (van Bergeijk & Johnson, 2014). The developed instruments can be used for a cross-case analysis (Donovan & Hanney, 2011), because of its standardized format. Furthermore, it includes three options of usage to strengthen the knowledge transfer and learning effect internally and to provide sufficient information to the external demanders. A gradual implementation in future could be a start. Nevertheless, this discussion needs to include the expenses of financial and human resources to establish such a system. It should not be the goal to create a Frankenstein monster, but to keep a cost-benefit balance (Martin, 2011). It is important to understand that not only to show societal impact is needed, but also to understand how it is produced. The sustainability research uses knowledge from society for their research to find sustainable solutions within the real-world, which should not be seen as a replacement, but a supplement in the scientific world (Grunwald, 2015).



# Table of Contents

|   |            |
|---|------------|
| <b>LIST OF FIGURES.....</b>   | <b>III</b> |
| <b>LIST OF TABLES.....</b>  | <b>III</b> |
| <b>ABBREVIATIONS .....</b>  | <b>IV</b>  |
| <b>1 INTRODUCTION .....</b>   | <b>1</b>   |
| 1.1 BACKGROUND AND PROBLEM DEFINITION.....  | 2          |
| 1.2 PURPOSE AND RESEARCH QUESTIONS .....  | 4          |
| 1.3 SCOPE AND LIMITATIONS.....  | 5          |
| 1.4 ETHICAL CONSIDERATIONS .....  | 6          |
| 1.5 TARGETED AUDIENCE.....  | 6          |
| 1.6 DISPOSITION (OUTLINE).....  | 6          |
| <b>2 RESEARCH METHODOLOGY .....</b>   | <b>7</b>   |
| 2.1 RESEARCH DESIGN .....   | 7          |
| 2.2 METHODS OF DATA COLLECTION AND ANALYSIS.....  | 8          |
| 2.2.1 Literature Review .....   | 8          |
| 2.2.2 Expert Interviews and Analysis.....   | 8          |
| 2.2.3 Operationalization of the Theoretical Framework – Data Collection and Analysis..... | 9          |
| <b>3 LITERATURE ANALYSIS – FROM THE ASSESSMENT OF SCIENTIFIC TO SOCIETAL IMPACT .....</b> | <b>14</b>  |
| 3.1 THE DEFINITION OF SOCIETAL IMPACT .....   | 14         |
| 3.2 MAIN RESEARCH RESULTS OF THE LITERATURE REVIEW.....                                   | 16         |
| 3.2.1 Key Challenges.....   | 17         |
| 3.2.2 Theoretical and Methodological Approaches to Assess Societal Impact .....           | 18         |
| 3.2.3 From Another Perspective: Social Impact Assessment (SLA).....                       | 26         |
| 3.2.4 Insights in Practical Examples on Different Levels within Europe.....               | 26         |
| 3.3 MAIN RESULTS OF EXPERT INTERVIEWS.....  | 32         |
| <b>4 THEORETICAL FRAMEWORK AND ITS OPERATIONALIZATION .....</b>                           | <b>37</b>  |
| 4.1 DEVELOPMENT OF THE THEORETICAL FRAMEWORK .....  | 37         |
| 4.2 OPERATIONALIZATION OF THE FRAMEWORK: THE ANALYTICAL TOOL DEVELOPMENT .....            | 40         |
| 4.2.1 Categorization of Indicators.....   | 41         |
| 4.2.2 The Analytical Tool .....   | 46         |
| 4.2.3 Options How to Use the Tool.....  | 46         |
| <b>5 WUPPERTAL INSTITUTE CASE STUDY.....</b>  | <b>48</b>  |
| 5.1 BACKGROUND INFORMATION ABOUT THE CURRENT SITUATION IN GERMANY.....                    | 48         |
| 5.2 DESCRIPTION OF THE WUPPERTAL INSTITUTE.....   | 49         |
| 5.3 STRATEGIC OPTIONS OF THE INSTITUTE .....  | 51         |
| 5.3.1 CASCADE .....   | 52         |
| 5.3.2 SusLabNWE (subproject SusLabNRW).....   | 53         |
| 5.3.3 Cleverer Kiez .....   | 55         |
| <b>6 ANALYSIS AND DISCUSSION .....</b>  | <b>58</b>  |
| 6.1 DISCUSSION OF FINDINGS .....  | 58         |
| 6.2 DISCUSSION OF METHODOLOGY.....  | 62         |
| 6.2.1 Development of a Theoretical Framework and its Operationalization .....             | 62         |
| 6.2.2 Test-phase of the Tool .....  | 63         |
| <b>7 CONCLUSION.....</b>  | <b>65</b>  |
| 7.1 INSPIRATION FOR FUTURE WORK .....   | 67         |

|   |            |
|---|------------|
| <b>BIBLIOGRAPHY.....</b>                                      | <b>69</b>  |
| <b>APPENDIX A - WORK SCHEDULE .....</b>                       | <b>77</b>  |
| <b>APPENDIX B – INTERVIEW QUESTIONS TO AN EXPERT.....</b>     | <b>78</b>  |
| <b>APPENDIX C – QUESTIONNAIRE TO A PROJECT LEADER .....</b>   | <b>81</b>  |
| <b>APPENDIX D – QUESTIONNAIRE TO A BOUNDARY PARTNER .....</b> | <b>85</b>  |
| <b>APPENDIX E – CASE TEMPLATE WITH KEY QUESTIONS.....</b>     | <b>93</b>  |
| <b>APPENDIX F – CASCADE PROJECT REPORT .....</b>              | <b>98</b>  |
| <b>APPENDIX G – SUSLABNWE/NRW PROJECT REPORT.....</b>         | <b>113</b> |
| <b>APPENDIX H – CLEVERER KIEZ PROJECT REPORT .....</b>        | <b>132</b> |

## List of Figures

|  |    |
|--|----|
| Figure 2-1 ‘Description of the design of the research project’ .....   | 7  |
| Figure 2-2 ‘Description of the components of the tool’.....  | 10 |
| Figure 2-3 ‘Storyboard for the project ‘Cleverer Kiez’ .....   | 12 |
| Figure 3-1 ‘Process model of societal impact development’ (in Stelzer et al., 2015 adapted by Penfield et al., 2014).....  | 20 |
| Figure 3-2 ‘Impact-stairs with cascades’ (translated from Kurz et al., 2013 5 with the addition of cascades, based on Schmidt, 2015).....  | 21 |
| Figure 3-3 ‘IGES Impact Generation Strategy’ (adapted by IGES, 2014) .....   | 21 |
| Figure 3-4 ‘The logic model of the Payback Framework’ (adapted by Hanney et al. in Donovan & Hanney, 2011 182) .....   | 24 |
| Figure 3-5 ‘Importance of Impact within the dual-support system of the UK’ (received through personal contact with Ch. Hewer, Executive Directorate of RCUK).....  | 28 |
| Figure 3-6 ‘An abstract representation of a project’s influence’ (Based on outcome mapping approach developed by International Development Research Centre in de Bruin, 2014) .....  | 31 |
| Figure 4-1 ‘Theoretical framework for the assessment of project’s societal impact’ (adapted from Donovan & Hanney, 2011; IGES, 2014; Earl et al., 2001; Spaapen & Drooge, 2011; Lähteenmäki-Smith, 2006; Bornmann & Marx, 2014 211)..... | 38 |
| Figure 4-2 ‘Methodological implementation of the framework into a step-by-step tool and its ‘counter-flow’ interactions’ .....   | 41 |
| Figure 5-1 ‘The three research groups of the WI’ (Wuppertal Institute Report, 2011 21ff.; Wuppertal Institute, 2016c).....   | 50 |
| Figure 5-2 ‘Strategic options of the institute’ (adapted by Mijnhardt in van Bergeijk & Johnson, 2014 50 with information about the WI from his website and the Wuppertal Institute Report, 2011) .....                                  | 51 |

## List of Tables

|   |    |
|---|----|
| Table 2-1 ‘List of interviewees’ .....  | 8  |
| Table 2-2 ‘List of projects’.....   | 11 |
| Table 2-3 ‘Section of the Case Template’ (see Appendix E).....  | 13 |
| Table 4 “A list and evaluation of most-cited societal impact measurement approaches” .....                    | 24 |
| Table 4-1 ‘Categorization of indicators for an assessment of societal impact in sustainability research’..... | 42 |

## **Abbreviations**

|         |   |
|---------|---|
| BEA     | Berlin Energy Agency                                      |
| CASCADE | Cities Exchanging on Local Energy Leadership              |
| DeGEval | German Evaluation Society                                 |
| ERiC    | Evaluation Research in Context                            |
| ESF     | European Science Foundation                               |
| EU      | European Union  |
| GDP     | Gross Domestic Product                                    |
| GRI     | Global Reporting Initiative                               |
| HEFCE   | Higher Education Funding Council for England              |
| HEI's   | Higher Education Institutions                             |
| ICM     | InnovationCity Management GmbH                            |
| ICT     | Information and Communication Technology                  |
| IDRC    | International Development Research Centre                 |
| IGES    | Institute for Global Environmental Strategies             |
| MSC     | Most significant change                                   |
| OECD    | Organization for Economic Cooperation and Development     |
| PMEC    | Planning, Monitoring, Evaluation and Communication System |
| RAE     | Research Assessment Exercise                              |
| RCUK    | Research Council UK                                       |
| R&D     | Research and Development                                  |
| REF     | Research Excellence Framework                             |
| RG      | Research Group  |
| RQF     | Research Quality Framework                                |
| SEI     | Stockholm Environment Institute                           |
| SEP     | Standard Evaluation Protocol                              |
| SIA     | Societal Impact Assessment                                |

|           |   |
|-----------|---|
| SIAMPI    | Social Impact Assessment Methods for research and funding instruments through the study of Productive Interaction |
| SusLabNWE | Sustainable Labs North West Europe  |
| WGBU      | German Advisory Council on Global Change  |
| WI        | Wuppertal Institute   |



# 1 Introduction

How would you describe the relationship between the wider society and the scientific world? Does a “societal responsibility of scientists” (Martin, 2011 248) exist? What would be an ideal condition? These questions are in focus of a lively discussion in both the past and present. One major driver is the increasing importance to deal with grand societal challenges, like mostly mentioned the climate change, global warming and clean energy (WR, 2015 15) and subsequently the need of a societal transformation in the 21<sup>st</sup> century. The Intergovernmental Panel on Climate Change publishes scientific findings about these challenges, but who has to take action and how? According to Bornmann (2014a), it is clear that these threats affect “relatively autonomous” (p.3) societal subsystems (e.g. science, policy, economy, civil society), which result in complex correlations (WR, 2015; Wiek et al., 2012). The German Science Council (in German: ‘Wissenschaftsrat’) emphasizes that collaboration is needed to successfully cope societal challenges (WR, 2015 26). Therefore, one task is to overcome the independence of these subsystems and to achieve a multiple-sided dissemination of knowledge (WR, 2015).

The need of a transformational change is growing and the scientific world plays a significant and active role to find sustainable societal solutions for the common good (Miller et al., 2014; WR, 2015; Luederitz et al., submitted). Besides the need of an interaction between societal subsystems, scientific disciplines have to cooperate. The demand of alternative formats besides well demarcated disciplines (Schneidewind, 2015) is highly discussed (WR, 2015). The metaphor about scientists in an ivory tower changed from the need of independence into a negative understanding of isolation (Luederitz, pers. comm.) and “scientists have become so specialized that they do not even understand each other anymore” (Pols in van Bergeijk & Johnson, 2014 12). Furthermore, there is an ongoing loss of trust in research, that it has always a positive societal impact in mind (Bornmann, 2013; Martin, 2011).

An alternative format is sustainability research. It is interdisciplinary and connects different fields of research to find solutions for a sustainable development, as well as to “strengthen the capacity to act with these problems” as a society (Jahn & Keil, 2013 8). This is one major objective, according to Kates et al. (2001). Others are to understand “the fundamental interactions between nature and society” and “promoting social learning necessary to navigate the transition to sustainability” (Kates et al. in Miller et al., 2014 239ff.). Transdisciplinary research has been developed in context of sustainability research since the 1980s. It includes the usage of methods from different disciplines and the integration of non-academic stakeholders within the research process, to produce societal impact outside of the academic world (Walter et al., 2007; WR, 2015). Furthermore, strengths and weaknesses of individual scientific disciplines get visible through this interaction as an “organizational principle” (Schneidewind, 2015 89).

Building on those achievements, transformative research takes the view that holistic societal challenges cannot be solved without scientific knowledge (Schneidewind, 2015). First, science initiates social change processes, but also has to learn from them (Schneidewind & Singer-Brodowski in Schneidewind, 2015). Second, this requires an opening of the scientific world and an interaction between stakeholders of all societal subsystems to fulfil the “social contract” (Wiek et al., 2014 117ff.). To achieve this, “changes in research modes, incentive structures, and reward systems” are needed in the scientific world (Wiek, Scholz, Talwar et al., Lang et al., in Wiek et al., 2012 7). Nevertheless, it should be borne in mind that the societal relevance is, in contrast to scientific relevance, influenced by normativity and self-interests (e.g. Wiek et al., 2012; Wiek et al., 2014).

Besides the positive view on this development, criticism about the transformation of the whole scientific system is expressed by various scientists. A prime example is the debate between high-ranking personalities of German science. The president of the German Research Foundation, P. Strohschneider, expresses his concern about the direct interaction between science and society as a “retreat in premodern normativities” (Grunwald, 2015 6). He lists four characteristics of transformative research: solutionism (the usefulness of research to achieve normative goals); the transdisciplinarity, to deal with societal, not scientific challenges; the evidence base through normative foundations; and the dedifferentiation between scientific excellence and societal relevance, science and society (Grunwald, 2015 17ff.). A. Grundwald, German expert of Technology Assessment, responds with the acceptance of the first two characteristics, but not the characteristics of evidence base and the dedifferentiation. The relationship between norms and science is sensitive, according to G. Stock (President of the Union of German Academics of Science and Humanities), especially because of the German history and the experiences with the instrumentalization of science by politics (in Grundwald, 2015). Besides this controversy, the central question is, if transformative research and its direct interaction with the non-academic world wants to replace the established scientific system or if it is just a supplement? (Grunwald, 2015). G. Stock comes to the conclusion that a replacement is not intended, just a readjustment to deal with societal challenges (cf. Grunwald in Schneidewind, 2015; WR, 2015). Additionally, the German Science Council emphasizes that the current scientific system needs to be kept to strengthen the “robustness”, but basic and applied research needs to be continuously audited (WR, 2015 25ff.).

Therefore, U. Schneidewind (2015), president of the Wuppertal Institute (WI) and member of the German Advisory Council on Global Change (WGBU), demands a democratization of the relationship between society and the scientific world and to stop ignoring the demand of societal impact of research to deal with transformation processes (cf. Schneidewind & von Wissel, 2015 8; Wiek et al., 2012; Schneidewind, 2015). He also points out that even if the scientific world ignores its role of knowledge utilization, there is an impact on these societal processes. The democratization includes the focus on the generation of impact in the real-world to achieve sustainable development (Miller et al., 2014) and the provision of research funds, but also the need of a democratic legitimation of scientific research towards the society (Schneidewind & von Wissel, 2015). Even if the sustainability research deals with societal challenges, a substantiated assessment is required, as Milton Freedman demonstrated: “One of the great mistakes is to judge policies and programs by their intentions rather than their results” (in European Commission, 2015a 5).

## 1.1 Background and Problem Definition

Related to the previous statement, it shows that scientific impact, as an absolute standard of disciplinary excellence, is not sufficient anymore (WR, 2015). Commonly used bibliometric analysis, or the counting of citations are not valuable approaches to show the scientific quality and the societal relevance of research (Penfield et al., 2014; Pols in van Bergeijk & Johnson, 2014). Furthermore, L. Bornmann (2013) points out that highly recognized research in the academia is maybe not as good as for the society. In the opinions of Penfield et al. (2014), it is simply a cause of justification for research and that a failure means “no reason for existence” (p.22). Overall, the increased awareness of “sustainability challenges with long-term negative environmental, economic and social impacts” (Wiek et al., 2014 117; Meagher et al., 2008) promotes the development to expand the measurement of easily collected economic indicators (Bornmann, 2013).

Generally speaking, evaluation can be defined as an instrument “with which summatively observed social changes can be measured, analysed and assessed, and through which formative data for the rational control of processes generated” (Stockmann & Meyer, 2013 9).



Furthermore, the assessment could be seen “as a strategy to increase the social returns”. A distinction can be made between three types of evaluation with different purposes: prior (ex-ante), during the process and summative (ex-post) evaluation (Stockmann, 2000). The latter for example focuses on the function of control, while the others are to get an “insight, legitimation and development” (Stockmann & Mayer, 2013 74), but this can differ individually, depending on the purpose. In this context, an important change in focus is the assessment of outcomes and impacts, rather than the input to comply with the demands of “learning, accountability, or to demonstrate the value of research investments” (Morton, 2015 1). Even though, one has to keep in mind that motivation, time staff, material and legal resources can limit that scope (Stockmann, 2000). An evaluation can have an instrumental and/or enlightening function with the goal to change “the terms of the debate. It changes the conceptions of how the world operates” (Feller in VINNOVA, 2008 7).

Based on this realization, to show the societal impact of scientific activity is first increasingly demanded by external drivers (e.g. purchasers, society, politics). Reasons are mainly the accountability and that the funds are deserved (Holmberg et al., 2015). The Lund Declarations (2009), and its renewal from 2015 by the Swedish presidency of the European Union (EU), claim to focus on the grand societal challenges in Europe with requirement to measure and “maximize the economic and societal impact of new knowledge in areas such as industrial, environmental and social policies, agriculture and regional development” (p.2). Second, publicly-funded researchers themselves (also as tax-payers) demand to prove, if their research has societal impact and to show the need of resources to deal with societal challenges (Bell et al., 2011; Martin, 2011; WR, 2015). The German Scientific Council indicates this development as a supplement to the internal self-regulation of research through funding or incentives, like evaluations to show success (WR, 2015). Historically, another push towards research evaluation and the assessment of its impact was the financial crisis in the 1970s (Martin, 2011) and again in the early 2000s. Publicly-financed researches were affected by public expenditure cuts (Martin, 2011). This is important when talking about investing money, because “OECD countries spend approximately 2-3% of GDP in R&D each year” (Martin in Bornmann, 2013 217).

Within Europe, one of the key drivers is the EU and its focus on societal challenges (Schneidewind & von Wissel, 2015). The European Framework Program ‘Horizon 2020’ includes the indicator of societal impact in its assessment to allocate research funding (van Bergeijk & Johnson, 2014). On the national level, one highly advanced system of research evaluation can be presented in the United Kingdom (UK), with the origins in the mandate of Margaret Thatcher to show “value for money” within research (Martin, 2011 247). A first scepticism of researchers about “outsiders encroaching in “their” territory” and the “peer-review as the primary decision-making mechanism” (Martin in Martin, 2011 249) changed into adaptation, or “game-playing” (Martin, 2011 251). Penfield et al. (2014) mention four specific purposes why the UK ‘Higher Education Institutions’ (HEI’s) decide to measure a broader impact: “monitoring and management to get an overview, accountability, inform funding and increased understanding of methods and routes” (p.22), as well as a “reduced uncertainty in decision making” (Mertens in Stockmann, 2000 13). However, there are also critical voices claiming that the assessment of research could produce “selection pressure” within research to more “research that has more direct economic impact or which is easier to explain to public” (Penfield et al., 2014 23).

Within research institutions, the focus on societal challenges by purchasers and the demand to show societal impact has a direct impact on their strategic alignment (WR, 2015). Steps towards an opening of the scientific world for the society and various attitude changes can be seen. One example is the change in the production of research and how to communicate that to the broad real-world (Bornmann, 2014a). The open access strategy and its assessment through

Altmetrics (alternative metrics) (e.g. number of tweets of a scientific publication) is one step in the right direction towards knowledge transfer into the society (Holmberg et al., 2015). Open science is defined as “the idea that scientific knowledge of all kinds should be openly shared as early as is practical in the discovery process” (Holmberg et al., 2015 3). But not only to communicate, also to interact with non-academics within the research agenda is recognized to obtain a learning effect on both sides (van Bergeijk & Johnson, 2014). The internal and external demands are not only seen as pressure, they could also be seen as a chance of the supply-side to establish a structured learning process as a quality management tool “about the dynamics, effective catalysis and implementation of knowledge exchange” (Meagher & Lyall, 2013 3; Romanainen, Finnish Innovation Agency, in VINNOVA, 2008). The Stockholm Environment Institute (SEI) introduced the PMEC (Planning, Monitoring, Evaluation and Communication) system in year 2011 (SEI, 2013) and is presented in this thesis as an exemplary approach.

Nevertheless, the extension of the assessment from scientific to societal impact of research projects is a research area in its early stages, with a high number of uncertainties in intellectual and practical aspects, but most important an overall accepted definition of societal impact is missing (e.g. Walter et al., 2007; Maas & Liket, 2011; Martin, 2011).

As written above, the shift towards the assessment of societal impact is driven by several factors: the demand from outside academia through policy and society, but also the increasing awareness by scientists to fulfil their contract with the society to develop sustainable solutions of how the society can deal with societal challenges. An isolation is counterproductive to this position. Particularly the interdisciplinary and transdisciplinary sustainability research recognizes the importance of an interaction with the society and of leaving the “ivory tower”, which is imbued with negativity. That shows that the production and assessment of societal impact are interdependent. Nevertheless, the research topic is young and there is an ongoing debate about how to define and assess societal impact. Research in this field is strongly needed to reach an overall accepted strategy in practice.

## 1.2 Purpose and Research Questions

The aim of the thesis is to contribute to the knowledge of how to understand the theoretical discourse about the shift from scientific to societal impact and how this can be practically implemented on the project-level within sustainability research to fulfil external and internal demands. The latter will be examined in a pilot-unit of projects of the Wuppertal Institute with special feature to integrate various directly involved stakeholders in the assessment process. In line with the research aim and focusing on different aspects of societal impact, the research questions build on each other. The first two applied questions, aiming to strengthen the basic understanding (Turabian, 2013), are followed by the third umbrella question:

- RQ1: How can societal impact, or the societal impact of scientific activity, be understood or defined?
- RQ2: Which theoretical and methodological approaches are discussed in literature and on this basis, what can be learned from practical examples with regard to opportunities and challenges?
- RQ3: Based on the theoretical findings, how can the assessment of societal impact of sustainability-oriented projects look like in practice? Does the integration of directly involved stakeholders into the assessment provide an added value?

This knowledge gap is part of the overarching problem of an assessment. This thesis presents various theoretical and methodological approaches from different research fields to deal with various challenges, for example the influence of external, normative forces through the societal

context of research. As a result of this analysis and the observation of the previously mentioned real-world fulfillments, a theoretical framework and its operationalization, to assess the societal impact of sustainability research, is developed as a possible solution.

The practical part of this thesis demonstrates a possibility of how to implement an assessment of societal research on a project-level to integrate sustainability within the strategic orientation of an institution and to cope societal challenges. In that context, the Wuppertal Institute for Climate, Environment and Energy (WI) is suitable as a study with a selection of three cases to test the self-developed tool, because it describes itself as a pioneer of transformational and sustainability research, dealing with sustainable challenges. The institute's applied research focuses on societal impact production for a sustainable development within society (Wuppertal Institute, 2016).

### **1.3 Scope and Limitations**

Various limitations were clear from the beginning of the writing process. The scope of the master's thesis is defined by the previously mentioned early stage of the discourse. Different developments happen on different levels (disciplines, multi-level governance, etc.) at the same time. That is the reason why this thesis can only produce a snapshot of the current discussion. The data collection was done by a comprehensive review of mostly new published literature. Additionally, practical examples of the demand to show societal impact of research exists all over the world, but the geographical scope is Europe. The major reason for that is to present a holistic picture about drivers on various levels of the institutional system, which influences the strategic orientation of research institutions. The decision to present the dual-funding system in the UK and not for example the Dutch Strategic Evaluation Protocol (SEP) was felt because of several reasons: first, to discuss the aspect of connecting funding with societal impact of research; second, current analysis exists about its operation and these findings are integrated into the development of an own theoretical framework. The same line of thought was applied to the decision of presenting the SEI PMEC system. Additionally, the current development within the EU is significantly influencing the strategic alignment of the Wuppertal Institute, the case study of this thesis.

Nevertheless, the uncertainty to miss important issues led to the decision to interview experts from research and practice. This enriches this thesis with an external perspective about the current development. Different research fields were conducted to break the walls within the discussion and to see if there exist overlaps between used approaches and how these similarities could be combined in an approach within sustainability research.

Furthermore, the four-month period of this thesis has the consequence that the developed tool could only be tested on three projects. These cases were selected on the basis of various factors (e.g. project end, research group). This has the restriction of generalization as a consequence. Furthermore, one case could not be fully completed because of the non-response of two boundary partners, or "individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence" (Earl et al., 2001 1). Nevertheless, this circumstance lead to a key result of this thesis. The pilot testing should be seen as a start of an assessment-series for further refinement and the development of an integrated assessment process. This is a major output of this thesis. Several mistakes could be resolved during the pilotphase, but a multiple number of assessment is needed to capture all errors.

## **1.4 Ethical considerations**

A key component of a research process is the consideration of ethical principles through all phases, but especially during the interview conduction. This is used as a main data source for this thesis and requires high ethical sensibility towards the interviewees (Bortz & Döring, 2006). The document was sent to the interviewees beforehand to guarantee an efficient interview process and to clarify misunderstandings. All questionnaires include a section about the rights of the interviewees to fulfil the obligation to inform (Bortz & Döring, 2006). The interviewee was asked if the interview can be recorded for transcription. Furthermore, the beginning contains information about the purpose of the interview and the confidentiality agreement how to use the collected data on an optional basis. This includes the possible anonymisation of the results and furthermore, the interviewees were asked if he or she wants the results before the publication to be able to prove the statements (see also Appendices B-D).

## **1.5 Targeted audience**

The thesis is interesting for a variety of people, working or interested in the assessment of social impact (scholars and students, practitioners in the field of research evaluation and quality management, clients). The paper provides insights on the state of the art of the assessment of societal impact, its definitions and theoretical approaches. It might help to identify additional knowledge gaps and lead to further research how to solve the big problem of capturing societal impact in the real world. It should be seen as an inspiration for future research to rethink current discussions and to think across research fields. This is especially useful for practitioners, which have the task to put theory into practice. Furthermore, this thesis is part of the sustainability management of the WI in Germany. This year's sustainability report includes the topic of the societal impact of the institute and a summary of this thesis will be published.

## **1.6 Disposition (Outline)**

Chapter 1 provides a comprehensive introduction to the subject of the assessment of societal impact by sustainability research. It gives first indications about challenges, but also the need of this assessment. Furthermore, the research questions are clearly defined, followed by the scope and limitations of this thesis, as well as the target audience.

Chapter 2 presents the methodological and analytical approach. Furthermore, it functions as a guide through the consecutive steps of this thesis.

Chapter 3 includes a literature review to identify research gaps, but also to show theoretical and analytical frameworks in literature and practical examples of the assessment of societal impact. These findings, as well as the resulting interviews with the experts, provide information of how to create an own framework and its operationalization.

Chapter 4 presents the tool development, based on the creation of a theoretical and analytical framework. Besides the methodological steps, presented in Chapter 2, this chapter explains the structure of the framework and its tool and the used references.

Chapter 5 contains the case study of the Wuppertal Institute and the pilot-phase of three projects as the practical implementation of the tool.

Chapter 6 discusses the findings of the research and the practical implementation. Strengths and weaknesses of the overall approach is reflected by the author.

Chapter 7 summarises the main findings and comes back to the research questions. Suggestions for future research finalize the thesis.

## 2 Research Methodology

The second chapter focuses on the used research methodology and its justification to answer the research questions. Furthermore, it will give detailed information about the mixed-method approach of data collection and analysis.

### 2.1 Research Design

The research, conducted for this thesis about societal impact, is a structured scanning of existing literature and practical applications. It demonstrates the novelty and ongoing discussion about challenges and uncertainties of how to capture the societal impact of activities as well as its delimitation to other research areas. That is the reason why the methodology is based on different data sources and methods to get a holistic view of the entire topic. The way the research is designed for this thesis includes the opportunities, but also the challenges of measuring the societal impact instead of just the scientific impact of research.

Key assumptions within this field of research are difficult to find. It became clear that the basic condition of a homogeneous discussion, an overall accepted definition, was not attainable at this time. The applied RQ1 has been chosen, because it questions exactly this inconsistency and will be answered from a theoretical point of view. Following, RQ2 asks about theoretical and methodological approaches, as well as practical examples and their opportunities and challenges.

The literature review and the expert interviews, presented in Chapter 3, give a strong background and assumptions to answer RQ3. Chapter 4 introduces the practical implementation, which includes first the development of a theoretical and analytical framework and second its operationalization through a tool.

Finally, the tool is tested in a pilot-unit of three projects of the WI. This includes desk research of the projects, interviews with project leaders, one directly involved boundary partner and finally the integration of the findings within a case template. The Chapters 4 & 5 give an overview of the practical applications, its positive and negative findings and how this tool can be used further on within the sustainability management of the institute. Figure 2-1 shows the chronological order of the design of the research project:

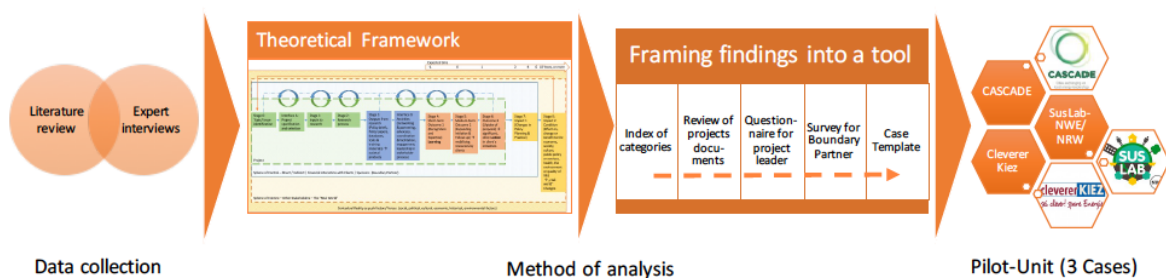


Figure 2-1 'Description of the design of the research project'

For the replication of the work process, Appendix A includes the full schedule. It shows the structured working method from collecting material, the initial research, expert interviews, project reviews and their analysis to the final writing process of this thesis.

## 2.2 Methods of Data Collection and Analysis

The data collection was divided into different steps, which build on each other to explore the theme. This section will explain the set of techniques and its creation, collection, coding, organization and analysis of data in detail.

### 2.2.1 Literature Review

The first step has been made with the help of a comprehensive literature review, conducted by review of books, peer-reviewed articles, conference papers, grey literature and official documents of national and European initiatives. This beginning has several reasons, for example it gives the reader background information and thus, RQs 1 & 2 can be answered from a theoretical and practical point of view. To structure the sources, a synthesis matrix was used to cluster the information into subtopics for a better analysis, following the approach delineated by the NC State University Writing and Speaking Tutorial Services (Ingram et al., 2006). The main focus was the geographical scope of the European Union, but also research from other parts of the world were integrated to deliver a richer and more encompassing overview of available material. Additionally, it creates a basis, which is necessary for the understanding of the next steps. Moreover, the findings are significantly influencing the design of the specially developed framework and the following steps of a tool development.

### 2.2.2 Expert Interviews and Analysis

In order to develop an analytical framework, expert interviews were applied with the aim to capture the information of the literature correctly and combine written text with personal opinions. This step gives the chance to question assumptions and categorise views by the authors, based on their own understanding of what societal impact means. Furthermore, it offers the opportunity to interview experts from different fields, from researchers with main focus on transdisciplinary research, to practioners such as a project evaluator (see Table 2-1). This enriches the background information about the dynamic topic and is part of the answers to RQs 1 & 2.

Table 2-1 'List of interviewees'

| Experts |                              |  |                           |
|---------|------------------------------|--|---------------------------|
|         | Name                         | Job/Position   | Date of Interview, Mode   |
| 1       | Dr. Dr. habil. Lutz Bornmann | Works as a sociologist of science for the Division for Science and Innovation Studies in the Administrative Headquarters of the Max Planck Society in Munich (Germany). He is an expert in research evaluation, peer review, bibliometrics and Altmetrics. | 02.02.2016, per telephone |
| 2       | Dr. Florian Keil             | Founder of "keep it balanced" in Berlin and cooperation partner of the ISOE Institute with main focus on transdisciplinary methods and concepts.   | 23.02.2016, per telephone |
| 3       | Kes McCormick                | Senior lecturer at IIIIEE and co-author of the publication "Joint Learning through Evaluation – A Tentative Evaluative Scheme for Sustainability Transition Experiments" (submitted)   | 23.02.2016, per Skype     |
| 4       | Bernward Causemann           | Consultant for organization development within the development cooperation (NGOs). Member of the mailing list of the German Evaluation Society (DeGEval).  | 24.02.2016, per telephone |
| 5       | Annemarieke de Bruin         | Manager of monitoring evaluation team, Stockholm Environment Institute (SEI).  | 24.02.2016, per Skype     |

|   |                          |  |                                |
|---|--------------------------|--|--------------------------------|
| 6 | Prof. Dr. Peter Henricke | President of the Wuppertal Institute until 2008. He is now member of the “think tank of Club of Rome” and a important person in the German environmental debate. | 25.02.2016, personal interview |
| 7 | Christoph Lüderitz       | Research associate at the Institute for Ethics and transdisciplinary sustainability research.  | 03.03.2016, per telephone      |
| 8 | Laura Maria Bono         | Founder of the consulting company “social impact research & consulting” in Austria. Main focus on the non-profit sector.   | 07.03.2016, per telephone      |
| 9 | Stefan Schmidt           | Founder of “schmidtevaluations”. He is a freelance evaluator. Member of the mailing list of the German Evaluation Society (DeGEval).                             | 09.03.2016, personal interview |

A standardized, neutral interview was chosen (Bortz & Döring, 2006 239), because the topic is clearly defined and the literature review gives detailed prior knowledge. The fully developed questionnaire includes formulated questions in a specific order (Bortz & Döring 2006, 238ff.). The draft version was reviewed by the two supervisors, as well as examinees and the feedback is integrated in the final questionnaire, provided in Appendix B. Regardless how the interview was conducted, two general questions were asked in the beginning. First, to ask for the allowance to record the interview to transcribe it afterwards. And second, if the interviewees name can be used as a reference in the thesis. After that, some questions about the background information of the interviewee were answered with the intention to ease the situation and improve the flow of conversation. With that, the questionnaire includes a macro- and microplanning (Bortz, Döring 2006, 244). On the micro-level, the questionnaire is split into three different categories. The first asks questions about the definition of scientific and societal impact, as well as the relationship between scientific quality and societal relevance. The first question was adopted from Samuel & Derrick (2015). Furthermore, it includes two questions about the relevance of impact and the relationship between social impact and societal relevance and excellence. That establishes the base, needed to understand the answers of the following questions correctly. The second section asks about the main drivers that are demanding to assess societal impact of research, within institutions and external. It aims to gather information about the current development in Germany, or another European country. Based on information in literature, questions about the open access strategy and the current development, to connect funding and the quality of impact, were queried. The last section requests information about the practical implementation, the process to measure and report impact. The questions about possible processes and the measurements were essential to answer RQs 2 & 3. The questionnaire was developed both in English and German.

The interview analysis includes further actions. First, the interviews were all recorded and transcribed afterwards. The important information was highlighted per question and transferred into an excel sheet, which combines all answers of the experts. Similar to the synthesis matrix in the literature review, this procedure simplifies the analysis of each question. The result can be read in Chapter 3.3. Based on these steps, an analytical framework for a practical implementation of the theoretical findings is developed and presented in Chapter 4.

### **2.2.3 Operationalization of the Theoretical Framework – Data Collection and Analysis**

The method of a case study methodology is chosen, because one of the main research questions is how the tool can be implemented in reality. It allows to go into detail of a complex situation by “direct observation” (Yin, 2014 16) through a mixed-method approach (e.g. documentary review, interviews, surveys, focus groups). These thoughts are in line with what is found in

literature about societal impact as the best available method. This method is often criticized for its lack of generalization, objectivity, quantification and its time-intensity (Donovan & Hanney, 2011; Bornmann, 2013; Bornmann, 2014a; Wiek et al., 2014; Bell et al., 2011), but provides a deep understanding of a specific process and allows the impact assessment in a context-specific situation (Penfield et al., 2014). The study of the Wuppertal Institute and its three cases should show the implementation of the tool in reality, its possibilities and challenges. This is in line with the statement by Yin (2014) that case studies “are generalizable to theoretical propositions and not to populations or universe” (p.21). The research design is based on the findings of the literature review and the expert interviews. This requires to go from the institutional level to the projects-level to test the developed tool and furthermore, to answer RQ3 about the practical application of the assessment of societal impact.

The implementation of the framework requires a set of steps to strengthen validity and reliability of the design (Yin, 2014). The tool development is described in detail in Chapter 4 and includes the following steps (see Fig. 2-2, which includes the steps 1-5). Step 2-5 are also described at the beginning of each question catalogue, while step one is the base of the other steps. This was sent per email to the interviewees.

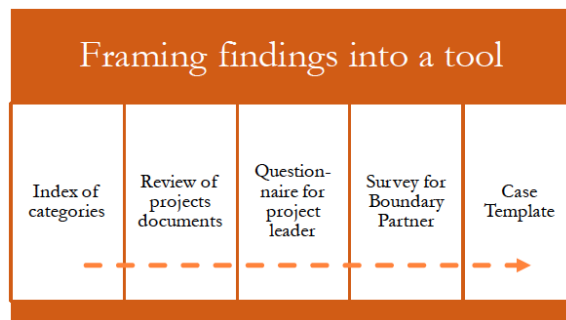


Figure 2-2 'Description of the components of the tool'

### Step 1: Categorization of indicators of an assessment of societal impact in sustainability research

– The first step is needed to transfer the structure of the model into a practical tool. That happened by the adaptation of the process chain (Project identification – Impact 1). Different indicators were developed to analyse the specific step (e.g. for “input” the indicators “expertise, trust” were selected). Most of the indicators are significantly based on the work of Luederitz et al. (submitted). The paper is currently in the final draft status, and the adaptation into the own research context was done in correspondence with three co-authors (Ch. Luederitz, F. Stelzer, K. McCormick). Nevertheless, the scheme is extended by the inclusion of other approaches, which are directly cited in the Table 4-1, for transparency and replicability. Following this structure, questions for the project leader and the boundary partner were developed (see Appendix C & D). Boundary partners are understood as directly involved stakeholders in the project and “with whom the program anticipates opportunities for influence” (Earl et al., 2001 1).

### Step 2: Identification of the project and gathering basic knowledge

– The second step includes the identification of the projects. The “time-lag” is clearly identified in the literature review as a key problem and consequential, the timing of an assessment is not clear. That is the reason why finished regional, national and European-wide projects between 2013-2015 were chosen. At the end, two projects of the research group “Energy, Transport and Climate Policy” and one of research group “Sustainable Production and Consumption” were selected by my supervisor at the WI and me:



Table 2-2 List of projects'

| Projects   |                      |  |  |
|--|----------------------|--|--|
| Projectname<br>(Research Group<br>(RG))  | Duration             | Interviewed<br>Project Leader,<br>(date/mode)                  | Interviewed Boundary Partner   |
| CASCADE – Cities<br>Exchanging on<br>Local Energy<br>Leadership<br>RG “Energy,<br>Transport and Climate<br>Policy” | 07/2011 –<br>06/2014 | Anja Bierwirth<br>(29.03.2016,<br>personal interview)          | Agnes Schönfelder (Mannheim City<br>Administration’s Climate Protection Unit)<br>(14.04.2016, personal interview)                    |
| SusLabNWE<br>/NRW -<br>Sustainable Labs<br>North West Europe<br>RG “Sustainable<br>Production and<br>Consumption”  | 01/2012 –<br>04/2015 | Dr. Carolin<br>Baedeker<br>(24.03.2016,<br>personal interview) | Jannis Heuner (during project InnovationCity,<br>now WirtschaftsEntwicklungsGesellschaft<br>Bochum GmbH) (12.04.2016, per telephone) |
| Cleverer Kiez<br>RG “Energy,<br>Transport and Climate<br>Policy”   | 05/2010 –<br>01/2013 | Dr. Michael<br>Kopatz<br>(23.03.2016,<br>personal interview)   | No response after several contacting.  |

The second part of step two includes a review of project-documents through desk research to gather basic knowledge about the projects. This gives a first insight into the content, structure, participatory events and context. Information were found on the homepage of the WI, as well as on the project-website and -publications.

**Step 3: Interview with the project leader** - The third step includes an interview with the project leader. One aspect is to fill information gaps, but also to have a look into the project development and more detailed information of the interaction with the boundary partner. The questions for the interview are in order of the process phases from the identification of the project to the forecast of the societal impact, presented in section 3.2.2.1. Furthermore, a checklist for required information was created before the interview. It includes questions about the boundary partners, detailed information about publications and other missing information (see Appendix C). Additionally, a storyboard is created as a memory aid about participatory events and the project-process, based on the project process. Figure 2-3 shows the storyboard of the project “Cleverer Kiez” as an example of the design:

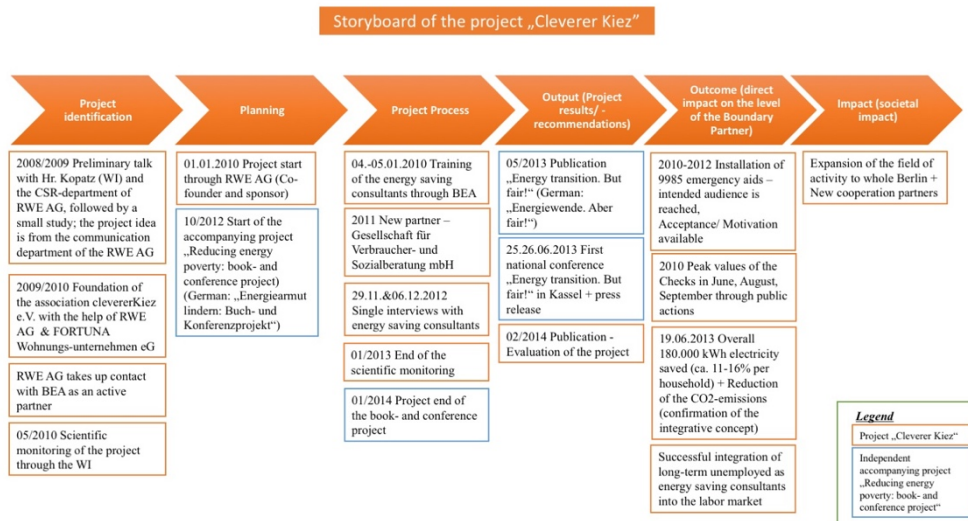


Figure 2-3 'Storyboard for the project 'Cleverer Kiez'

**Step 4: Questionnaire for the boundary partner** – The following step includes the questionnaire for the boundary partner, because this directly involved stakeholder can be seen as a key source for the judgment of impact, as well as the strengthening of it (ESF, 2012). Reasons are that the person was actively engaged within the project process and gives information about feedback-loops. In general, the boundary partners integrate project results/recommendations in their work and bear it into the “real world”. The document includes detailed information about the purpose and the steps to clarify the reason why they should participate. It is an option to send the questionnaire per post, so that the boundary partners can answer all questions on their own. Nevertheless, personal interviews were conducted for this thesis. Causes are the timeline considerations of the thesis and that a personal survey situation is beneficial to clarify misunderstood questions (Bortz & Döring, 2006). Furthermore, Fisseni (1974) explains that it does not matter for some questions, if they are asked in person or written (in Bortz & Döring 2006, 237). That is the reason why the questionnaire includes sections of detailed descriptions of the structure and the questions are clear and understandable to avoid missing answers. Talking about the structure, it has not the same like the questionnaire for the project leaders. The questions are in order of the phases of a project process, but it begins with the step “from implementation to societal impact” in line with the effect logic. This is explained in detail in section 4.2.2. Additionally, it includes a reminder of project results/recommendations of the project x, as well as a reminder of objectives and the storyboard, completed by the project leader. Some of the questions can be easily coded, for example the mainly used Likert-scale (Bortz & Döring 2006, 224) with 1-5 (see Appendix D). Open questions need a thematic coding, which gives also the possibility of a quantitative analysis after a number of projects, which is further explained in Chapter 3.2.4.3. While the feedback-level of the project leaders was satisfactory, the contact with the boundary partners was difficult. Reasons could be the Easter holidays and that there is no real benefit visible for them. This is also mentioned by Flick (2009), who mentions time pressure as a common challenge for expert interviews.

**Step 5: Compiling the findings into a case template** – This is the final document with all information found in step two to four. The case template is strongly connected to the table of a categorization of indicators, developed in step one. The answers of the two questionnaires are sorted to the specific section, e.g. the category “communication during project” is answered through question seven and eleven of the project-leader questionnaire (see Appendix C) and question four of the boundary partner questionnaire (see the section in Table 2-3; Appendix D).

The highlighted sections of the answers were summarized and put into the case template. Findings are presented in Chapter 5 and the complete template can be found in Appendix E.

Table 2-3 'Section of the Case Template' (see Appendix E)

| Category                            | Response to Questions  | Nr. of Question (Q)   |
|-------------------------------------|--|---|
| <b>Communication during Project</b> | (Data about communications and interactions are needed "to capture and link", in Penfield et al., 2014 31)   | Q7 Project leader Questionnaire (PLQ)<br>Q11 Boundary Partner Questionnaire (BPQ)<br>Q4 BPQ |
|                                     | <i>Please remember: Types of productive interaction (Spaapen &amp; van Drooge, 2011 213)</i><br><i>Direct: Personal contact</i><br><i>Indirect: Through material carrier</i> |   |

### 3 Literature Analysis – From the Assessment of Scientific to Societal Impact

This literature review includes papers from the years 2000 - 2016 with the same overall question: How can we understand and measure the societal impact of research? The paper tries to respond to this question by analysing existing research, based on the structure as follows: First, the definitions of societal impact will be explored and compared to each other (section 3.1). This is followed by the review, focusing on the main results of key challenges, as well as the theoretical and practical elaboration to answer the RQs 1 and 2 (section 3.2). Section 3.3 discusses the main results of the expert interviews, based on the previous findings.

#### 3.1 The Definition of Societal Impact

There is clearly a “lack of consensus” (Maas & Liket, 2011 174) regarding the definition of societal impact, which influences the possibilities of analysis. Therefore, it is necessary to break down the terminology to its components. At first the word *impact* is defined and its position in the process (Bornmann, 2014a). Second, it is important to elaborate the expansion from *scientific* to *societal impact*, different terminologies, their commonalities and differences.

Starting with the word *impact*, the Oxford English Dictionary describes it broadly as “marked effect or influence” (in Penfield et al., 2014 21) and the researchers Donovan and Hanney (2011) as *payback*. It could also be seen as a “knowledge transfer” or better “exchange” from science to society (Meagher et al., 2008 163). Literature review makes clear that impact is often linked with the word *change* (ESF, 2012). For example the EU defines “impact as further and/or indirect change generated by interventions” (EU in Loikkanen et al., 2013 25). In that context, it is important to theoretically understand the varied interpretations about the full extent of impact, which can be applied to practice afterwards. According to the social impact theory, impact is defined as “cognitive or physical consequences of a program” (Walter et al., 2007 328). Nutley et al. (2007) divide impact into instrumental (direct) and conceptual use (indirect) (in Meagher et al., 2008 165), while Stockmann & Meyer (2013) split it into three dimensions: structure, processes and individual behavior, which can be planned or unplanned as well as positive and negative (p.70ff). These should not be ignored within the practical implementation and are integrated into the development of the framework, described in detail in Chapter 4. In summary, impact is “diffuse, subtle, diverse and long-term, and causality cannot be readily ascribed” (Meagher et al., 2008 164).

Coming to the next stage and adding the adjective *scientific* to qualify *impact*, a clear line is drawn on the focus only on science (Wolf et al., 2013). To understand this definition correctly, the noun research has to be defined. The Research Quality Framework (RQF) describes it as “creative work undertaken on a systematic basis in order to increase the stock of knowledge” (Development Advisory Group for RQF, 2006 12). To analyse impact of research correctly, one has to identify the correct target audience. In the case of scientific impact, this is academia. So it can also be named as “academic impact”, or the “intellectual contribution to one’s field of study within academia” (Penfield et al., 2014 21).

Expanding the scope outside of academia, there is *societal impact*, when the society gives societal relevant results a hearing and a knowledge transfer occurs (Bornmann & Marx, 2014). Morton (2015 2) describes a process-oriented concept of “research uptake, use and impact”, which is often quoted in literature. That means that “research users have engaged with research” and “act upon research” (p.2). Then, impact means that “changes in awareness, knowledge and understanding, ideas, attitudes and perceptions, and policy and practice as a result of research” (p.2). Additionally, latter can be differentiated in more detail within parts of society (Bornmann,

2014a). This is also included within the detailed definition by the English ‘Research Excellence Framework’ (REF), which is used as the fundamental, or working definition of this thesis:

*Impact “as an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia”. Furthermore, “impact includes, but is not limited to, an effect on, change or benefit to:*

- *the activity, attitude, awareness, behavior, capacity, opportunity, performance, policy practice, process or understanding*
- *of an audience, beneficiary, community, constituency, organization or individuals*
- *in any geographic location whether locally, regionally, nationally or internationally.*

*Impact includes the reduction or prevention of harm, risk, cost or other negative effects.”* (Paragraph 140 - 142 of REF3a/b in REF, 2011 26). With regard to this definition, Nutley et al. (2007) and Meagher & Lyall (2013) classify non-academic “research use and impacts” (p.165) into five types, which are used in the questionnaire to the boundary partner as a part of the assessment tool. They distinguish between *instrumental change* (“direct impact of research on policy and practice decisions”), *conceptual use* (“where research changes ways of thinking, altering policy makers and practitioners to an issue or playing a more general consciousness-raising role”) and *capacity-building* (“this can refer to education, training or even development of collaborative abilities”) (Nutley et al. in Meagher & Lyall, 2013 3). Meagher & Lyall (2013) expand this with two short-term process-oriented impacts “as proxy indicators for enhanced likelihood of future impact” (p.9): *attitudinal change* (“positive changes in institutional cultures and individual attitudes toward knowledge exchange) and *enduring connectivity* (“when researchers and prospective users stay in contact after a funded project ends”) (p.3). According to Merton, this should generate “communalism”, to transfer scientific to public knowledge (in Bornmann & Marx, 2014 213). This makes the interrelation of scientific research and non-academic partners (business, government, civil society) visible (Wiek et al., 2014) and is similar to the three variations of Bornmann (2013), who has been involved in this discussion since the 1990s. He distinguishes between *societal products* as common output categories, the *knowledge use* or interactions processes and *societal benefits* as “changes in the society” (p.217). But it is also clear that this is subjective and time-dependent. However, it is “beyond academia” and can also be defined as “external socio-economic impact” (Penfield et al., 2014 21). Different authors mention the importance of quality and its mutual relationship to relevance in this context, because “the value of scientific research depends on a combination of scientific quality and societal relevance” (de Groot in KNAW, 2013 19), whereas societal quality can be described as a “precondition of societal benefit”(Wolf et al., 2013 3).

Some other researchers use the word *social* instead of societal impact, or *social value creation* and *social return* (in Maas & Liket, 2011 174). The terminology *societal effect(s)* is used by Wiek et al. (2014), based on Walter et al. (2007) to describe (un-)intended “outputs, outcomes, and impacts from participatory sustainability research” (p.118). Effects can be “quality products, knowledge gains, increased decision-making capacity, enhanced networks or transformational changes” (Wiek et al., 2014 117). Nevertheless, like the literature review, as well as the conference “Social impact @ sciences: the end of the ivory tower?” by the International Institute of Social Studies show, there is no overall accepted definition (van Bergeijk & Johnson, 2014). Causes are differences in research contexts and their individual challenges in theory and practice: “The problem is that each research community (and perhaps even each individual) has their own conception of impact as it pertains to their research” (Martin, 2011 249). One result of the conference is that “inclusion” is a key challenge (van Bergeijk & Johnson, 2014 71). But that faces the lack of a theoretical consensus, which causes practical misunderstandings and various interpretations. This is a prerequisite for understanding the variety of theoretical and

methodological approaches as well as practical examples, which will be further explained in the next sections.

## **3.2 Main Research Results of the Literature Review**

This section functions as an overview of the main results of the literature review. These can be split into a theoretical and practical level, which equally contribute to answer RQs 1 & 2 of this thesis. Based on the variety of definitions, going beyond academia means an increase in complexity of the impact assessment. This is the opinion of the majority of researchers (e.g. Bornmann, 2014a; Epstein, 2008). Furthermore, the correlation between scientific and societal quality is defined as weak (Bornmann, 2013). Therefore, challenges arise, which will be explained in the following section and new approaches, besides the counting of publications, are needed. When talking about social impact measurement methods, Maas and Liket (2011) list six characteristics, which show the heterogeneous exposure reality: “purpose, time frame (ex ante, during, ex post), orientation (input-output), length of time frame, perspective (micro-macro) and approach” (p. 180).

For the European Science Foundation (2012) it is clear that the impact assessment has an extensive goal: It has “to support and strengthen the quality of research”, and also to provide “knowledge of the relationship between actions and effects” (p.3ff.). This relationship will be further explored in the section about the structuring of a process chain into logic models (see section 3.2.2.1). Nevertheless, the essential point of all approaches is the required capture of “tangible effects” (e.g. “usable products”) and “less tangible effects” (e.g. “networks built, structural changes”) (Wiek et al., 2014 130). To reach this goal, a possible shift of focus away from impact to the productive interaction in a process and its function as “enlightenment” of actors as a measurement method is possibly needed, according to Spaapen and van Drooge (2011 216). On this basis, two key theoretical and methodological approaches are explained: the SIAMPI approach (section 3.2.2.2) and the Payback Framework (section 3.2.2.3). Nevertheless, Bornmann & Marx (2013) come to the deflating conclusion that “societal impact is more postulated than demonstrated by research” (p.216). This will be further elaborated from a different angle: the Societal Impact Assessment (SIA) in section 3.2.3.

However, it is clear for Bornmann (2014a) that there is an uncontroversial demand on science to show impact. The relationship between the academic and non-academic world and the “freedom of research” is debated in the literature as well as how the results of measurements are used. An “accompanying, participatory evaluation” from the beginning of a project would be “most promising” (Walter et al., 2007 336; Spaapen & Drooge, 2011). In relation to that, as a researcher it is necessary to think about the audience and to use specific “publishing habits” to get a greater impact (Bornmann, 2014a 17). He emphasizes his point of view in another paper with the statement that “papers tailored for a readership outside the area of research or science lead to societal impact” (Bornmann, 2014b 946). That means research is communicated to the whole society, not only within science. This could be done better by research centres or programme grants, which “might have a greater potential for, and focus on, knowledge transfer” (Meagher et al., 2008 172).

Besides new ways of publishing, coming from theoretical approaches to practical examples to assess societal impact, latter are affected by two threads. First, external drivers request to see impact by research because of multiple objectives: accountability, justification of investment, improving the effectiveness, relevance and wider impacts of the research programme (learning) (Bell et al., 2011). Second, internal drivers are often the answer of the external pressure or the personal interest to produce results with a societal impact. A specific expertise is required (Walter et al., 2007), as well as motivation and “serendipity in the interaction process” to achieve impact (Spaapen & Drooge, 2011 215). Key examples within a multi-level system, first on the

EU level (section 3.2.4.1) followed by the analysis of the dual-funding system of the UK, are presented in section 3.2.4.2. The institutional level is explored through the best practice case of the SEI and its PMEC system (see section 3.2.4.3). But first, key challenges, which limit and define the assessment, are listed in the next section.

### **3.2.1 Key Challenges**

*Time lag* - A highly discussed problem is the time-lag between research and application (Development Advisory Group for RQF, 2006) and the timing of subsequent assessment. This means that if the evaluation is too soon, “few impacts may be apparent”, while others are not (Bell et al., 2011 235). Furthermore, there is a risk of missing the long-term impacts, or “knowledge creep” (Derrick & Samuel, 2016 5). Also, unintended impacts can appear after a while (Wolf et al., 2013). This unpredictability can also be called the “serendipity” of outcomes and impacts of research projects (Meagher et al., 2008 165). Following the methodology of the Theory of Change is a good method to deal with it, according to S. Donaldson on the Wharton Social Impact Conference (2016). Penfield et al. (2014) and Derrick & Samuel (2016) note in this context that impact is not static and can change over time. When talking about the ideal moment of measurement, Walter et al. (2007) come to the conclusion that it “depends of the type of project” and suggest two years after closure (p.329). Other studies recommend waiting for five years or using time series, because the norm is not defined (Manville, 2014). Furthermore, Loikannen et al. (2013) raise the problem that it is even more difficult to compare effects in the same period of time because of different time intervals between cause and effect.

*Attribution & Causality* - After timing, attribution and causality are major challenges. How is it possible to measure the impact of research on policy goals? How can we get certainty? Meagher et al. (2008) raise the problem that “changes in practice often appear to stem from a general “awareness-raising” or conceptual shift” (p.170). This is also supported by Spaapen and van Drooge (2011) with the additional note of the influencing time-lag. It makes clear that societal impact appears in most cases as non-linear through interactions of stakeholders and “through the complex interplay of serendipity, luck and complex networks (of researchers and non-researchers) interacting” (Derrick & Samuel, 2016 79). Solutions to this problem are worked out by Bell et al. (2011). These could be the use of a counterfactual (see also ESF, 2012) and the demand-side approach, to work retrospectively as well as to “institutionalise impact evaluation processes” (p.234ff.). The strategy of tracking-back is also examined by Luederitz et al. (submitted) in their tentative evaluative scheme. Furthermore, S. Donaldson suggests the mixed-method approach to return a verdict (Wharton Social Impact Conference, 2016).

*Linear measurement methods* – Jayasundra-Smits (2014) notes in her chapter that “a long and winding road has to be taken”(in van Bergeijk & Johnson, 2014 28). Also Spaapen and van Drooge (2011) and other researchers criticize the current use of linear methods and claim a shift to “understand societal impact in a broader context” (p.216). Additionally, a change in purpose from accountability and judgment to a process-oriented approach to strengthen learning effects is preferred. For that, the multiple flow of knowledge has to be recognized within networks of different stakeholders and their interactions (Meagher et al., 2008). This will be further discussed in section 3.2.2.1.

*Data Collection* – The challenge of data collection about all interactions and the connection with the findings of the process depends on the time frame of the assessment. One can say that it is most difficult for the retrospective process. First, an organized data collection is needed to get reliable information. Wolf et al. (2013) give examples of structured proposals and reports in their paper. Nevertheless, there will be risks within current methods regarding conflicting narratives. More detailed quantitative data is difficult to get because of different interests, expectations and lack of consensus (Spaapen & Drooge, 2011). Bell et al. (2011) claim a need

of new approaches to process this data and to find less tangible data. Second, that is the reason why Wiek et al. (2014) as well as Penfield et al. (2014) suggest data collection from the beginning to guarantee data availability (Loikkanen et al., 2013). The need for resources (financial, human) for that process is the greatest obstacle (RCUK, n.d.).

*Characteristics of science* - Bornmann (2014a) writes in his chapter “Problems of impact measurement” about the inequality within science (e.g. discrepancy of good papers and researchers and their amount of citations), “the right to make mistakes and the significance of extreme events” (p.11) and possible anomalies. Furthermore, he claims the randomness, unpredictability, error and revolutionary events of and within science. These characteristics have to be recognized by the demand on science.

*Cassandra Problem* - Bell et al. (2011) address the challenge to measure good or bad advice or delays by research that are not taken into reality. This could be solved by the calculation of “opportunity costs of a “wrong decision”; the cost of the alternative to not taking the advice” (p.235).

These challenges have to be kept in mind when thinking about theoretical and methodological approaches, because they are influencing their expression and limitations. Key frameworks will be presented in the next sections.

### **3.2.2 Theoretical and Methodological Approaches to Assess Societal Impact**

When briefly talking about measuring the scientific impact, different bibliometrical analyses are available, well-known and often used. Examples to gather quantitative data are counting citations through simple instruments like the H-index by J.E. Hirsch, the Eigenfactor, or the Journal Impact Factor (Wolf et al., 2015). Problems are the limitation to a specific range of impact, as well as influential publications that are rarely cited, which cannot be captured (Bell et al., 2011; Penfield et al., 2014; Holmberg et al., 2015). Table 4 summarizes the advantages and disadvantages of these measurements of scientific impact.

Altmetrics, or Alternative Metrics, can be presented as an intermediate step between the assessment of scientific and societal impact. It is a new evaluation-measurement of scientific papers, relying on filters and based on metrics in the web as its source. The special focus lies on social media (e.g. tweets, shares, downloads, etc.) and the cooperation with Zotero and Mendeley. It gives the chance to assess the attention of publications “from a wider audience beyond the closed silos of academia” (Holmberg et al., 2015 2). It has no common definition, but is part of the open science movement and a counter to the peer-review (Bornmann, 2014a; Bornmann, 2014b; Holmberg, 2015). Additionally to the quantitative analysis, the measurement offers information about the reader itself (Holmberg et al., 2015). This strengthens the transparency and collaboration between science and society and furthermore gives incentives to researchers to uncloset their research, according to Holmberg et al. (2015). Nevertheless, a specification of an impact is impossible and it needs further development (Priem et al., 2010; Williams & Padula, n.d.).

The societal impact measurement needs to go beyond these methods, because as previously explained, factors of research quality and societal relevance are in focus (Pols in van Bergeijk & Johnson, 2014). That is the reason why new methods besides citation and publication metrics are needed to capture societal impact. Wiek et al. (2014) clarify that we are talking about Mode-2 research (outside of science). Nevertheless, also the measurement of scientific impact is part of the “research’s social contract with society” (Gibbons et al., Nowotny et al., Wolfendale in Derrick & Samuel, 2016 76). Based on the challenges and the lack of definition, it is obvious



that there is also no clear line in how to assess societal impact (e.g. de Jong et al., 2014). This complexity is also reflected in the current problems of a practical implementation. Nevertheless, that is no surprise when this status is understood as on the same stage of R&D measurement in the 1960s, according to Godin and Doré (in Bornmann, 2013). There are “no robust or reliable methods for measuring societal impact” (Bornmann & Marx, 2014 211). There are also different opinions about the role of such an assessment. It can be seen as a measurement of impact, or as a part of impact itself (Donaldson on the Wharton Social Impact Conference, 2016). From a theoretical perspective, it is clear that there are two kinds of approaches available. One is based on theoretical frameworks, the other is more practice-oriented (Bell et al., 2011; Wolf et al., 2013). Spaapen and van Drooge (2011) base their research on social constructivist methods and the role of stakeholders. That is based on R. Edward Freeman’s stakeholder theory published in his worldwide acknowledged book “Strategic Management: A Stakeholder Approach” (1984). Another approach is taken by Bell et al. (2011). They distinguish between approaches based on intervention theory or being more practical. As Bell et al. (2011) point out, the practical implementation is still mostly done through “programme-level evaluations or a number of individual projects” (p.233). They have also found that there is a range “from ad hoc non-structured approaches to incorporation of research impact as a key element within wider evaluation processes, to more in-depth project level approaches” (p.233). Nevertheless, L. Bornmann claims that there is a lack of examined examples (Bornmann, 2013).

When talking about the beginning of an impact measurement, there is a “need for a framework” which is operational, comprehensive and can be used in different research fields and processes (Wiek et al., 2014 119). Therefore, Wiek et al. (2014) have developed a methodological scheme to capture societal effects with the focus on participatory processes. Going more into detail, Martin (2011) identifies more than 60 indicators to measure societal impact (in Bornmann, 2013). The researchers Godin & Doré go one step back, developing 11 dimensions with specific indicators. The European Commission (2008) indicates four different fields to measure societal impact: economic, social, environmental and cultural benefits (Bornmann, 2013 227ff.). Molas-Gallart et al. split indicators into two sets: indicators of activity and impact (in Meagher et al. 2008). Buchanan lists seven indicators, which measure a high impact project: “(1) The development of relationships and networks of user communities, (2) the involvement of users at all stages, (3) well-planned user engagement and knowledge exchange strategies, (4) portfolios of research activity build reputation with research users, (5) good infrastructure and management support, (6) follow-on activities after the end of the project, (7) researchers need to keep better records of their impact generating activities” (Buchanan in van Bergeijk & Johnson, 2014 47ff.). Nevertheless, it is clear that an “overstretching” has to be avoided (Lähtenmäki-Smith, 2006 44), which influences the development of the tool (see Chapter 4).

To conclude, there is a “need of a balanced evaluation that recognizes scientific quality as well as societal relevance and applicability” (Wolf et al., 2015 3). However, Smith (2001) is right in his summary of factors that “the instrument should (a) fit with current ways of evaluating research, (b) look to the future, (c) be efficient for both, assessors and the assessed, (d) work in practice” (in Bornmann, 2013 220). In addition, the purpose of the assessment has to be clarified. Stockmann (2000 81) summarizes the four most important of them (“responsibility, improvement, knowledge enhancement and strategy”), with the additional comment that the weight can differ individually, depending on the purpose (see also Stockmann & Mayer, 2013). Moreover, factors like motivation, time, staff, material and legal resources can limit the scope of an assessment (Stockmann, 2000).

As already explained in the chapter about the various definitions of societal impact, the process chain, or a basic logic model, is mostly used as a base to understand the generation of societal

impact. This also influences the design of assessment frameworks. For a better understanding, different designs will be explained in the next section.

### 3.2.2.1 Integrating Societal Impact into a Process Chain

To give the assessment a (linear) structure, the basic model of assessment is used in different interpretations “that the viability of the theory can be tested” (Stockmann, 2000 174). This can be used for all three kinds of evaluation: ex ante, during process, or ex post (Luederitz et al., submitted). C. Weiss, a pioneer in the discussion of how to translate the program theory and the Theory of Change into evaluation, first considers the logic model as a guide. Second, it is a “visual way of depicting the theory” with the steps of “(a) program inputs, (b) program activities, (c) interim outcomes, (d) desired end results” (in Stockmann, 2000 174). It is important to understand the follow-up of outputs, outcomes and impacts (Penfield et al., 2014), because different definitions and process chains can lead to diffusions.

The diversity of interpretation is easy to show. Walter et al. (2007) for instance defines outputs as the “procedural and product-related involvement of the stakeholders” and outcomes as the “ultimate effects” (p.327ff.). Impact within the process are “intermediate effects connecting outputs” (p.325). This is similar to the view of Maas and Liket (2011). They define impact within the logic model as “the portion of the total outcome that happened as a result of the activity of an organization, above and beyond what would have happened anyway” (p.174). However, this is not the perspective this thesis is following. The interpretation by Penfield et al. (2014) is the guideline for the development of the theoretical framework, elaborated in Chapter 4. They categorize impact as the last step of the process after outcome with direct effects. That is also supported by Wiek et al. (2014), because they define outcomes/impacts as the last steps, or “second-order/indirect effects” (see also Fig. 3-1). These are “structural changes and decisions/actions” (p.125). That the impact is the sum of all outcomes is also pointed out by S. Donaldson, director of the Evaluation Center at the Claremont Graduate University (Wharton Social Impact Conference, 2016). Impacts follow the process chain as “changes, e.g., behavioural and economic” (Penfield et al., 2014 31).

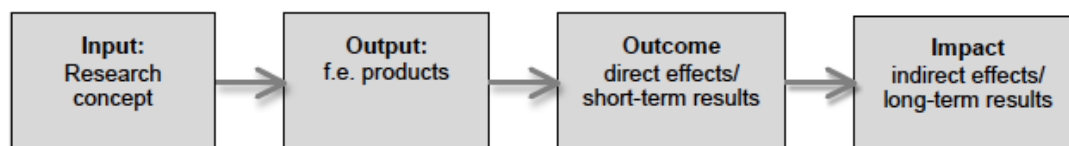


Figure 3-1 ‘Process model of societal impact development’ (in Stelzer et al., 2015 adapted by Penfield et al., 2014)

Another concept, called “Impact-stairs” (in German: “Wirkungstreppe”), is developed by Phineo, a German non-profit analysis- and consultant company. It includes seven steps to assess projects, and impact happens after stage four, when the target audience changes their skills (Kurz et al., 2013). The extension of the model is an integration of cascades to show that multiple steps are sometimes needed to reach the final target audience (see Fig. 3-2).

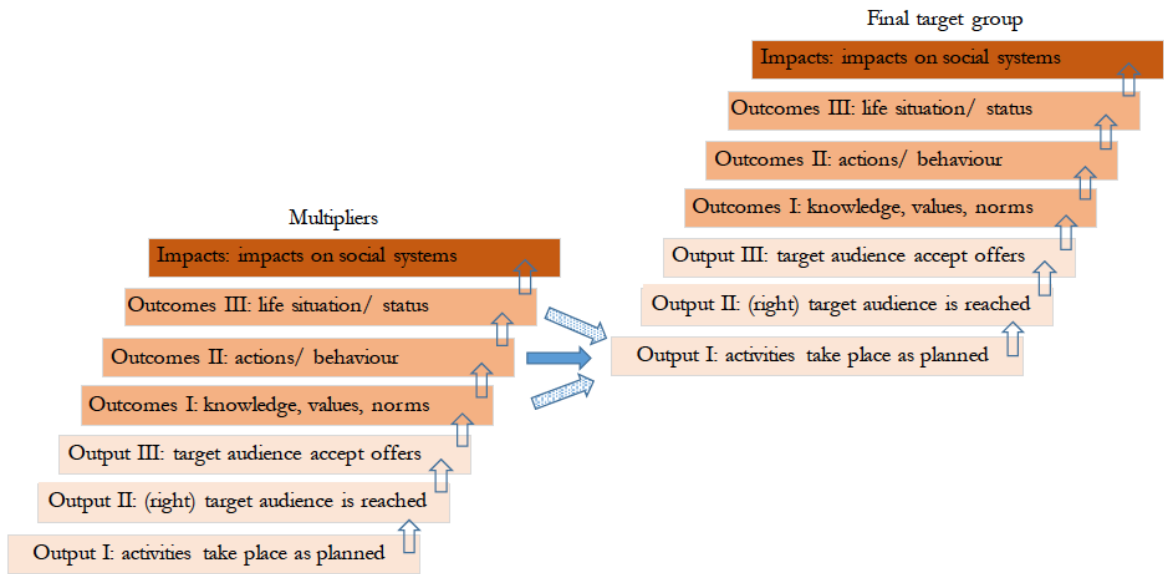


Figure 3-2 'Impact-stairs with cascades' (translated from Kurz et al., 2013 5 with the addition of cascades, based on Schmidt, 2015)

A key concept for this thesis is developed by the Institute for Global Environmental Strategies (IGES), which is an independent policy research institute in Japan. They define their impact generation by research and strategic operation and the logic model includes seven stages, including sub-items for the stages outcomes and impacts (see Fig. 3-3) (IGES, 2014).

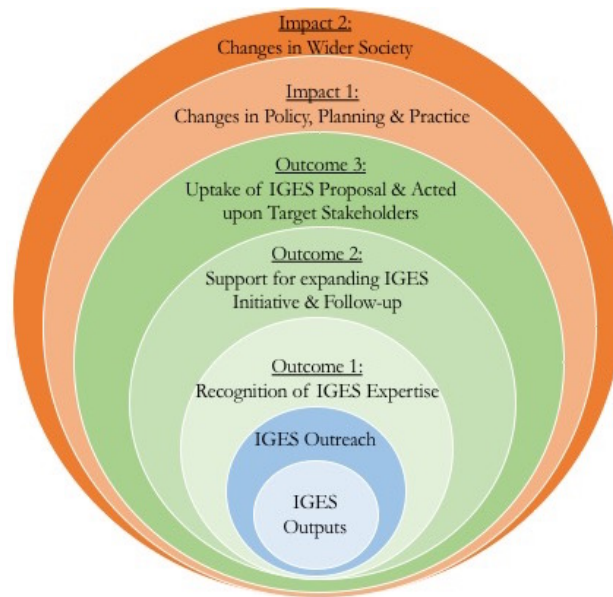


Figure 3-3 'IGES Impact Generation Strategy' (adapted by IGES, 2014)

To sum up, there are differences how researchers define and use the words 'output', 'outcome' and 'impact' and their relation to each other. Nevertheless, the linear model is criticized as being far from reality (ESF, 2012). Instead, ESF suggests the usage of "instrumental, conceptual, broad consequences" (p.6). Another option to use the logic model is not to follow the linearity, but to use it for tracking back from the main interest focus of impacts to inputs. From this point of view, different steps can happen in parallel or independently and do not need a linear follow-up. The following questions are asked: "What was generated?", "what was accomplished?",

“how was it completed?” and “what was invested?” (Luederitz et al., submitted). These thoughts are essential for the model development, described in detail in the next chapter. In this context, the following sections present the two key methodologies of social impact assessment.

### **3.2.2.2 SIAMPI approach (Spaapen & Van Drooge, 2011)**

The Dutch project “Evaluating Research in Context” (ERiC), funded by the European Commission’s 7<sup>th</sup> Framework Programme, coordinated the project “Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions” (SIAMPI) from 2009-2011 (e.g. Spaapen & Drooge, 2011; Van der Meulen, 2010; Penfield et al., 2014).

As the name of the approach implies, productive interaction is set as a “pre-condition for the social impact of research” (Spaapen & Drooge, 2011 213). C. Weiss already developed the interactive model in the 1970s, “where relationships and networks are the most important way in which research is shared, used and reused” (in Morton, 2015 2). Furthermore, Wiek et al. (2014) claim a participatory process is necessary, or in other words a two-way interaction, which is at best a long-term relationship within a network (Meagher et al., 2007 171). The so-called “knowledge intermediaries”, or key actors are essential to detect the complexity of a process and to capture the impacts. For that, a change in behavior is needed (RELU, Lyal et al. in Meagher & Lyall, 2013 1). Thus, the focus lies on “exchanges between researchers and stakeholders” and the resulting knowledge production, which at the best lead to behavioural changes, or societal impact (Molas-Gallart & Tang in Samuel & Derrick, 2015 3). These exchanges are made by tracks (e.g. publications) and social impact a “consequence of the process” of interaction (Spaapen & Drooge, 2011 212). This gradual transition is complex and scientific research simply a part of it (Spaapen & Drooge, 2011).

There is a common sense that “productive interaction is a necessary requirement for research to have a societal impact” (ERiC in Bornmann, 2013 221) and this finding has a broad consensus within the research, so that Spaapen and van Drooge (2011) declare it as “near vital to achieve social impact” (p.213). The type of interaction, as well as the intensity are essential to assess (de Jong et al., 2014). Spaapen & van Drooge (2011) distinguish between three types of interactions: direct (personal contact), indirect (through material carrier) and financial (economic exchange/ financial contribution). These “may overlap” or “occur either simultaneously or longitudinally through time” (p.213). This distinction is used within the assessment tool of this thesis.

The methodological implementation is the usage of case studies and the operationalization of productive interaction for the purpose to assess societal impact (de Jong et al., 2014). When talking about societal impact, one essential factor is the different stakeholders involved (Bornmann, 2014a), which leads to a “lack in precision”, according to Epstein (2008 163). To solve this problem, a mixed-methods approach is used (Stelzer et al., 2015). Furthermore, Spaapen points out that narratives are a “good way to describe interactions between academic researchers and other stakeholders”, because it is “still a black box” (in van Bergeijk & Johnson, 2014 28). With that, it is obvious that there is no linear input-output thinking in focus. For an operationalization, Meagher & Lyall (2013) develop five “ideal steps towards impact development”: “(1) dialogue/networking between academics/non-academics, (2) joint knowledge exchange activities (workshops, training, visits), (3) active ongoing collaboration, (4) utilization of research ideas, (5) utilization of research findings” (p.6).

The SIAMPI approach has positive and negative aspects. Latter is simply explained, because case studies are in general very labour intensive because of interviews, desk research and analysis (de Jong et al., 2014). Furthermore, personal commitment, but also unforeseen occurrences during the project can turn out to be negative or positive (Spaapen & Drooge, 2011). Positive

about this approach is that the challenges of time-lag, attribution and causality can be solved through process indicators (de Jong et al., 2014). The researchers explain that productive interaction has an “enlightenment” function, because the interaction is close to the stakeholders and can be influenced in small steps (p.216; also Spaapen & van Drooge, 2011 in Samuel & Derrick, 2015). With help of a study of four cases in ICT research, de Jong et al. (2014) came to the conclusion that “productive interaction can occur in basic research as well as applied research” (p.96) and that not only interaction during the process, but also after completion are significant to look at.

Additionally, the quality has to be assessed, as well as different types of interaction. To conclude, de Jong et al. (2014) give three advice to assess societal impact: “emphasis should be on (i) contributions of research to societal impact instead of attributing societal impact to specific research, and (ii) efforts instead of results...(iii) it should be taken into account how well the efforts are embedded in an understanding of the knowledge production and knowledge use in the networks of the research group, project of program” (p.100). This approach could be seen as one solution to fulfill the external demand of purchasers and not to create a Frankenstein’s evaluation monster. This fear is further elaborated by B. R. Martin about the REF 2014 in the UK, explained in section 3.2.4.2.

### **3.2.2.3 The Payback Framework (Donovan & Hanney, 2011)**

Coming to the second key methodology in current literature, Donovan & Hanney (2011) redefine impact as payback. The Payback Framework is a research evaluation tool and originally used for health services research, but is now transferred in other research fields as the mostly used method. Reasons for that are the benefits of a structured data collection and the possibility of cross-case analysis (Donovan & Hanney, 2011).

It consists of two steps: First, the logic model with seven stages to go through the process with a structured approach. The peculiarity is that it includes feedback-loops and is non-linear (see Fig. 3-4). The second item is a “series of categories to classify the paybacks (benefits) from research” with the output and societal impact as an indicator (Donovan & Hanney, 2011 181). The outcome-based, retrospective and narrative case study approach is used to assess a series of five outcome categories of individual paybacks from research: “knowledge production, research targeting, capacity building and absorption, informing benefits and broader economic benefits” (Hanney et al., Donovan & Hanney in Samuel & Derrick, 2015 3). To gather data within case studies, a mixed-method approach is used (interviews, questionnaires, bibliographic and document analyses). In his paper, Buxton (2011) came to the conclusion about the challenges of measuring societal impact and the framework that “the “holy grail” is to find short-term indicators that can be measured before, during or immediately after the research is completed, and that are robust predictors of the longer-term impact or payback from the research” (Buxton, 2011 260). This is one of the key findings for the development of the framework (see Chapter 4).

One example of practical usage is an evaluation of impact of the National Breast Cancer Foundation investment (1995-2012) by Donovan et al. (2014). They used surveys, case study research and bibliometric analysis. Different Payback Framework categories were fulfilled, e.g. knowledge production through publications, dissemination and the interaction with research users, capacity building, etc. Results showed that both, basic and applied research produce “paybacks” in different categories, and that the methodology is a success (see Donovan et al., 2014).

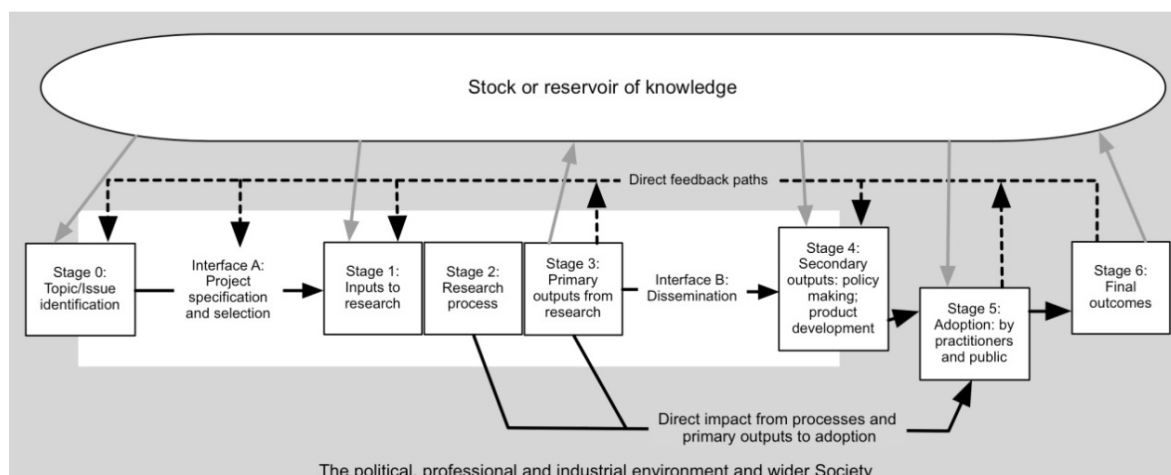


Figure 3-4 ‘The logic model of the Payback Framework’ (adapted by Hanney et al. in Donovan & Hanney, 2011 182)

To conclude this section, it is visible that there is an ongoing debate of how to assess impact and research is still nowhere near a working consensus. The ESF sees a trend in the identification of indicators with the ability to predict prospective impact. These should be included in a mixed-methods approach (ESF, 2012). The following table includes a list of most-cited impact measurement approaches, as well as its advantages and disadvantages to gain a quick overview and to answer the first part of RQ2. The table starts with methods of scientific impact measurement, followed by the intermediate method of Altmetrics. The two key methodologies of societal impact measurement are listed at the end. The next section broadly shows the discussion from another research strand: Societal Impact Assessment (SIA).

Table 4 “A list and evaluation of most-cited societal impact measurement approaches”

|                               | Approach   | Description  | Advantages   | Disadvantages  | References   |
|-------------------------------|--|--|--|--|--|
| Scientific impact measurement | <b>Bibliometrics (Citation Count or H-Index by J.E. Hirsch, Eigenfactor, Journal Impact Factor (IF))</b> | Measurement of impact within science through the counting of publications and citations through various equations.   | Traditional research impact indicators, so well-known and often used.<br>Simple instruments.<br>Quantitative method.                           | It cannot capture broad, societal impact and shows only a specific range of impact.<br>The identification of causality is not possible.<br>It could miss significant publications, who are rarely cited. | Bell et al. (2011);<br>Penfield et al. (2014);<br>Holmberg et al. (2015);<br>Wolf et al., (2015) |
|                               | <b>Altmetrics (Alternative metrics)</b>  | It is a measurement of scientific papers, relied on filters and based on metrics in the web as a source, especially with a special focus on social media (e.g. | It is possible to measure societal impact of publications with this method fast.<br>A new evaluation-method. This is the chance of a change in | The evaluation of a specific impact is not possible (social, cultural, environmental, economic).<br>In early stages - Further research is needed to use  | Bornmann (2014a);<br>Bornmann (2014b);<br>Holmberg et al. (2015);<br>Priem et al. (2010);        |

|                             |   |   |  |  |   |
|-----------------------------|---|---|--|--|---|
| Societal impact measurement |   | tweets, shares, downloads, etc.) and the cooperation with Zotero and Mendeley.<br><br>No common definition, but part of the open science movement.<br>Counter to peer-review.   | perspective and a varied analysis.   | it as a credible indicator of impact.  | Williams & Padula (n.d.)  |
|                             | <b>Case-study approach</b>                        | Measurement of societal impact for a specific project with the usage of a mixed method (e.g. the analysis through document review, interviews, surveys, focus group, etc.).   | Current best practice<br><br>Usage of quantitative and qualitative indicators.<br><br>A complex situation can be assessed.<br><br>A detailed, comprehensive understanding is possible.   | Time-intensive<br><br>Lack of objectivity – selective usage is possible.<br><br>Lack of quantification/generalization. | Bornmann (2013);<br>Bornmann (2014a);<br>Wiek et al., (2014);   |
|                             | <b>SIAMPI approach (Spaapen &amp; van Drooge)</b> | It is an analysis of the network (participatory approach) and interaction (exchanges) between researchers and clients during the process as a pre-condition to achieve societal impact.   | Learning tool, not assessment.<br><br>Less information needed.<br><br>Goes beyond metrics.   | No comprehensive assessment possible.  | Spaapen & van Drooge (2011);<br>Penfield et al. (2014);<br>Wiek et al. (2014);<br>Wolf et al. (2013); |
|                             | <b>Payback Framework (by Buxton and Hanney)</b>   | Originally developed for health science research and now also used in other research fields. It is based on the assumption that the whole system has to be captured to realize the impact. It includes data collection and a cross-case analysis (logic-model with seven stages), followed by a multi-dimensional | A comparison is possible because of the cross-case analysis.<br><br>Used in different research fields.<br><br>Multidimensional categorization of benefits is possible.<br><br>Recognizes the nonlinear process of research impact (includes feedback loops). | Need of effort to apply.   | Bornmann (2013);<br>Donovan & Hanney (2011);<br>Penfield et al. (2014);<br>Wolf et al. (2013);        |

|  |  |                        |  |  |  |
|--|--|------------------------|--|--|--|
|  |  | classification scheme. |  |  |  |
|--|--|------------------------|--|--|--|

### 3.2.3 From Another Perspective: Social Impact Assessment (SIA)

As Esteves et al. (2012) make clear, “SIA is a field of research and practice, a discourse, paradigm, or subdiscipline in its own right” (p.34) and was introduced 1969 by the US-National Environmental Policy Act. Organisations, as well as companies can use it as a process-oriented assessment as a part of the management and monitoring with special emphasis on “social issues as drivers of business risk” (Esteves et al., 2012 36). Furthermore, it is in alignment with the Health Impact Assessment (HIA), Environment Impact Assessment (EIA) and the Strategic Environment Assessment (SEA) (Wong & Ho, 2015). F. Vanclay (2003) and a research team developed on behalf of the International Association of Impact Assessment the “International Principles of Social Impact Assessment” to align the procedure and comprehension of SIA within the international community and set basic principles (Vanclay, 2003). The process is described in detail in the paper written by Arce-Gomez et al. (2015 87): “(1) Screening, (2) Community Profiling, (3) Scoping, (4) Assessing Impacts, (5) Developing Alternatives, (6) Mitigation, (7) Monitoring, (8) Management & Evaluation”. Benefits are that it “fosters the sustainability and equitability of biophysical and human environment” in the long-term (Vanclay in Wong & Ho, 2015 124; Vanclay et al., 2015).

When talking about advantages and disadvantages, SIA offers several important benefits as a “strategic tool for managing the social consequences of development” (Wong & Ho, 2015 124) and strengthens to increase business value as well as community capitals (Vanclay et al., 2015). Esteves et al. (2012 36) list eight advantages, the most important are gains in “certainty, planning, competitiveness and legacy within the process of a project, to gain more control over social/environmental risks and conflicts”. Additionally, it strengthens the internal, as well as external communication and with that trust and a positive future development (Vanclay et al., 2015). On the other hand criticism is levelled at the gap between theoretical foundations and practical application (Arce-Gomez et al., 2015).

The last critique is frequently mentioned in the literature. This is not at least one of the main reasons why demonstrations of how to assess impact should be observed. For that, the next section includes first of all examples driven by external demanders: The EU programme ‘Horizon 2020’, as well as the dual-funding system in the UK. The second example is pushed by internal forces to increase societal impact of research. One of the best practices is the PMEC system, implemented by the SEI.

### 3.2.4 Insights in Practical Examples on Different Levels within Europe

To be able to answer the RQs 1 & 2, it is important to take the step from theory to real-world approaches with its societal context factors. The history of evaluation is shaped by the positive development of the welfare states in Europe in the early 1960s, as well as the economic recession ten years later. It became clear that there is a “need of a controlling instrument for programmes and their impacts” (Stockmann, 2000 22), which paved the way for the new public management. Furthermore, the constant development of the European Union during the 1980s led to the greater consideration of accountability and the value for money (Stockmann, 2000). Furthermore, the society got a greater priority within evaluation and evaluation has been considered “as a resource for civil society” (Stockmann, 2000 71).

This shows, that there exists a demand of assessments of research on different political levels. In this context, Morton (2015) worked out that “different approaches to impact assessment are



appropriate for programme, project, research centre, or other units of analysis” (p. 2). This chapter provides a short overview of the approach on the level of the European Union, followed by consideration of the current situation in the UK. There exist different national evaluation systems all over the world (e.g. the SEP 2015-2021 in the Netherlands) with the goal to evaluate “if the national research performs better or worse than the global average” (Bornmann, 2014a 4). But because of limited content of the thesis, the British example is presented in detail, because it provides significant information used for the model development and the practical implementation in the Wuppertal Institute. Going down on the multi-level system to the institutional level, section 3.2.4.3 provides an overview of the PMEC-tool as best practice, developed by the SEI.

#### **3.2.4.1 ‘Horizon 2020’ - European Union**

On the level of the EU, the need of a multi-stakeholder approach is integrated in the biggest research and innovation program “Horizon 2020”. It is the extension of the 7<sup>th</sup> European Research Framework with special emphasis on a cooperation between economy and research to create growth and job opportunities (BMBF, 2014). Between 2014-2020, around €80 billion of funding are available for basic and applied research with focus on excellence, mobility and training to get a greater impact (RCUK, 2014; BMBF, 2014). Around 38% of the funding (€29,7 billion) is allocated to research, dealing with grand societal challenges (WR, 2015). Financial requests for projects/programmes have to pass an **ex-ante evaluation** with the assessment criteria of excellence, impact, quality and efficiency of implementation. The criteria of impact is especially weighted for innovation activities (BMBF, 2014). Furthermore, researchers can register to be reviewer of this assessment to gain an insight into the selection procedure and to increase transparency. Nevertheless, it is also clear that there exist different challenges. First, overall accepted indicators are difficult to define, because different specialities require adjusted indicators. Furthermore, the timelag between inputs and outputs is again considered as a key challenge (European Commission, 2015a). However, compulsory Key Performance Indicators with a baseline and a target for an precise assessment and monitoring are developed, as well as simplified data collection through a large, common database (European Commission, 2015a).

#### **3.2.4.2 The ‘dual-support system’ - United Kingdom**

Public research funds in the UK are provided to HEIs by a ‘dual-support system’ to support excellent research (see Fig. 3-5). There is a general consensus on the “importance of societal and economic as well as academic impact” (RCUK, 2016) and therefore the link is that impact is supported throughout.

The *Research Council* (RCUK) is one stream of research funding and cooperates with the EU program ‘Horizon 2020’. They provide funding for specific programmes, projects and research scholarships, with the main focus on research excellence. Their goal is to foster “global economic performance, and specifically the economic competitiveness of the UK, increasing the effectiveness of public services and policy, enhancing quality of life, health and creative output”(RCUK, n.d.). For that, they require academics “**to consider the future impact of research at the point of applying for funding**” (RCUK, 2016). Since 2014, ‘Pathways to impact’ is part of RCUK’s grant application procedures with the key focus on the engagement with the society as a way to improve the quality. This can be interpreted as a shift towards knowledge exchange (RCUK, 2014). Additionally, the focus on impact increases the accountability, maximizes benefits and the reputation (RCUK, n.d.). That means that applications have to include information about academic beneficiaries, an impact summary and the pathways to impact. Benefits are that researchers think about their impact in future, their scope and pathway. Challenges are resources and the existing confusion about the purpose of such an requirement (RCUK, n.d.).

The other stream is pillared by the UK funding bodies. The *Higher Education Funding Council for England* (HEFCE) is one of them. The funding should ensure the capacity and infrastructure to perform high-quality innovative research and supports fundamental and ‘blue sky research’ in institutions, so it is not allocated to specific topics (Hewer, pers. comm.). Furthermore, it can be used to finance the training of young researchers. Both streams realize the importance to measure impact of research. The HEFCE assess on behalf of the UK funding bodies (SFC, HEFCW, DELNI) **“the historic evidence of impact”** (RCUK, 2016) by the *Research Excellence Framework* (REF). It is a UK-wide exercise and the outcomes of the REF are used by the funding bodies to distribute research funding to HEI’s. The next subsection explains the REF as an assessment approach, its opportunities and challenges, in more detail.

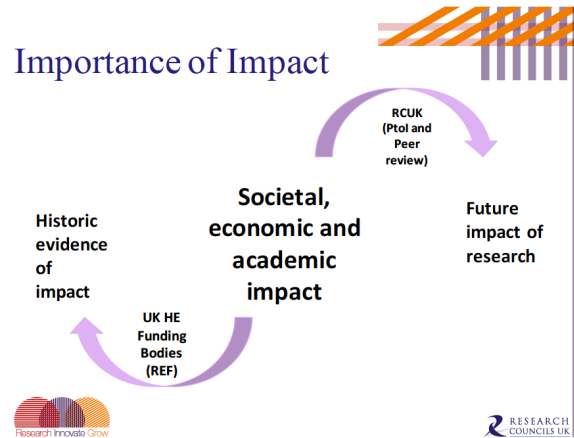


Figure 3-5 *Importance of Impact within the dual-support system of the UK’ (received through personal contact with Ch. Hewer, Executive Directorate of RCUK)*

### **Research Excellence Framework (REF), United Kingdom**

The REF 2014 is successor of the Research Assessment Exercise (RAE), which is based on the Australian Research Quality Framework (RQF) and mostly mentioned as an appropriate approach. Nevertheless, the RQF was never realized (Donovan in Martin, 2011). In the UK, the origin lies in the 1980s, “when Margaret Thatcher and her government required that all areas of public expenditure should demonstrate “value for money” and provide evidence that the funds spent met the “three Es” of economy, efficiency and effectiveness” (Rhodes in Martin, 2011 247). That was implemented by periodic RAE’s (every five years), started in year 1986. Differently from the predecessor, REF 2014 includes a peer-review exercise and for the first time in the world the assessment of societal impact to assign funding (Derrick & Samuel, 2016; Manville, 2014). Purposes are the accountability and the fulfillment of the social contract of research (Martin, 2011). The “overall quality profile” consists of (1) the quality of research output (65%), (2) social, economic, cultural impact (20%) and (3) research environment (15%) (REF, 2011 3).

The assessment of impact is based on two criteria: significance (“intensity of the influence or effect”), and reach (“the spread or breadth of influence or effect on relevant constituencies” (REF in Samuel & Derrick, 2015 4; REF, 2011 6). These criteria are used within the assessment tool, developed for this thesis. As an ex-post societal impact assessment, it includes four main panels of assessment (A-D), which is a common judgment. The final decision is based on the mean of all opinions as an instrument of “self-regulation of the research community” (Derrick & Samuel, 2016 77).

Besides all the successes, Martin (2011) is asking “Are we creating a Frankenstein monster?”. Even before REF, the universities and departments started to play the game and put a lot of

resources in the process of RAE to get excellent. He claims that after the third or fourth RAE, the cost-benefit considerations were not positive anymore (Martin, 2011). He claims that the new REF is “complicated and burdensome”, because of the criterion impact (p.247). First, this includes conceptual and methodological problems on the theoretical level, according to Martin (2011). And second, it requires extensive financial and human resources. He comes to the conclusion that “total costs should clearly be less than the benefits that flow from enhanced accountability” (Martin, 2011 248).

Additionally, as already mentioned earlier, the approach of peer-review is questionable, because of the judgment through peer-reviewers. This was further elaborated from Samuel & Derrick (2015) by interviews with 62 evaluators before the review-process had started (28.8% response rate). There was “little consensus found about impact across all interviewees”, but some interviewees defined several stages of impact, similar to the SIAMPI approach (Samuel & Derrick, 2015 7). On the other side, some reviewers define impact “as an outcome over a process involving a number of individual impact events”, which is similar to the Payback Framework and the definition by REF (Samuel & Derrick, 2015 9). It is clear that there exist different views on impact as a stage after outcome, or as a process. These findings are in line with the analysis of 7000 impact case studies for REF 2014, “suggesting that the development of universal, robust impact metrics is unlikely” (NERC, 2015 24). Furthermore, impact contains values and is influenced by “uncontrollable” forces, so 40 out of the 62 reviewers. Interesting is the statement to “think of impact as a verb rather than a noun, I think it’s a lot easier to analyse” (Samuel & Derrick, 2015 10).

As an output of the interviews, Derrick & Samuel (2016) developed the **evaluation scale** with two extremes to present a dominant definition of societal impact. They clarify that the focus “influences the direction of the societal impact evaluation, and may provide a lens with which to interpret evaluation outcomes” (Derrick & Samuel, 2016 84). The first extreme is a *quality-focused evaluation*, and a “necessary precursor to excellent societal impact” (p.84). The extreme is confronted by the *societal-impact evaluation* with the view that it is not true that “low quality research cannot be impactful” (p.85).

The data analysis made clear that reviewers tend to be inbetween these positions. Derrick & Samuel (2016) show on five decisions, how the position within the two extremes can vary. The decisions are in line with the questions asked about the personal definition of impact, productive interactions as indicators of impact, intentions and strategies for assessment and overcoming difficulties, indicators, attribution and causality (Derrick & Samuel, 2016 81ff.). Because of the page limit, this thesis will only demonstrate one significant decision. For a more detailed insight, the original text is merely referred to as a reference. The fourth decision is about “Push Factors and Assessing Impact” (cf. Derrick & Samuel, 2016 90). The answer from the quality-focused extreme would be that the role of the researchers is simply to produce quality research. If this is done in the right way “societal impact would happen linearly” (p.90). On the other side, the societal-impact focus would oppose that “research needed to be “pushed” in order to produce societal impact” (p.91). Pushes can be relation- and partnerships with stakeholders and with that the importance of productive interaction is recognized.

To conclude, the extremes are a start of identifying varying opinions about societal impact. Furthermore, these findings are very important when thinking about the group judgment, which is influenced by the group dynamic: “if the reviewers have different opinions, pressure for a consensus could result in acceptance of the majority position without adequate consideration of deviating opinions” (Olbrecht & Bornmann in Samuel & Derrick, 2015 12). An alternative to this is the open science movement with the replacement of peer-reviews by “open reviews”, what would mean the integration of knowledge users (Holmberg et al., 2015 3). The ICTs offer

ongoing new opportunities (Stockmann, 2000) with open science as a way and criterion of knowledge production beyond academia (Wolf et al., 2015). One development is the usage of Altmetrics. This would also solve the problem of hierarchies and power within the scientific world and increase the transparency and interaction.

However, Martin (2011) recognizes the REF 2014 as an incentive system to think about knowledge transfer between science and society in the beginning, but sees no benefit anymore and claims a rethinking of the dual system. Additionally, Wolf et al. (2013) clarify that “using the data for funding decisions and learning processes would raise questions of trust and users’ conflicting interests”, on the other hand this “opens up freedom in terms of the plurality of research and the strengthens the democratisation of public research funding” (Wolf et al., 2013 112). The future will show, which opinion will reshape the REF.

### 3.2.4.3 Stockholm Environment Institute (SEI)

In their paper about “real-world approaches to assessing the impact of environmental research in policy”, Bell et al. (2011) present a couple of organisations, which evaluate their programmes and projects with the use of different methods. One key example for this thesis is the system used by the SEI, which evaluates public-policy impact with “study-based impact evaluation from supply-and demand-side” (Bell et al., 2011 232). The measurement of the outcome is part of the project as an **adaptive project management** (SEI, 2013) and later on as an overall **ex-post evaluation** on the institutional level. The goal is “to increase internal organizational learning” through a “systemic way to share lessons”, as well as to give account to funders (SEI, 2013 1ff).

Since 2010, the practical implementation is a web-based system, called ‘PMEC’ (Planning, Monitoring, Evaluation and Communication System). The tool is used for basic and applied research with their specific outcomes and projects with various sizes (Visser et al., 2012). Every team member has access to fill in the tool with information in three main steps with a number of subitems: First, the *intentional design* with general information about the project, the identification of goals/purpose and plan developments, as well as qualitative and quantitative progress markers (with a base line) and a list of boundary partners. These “are those individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence” (Earl et al., 2001 1). The stage is the preparation for the *monitoring* stage. Important to mention are the journals, because they function like a diary for the team-members to write down the level of change, unanticipated changes, lessons learnt and a required follow-up. Furthermore, a list of outputs produced through the project should be compiled. The second subitem is called the ‘Most Significant Change’ (MSC) technique (see next section) and can also be used in the last step. The final (internal) *evaluation* includes the analysis of the reached goals, if the resource management was fine, the cooperation and coordination and advices for the future (SEI, 2013).

Nevertheless, the coordinator of the PMEC system of all seven SEI-centers points out in her presentation that there is a lack of usage and quality of information (de Bruin, 2014). Counter-effects are that they provide trainings and it is mandatory to use the PMEC system. Furthermore, the system is supported by the higher management and coupled with financial resources of the project (de Bruin, pers. comm.).

The next two subsections will explain the methodologies of ‘Outcome Mapping’ and ‘Most Significant Change’ in detail. They are a significant base of the PMEC system and inspiration of the framework development of this thesis.

### 'Outcome Mapping' Methodology

This methodology originates from the Theory of Change approach of the International Development Research Centre (IDRC), introduced in year 2001 (SEI, 2013) and includes the same steps as explained for the PMEC system (see Smutylo & others, 2005). That it is grounded in the theoretical approach could be an indicator of the usage of a basic logic model. However, the processing differs in several ways.

First, it is not following the cause-effect framework and refuses with that the implementation of a linear model (Earl et al., 2001). The focus lies on interventions and subsequent behavioural and social changes of involved boundary partners. "Results are measured in terms of the changes in behavior, actions and relationships that can be influenced by the team or program" (Smutylo & others, 2005 1). That is the reason, why the methodology defines outcomes "as changes in the behavior, relationships, activities, or actions of the people, groups, and organizations with whom a program works directly" (Earl et al., 2001 1). The latter part of the definition gives an insight about the understanding of the influence of a project.

The outcome mapping subdivides the influence of a project in three spheres: sphere of control, influence and interest (see Fig. 3-6). The inner circle is the project, which directly interacts with project partners. The project or program team is in direct contact with the so-called boundary partners. A. de Bruin emphasizes in our interview that the line between project- and boundary partner can shift, so "there is a little bit of flexibility" (de Bruin, pers. comm.). The outcome mapping "allows the program to measure results within its sphere of influence, to obtain useful feedback that can help improve performance and to take credit for its contribution to outcomes rather than for the outcomes themselves" (Smutylo & others, 2005 2). This impact model resembles the SIAMPI approach, the Payback Framework as well as the model presented by Stockmann & Meyer (2013). Therein, the main focus is the program, followed by the providers and the surrounding environment. They also mention that "since it is organizations that implement programmes or provide services intended to produce impacts, they and their relationships with other organizations or social subsystems are of special importance in impact evaluations" (Stockmann & Meyer, 2013 97).

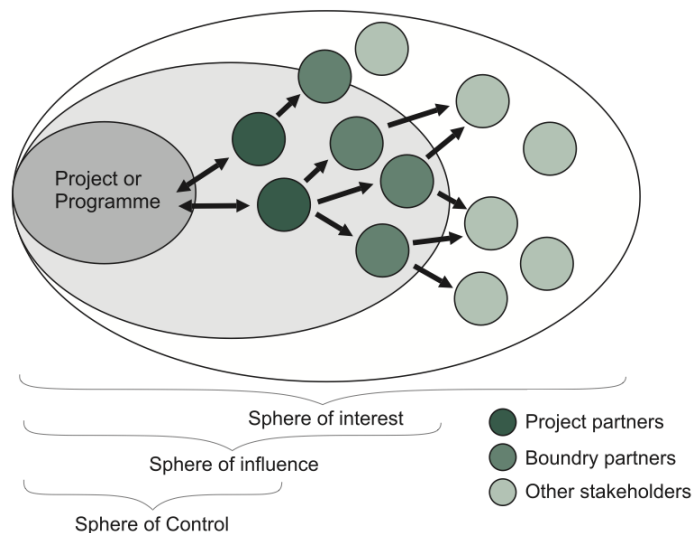


Figure 3-6 'An abstract representation of a project's influence' (Based on outcome mapping approach developed by International Development Research Centre in de Bruin, 2014)

An important question in the context of this thesis is “Why not impact?” and is answered by Earl et al. (2001). One reason is that the method is mainly focusing on learning and not attribution. They emphasize that the risk of the focus on impact is the request to provide “evidence that a particular program has brought about a sustainable improvement in the environment or in the well-being of a large number of targeted beneficiaries” (p.5ff.). It is not in focus to give account to donors. Furthermore, it is unrealistic for them that there is a straight, linear line from the project to the wider real-world, like the alignment of the evaluation scale extreme, namely *societal-impact evaluation* (see section 3.2.4.2). The contextual reality is important to recognize, but outcome mapping “deals with the problem of how to attribute impact by increasing the value and attention placed on results achieved “upstream” from impact” (p.10). It is not about the empirical evidence that impact occurred, it is about “improving rather on proving, on understanding rather than on reporting, and on creating knowledge rather than on taking credit” (p.10).

### **‘Most Significant Change’ (MSC) Methodology**

The MSC methodology can be optionally used in the second and/or third stage of the PMEC system (SEI, 2013). It is a “form of participatory monitoring and evaluation” during the project process with focus on performance and learning. Furthermore, it is a management tool with a structured data collection “on impact and outcomes that can be used to help assess the performance of a program as a whole” (Davies & Dart, 2005 8). The whole methodology includes ten steps. One of the first steps is the definition of domains of change as indicators, because pre-defined indicators are not used. The stories of changes are collected with two questions: First, „looking back over the last month, what do you think was the most significant change in [particular domain of change]?” (Davies & Dart, 2005 11). It is important that there are specific boundaries included within the question (e.g time period, own judgement, domain of change, etc.). Second, „from among all these significant changes, what do you think was the most significant change of all?” (Davies & Dart, 2005 11). The quantification of the answers is the next step after data collection, based on the domains of change (e.g. “changes in quality of peoples’ s lives”, “changes in sustainability of people’s organisations and activities”) (Davies & Dart, 2005 17). The domains of change should be restricted and are not SMART (“specific, measurable, achievable, relevant, time-bound”)(Davis & Dart, 2005 18). Nevertheless, the tool can be used without them. The quantification should also include negative changes as a feedback. Besides the categorization within domains of change, a thematic coding (p.41) can be used for a qualitative analysis. That means the development of categories on the basis of the collected stories and the usage of statistical analysis. The methodology is integrated within the questionnaire of the project assessment tool of this thesis.

## **3.3 Main Results of Expert Interviews**

As the previous sections show, there exists neither a consensus on the theoretical level, nor for the practical assessment of societal impact. Merely a tendency towards a focus on the process and the scope of assessment became obvious. That is the reason why nine experts from different fields of research and work areas (see Chapter 2) were asked about their individual opinion. These findings are an essential basis for the own development of a framework, presented in Chapter 4 of this thesis. This section is oriented towards the structure of the used questionnaire: the definition of scientific and societal impact and its relevance, possible drivers as well as questions about the process to measure and report societal impact (see Appendix B for the complete questionnaire).

**1<sup>st</sup> section – Definition of Impact.** The first question was adapted from the questionnaire to 62 evaluators of REF 2014 by Samuel & Derrick (2015): “In your own words, please tell me how you would define research impact?” (p.5). Various interviewees start to answer the question

with a reference to the importance of understanding the generation of impact within and across a discipline (transdisciplinary research), in other words the various dimensions of science. While P. Henricke (pers. comm.), former president of the WI and an important person in the German environmental debate, split the notion of research into basic and applied, Ch. Luederitz elaborates that both types have impact, but within different time horizons. Going beyond science, another question is the function of science and its relationship to society. The transdisciplinary researcher rightly continues to argue that science is surrounded and influenced by a social context, but on the other hand has to preserve its mental independence. In comparison to this, P. Henricke punctuates that science has the function of being a problem solver and a pulse generator of changes within society (pers. comm.). In other words, science could contribute to the self-enlightenment, self-criticism and reflection of society (Keil, pers. comm.) and must have an active role in the societal transformation (Luederitz, pers. comm.). In a nutshell, the interviews confirm the opinion found in literature that science has the responsibility to give something back to society. With that, the word “change” within a process, that could be also a stabilization, was mentioned by several interviewees, as well as the cause-effect relationship (Henricke; Bono; Schmidt; Causemann; de Bruin; pers. comm.).

The sustainability researcher K. McCormick characterizes impact within research as the utilization of one work into new frameworks and theories, while societal impact happens through the utilization of research within policy and industry (pers. comm.). Talking from a practical perspective, S. Schmidt’s view as an evaluator is defined on the basis of the staircase model with a number of cascades (see Fig. 3-2): the relation of intervention and changes, first on a personal level (outcome), then on the social system with increasing complexity. L. M. Bono (pers. comm.) is also a practitioner and added the point that some activities tend to produce impact on a personal level, which could have long-term impacts on society. But there are also activities with direct focus on societal impact within society itself. Interestingly, she confirms the understanding that different research fields and different languages use different terms, which makes a consensus even more difficult to find. But in general, L. M. Bono indicates that it is a shift of the focus away from resources to what happened through an activity, intended as well as unintended, positive and negative (pers. comm.). Supplementary, she directs the view to the subjectivity of impact, influenced by norms and values. This aspect is scarcely treated in the literature and a valuable contribution to the discussion.

A. de Bruin and Ch. Luederitz provide another perspective about the impact of scientific research. For A. de Bruin, impact is too far and that is the reason why her focus lies on outcome, the level of change which can be influenced. Nevertheless, she claims for a “holistic look of change” and that it is non-relevant if it is academic or non-academic. In that context, she cites the framework of five types of impact by Meagher & Lyall (2013), which is also cited in the section of definitions of societal impact. That is also supported by Ch. Luederitz with the question “What impact could be produced by science without having societal impact?” “How can science have an impact without having societal relevance?” (pers. comm.). A. de Bruin further explores that she thinks that “there is not that big distinction between a non-academic and researcher person”, it is just about power, depending on the position within the social context (pers. comm.). To conclude, the overall question is asked by B. Causemann, a consultant for organization development within the development cooperation: Which impact are we interested in?

In this context, different positions about the **relationship of scientific quality and societal relevance, as well as scientific excellence and relevance** are also interesting to discuss. Dr. Keil, researcher with the main focus on transdisciplinary research, makes clear that scientific quality is a precondition of societal relevance, while relevance is a potentiality to produce societal impact (pers. comm.). K. McCormick also sees a strong relationship, but is not sure about the

division of relevance and impact (pers. comm.). Nevertheless, S. Schmidt points out that relevance is measured on the basis of values and they can change over time (pers. comm.). Whether relevance is in alignment with excellence or not, a focus only on the short-term time horizon can produce trade-offs (McCormick, pers. comm.). When talking about scientific excellence, L. M. Bono gives a plausible and useful definition: an optimal ratio of resources and relevant impact. Furthermore, it is measured by bibliometrics, according to Ch. Luederitz, while there is a contradiction to societal relevance. Nevertheless, from his point of view is the difference between relevance and quality artificial, because excellent research can be societal relevant. With that, scientific excellence is a means to an end to reach societal relevance (pers. comm.). Remarkably, Dr. Keil opposes that for him, excellence is a conservative, one-eyed perspective about research (pers. comm.).

**2<sup>nd</sup> section – Drivers.** The second section of the questionnaire includes questions about the drivers, which push and demand the assessment of societal impact. The interviewee's statements are in line with the previously mentioned split of internal and external forces on different levels. Most frequently mentioned as external drivers are the European funding system and in general politics and the civil society. According to the interviewed experts, they have the right to claim that tax revenues are handled efficiently and effectively, the so-called social return of investments (McCormick; Schmidt; Keil; Schmidt; Bono, pers. comm.). F. Keil explains that there are parallel developments within different countries (UK, Sweden, Germany, etc.) (also McCormick; pers. comm.). An important detail reflects K. McCormick with his statement that the measurement of the quality of impact is less focused for these external drivers, the focus lies more on the expected impact (pers. comm.). This is also confirmed by S. Schmidt with the example of the US with another evaluation habit. There he explains that around a third of the project-budget is allocated to the final evaluation, in Germany only approx. 2-5%, which means a huge limitation.

F. Keil and B. Causemann indicate that internal drivers are the trend towards quality management, or the so-called new public management, mainly influenced through American concepts (pers. comm.). More detailed, L. Bornmann lists correctly the key factors of internal quality assurance, the justification, control and the learning effect as motivators (pers. comm.). Furthermore, the coordinator of the monitoring and evaluation tool within SEI mentions that the 'PMEC' system is a selling point and the approach of Outcome mapping improves the quality of projects through a more conscious design process for change (de Bruin, pers. comm.). This supplements K. McCormick with the point to get quick feedback through feedback loops. Ch. Luederitz lists the researchers themselves, because "it is important to keep a sharp eye on our own work" (translated, pers. comm.). Nevertheless, on all levels, an assessment is only useful if it leads to improvements in the future (pers. comm.).

Another driving force has already been mentioned in section 3.2.2, the open access strategy. This is welcomed by all interviewees and further development remains to be seen. It is clear that the options have not yet been fully exploited and it is still at the very beginning. However, it is the chance to reach a broader audience and the opening of the so-called "ivory-tower". In contrast, Ch. Luederitz comes to the conclusion that only a specific target audience with an interest in scientific publications is reached. It cannot be the overall solution and there is a need of knowledge transfer into society through communication with in a comprehensible language. Another point is the financing situation. While F. Keil the current scheme of for-profit publishers as a great barrier for accelerated scientific progress, K. McCormick points out the missing revenues without the current system (pers. comm.).

**3<sup>rd</sup> section – Process to measure and report impact.** For almost all interviewees, it is clear that the time-lag is the biggest challenge (Causemann; McCormick; Schmidt; Bono; Hennicke,



pers. comm.). One valuable solution of the timing-problem of an assessment is proposed by S. Schmidt and Ch. Luederitz. They want to use time series analysis and a correction through individual knowledge gained over time (pers. comm.). Furthermore, all other challenges, presented in section 3.2.1 were confirmed with the addition of resources as a barrier (McCormick; Bono; Schmidt, pers. comm.). Besides the accepted fundamental idea of the Theory of Change, another problem is pointed out, namely the linear perspective of the basic logic model with the input as a starting point. S. Schmidt argues from a historical perspective that this was the starting point to manage the distribution of tax revenues (pers. comm.). He narrated an interesting development about the utilization of taxes in Germany. It was clear for several years for example for municipalities that if they did not reach the expenditures of the previous year that year, they would get less in the next year. This “endless spiral” was clipped off by the focus to the output, the documentation how they spent the money. The next stage was to be impact-oriented, which led to the free call for projects to be more effective (pers. comm.).

Nevertheless, the linear usage of the logic model cannot capture the complex reality, according to B. Causemann and S. Schmidt. In addition, L. Bornmann makes clear that impact is difficult to measure in the “pure form”, because of its detours (pers. comm.). Furthermore, S. Schmidt points out from his practical experience that “if you want to say that you are doing impact research, you need the empirical evidence” (translated, pers. comm.). This would mean the usage of control groups within a laboratory situation, which includes ethical and financial problems. A solution is offered by Ch. Luederitz with the usage of the logic of evaluation and its focus on changes. But the question is how to measure that. Through the results of the interviews, it is clear that different, even too many approaches exist and that there is no common understanding about the best practice (McCormick; Keil; Causemann, pers. comm.). L. Bornmann indicates that the current tendency goes to case studies with the problem of cross-case comparability (pers. comm.). Furthermore, it is clear that the implementation of ex-ante assessment, during the process and ex-post assessment should be equally discussed, because each type has its own function (e.g. ex-post is more about performance, while a learning-factor is in the foreground during the process) and several researchers suggest a mixture (Keil; McCormick; Schmidt, pers. comm.). It is important to understand what to evaluate and what the possibilities are, claims L. M. Bono (pers. comm.). Therefore, a question about possible indicators to measure societal impact was asked, with the answer that citations, or peer-reviews are not enough (Bornmann; Henricke, pers. comm.). F. Keil correctly suggests a clear definition of impact as a starting point (pers. comm.). It is difficult to give advice about reasonable indicators, says L. Bornmann, because the discussion about how to measure societal impact is at the beginning. Ch. Luederitz mentions that they should be context specific, but a weighting against each other, or the establishment of quantitative indicators are out of reach at the moment (also Keil, pers. comm.).

The experts come to the conclusion that there is a need for an alternative to measure societal impact at its final stage. Interestingly, the answers of the interviewees go into two directions. S. Schmidt proposes the first alternative to measure the intended outcomes and, if possible, unintended results (pers. comm.). Another “pragmatic approach” would be to set the focus on the quality of a research process as a precondition to produce societal impact, or even as impact itself (Keil; McCormick, pers. comm.). One best practice is the PMEC system, which captures observed changes in boundary partners behaviours and attitudes as part of a research project. Learned lessons from projects are then shared across SEI to support institutional learning. According to A. de Bruin, the system gathers knowledge about what contributed to or observed changes in the boundary partners (pers. comm.). Furthermore, the aggregated data on the project-level can be used to produce a quantitative dataset. To sum up, productive interaction is accepted as an indicator by several experts, even if L. Bornmann mentions that it can lead to impact, but does not have to (pers. comm.). Therefore, the integration of stakeholders should

be improved. S. Schmidt complains that there is a need for “change in relationship” between research and university, policy and industry to improve the interaction. Within an evaluation process, each voice should be equal to strengthen the appreciation, credibility and also the openness of the target group (pers. comm.). F. Keil and L. M. Bono talk about the learning process on both sides, too (pers. comm.). These statements make clear that the assessment of societal impact on a whole society is rather a vision in reality and specific restrictions have to be in place, which influence significantly the framework development, fully explored in the following chapter.

## **4 Theoretical Framework and its Operationalization**

The theoretical foundation in Chapter 3 points out the key factors to consider while developing a theoretical and analytical framework. In general, Luederitz et al. (submitted) demand that an evaluative scheme should be “generic, comprehensive, operational, and formative”. Additionally, flexibility is an important characteristic (van Bergeijk & Johnson, 2014), as well as the usage of existing frameworks in a mixed-method approach (Stockmann, 2000). Nevertheless, the lack of a generally accepted definition of societal impact, its normative aspect and the consequent lack in a received instrument and standardized format lead to the development of an own theoretical framework. There is a need of a framework “to elaborate the different types of knowledge flows and network interactions involved in generating non-academic impacts from research” (Meagher et al. in Meagher & Lyall, 2013 8). One step further, this means a change of perspective from assessing impact to the assessment of the process towards societal impact as an integrated approach. This is in line with the statement mentioned several times that the assessment of societal impact in the real-world is a vision rather than practicable.

The method used in this thesis includes different stages. The first stage is the development of the theoretical framework and will be explained in detail in section 4.1. The next stage is the methodological implementation of the framework into an analytical tool to be able to assess the process towards and the societal impact created by projects in sustainability research (see section 4.2). The tool contains different sub-components. The first one is the selection of indicators within the different stages of a project. Therefore, a prioritization is needed to “avoid overstretching” (Lähtenmäki-Smith, 2006 44). Transparency and replicability are important as well as the usage of quantitative and qualitative indicators (van Bergeijk & Johnson, 2014). The realization will be presented in section 4.2.1 and 4.2.2. The methodology of these components is described in detail in Chapter 2. Different indicators mention the WI as the institute, because the first pilot-unit was done for this case-study. However, it could be replaced by many other organizations with an interest in their societal impact, with possible minor adjustments. Finally, section 4.2.3 presents different options for the usage of the instrument, which depends on the intentions to satisfy the external and internal demands to show the societal impact of sustainability research.

### **4.1 Development of the Theoretical Framework**

The development of the framework is based on the findings of the literature review and the expert interviews. To facilitate the mutual understanding of the different components, it is useful to look at Fig. 4-1 while reading the development process.

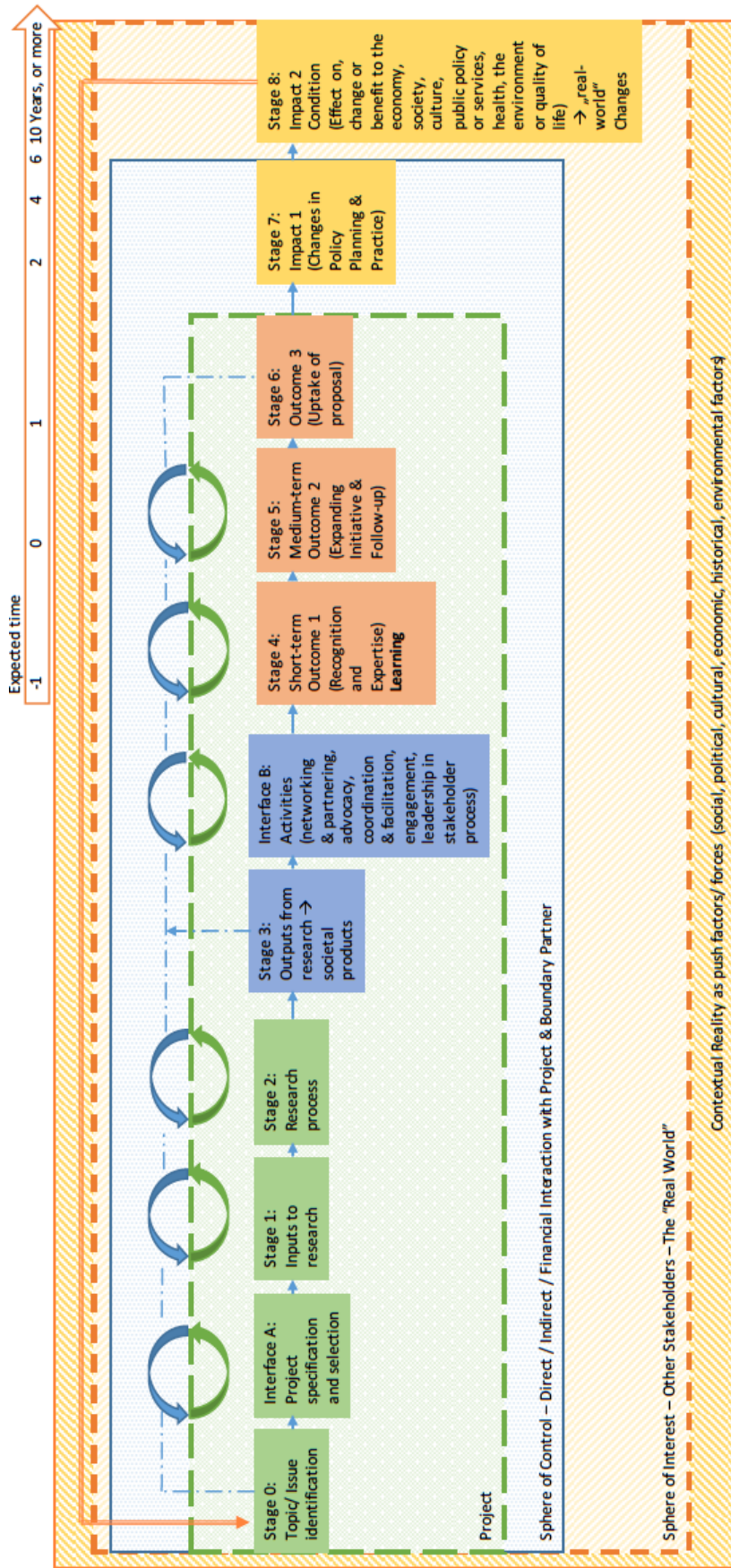


Figure 4-1 'Theoretical framework for the assessment of project's societal impact' (adapted from Donovan & Hanney, 2011; IGES, 2014; Earl et al., 2001; Spaepen & Drooge, 2011; Lähteenmäki-Smith, 2006; Borrmann & Marx, 2014 211)

A key basis is the Payback Framework (Hanney et al. in Donovan & Hanney, 2011), presented in section 3.2.2.3, because it provides a systematic data collection and analysis with usage of a mixed-method of interviews, surveys and documentary analysis. Because of that, a cross-case analysis is possible and increases transparency as well as replicability. Furthermore, a structural element is the logic model with seven stages from the topic/issue identification until the sixth stage of the final outcomes. The usage of the cause-effect framework is mostly used for research impact evaluation (Donovan & Hanney, 2011) and, as explained in section 3.2.2.1, different variants are used in practice. Examples are the program tree by Univation or Penfield et al. (2014) including the steps from input to impact. Nevertheless, Spaapen and van Drooge (2011) suggest a focus on small steps of the process, which is successfully implemented in the model called “impact-stairs” (Kurz et al., 2013) and the “Results Chain of IGES Impact Generation Strategy” by IGES (2014) (see also Fig. 3-2 & 3-3). Besides the division of the steps outputs - impacts, they further sub-divide them into smaller units to clearly identify the fulfillment of the requirements to reach the impact-stage (see also section 3.2.2.1). Additionally, the split of short- and medium-term outcomes shows the timeframe of the specific step. IGES describes themselves as an “Agent of Change”, they have the goal to reach an impact on policy, planning and implementation and changes in the wider society (IGES, 2014). That is the reason why the structure was used for the framework, also because it includes the consideration from the micro-level (project) to the macro-level (impact of project). Nevertheless, as the IGES model only starts with the output level, which cannot capture the important information about stages of issue identification until output of a project, a combination of the logic model by the Payback Framework and the results chain by IGES is compiled.

The third step includes the setting of the logic model into a context. The main inspirational source for that is the Outcome Mapping methodology and out of that the resulted PMEC system (see section 3.2.4.3). In general, when talking about the context, it is important to realize “social, political, cultural, economic, historical and environmental factors” (Earl et al., 2001 7). Outcome mapping is also following the result chain, but integrates three spheres of influences within a project/program: sphere of control, influence and interest. The graduation of the project’s influence is well-illustrated by the SEI (see Fig. 3-6). Additionally, each sphere includes different stakeholders with whom the project is directly or indirectly interacting with: Project partner, boundary partner (can match) and other stakeholders. The integration of various stakeholders is seen as a benefit from different experts. In general, the term stakeholder is defined as a “heterogeneous constellation of involved parties...Stakeholder comprises all those people and groups of people who are in one way or another directly or indirectly affected by the activities of a project, involved or interested in its outcome. An exact distinction and definition of the stakeholders varies dependent on the complexity of the project” (Stockmann & Meyer, 2013 284). In the context of projects, stakeholders can differentiate between two constellations: research funders/clients and practice partners, or both (Jahn & Keil, 2013 12). They can provide important input for the assessment through the whole steps of the logic model. Coming back to the different spheres, Outcome Mapping is defining boundary partners within the sphere of influence as “those individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence” (Earl et al., 2001 1). Based on the findings in Chapter 3, the sphere of influence until the stage of Impact 1 with the inclusion of boundary partners defines the frame of a possible assessment. It is clear that to assess ‘real-world’ changes is unrealistic, because of the context factors with uncontrollable forces. So the assessment has its boundary after Impact 1, which means “changes in policy, planning and practice” of the boundary partner.

Furthermore, the framework also indicates that the contextual reality is not only influencing Impact 2, but also the identification stage of the project. A project within sustainability research does not happen by chance, as a range of different experts emphasize (e.g. because of the

enlightenment function of science, mentioned in Spaapen & van Drooge, 2011; de Jong et al., 2014; Keil, pers. comm.). To illustrate the time-frame of the project-process and possible impacts, a timeline is integrated at the top of the framework, adapted by Tassey (2003) (in Lähteenmäki-Smith, 2006 35). It shows the time-lag between application and the impact in the real-world. The time perspective indicates different time horizons of immediate, intermediate and ultimate impacts during a project until up to 15 years or more to reach societal impact (here Impact 2). In that context, it is necessary to keep in mind that impacts can be negative/positive; anticipated/unanticipated; relevant/irrelevant for the project target (Lähteenmäki-Smith, 2006, but also see section 3.1).

The refinement of the framework is the last step and includes the definition of productive interaction between the project-team and the boundary partner(s). Basis here is taken from the SIAMPI approach, because it is the well established approach to focus on the project process and to solve the time-lag problem. As described in Chapter 3, the productive interaction is split into direct, indirect and financial interactions during different stages of the process (Spaapen & van Drooge, 2011), which will be further explained in the tool development. To draw the complete interaction, feedback loops are necessary to understand. Donovan & Hanney (2011) integrate them in their framework with the formation of a non-linear process (p.181). But besides giving arrows in one direction, like in the Payback Framework (see Fig. 3-4), the feedback loops in this framework can be interpreted as an equal, direct interaction between the project team and the boundary partner(s) to reach an accepted agreement in each stage (see Fig. 4-2). That shows even more the importance to integrate the perspective of the boundary partner(s), because otherwise only one side of the coin is considered.

## **4.2 Operationalization of the Framework: The Analytical Tool Development**

Coming to the second step of the analysis, the development of a tool is based on the framework. According to Maas & Liket (2011 180), the characteristics of the assessment of societal impact can vary (e.g. purpose, time frame, approach). The implementation for this thesis is an ex-post assessment of sustainability research projects with the boundary after Impact 1. Nevertheless, besides the focus on judgment, several options exist to strengthen the aspects of learning, as well as internal/external communication. This is explained in the last section of this chapter.

It contains five steps of a mixed-method approach: 1) Categorization of indicators, 2) Review of projects documents, 3) Questionnaire to the project leader, 4) Survey to the Boundary Partner(s), 5) Case Template. Step one is the base of the following steps and the results are all combined in step five as a final report (see Fig. 4-2). This section will explain step one and two in detail, as well as the implementation of the steps 3-5. To gather a deeper understanding of the methodology, see Chapter 2. Furthermore, the appendix includes all documents.

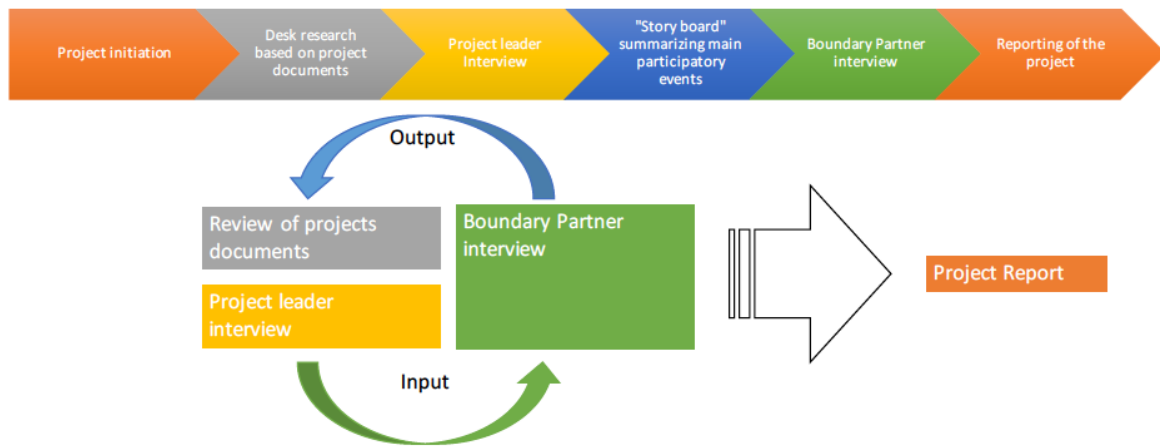


Figure 4-2 'Methodological implementation of the framework into a step-by-step tool and its 'counter-flow' interactions'

#### 4.2.1 Categorization of Indicators

The categorization of indicators is the second element of the Payback Framework, which includes "series of categories for classify the individual paybacks from research" (Donovan & Hanney, 2011 181). In general, Loikkanen et al. (2013) list six characteristics of indicators: they should be "relevant, comprehensive, illustrative, exhaustive, robust and plausible" (p.27). The task is to find indicators for specific stages of the logic model. This was done in a table with four columns: indicator, definition, questions to the project leader and questions to the boundary partner (inspired by the table in Donovan & Hanney, 2011 182). First, the rows are split into the steps of the logic model. Second, specific indicators, in total 14, are assigned to each step. The last two rows include specific questions, directly related to the appropriate indicator. The numbers above each question show the order within the questionnaire to avoid a misunderstanding. This means that the questionnaire for the project leader starts with the stage 'Project identification', while the questionnaire for the boundary partner starts with stage 'Output'. This feature will be explained in detail in the next section.

The main source for this categorization is the framework established by Luederitz et al., which is in publication process. The different categories are based very closely on the definition of this paper and when possible, the original wording was kept. The table is also published on a poster by Luederitz et al. (2015) for the 11<sup>th</sup> International Conference of the European Society for Ecological Economics at the University of Leeds. Other key references are the CIPP evaluation model by Stockmann (2000) and the practical book by Phineo (Kurz et al., 2013) to assess impact of projects by non-profit organizations. Another key source is the MSC methodology with its two questions (Davies & Dart, 2005) (see section 3.2.4.3). Also the five different types of impact by Meagher et al. (2008) were integrated, as well as elements of the questionnaire to measure the social effects of participatory sustainability research by Wiek et al. (2014). Within the category of the research process, the idea of a storyboard for a better visualization was integrated and is adapted by Wiek et al. (2014) (p.127ff.). The storyboard has to be filled out by document analysis and the interview with the project leader. At the end, an almost complete storyboard with the questionnaire can be send to the boundary partner to refresh the memories about events, outputs and outcomes of the project (see Fig. 2-3). These and other references are directly linked to the text:

Table 4-1 'Categorization of indicators for an assessment of societal impact in sustainability research'

|   | Indicator  | Definition   | Question to Project leader   | Question to Boundary partner   |
|---|--|--|--|--|
|   | Project identification                                 |  | 1  | 9  |
| 1 | Awareness <sup>1</sup> /Personal Interest <sup>1</sup> | The participants are conscious about the significance, as well as interested in the project, which tackle societal challenge(s) <sup>1</sup>       | <ul style="list-style-type: none"> <li>When thinking about the project goals, do they reflect your expectations as a researcher?<sup>2</sup> (Context)<sup>2</sup></li> </ul>  | <ul style="list-style-type: none"> <li>What was your motivation for participating in this project?<sup>4</sup></li> <li>Do the goal(s) reflect your needs /expectations as a boundary partner?<sup>2</sup></li> </ul>  |
| 2 | Support <sup>1</sup>                                   | It exists an adequate scope of structural, financial, nonfinancial resources for the project. <sup>1</sup>   | <ul style="list-style-type: none"> <li>“What means are required to achieve a given set of goals, in terms of schedules, staffing, budget, and the like?”(Input)<sup>2</sup></li> </ul>   | <ul style="list-style-type: none"> <li>Did you communicate structural, temporal requirements from your side to the researcher/project-team of the WI during project identification?<sup>3</sup></li> <li>To sum up, are you satisfied about the collaboration with the WI in the project x?</li> </ul> |
|   | Input  |  | 2  | 8  |
| 3 | Expertise <sup>1</sup>                                 | The participants have some expertise in sustainability research (professional skills and research techniques) to develop the project. <sup>1</sup> | <ul style="list-style-type: none"> <li>The researchers in your team have specific professional skills. Could you please explain how specific professional skills of team members contribute reaching the project objectives?</li> <li>Did you integrate experiences from previous projects?<sup>4</sup></li> </ul> | <ul style="list-style-type: none"> <li>Do you agree that you were actively engaged in formulating the problem statement of the project?<sup>3</sup></li> </ul>   |
| 4 | Trust <sup>1,10</sup>                                  | The project-team agrees to rely on the expertise of non-academic participants and researchers within the project. <sup>1</sup>                     | <ul style="list-style-type: none"> <li>Do you think your team relied on the expertise of non-academic participants (boundary partners) in this project?<sup>1</sup></li> </ul>   | <ul style="list-style-type: none"> <li>Do you think you as a boundary partner were willing to rely on the expertise of researchers (academics) in this project?<sup>1</sup></li> </ul>   |

<sup>1</sup> (Based very closely on Luederitz et al., submitted, when possible the original wording was kept. The table is also published on a poster by Luederitz et al., 2015 for the 11<sup>th</sup> International Conference of the European Society for Ecological Economics at the University of Leeds)

<sup>2</sup> (Questions of the CIPP evaluation model in Stockmann, 2000 43)

<sup>3</sup> (Translated from Jahn & Keil, 2013 21)

<sup>4</sup> (Translated from Kurz et al., 2013 24)



|   | Research Process                                  |   | 3  | 7  |
|---|---|---|--|--|
| 5 | Sequence of actions/<br>Transparency <sup>1</sup> | The project has a chronological chain of activities, which ensures “open and truthful reporting on intentions and pursued actions within” the process. <sup>1</sup>                                       | <ul style="list-style-type: none"> <li>If we have a look at the storyboard, what was in your opinion the most significant change that took place during the project process? Why was this particularly significant for you?<sup>5</sup> If an event is missing, please document it on the storyboard.</li> </ul>   | <ul style="list-style-type: none"> <li>When thinking back about the research process, how was interaction look like during the process?<sup>3</sup> And how often did this interaction happen (e.g. once a day/week/month, 2-3 times a week/month, etc.)?</li> </ul>   |
| 6 | Collaboration <sup>1, 10</sup>                    | The process includes participatory settings for collaboration of participants and ensure empowerment of participants <sup>1</sup> (e.g. through events, workshops, email exchange, etc.)                  | <ul style="list-style-type: none"> <li>How was the exchange of knowledge/ productive interaction between the project-team of researchers and the boundary partners organized?<sup>6</sup></li> </ul>   | <ul style="list-style-type: none"> <li>Please indicate on the storyboard, which of the following events during the project process you participated in.<sup>7</sup> If an event is missing, please document it on the storyboard.</li> <li>Do you agree that your opinions and perspectives as a boundary partner were represented in the participatory activities and integrated into the process development?</li> </ul>   |
| 7 | Reflexivity and Learning <sup>1</sup>             | The process includes an exchange of knowledge through feedback-loops between non-academic participants /boundary partner(s) and researchers to guarantee reflexivity and a learning process. <sup>1</sup> | <ul style="list-style-type: none"> <li>During the process, did you continuously verify possible options for the implementation of the key results?<sup>3</sup></li> <li>Were researchers willing to respond to signals/comments received from boundary partners and/or society?<sup>8</sup> Was it more “learning from each other” or “teaching” (two extremes)</li> </ul> | <ul style="list-style-type: none"> <li>Do you agree that your feedback was sufficiently integrated in the project process?</li> <li>Did you communicate structural, temporal requirements from your side to the researcher/project-team of the WI during project identification?</li> <li>Do you remember any periods where there was a lack of consensus between you and the researchers within the project process?<sup>7</sup></li> <li>If so, please explain the nature of lack of consensus and how this was or was not addressed.<sup>7</sup></li> </ul> |

<sup>5</sup> (Davies & Dart, 2005)

<sup>6</sup> (The shift from "knowledge transfer" to "knowledge exchange", discussed by Meagher et al., 2008 164)

<sup>7</sup> (Based very closely on a questionnaire by Wiek et al., 2014)

<sup>8</sup> ("By "strong contextualization" Nowotny et al. denote a field where researchers have the opportunity and are willing to respond to signals received from society. The authors argue that the more contextualized knowledge production is, the more likely it is to produce socially robust knowledge" in Spaapen & Drooge, 2011 214)

| Output                  |                               | 4  | 1   |  |
|-------------------------|-------------------------------|--|---|--|
| 8                       | Built capacities <sup>1</sup> | The project produces results/recommendations with an effect on the behaviour and practices. <sup>21</sup>  | <ul style="list-style-type: none"> <li>What was in your opinion the <i>most significant change</i> that took place because of the project results/recommendations?<sup>25</sup></li> <li>Why was this particularly significant for you as the project leader?<sup>25</sup></li> </ul>                                     | <ul style="list-style-type: none"> <li>Do you agree that the project results/recommendations (output) generated knowledge that was useful for you?<sup>9</sup></li> </ul>  |
| 9                       | Accountability <sup>1</sup>   | The project ensures confidence and commitment of participants to implement results generated by the project and their dedication to positive change. <sup>1</sup>  | <ul style="list-style-type: none"> <li>What was in your opinion the <i>most significant change</i> that took place because of the project results/recommendations?<sup>25</sup></li> <li>Please choose the applicable category/ies and write down, why this was particularly significant for you?<sup>25</sup></li> </ul> |  |
| Interface B: Activities |                               | 5  | 2   |  |
| 10                      | Distribution <sup>10</sup>    | Together with a wide variety of activities, such as networking and partnering, advocacy, coordination and facilitation, as well as engagement and leadership in a stakeholder processes, outputs should lead to the next levels of results, i.e. outcomes and impacts. <sup>11</sup> | <ul style="list-style-type: none"> <li>After the product results/recommendations (output) were completed, how did you ascertain that the boundary partner(s) absorbed these results?</li> </ul>   | <ul style="list-style-type: none"> <li>After the finalisation of the project results/recommendation, what were the next steps to integrate the results in your work?</li> <li>Were you satisfied with the communication between you and the WI after the project results/recommendations were compiled?</li> </ul> |
| Outcome 1               |                               | 6  | 3   |  |
| 11                      | Recognition <sup>11</sup>     | Boundary partners recognise the impact-oriented project results/recommendations and give the WI the opportunities to promote, teach or share it with wider audience. <sup>11</sup>   | <ul style="list-style-type: none"> <li>After the boundary partner(s) recognised the impact-oriented project results/recommendation, did you get opportunities to share your findings with the help of them?</li> </ul>  | <ul style="list-style-type: none"> <li>Did you share, or promote the result(s) of the project?</li> </ul>  |

<sup>9</sup> (Vanclay et al., 2015)

<sup>10</sup> (Walter et al., 2007 pointed out that "trust in others and distribution of knowledge were positively affected by involvement" (p.334). Furthermore, they come to the result that "the corresponding impacts are possibly a result of the involvement in the transdisciplinary process" (p.333). Nevertheless these results have to be carefully considered because of possible collinearity of the variables (p.335))

<sup>11</sup> (Hamanaka, H., 2015. Impact Generation Strategy of IGES. Working Paper "Societal Impact Patterns – Conceptual Framework and Discussion" for the International Advisory Board (IAB)-Meeting of Wuppertal Institute)

|    | Outcome 2   |   | 7  | 4  |
|----|---|---|--|--|
| 12 | Transferability <sup>1</sup><br>, <sup>12</sup>     | The output of the project is applicable and can be implemented to the boundary partner's work. <sup>1</sup>   | <ul style="list-style-type: none"> <li>How were the project results/recommendations integrated into the boundary partner's work? What was your role in this process?</li> </ul>  | <ul style="list-style-type: none"> <li>If you have used the key results of the project, please indicate how.<sup>7</sup></li> </ul>  |
|    | Outcome 3   |   | 8  | 5  |
| 13 | Significance and reach of the outcome <sup>13</sup> | <p>Significance: intensity of the influence or effect<sup>13</sup></p> <p>Reach: the spread and breadth of influence or effect on relevant constituencies<sup>13</sup></p>  | <ul style="list-style-type: none"> <li>How would you assess the significance and reach of the project within the boundary partner's own action?<sup>13</sup></li> </ul>  | <ul style="list-style-type: none"> <li>Does the uptake of the WI project results/recommendations fulfil the objectives, defined in the beginning of the project?</li> </ul>  |
|    | Impact 1  |   | 9  | 6  |
| 14 | Changes in societal realms <sup>1, 14</sup>         | <p>Impact includes, but is not limited to, an effect on, change or benefit to:</p> <ul style="list-style-type: none"> <li>The activity, attitude, awareness, behaviour, capacity, opportunity, performance, policy, practice, process or understanding</li> <li>Of an audience, beneficiary, community, constituency, organisation or individuals</li> <li>In any geographic location whether locally, regionally, nationally or internationally</li> </ul> <p>Impact includes the reduction or prevention of harm,</p> | <ul style="list-style-type: none"> <li>Looking back to the uptake of the project results/recommendations by the boundary partner, what do you think was the <i>most significant change in particular domain based on objective?</i><sup>5</sup></li> <li>Where there some unanticipated changes?<sup>16</sup></li> <li>What are the lessons learnt and is there anything that requires some follow-up?<sup>17</sup></li> </ul> | <ul style="list-style-type: none"> <li>Looking back to the uptake of the project results/recommendations by the boundary partner, what do you think was the <i>most significant change in particular domain based on objective?</i><sup>5</sup> What contributed to the change(s)?<sup>18</sup></li> <li>Where there some unanticipated changes?<sup>16</sup></li> <li>What are the lessons learnt and is there anything that requires some follow-up?<sup>17</sup></li> </ul> |

<sup>12</sup> ("The interaction is productive when it leads to efforts by stakeholders to somehow use or apply research results or practical information or experiences." in Spaapen & Drooge, 2011 212)

<sup>13</sup> (Samuel & Derrick, 2015 4; Derrick & Samuel, 2016 80)

<sup>14</sup> („...the “holy grail” is to find short-term indicators that can be measured before, during or immediately after the research is completed, and that are robust predictors of the longer-term impact or payback from the research“ in Buxton, 2011 260)

<sup>16</sup> (VIT, 2009 35)

<sup>17</sup> (Stockmann & Meyer, 2013 127)

<sup>18</sup> (Meagher, 2013)

|  |  |  |  |  |
|--|--|--|--|--|
|  |  | risk, cost or other negative effects.” <sup>15</sup> |  |  |
|--|--|--|--|--|

### 4.2.2 The Analytical Tool

As mentioned above, the methodical approach of the questionnaires is explained in detail in Chapter 2. This section explains the development to its current form. The questions are classified into categories according to the logic model. As mentioned in the previous chapter, the two questionnaires work against each other to capture the feedback loops within the project as a special feature of the tool (see Fig. 4-2). That solves the problem that the linear thinking cannot pick up the feedback loops, while “thinking about impact first may narrow the range of examples that are generated” (Manville, 2014). The process of tracking back is also integrated in the evaluative scheme by Luederitz et al. (submitted), based on Forrest & Wiek (2014). They developed an analytical-evaluative framework with the second step to reconstruct the the pathway to outputs (Forrest & Wiek, 2014 70ff.), because “it is helpful for identifying the key events, processes, or decisions that link the hypothesized cause or causes with the outcomes” (Falleti in Forrest & Wiek, 2014 72). Furthermore, while the questionnaire to the project leader asks organizational questions, the focus in both is on interactions and changes during and after the project process. It is clear that each side provides their own perspective, so that similarities and different opinions become visible. The two questionnaires can be found in Appendices C & D.

The case template is the last step of the tool. It includes all information about the project, collected through documentary analysis and the two questionnaires. In the beginning, a row for keywords is created to easily search commonalities among projects for an improved internal communication within the institute. Each criterion within the case template is linked to the specific questions of the questionnaires, which supports a transparent and replicable cross-case analysis. Inspiration for the structure were findings from the literature analysis (e.g. Stockmann, 2000 167, structure of the PMEC system, the REF Impact case study template found in REF 2014 (2011 52) and the identified indicators. Furthermore, Altmetrics as a measurement is included in the process to assess the spread of scientific publications in social networks. As you can see in the case template, references are directly linked and explained to the text (see Appendix E).

### 4.2.3 Options How to Use the Tool

The options of how to use the tool depend on various decisions: first, an assessment of the societal impact of a project can be ex-ante, during, or ex-post. As recommended in literature and by experts, a mixture of different types is useful (Keil; McCormick; Schmidt, pers. comm.). However, this choice depends on the purpose of an assessment. In particular, if it is to be used as a judgement and control instrument; if the institute is more focused on a structured learning process; or if the assessment is more driven from external, or internal viewpoints. The weight of the purpose of an assessment decides about the usage of this tool.

Overall, three alternatives with various levels of difficulty in implementation are elaborated:

- 1) The integration of the tool within the project process, like the ‘PMEC’ system (web-based). That includes the usage during the process as an integrative management tool, as well as an assessment afterwards on the project- and institutional level. This option is a new way of project-management, which could lead to learning-effects during and after the project. Furthermore, the tool is extended with the inclusion of the boundary

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<sup>15</sup> (REF, 2011 26)

partners as a comprehensive information source from the sphere of control. Another benefit could be the fulfillment of future-external demands, as a precautionary principle. Nevertheless, it needs a restructuring of the project process, and the investment of an amount of resources (financial, human) and training.

- 2) The second alternative would be to go through the steps as an ex-post assessment, as has been done for this thesis. This would need no restructuring of the project process, but it requires data availability after the project ends. Furthermore, it needs a responsible person to go through the steps, which can be time consuming.
- 3) The third alternative is the easiest version. The purpose is to collect data of the boundary partner and their satisfaction about the cooperation with the institute. The questionnaire includes qualitative, as well as quantitative items. The qualitative answers could be coded, so that a dataset could be achieved after a number of projects. This could be integrated within the sustainability report as an indicator to fulfill the principle of 'stakeholder inclusiveness' and responsibility towards them of the Global Reporting Initiative (GRI). Furthermore, the G4-PR5 require the analysis of the customer satisfaction in its materiality analysis (GRI, 2015 81). This alternative could be a step to fulfill the compliance with GRI, the most commonly used guidelines for sustainability reporting (GRI, 2015).

## 5 Wuppertal Institute Case Study

### 5.1 Background Information about the Current Situation in Germany

Germany is not as developed as the UK or the Netherlands in the integration of the criterion ‘impact’ within the assessment of research projects/programmes. Nevertheless, the country was also influenced by the trend to use evaluations as a management- and control instrument to allocate state subsidies in the 1960s (Stockmann, 2000 24). First, the input was focused, which changed to the output-focus and later on to the outcome and impact (Stockmann, 2000). Additionally, as a European member state, an important driver is the EU with the focus that research funding produces societal impact (European Commission, 2015b). More detailed examples are mentioned in the position paper of the German Science Council: the ERA Expert Group and the European Research Area Board with the focus on societal impact of European research (WR, 2015).

Besides the assessment of scientific impact, there exists no institutionalized process for evaluation, or performance monitoring of research programmes with specific indicators for programmes, funded by the Federal Government (Jahn et al., 2014; Stockmann, 2000). However, a significant driver on the national level is the German Science Council, founded in 1957 by the Federal and State Government. Their job is to give an overview of German scientific work and advice the government about funding of research (WR, 2014b). With that function, the council influences the research system, research rating and the excellence initiative by the German Federal and State Government. Focus is the controlling of research and their impact to increase efficiency and transparency. This position influences the comprehensive view of science. First, research is no “autarky” and it is surrounded by a societal, economical and political reality (WR, 2011 12). Second, research can also gain knowledge through this reality and is not captured in the ivory tower. As one of the most important German science-policy advisory bodies (WR, 2014a), it is also the management body, which conducts evaluations of institutions, research areas, as well as system and structural evaluations. Important to realize is that the results of such an evaluation can influence the financial situation of institutions and with that its continuation. The peer-review system is used, but also criticised with the same points as the discussion showed in the section about REF 2014. But as a solution, they suggest “informed peer-review”, which is guided by a specific set of indicators (WR, 2011 17ff.). Other assessment approaches are the successful third party funding, the counting of the number of doctorates and numbers of publications. This proves the limitation on the assessment of scientific impact. Nevertheless, the German Science Council also recognizes the weaknesses of such an assessment with reference to the ‘Matthew effect’ by the sociologist R.K. Morton, which means that famous authors are more cited than unknown researchers (WR, 2011 19). This can lead to potential distortions. A change of perspective happened in year 2015 with the position paper about great societal challenges, cited in the introduction of this thesis. The reorientation influences the German research system and promotes the discussion about the expansion of indicators from scientific excellence to societal and political relevance (Jahn et al., 2014).

Other German political strategies are split into federal and state levels. On the federal level, the ‘Hightech Strategy 2020’ focuses on societal impact of research through the analysis of societal challenges (WR, 2015). Examples of the state level are the ‘Research strategy progress NRW’ (in German: ‘Forschungsstrategie Fortschritt NRW’) with the focus on societal challenges, but also the importance of the participation of multiple stakeholders and the possible societal impact of research (WR, 2015). Overall, it is visible that the importance of societal impact of research is recognized, but not yet assessed.

Furthermore, the research field of evaluation is fragmented with less communication among each other. One countermovement is the foundation of the German Evaluation Society (DeGEval) in year 1997 and the German Advisory Council on Global Change supports an assessment strategy as an instrument to deal with societal challenges to achieve a sustainable development (Wolf et al., 2015).

This background has to be in mind when talking about the alignment of a research institute in Germany. More and more non-university institutes recognize the importance to deal with their sustainability strategy. The WI celebrates its 25<sup>th</sup> anniversary and because of that focuses on its societal impact. With its research orientation on the great transformation, it is perfect to use it as a case study to implement the tool, explained in the previous chapter.

## 5.2 Description of the Wuppertal Institute

This section gives background information about the case study. It is important to understand the contextual background to assess societal impact on the project-level. Furthermore, it allows to show ambitions to demonstrate societal impact on the institutional level as well, an important prerequisite.

The German Wuppertal Institut for Climate, Environment and Energy was found after the fall of the Berlin Wall in year 1991 by the prime minister of the Land North Rhine-Westphalia, Johannes Rau. Locations are his hometown Wuppertal and later on the capital Berlin. Reasons were to be more connected to national policy, to spread project results and to facilitate acquisition (Wuppertal Institute Report, 2011). During the 1990s, the awareness about climate change was increasing, especially through the Earth Summit in Rio de Janeiro. As an answer to this realization, the former director of the institute, Friedrich Schmidt-Bleek developed the internationally accepted 'Ecological Rucksack', which shows that the institute is more focused on applied research. The institute considered itself as an pulse generator for science and society with the requirements to "broadly radiate into civil society" and influence the national political, and/or business-related programmes (Wuppertal Institute Report, 2011 66ff.). This can be classified as a success story, because it is a pioneering institution within transformation and applied sustainability research. The international reputation can be seen in the 2015 Global Go To Think Tank Index Report. The institute has the position 26 in the category "Top Environmental Policy Think Tanks" and with that the fourth best in Germany (McGann, 2016). The working practice makes it difficult to compare the institute with others, but it would be on an international level for example the World Resource Institute, IGES or the Dutch Research Institute for Transition. Nationally, it can be compared for instance to the Institute for applied ecology or the Potsdam Institute for Climate Impact Research (Wuppertal Institute Report, 2011 12).

### Mission Statement

The institute started with the mission statement to promote "measures and initiatives to secure the climate situation, to improve the environment and to save energy, as an interface between the scientific pursuit of knowledge and its practical application" (Wuppertal Institute, 2016a). This was extended to emphasize the sustainable development and interconnect with the research programme to a transition:

"The Wuppertal Institute undertakes research and develops models, strategies and instruments for transitions to a sustainable development at local, national and international level. Sustainability research at the Wuppertal Institute focuses on the resources, climate and energy related challenges and their relation to economy and society. Special emphasis is put on

analysing and stimulating innovations that decouple economic growth and wealth from natural resource use.” (Wuppertal Institute, 2016b)

### Research Groups

To guarantee the connectivity between the mission statement and the acquisition of projects, the institute is split into three “integrative, interdisciplinary and stakeholder-oriented” research groups (Wuppertal Institute Report, 2011 8). Nevertheless, the groups practice a close exchange of knowledge, also with the inclusion of other actors of policy, economy and civil society. Thereby, knowledge and design interests are playing a huge role, as well as editing the findings into a language for societal actors.

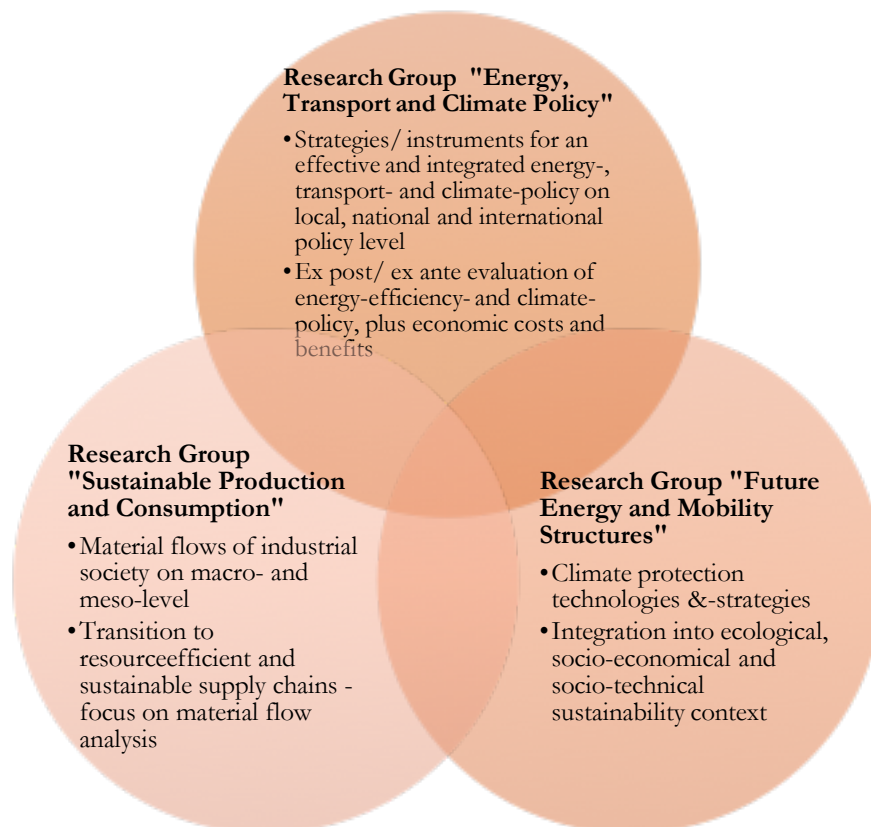


Figure 5-1 ‘The three research groups of the WI’ (Wuppertal Institute Report, 2011 21ff.; Wuppertal Institute, 2016c)

### Strengths and Weaknesses of the WI

*Strengths* of the institute are its “high flexibility of working structure” (Wuppertal Institute Report, 2011 72) and the integrative and interdisciplinary approaches with a high societal and political impact, according to the report addressed to the German Science Council in year 2011. The internal allocation of funds increases competition and innovation. Furthermore, the quality assurance is guaranteed through an internal and external assessment with focus on scientific quality, as well as societal relevance and impact (Wuppertal Institute Report, 2011). Relevant for this paper is the product-related evaluation as an instrument of reflection and controlling, which is done by a multilevel, internal review. Assessment criteria are: “professional quality, connectivity, effectiveness and target group orientation” (Wuppertal Institute Report, 2011 48).



*Weaknesses* are the high pressure of external funds, which leads to the problem that some fundamental projects are barely funded (Wuppertal Institute Report, 2011). Furthermore, the institute is owned solely by the Land North Rhine-Westphalia as a non-profit limited company (in German: ‘gemeinnützige Gesellschaft mit beschränkter Haftung’). It is a positive relationship, but nevertheless causes problems of long-term planning security because of the “principle of annuality” (Wuppertal Institute Report, 2011 68).

### 5.3 Strategic Options of the Institute

To describe the strategic options of the institute in a structured way, it is effective to show the relation between quality and relevance of its performance in a matrix (see Fig. 5-2). Additionally, this is also useful to see the ambition of the institute to produce societal impact on an institutional level.

The model is adopted and modified from a conference-paper by W. Mijnhardt. The conference is called ‘Social impact @ Sciences: Why Does Science Matter’, organized by the ISS (International Institute of Social Studies) in 2014. In his chapter, he performs a “reality-check” of the SEP 2015-2021 “from the institutional perspective” (Mijnhardt in van Bergeijk & Johnson, 2014 55). Therefore, the “matrix for excellence” has “two dimensions: on the vertical axis I put (‘low society’ versus ‘high society’) quality and on the horizontal axis (‘low society’ versus ‘high society’) relevance” (p.57). With that, W. Mijnhardt shows how the institutions have to perform to be excellent, according to the new SEP definitions. Furthermore, he points out what the institution has to do to be excellent in each of the four section. This scheme is modified to show the performance of the WI:

|         |               |  |   |
|---------|---------------|--|---|
| Quality | High Academic | <b>Compete (be selective)</b> <ol style="list-style-type: none"> <li>1. Leading pioneer in transformative research towards sustainable development</li> <li>2. A gender-balanced research team (ca. 220) with a wide variety of scientific disciplines focuses on transdisciplinary research</li> <li>3. The WI is collaborating with universities to support young academics</li> <li>4. The WI published 83 academic papers in peer-reviewed academic journals (2010)</li> </ol>   | <b>Contribute (be inspiring)</b> <ol style="list-style-type: none"> <li>1. The focus lies on solutions “acceptable to broad sectors of society and involving both the supply and demand sides” (Wuppertal Institute, 2016a)</li> <li>2. National/ international cooperation (e.g. universities, institutes, projects and postgraduate programmes)</li> <li>3. Partially transdisciplinary networks to “to profit from each other’s knowledge and experience” (Wuppertal Institute, 2016e)</li> <li>4. “Transition-cycle”: problem analysis → vision development → experiments → collective learning and diffusion of solutions</li> <li>5. Transdisciplinary research needs a dialog with stakeholders in all project-phases</li> </ol> |
|         | Low Academic  | <b>Constrain (administrative)</b> <ol style="list-style-type: none"> <li>1. The WI is a non-profit limited company, owned by the Land North Rhine-Westphalia</li> <li>2. Organisation: Management of Board, Steering Group, International Advisory Board and Subvisory Board + Work Council</li> <li>3. Friends of the Wuppertal Institute (non-profit association) – project-funding</li> <li>4. Sustainability Management within the WI since 2010 with different concepts (energy, mobility, sustainable procurement) and internal/ external communication</li> </ol> | <b>Connect (be organized)</b> <ol style="list-style-type: none"> <li>1. Communicating sustainability → Open access strategy to different target groups (scientific world, decision makers, general public, young people) for a wider public viewing</li> <li>2. Website as communication platform → 3200 monthly downloads (2011), WI-Newsletter, WI Papers/ Special/ Thesis/ Reports (final report of projects)</li> <li>3. Publishing of the Magazine for Sustainable Management “factorY”, free of charge</li> <li>4. Alumni network through social networks</li> <li>5. Communication with civil society through media (e.g. interviews, magazines, books, educational material)</li> </ol>   |
|         |               | Low Society  | High Society  |
|         |               | Relevance  |   |

Figure 5-2 ‘Strategic options of the institute’ (adapted by Mijnhardt in van Bergeijk & Johnson, 2014 50 with information about the WI from his website and the Wuppertal Institute Report, 2011)

The WI finishes a significant number of projects each year in all three research groups. To select three projects as a pilot-unit for testing the tool (see Chapter 4), various criteria were applied. First, it was clear that each research group should be included to achieve a balanced representation. Second, the project completion has to be two to three years ago. The literature review, as well as the expert interview gave no clear guidance about the timing of such an

assessment. Nevertheless, this analysis follows the recommendations of one to three years as a time-frame. This could be solved after a series of assessments in future. For that, the questionnaires include a question, if the stakeholder thinks that the timing is right. The answer in combination with the time of the questionnaire and the duration of the project can solve the problem individually (see Appendix D).

However, suitable projects were found on the homepage of the institute and collected in an excel sheet. The selection was also presented to and refined with the supervisor of the WI, Dr. F. Stelzer. After that, the project leaders were contacted, to get their approval. The result of this process is the selection of three projects. The next sections will present each project and the key findings of the assessment. The three complete final reports can be found in the Appendices F-H. They are written in German, but give an insight into the structure. The case template is in English (see Appendix E).

### 5.3.1 CASCADE



**Description of the project** - The European-wide project “Cities Exchanging on Local Energy Leadership” (CASCADE) was successfully implemented between 07/2011 – 06/2014. From the side of the WI, the research group “Energy, Transport and Climate Policy” was involved with A. Bierwirth as the project leader. Clients were the Executive Agency for competitiveness & Innovation (EACI) and the EU-program Intelligent Energy Europe (IEE). Coordinator at the EU-level was EUROCITIES (Wuppertal Institute, 2016d). The goal of the project is “to improve the implementation of sustainable energy policies in large and medium European cities” (CASCADE, 2014 2) and more specific: the improvement of local energy action plans, the connectivity between European cities and the identification of participated cities as best practices in their country. The overall goal is the achievement of the EU 2020-targets by cities. The broad goals show that they are domains of change and no qualitative performance indicators.

The project includes three thematical areas: renewable energy and distributed energy generation (the WI was expert on this topic during the project), energy and urban transport as well as energy efficient buildings and districts. Eighteen European partner cities participated from the beginning and passed all three levels of the methodological approach, which is structured as a cascade model: Level one includes in-depth peer review visits, followed by work-shadowing and mentoring visits with now twenty additional cities and the last level implies around 36 regional and national networking activities with again 37 additional cities. Overall, 76 cities from 19 EU-countries participated in CASCADE (CASCADE, 2013b). Mannheim was the only German city participating from the beginning (City Mannheim, 2016). The methodology is also in line with the mission of the institute (see section 5.2). Interestingly, an ex-post evaluation of the project was not possible because of limited project duration.

**Financial Interaction** – The European project budget is €2 million (CASCADE, 2013a), 75% EU-funded (CASCADE, 2013a), while the WI calculates around €127.000 and the City Mannheim approx. €60.000 (Bierwirth, pers. comm.; Schönfelder, pers. comm.).

**Societal Impact** – The two questionnaires are answered by A. Bierwirth as the project leader within the WI. Representative of a boundary partner is A. Schönfelder from the Mannheim City Administration’s Climate Protection Unit. Both agree that the target goals reflect their expectations and the input-, as well as the process-phase are generally satisfactory for both sides. The storyboard is a supportive method to realize that specific events, for example the congress in Malmö is significant for representative of the city Mannheim. One reason is that the boundary partner had to present their findings in front of an international audience, which improved foreign language and presentation skills. It is clear for A. Schönfelder (City Mannheim) that not

only the discussion about energy targets is a benefit of the project, but also the communication within an international group and to learn how EU-projects are working. A. Bierwirth (WI) mentions that the opinion of each city was integrated from the beginning of the process and the level of cooperation was really high. Overall, A. Schönfelder as the representative of the boundary partner is “very satisfied” with the cooperation and communication with the WI during the process. The rigorous implementation of the project is honored by A. Bierwirth with the usage of the MSC technique.

One major output is the CASCADE Benchmark, which includes Key Performance Indicators and can be used by cities to evaluate their own performance to achieve their EU2020-targets. Another output is the toolkit for peer-learning with the steps of peer-review, mentoring, work-shadowing and study visits. Each step is escorted by a booklet. The third output are project results in general: an increased knowledge within the above mentioned topics, improvement of the internal/external cooperation and policy-making through success stories. A. Schönfelder agrees that the outputs were useful for the city Mannheim, especially for city planning and communication strategies. That was also communicated by the usage of the internet, conferences and the spread of the CASCADE Benchmark. Mannheim communicated the results to the cities Viernheim and Ludwigshafen on a national workshop. Additionally, they translated the benchmark into German for the national usage. Nevertheless, the usage of Altmetrics for one publication had no result, as well as the search within social networks. When talking about significance and reach, it is clear that the project focus is on the participating cities and interestingly, A. Bierwirth has no information about the reach as a project leader. In contrast, A. Schönfelder is able to answer this from her perspective, based on the five types of impact. First, an improved capacity building is reached, especially in open planning and communication between resorts. This leads to the additional change on how to communicate the strategy of the city to citizens.

To conclude, the impact on level one is queried, based on the different objectives (City Mannheim, 2016): (1) *Faster implementation and improvement of sustainable, local Energy Action Plans.* Therefore, A. Bierwirth (WI) answers that the difference between each local action plan was significant and that individual aspects could be improved, but not the whole SEAP. The city Mannheim agrees that this goal was reached and confirms their effective work. (2) *Improvement of the networking between cities.* A. Bierwirth (WI) emphasizes that this was only reached for the cities, which participated from level one of the project. That is also confirmed from the perspective of the city Mannheim. The developed partnerships can be used for further projects in future. (3) *Position of the city as a model within its country.* A. Bierwirth could not say if the project really changed the position of the city, but if so only positive. From the perspective of the city Mannheim, this target was fulfilled and especially the peer-to-peer visits strengthened the competences in technical vocabulary in English. Unexpected changes did not happen. Overall A. Schönfelder supports the methodology and the benchmark and its future usage.

### **5.3.2 SusLabNWE (subproject SusLabNRW)**



**Description of the project** - The “Sustainable Labs North West Europe” (SusLabNWE) is a grouping of Living Labs in four countries of Northern Europe (Germany, Sweden, Netherlands and Great Britain). The duration was from 01/2012 – 04/2015 and located in the research group ‘Sustainable Production and Consumption’ with the goal to establish a network infrastructure for sustainability innovations with special emphasis on user integration (SusLabNWE, n.d.; SusLabNWE Brochure, 2014). That means the analysis of user behavior and negative rebound effects, as well as the user acceptance of sustainable product and service innovations. Main goals are the establishment of a network between European Living Labs and the exploration of technologies for users within an infrastructure of transdisciplinary research. The third goal is the creation of pilot-units with the topics of ‘heating/room temperature’. Scientific publications

of the results should follow, as well as the presentation on conferences. To sum up, the research question is: “How can the energy and resource efficiency in buildings be increased through the integration of users as well as actors in the value chain “heating/room temperature” into the development of processes, products and services?” (SusLabNWE, n.d.).

The German subproject is called ‘SusLabNRW’, because the initially used ‘InHouse’ laboratory of the Fraunhofer Institute is located in Duisburg. However, the laboratory was replaced by the inclusion of real households (approx. 115,000 inhabitants) in the Innovation City Bottrop in the federal state North Rhine-Westphalia (NRW). The goals of the German subproject are congruent with the European targets, just a concretisation. Nevertheless, the targets are more ‘domains of change’, no qualitative performance indicators. While INTERREG IVB North-West Europe was the European purchaser, the Ministry of Innovation, Science and Research of NRW financed around 50% of the subproject. Besides the European and other partners in business, politics, civil society and science, key partners in SusLabNRW are the Wuppertal Institute, the University Ruhr West, the Fraunhofer InHaus and the InnovationCity Management GmbH (ICM). Latter was interviewed as the Boundary Partner (J. Heuner), while Dr. C. Baedeker was interviewed as the project leader within the WI. The institute plays the role as an integrator between the different partners with the input from the scientific perspective (lifecycle-thinking, user integration, resourceefficient and sustainable product- and servicesystems).

**Financial Interaction** – On the European level, the financial interaction was around €5.12 Mio., while around €900.000 were spent in SusLabNRW with 50% funding by the Land NRW (Baedeker, pers. comm.).

**Societal Impact** – When talking about the targets, they fulfill the expectations of the WI and the boundary partner ICM. Furthermore, the focus lies on energy with the mission to reduce the usage of resources and energy within households by user interaction. The overall target could be seen in the decoupling of growth and the usage of natural resources, which reflects the mission of the institute. C. Baedeker was able to integrate knowledge from previous projects, like the ‘Ecological Rucksack’, knowledge about sustainability livinglabs and new ways of thinking in the input-phase. On the other side, J. Heuner (ICM) trusts the knowledge of the WI and feels actively integrated in the first phase of the project. A reflection about the different steps were integrated in the whole process and it was clear, strengthened with the help of the storyboard, that SusLabNWE and NRW were not aligned during the whole process. One major reason was the recognition on the German level that the integration of real households is better than the InHouse as a lab, a great “upheaval” (C. Baedeker, pers. comm.). That is also the MSC from the perspective of the project leader. There was a work distribution between German partners, the WI developed the methods how to assess households and networks, while ICM made contact with households and business partners in Bottrop. It is clear for C. Baedeker that the integration of knowledge from every partner and learning from one another is necessary for Livinglabs. J. Heuner agrees that the opinions and knowledge of ICM were integrated within the activities and process development. There was no lack of consensus during the process, but some problems are mentioned, like the lack of capacity and sometimes control of boundary partners. Overall, J. Heuner is satisfied with the communication between the WI and ICM through personal interaction.

Outputs are scientific publications and project recommendations/-results. One significant result is that the behavior has a huge influence on heating energy consumption. This can be influenced by Product-System-Services and the sustainable livinglab is a useful problem-solving method. Another success is the expected publication of a book in cooperation with all partners to document the results. Besides these success stories, J. Heuner fully agrees that the results are

useful for ICM and were used to calibrate their energy consulting and influenced the conception of new projects (integration of technical and social aspects). Furthermore, the project used all kinds of publication, from scientific papers to social networks. It is clear for C. Baedeker that different types of publications are necessary to reach different target audiences (pers. comm.). Nevertheless, the analysis with the software ‘Altmetrics’ had only little results, but interesting information about twitter demographics (one tweeter in Italy) and five readers on Mendeley (for the full Altmetrics report see Appendix G). The significance and reach of the project is more focused on the boundary partners, but has a significant influence, according to C. Baedeker. When talking about the application of the results, it is clear that future research is needed and useful, also within other topics (e.g. mobility, nutrition, etc.). From the perspective of J. Heuner, all five types of impact are fulfilled: capacity building (improved consulting), conceptual use (importance of low investment actions, like behavioural changes), instrumental use (establishment of data sets, new theses), attitudinal change (the project is a prime example of knowledge exchange), enduring connectivity (e.g. future publication of a book).

The last stage of the questionnaire is about impact on level one, assessed on the base of the project’s objectives (SusLabNWE, n.d.): (1) When talking about *the development of low investment strategies*, it is clear for C. Baedeker that the integration of users is significant. Nevertheless, J. Heuner states that implementation of new products was not realized, because one lack was in the integration of companies to develop such products. There is still a problem in the interplay between technology and behavior and the installer needs to be integrated in the service system (pers. comm.). (2) The second goal is the *publication of scientific knowledge* and that was clearly fulfilled for J. Heuner (ICM). The upheaval from labs to households was necessary, according to C. Baedeker. (3) When talking about the *integration of the whole value chain ‘heating/room temperature’*, C. Baedeker mentions again that the integration of the installer is needed, as well as family and friends. From the perspective of the boundary partner (ICM), it is not clear if this goal was reached. (4) The last goal is about the *development of qualification material*, but that was not developed. C. Baedeker mentions that a possibility would be the development of a consulting tool and J. Heuner agrees that the results were integrated in the work of ICM as a part of consulting. Unexpected changes are for example results by the University North Ruhr that the room temperature has no influence of energy consumption, because of other more significant factors. Another result is explained by J. Heuner that the heating in households often works in the factory setting with the loss of efficiency as a result. According to C. Baedeker, learned lessons are that the used approach is “absolutely reasonable”. Research plays a role as a facilitator, but the user has to be more in focus. From the perspective of J. Heuner, he is surprised about the openness of the test persons. Nevertheless, the (less-scientific) communication of the results with these stakeholders should be improved in future.

### 5.3.3 Cleverer Kiez sei clever! spare Energie

**Description of the project** – The project is located in the German capital Berlin, more detailed in the district Marzahn with the duration from 05/2010-01/2013. It deals with the increasing energycosts for most recipients of social benefits and low-paid workers. That is the reason why the efficient usage of energy is not only an ecological, or economic, but also a social topic. The energy company RWE AG, the Berlin Energy Agency (BEA) and Layon advertising design and communication GmbH started this common project with Dr. M. Kopatz as the project leader from the WI (Research Group “Energy, Transport and Climate Policy”). Principal task was the energy consulting of deprived households (Schaller & Kopatz, 2014). Two boundary partners were contacted per email, but they did not reply.

The training for energy consultants was addressed to long-term unemployed people as a chance of reintegration into the labour market. The project goals are directed to address the problem of fuel poverty. Two targets are defined: First the reduction of heating costs and how this could

be reached (behavioral change), and second, the energy consulting as a possibility of long-term unemployed people as a chance of the reintegration into the labour market. These are ‘domains of change’ and no qualitative performance indicators (Schaller & Kopatz, 2014).

**Financial Interaction** – The project budget was €80.000 (Kopatz, pers. comm.).

**Societal Impact** – From the side of the project leader, the targets fulfill his expectations and he integrated knowledge from previous projects. Overall, the project reflects the WI-mission statement, because the focus lies on the topic of energy and its included societal challenges. The project is locally implemented, but has national impact. One reason is the inclusion of the project in another national project called ‘Stromspar-Check’ (in English: ‘Power-save check’) (Schaller & Kopatz, 2014). However, one significant contextual factor is important to mention, because it influences the success of the project. By increasing electricity prices in autumn 2012, the media discussed the opportunity of energy consulting for private households. That increased the visiting number of the project-website significantly (Schaller & Kopatz, 2014).

Furthermore, alternatives were discussed during the process. Because of the non-participation of any boundary partner in this assessment, it is only possible to describe the cooperation from the perspective of the project leader. M. Kopatz considers the project process as a learning process, but he only communicated with the BEA at the beginning, with RWE AG regularly. Furthermore, he visited the project several times in Berlin. That is also his MSC during the process, because it is clear for him through the attendance of energy consultations that there exists enormous differences between different consulting concepts. The consultations in Berlin could be improved and he mentions another concept, used in Nuremberg as a model. But the BEA did not change anything in their training with long-term unemployed people. Another MSC is the idea to publish a book, instead of writing a simple project report. Outputs were then the publication “Energiewende. Aber fair! Wie sich die Energiezukunft sozial tragfähig gestalten lässt” [in English: “Energytransition. But fair! How the energy future could be designed socially compatible”] by M. Kopatz. Target audience is the general public. Additionally, a conference about energy transition was held in Kassel as well as the publication of the Wuppertal Report in year 2014.

Key results, or recommendations are the recognition that the project also reaches not only deprived households, but also higher earners. The usage of energy consultations can avoid debts and can lead to a strengthened environmental awareness and motivation to care about the energy usage. There was a high acceptance of the energy consultations and savings from up to 11-16% per household can be reached (Kopatz, pers. comm.). The project was a chance for long-term unemployed people to learn new skills and the integrative concept was successful (Schaller & Kopatz, 2014). The indirect interaction, or dissemination of the results was done by the own website, social networks, conferences, press release, other publications and most important: the published book. The project included extensive public activities especially in Berlin.

When talking about the significance and reach of the project, it was well-known in the capital, but also because of its good marketing. Furthermore, the inclusion within the national project increased the reach after the project ended. The project itself reached 1015 households and had a significant effect (Kopatz, pers. comm.). Because of the single interview with the project leader, the implementation of the results is difficult to identify. Nevertheless, it is clear that the topic about heating was neglected during the process (conceptual use), but not changed (Kopatz, pers. comm.). The results are more a food for thought, also in terms of professionalism and effectiveness. Coming to the questions about impact level one, two domains based on the project’s objectives were identified (Schaller & Kopatz, 2014): (1) *The reduction of heating costs* were neglected. (2) M. Kopatz could not say if the *integration of long-term unemployed people* were a success.

Furthermore, an identification of unexpected changes is not possible and a follow-up is not necessary. Nevertheless, the book gives new insights into the topic of fuel poverty and the project 'prepaid instead of ban' within the general topic of energy consumption was initiated.

## 6 Analysis and Discussion

The paper shows two interlinked aspects regarding the assessment of societal impact. First, it is increasingly required to produce research with a demonstrable societal impact to meet the obligations under the contract with the society and their representatives (e.g. Meagher et al., 2008). Second, it is not enough to measure scientific impact, or economic returns as a proof (e.g. Penfield et al., 2014). Both include challenges and opportunities, which have been analysed through the literature review and expert interviews. One significant finding is the implication of many definitions, which is leading to an overload, confusion and the resulting approaches, split in scientific disciplines and languages of how to define and assess societal impact on the project-level. An evidence for that is for instance the literature reviews, produced by L. Bornmann (2013, 2014a). Nevertheless, it was possible to extract the relevant information to develop an own holistic assessment framework and its realization. The findings about the assessment of societal impact are presented in the next section, followed by the discussion of the used methodology.

### 6.1 Discussion of Findings

The discussion about the assessment of societal impact can be structured in a SWOT analysis (strengths, weaknesses, opportunities and threats) to make a judgment of what has been learned from this thesis about the topic and the implementation in practice. The analysis is a result of the findings through the theoretical analysis and the subsequent test-phase of an own developed framework and its operationalization. The overall question of this analysis is: What are major strengths, weaknesses, opportunities, threats to enhance the assessment of societal impact within sustainability research?

**Strengths** – The theoretical analysis clearly shows the current necessity in the change of the perspective away from measuring the quality of societal impact in the real-world to the assessment of the process. This is accomplished by a set of indicators as proxies towards impact as an integrated approach (Spaapen & van Drooge, 2011; Morton, 2015; Meagher & Lyall, 2013). The process-oriented focus on productive interaction solves the problems of time-lag, attribution and causality with the special emphasis on learning (de Jong et al., 2014). In this context, productive interactions between stakeholders are seen as indicators of societal impact. This captures the important findings that knowledge exchange and a direct interaction in the process are essential to have implications on an increased trust and on the achievement of impact after the project closure (Vanclay et al., 2015; Meagher et al, 2007; Meagher & Lyall, 2013).

Getting into more detail about the theoretical framework as the basis of the tool, the logic model proved to be useful as a guidance with multiple options (e.g. tracking back option, integration of cascades). The combination of various approaches and its integration into the context of the project seems suitable in theory and practice. Furthermore, it enables the collection of data about the black box of the project process to identify interactions and their causality in a structured way (based on Spaapen in van Bergeijk & Johnson, 2014). The structure makes it possible to dismantle the interactions from input to impact in smaller elements within the black box. That confirms the usage of a logic model with smaller steps. From a practical point of view, the integration of the storyboard is a valuable instrument to identify important productive interactions (Wiek et al., 2014). With this approach, it is possible not only to assess the creation of societal impact, but also to gather information about the question of how this accrues.

The tool development is mainly based on the assumption that the case study method is the currently best available method (Bornmann, 2013; 2014a; Wiek et al., 2014), as well as the Payback Framework with the claim of a structured data collection to enable a cross-case analysis



(Donovan & Hanney, 2011). The possible options of the tool show the flexibility to deal with different financial and human resources and varying purposes of an assessment (learning, judging, internal control, etc.).

The pilot-test of the tool with three cases of the WI-study included in the work show the importance of a holistic perspective to capture positive and negative, intended and unintended influences (Wolf et al., 2013) from the sphere of control and interest, as well as the contextual reality (Earl et al., 2001). The division into spheres proved as a useful method to enclose the sphere of influence to gather specific feedback about the different project-phases. First, the three assessments served their purposes to generally strengthen the focus on the contract between research and society, as well as the reflection about the audience of a project. Second, the assessment achieved the objectives to test the research quality and to provide a structured knowledge about interventions and its impacts through the usage of the set of indicators. In this context, the practical implementation of a structured mixed-method approach and its summary in a project report can be described as a suitable way.

Coming back to the importance of small steps, the pilot-phase points out the importance of asking questions about impact separately for each objectives of the project, as well as to split impact into five types to gather sufficient and accurate information (Nutley et al. in Meagher & Lyall, 2013; see Appendix D, question 7). This approach can be used for projects of applied and basic research, like the PMEC system by the SEI (Visser et al., 2012). Interestingly, the test-phase shows indications that the purpose of the project influences the productive interaction. For instance, the project CASCADE integrated productive interaction as one part of the methodology and SusLabNRW was organized through a clear apportionment of work and communication between active project partners. It was clear to all participants that a mutual learning process is in focus. The contrary can be observed in the project Cleverer Kiez. There, the tasks were clearly defined. One partner identified the project's purpose, while the other partner organized the implementation process. To sum up, it is visible that not only the type of research (basic, applied) influences the production and timeframe of societal impact, but also the methodology of the specific project.

Furthermore, the pilot-phase confirms the importance of integrating boundary partners into the assessment, which answers the subquestion of RQ3. The integrated feedback loops during the steps of the project process resolve the linearity (Luederitz et al., submitted; Donovan & Hanney, 2011) and provides the assessment with information from 'counter-flow' questionnaires (e.g. the first examining flow from input to impact, the second from output to input) (see Fig. 4-2). It creates a platform for the boundary partner to be able to share knowledge about the process and complete information about feedback loops from the sphere of control and further processing of the outputs until Impact 1 (see Fig. 4-1). The project Cleverer Kiez clearly verifies the important role of the boundary partner in this tool. One reasons why the project is presented at last is to demonstrate the decrease in information in comparison to the other projects, when the information and direct feedback of the boundary partner are missing.

Overall, a clear strength of the implementation of such a tool is the opportunity to deal with external demands (also in line with the precautionary principle for future demands), to show accountability and internal to increase the knowledge about how to produce societal impact.

**Weaknesses** - The key challenges to assess societal impact, collected with the help of the literature review and expert interviews, clearly influence the practical application (e.g. time-lag, attribution and causality, data collection, linear measurement methods). This is based on the complex characteristic of societal impact (positive, negative, unintended, intended) (Stockmann & Meyer, 2013), as well as the influence of multiple externalities and stakeholders (Samuel &

Derrick, 2015) hamper a direct measurement. The discussion about the subjectivity, driven by uncontrollable and changing norms and values are critical factors and show the complexity of the whole discussion (L. M. Bono, pers. comm.). The conceptual and methodological problems on the theoretical level give only a tendency for rarely implemented approaches with a robust and reliable method.

Furthermore, it became clear by the expert interviews that an empirical evaluation of societal impact is not favourable, because of various consequences. Control groups are needed, preferably with laboratory-like test settings. But this includes ethical and financial problems (e.g. the debate of humans as guinea pigs) and is not commonly used in social sciences (Schmidt, pers. comm.). In this context, the focus on productive interaction is a useful strategy, but this analysis indicates that it is important to realize that it could be a forerunner of societal impact, but there is no guarantee (see also Schmidt, pers. comm.).

Coming to the current best available method to assess societal impact, various challenges are confirmed through the practical application. Depending on the purpose of an assessment and its related time, data availability is a major weakness and in line what is written in literature (e.g. Wiek et al., 2014; Penfield et al., 2014). In a retrospective process, the focus on the interaction can solve the challenges of time-lag, attribution and causality, but also increases the difficulty of data collection about the project process. Furthermore, the developed tool is dealing with the criticism about the linear measurement method with the integration of questionnaires with the project leader and one boundary partner as data sources. In practice, the selection of the latter is influenced by the recommendation of the interviewed project leader. This could lead to a distorting effect, which could be solved by the interview of multiple boundary partners (if available). The categories of indicators, which are basis of the questionnaires are weighted equally. As a conclusion of the interview with Ch. Luederitz (pers. comm.), it is not possible at the moment to say, if one indicator need more weight than another.

Overall, a significant weakness is the available financial and human resource, which influences the intensity of an assessment (e.g. RCUK, n.d.). The literature review shows, that a mixture of assessment methods should be used, but it is also clear for me that the benefit has to overweight the input of resources, like Martin (2011) wrote in his analysis about a possible Frankenstein monster. An assessment is only useful, if the results are processed and the relation of expense to benefit is appropriate.

**Opportunities** - The external pressure to show accountability should also be understood as a chance to show an active role of science as a problem solver and pulse generator of change within the society. The evidence gathered in this study supports a position that the scientific world plays an enlightenment-role and to stimulate self-criticism and reflection within the real-world (see also Keil, pers. comm.). A structured understanding of impact as a change (see ESF, 2012), generated by interventions, can lead to a strengthened position and to improve societal capital. With that understanding, it is clear that the production of research´s societal impact goes hand in hand with the assessment of it.

In this context, significant to realize is the importance of knowledge transfer (Meagher et al., 2008) and its design. The societal relevance, as well as the engagement of users can play a key role and should be focus in the project process and its assessment. As previously mentioned, a mixture of assessment methods (pre, during, post) would be ideal to fulfil different purposes from accountability to learning (see also Keil; McCormick; Schmidt, pers. comm.). Nevertheless, it is also interesting to mention in this context that the projects demonstrate the possible difference of target audiences. This confirms the statement by experts that project could have in focus first the individual level and followed by that long-term impacts in society, or

immediately impacts within the society (e.g. Bono, pers. comm.). A simple logic model cannot capture these foci similarly. One example is the staircase model to capture the different time horizons and target audiences of interventions and their changes. That is the reason why a future opportunity of design could be the integration of cascades (see Fig. 3-2 in Chapter 3.2.2.1).

Furthermore, another important expansion in the assessment is the aspiration to focus on the quality of the fulfilment of indicators, instead of only a nominal query (yes/no). The implementation shows that it is important to think in smaller steps, as well as to integrate ordinal questions for a closer examination (see Appendix D with the integration of codings). This is also in line with the potential improvement through the integration of quantitative besides qualitative indicators with a baseline for a possible comparison. The quantification of narratives through thematical coding was introduced in the case template and could be a promising approach to develop a catalogue of codings.

Follow up the future scenario, deficiencies will be remedied after an amount of assessments. One important example is the solution of the timing problem of an assessment through a time series analysis and improved knowledge about the required design. Overall, the test-phase shows methodical and thematical interfaces of the projects across research groups and the implementation of the assessment as an adaptive project management tool could increase transparency, reputation and accountability. The results can be used internal as a reflection within the project, or on the institutional level as a part of organizational learning. The keyword section in the beginning of the case template can be used to identify useful cross-case knowledge exchanges on the institutional level (e.g. SusLabNWE and Cleverer Kiez teams could share their knowledge about behavioural changes in energy consumption of households or the communication with test users). Furthermore, another expansion on the institutional level would be the synthesis of the assessment results. In there, the challenges and opportunities found during the different projects can be discussed and analysed and could lead to an overall improvement within the project management as well as of the communication within the institute. To conclude, this analysis seems to support the position of L. M. Bono that the findings of the assessment should be used as a compass, not like a linear road-map how to achieve societal impact. For external communication, this successful development can be presented to demanders and supporters. In this context, important opportunities get possible through the development of the ICTs. The Altmetrics method is future-oriented and with the possibility to assess impact in various societal dimensions a suitable tool in future. Additionally, knowledge transfer will be easier, pushed through the open access strategy.

**Threats** – The literature review shows that the lack of consensus about the definition of societal impact causes misunderstandings and misinterpretations, summarized in theoretical frameworks and analytical methods. The various characteristics of societal impact reinforce the interpretations and considering only the visible part of it could cause a major threat.

Additionally, different disciplines discuss this topic for years on the basis of their research contexts and individual understanding. The ongoing separation hinders to find a consensus. One major example is the advanced level of discussion in the discipline of development cooperation and the implementation of the Theory of Change through process-oriented methods with the focus on learning. Furthermore, the characteristics of science itself are barriers to find a linear cause-effect correlation (e.g. Bornmann, 2014a). Its unpredictability and randomness are uncalculable factors and the enforcement in a structured system internally and externally could inhibit these vital characteristics.

As mentioned several times, there is a common understanding that to show causalities of project's objectives and real-world impacts are more of a vision in the current reality (e.g. Bono,

pers. comm.; Donovan & Hanney, 2011; Wiek et al., 2014). What is missing in this discussion, on the basis of this analysis, is clearly the practical experience of theoretical concepts. This is also claimed by several experts. In this development stage, the statement that the wrong usage of impact assessment could lead to higher competition and an increased misunderstanding about this field within research is important to consider, what could be followed by a change in publishing habits and interests (cf. Martin, 2011). This is even more difficult when thinking about the assessment of societal relevance on the basis of norms and values, which can change over time. This analysis proves that a shift in perspective stunts this development.

## **6.2 Discussion of Methodology**

Chapter 2 of the thesis clearly describes the methodological approach and its step-by-step implementation. The basic assumption is that the project is producing societal impact, but the task is to provide a much clearer view of how this is taking place. Overall, the theoretical and practical analysis of the current state of the art of literature about how to assess societal impact lead to the development of the theoretical and holistic framework and its operationalization. Reflecting, the findings provide a useful guidance through the research process. The literature review was driven by the applied question to understand and define societal impact, as well as to show theoretical and practical approaches. The expert interviews were needed because of the novelty of the topic and to reach a level of security about the current discussion and to confirm possible strategies of a practical implementation.

The definition of societal impact of REF 2014 was used, because it is broad and demonstrates the diverse characteristics of societal impact within a multilevel system with various scopes. Another possibility would be to use a focus group of researchers within the WI to identify a working definition. This approach would include a presentation of the current status of definitions of societal impact, which would be discussed. Nevertheless, one major reason to rely on the available definition was the results of the interviews with reviewers by Derrick & Samuel (2016). They come to the conclusion that there is a peer pressure to come to a mean of a definition, which is not reflecting the diversity of individual opinions. The definition by REF 2014 can be understood as a broad solution with the Theory of Change approach as a background. Nevertheless, it lacks in precision of how to achieve impact, which is solved through the strategy of practical implementation.

### **6.2.1 Development of a Theoretical Framework and its Operationalization**

The development of the framework was based on several assumptions found in literature and through expert interviews. Overall, the design fits with the current discussion and level of development. It is true that the integration of several approaches is useful and needed to achieve a suitable holistic framework. The split of the phases into smaller units and their feedback loops have proven highly effective, as well as the setting of it in context, divided in three spheres. That shows the various dimensions and offers opportunities of a demarcation for the operationalization.

The operationalization is based on a set of indicators to assess small steps within the process as proxies for future societal impact, which is at the moment not operational because of a variety of uncontrollable variables. The categorization of indicators is shown in a table for a transparent and understandable approach. The reader should first recognize the category and indicator, then its definition and the operationalization into questions for the particular stakeholder. The coherent direct referencing gives the reader the possibility to check the original meaning. The table signalizes that the indicators and questions are significantly based on current approaches and transferred and extended in the context of this thesis. Nevertheless, as Ch. Luederitz

emphasized in an expert interview, their indicators are not final and can be refined. This is also true for the own approach with future opportunities in specialization and weighting.

Furthermore, the assessment during the project process and one to three years afterwards allow the integration within the general project evaluation and its budget and can produce direct learning effects on several levels: within the project-team, for the boundary partner and on the institutional level.

However, the used methodological approach is also a result of the impossibility of an empirical evaluation. Additionally, to use quantitative methods could cause a high intercorrelation between selected variables as predictors of societal impact and the ignorance of third variables, which causes no verifiable assessment results. These are reasons to mostly rely on qualitative data to detect significant narratives, which could be coded. Nevertheless, it is important to establish a transparent, structured system of data-collection to enable replicability, as well as cross-case analysis and a synthesis of the most important findings of methodical and thematical overlaps of projects. This was reached through the method applied.

## **6.2.2 Test-phase of the Tool**

In literature, the case study approach is declared as the current best practice (Bornmann, 2013; 2014a; Wiek et al., 2014). Besides its weaknesses, it enables a deep drilling into a project to collect data about indicators of future societal impact. It also allows the capture of unintended and unexpected actions from different perspectives of directly involved stakeholders (e.g. Appendices C, Question 16; D, Question 9) and the approach can be improved through direct feedback. The generalization of findings is reached through a synthesis of findings, but this should always be understood in the societal context. That shows the necessity of a holistic framework and confirms the used approach.

Another option of data analysis would be a broad questionnaire, send to several projects to reach a high number of surveys and possible quantitative data analysis. Weaknesses of this approach would be the shallowness, because it is not possible to drill deep with simple surveys to project leaders and boundary partners. Furthermore, the response rate was a critical factor of the thesis period as well as the limitation of projects finished one to three years ago. The focus on the project process and the productive interactions between directly involved stakeholders influenced the decision to analyse three projects, but deeply through a mixed-method approach of documentary analysis and interviews. Additionally, the option of a survey is integrated in the current tool to provide quantitative data about the opinion of the boundary partner as a judgement of the projects performance. This leads to the inclusion of only one boundary partner within the tool. First of all, the initial idea was to interview clients of the project, because they give the funding and are representatives of the external pressure. But after a couple of project analysis, it was clear that the client sometimes only provides funding and is not directly involved in the project process. That would cause the failure of the approach and the solution was to expand the scope according to the Outcome Mapping Methodology. Nevertheless, the test phase shows the tendency of the project leader to choose the boundary partner with the best relationship. This analysis indicates a clear risk of biased results in such case – and further, suggests that a better approach would be to query all boundary partners, or a random sample. However, this would cause limitations in the usage of the findings, because the selected boundary partner by the project leader is an important partner for the institute and the questioning could conceivably improve the relationship for future cooperations. The selection process needs an improvement of transparency.

Overall, the pilot-unit shows the functionality of the tool and its feasibility in reality. The ‘counter-flow’ questionnaires are a special feature and fulfil the purpose to ask questions,

structured on the basis of the logic model, in a non-linear way. Nevertheless, the logic model could be extended to the integration of cascades and the specification of the societal impact within “economy, society, culture, public policy or services, health, the environment or quality of life”, as the REF-definition specifies. To assess Impact 2 is not reached with the current tool, only the impact in the sphere of influence and its “effect on, change or benefit to the activity, attitude, awareness, behavior, capacity, opportunity, performance, policy practice, process or understanding” (REF, 2011 26).

## 7 Conclusion

Returning to the overall aim of the thesis, which was to contribute to the knowledge of how to understand the theoretical discourse about societal impact and how this can be practically implemented to fulfill the internal and external demands, various influencing factors were identified. The development to perform assessments is motivated to show societal responsibility as a scientist, working in a hierarchical and tending isolated scientific world. Furthermore, the data gathered in this study indicates that the scientific world revolves around itself with extreme pressure to publish frequently in well-known journals to compete for funding and scientific recognition. Nevertheless, more and more voices are raised to break through this thinking about excellent quality research. The evidence gathered in this study supports a position that science needs to accept its characteristics of being random and that sometimes luck plays a significant role. But control is needed, pushed by funders from economy and politics, the civil society and researchers themselves. The peer-review system is a popular means of quality assurance within science. However, it is still happening in the ‘ivory tower’.

The introduction of this thesis showed that knowledge-sharing between societal subsystems, as well as between scientific disciplines is a key factor to deal with grand societal challenges. As a result of the literature review and expert interviews, researchers need to overcome their desire to protect their knowledge and be a guide to a comprehensive structural societal transformation towards a sustainable future. Furthermore, this study confirms the claim by U. Schneidewind (2015) of a democratization of the scientific world. Interestingly, the critique about the “retreat in premodern normativities” (Grunwald, 2015 6) through the direct interaction between science and society is commonly formulated in literature, but not that the scientific system is also driven by norms and values of the funding bodies. The analysis indicates that there is an ongoing need of an audit, based on democratic principles to achieve a balance of dependency to guarantee unbiased basic and applied research. Therefore, a democratization is not only needed to define the relationship between science and society, but also within the scientific world itself. The democratic principles of transparency, participation, accountability, but also freedom, equality and diversity are important to integrate in the discussion about the relationship. A positive and progressive counterdevelopment is the open access strategy, which needs further development, pushed by improved ICTs and actions on different institutional levels. Recently, the Competitiveness Council of the EU targeted an open access of all scientific papers by 2020, a “life-changing move”, according to the European science chief C. Moedas (Creighton, 2016). Surprisingly, TED talks are not mentioned in literature, because they give access in another medial format to present scientific outcomes.

Based on this understanding, transdisciplinary sustainability research shows to be a role model for the whole research community, not as a replacement, but supplement. Especially the goal to produce single-loop, but later on an independent further development within the society itself (cf. Wals, 2009) means the interaction with non-academic stakeholders as a knowledge source and converters. This is supported by the findings of this thesis. Furthermore, the analysis indicates the importance to understand the societal relevance of research, its normativity and self-interest to find suitable sustainable solutions. However, the democratization also means to show accountability and the assessment of societal impact is a suitable instrument to fulfil this demand. This work indicates that it is a rational control to show legitimation, but also produces recognition of research with good scientific quality and societal relevance. Nevertheless, a holistic understanding of societal impact needs to be established. The first applied research question addresses this aspect:

- RQ1: How can societal impact, or the societal impact of scientific activity, be understood or defined?

As mentioned in the thesis, there exists a clear lack of consensus about a definition of societal impact. First, this lack appears because of the varying opinions on the relationship between scientific quality and societal relevance, as well as the involved questioned inclusion of norms and values within research. The discussion is well structured by Derrick and Samuel (2016) and their evaluation scale with two extremes: quality-focused and societal-impact evaluation. That peer-reviewers vary in their position, depending on different questions about characteristics of societal impact, shows the heterogeneity even on the individual level. That causes a high level of uncertainty and misunderstanding. An open dialogue between disciplines is needed to achieve inclusion. Nevertheless, this thesis tends to the extreme of societal-impact evaluation with the assumption that a productive interaction is needed for a mutual knowledge exchange.

The definition by REF 2014 was used as a working definition, because it includes various scopes of societal impact (see Chapter 3.1). Nevertheless, it seems doubtful that impact is always positive, it is important to include negative effects as well. It seems that the definitions depend on the purpose, if it is theory- or practice-focused, and the understanding of the specific time of impact within the process chain and is often linked with change (ESF, 2012). This analysis supports the view by L. M. Bono (pers. comm.) that this can also be a stabilization through knowledge exchange with varying target audiences. The expert interviews and the practical implementation show that research can have a direct impact on the society as a goal, or first on individuals with a subsequent distribution. Based on these discussions, it is not a surprise that there exists also a lack in an overall accepted approach, which is asked in RQ2:

- RQ2: Which theoretical and methodological approaches are discussed in literature and on this basis, what can be learned from practical examples with regard to opportunities and challenges?

The non-common sense about the understanding of societal impact is the cause for the missing of an overall accepted instrument and a standardized format. The theoretical and methodological approaches found in literature, as well as the practical examples clearly show the focus change within an assessment away from input towards outcome and impact of a process chain. The current status is that two options are available: first, to focus on intended outputs and outcomes, or second to assess the productive interaction as a proxy of societal impact. The implementation of such an assessment depend on the reason, which leads to the third question:

- RQ3: Based on the theoretical findings, how can the assessment of societal impact of sustainability-oriented projects look like in practice? Does the integration of directly involved stakeholders into the assessment provide an added value?

To answer this research question, a holistic theoretical framework has been developed. It is structured on the basis of a logic model with small steps. The operationalization proves the usage in a non-linear way with focus on feedback loops to capture productive interactions. From this, the shift away from input to the end of the process chain is fulfilled. Furthermore, the logic model is set into its context with various spheres, which shows the importance of setting boundaries for the assessment to control the influence of uncontrollable forces. On top, the framework requires the integration of directly involved boundary partners. This adds value to the assessment through additional knowledge about their perspective of knowledge exchange and the integration of the projects results/recommendations in their work. The operationalization requires a mixed-method approach, based on a categorization of indicators to each process step. The two contrary questionnaires are a special feature of the tool and showed its success during the pilot-phase.



As mentioned in section 1.4, the output of this research could be interesting for a variety of people. The thesis provides a comprehensive overview about the current state of the art within literature and expert's opinion from different fields of work. It highlights the importance to analyse theoretical approaches, as well as practical implementations, which are driven by internal and external demands. Nevertheless, the thesis wants to show that the resulting pressure provides also chances of a structured learning about the process towards societal impact.

## **7.1 Inspiration for Future Work**

Besides the current trend to assess societal impact, there is huge requirement of future research. This will be led by the trend of an increasing demand about measuring impact, for example for publicly-funded research within the EU (Bell et al., 2011). Nevertheless, the current approaches are "vulnerable to external influences such as changes in government" (Bell et al., 2011 236). The flexibility of a comprehensive multi-method approach should be strengthened to deal with such changes and to guarantee a democratized implementation.

This development is pushed by the open science movement, to open the scientific world for other societal subsystems. In the case of the promising usage of Altmetrics, it is clear that further research has to be done to assess specific impacts within a society (Bornmann, 2014b). This will be driven by further development of ICTs.

Furthermore, it is not only needed to show societal impact, but also to understand how to produce societal impact. This is an important focus area for future work. From L. Bornmann's point of view, further research is required to "investigate whether productive and highly professionalized interaction between stakeholders and scientists generally result in societal impact" (p.227). This can usefully be done by improved assessment strategies. For that, Penfield et al. (2014) give the practical advice to develop an assistance system for impact measurement, which captures all communications between the stakeholders and "link these with research findings and outputs or interim impacts to provide a network of data" (p.30). The data collection is crucial for the significance of assessed findings. This is also mentioned by Wiek et al. (2014) with the claim of an advanced application of approaches and their improvements to explore the links between research and impact easier and to have the possibility to measure impact in a more detailed way.

The holistic framework developed in this work, and its operationalization should be understood as a base and inspiration for further expansion and new methodological designs in future. This is especially useful for practitioners, working in institutions with the ambitious aim to assess the societal impact of their projects. The thesis shows the different elements of a tool, which can be individually modified, depending on the financial and human resources. Going more into detail about the set of indicators used, it is not currently possible to weight them against each other. This can be solved after a series of tests and analysis. The tool should be seen as a motivation to gain practical experiences, which will keep the discussion forward. A long-term future scenario could be an international set of principles of how to assess societal impact, accepted by several institutes like the "International Principles of Social Impact Assessment" of the SIA (see Chapter 3.2.3). And finally, the test-phase within the Wuppertal Institute should be the start of a structured assessment of project's societal impact with the ability of a cross-case analysis on the institutional level. That opens up new ways of an internal management and learning process with a huge potential in short- and long-term future to identify risks and opportunities to deal with great societal challenges. Nevertheless, it should always be in mind that an assessment is only useful, if the results are processed.

To conclude, it is difficult to predict the future development of this discourse. But it is clear that a standstill will not happen, because of the interests of the demands of stakeholders in a multi-level system. The sustainability research shows that the opening towards society can bring benefits, even to improve scientific quality of their research. Nevertheless, it is also clear that there has to be a balance of independency between science and the society. The integration of norms and values within research includes a risk of bias, but also is a potential of a better implementation.

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## Appendix A - Work schedule

| Task Name                               | Duration     | Start | Finish | Specific Tasks   |
|---|--------------|-------|--------|--|
| Collecting Material                     | 81 Days      | 01.02 | 22.04  |  |
| Initial Research                        | 15 Days      | 01.02 | 15.02  | 1.Literature Research<br>2.Literature Matrix   |
| Deadline for RG regarding projects      |              | 16.02 |        | *Selection of projects (1 per RG)  |
| Interviews                              | 15 Days      | 16.02 | 02.03  | 1.Development of interviews for:<br>*Researcher/Experts<br>*WI-board of management<br>2.Interviews and data collection   |
| Project Reviews                         | 32 Days      | 03.03 | 03.04  | 1.Development of a logic model (Steps)<br>2.Development of a Survey for Boundary Partners<br>3.Data collection in 3 projects (Project plans, reviews, interviews with project members) |
| Analysing the results of the interviews | 9 Days       | 04.04 | 12.04  | 1.Creation of a matrix   |
| Analysing the results of the projects   | 9 Days       | 13.04 | 21.04  | 1.Creation of a matrix   |
| Writing Process                         | 6 Weeks      | 22.04 | 03.06  |  |
| Deadline                                | 6. June 2016 |       |        |  |

## Appendix B – Interview Questions to an Expert

### General questions:

- 1) *Can I record this interview to transcribe it afterwards? I will delete the record immediately after I finished the transcript.*
  - 2) *Can I use your name as a reference, or should it be anonymous in my thesis?*
1. Definition of impact: In your own words, please tell me how you would define scientific impact?<sup>19</sup>
    - a. How would you define the relationship between scientific quality and societal relevance?
    - b. How would you define societal/social impact?
    - c. Relevance of impact: Why does impact matter?
    - d. How would you describe the relationship between social impact and societal relevance? Excellence vs. relevance?
  2. Drivers: Could you describe the main drivers that you perceive are driving the desire to assess societal impact of research? (Internal / External)
    - a. Which actors do you perceive are the most important “demanders” of impact assessment?
    - b. Do you have information about the current development of societal impact research in Germany (*replaceable, EU*)?
    - c. What do you think about the development of open access / open science?
    - d. What is your notion about the relation between funding and the quality of impact?
  3. Process to measure and report impact: How would you measure and report an assessment of societal impact? (logic model)
    - a. Process: What is needed to reach societal impact?
    - b. Which main benefits do you see in assessing societal impact?
    - c. What could be barrier factors for the realisation of societal impact?
    - d. Which requirements have to be fulfilled/ improved, so that societal impact of a project can be improved?
    - e. Measurement: How can we deal with difficulties of assessing impact (causality, attribution, time lag)?
    - f. Within the process, at what stage would you say that impact happens? When should we measure impact?
    - g. What could be indicators of societal impact?
    - h. What would you say about the statement, that productive interaction between researchers and other stakeholders is an indicator for societal impact?
    - i. What do you think about the perspective to use the client’s opinion as a way to assess societal impact of projects?
    - j. What is your opinion about ex ante and ex post assessments?

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<sup>19</sup> This question was used as a broad opening question for the interviews with REF 2014 evaluators (Samuel & Derrick, 2015 5).

k. Do you know one/some framework(s) that can be used to assess societal impact?

\*\*\*\*\*German\*\*\*\*\*

Generelle Fragen:

- 1) Darf ich das Interview aufzeichnen, um es später zu transkribieren? Die Aufnahme wird danach gelöscht.
  - 2) Darf ich Ihren Namen in der Masterarbeit als Referenz nutzen, oder sollen die Informationen anonym gehandhabt werden?
1. Leitfrage: Wie würden Sie die Wirkung von Wissenschaft mit Ihren eigenen Worten beschreiben?
    - a. Wie würden Sie die Beziehung zwischen wissenschaftlicher Qualität und gesellschaftlicher Relevanz beschreiben?
    - b. Wie würden Sie „gesellschaftliche Wirkung“ definieren?
    - c. Relevanz von Wirkung: Warum ist Wirkung von Bedeutung?
    - d. Wie würden Sie die Beziehung zwischen gesellschaftlicher Wirkung und Relevanz beschreiben? Bzw. Relevanz und Exzellenz?
  2. Können Sie die Hauptantreiber beschreiben, welche die Bewertung von gesellschaftlicher Wirkung verlangen? (Intern/ Extern)
    - a. Welche Akteure stellen Ihrer Meinung nach den Hauptanspruch an die Bewertung von gesellschaftlicher Wirkung?
    - b. Haben Sie Wissen/Informationen über den aktuellen Stand des Forschungsfelds der gesellschaftlichen Wirkung in Deutschland (oder ein anderes Land, bzw. EU)?
    - c. Was denken Sie über die Entwicklung des „open access/science“?
    - d. Was halten Sie davon, dass die Finanzierung von Wissenschaft von der Wirkungsqualität abhängig ist?
  3. Wie würden Sie eine Bewertung von gesellschaftlicher Wirkung umsetzen? (Messung, Berichterstattung, etc.) (logic model)
    - a. Was muss vorausgesetzt werden, damit eine gesellschaftliche Wirkung erzielt wird?
    - b. Welche Vorteile sehen Sie in der Bewertung von gesellschaftlicher Wirkung?
    - c. Was könnte die Entstehung von gesellschaftlicher Wirkung hemmen?
    - d. Welche Anforderungen müssen erfüllt, bzw. verbessert werden, um die gesellschaftliche Wirkung eines Projekts zu verbessern?
    - e. Messung: Wie kann man Schwierigkeiten der Bewertung von Wirkung überwinden? (Kausalität, Zuordnung, Zeitverzögerung)
    - f. Wann würden Sie sagen entsteht gesellschaftliche Wirkung während eines Projektprozesses? Wann sollte diese gemessen werden?
    - g. Was könnten Indikatoren zur gesellschaftlichen Wirkungsmessung sein?
    - h. Wie würden Sie auf die Aussage reagieren, dass produktive Interaktion/Kontakt als Indikator für die gesellschaftliche Wirkung verwendet wird?

- i. Wie ist Ihre Meinung dazu, die Meinung der Klienten als Zugang zur Bewertung der gesellschaftlichen Wirkung von Projekten zu nutzen?
- j. Wie ist Ihre Meinung zu der Bewertung zu Beginn und/oder nach Abschluss eines Projektes?
- k. *Können Sie mir Methoden nennen, die man als Rahmen einer solchen Bewertung nutzen kann?*

## **Appendix C – Questionnaire to a project leader**

Dear *project leader x*,

Thank you very much for the chance to interview you about the *project “x”*.

The Wuppertal Institute will highlight particularly the theme “Societal Impact of the Wuppertal Institute” during the process of sustainability reporting in year 2016. In this context, the overall goal of my master thesis is to assess the societal impact of projects by the Wuppertal Institute. This will shift the focus from the scientific relevance to societal and political relevant knowledge. Customers are demanding this more and more in Europe, because they want to know if the money is efficiently applied to create a sustainable future. My thesis is split into a theoretical and practical part. Latter is divided into three steps, whereupon your interview belongs to the second step.

The practical part includes the following steps:

### **Step 1: Basic knowledge about the project**

First, a review of project-documents gives a first insight in the content, structure, participatory events and context (desk research by S. Peter).

### **Step 2: Interview with the project leader**

Second, an interview with the project leader, you, fills informational gaps as well as gives insights in the project development and more detailed information into the interaction with the boundary partner\*.

### **Step 3: Questionnaire to the boundary partner**

The last step includes a questionnaire for the boundary partner, because he was actively engaged within the project process and gives information about feedback-loops. Furthermore, the boundary partner integrates project results/ recommendations in their work and bear it into the “real world”.

Thank you very much in advance,

Sophie Peter

Contact person for further questions is Sophie Peter, Masters candidate in Environmental Sciences, Policy and Management; E-Mail: xx T: xx

### **But first, three general questions:**

- 1) *Can I record this interview to transcribe it afterwards? I will delete the record immediately after I finished the transcript.*
- 2) *Can I use your name as a reference, or should it be anonymous in my thesis?*
- 3) *Should I send you the master thesis before my deadline (6<sup>th</sup> June), so that you can proof your statements?*

At the beginning, I want to give you a quick overview about the structure of this questionnaire for the bigger picture. The questions are in order of the logic model, which begins with the identification of the project, input, project process and output (project results/recommendations). After that, questions about activities with the boundary partner are following, which leads to the outcomes 1-3. The last questions are targeted on a forecast of the societal impact of the project.

| Checklist for required information |   |
|------------------------------------|---|
| <input type="checkbox"/>           | Are the project results/ recommendations correct and complete?  |
| <input type="checkbox"/>           | Boundary Partner: <ul style="list-style-type: none"><li>- Which boundary partner should be asked for an interview?</li><li>- He should contribute to the project from the beginning</li><li>- He should integrate project results/ recommendations into his own work</li><li>- My idea: x</li></ul> |
| <input type="checkbox"/>           | Did you use a project structure plan? Did you use a software for that? <ul style="list-style-type: none"><li>- Please complete the storyboard with information about the project identification and in particular participatory events during the process</li></ul>                                 |
| <input type="checkbox"/>           | Detailed information about publications (publisher, DOI/RUN, target audience, etc.)   |
| <input type="checkbox"/>           | Usw.  |

## I. Project identification

1. When thinking about the project goals, do they reflect your expectations as a researcher?
2. What means are required to achieve the given set of goals, in terms of schedules, staffing, budget, partners and the like?

## II. Input

3. The researchers in your team have specific professional skills. Could you please explain how specific professional skills of team members contribute reaching the project objectives?
4. Did you integrate experiences from previous projects?
5. Do you think your WI-team relied on the expertise of non-academic participants (boundary partners) in this project?

## III. Research Process

6. If we take a look at the storyboard (see PDF), what was in your opinion the most significant change that took place during the project process? Why was this



particularly significant for you? If an event is missing, please document it on the storyboard.

7. How was the exchange of knowledge/ productive interaction between the WI-project-team of researchers and the boundary partners organized?
8. During the process, did you continuously verify possible options for the implementation of the key results?
9. Were researchers willing to respond to signals/comments received from boundary partners and/or society? Was it more “learning from each other” or “teaching” (two extremes)?

#### IV. Output

10. What was in your opinion the most significant change that took place because of the *project results/recommendations*? Why was this particularly significant for you as the project leader?

#### V. Interface B: Activities

11. After the project results/ recommendations (output) was completed, how did you ascertain that the boundary partner(s) absorbed the results?

#### VI. Outcome 1

12. After the boundary partner(s) recognised the impact-oriented project results/recommendations, did you get opportunities to share/promote your findings with the help of them?

#### VII. Outcome 2

13. How were the project results/recommendations integrated into the boundary partner’s work? What was your role in this process?

#### VIII. Outcome 3

14. How would you assess the significance and reach of the project within the boundary partner’s own action?

*Significance: intensity of the influence or effect*

*Reach: the spread and breadth of influence or effect on relevant constituencies<sup>20</sup>*

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<sup>20</sup> (Samuel & Derrick, 2015 4)

## IX. Impact 1

15. Looking back to the uptake of the project results/recommendations by the boundary partner, what do you think was the most significant change in particular *domain based on objective*?
16. Where there some unanticipated changes?
17. Is there anything that requires some follow-up?
18. Any other comments to the questions or my master thesis?

Thank you very much for your participation!

## **Appendix D – Questionnaire to a boundary partner**

Dear *Sir or Madam x*,

Thank you very much for the chance to interview you about the *project “x”*.

The Wuppertal Institute will particularly highlight the theme “Societal Impact of the Wuppertal Institute” during the process of sustainability reporting in year 2016. In this context, the overall goal of my master thesis is to assess the societal impact of projects by the Wuppertal Institute. This will shift the focus from the scientific relevance to societal and political relevant knowledge. Customers are demanding this more and more in Europe, because they want to know if the money is efficiently applied to create a sustainable future. My thesis is split into a theoretical and practical part. Latter is divided into three steps, whereupon your interview belongs to the second step.

The practical part includes the following steps:

### **Step 1: Basic knowledge about the project**

First, a review of project-documents gives a first insight in the content, structure, participatory events and context (desk research by S. Peter).

### **Step 2: Interview with the project leader**

Second, an interview with the project leader fills informational gaps as well as gives insights in the project development and more detailed into the interaction with the boundary partner\*.

<sup>1</sup> \**Boundary partners* are those individuals, groups, and organizations with whom the program interacts directly and with whom the program anticipates opportunities for influence” (Earl, Carden, Patton, & Smutylo, 2001 1).

### **Step 3: Questionnaire to the boundary partner**

The last step includes a questionnaire to you, because you were actively engaged within the project and with that knowledge, you can complete information about the feedback-loops during the process. Furthermore, you are the one who will integrate the project results/recommendations into your work and carry it into the “real world”. Please take around 20-30 minutes for our phone call.

Please contact me for further questions.

Thank you very much in advance,

Sophie Peter

Contact person is Sophie Peter, Masters candidate in Environmental Sciences, Policy and Management; E-Mail: xx, T: xx

**First, your contact details:**

|                                |   |
|--------------------------------|---|
| <b>Name</b>                    |   |
| <b>Contact Person</b>          |   |
| <b>E-Mail</b>                  |   |
| <b>Telephone</b>               |   |
| <b>Area of work</b>            | <input type="checkbox"/> Government <input type="checkbox"/> Private Enterprise<br><input type="checkbox"/> NGO <input type="checkbox"/> Other: |
| <b>Role within the Project</b> |   |

**Second, can I use your name as a reference, or should it be anonymous in my thesis?**

- Yes, you can use my name
- No, I want it anonymous

**Should I send you a copy of my master thesis after publication (August '16)?**

- Yes     No

---

**Location, Date, Signature**

At the beginning, I want to give you a quick overview about the structure of this questionnaire for the bigger picture. The questions are in order of the logic model, but we begin with the steps “from implementation to societal impact” to understand the effect logic. Afterwards, questions about the project process, the input and finally the project identification are following.

**I. From implementation to societal impact**

**Reminder about project results/ recommendations of the *project x*?**

- Instruments
- Recommendations
- Results
- Etc.

|  | Strongly agree           | agree                    | Neither agree nor disagree | disagree                 | Strongly disagree        | Don't know               |
|--|--------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| 1) Do you agree that the project results/recommendations (output) generated knowledge that was useful for you? Please cross your option. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|  | 1                        | 2                        | 3                          | 4                        | 5                        | 0                        |

2) What was in your opinion the most significant change that took place because of the project results/recommendations? Please choose the applicable category/ies and write down, why this was particularly significant for you.

|                          |   | Category             | Description  |
|--------------------------|---|----------------------|--|
| <input type="checkbox"/> | 1 | a) Capacity building | Refer to education, training or even development of collaborative activities.  |
| <input type="checkbox"/> | 2 | b) Conceptual use    | Research changed ways of thinking, altering policy makers and/or practitioners to an issue or playing a more general “consciousness-raising role”. |
| <input type="checkbox"/> | 3 | c) Instrumental use  | Direct impact of research on policy, practice decision(s), etc.  |

|                          |   |                          |  |
|--------------------------|---|--------------------------|--|
| <input type="checkbox"/> | 4 | d) Attitudinal change    | Positive changes in institutional cultures and individual attitudes towards knowledge exchange.            |
| <input type="checkbox"/> | 5 | e) Enduring connectivity | When researchers and prospective users stay in contact even after a funded project has ended <sup>21</sup> |

**Detailed description**

*(e.g. Capacity building: Because of the project results/ recommendations x, we organised internal trainings around the findings and how we could change our own work into a more sustainable way.)*

*Open Question*

- 3) After the finalisation of the project, what were the next steps to integrate the results in your work?

*Open Question*

- 4) Were you satisfied with the communication between you and the Wuppertal Institute after the project results/recommendations were compiled?

Very dissatisfied ○ 1    ○ 2    ○ 3    ○ 4    ○ 5 Very satisfied

- 5) Did you share, or promote the result(s) of the project?

Yes  (1)    No  (2)

- 6) If you have used the key results of the project, please indicate how (if necessary please refer to the answer of question 2):

*Open Question*

<sup>21</sup> (Meagher & Lyall, 2013 3)

|   | Strongly agree           | agree                    | Neither agree nor disagree | disagree                 | Strongly disagree        | Don't know               |
|---|--------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| 7) Does the uptake of the Wuppertal Institute's project results/recommendations fulfil the objectives, defined in the beginning of the project? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1 <sup>st</sup> Objective   | 1a                       | 2a                       | 3a                         | 4a                       | 5a                       | 0a                       |
| 2 <sup>nd</sup> Objective   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | 1b                       | 2b                       | 3b                         | 4b                       | 5b                       | 0b                       |

**Reminder about objectives:**

- a) 1<sup>st</sup> Objective
- b) 2<sup>nd</sup> Objective, etc.

- 8) Looking back to the uptake of the project results/recommendations by the boundary partner, what do you think was the most significant change in *particular domain based on objective*? When you are answering this question, please also highlight what contributed to the change(s):

*Open Question*

- 9) Where there some unanticipated changes?  
 Yes  (1) No  (2)

If yes, please describe them here:

*Open Question – Follow-up Question*

10) What are the lessons learnt and is there anything that requires a follow up?

*Open Question*

## II. Research Process

11) When thinking back about the research process, how was interaction look like during the process? And how often did this interaction happen (e.g. once a day/week/month, 2-3 times a week/month, etc.)?

|                               | Never                         | Several times a year and rarer | Once per month                | Several times per month       | Once per week                 | Several times per week        | Daily                         |
|-------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| a) Face-to-face contact       | <input type="radio"/><br>(1a) | <input type="radio"/><br>(2a)  | <input type="radio"/><br>(3a) | <input type="radio"/><br>(4a) | <input type="radio"/><br>(5a) | <input type="radio"/><br>(6a) | <input type="radio"/><br>(7a) |
| b) Per E-Mail                 | <input type="radio"/><br>(1b) | <input type="radio"/><br>(2b)  | <input type="radio"/><br>(3b) | <input type="radio"/><br>(4b) | <input type="radio"/><br>(5b) | <input type="radio"/><br>(6b) | <input type="radio"/><br>(7b) |
| c) Per telephone, Skype, etc. | <input type="radio"/><br>(1c) | <input type="radio"/><br>(2c)  | <input type="radio"/><br>(3c) | <input type="radio"/><br>(4c) | <input type="radio"/><br>(5c) | <input type="radio"/><br>(6c) | <input type="radio"/><br>(7c) |
| d) Others:<br>_____           | <input type="radio"/><br>(1d) | <input type="radio"/><br>(2d)  | <input type="radio"/><br>(3d) | <input type="radio"/><br>(4d) | <input type="radio"/><br>(5d) | <input type="radio"/><br>(6d) | <input type="radio"/><br>(7d) |

12) Please indicate on the **storyboard (see PDF)**, which of the following events during the project process you participated in. If an event is missing, please document it on the storyboard.



|  | Strongly agree           | agree                    | Neither agree nor disagree | disagree                 | Strongly disagree        | Don't know               |
|--|--------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| 13) Do you agree that your opinions and perspectives as a boundary partner were represented in the participatory activities and integrated into the process development? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14) Do you agree that your knowledge was sufficiently integrated in the project process?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|  | 1                        | 2                        | 3                          | 4                        | 5                        | 0                        |

15) Did you communicate structural, temporal requirements from your side to the researcher/project-team of the Wuppertal Institute during project identification?

Yes  (1) No  (2)

16) Do you remember any periods where there was a lack of consensus between you and the researchers within the project process?

Yes  (1) No  (2) Partially  (3)

17) If so, please explain the nature of lack of consensus and how this was or was not addressed.

*Open Question*

### III. Input

|  | Strongly agree           | agree                    | Neither agree nor disagree | disagree                 | Strongly disagree        | Don't know               |
|--|--------------------------|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| 18) Do you agree that you were actively engaged in formulating the problem statement of the project? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|  | 1                        | 2                        | 3                          | 4                        | 5                        | 0                        |

19) Do you think you as a boundary partner were willing to rely on the expertise of researchers (academics) in this project?

Yes  (1)      No  (2)

#### IV. Project Identification

20) What were your motivation for participating in the project/ planning this project?

*Open Question*

21) Do the goal(s) reflect your needs /expectations?

Yes  (1)      No  (2)

22) To sum up, are you satisfied about the collaboration with the Wuppertal Institute in the *Project x*?

*Very dissatisfied*  1     2     3     4     5 *Very satisfied*

23) Do you think that the time was correctly chosen for this questionnaire?

(1) Yes, the time after the project ended is long enough to assess the impact.

(2) No, the time after the project is not long enough to assess the impact.

(3) It would be better perform the assessment directly after the project end.

24) Do you have any other comments about the questionnaire, or the master thesis?

*Open Question*

Thank you very much for your participation!

## Appendix E – Case Template with Key Questions

### List of abbreviations

|            |                                       |
|------------|---------------------------------------|
| <b>PLQ</b> | Project-leader Questionnaire          |
| <b>BPQ</b> | Boundary Partner-Questionnaire        |
| <b>MSC</b> | Most significant change <sup>22</sup> |

### Key words

|  |  |                              |
|--|--|------------------------------|
| <b>Case</b>  | Title:<br>Project No.:<br>Duration:  |                              |
| <b>Project Team<br/>(Name, Field of expertise)</b> | Project leader:<br>Staff:  | Q3 PLQ                       |
| <b>Boundary Partner(s)</b>                         | Name:<br>Contact Person:<br>Role within the project:   |                              |
| <b>Financial Interaction</b>                       | Project budget:<br>Others:   | Q2 PLQ <sup>23</sup>         |
| <b>Project's Goal(s) / Purpose</b>                 | - What are the program's goals? <sup>24</sup> Can they be transferred as domains of change? Or are they indicators and SMART (specific, measurable, achievable, relevant, time-bound), clearly defined? <sup>1</sup><br>- Is/Are problem(s) clearly defined? <sup>25</sup> | Q1 PLQ<br>Q20 BPQ<br>Q21 BPQ |

<sup>22</sup> (Davies & Dart, 2005)

<sup>23</sup> (CIPP evaluation model (I = Input) in Stockmann, 2000 43)

<sup>24</sup> (CIPP evaluation model (C = Context) in Stockmann, 2000 43)

<sup>25</sup> (Kurz et al., 2013)

|                                |  |                   |
|--------------------------------|--|-------------------|
| Reflection on Mission of WI    | - How does the completion of this project relate to WI's mission?  |                   |
|                                | <p>“The Wuppertal Institute undertakes research and develops <b>models, strategies and instruments</b> for transitions to a sustainable development at <b>local, national and international level</b>. Sustainability research at the Wuppertal Institute focuses on the <b>resources, climate and energy related challenges and their relation to economy and society</b>. Special emphasis is put on analysing and <b>stimulating innovations</b> that <b>decouple</b> economic growth and wealth from natural resource use.” (Wuppertal Institute, 2016b)</p> |                   |
| Input                          |  | Q4 PLQ            |
|                                |  | Q18 BPQ           |
|                                |  | Q19 BPQ           |
| Research Summary / Story Board | - How was it done? Reconstruct the sequence of actions that led to each intervention delivery (path reconstruction) <sup>26</sup> and be aware of the context of research. <sup>27</sup> (Narrative)   | Q8 PLQ<br>Q12 BPQ |
| Collaboration                  |  | Q5 PLQ            |
|                                |  | Q9 PLQ            |
|                                |  | Q13 BPQ           |
|                                |  | Q14 BPQ           |
|                                |  | Q15 BPQ           |
|                                |  | Q16 BPQ           |
|                                |  | Q22 BPQ           |
| Communication during Project   | - How are communications captured and recorded? <sup>28</sup>  | Q7 PLQ            |

<sup>26</sup> (Forrest & Wiek, 2014 70)

<sup>27</sup> (Stockmann, 2000 167)

<sup>28</sup> (Data about communications and interactions are needed "to capture and link" in Penfield, Baker, Scoble, & Wykes, 2014 31)

|   |  |                              |
|---|--|------------------------------|
|   |  | Q11 BPQ<br>Q4 BPQ            |
|   | <p><i>Please remember: Types of productive interaction</i></p> <p><i>Direct: Personal contact</i></p> <p><i>Indirect: Through material carrier<sup>29</sup></i></p>  |                              |
| MSC during process by project team  | Narrative → thematic coding (sort notes into categories) (p.41) <sup>1</sup>   | Q6 PLQ                       |
| Outputs from research (e.g. Policy briefs, Policy papers, databases, tools & training materials, presentations, etc.) |  | Q1 BPQ<br>Q6 BPQ             |
| Dissemination of the Output   | <p>Indirect Interaction with the Society<sup>5,6</sup></p> <p>Mixed Publications<sup>30</sup></p> <p><input type="checkbox"/> Usage of the internet (Homepage, Link to website on other homepages)</p> <p><input type="checkbox"/> Usage of social networks (Facebook, Twitter, LinkedIn, etc.)</p> <p><input type="checkbox"/> scientific publications (List of publications with DOI or URN) → Altmetrics<sup>31</sup> (DOI, URN number needed)</p> <p><input type="checkbox"/> Conferences/ speeches</p> <p><input type="checkbox"/> Regional</p> | Q12 PLQ<br>Q14 PLQ<br>Q5 BPQ |

<sup>29</sup> (Spaapen & Drooge, 2011 213)

<sup>30</sup> (Jayasundra-Smits in van Bergeijk & Johnson, 2014 73)

<sup>31</sup> (Altmetrics "is a term to describe web-based metrics for the impact of scholarly material, with an emphasis on social media outlets as sources of data" in Bornmann, 2014 7)

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|--|--|------------------------------|
|  | <input type="checkbox"/> National<br><input type="checkbox"/> European<br><input type="checkbox"/> International<br><input type="checkbox"/> Press release / newspaper articles<br><input type="checkbox"/> Regional<br><input type="checkbox"/> National<br><input type="checkbox"/> European<br><input type="checkbox"/> International<br><input type="checkbox"/> Participation on active events (expedition, exposition, etc.)<br><input type="checkbox"/> Mentioned in the quarterly reports of the Wuppertal Institute<br><input type="checkbox"/> Publication of the Wuppertal Report (final project report)  |                              |
| Application of research findings (output) (impact on boundary partner's policy, planning & practice) |  | Q10 PLQ<br>Q11 PLQ<br>Q2 BPQ |
|  | <p><i>Please remember:</i></p> <ol style="list-style-type: none"> <li>1) <i>Capacity building = refer to education, training or even development of collaborative activities</i></li> <li>2) <i>Conceptual use = research changes ways of thinking, altering policy makers and practitioners to an issue or playing a more general "consciousness-raising role"</i></li> <li>3) <i>Instrumental use = direct impact of research on policy, practice decision</i></li> <li>4) <i>Attitudinal change = pos. changes in institutional cultures and individual attitudes towards knowledge exchange</i></li> <li>5) <i>Enduring connectivity = when researchers and prospective users stay in contact even after a funded project has ends<sup>32</sup></i></li> </ol> |                              |
| Uptake of project by Boundary Partner (MSC)  | (e.g. policies, action plans, guidelines, programs, etc.)  | Q13 PLQ<br>Q3 BPQ            |
| Impact (Level 1) Changes in  | Domains based on objectives of the project <sup>l</sup>  | Q15 PLQ                      |

<sup>32</sup> (Meagher & Lyall, 2013 3)

|   |  |   |
|---|--|---|
| <b>Policy, Planning and/or Practice</b> |  | Q16 PLQ<br><br>Q7 BPQ<br>Q8 BPQ<br>Q9 BPQ |
| <b>Key lessons learnt – follow-up</b>   |  | Q17 PLQ<br>Q10 BPQ                        |



## Appendix F – CASCADE Project Report

|  |                          |   |        |
|--|--------------------------|---|--------|
| <b>Schlagwörter</b>  |                          |   |        |
| Peer-to-Peer Learning, Dialogformate, Städte, EU2020, Klimaschutzziele, Energie, Benchmark, Verkehr, Effizienz, Prozessanalyse, Work Shadowing, benchmarking, climate, implementation, renewable energy, peer learning, SEAP |                          |   |        |
| <b>Projekt</b>   | <b>Titel</b>             | “CASCADE – Cities exchanging on local energy leadership”  |        |
|  | <b>Projekt Nr.</b>       | 3257 (FG 2)   |        |
|  | <b>Zeitraum</b>          | 07/2011 – 06/2014   |        |
| <b>Projekt-Team<br/>(Name, Expertise)</b>  | <b>Projektleitung</b>    | Dr. Ralf Schüle<br><br>Anja Bierwirth   | Q3 PLQ |
|  | <b>Mitarbeiter/innen</b> | Sophie Arens<br><br>Michael Roelfes<br><br>→ kommunikative und analytische (wissenschaftliches Arbeiten) Fähigkeiten waren wichtig bei der Auswahl<br><br><b>Rolle:</b> Experte für den Themenschwerpunkt Erneuerbare Energien und dezentrale Energieerzeugung; Prozessanalyse; Entwicklung des CASCADE-Benchmark |        |
| <b>Boundary Partner</b>  | <b>Name / Rolle</b>      | Executive Agency for Competitiveness & Innovation (EACI)<br><br>/ Auftraggeber/Förderer   |        |
|  | <b>Name / Rolle</b>      | EUROCITIES<br><br>/ Koordination  |        |
|  | <b>Name / Rolle</b>      | EU-Programm Intelligent Energy Europe (IEE)   |        |



|                                  |   |   |        |
|----------------------------------|---|---|--------|
|                                  |   | / Auftraggeber/Förderer   |        |
|                                  | <b>Name</b>   | Stadt Mannheim  |        |
|                                  | <b>Kontaktperson</b>  | Inge Kronbach<br>(Administration),<br><br>Agnes Schönfelder<br>(Klimaschutzleitstelle,<br>senior expert),   |        |
|                                  | <b>Email</b>  | XX  |        |
|                                  | <b>Rolle</b>  | Nationaler, städtischer<br>Projektpartner für<br>Deutschland, mit der<br>Aufgabe des nationalen<br>und regionalen<br>Networkings, besonders<br>in dem Bereich<br>„Energieeffizienz in<br>Gebäuden und<br>Quartieren“. |        |
|                                  | <b>Name / Rolle</b>   | Koucky & Partners<br><br>/ Experte für den<br>Bereich Verkehr   |        |
|                                  | <b>Name / Rolle</b>   | Stadt Malmö<br><br>/ Experte für<br>Gebäudeenergieeffizienz<br>und Quartier-<br>senergieeffizienz   |        |
|                                  | <b>Europäische Städte:</b><br><br>1. Level: 18 Europäische Städte<br>2. Level: +20 Europäische Städte<br>3. Level: +36 Europäische Städte (insgesamt 74 Städte) |   |        |
| <b>Finanzielle Interaktionen</b> | <b>Projektbudget</b>  | €2 Millionen, davon 75%<br>EU-finanziert (IEE-<br>Programm) → €1.69<br>Millionen  | Q2 PLQ |
|                                  | <b>Sonstiges</b>  | 127.000 Euro für das<br>Wuppertal Institut  |        |

|                     |   |                                |   |
|---------------------|---|--------------------------------|---|
|                     |   | 60.000 Euro für Stadt Mannheim |   |
| <b>Projektziele</b> | <p>„To improve the implementation of sustainable energy policies in large and medium European cities“</p> <p><b>Drei übergeordnete Ziele von CASCADE</b></p> <ol style="list-style-type: none"> <li>1. nachhaltige lokale Energieaktionspläne sollen verbessert und schneller umgesetzt werden (SEAPs)</li> <li>2. Verbesserung der Vernetzung der Städte - Sicherstellung eines sinnvollen und nachhaltigen Lernens und des Austauschs von guten Praxisbeispielen der Städte untereinander</li> <li>3. Vorbildfunktion der Städte innerhalb ihres Landes – Erweiterung der Reichweite des Projekts trotz internationaler Sprachbarrieren</li> </ol> <p>Die geografische Rahmenbedingung war der EU-Raum.</p> <p><b>SMART?</b> Die Ziele sind „domains of change“, keine Kennzahlen.</p> <p>In dem Antrag wurden „long-term impacts“ bzgl. CO2-Reduktion, Investitionen etc. beschrieben, die jedoch bei Bildungs- / Austauschprojekten dieser Art ex-ante nur sehr grob abgeschätzt werden können. Eine ex-post Evaluation war aufgrund der begrenzten Projektlaufzeit nicht möglich.</p> <p><b>Reflektion der Ziele durch die Projektleiterin A. Bierwirth:</b></p> <p>Die Ziele erfüllen die Erwartungen als Wissenschaftlerin, da dass Projekt die Problematik erfasst, dass Konzepte schnell geschrieben sind, aber die Umsetzung dann schwierig ist.</p> <p><b>Reflektion der Ziele durch die Stadt Mannheim</b></p> <p>Die Motivation, an CASCADE teilzunehmen war, dass es von der Stadt Mannheim und speziell von dem Oberbürgermeister gewünscht war, sich mehr international einzubringen. Damit wollte die Stadt zeigen, „dass wir da was machen können und machen wollen“. In CASCADE ist die Stadt als lernende Stadt</p> |                                | <p>Q1 PLQ</p> <p>Q20 BPQ</p> <p>Q21 BPQ</p> |

|   |   |   |
|---|---|---|
|   | <p>eingestiegen, hat aber schnell gemerkt, dass sie eher eine Host-City ist. Das hat Selbstbewusstsein aufgebaut. Ein weiterer Punkt war, dass gelernt wurde, wie europäische Projekte ablaufen und ein weiterer Anreiz war die englische Sprache. Ein Ziel war es auch, den SEAP mit anderen Städte zu vergleichen und daraus zu lernen.</p> <p>Somit reflektieren die Ziele die Bedürfnisse/Erwartungen.</p>  |   |
| <p><b>Reflektion auf die WI-Mission</b></p> | <p>Die Projekte behandeln Probleme in der Umsetzung von Klimaschutzkonzepten und –maßnahmen durch drei „Kaskaden“ von Peer-Learning-Formaten und Netzwerk-Veranstaltungen in europäischen Städten (Groß- und Mittelstädten). Dies unterstützt die Städte die EU-2020-Ziele zu Energie und Klimawandel zu verwirklichen. Es gibt drei inhaltliche Schwerpunkte:</p> <ul style="list-style-type: none"> <li>- Energie im städtischen Verkehr</li> <li>- Energieeffizienz in Gebäuden und Stadtvierteln</li> <li>- Erneuerbare Energien und dezentrale Energieerzeugung</li> </ul> <p>Das Instrument des Peer-to-Peer-Lernens wird angewendet, um die Umsetzung von Klimaschutz- und Energiepolitik in den Städten zu verbessern. Peers sind dabei Stadexperten, Entscheidungsträger, lokale Akteure bzw. Interessenvertreter. Das Toolkit besteht aus: Peer-Review, Mentoring, Work Shadowing und Studienbesuchen.</p> <p>“The Wuppertal Institute undertakes research and develops <b>models, strategies and instruments</b> for transitions to a sustainable development at <b>local, national and international level</b>. Sustainability research at the Wuppertal Institute focuses on the <b>resources, climate and energy related challenges and their relation to economy and society</b>. Special emphasis is put on analysing and <b>stimulating innovations</b> that <b>decouple</b> economic growth and wealth from natural resource use.”<br/>(wupperinst.org/profile, 2016)</p> |   |
| <p><b>Input</b></p>                         | <p><b>Integration von Erfahrungen (Projektleiterin A. Bierwirth):</b></p> <p>Erfahrungen wurden vor allem in Veranstaltungen und die Arbeit mit Stakeholdern eingebaut, z.B. durch Workshops, unterschiedliche Dialogformate. Das Peer-to-Peer-Learning war ein neues Format, das Fr. Bierwirth spannend fand „diese Formate konkret mitzulernen und mitzumachen“.</p> <p><b>Aus der Perspektive von Frau Schönfelder:</b></p>  | <p>Q4 PLQ</p> <p>Q18 BPQ</p> <p>Q19 BPQ</p> |

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|--------------------------|--|------------------------------|
|                          | <p>Fr. Schönfelder „stimmt voll zu“, dass Sie aktiv an der Formulierung der Problemstellung des Projekts involviert war.</p> <p>Da sie als Senior Expert an dem Projekt beteiligt war, war der Austausch von Wissen mit dem WI eher auf Augenhöhe als ein „Verlassen auf die Expertise der Wissenschaftler“.</p>   |                              |
| <p><b>Storyboard</b></p> | <p>→ Das Storyboard<sup>3334</sup> beinhaltet die wichtigsten Handlungsschritte/ direkte/indirekte Interaktionen <b>(siehe Anhang)</b></p> <p>Der Projektverlauf beinhaltet innerhalb von drei Jahren drei „kaskaden“-artige Stufen, die von Netzwerkarbeit, Ideen- und Erfahrungsaustausch geprägt waren.</p> <ul style="list-style-type: none"> <li>○ 1.Jahr: Arbeitsbesuche</li> <li>○ 2.Jahr: Erweiterung des Projekts um 20 Städte + Reihe von Netzwerkaktivitäten</li> <li>○ 3.Jahr: regionale und nationale Netzwerkarbeit</li> </ul> <p><b>Projektleiterin A. Bierwirth:</b></p> <ul style="list-style-type: none"> <li>- <b>Kontext:</b> konkrete kontext-spezifische Ereignisse sind nicht bekannt, außer dass die EU2020 Ziele erreicht werden müssen.</li> <li>- Durch Fragebögen wurde kontinuierlich bei den Städten abgefragt, ob die Umsetzung der Schlüsselergebnisse möglich ist. (1)</li> </ul> <p><b>Aus der Perspektive von A. Schönfelder:</b></p> <ul style="list-style-type: none"> <li>- Speziell für die Stadt Mannheim waren die internationalen Treffen sehr spannend. Sie durchliefen zwei Peer-to-peer Visits (Birmingham, Tampere), ein Study-visit in Malmö, haben ein Study-Visit in Mannheim organisiert, hatten Mentoring-Visits in Amarooussion und Edinburgh, work-shadowing in Birmingham (dieser Besuch hatte eine starke Wirkung). Sie haben das komplette Programm durchlaufen, zum Teil mehrfach.</li> </ul> | <p>Q8 PLQ</p> <p>Q12 BPQ</p> |

<sup>33</sup> (Forrest & Wiek, 2014 70)

<sup>34</sup> (Stockmann, 2000 167)

|                              |  |  |
|------------------------------|--|--|
|                              | <ul style="list-style-type: none"> <li>- Der Kongress in Malmö war ein einschneidendes Erlebnis mit Q&amp;A Runde mit internationalem Publikum</li> <li>- Das Städtetreffen mit Ludwigshafen (Fokus Energieeffizienz und Finanzierungsmöglichkeiten) und Viernheim (Fokus Energieeffizienz und erneuerbare Energien) war auf nationaler Ebene ein wichtiger Schritt, um das nationale Ziel zu erfüllen.</li> </ul>   |  |
| <p><b>Zusammenarbeit</b></p> | <p>Das WI übernahm im Bereich “Erneuerbare Energien und dezentrale Energieerzeugung” die Expertenrolle.</p> <p>→ Eine nicht geplante Zusammenarbeit ergab sich mit der Kommission. Diese wollte einen Input haben zu der Frage, „welche Fördermittelquellen werden eigentlich genutzt in den Städte, was rufen die eigentlich ab, was finden die schwierig.“ (A. Bierwirth)</p> <p><b><u>Aus der Perspektive von der Projektleiterin A. Bierwirth:</u></b></p> <p><b>Vertrauen in Knowhow von nichtakademischen Teilnehmern:</b></p> <ul style="list-style-type: none"> <li>- Es wurde erkannt, dass die Schwierigkeiten der Städte bei der Umsetzung nicht uniform sind, sondern „sehr viel differenzierter, unterschiedlicher sind als wir dachten.“</li> </ul> <p><b>Signale/Kommentare von BP/Gesellschaft:</b></p> <ul style="list-style-type: none"> <li>- Neben der Analyse von Literatur wurde von Anfang an die Meinung der Städte in das Benchmark integriert: „...wir wollen erstmal wissen, was bewegt euch denn jetzt eigentlich, was sind denn eigentlich eure Probleme. Das war Ausgangspunkt für den Benchmark.“ Dazu wurden Fragebögen, Interviews und Workshops genutzt. Jedoch wurde auch erkannt, dass die Intervalle der Fragebögen zu hoch waren und deshalb wurde eine Runde ausgesetzt.</li> </ul> | <p>Q5 PLQ</p> <p>Q9 PLQ</p>  |
|                              | <p><b><u>Aus der Perspektive von A. Schönfelder:</u></b></p> <ul style="list-style-type: none"> <li>- Sie „stimmt zu“, dass Ihre Meinungen und Perspektiven in die Aktivitäten und in die Prozessentwicklung integriert wurden.</li> <li>- Sie „stimmt voll zu“, dass Ihr Wissen ausreichend in den Projektprozess integriert wurde.</li> </ul>  | <p>Q13 BPQ</p> <p>Q14 BPQ</p> <p>Q15 BPQ</p> <p>Q16 BPQ</p> <p>Q22 BPQ</p> |

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|  | <ul style="list-style-type: none"> <li>- Die Stadt Mannheim hat während des Projektprozesses strukturelle und/oder zeitliche Anforderungen von Ihrer Seite rechtzeitig an das Team des WI kommuniziert.</li> <li>- Es gab keinen Zeitpunkt in dem Projektprozess, an dem es ein Mangel an Konsens zwischen der Stadt Mannheim und dem WI gab. Es gab Probleme mit einem anderen Institut in Dänemark (Kommunikationsproblem).</li> <li>- Zusammenfassend ist die Stadt Mannheim „<b>sehr zufrieden</b>“ mit der Zusammenarbeit mit dem WI.</li> </ul>  |  |
| <p>Kommunikation während und nach dem Projektprozess</p> | <p><b>Direkte Interaktion aus der Perspektive von A. Bierwirth:</b></p> <ul style="list-style-type: none"> <li>- Steering-group Meetings: Es gab regelmäßige Projekttreffen mit den Experten in Brüssel (EUROCITIES, 3 Experten)</li> <li>- 1-2x im Jahr trafen sich alle Partner</li> <li>- Peer-Learning Training mit einem kleinen Beratungsunternehmen</li> <li>- Zwischenkonferenz in Malmö</li> <li>- Austauschformate im Rahmen des Peer-Learnings</li> <li>- Austausch per Email und Telefonkonferenzen</li> </ul> <p><b>Aus der Perspektive von A. Schönfelder:</b></p> <ul style="list-style-type: none"> <li>- Persönlicher Kontakt: Einige Male im Jahr und seltener</li> <li>- Per Email: Einige Male im Jahr und seltener</li> <li>- Per Telefon, Skype, etc.: Einige Male im Jahr und seltener</li> <li>- Zusammenfassend ist die Stadt Mannheim mit der Kommunikation mit dem WI „<b>sehr zufrieden</b>“, nachdem die Projektergebnisse/-empfehlungen zusammengetragen wurden.</li> </ul> <p><i>Please remember: Types of productive interaction</i></p> <p><i>Direct: Personal contact</i></p> <p><i>Indirect: Through material carrier</i></p> | <p>Q7 PLQ</p> <p>Q11 BPQ</p> <p>Q4 BPQ</p> |

|   |  |  |
|---|--|--|
| <p>MSC (Most significant Change) aus der Sicht des Projektleiters während des Prozesses</p> | <p>- <b>Konsequente Durchführung des Projekts</b><br/>(Thematic coding: <i>konsequente Durchführung</i>)<br/>Es verlief alles nach Plan, da die Projektleiterin von EUROCITIES das Projekt sehr konsequent durchgeführt hat.</p> | <p>Q6 PLQ<br/>Narrative<br/>→ thematic coding (sort notes into categories) (p.41)<sup>1</sup></p>  |
| <p>Outputs</p>  | <p>1) <b>CASCADE Benchmark</b></p> <p>2) <b>Toolkit für Peer-Learning</b></p> <p>3) <b>Projektergebnisse/-empfehlungen</b></p>   | <p>durch das Wuppertal Institut (Schlüsselfaktoren), mit dem sich Städte selbst hinsichtlich des Stands der Umsetzung von Klimaschutzkonzepten und -projekten evaluieren und Verbesserungspotenziale erkennen können. Es beinhaltet eine Liste von Kriterien, mit deren Hilfe eine Stadt die Umsetzung ihrer Klima- und Energiepolitik einschätzen und beurteilen kann (idealen, wünschenswerten Standard) durch ein Self-Assessment oder Peer-Review. Für die drei Themenfelder gibt es drei leicht voneinander abweichende Benchmark Versionen. Diese Kriterien wurden auf Rückmeldung der Fragebögen usw. entwickelt.</p> <p>erarbeitet von allen vier Hauptpartnern. Dies beinhaltet das Peer-Review (Begutachten einer Stadt durch Peer-Experten anderer Städte), Mentoring, Work Shadowing (Arbeitsplatzbegleitung), Studienbesuch. Für jedes Format gibt es ein Heftchen, mit dem Ziel „, wenn man sich das durchliest und anguckt, dass man das dann auch mal in der Stadt selbst initiieren kann.“</p> <p>a. Verbessertes Wissen und Fähigkeiten der Mitarbeiter*innen lokaler Behörden in Bezug auf die Gestaltung und Umsetzung kommunaler Pläne im Bereich</p> |

|  |   |  |
|--|---|--|
|  |   | <p>der nachhaltigen Energie (peer-to-peer-lernen, Vernetzung)</p> <ul style="list-style-type: none"> <li>b. Es wurden bewährte Methoden für die Vernetzung und Peer-to-peer-Lernmethoden erarbeitet (plus Ratschläge zur Implementierung in der Energiepolitik)</li> <li>c. Beschleunigung und Verbesserung bei der Bereitstellung einer nachhaltigen Energiepolitik in mittleren und großen EU-Städten (besseres Verständnis von Schlüsselherausforderungen in Bezug auf die Umsetzung einer nachhaltigen Energiepolitik)</li> <li>d. Die Ausweitung des Anwendungsbereichs von CASCADE und das Erreichen der nationalen, regionalen und europäischen Ebenen</li> <li>e. Verbesserung der transnationalen Zusammenarbeit (Netzwerk von 76 Städten, 376 Stadt-Experten*innen)</li> <li>f. Die erfolgreiche Demonstration von lokaler Führung zu dem Thema „Energie“ auf nationaler, regionaler und europäischer Ebene</li> </ul> <p>→ Erweiterung von Wissen, Verbesserung der internen/externen Zusammenarbeit, verbesserte Politikgestaltung und ergreifen von Maßnahmen (aus Success Stories from Partner cities)</p> |
|  | <p>Fr. Schönfelder „stimmt zu“, dass die Projektergebnisse/-empfehlungen Wissen erzeugt haben, die nützlich für die Stadt Mannheim sind. Besonders zum einen in der Stadtplanung (Energiestandards auf den Konverionsflächen), zum anderen für das Kommunikationskonzept, Kampagnenaufbau, etc.</p> | <p>Q1 BPQ<br/>Q6 BPQ</p>   |



|  |   |                |
|--|---|----------------|
| <p><b>Verbreitung der Projektergebnisse/ -empfehlungen</b></p> | <p><input checked="" type="checkbox"/> Usage of the internet (Homepage, Link to website on other homepages)</p> <p><input type="checkbox"/> Usage of social networks (Facebook, Twitter, LinkedIn, etc.)</p> <p><input checked="" type="checkbox"/> scientific publications (List of publications with DOI or URN)</p> <ul style="list-style-type: none"> <li>• Wuppertal Institute (06/2013), Titel: <b>Overcoming the implementation gap in urban climate policies: The CASCADE experiment</b>”, Conference Paper, ECEE Summer Study Proceedings, 831-838; URN: <a href="https://nbn-resolving.org/urn:nbn:de:bsz:wup4-opus-49132">urn:nbn:de:bsz:wup4-opus-49132</a></li> </ul> <p><input checked="" type="checkbox"/> Conferences/ speeches</p> <p style="padding-left: 20px;"><input checked="" type="checkbox"/> Regional</p> <p style="padding-left: 20px;"><input checked="" type="checkbox"/> National</p> <p style="padding-left: 20px;"><input checked="" type="checkbox"/> European</p> <p style="padding-left: 20px;"><input type="checkbox"/> International</p> <p><input checked="" type="checkbox"/> Press release / newspaper articles</p> <p style="padding-left: 20px;"><input checked="" type="checkbox"/> Regional</p> <p style="padding-left: 20px;"><input type="checkbox"/> National</p> <p style="padding-left: 20px;"><input type="checkbox"/> European</p> <p style="padding-left: 20px;"><input type="checkbox"/> International</p> <p><input checked="" type="checkbox"/> Participation on active events (expedition, exposition, etc.)</p> <p><input checked="" type="checkbox"/> Mentioned in the quarterly reports of the Wuppertal Institute</p> <p><input checked="" type="checkbox"/> Publication of the Wuppertal Report (final project report)</p> |                |
|  | <p><b>Hilfe der Verbreitung der Projektergebnisse/ -empfehlungen durch Boundary Partner:</b></p> <p>Es stand von Anfang an fest, dass das Projekt in jedem Land im Rahmen einer regionalen, oder nationalen Konferenz vorgestellt wird. Dort wurden die Publikationen immer ausgelegt. Jedoch hält Fr.</p>  | <p>Q12 PLQ</p> |

|   |   |                            |
|---|---|----------------------------|
|   | <p>Bierwirth das CASCADE-Benchmark für „nicht so einfach. Es ist schon echt relativ umfangreich, relativ aufwendig. Also ganz toll, wenn man es gut macht, aber das so ganz ohne Begleitung, einfach mal so eben durchzuführen halte ich für schwierig.“</p>  |                            |
|   | <p>Die Stadt Mannheim hat wie jede andere Stadt in diesem Projekt ein Kommunikationskonzept gehabt, das alle besuchten Events beinhaltet. Die Ergebnisse wurden besonders mit den Städten Viernheim und Ludwigshafen ausgetauscht. Zudem hat die Stadt Mannheim einen nationalen Workshop veranstaltet, da sie national leader war. Des Weiteren hat die Stadt an der Übersetzung des Toolkit auf deutsch mitgearbeitet.</p>  | <p>Q5 BPQ</p>              |
|   | <p><b><u>Signifikanz und Tragweite (A. Bierwirth):</u></b></p> <ul style="list-style-type: none"> <li>- Von Städten, die schon sehr weit fortgeschritten waren mit ihren SEAPs kam die Rückmeldung, dass sie nicht viel gelernt hätten, aber viel in das Projekt „reingebuttert“ haben. „Das war so ein bisschen von vornherein die Frage, was können wir speziell für die Städte, die sehr weit, sehr advanced sind, was können wir für die eigentlich machen. Das war so ein kleines, etwas negativerer Aspekt.“</li> <li>- Über die Tragweite konnte Fr. Bierwirth nicht viel sagen: „Also wie gesagt, ob die das dann wirklich einsetzen in ihrer täglichen Arbeit, oder sich zwischendurch zurückerinnern, ach da war doch mal was da könnte ich mal so ein Element in meine Arbeit ausprobieren, vielleicht nur ein Teilelement aus so einem Projekt, das weiß ich nicht. Keine Ahnung.“ Jedoch gab es Rückmeldung von zwei Städten, dass sie Elemente aus den Peer-to-Peer Formaten in anderen Kontexten verwendet haben.</li> </ul> | <p>Q14 PLQ</p>             |
| <p><b>Anwendung der Projektergebnisse/-empfehlungen</b></p> | <ul style="list-style-type: none"> <li>- Der Ansatz des Peer-to-Peer-Learning macht Sinn, ist aber sehr zeitaufwendig und „ich glaube, dass es für Städte sehr schwierig ist, sowas nebenher, mal eben so nebenher mit zu organisieren.“</li> <li>- Durch das Projekt entstanden Kontakte, „da könnte ich mir denken, die könnte man relativ leicht reanimieren.“</li> </ul>  | <p>Q10 PLQ<br/>Q11 PLQ</p> |
|   | <p><b>Aus der Perspektive von A. Schönfelder:</b></p> <p><b>a) Kapazitätsaufbau</b></p>   | <p>Q2 BPQ</p>              |

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|   | <p>Besonders der Bereich open planning, oder Stadtplanung, wurde diskutiert, da es ein Querschnittsthema ist und viele Abteilungen verbindet. Dafür müssen neue Kapazitäten aufgebaut werden, um eine Querverbindung zu schaffen.</p> <p><b>d) Verhaltensveränderung</b></p> <p>Die Stadt Mannheim hat auch im Bereich Kommunikation besonders von skandinavischen Partnerstädten gelernt, wie man Kommunikationskampagnen gestalten kann: „Also unsere Hefte, wenn man vorher nachher vergleicht, sind gravierend anders nach CASCADE“.</p>   |                              |
|   | <p>6) <i>Kapazitätsaufbau = Dies bezieht sich auf die Bildung, Training oder andere Entwicklungen von gemeinschaftlichen Aktivitäten.</i></p> <p>7) <i>Konzeptioneller Nutzen = Die Forschung verändert Denkweisen, verändert die Meinung politische Entscheidungsträger und/ oder Ausübende zu einem Thema oder spielt eine allgemeine "bewusstseinsweiternde Rolle".</i></p> <p>8) <i>Instrumentalisierung = Direkte Wirkung der Wissenschaft auf Politik, Praktiken, Entscheidungen, etc.</i></p> <p>9) <i>Verhaltensänderung = Positive Veränderungen in institutionellen Kulturen und individuellen Einstellungen gegenüber dem Wissensaustausch.</i></p> <p>10) <i>Dauerhafte Konnektivität = Wenn Wissenschaftler und potenzielle Anwender in Kontakt bleiben, auch nachdem das geförderte Projekt beendet ist.</i></p>   |                              |
| <p><b>Aufnahme der Projektergebnisse/-empfehlungen in die Arbeit des BP (MSC)</b></p> | <p><b>Aus der Perspektive von der Projektleiterin A.Bierwirth:</b></p> <ul style="list-style-type: none"> <li>- Die Teilnehmer fanden das Projekt gelungen. Jedoch konnte Fr. Bierwirth nicht sagen, ob die Städte die Ergebnisse in ihre Arbeit integrieren. Das wussten die Teilnehmer selbst noch nicht: „Und da haben wir dann zwar auch nachgefragt am Ende des Projektes, habt ihr schon was umgesetzt, es ist aber auch viel wo die Leute sagen, so schnell geht sowas nicht. Also da ist eine Projektlaufzeit von drei Jahren eigentlich zu kurz, um zu sagen, das hat jetzt wirklich hier, also Ideen sind ja da, das hat jetzt hier einen konkreten Beitrag geleistet ist dann schwierig zu sagen. Weiß ich nicht, ob daraus was geworden ist, keine Ahnung.“</li> <li>- Durch den Projektprozess wurden Anwendung-Hemmnisse auf internationaler Ebene sichtbar, die vorher nicht berücksichtigt wurden (z.B. Müllmafia in Italien)</li> </ul> | <p>Q13 PLQ</p> <p>Q3 BPQ</p> |

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|                                | <p><b>Aus der Perspektive von A. Schönfelder:</b></p> <ul style="list-style-type: none"> <li>- Vor allem in dem Bereich open planning, Stadtplanung, wurden Erkenntnisse integriert. Dies gilt besonders für die 500 Hektar freierwerdende, amerikanische Konversionsfläche, die genutzt werden soll, um Modelquartiere zu schaffen.</li> <li>- Als zweiter Punkt die Kommunikation, also wie man Kampagnen gestalten kann, Verhaltensveränderungen bewirkt, wie geht man auf Bürgerinnen und Bürger in den Quartieren zu (Events, Aktionen, Umfragen offener gestalten).</li> <li>- Ein Ergebnis war auch eine Bestätigung zu bekommen, „dass wir in vielen Bereichen eine sehr gute Arbeit machen. Vor allem strukturell“, von dem andere Städte profitieren können.</li> </ul>   |   |
| <p><b>Impact (Level 1)</b></p> | <p><i>Domains based on objectives of the project</i></p> <p><b>1) Schnellere Umsetzung und Verbesserung von nachhaltigen lokalen Energieaktionsplänen</b></p> <p>Der Stand von lokalen Energieaktionsplänen war sehr unterschiedlich. „Die verbesserte Umsetzung wurde glaub ich hier und da mal genannt, aber eher im überschaubaren Rahmen“. Bei Einzelaspekten gab es Input, diese besser umsetzen zu können, jedoch „für den gesamten SEAP eher nicht“.</p> <p><b>Stadt Mannheim:</b></p> <p>Fr. Schönfelder „stimmt zu“ dass die Projektergebnisse dieses Ziel in der eigenen Arbeit erfüllt. Der Austausch war eine Bestätigung gewesen, „dass wir auf dem richtigen Weg sind“.</p> <p><b>2) Verbesserung der Vernetzung der Städte - Sicherstellung eines sinnvollen und nachhaltigen Lernens und des Austauschs von guten Praxisbeispielen der Städte untereinander</b></p> <p>Städte, die ab Level 1 beteiligt waren gab es eine Verbesserung der Vernetzung, „zumindest in der Projektlaufzeit“. Für die Städte, die später dazu kamen, „das weiß ich nicht, ob der Kontakt da intensiv genug war“.</p> | <p>Q15 PLQ</p> <p>Q16 PLQ</p> <p>Q7 BPQ</p> <p>Q8 BPQ</p> <p>Q9 BPQ</p> |

### **Stadt Mannheim:**

Fr. Schönfelder „stimmt zu“, dass die Projektergebnisse dieses Ziel in der eigenen Arbeit erfüllt. Es sind Städte-Partnerschaften entstanden, die für weitere Projekte genutzt werden können.

### **3) Vorbildfunktion der Städte innerhalb ihres Landes – Erweiterung der Reichweite des Projekts trotz internationaler Sprachbarrieren**

Ob das Projekt den Status der Stadt im Land verändert hat, konnte Fr. Bierwirth nicht sagen. Es waren jedoch Städte dabei, die „schon eine wichtige Vorbildfunktion haben. Ob das sich jetzt durch das Projekt verändert hat, finde ich schwer einzuschätzen.“ Jedoch hat das Projekt auch nicht geschadet.

### **Stadt Mannheim:**

Fr. Schönfelder „stimmt zu“, dass die Projektergebnisse dieses Ziel in der eigenen Arbeit erfüllt.“ Also das haben wir wirklich gut hingekriegt“. Besonders die peer-to-peer Visits mit vielen Interviews waren gut, auch um Kompetenzen in dem Fachvokabular zu verbessern.

### **Unerwartete Veränderungen**

#### **Projektleiterin A. Bierwirth:**

- Es gab während dem Besuch in Venedig einen Fokuswechsel, weg von Technologien zu Planungsmanagement. Dies könnte den Schwerpunkt der Betrachtung der angestrebten Projekte der Städte verändert haben.
- Dramatische Veränderungen gab es nicht.

#### **Stadt Mannheim – A. Schönfelder:**

- Es traten keine unerwarteten Veränderungen auf.

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| <p><b>Lessons learned/<br/>Nachbereitung</b></p> | <p><b>Projektleiterin A. Bierwirth:</b></p> <ul style="list-style-type: none"> <li>- Erarbeitung der Möglichkeit eines Folgeprojekts mit kommunalen Wohnungsgesellschaften</li> </ul> <p><b>Stadt Mannheim – A. Schönfelder:</b></p> <ul style="list-style-type: none"> <li>- Die lessons learned wurden von jeder Stadt am Ende des Projekts zusammengefasst: Der Austausch von Wissen mit anderen Städten war prägend. Besonders im Bereich Kommunikation fand ein Austausch über kreative Ideen statt. Im Bereich Stadtplanung gab die peer-to-peer Methodik Möglichkeiten des Austauschs in Malmö und Tampere.</li> <li>- Methodik: „Da kann man auf jeden Fall eine ganze Menge herausziehen, wenn man mit Städten, oder auch nur mit anderen Partnern im Projekt zusammenarbeitet und benutzt diese Methode der Interviews und der Benchmark, um bestimmte Kriterien abzufragen. Man kommt dadurch viel schneller zum Ergebnis, als wenn man stundenlang am Tisch sitzt und nur irgendetwas diskutiert“. Die anderen Lernmethoden, wie study-visit, workshading und mentoring-visit sind dabei ebenfalls hilfreich.</li> <li>- Fr. Schönfelder überlegt sich jetzt bei einem Austauschprojekt, „ob man etwas daraus verwenden kann“ und verbreitet diese Informationen an andere Partner, auch als Selbstcheck mit dem Benchmark.</li> </ul> | <p>Q17 PLQ</p> <p>Q10 BPQ</p> |
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## Appendix G – SusLabNWE/NRW Project Report



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| <b>Schlagwörter</b>   |                          |  |        |
| Interdisziplinarität; Nutzerverhalten; SusLab; LivingLab; Nutzerakzeptanz; ökologischer Rucksack; Netzwerkanalyse; Nutzerinteraktion; Design-Lösungen; Energiesparberatung; Rebound-Effekt; |                          |  |        |
| <b>Projekt</b>  | <b>Titel</b>             | „SusLabNWE“ – Errichtung einer vernetzten Infrastruktur für nutzerintegrierte Nachhaltigkeitsinnovationen; Teilprojekt/Pilotanwendung „SusLabNRW“                          |        |
|   | <b>Projekt Nr.</b>       | 3439 (FG 4)  |        |
|   | <b>Zeitraum</b>          | 01/2012 – 04/2015  |        |
| <b>Projekt-Team (Name, Expertise)</b>   | <b>Projektleitung</b>    | Dr. Carolin Baedeker, Holger Rohn  | Q3 PLQ |
|   | <b>Mitarbeiter/innen</b> | Najine Ameli<br>Prof. Dr. Christa Liedtke<br>Julia Nordmann<br>Jens Teubler<br><br>→ Wichtig in diesem Projekt war die Interdisziplinarität, ein bunter Mix an Disziplinen |        |
| <b>Boundary Partner</b>   | <b>Name / Rolle</b>      | INTERREG IVB North-West Europe / Auftraggeber/Förderer (49% Finanzierung)  |        |
|   | <b>Name / Rolle</b>      | Ministerium für Innovation, Wissenschaft und Forschung des Landes Nordrhein-Westfalen<br><br>/ Auftraggeber/ Förderer (50% Finanzierung)                                   |        |
|   | <b>Name / Rolle</b>      | Eidgenössische Materialprüfungs- und Forschungsanstalt (EMPA)  |        |

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|----------------------------------|--|---|--------------------------------------|
|                                  | <b>Name</b>  | Hochschule Ruhr West (HRW)  |                                      |
|                                  | <b>Kontaktperson</b>   | Prof. Dr. Viktor Grinewitschus  |                                      |
|                                  | <b>Email</b>   | xx  |                                      |
|                                  | <b>Rolle</b>   | Living-Lab Container,<br>Datensammlung in Haushalten  |                                      |
|                                  | <b>Name</b>  | InnovationCity Management GmbH (ICM)  |                                      |
|                                  | <b>Kontaktperson</b>   | Jannis Heuner   |                                      |
|                                  | <b>Email</b>   | xx  |                                      |
|                                  | <b>Rolle</b>   | Bis 01.05.2015 bei ICM GmbH, jetzt bei WirtschaftsEntwicklungsGesellschaft Bochum mbH - <a href="http://bochum-wirtschaft.de/?s=heuner">http://bochum-wirtschaft.de/?s=heuner</a> |                                      |
|                                  | Name / Rolle   | Fraunhofer InHaus<br><br>/ Livinglab-Haus   |                                      |
|                                  | <b>Europäische Partner:</b> TU Delft, CityPorts Academy Rotterdam, ETH Zürich, Swisscleantech Association, Imperial College London, Institute for Sustainability, Design London, Chalmers tekniska högskola, Joannesberg Science Park AB, Woonbron |   |                                      |
| <b>Finanzielle Interaktionen</b> | <b>Projektbudget</b>   | 5.12 Mio.€ (FG4: 424.940€)  | Q2 PLQ                               |
|                                  | <b>Sonstiges</b>   | 900.000€ insgesamt in Deutschland für alle, wobei 50% durch das Land NRW finanziert wurde.  |                                      |
| <b>Projektziele</b>              | Die Projekte behandeln das Nutzerverhalten mit negativen Rebound-Effekten, sowie den Mangel an Nutzerakzeptanz von Produkt- und Dienstleistungsinnovationen mit hohen Nachhaltigkeitspotenzialen. Die geografische Rahmenbedingung ist Nordeuropa. |   | Q1 PLQ<br><br>Q20 BPQ<br><br>Q21 BPQ |
|                                  | <b>Hauptziele des Projekts „SusLabNWE“ sind</b>  |   |                                      |



- 1) Aufbau eines Wissensnetzwerks für nachhaltigkeitsorientierte LivingLabs mit einer neuen Testinfrastruktur für Unternehmen, Forschungsinstitute und politische Entscheidungsträger
- 2) Errichtung einer Infrastruktur zur transdisziplinären Erforschung von Nutzer-Technologie an fünf Standorten in Europe
- 3) Gemeinsame Pilotanwendungen im Bereich Heizung/ Raumwärme mit dem Ziel einer Optimierung des Systems
  - *Increases the adoption of sustainable and innovative solutions in people's daily lives*
  - *By applying the suslab research and design practices, sustainable developments have a far better chance to succeed*
  - *Integration of physical and human aspects related to energy use and allows for an international comparability across regions*
- 4) Fachpublikationen der Ergebnisse sowie die Vorstellung auf wissenschaftlichen Konferenzen

#### **Teilprojekt SusLabNRW - Projektziele**

- 1) Entwicklung von Niedrig-Investitionsmaßnahmen mit besonderer Beteiligung der Partnerunternehmen, um die Energie- und Ressourceneffizienz, in Gebäuden zu erhöhen
- 2) Erzeugung von wissenschaftlichen Erkenntnissen über die Integration der Benutzer in Prozesse in Bezug auf die Bereitstellung von Energie- und Ressourceneffizienten Produkt-Service-Innovationen
- 3) Integration der gesamten Wertschöpfungskette „Heizen/ Raumtemperatur“
- 4) Entwicklung von Qualifizierungsmaterial für die Wertschöpfungskette „Heizen/ Raumtemperatur“

**SMART?** Die Ziele sind „domains of change“, keine Kennzahlen.

→ Die Ziele von SusLabNWE und SusLabNRW sind deckungsgleich, lediglich eine Konkretisierung. Die Herangehensweise an die Pilotierung unterscheiden sich je nach Partner.

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|   | <p><b>Reflektion der Ziele durch die Projektleiterin C. Baedeker:</b></p> <p><i>Die Ziele erfüllten die Erwartungen als Wissenschaftlerin.</i> Es ist ein sehr wissenschaftliches Projekt, „weil es sehr experimentell ist muss man sagen und das ist eigentlich so eine ganz klassische Geschichte von transformativer Wissenschaft, weil eigentlich nicht klar war, wo enden wir und wie ist das, wie entwickelt sich das im Laufe des Projekts, weil das sehr stark abhängig war von den Zwischenergebnissen und den Interaktionen.“ Die Ziele wurden im Projektverlauf korrigiert, oder konkretisiert, „einfach auch an dem, was wir gelernt haben und wo wir dann hinwollten.“</p>   |   |
|   | <p><b>Reflektion der Ziele durch InnovationCity Ruhr (Herr Heuner):</b></p> <p>Die Motivation war Erkenntnisse zu erlangen über den Bottroper Gebäudebestand und die Verhaltensweise von Nutzern. Diese Informationen flossen in die Beratung, sowie Projektgestaltung. <i>Die Ziele haben die Bedürfnisse/ Erwartungen reflektiert.</i></p>  |   |
| <p><b>Reflektion auf die WI-Mission</b></p> | <p>Das Projekt fokussiert auf das Themenfeld „Energie“, mit der Mission der Reduzierung des Ressourcen- &amp; Energieverbrauchs zu Hause, der Nutzerinteraktion (Strategie der gezielten Begrenzung) und der Entwicklung von Pilotanwendungen. Dazu werden Partnerunternehmen, sowie die Benutzer in die Strategie integriert. Dies geschieht durch das EU-Projekt in Nord-Europa und in dem nationalen Teilprojekt in NRW. Somit zielt es auch auf die Entkopplung von Wirtschaftswachstum und die Nutzung von natürlichen Ressourcen ab.</p> <p>“The Wuppertal Institute undertakes research and develops <b>models, strategies and instruments</b> for transitions to a sustainable development at <b>local, national and international level</b>. Sustainability research at the Wuppertal Institute focuses on the <b>resources, climate and energy related challenges and their relation to economy and society</b>. Special emphasis is put on analysing and <b>stimulating innovations</b> that <b>decouple</b> economic growth and wealth from natural resource use.” (Wuppertal Institute, 2016b)</p> |   |
| <p><b>Input</b></p>                         | <p><b>Integration von Erfahrungen (Projektleiterin C. Baedeker):</b></p> <p>Es wurden Kenntnisse aus dem ökologischen Rucksack integriert und generell aus der „SusLab-Familie“. Darin wird seit 2008 geforscht. Neue Methoden wurden entwickelt, aber auch ausprobiert (z.B.</p>   | <p>Q4 PLQ</p> <p>Q18 BPQ</p> <p>Q19 BPQ</p> |

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|                          | <p>Netzwerkanalyse). Es war ein Mix aus neu und alt, lediglich etwas verändert.</p> <p><b>Aus der Perspektive von Herrn Heuner:</b></p> <p>ICM war bereit, sich auf die Expertise der Wissenschaftler des WI in diesem Projekt zu verlassen. Darüber hinaus stimmt Herr Heuner zu, dass ICM aktiv an der Formulierung der Problemstellung des Projekts involviert war (damals durch Herrn Tata).</p>  |                              |
| <p><b>Storyboard</b></p> | <p>→ Das Storyboard beinhaltet die wichtigsten Handlungsschritte/ direkte/indirekte Interaktionen (siehe Anhang)</p> <p><b>Projektleiterin C. Baedeker:</b></p> <ul style="list-style-type: none"> <li>- Der Handlungsablauf kann als iterativer Prozess angesehen werden, sich immer wieder zu fragen, wo wir stehen, was wollen wir erreichen.</li> <li>- Einschränkung gab es durch das Thema „Heizen“ und dadurch mussten die Wintermonate für Messungen genutzt werden.</li> <li>- „Wir hatten eher das Gefühl wir haben viel viel mehr erreicht und auch letztlich viel mehr ausprobiert. Haben viel früher mit den Piloten angefangen, als geplant war.“</li> <li>- Es wurde durch eine kontinuierliche Reflektion überprüft, ob die Ziele erreicht werden können.</li> </ul> <p><b>Aus der Perspektive von Herrn Heuner:</b></p> <ul style="list-style-type: none"> <li>- Durch die internationalen Treffen wurde erkannt, dass die <i>Partner nicht auf einer Linie waren</i>. Grund dafür war auch die Erkenntnis in dem SusLabNRW, dass Test-Häuser nicht benötigt werden, sondern man direkt in die Haushalte geht. Dadurch waren manche Partner noch mit dem Aufbau von LivingLabs beschäftigt, während SusLabNRW mit den Tests begann.</li> <li>- Manche Aktivitäten liefen langsamer, als geplant.</li> <li>- Als kritisch fand Herr Heuner auch die Budgetverwaltung und der Umgang mit Aufgaben (Verschiebungen, unvollständige Erledigung) von einigen internationalen Partnern.</li> </ul> | <p>Q8 PLQ</p> <p>Q12 BPQ</p> |

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| <b>Zusammenarbeit</b> | <b>SusLabNWE</b>   | Q5 PLQ |
|                       | <ul style="list-style-type: none"><li>- In dem Hauptprojekt "SusLabNWE" wirkte das WI mit Wissen in den Bereichen der Nutzerinteraktion und Lebenszyklus-Denken und mit Erfahrungen in der Entwicklung von Ressourceneffizienter und nachhaltigen Produkten/ Dienstleistungssystemen (SusLab Broschüre 2014)</li><li>- Es gab einen gemeinsamen Piloten an Design-Lösungen, den die TU Delft entwickelt hat und der in allen vier Ländern in 4-5 Haushalten eingesetzt wurde (Winter 14/15) (C. Baedeker)</li></ul>  | Q9 PLQ |
|                       | <b>SusLabNRW</b><br><br><ul style="list-style-type: none"><li>- Pilotierung: Stärkere Intensität der Zusammenarbeit mit den Nutzern, da in Bottrop mit Haushalten im Alltag gearbeitet wurde. „Aber faktisch haben alle das in dem Bereich heizen bearbeitet, haben unterschiedliche Produktlösungen ausprobiert.“ (C. Baedeker)</li></ul> <p>2012: Die Deutschen Partner gründeten eine Datenbank für das lokale Projekt</p> <p><b><u>Aus der Perspektive von der Projektleiterin C. Baedeker:</u></b></p> <p><b>Vertrauen in Knowhow von nichtakademischen Teilnehmern:</b></p> <ul style="list-style-type: none"><li>- „Ja, absolut. Wir brauchten das auch“</li><li>- Klare Arbeitsteilung: Hochschule Ruhr-West hat Datensammlung übernommen; InnovationCity hat die Kontakte mit den Stakeholdern hergestellt (Unternehmen, Bürger in Bottrop); WI hat das Methodensetting entwickelt, Haushaltanalyse und Netzwerkanalyse,</li><li>- Die Unternehmenspartner haben Input gegeben</li><li>- Haushalte konnten ihr Knowhow einbringen</li></ul> <p>→ „Dass ist halt das Livinglab, dass man eben sagt, jeder muss eigentlich sein Wissen einbringen und das muss dann letztlich zu den Produkt-Dienstleistungs-Lösungen führen, dafür brauch ich die Integration und das Lernen voneinander.“</p> |        |

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|   | <p><b>Signale/Kommentare von BP/Gesellschaft:</b></p> <ul style="list-style-type: none"> <li>- „Voneinander lernen“</li> <li>- LivingLab bedeutet ein sehr interaktiver Prozess und „dass man auf die Bedürfnisse, Bedarf vor allen Dingen reagiert“</li> <li>- Es wurde geschaut, was könnten Haushalte benötigen, um Routinen zu verändern. Aber auch, was Unternehmen benötigen (Feedbacksystem)</li> <li>- Das es nicht nur um technische Aspekte geht.</li> </ul>  |  |
|   | <p><b><u>Aus der Perspektive von Herrn Heuner:</u></b></p> <ul style="list-style-type: none"> <li>- Herr Heuner „stimmt zu“, dass die Meinung und Perspektiven von InnovationCity Ruhr in die Aktivitäten und in die Prozessentwicklung integriert wurden.</li> <li>- Er „stimmt zu“, dass Wissen von InnovationCity Ruhr als Partner ausreichend in den Projektprozess integriert wurde.</li> <li>- Allerdings wurden nur teilweise strukturelle und/oder zeitliche Anforderungen rechtzeitig an das Team des WI kommuniziert. Jedoch mussten sie dem WI auch „hinterherlaufen, einige male“</li> <li>- Während des Prozesses gab es kein Mangel an Konsens, Probleme gab es eher durch einen Mangel an Kapazitäten der einzelnen Partner durch parallellaufende Projekte. In diesem Kontext wurde auch das Problem genannt, dass man „nicht alle Partner steuern kann“. Jedoch war dies kein Problem mit dem WI.</li> </ul> | <p>Q13 BPQ<br/>Q14 BPQ<br/>Q15 BPQ<br/>Q16 BPQ<br/>Q22 BPQ</p> |
| <p><b>Kommunikation während und nach dem Projektprozess</b></p> | <p><b><u>SusLabNWE</u></b></p> <ul style="list-style-type: none"> <li>- 4 Treffen pro Jahr</li> <li>- Quergruppen</li> </ul> <p><b><u>SusLabNRW</u></b></p> <p><b>Aus der Perspektive von Projektleiterin C. Baedeker:</b></p> <ul style="list-style-type: none"> <li>- Räumliche Nähe in NRW, viele Projekttreffen alle zwei Monate.</li> <li>- Und/oder Telefonkonferenz</li> <li>- Gemeinsame Veranstaltungen</li> <li>- Per Email</li> </ul> <p><b>Aus der Perspektive von J. Heuner:</b></p> <p>a) Persönlicher Kontakt: „einmal im Monat“</p>   | <p>Q7 PLQ<br/>Q11 BPQ<br/>Q4 BPQ</p>                           |

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|   | <p>b) Per Email: „einige Male im Monat“<br/> c) Per Telefon, Skype, etc.: „einige Male im Monat“</p> <p>- Herr Heuner war „zufrieden“ mit der Kommunikation zwischen ICM und dem WI nachdem die Projektergebnisse/-empfehlungen zusammengetragen wurden.</p>  |   |
| <p>MSC (Most significant Change) aus der Sicht des Projektleiters während des Prozesses</p> | <p><b>1) Von FraunhoferInhaus in wirkliche Haushalte</b><br/> <i>(Thematic coding: Verfahrensänderung/ Forschungsfeldveränderung)</i><br/> Das Projekt wurde in dem FraunhoferInhaus gestartet, was jedoch nur bedingt alltagsgerecht war. Deshalb wurde in Haushalte umgeschwitched, was ein erheblicher Umbruch war. Bei der Hochschule Ruhr-West gab es einen Klick-Moment, „das ist wirklich unser Labor und das war ganz spannend, weil wir dann auch gemerkt haben, die Haushalte sind immer weiter mit uns gegangen und haben ganz viel ausprobiert und das war wirklich so ein wichtiger Umbruch.,,</p> | <p>Q6 PLQ<br/> Narrative → thematic coding (sort notes into categories) (p.41)<sup>1</sup></p>  |
| <p>Outputs</p>  | <p>4) Zwischenergebnisse (Innovation CityRuhr – Projektsteckbrief SusLabNWE) (Homepage SusLabNWE)</p> <p>5) Publikation „Transition through sustainable Product and Service Innovations in Sustainable Living Labs: application of user-centred</p>   | <p><b><u>Projektempfehlungen/-ergebnisse:</u></b></p> <ul style="list-style-type: none"> <li>• Verhalten hat starken Einfluss auf Wärmeenergieverbrauch, Ausrichtung auf Nutzungsbedingungen wichtig</li> </ul> <p><b><u>Projektempfehlungen/-ergebnisse (Conclusion, p.17ff.):</u></b></p> <ul style="list-style-type: none"> <li>• Nutzerverhalten kann durch PSS verändert werden und die simple Diskussion über Energieverbrauch und Veranschaulichung von dem</li> </ul> |

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|  | <p><b>research methodology within four Living Labs in Northern Europe</b>” – Paper for presentation at the 5th International Sustainable Transitions (IST) Conference, 27-29.8.2014</p> <p><b>6) Voraussichtliche Publikation eines Buches, Springer-Verlag</b></p>   | <p>privaten Energieverbrauch kann zu Veränderungen führen.</p> <ul style="list-style-type: none"> <li>• Erste Ergebnisse unterstützen und bestätigen die ursprüngliche Idee, das SLL Infrastrukturen ein wichtiger Ansatz ist, um seinen Fokus auf die Mensch-Technologie Interaction zu richten, um eine Transition zu erzielen. Es kann gezeigt werden, dass erfolgreiche, nachhaltige PSS nur unter realen Einsatzbedingungen und durch die Integration der Nutzer/Haushalte innerhalb eines SLL realisiert werden kann. Das heißt die Integration von Haushalten in Stadtteilen, sowie Laboren scheint am Besten zu funktionieren.</li> </ul> <ul style="list-style-type: none"> <li>- In Kooperation mit allen Partnern</li> <li>- Dokumentation der Ergebnisse</li> </ul> |
|  | <ul style="list-style-type: none"> <li>- Herr Heuner „stimmt voll zu“, dass die Projektergebnisse/ -empfehlungen Wissen erzeugt haben, die nützlich für die ICM waren.</li> <li>- Schlüsselergebnisse wurden verwendet, um die Energieberatung (qualitativ) bewerten zu können. Die Ausrichtung der Beratung wurde dadurch kalibriert.</li> </ul> <p>[x] Usage of the internet (Homepage, Link to website on other homepages)</p> <p>[x] Usage of social networks (Facebook, Twitter, LinkedIn, etc.)</p> <p>[x] scientific publications (List of publications with DOI or URN)</p> <ul style="list-style-type: none"> <li>- Liedtke, C. Welfens, M.J. Rohn, H. and Nordmann, J., (2012). <b>Living Lab: User-Driven Innovation for Sustainability</b>. In: International Journal of Sustainability in Higher Education, forthcoming. DOI: 10.1108/14676371211211809</li> </ul> | <p>Q1 BPQ</p> <p>Q6 BPQ</p> <p>Q12 PLQ</p>  |

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- WI (02/2016) – NRW 2030 Zukunftsbilder, Hintergrundpapier zum AP 8 im Rahmen des Zuwendungsprojekts „**Konzeptionelle Analysen und Überlegungen zur Ausgestaltung einer Nachhaltigkeitsstrategie NRW aus wissenschaftlicher Sicht**“

→ Eine Analyse durch die Software „Altmetrics“ hat zu wenig Ergebnissen geführt (**siehe Anhang**)

[x] Conferences/ speeches

[x] Regional

[x] National

[x] European

International

[x] Press release / newspaper articles

[x] Regional

National

European

International

[x] Participation on active events (expedition, exposition, etc.)

[x] Mentioned in the quarterly reports of the Wuppertal Institute

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|   | <p>☐ Publication of the Wuppertal Report (final project report)</p> <p>→ „Also ist schon klar, dass es unterschiedliche Medien geben muss von wissenschaftlichen Publikationen, bis aber auch zu anderen Medien und das Buch jetzt auch nochmal als eines, was nicht komplett wissenschaftlich ist, für eine andere Öffentlichkeit halt noch.“ (C. Baedeker)</p>   |                               |
|   | <p>Durch einen Newsletter wurden Ergebnisse des Projekts mit anderen Akteuren geteilt.</p> <p>Zudem wurden Kommunikationskreise, wie beispielsweise der wissenschaftliche Beirat genutzt, um die Ergebnisse zu verbreiten.</p>   | Q5 BPQ                        |
|   | <p><b><u>Signifikanz und Tragweite:</u></b></p> <p>Hohe Signifikanz für die Hochschule und InnovationCity, „also bei dem einen Partner vielleicht mehr, bei dem anderen weniger, aber schon ein starker Einfluss.“ (C. Baedeker)</p>   | Q14 PLQ                       |
| <p>Anwendung der Projektergebnisse/empfehlungen</p> | <p><b>MSC wegen der Projektergebnisse/empfehlungen:</b></p> <ul style="list-style-type: none"> <li>- Es besteht ein „unheimlicher Bedarf da weiterzugehen“, ein Produktdienstleistungssystem zu entwickeln, ein Beratungssystem aufzubauen „und dass dann auch in Energieberatungen, Verbraucherkonzernen zu etablieren.“ Dies soll in neuen Projekten erfolgen.</li> <li>- Die Erkenntnis, dass „Livinglab funktioniert“, kann auch auf andere Bereiche übertragen werden (z.B. Ernährung, Mobilität)</li> </ul> <p><b>Sicherstellung der Integration von Ergebnissen in die Arbeit des BP:</b></p> <p>Es bestand ein hohes Eigeninteresse bei dem WI und den Projektpartner, „aber wir haben auch gemerkt, man kann immer noch weitergehen“. Man könnte dieses Produkt-Dienstleistungssystem auf andere Bereiche als heizen erweitern. Jedoch muss bei dieser Erweiterung gewisse Dinge nicht mehr durchlaufen werden und man kann eine Infrastruktur abrufen.</p> | <p>Q10 PLQ</p> <p>Q11 PLQ</p> |

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|  | <p><b>Aus der Perspektive von J. Heuner:</b></p> <p><b>a) Kapazitätsaufbau</b></p> <p>Es wurde deutlich, dass der Beratungsfluss verbessert werden muss. Ein Schnellcheck vor einer Beratung wäre eine Möglichkeit, um einen individuellen Datensatz zu erheben. Dazu müssten allerdings Kapazitäten aufgebaut werden, „um wirklich die Qualität der Beratung zu erhöhen“.</p> <p><b>b) Konzeptioneller Nutzen</b></p> <p>Durch die Kommunikation von Carolin B. mit dem Ministerium wurden die Denkweisen in der Politik beeinflusst. Bedeutsam war dabei das Ergebnis, dass effektive Maßnahmen nicht hoch-investiv sein müssen, sondern durch eine Verhaltensveränderung, oder Anpassung, Einsparungen erzielt werden können. Dies ist durch das Projekt belegbar. Dazu zählt auch ein neues Verständnis des Zusammenspiels zwischen Technik und Verhalten.</p> <p><b>c) Instrumentalisierung</b></p> <p>Durch das Projekt wurden neue Datensätze angelegt. Das Sample war groß genug, um konkrete Ziele abzuleiten, die in den 10 Bottroper Thesen zusammengestellt wurden. Diese Ergebnisse wurden kommuniziert und in die Beratungspraxis integriert.</p> <p><b>d) Verhaltensveränderung</b></p> <p>Das Projekt kann als Paradebeispiel für diesen Punkt angeführt werden. Es war darauf angelegt, dass ein Austausch stattfindet. Die Kernaufgabe des ICM war die Vernetzung der Tätigkeiten zwischen Wissenschaft, Wirtschaft, öffentlicher Hand und den Bürgern.</p> <p><b>e) Dauerhafte Konnektivität</b></p> <p>Herr Heuner konnte nichts genaues zu Punkt e) hinzufügen, da dies eher an Herrn Grinewitchus gerichtet werden sollte (er hatte direkten Kontakt mit den Probanden durch mehrere Projekte, z.B. „100 KWK in Bottrop“)</p> | Q2 BPQ |
| <ol style="list-style-type: none"><li>1) <i>Kapazitätsaufbau = Dies bezieht sich auf die Bildung, Training oder andere Entwicklungen von gemeinschaftlichen Aktivitäten.</i></li><li>2) <i>Konzeptioneller Nutzen = Die Forschung verändert Denkweisen, verändert die Meinung politische Entscheidungsträger und/oder Ausübende zu einem Thema oder spielt eine allgemeine "benusstseinsweiternde Rolle".</i></li><li>3) <i>Instrumentalisierung = Direkte Wirkung der Wissenschaft auf Politik, Praktiken, Entscheidungen, etc.</i></li></ol> |   |        |

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|  | <p>4) <i>Verhaltensänderung = Positive Veränderungen in institutionellen Kulturen und individuellen Einstellungen gegenüber dem Wissensaustausch.</i></p> <p><i>Dauerhafte Konnektivität = Wenn Wissenschaftler und potenzielle Anwender in Kontakt bleiben, auch nachdem das geförderte Projekt beendet ist.</i></p>  |   |
| <p><b>Aufnahme der Projektergebnisse/empfehlungen in die Arbeit des BP (MSC)</b></p> | <p><b>Aus der Perspektive von der Projektleiterin C. Baedeker:</b></p> <p>Es gab einen „Aha-Effekt“ für die ICM GmbH, welche Rolle Haushalte in der Erzielung der Klimaschutzziele spielen können.</p> <p>Die Hochschule Ruhr-West erarbeitete ein Feedbacksystem im Bereich Heizen.</p> <p><b>Aus der Perspektive von J. Heuner:</b></p> <p>Die Projektergebnisse wurden in die Beratungstätigkeit integriert. „Genau, dass war der Fall“. Darüber hinaus beeinflussten sie die Konzeption neuer Projekte (Ergebnisse zur Verhaltenstechnik, mit welchen Themen man Probanden locken kann und wie die Ansprache gestaltet werden sollte).</p>   | <p>Q13 PLQ</p> <p>Q3 BPQ</p>  |
| <p><b>Impact (Level 1)</b></p>   | <p><i>Domains based on objectives of the project<sup>1</sup></i></p> <p><b>a. <i>Entwicklung von Niedrig-Investitionsmaßnahmen mit besonderer Beteiligung der Partnerunternehmen, um die Energie- und Ressourceneffizienz, in Gebäuden zu erhöhen</i></b></p> <p>Zwei Erkenntnisse: Es wird ein Feedback-System entwickelt, „was wirklich tatsächlich dem Nutzer ein direktes Feedback geben soll.“ Rein technische Lösungen reichen nicht aus, denn es geht um die Verhaltensveränderung der Nutzer. Dazu geht es eher um Design-Lösungen in einem direkten Feedback-System. Niedriginvestive Maßnahmen sind notwendig. „Und das war schon spannend zu sagen, es funktioniert mit den Niedriginvestiven und die hochinvestiven Maßnahmen soll man natürlich gar nicht verteufeln, aber es kann halt sein das durch das Verhalten, also Nutzerverhalten spielt eine riesen Rolle und durch das Verhalten können diese Potenziale dieser hochinvestiven Maßnahmen, sprich Dämmung, Fenster usw. völlig wieder aufgelöst werden, weil wenn ich gedämmte Fenster habe, aber die den ganzen Tag auf, dann nützen sie nicht.“</p> | <p>Q15 PLQ</p> <p>Q16 PLQ</p> <p>Q7 BPQ</p> <p>Q8 BPQ</p> <p>Q9 BPQ</p> |

**ICM GmbH:**

Von der Wissenschaftsseite von Herrn Grinewitchus sind Handlungsempfehlungen gekommen, jedoch wurden diese nicht unbedingt in ein Dienstleistungssystem übertragen. Die ursprüngliche Idee war es, konkrete Produkte zu testen, jedoch wurde das „eher nicht“ realisiert und eingesetzt. Die HRW hat ein Dienstleistungssystem entwickelt, das jedoch nicht eingesetzt wurde, so Herr Heuner: „Aber ob das soweit getrieben wurde glaube ich eher nicht“.

Ein weiterer Punkt ist, dass die Integration der Unternehmensseite nicht ausreichte, um Produkte zu entwickeln, oder neue Dienstleistungen zu schaffen. Im Zusammenspiel zwischen Technik und Verhalten sind die Dienstleistungssysteme noch „sehr unterbesetzt“. Der Knackpunkt ist der Installateur, der direkten Kontakt mit dem Kunden hat, jedoch keinen Anreiz für eine Optimierung der Heizung hat. „Das müssen wir noch angreifen“.

**b. *Erzeugung von wissenschaftlichen Erkenntnissen über die Integration der Benutzer in Prozesse in Bezug auf die Bereitstellung von Energie- und Ressourceneffizienten Produkt-Service-Innovationen***

Livinglab-Forschung in Laboren reicht nicht aus, man muss in Quartiere und Haushalte gehen. Mit wenig Fallzahlen kann sind Schlussfolgerungen im Kontext des Milieus/Zielgruppe möglich.

**ICM GmbH:**

Herr Heuner „stimmt zu“, dass dieses Ziel nach der Integration der Projektergebnisse/-empfehlungen in die Arbeit des ICM erfüllt ist. Jedoch waren die wissenschaftlichen Erkenntnisse nicht der Fokus von ICM, eher die Nutzung der Ergebnisse.

**c. *Integration der gesamten Wertschöpfungskette „Heizen/Raumtemperatur“***

Es wurde klar, dass in Deutschland die Hersteller nicht in direktem Kontakt mit den Nutzern stehen, sondern Installateure dazwischengeschaltet sind. Für den Kundenkontakt sind gute Qualifikationen und Beratungskompetenzen notwendig. Man muss alle in den Prozess einbeziehen. Und dabei geht es neben dem technischen Wissen auch um Didaktik. Dies hat man auch bei der Netzwerkanalyse herausgefunden, da Installateure neutral beraten. Deshalb sollte man Beratungssysteme noch mehr

nutzen in der Wertschöpfungskette. Ebenfalls spielen Familie und Freunde eine wichtige Rolle in der Wertschöpfungskette, so ergab die Netzwerkanalyse. Man braucht eine „wertschöpfungskettenübergreifende Kommunikation“.

**ICM GmbH:**

Herr Heuner ist sich nicht ganz sicher, ob das tatsächlich gelungen ist. Die verschiedenen Akteure wurden in den Prozess integriert, doch ob es zu einer Veränderung in der Wertschöpfungskette gegeben hat „kann ich so nicht sagen“.

**d. Entwicklung von Qualifizierungsmaterial für die Wertschöpfungskette „Heizen/Raumtemperatur“**

Es wurde kein Material entwickelt, sondern Erkenntnisse festgehalten. Eine Möglichkeit wäre wertschöpfungskettenübergreifende Beratungstools zu entwickeln.

**ICM GmbH:**

Herr Heuner „stimmt zu“, dass dieses Ziel nach der Integration der Projektergebnisse/-empfehlungen in die Arbeit des ICM erfüllt ist. Jedoch wurden keine umfassenden Broschüren produziert, es war eher Teil der Beratung.

**Unerwartete Veränderungen**

**Projektleiterin C. Baedeker:**

Ein Europäischer Partner, die ETH Zürich ist aus dem Projekt ausgeschieden. Ansonsten gab es nichts Einschneidendes.

**ICM - J. Heuner:**

Unerwartete Veränderungen gab es vor allem in den nicht zu erwartenden Projektergebnissen, die jedoch jetzt empirisch belegt waren. Herr Grinewitchus hat zwei umfangreiche, wissenschaftliche Auswertungen veröffentlicht. Diese waren für den Endkunden zu wissenschaftlich. Jedoch stand fest, dass zum Beispiel die Wahl der Raumtemperatur keinen Einfluss auf den tatsächlichen Energieverbrauch hatte, „weil andere Effekte viel deutlicher waren“. Ein anderer Punkt war, dass Heizungen oft in der Werkseinstellung laufen und somit ein Effizienzverlust von 10-20% passiert, der durch eine simple Einstellung erzielt werden kann, ohne

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|  | hoch-investive Ausgaben. Damit kann dann auch die Stromrechnung gesenkt werden.  |                               |
| <p><b>Learned Lessons/<br/>Nachbereitung</b></p> | <p><b>Projektleiterin C. Baedeker:</b></p> <p>Der Ansatz ist „absolut sinnvoll“. Es wurde eine Infrastruktur aufgebaut, die man zu unterschiedlichen Themenbereichen nutzen kann. Es wurde ein Vielzahl an Methoden verwendet, ein Methodenmix ist wichtig. Nutzer müssen sehr stark in den Mittelpunkt gestellt werden und die Verlinkung zwischen Unternehmen und Nutzern sollte noch stärker forciert werden. Dazu spielt die Wissenschaft eine wichtige Rolle als „Ermöglicher“.</p> <p><b>ICM - J. Heuner:</b></p> <p>Die Offenheit der Probanden, an solch einem Projekt teilzunehmen, hat Herr Heuner überrascht, da es um sehr sensible Daten geht.</p> <p>Der Kontakt mit den Probanden war etwas chaotisch während dem Projektprozess (Unklarheit über das Kommunikationsmedium, etc.), sowie zwischen den Partnern WI, ICM, HRW, jedoch war die Stimmung gut. Auf europäischer Ebene war es noch chaotischer „weil da ja im Grunde jeder gemacht hat, was er eigentlich wollte“.</p> <p>Was zu Projektende problematisch war, war dass die Kundenerwartung an die Ergebnisse erreicht werden mussten. Dabei gab es Unstimmigkeiten über die Kommunikation dieser Ergebnisse. Herr Grinewitchus veröffentlichte 50-60 seitige Ergebnisberichte, die zu wissenschaftlich für Probanden war. Herr Heuner schlug 4-5 konkrete Tipps als Kommunikationsmittel vor. Geeinigt wurde sich auch eine begleitende Veranstaltung der Berichte, auf der Mitarbeiter der HRW die Ergebnisse erläuterten. Dies geschah allerdings nur mit einer kleinen Gruppe, dadurch waren einige Probanden unzufrieden.</p> | <p>Q17 PLQ</p> <p>Q10 BPQ</p> |

## Altmetrics output of a publication, produced in cooperation with the project SusLabNRW:

20.3.2016 Altmetric – Exploring the Potential of a German Living Lab Research Infrastructure for the Development of Low Resource Products and Services

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### Exploring the Potential of a German Living Lab Research Infrastructure for the Development of Low Resource Products and Services

Overview of attention for article published in Resources, September 2014

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| <b>Published in</b> | Resources, September 2014  |
| <b>DOI</b>          | 10.3390/resources3030575   |
| <b>Authors</b>      | Justus von Geibler   |

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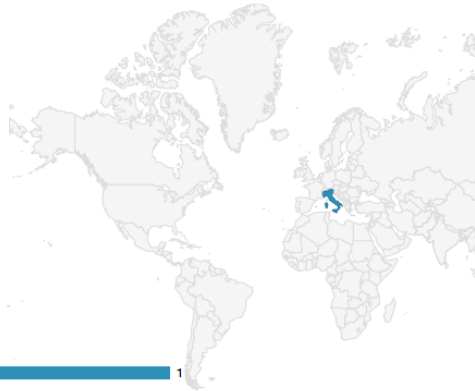
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3

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| ALL RESEARCH OUTPUTS               | OUTPUTS FROM RESOURCES | OUTPUTS OF SIMILAR AGE        | OUT OF SIMILAR AGE RESOURCES |
|------------------------------------|------------------------|-------------------------------|------------------------------|
| #2,278,826<br>of 4,508,238 outputs | #25<br>of 36 outputs   | #60,178<br>of 120,236 outputs | #<br>of 20                   |

Altmetric has tracked 4,508,238 research outputs across all sources so far. This one is in the 36th percentile – i.e., 36% of other outputs scored the same or lower than it.

## Appendix H – Cleverer Kiez Project Report

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| <b>Schlagwörter</b>                       | Energiearmut; Energiewende; Energiesparberatung; Verhaltensveränderung; integratives Konzept; Umweltbildung; Energieeffizienz; Berliner Energieagentur; RWE AG;   |                             |
| <b>Projekt</b>                            | <p><b>Titel:</b> “Cleverer Kiez“ &amp; das Begleitprojekt “Energiearmut lindern: Buch- und Konferenzprojekt”</p> <p><b>Projekt Nr.:</b> 1268 &amp; 1294 (FG 2)</p> <p><b>Zeitraum:</b> 05/2010-01/2013 &amp; 10/2012-01/2014</p>  |                             |
| <b>Projekt-Team<br/>(Name, Expertise)</b> | <p><b>Projektleitung:</b> Dr. Michael Kopatz</p> <p><b>Mitarbeiter/innen:</b></p> <p>Dr. Ralf Schüle (Rolle/Expertise: war nur bei den ersten Gesprächen einbezogen)</p> <p>Oliver Wagner (Rolle/Expertise: beratende Stellung, nicht aktiv im Projekt beteiligt)</p> <p><b>Zusätzliche Mitarbeiter im Begleitprojekt:</b></p> <p>Luisa Lucas (Rolle/Expertise: Organisation der Abschlussveranstaltung)</p> <p>Maximilian Preute (Rolle/Expertise: Rechercharbeiten)</p> | <p>Q2 PLQ</p> <p>Q3 PLQ</p> |
| <b>Boundary Partner</b>                   | <p><b>Name:</b> RWE AG</p> <p><b>Kontaktperson:</b> xx</p> <p><b>Email:</b> xx</p> <p><b>Rolle:</b> Auftraggeber/Förderer; sehr aktiv im Projekt Cleverer Kiez – Gründung des Vereins, starke Auseinandersetzung mit dem Inhalt, ließen Akteuren relativ großen Freiraum; in dem Buchprojekt eher passiv/neutral</p> <hr/> <p><b>Name:</b> Berliner Energieagentur</p> <p><b>Kontaktperson:</b> xx</p> <p>Unternehmensbereich InformE</p> <p><b>Email:</b> xx</p>         |                             |

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|   | <p><b>Rolle:</b> Schulung der Energiesparberater, wissenschaftliche Begleitung (Befragung, Interviews)</p>   |  |
|   | <p><b>Name:</b> Layon Werbedesign &amp; Kommunikation GmbH</p>   |  |
|   | <p><b>Rolle:</b> Mitarbeit bei der Evaluation, Marketing</p>   |  |
| <p><b>Finanzielle Interaktionen</b></p>     | <p><b>Projektbudget:</b> 80.000€ (netto) für Projekt Cleverer Kiez</p> <p><b>Sonstiges:</b> Das Teilprojekt ist finanziell unabhängig.</p>   | <p>Q2 PLQ</p>  |
| <p><b>Projektziele</b></p>                  | <p>Die Projekte behandeln das Problem Energiearmut und wie die Energiewende sozialer gestaltet werden kann. Dies ist klar definiert.</p> <p>Projektziele sind</p> <ol style="list-style-type: none"> <li>1) Die Senkung von Heizungskosten und wie dies erzielt werden kann (Verhaltensveränderung),</li> <li>2) Die Energiesparberatung als Möglichkeit für Langzeitarbeitslose, um es in das Berufsleben zu schaffen.</li> </ol> <p>Die geografische Rahmenbedingung ist Berlin-Marzahn.</p> <p><i>SMART?</i> Die Ziele sind „domains of change“, keine Kennzahl.</p> <p><b>Reflektion der Ziele durch den Projektleiter:</b></p> <p>Die Projektziele reflektieren die Erwartung von Herrn Kopatz als Projektleiter. (1)</p> <p><b>Integration von Erfahrungen:</b></p> <p>Er hat Erfahrungen von früheren Projekten integriert, aber nicht speziell zu dem Thema Energie.</p> | <p>Q1 PLQ</p> <p>Q4 PLQ</p> <p>Q18 BPQ</p> <p>Q20 BPQ</p> <p>Q21 BPQ</p> |
| <p><b>Reflektion auf die WI-Mission</b></p> | <p>Das Projekt fokussiert auf das Themenfeld „Energie“ und die damit verbundene Herausforderung gegenüber der Gesellschaft (Energiewende-Energiearmut).</p> <p>Die Einführung von einer Energiesparberatung, sowie die Verteilung von Soforthilfen (effizientere Produkte) sollen zu einer Verhaltensveränderung in Haushalten führen und im Endeffekt Geld gespart und der Umwelt geholfen werden (CO2-Einsparung) (integratives Konzept mit sozial- &amp; umweltpolitischen Zielen). Dies geschieht auf lokaler Ebene (Schwerpunkt Berlin-Marzahn), erreicht</p>   |  |

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|  | <p>aber durch das Begleitprojekt die nationale Ebene. Die Ergebnisse werden in dem Projekt „Stromspar-Check“ der BEA weitergeführt.</p>   | <p>“The Wuppertal Institute undertakes research and develops <b>models, strategies and instruments</b> for transitions to a sustainable development at <b>local, national and international level</b>. Sustainability research at the Wuppertal Institute focuses on the <b>resources, climate and energy related challenges and their relation to economy and society</b>. Special emphasis is put on analysing and <b>stimulating innovations</b> that <b>decouple</b> economic growth and wealth from natural resource use.”<br/>(wupperinst.org/profile, 2016)</p> |
| <p><b>Storyboard</b></p>                                 | <p>→ Das Storyboard beinhaltet alle Handlungsschritte</p> <p><b>Kontext:</b> Im Herbst 2012 diskutieren die Medien Strompreissteigerung, Energiesparberatung für Privathaushalte. Daraus folgte ein Anstieg der Besucherzahl der Website</p> <p>Es wurden kontinuierlich mögliche Optionen für die Umsetzung der Schlüsselergebnisse während des Prozesses von Seiten Herrn Kopatz überprüft. (1)</p> | <p>Q8 PLQ</p> <p>Q1 BPQ</p> <p>Q8 BPQ</p> <p>Q13 BPQ</p> <p>Q22 BPQ</p> <p>Q23 BPQ</p>   |
| <p><b>Zusammenarbeit</b></p>                             | <p><b>Aus der Perspektive des Projektleiters:</b></p> <ul style="list-style-type: none"> <li>- Herr Kopatz wusste nicht, ob sein Team auf das Know-how von nichtakademischen Teilnehmern in diesem Projekt vertraut. (0)</li> <li>- Herr Kopatz sieht die Zusammenarbeit als „Lernprozess“ an.</li> </ul>   | <p>Q5 PLQ</p> <p>Q9 PLQ</p> <p>Q14 BPQ</p> <p>Q15 BPQ</p> <p>Q16 BPQ</p> <p>Q17 CQ</p> <p>Q19 BPQ</p>  |
| <p><b>Kommunikation während des Projektprozesses</b></p> | <p><b>BEA:</b> Mit der BEA gab’s gar nix, die haben uns einfach ignoriert quasi. Die haben ihre Schulung gemacht, dann war es für die abgehackt. Lag vielleicht auch an personellen Sachen, weil die mit der wir das ursprünglich gemacht haben, die ist krank geworden langfristig, mag auch solche Gründe gehabt haben.</p>   | <p>Q7 PLQ</p> <p>Q12 BPQ</p>   |

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|   | <p><b>RWE AG:</b> Und mit RWE hatten wir regelmäßig Kontakt und im Cleveren Kiez dann sowieso.</p> <p><b>Persönlicher Kontakt mit dem Verein Cleverer Kiez:</b> Herr Kopatz ist nach Berlin gefahren.</p>  |               |
|   | <p><b>Please remember: Types of productive interaction</b></p> <p><i>Direct: Personal contact</i></p> <p><i>Indirect: Through material carrier</i></p>   |               |
| <p>MSC (Most significant Change) des Projektleiters während des Prozesses</p> | <p><b>1) 5-malige Begleitung der Energiesparberatung in Berlin</b><br/> <i>(Thematic coding: Praktische Erfahrung im Forschungsfeld)</i></p> <ul style="list-style-type: none"> <li>- Durch die Begleitung (3x) der professionellen Energiesparberatung in Nürnberg (EnergieSparProjekt, S.104) hat Herr Kopatz festgestellt, dass enorme, riesige Unterschiede zwischen den beiden Beratungskonzepten besteht: "Ich war dabei, habe unterschiedliche gesehen. Diese Leute, die ein Crashkurs gemacht haben über 3 Wochen zur Stromsparberatung, das ist nicht zu vergleichen mit einem richtigen Energiesparberater, der das auch didaktisch so reduzieren und vermitteln kann, dass die Leute verstehen um was es geht. Und dann merkt man eine riesen Spannweite, was die Effektivität der Beratung anbelangt und deshalb sind die Ergebnisse auch sehr verschieden."; „...aber so von Anfang an war mir das nicht klar, das man das Nürnberger Model hätte besser machen sollen, wenn man ein eigenes Projekt an den Start bringt. Soweit war ich da noch nicht. Das ist mir erst später klar geworden, dass die Nürnberger viel effektiver sind. Und insofern, daraus ist aus klar was man ändern könnte im Stromsparcheck, was die da jetzt draus gemacht haben weiß man nicht genau.</li> <li>- Dadurch kam er zu dem Resultat, dass die Effektivität der Beratung in Berlin verbesserungsmöglich ist. Jedoch wurde das von der BEA nicht positiv aufgenommen:</li> </ul> | <p>Q6 PLQ</p> |

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|                       | <p>„Und da eck ich bis heute dabei an, bei dem Stromsparmcheck, weil die ja einmal diese Laienberatung überwiegend und die haben ihr Projekt damit unterwandert gesehen, mit diesen Aussagen.“ „...aber meine Intention, dass Nürnberger Beispiel als Vorbild zu nehmen, das war dann sowieso nicht angesagt und das man die Berater immer weiter entwickelt, die im Einsatz sind, also das sie ihren Job behalten dort und dann immer weiter vorangehen, ich glaube das haben einige auch auf dem Schirm und halten das für möglich.“</p> <ul style="list-style-type: none"> <li>- Durch diese Erfahrung festigte sich die Erkenntnis, dass es wichtig ist in das Forschungsfeld zu gehen, um einen praktischen Eindruck zu bekommen: „Außerdem gibt es einen anderen Impetus. Man hat ein anderer Bezug zum Projektthema... dann merkt man, dass teilweise die Probleme ganz woanders liegen.“</li> </ul> <p><b>2) Buchidee als Output</b><br/>(Thematic coding: <i>Publikation</i>)</p> <ul style="list-style-type: none"> <li>- Aus dem Projektkontext ist die Buchidee entstanden: „Anstatt einfach nur einen nüchternen Bericht zu liefern über das Projekt haben wir gesagt, da machen wir ein Buchding draus.“</li> </ul> |                              |
| <p><b>Outputs</b></p> | <p>05/2013 <b>Publikation „Energiewende. Aber fair! Wie sich die Energiezukunft sozial tragfähig gestalten lässt“</b> von Michael Kopatz (oekom-Verlag)</p> <ul style="list-style-type: none"> <li>• <u>Zielgruppe</u>: für die allgemeine Öffentlichkeit geschrieben: „allgemein interessierte Leser, aber auch insbesondere diejenigen, die sich mit dem Thema [Energiewende muss nicht sozial ungerecht sein] befassen. Man befasst sich lieber mit einem Thema, wenn es gut dargestellt und gut lesbar ist.“</li> <li>• <u>Projektempfehlungen/-ergebnisse</u>:             <ul style="list-style-type: none"> <li>• Aufzählung von Maßnahmenfeldern und existierender Praxisbeispiele zur Bekämpfung der Energiearmut</li> </ul> </li> </ul> <p>25.&amp; 26.06.2013 Erste bundesweite <b>Konferenz „Energiewende. Aber fair!“</b> in Kassel</p> <p>02/2014 Wuppertal Report <b>„Energiesparberatung im Kiez. Evaluation des Projekts clevererKIEZ e.V.“</b>, Schaller, S.; Kopatz, M. + Pressemitteilungen</p>   | <p>Q12 PLQ</p> <p>Q2 BPQ</p> |

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|  | <ul style="list-style-type: none"> <li>• <u>Zielgruppe</u>: meistens Wissenschaftler, die nach konkreten Informationen suchen</li> <li>• <u>Projektempfehlungen/-ergebnisse</u>:             <ul style="list-style-type: none"> <li>• Das Projekt hat Geringverdiener/ Schwellenhaushalte, als auch Haushalte, die finanziell gut gestellt sind, erreicht</li> <li>• Das Projekt kann dazu beitragen Energieschulden, Energiesperrungen zu vermeiden</li> <li>• Es kann zum Umweltbewusstsein verhelfen und Kommunen entlasten</li> <li>• Hohe Akzeptanz der Energiesparberatung</li> <li>• Insgesamt kann ein Einsparung von 11-16% pro Haushalt durch die Maßnahmen des Projekts erzielt werden → positive Wirkung der Energiesparberatung (zum Teil durch Soforthilfen)</li> <li>• Steigerung der Motivation durch Beratung, sich um den Energieverbrauch zu kümmern</li> <li>• Energiesparberater haben neue Fähigkeiten erlernt, erfolgreiche Integration in den Arbeitsmarkt</li> <li>• Integratives Konzept konnte bestätigt werden</li> </ul> </li> </ul> |   |
| <p>Verbreitung der Projektergebnisse/-empfehlungen</p> | <p>[x] Usage of the internet (Homepage, Link to website on other homepages)</p> <p>„clevererkiez.de“ auf deutsch, russisch, türkisch, nicht mehr verfügbar (Stand: März 2016), jedoch „...ist ja jetzt nicht etwas Neues erfunden worden. Die haben dann im Grunde genommen den Stromsparcheck als Cleveren Kiez gemacht.“</p> <p>[x] Usage of social networks (Facebook, Twitter, LinkedIn, etc.)</p> <p>[x] Scientific publications (List of publications with DOI or URN)</p> <p><b>Buch</b> „Energiewende. Aber fair!“</p> <ul style="list-style-type: none"> <li>- wurde ca. 500-1500 verkauft, dabei ging „ein kleinerer Teil der verkauften Auflage an eine Institution im Umkreis des Autors“ (Quelle: Email-Kontakt mit dem oekom-Verlag)</li> <li>- 500 Stück wurden von der RWE AG gekauft, die anschließend an alle Bürgermeister in NRW verschickt wurden</li> </ul>   | <p>Q13 PLQ</p> <p>Q15 PLQ</p> <p>Q6 BPQ</p> |

Conferences/ speeches

Regional

National

European

International

Press release / newspaper articles

Regional

National

European

International

Participation on active events (expedition, exposition, etc.)

Mentioned in the quarterly reports of the Wuppertal Institute

Publication of the Wuppertal Report (final project report)

**Persönlicher Kontakt mit der Gesellschaft** durch breite Öffentlichkeitsarbeit innerhalb der Bezirke (z.B. Informationsstand auf Mieterfesten und Umweltfesten, Verteilung von Flyern durch regionale Einrichtungen, Unternehmen, Vereine, Schaltung von Anzeigen und Beiträgen in regionalen Printmedien, Beteiligung an berlinweiten Veranstaltungen, Give-aways)

→ Breite Palette an Kommunikationsmaßnahmen - Das Format der Informationsveranstaltungen wird als wirksamstes Instrument zur Zielerreichung des Projekts identifiziert, sehr hohe Kosten bei der Nutzung des Internets

**Signifikanz und Tragweite:**

- In Berlin war das Projekt in der Szene bekannt, was auch an dem sehr guten Marketing liegt: „Wenn das noch ein paar Jahre weitergelaufen wäre, dass hätte sich so selbst verstärkt. Anfangs, das geht ganz viel über Hörensagen, über Mundpropaganda und da kommt man



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|  | <p>erst richtig weiter, wenn das schon eine gewisse Kontinuität hat.“</p> <ul style="list-style-type: none"> <li>- Verbesserungsmöglichkeiten für das Projekt Stromsparcheck der BEA wurden deutlich, welches ein fortlaufendes bundesweites Projekt ist. „Insofern ist das, man kann nicht sagen, der Stromsparcheck hat sich dadurch ergeben oder so, es hat eine große Tragweite, weil es quasi weitergetragen wird, aber das kann man nicht dem Cleveren Kiez Projekt zuweisen, dass hätte es so oder so gegeben.“</li> <li>- Wenn man nur das Projekt clevererKIEZ nimmt, nahmen 1015 Haushalte teil und es gab „ein nachweisbaren Effekt“. Jedoch ist nach Projektende Schluss: „es gibt keine Implikationen daraus.“</li> </ul>  |   |
| <p>Anwendung der Projektergebnisse/-empfehlungen</p> | <p><b>Projektleiter:</b></p> <ul style="list-style-type: none"> <li>- <b>Konzeptioneller Nutzen:</b> Das Thema Heizkosten wurde während des Projektprozesses vernachlässigt und wurde als „Lücke beim Stromsparcheck“ entdeckt, jedoch „...die BEA hat da so ihren Stiefel durchgezogen mit Strom und da hätte ich im Prinzip bei der Schulung, aber da bin ich gar nicht gefragt worden, da hätte ich schon mal sagen müssen wie machen wir die Schulung überhaupt. Und dann hab ich später versucht das Thema heizen reinzubringen und das lief sehr sehr widerstrebend.“</li> </ul> <ol style="list-style-type: none"> <li>1) <i>Kapazitätsaufbau = Dies bezieht sich auf die Bildung, Training oder andere Entwicklungen von gemeinschaftlichen Aktivitäten.</i></li> <li>2) <i>Konzeptioneller Nutzen = Die Forschung verändert Denkweisen, verändert politische Entscheidungsträger und/ oder Ausübende zu einem Thema oder spielt eine allgemeine "bewusstseinsweiternde Rolle".</i></li> <li>3) <i>Instrumentalisierung = Direkte Wirkung der Wissenschaft auf Politik, Praktiken, Entscheidungen, etc.</i></li> <li>4) <i>Verhaltensänderung = Positive Veränderungen in institutionellen Kulturen und individuellen Einstellungen gegenüber dem Wissensaustausch.</i></li> <li>5) <i>Dauerhafte Konnektivität = Wenn Wissenschaftler und potenzielle Anwender in Kontakt bleiben, auch nachdem das geförderte Projekt beendet ist.</i></li> </ol> | <p>Q10 PLQ</p> <p>Q11 PLQ</p> <p>Q3 BPQ</p> <p>Q5 BPQ</p> |

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| <p><b>Aufnahme der Projektergebnisse/-empfehlungen in die Arbeit des BP</b></p> | <p><b>Projektleiter:</b></p> <ul style="list-style-type: none"> <li>- Die Empfehlungen des Projekts haben Denkanstöße in den Bereichen der Professionalität und Effektivität für das Projekt Stromsparmache gegeben: „denen ist das jetzt auch ein dringendes Anliegen, dass die Leute länger in der Maßnahme bleiben.“</li> </ul>   | <p>Q14 PLQ<br/><br/>Q4 BPQ<br/><br/>Q7 BPQ</p>                   |
| <p><b>Impact (Level 1)</b></p>  | <p><i>Domains based on objectives of the project<sup>1</sup></i></p> <p><b>1) Senkung der Heizungskosten</b></p> <ul style="list-style-type: none"> <li>- Das Thema Wärme „wurde nicht so intensiv bedacht wie es hätte sein müssen. Also eine intensive Beratung zum Thema Wärme hat es glaube ich da nie gegeben. Das habe im im Prinzip von Anfang an gesagt, da erinnere ich mich jetzt wieder, dass man ihnen das im Haushalt direkt zeigen muss, Fenster freiräumen, Stoßlüften.“</li> </ul> <p><b>2) Integration der Langzeitarbeitslosen in den Arbeitsmarkt</b></p> <ul style="list-style-type: none"> <li>- „Naja, ob die später wieder einen Job gekriegt haben weiß ich nicht.“</li> </ul> <p><b><u>Unerwartete Veränderungen:</u></b></p> <ul style="list-style-type: none"> <li>- Herrn Kopatz fallen keine unerwarteten Veränderungen ein. (2)</li> </ul> | <p>Q16 PLQ<br/><br/>Q17 PLQ<br/><br/>Q9 BPQ<br/><br/>Q10 BPQ</p> |
| <p><b>Nachbereitung</b></p>   | <p><b>Projektleiter:</b></p> <ul style="list-style-type: none"> <li>- Eine Nachbereitung ist nicht notwendig. Also ich habe daraus gewissen Empfehlungen abgeleitet, wie eine Beratung optimaler Weise konzipiert werden sollte. Da ist der Prototyp das Nürnberger Projekt.</li> <li>- Das Buch beinhaltet Vorschläge, wie man das Thema Energiearmut weiterbearbeiten kann. Dadurch entstand das Folgeprojekt zu „Prepaid statt Sperre“</li> </ul>   | <p>Q18 PLQ<br/><br/>Q11 BPQ</p>                                  |