

# Whitepaper: Stimulating and measuring Open and Cross Innovation

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**Cross Innovation Hub**

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## **Abstract**

Innovation is changing. Today's world is marked by globally connected and increasingly digital economic systems that radically change the conditions for businesses. Doubtlessly, innovation cycles shorten, and new solutions through multiple perspectives are asked for and needed in this complex context. Open and Cross innovation as innovation processes that break down silos and create solutions at the intersection of scientific disciplines (e.g. humanities and natural sciences) and industries (e.g. creative industries and manufacturing industries) gain increasing relevance and importance in a volatile, uncertain, complex and ambiguous world (VUCA). Although their importance is acknowledged in literature, little work has been done to develop measurement frameworks for the effects of cross and open innovation processes. In lack of suitable measurement frameworks, financial institutions and public financiers alike utilise traditional measurement frameworks that favor technical innovations and insufficiently capture the complexity and great importance of open and cross innovation processes. Hence, funding is often biased towards a more traditional, often purely technical approach to innovation and does not adequately recognize the value of non-technical innovation.

As two intermediaries from Hamburg that foster open and cross innovation processes, Science Scout (an initiative of Hamburg Innovation) and Cross Innovation Hub (Hamburg Kreativ Gesellschaft) joined forces to start a discussion around the stimulation and measurement of open and cross innovation processes. We argue that new measurement frameworks are needed in order to demonstrate the value of non-technical innovation resulting from open-and cross innovation processes and to further leverage public funding for the stimulation of complex, non-technical innovations, which will become increasingly relevant for Germany's economy in the future. In this whitepaper, we offer insights into our work and our approaches to measurement by presenting cases from both Science Scout and Cross Innovation Hub. Further, we briefly analyse the impact of the humanities and the creative industries as innovation drivers and review common measurement approaches. Finally, based on our experience with cross and open innovation processes, we suggest five different approaches that can further advance this discussion.

## **Table of content**

<b>Innovation in change</b>	<b>4</b>
1.1. The importance of non-technical innovation for business, research and society	4
1.2. The importance of (new) measurement frameworks	6
<b>Stimulate and evaluate cross and open innovation</b>	<b>7</b>
2.1. Creative Industries and humanities as innovation drivers	7
2.2. Intermediaries promote new innovation processes	8
2.3. How we stimulate innovation	9
<b>3. Measurement approaches to innovation</b>	<b>16</b>
<b>4. Our approaches to measurement and our challenges</b>	<b>19</b>
<b>5. Suggestions of two intermediaries</b>	<b>22</b>
5.1. Terms and framework	23
<b>6. Conclusions for politics, administration and research</b>	<b>27</b>
6.1 Theses	28
<b>Bibliography</b>	<b>30</b>

# 1. Innovation in change

## 1.1. The importance of non-technical innovation for business, research and society

The transition from industrial society to information society and towards an increasingly volatile, uncertain, complex, ambiguous (VUCA) world has prompted a new, global economy - one that finds itself in constant change. Germany's economy is exemplary of this shift: Germany has built its economic success on the production and export of industrial goods (automotive industry, mechanical engineering etc.), however, the emerging sectors are strongly built on digital know-how and direct-to consumer businesses, and Germany is changing towards an information and knowledge society (Heimer et al., 2016). Innovation has been identified as a promising tool for companies to develop resilience in complex environments and has become an inevitable resource in most organisations. Innovation as such has been extensively discussed by literature over the past decades. Literature identified innovation not only as a source of competitive advantage for businesses, but declared innovation essential to "economic growth, development and the well being of nations" (OECD, 2018, p. 3).

The understanding of innovation is changing. Which types of innovation advance the economy and society? How can such innovation processes be promoted? The Oslo Manual (OECD, 2018) defines innovation as "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" and suggests two main types of innovation: Product innovation and business process innovation.

"A product innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market. A business process innovation is a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes and that has been brought into use by the firm." (OECD, 2018, p. 20)

Although business process innovation seems less technical than product innovation, the main measurement attributes center around increased efficiency. Whereas technological innovation dominated the academic and business world for a long time, non-technical and more complex forms of innovations have gained momentum over the past years, especially because of the aforementioned shift from industrial to information society and the corresponding economic and social relevance of non-technical innovation. Non-technical innovations are defined as "new types of product, service, process, organization and marketing concepts as well as business models. The primary contribution to value creation does not arise from the technologies used (e.g. components, software), but rather from changes that are aimed at previously unknown application contexts, possibilities of use, organizational structures, or mechanisms of yield and value creation. Non-technical

innovations can be market-oriented and public-interest oriented, but also in mixed forms.” (Heimer et al., 2016, p.4). Non-technical innovations hence can incorporate technology, but technology is merely the means to an end rather than the primary innovation. However, non-technical innovation as a term constitutes the negation of technical and therefore can be misleading and perceived as deficient. Although it is a limited concept, we will be working with this term in our paper because most readers probably already have an understanding of it.

This shift to an increasingly complex world has brought forward challenges that technical innovations alone cannot solve. In order to create solutions to the economic, societal and environmental challenges we are facing today, we cannot build on one-dimensional innovations anymore, in contrast, innovations must incorporate societal considerations and multidimensional aspects. This development prompted policymakers and researchers to develop new metrics for non-technical innovations. Considering non-technical developments and inventions as innovations is part of an extended understanding of innovation (“erweitertes Innovationsverständnis”). This extended understanding of innovation is urgently needed in a VUCA world. It differs from a traditional understanding of innovation in various aspects: Firstly, it moves away from a product-centric, technical understanding of innovation towards a more societal understanding of innovation, in which innovation is understood as a non-technical, open-ended process with many stakeholders rather than a linear process with a single outcome. It thus recognizes the important role of social sciences in the innovation ecosystem. Secondly, it regards innovation processes as participatory and co-creative rather than a top-down internal process, largely determined by research and development efforts. And lastly, it accounts for innovations that aren’t driven by strictly economical purposes but aim to solve larger societal challenges. More and more companies are facing social challenges and are looking for economic solutions. Innovation is thus not a linear process but rather one that is interdependent with larger societal, environmental and economic structures.

*Open and cross innovation processes* are examples of an extended understanding of innovation and allow for co-creation, multiperspectivity and external input. Companies are increasingly using open innovation processes with cross-departmental or cross-company collaboration for their innovation projects. Open innovation can be efficient in breaking up silos - internally and externally - and nurtures internal innovation processes through external input. Cross innovation is a specific form of open innovation that we understand as cross-sectoral between different industries.

“The cultural and creative industries are pioneers for an increasingly knowledge-based economy in Germany. Thanks to its high problem-solving skills and strong innovation orientation, the cultural and creative industries are an innovation driver for other sectors and contribute to increasing the competitiveness of the economy as a whole”, according to a study commissioned by Bundesministerium für Wirtschaft und Innovation (BMWi, 2012, p. 3). The creative industries can also play an important role in cross innovation processes. Cross Innovation between the CCIs and other economic sectors “take[s] place in open innovation setups, whereby insights are generated through the combination of different perspectives involving multiple partners” (European Commission, 2019, p. 20) while striving for the joint development of innovations. In Cross Innovation processes, creatives are co-creating ideas and solutions in the early phases of an innovation process and specifically not as service providers who give a product or service the finishing touch before it is

introduced to a market. Or in the words of Tim Brown, one of the creators of Design Thinking: "The former role [of design] is tactical, and results in limited value creation; the latter is strategic, and leads to dramatic new forms of value." (Brown, 2008, p. 86).

Although research is emerging on the measurement of non-technical innovations, the largest part of literature remains to focus on internal processes and metrics of "traditional" or technical innovation, making it difficult to find pragmatic solutions for businesses, organizations and intermediaries where outcomes of innovation processes are less tangible and more complex than a single output or a material product. The traditional metric system does not fit the multi-dimensional and non-technical innovations that have emerged from open and cross innovation processes. Quantitative measurement alone cannot grasp the diverse outcomes and impacts of non-linear processes.

## **1.2. The importance of (new) measurement frameworks**

Measurement of innovation is important for different reasons: companies and organizations use metrics to evaluate and benchmark their innovation efforts, to see where they stand in a competitive environment and in order to allocate budgets according to success and performance. For policymakers, metrics are important to understand and nurture innovation, to identify and realize potentials of industries. For public intermediaries, measurement is crucial to prove the success of our efforts to all involved stakeholders and to further secure public funding and support. Currently, measurement techniques favor technical innovation from the STEM sectors, forcing intermediaries and policymakers to follow linear innovation processes and metrics - counterintuitive to the latest economic developments in Europe (NESTA, 2008; Jaaniste, 2009). As NESTA claims, "Traditional metrics fail to adequately capture 'hidden innovation': innovation in services, the public sector and the creative industries, or new trends in open and user-led innovation." (NESTA, 2008, p. 1). Also, traditional metrics do not account for the societal dimensions that innovations often encompass and are yet unable to counter a blind progress automatism (what's new must be good) (Howald, Kopp & Schwarz, 2008). For intermediaries (and businesses), there are different approaches to measuring innovation performance/value in the creative industries, some of them rely on the Oslo Manual and/or follow the traditional metrics of value, impact, return on investment, while others focus on specific innovations, such as content or aesthetic innovation (Müller, Rammer & Trüby, 2009). These specific approaches however do rarely allow for comparability with other sectors.

This paper argues for the need of new measurement frameworks for non-technical innovations in open and cross innovation processes while exploring the innovation activities of two public intermediaries that stimulate innovation. Co-authored by the projects Cross Innovation Hub (Hamburg Kreativ Gesellschaft) and Science Scout (Hamburg Innovation) from Hamburg, this paper focuses on the perspectives of the humanities and the cultural and creative industries (CCIs) in cross and open innovation processes. Whilst both authors are implementing new ways of collaboration between different disciplines and can be regarded as important/leading bridge builders in Hamburg's innovation ecosystem, we are confronted with the challenges of measuring the impact of non-technical innovation.

New measurement frameworks are needed in order to demonstrate the value of non-technical innovation resulting from open-and cross innovation processes and to further leverage public funding for the stimulation of complex, non-technical innovations, which will become increasingly relevant for Germany's economy in the future.

## **2. Stimulate and evaluate cross and open innovation**

### **2.1. Creative Industries and humanities as innovation drivers**

In this whitepaper, we deal with the non-technical innovation achievements of the CCIs and the humanities. We want to present them as examples as important drivers of a new understanding of innovation.

As early as 2012, Fraunhofer / Prognos summed up the innovation achievements of the CCI: "The cultural and creative industries are innovative and pioneers in the use of new methods and forms of work design. [They] serve very non-technical innovations and thus expand the innovation system characterized by technical advances. " (Fraunhofer & Prognos, 2012, p. 3). ZEW – Leibniz-Zentrum für Europäische Wirtschaftsforschung (Center for European Economic Research) analyses the role of Creative Industries in affecting an economy's innovation performance. They distinguish three such roles: First, Creative Industries are a major source of innovative ideas and thus contribute to an economy's innovative potential and the generation of new products and services. Secondly, they offer services which may be inputs to innovative activities of other enterprises and organisations within and outside the creative industries. Thirdly, Creative Industries are intensive users of technology and often demand adaptations and new developments of technology, providing innovation impulses to technology producers. Moreover, the CCIs have been discussed to actively shape societal developments, equipped with skills needed to tackle contemporary and future challenges that companies face in a new, complex economy. In order to meet market/customer/client demands, the CCIs are working in short innovation cycles and Open Innovation processes involving diverse stakeholders. For example, research on design as one of the CCI sectors has shown the positive effects of integrated design on innovation activities (Galindo-Rueda, & Millot, 2015). Cross Innovation between the CCIs and other economic sectors "take[s] place in open innovation setups, whereby insights are generated through the combination of different perspectives involving multiple partners" (European Commission, 2019, p. 20). In Cross Innovation processes, creatives are co-creating ideas and solutions together with companies in the early phases of an innovation process and not just as service providers at the end of the value chain.

The humanities, by which we also mean the social sciences, law, economics, design, art studies or educational sciences, expand our knowledge and thus provide new ideas, which could be transformed into innovations (Bakhshi et al., 2008). This is done by creating and shaping social contexts within which knowledge can be exchanged between problem solvers, experts, key users, users of different social origins and learning processes can be initiated (Gustavsen, 2006). A comprehensive approach of illustrating the main functions of the humanities in the innovation system is by Jeanneart, Crevoisier, Brulé and Suter, who

have used humanities activities such as: Developing and organising, giving meaning, setting a framework and jointly introducing innovation in society (SBFI, 2020). Which can also include activities that are not of a technical nature, such as business model development for a car sharing concept (SBFI, 2020), the development of continuing education formats for refugees or in combination with technical nature, the market launch of a product or the finding of an application for a technology (John & Jöstingmeier, 2019). In doing so, the humanities also take into account ethical and cultural issues that allow for greater acceptance, especially for innovations that are applied in different countries (Bakhshi et al., 2008). Despite their importance for the innovation context, the humanities are often not regarded as innovation creators alongside the natural and engineering sciences (Gustavsen, 2006).

Consequently, the diffusion of innovation potentials in the humanities plays an essential role in knowledge transfer, firstly to connect the humanities with the concept of innovation - also in terms of communication - and secondly to integrate the humanities into innovation processes.

Both - the CCI and the humanities - have in common that their actors typically produce symbolic goods and therefore cannot or only to a limited extent be assessed according to conventional assessment criteria for product innovations.

## **2.2. Intermediaries promote new innovation processes**

The implementation of Open and Cross Innovation processes usually requires careful planning. Working together across company boundaries is relatively new and therefore a demanding organizational challenge (di Fiore/Vetter, Zusammenarbeit). Intermediaries can play a key role in bringing together different sectors, companies or disciplines. Identifying innovation potential, matching the right individuals, organisations or firms and steering the whole process from beginning to end is a crucial task for intermediaries to perform.

Cross Innovation Hub (Hamburg Kreativ Gesellschaft) and Science Scout (Hamburg Innovation) share the vision of bringing together knowledge and expertise from different industries through interdisciplinary interaction and new forms of collaboration to enable and catalyze cross and open innovation. While Cross Innovation Hub focuses on promoting the CCI's innovation capacities, Science Scout is highlighting the importance of the humanities for innovation. For the first time, Cross Innovation Hub and Science Scout will cooperate for a program - Cross Innovation Lab -, in which scientists will be involved alongside creative professionals and companies, working together on the challenges of climate change and sustainable businesses.

### **Cross Innovation Hub (Hamburg Kreativ Gesellschaft)**

Despite the CCIs reputation as a highly innovative economic sector in literature, the CCIs are not sufficiently recognized as innovation catalysts in society and the business world.



Creatives' innovation potential and their importance for businesses has not been made visible in the past. Because we as public supporters of the CCI were interested in sparking a change in perception and further exploring the CCI's innovation capacities, we applied for European funding for a project meant to build bridges between the CCI and other economic sectors. Since 2016, the Cross Innovation Hub, as part of Hamburg Kreativ Gesellschaft, pioneers in the field of cross-sector collaboration with the CCI and builds bridges between the CCI and other economic sectors. As a public intermediary, it is our role to connect companies and individuals from seemingly unrelated sectors in order to identify and leverage innovation opportunities. The cooperation in open and cross-innovation processes requires us as "bridge builders" between the creative experts and the companies (languages, terms and definitions, methods and process competencies differ).

The diverse programs, ranging from one-day workshops to think tanks and long-term collaborations, are aimed at inspiring a change of perspective, innovative business practices, new processes, products or business models between different stakeholders, such as corporates, scientists and creatives. Learning from the visionary creatives in the CCI, highlighting their innovation capability and making collaboration processes effective is our key mission.

The Cross Innovation Hub is funded by European Fund for Regional Development (ERDF).

### **Science Scout (Hamburg Innovation)**

As a platform for science and the humanities, Science Scout provides open access to the expertise of Hamburg based researchers, varying from creative perspectives to groundbreaking research approaches or to innovative solutions for current issues. As a project of Hamburg Innovation and funded by the Hanseatic City of Hamburg (Behörde für Wissenschaft, Forschung, Gleichstellung und Bezirke), Science Scout aims to display the diverse expertise of Hamburg's extensive university landscape and cooperating research institutions.

How Science Scout's online platform works: The keyword search on the website enables users to find and contact an expert in any field, from architecture to biotechnology and multimedia composition. Accessibility to science or humanities is facilitated and at the same time complex scientific projects are presented in an understandable way. The approach of the Innovation Scouts is crucial to this goal: in collaboration with the Universities' transfer departments they select innovative researchers on the basis of a scouting process, conduct interviews and make their expertise accessible online via a public profile. Furthermore, the Scouts support the researchers with their projects, either in an advisory capacity or by establishing contacts or cooperations.

### **2.3. How we stimulate innovation**

In order to illustrate our processes and outcomes, we will present two cases that reflect some of the work we have been doing. It is important to mention, however, that these cases do not represent the full spectrum of our work.

After a short introduction into our work processes in general, we present one case each using the tried and tested terms of effect logic:

- input
- output
- outcome
- impact

This is how we use the terms:

*Input & Activities:* what we invest (resources) and what we do to stimulate innovation (activities)

*Output:* concrete results from the input, our activities, our performance

*Outcome:* immediate benefit for the target group that follows from these activities (effect)

*Impact:* refers to effects with an outreach beyond the activity in the narrower sense, which exceed the immediate effects and are reflected in social consequences.

### **Cross Innovation Hub**

All of the programs of Cross Innovation Hub set a focus on cross-sectoral challenges and interdisciplinary practice in Open and Cross Innovation processes. We create different programs for different needs and stakeholders and initiate everything from topic setting, to process development, and matchmaking between firms and creatives. We facilitate processes through a range of methods and theories that enable participants to develop a collaborative mindset and engage in a constructive change of perspective.

We seek to stimulate the development of new solutions for new kinds of challenges and therefore concentrate on the phase of generating and processing ideas in the innovation process. This previously largely neglected phase has become increasingly important in the innovation process. The “fuzzy front end” (Koen, 2001) - as this first phase of the innovation process is also called - is ideally suitable for open and cross innovation processes. The fuzzy front end largely determines the outcome of the process, but it is a phase that is traditionally difficult to structure and evaluate. Particularly suitable innovation drivers in this process are creatives, because they bring along competence in developing ideas and methodological competence in this fruitful but also uncertain phase. The opening of the innovation process has the consequence that on the one side ideation and development and evaluation of ideas and on the other side product development are no longer one and the same process, but can be viewed as separate processes. We concentrate on the ideation phase with a view to the process and product development phase. We are pushing the development of concrete prototypes.

We design our early-stage collaboration process as follows:

The iterative processes are designed to alternate between divergent and convergent modes of thinking, similar to the Double Diamond structure proposed by the British Design Council: An increase in complexity through multiperspectivity and distant suggestions is followed by a reduction in complexity, which leads to the development of concrete solutions.

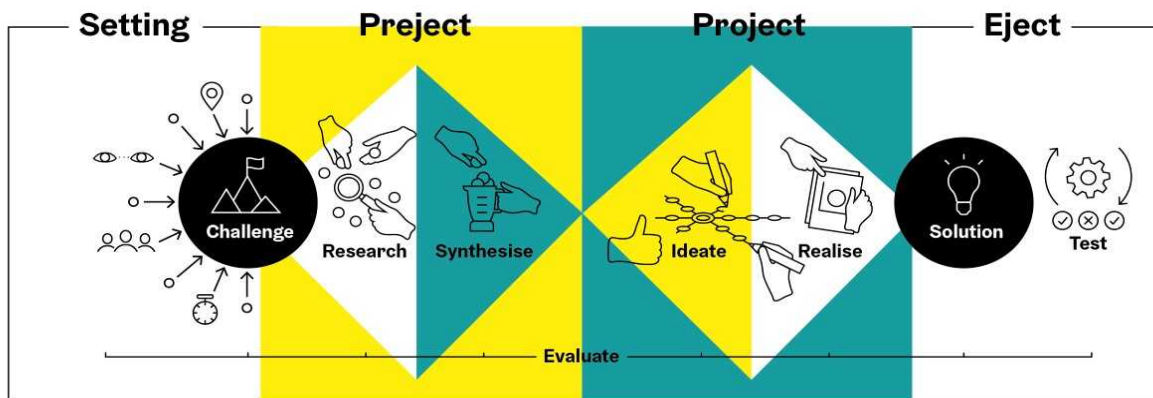


Figure 1: Visualization Cross innovation process (Cross Innovation Hub)

Most of our programs follow this iterative structure between divergent and convergent thinking. From an organisational standpoint, our programs can be divided into three phases: a PREJECT phase, a phase in which we specifically prepare the project, a PROJECT phase and an EJECT phase. During the PREJECT phase, we as intermediaries facilitate a matchmaking process between creatives and other economic sectors. Depending on the length of the program, the complexity of this process varies between simple registration and extensive application and selection procedures, in which juries are consulted. When choosing creatives for the collaboration with other companies, we are always looking for obvious qualities and skills (such as design if it is a design challenge) and non-obvious skills (such as theater for the same challenge), because we believe that the non-obvious skills make the collaboration especially rich in experience and add unusual perspectives to the problem. We are always looking for creative experts who are visionary, experimental and motivated. This matching process is essential for the further process and it sometimes takes place using the interest-based open-space-method for the self-organisation of teams. The project phase describes the actual program including workshops and other events, in which participants develop solutions together during an iterative, divergent and convergent process. During the project phase, we as intermediaries are acting as facilitators, moderators and/or organizers, depending on the project. At the end of the project phase, we start evaluating the outcomes and the process itself. For us as a learning project, this EJECT phase is equally important. Currently, we are working with surveys and interviews to evaluate the satisfaction with the program, the insights participants gained, and how innovative the outcome was. In general, key to our processes is the openness to results: participants start with a challenge but without a concrete solution in mind. This open mindset is essential for the process, as opportunities emerge through the absence of a pre-defined solution. For example, next to the original goal of developing a (non-defined) prototype, new business models or collaborations could emerge as a side-effect of the openness to results. This means, in turn, that our participants have to trust the process without working towards a pre-defined result.

One selected case will demonstrate further how processes are designed and what outcomes are created during and after the programs.

## **One example of Cross Innovation with the creative industries**

Garz and Fricke has participated as a partner company in the Cross Innovation Lab 2019 and will be used in order to demonstrate how a typical Cross Innovation process and thus the presentation of non-technical innovation works.

### **Challenge**

The embedded-systems-manufacturer Garz und Fricke has taken on the challenge of how to establish a new culture of collaboration across the divisions in order to stay agile and competitive in the midst of organisational transformation. The goal was to develop a prototype that spans the skills of all three business units, which was a novelty for the company in this form.

### **Input & activities**

During the Cross Innovation Lab, companies work together with creatives in an open-innovation set-up over eight days during a period of six weeks to create solutions to their challenges in a stimulating environment. Four creatives from the disciplines design (UX design, interior design), fine arts and performing arts were systematically involved as experts in the process and are essential sparring partners to the companies. This format consequently has both open- as well as cross-innovation aspects. Broadly, the process can be divided into four phases: the initial Kick-Off, where creatives and companies build teams, Field Research, in which the corporate challenges are penetrated in new depth, Define, in which the scope of the challenge is defined, and finally the Lab Phases, in which the cross-sectoral teams develop new solutions. The process is iterative and benefits from multiple feedback loops across teams. We act as facilitator and moderator during workshops together with an external moderator. Our key role is to establish a mutual learning mindset between partners and a collaboration on eye-level. We see the sparring between creatives and corporates as the central innovation activity, as the new type of collaboration and the external input spark new ideas. During the workshops and throughout the lab phases, we provided methodological input and took care of the organizational framing conditions.

### **Output**

Garz & Fricke participated in the workshops and was satisfied with the results. A prototype for a new product was created (the so-called 'Donatifier') which managed to include the skills of all three business units. The 'Donatifier' is a prototype for a cashless donation box that can be used at various locations for fundraising activities of all kinds. The small cube provides transparent information about the purpose of the donation, can be individually programmed and offers contactless card payment. At the 'Embedded World 2020' trade fair, the Donatifier was successfully tested in cooperation with the Hamburg-based NGO Viva con Aqua. The prototype itself functions as a symbol of the newly established internal collaboration process. It activates the entire company knowledge and motivates employees to work across departments.

### **Outcome**

Garz & Fricke builds small computers and mobile payment systems behind many everyday objects. In only four workshop days, the prototype of a new product (the 'Donatifier') was created, which activates the entire company's knowledge and requires employees to work

across business units. The small cube provides transparent information about the purpose of a donation, can be programmed individually and offers contactless card payment. At the Embedded World 2020 trade show, the Donatifier was successfully tested in cooperation with the Hamburg NGO Viva con Aqua.

Garz & Fricke worked together across divisions towards a tangible goal and explored new business opportunities. Furthermore, the team around the B2B company worked towards increased user-centricity, which opened up new opportunities. Company partners profited from knowledge, perspective and experience exchange with the creatives and could get to know new methods and ways of working. The creatives acted as valuable sparring partners, able to challenge assumptions and corporate belief systems that had hindered internal collaboration before. The donatifier is a pilot project that demonstrates what is possible when internal processes change, business units collaborate and creative experts are activated.

For Garz & Fricke, the cross innovation lab proved to be a successful experiment. The knowledge gained from the collaboration with external partners as well as the experience how successful internal collaboration can offer fast, promising results and new business opportunities has prompted Garz & Fricke to start a company-wide process.

For creatives, cross innovation processes are paid opportunities to apply their skills in a completely different environment and thus broaden their horizons and experience. Moreover, cross innovation processes can open up new markets and business fields.

### **Impact**

Case Garz & Fricke is a good example of complex innovations that cannot be captured in the conventional pattern of technical - non-technical: While the built prototype is technical, its innovation lies not in the use or invention of new technologies, but rather in the recombination of knowledge and in the creation of new internal processes. Within the given project it is only possible to assess potential impacts; the actual impact within the company will only become apparent after some time. Garz & Fricke could test interdivisional, collaborative processes together with creative experts, thus supporting the internal transformation. This first product gives impetus for further cross innovation activities in the company and it enables new ways in marketing.

### **Science Scout: Innovation scouting in the humanities**

In the following, the process of scouting for the humanities is explained in order to understand how non-technical innovations can be captured (see process visualisation). In a first step, the scouts, in close cooperation with the universities' transfer departments, select the researchers with the highest possible innovation potentials. This involves analysing the extent to which the research projects organise an innovation process, give meaning to a new development, or provide a framework for transferring the innovation to society or introducing it to the market (SBFI, 2020). In a second step, promising research projects are identified in an interview process. For this purpose, publications, exhibitions, concepts, research projects, teaching formats etc. are considered. The researchers indicate the areas in which they would like to cooperate and the expertise with which they can support other researchers, companies, politics or the public sector. With the knowledge resulting from

interviews and additional research, the innovation potential for transfer is extracted and edited by the Scout in cooperation with the editorial team of Science Scout. As a result, a profile is created for the researcher, which follows a predefined structure in order to organise the innovation potential and make it easier for users to find potential. In addition to a portrait text, the profile includes a vision of the future, cooperation partners, key topics, publications, cooperation interests and research projects. Thus, on the one hand, the diffusion of innovation potentials takes place online via the Science Scout platform and, on the other hand, the Innovation Scouts actively refer the experts to research projects, start-up projects, conferences, funding opportunities or company cooperations - depending on the researchers' interests.

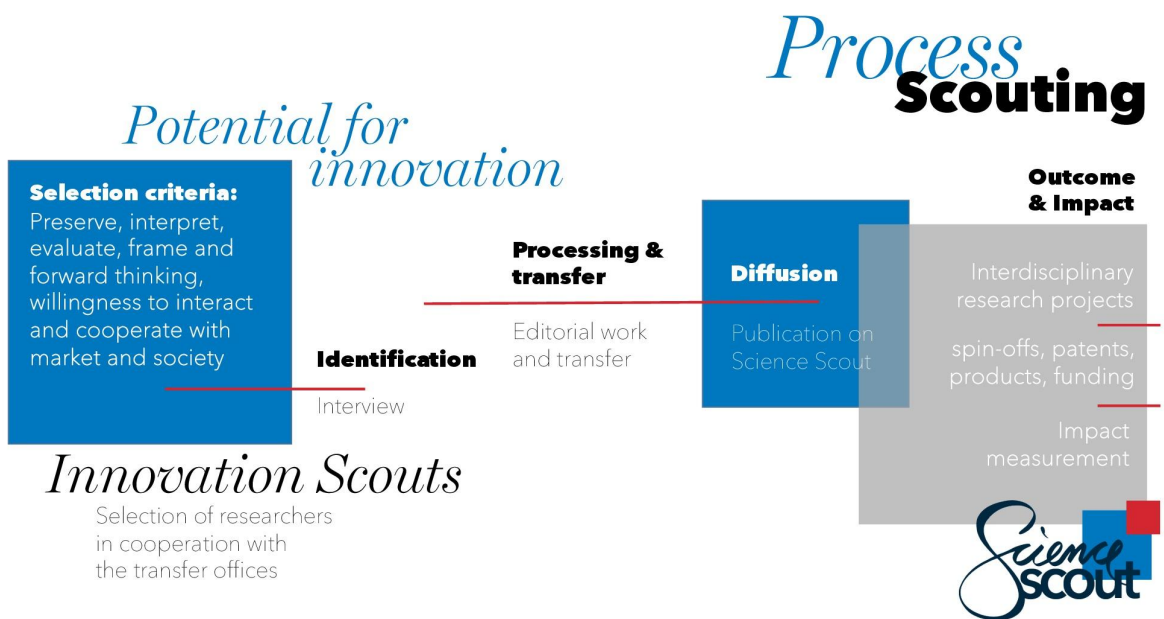


Figure 2: Visualization Scouting Process Humanities (Science Scout)

### One example of innovation scouting

The example of Professor Dr. Hajdu will be used in order to demonstrate how this process and thus the presentation of non-technical innovation works.

#### Input & activities (Selection, Interview preparation)

The input's architecture in the scouting process can be described as a triangle: researchers, the transfer departments and the scouts form a space of information. In this space, the scout navigates in order to create a first representative selection of the respective faculties' or departments' academic expertise that will be presented on the Science Scout platform. The scouts' input lies within the selection process that includes two main approaches: Firstly, what are the faculties' main and or recent research focuses? Secondly, what current topics are brought into focus (?) by the humanities that do not necessarily belong to the main research focuses of the department / faculty. In addition to the selection, the scouts' input results in the preparation of the interview. The collaboration (input) with the transfer

departments is crucial at this point as they offer a deep insight regarding current projects, interests and boundaries of the academic staff. The scouting process of Science Scout looks at the researcher's input in a holistic way: this includes a deep look at the background of the researcher, possible twists and turns in the academic pathway as well as the current main interests and projects in the academic work.

Georg Hajdu, Professor of Multimedia Composition at the Hamburg University of Music and Drama (HfMT), offers an interdisciplinary background with a wide scope of academic achievement ranging from a diploma in Biology to a PhD in Multimedia Composition. Within his professional career as a composer, he also designed and developed various music software applications, his networked multimedia performance environment, among them Quintet.net. Currently he teaches in the field of multimedia composition, a track designed by him at the HfMT. The transfer department pointed out that Prof. Hajdu was the leading part in the University's successful application of the award "Innovative Hochschule" in 2017 granted by the Federal Ministry of Education and Research. The HfMT was at that point the first arts university at federal level to have received this funding in Germany. Four sub-projects are being realised at the ZM4, the center of microtonal music and multimedia, including the construction of an instrument within the clarinet family based on the Bohlen-Pierce scale - the commercialisation of the instrument is currently in progress and a notation environment offering novel ways to represent music and to interact with it. In addition, Hajdu is part of a collaborative project aiming at improving the acoustic environment in hospital waiting rooms: The basis for this is the DJster software developed by Hajdu, which enables the generation of sounds in real time.

#### **Output (Interview, Extraction of Key words that sum up innovation potential)**

The interview offers a deeper look at the information that was collected during the selection process and the preparation of the interview. The extraction of the key words that sum up the different innovation potentials of an academic expert is the determining goal within this output process. In case of Prof. Hajdu the following keywords emerged during the interview: interdisciplinary, bridging based on the Bohlen-Pierce Scale, a musical scale with surprising mathematical properties, with focus on biology, chemistry and astrophysics as well as the intersection of music and technology. In his current research project, he is planning to build connections between astrophysics, biology, chemistry, music and technology based on the Bohlen-Pierce Scale.

#### **Outcome (Editorial Process & Publication)**

The transformation and publication of the collected information prior to- as well as during the interview into the expert profile on Science Scout defines the stage of outcome. The keywords that emerged out of the interview serve as guidelines within the writing process and highlight the innovation potential for the users of the platform. The expert profiles on Science Scout are structured in order to offer easy access to the information about the researcher that include contact information, the portrait text, future prospects, current researching projects, cooperations, fields of academic (cooperation) interests, CV, excerpt of publication and intellectual property. Before the expert profile in this structure is published another round of input is given within the approval process including the expert and the transfer departments. In conclusion, the transfer from expert knowledge and information about the researcher into accessible knowledge for the user becomes part of the translation during the editorial and publication processes.

In case of Prof. Hajdu the crystallized key words were highlighted via the subtitles that structure this text rubric and were amplified by further information e.g. Prof. Dr. Hajdu's humanistic perspective regarding the intersection of music and machine. In the rubric of future prospects, the keyword of bridging based on the Bohlen-Pierce Scale is specified in order to facilitate potential cooperations. This approach of Science Scout extracts and highlights the innovation potential in order to enable ensuing research projects, spin-offs or partnerships and corporations.

In this case the existing network of Science Scout enabled a research cooperation between Prof. Dr. Hajdu and his staff and the department of astrophysics of the University of Hamburg. The development of a narrative of data from astrophysics in conjunction with sounds of the Bohlen-Pierce-Scale describes one of the goals of this future interdisciplinary research project. As the Scale serves as a metaphor for extraterrestrial life-forms, research results of astrobiology that focus on the possibility of extraterrestrial life-forms are planned to be "orchestrated" in a multimedia performance.

### **Impact**

As a possible result of this interdisciplinary approach to the topic of extraterrestrial life-forms, the accessibility to knowledge within this topic might be widened as it is no longer part of one discipline but is tangible via interdisciplinary approaches. The shift from a research object that requires deep knowledge in astrobiology in order to have access to current research results or data, into a multimedia performance thus enables a democratization of knowledge. Conversely, the new context of multimedia composition offers a reciprocal perspective to the discipline of astrophysics regarding current research into extraterrestrial life-forms by emphasizing the societal and cultural impact of this very research.

What becomes apparent in both examples is that Hamburg Kreativ Gesellschaft as well as Hamburg Innovation connect different actors and companies, which might not have come together otherwise. In order to build bridges between different disciplines, be it between creative professionals and companies or researchers and companies, we take unconventional paths. It is our key activity to identify innovation potential, match potential partners, and guide a collaborative process. Our outcomes are not reduced to a single product or concept, but rather, are built on interactions, knowledge transfer and collaboration. We share the challenge of measuring non-technical innovations.

## **3. Measurement approaches to innovation**

This chapter presents current approaches to measuring non-technical innovation, while at the same time highlighting the limitations of existing approaches and the importance of knowledge transfer for open and cross innovation processes.

"Traditional innovation measurements have produced traditional innovation policy", NESTA wrote in 2008, and explained: "Modern understandings of innovation have their genesis in science policy and the manufacturing economy" (NESTA, 2008, p. 1). "New innovation is driving the production of new metrics But if this new innovation policy is to be embedded in economic policymaking, it needs new metrics to measure performance. This is now a global



priority.” (p. 2). For Germany, the ZEW – Leibniz-Zentrum für Europäische Wirtschaftsforschung (Center for European Economic Research) works on measuring innovation performance. It has been surveying the innovation activities of the German economy annually since 1993. For a long time, indicators of strong innovation performance for ZEW were the companies' spending on research and development and the number of patents that corresponded to the traditional innovation indicators. However, traditional innovation indicators do not necessarily capture innovation in every economic sector. For example, the music industry's share on R&D expenditure does not correlate with its innovation performance. In contrast, in the CCIs, intellectual property management is a key element of innovation performance.

The innovation activities of creative industries as well as their capacity to influence innovation of other sectors has barely found attention in research (Handke, 2006; Müller, Rammer & Trüby, 2009). Lange ascertains about the cultural and creative industries: “The question of the productivity of the cultural and creative industry is currently challenging science and practice worldwide. [...] Classical economic parameters such as employment, gross added value and company figures for measuring the productivity of a sector are less and less helpful in the political debate to qualify the direct and indirect contributions of this industry conglomerate and its intersectoral references, as well as its contributions to innovation and its indirect effects on location, regional branding and urban atmosphere.” (Lange, 2017, p. 106).

The same applies to the humanities, although they promote innovation (Bakhshi et al., 2008), the classic parameters from technology transfer, such as patents, licenses and the number of spin-offs (Hayter et al., 2020), can hardly be applied here either. One possible alternative to make the innovation activities of humanities visible is the approach of reflecting the exchange of knowledge. The literature, however, is also dominated here by linear technology transfer between universities and industry; moreover, the essential informal exchange of knowledge has hardly been considered to date (Hayter et al., 2020). Finally, innovations from the humanities are also found outside industry, for example in society (SBFI, 2020; Terstriep & Wloka, 2020), for which very little literature exists either.

The OECD introduces eight different categories for innovation activities: “research and experimental development; engineering, design and other creative work; marketing and brand equity activities; intellectual property; employee training; software development and databases; acquisition or lease of tangible assets; and innovation management activities” (OECD, 2018, p.85). Moreover, OECD introduces the concept of business capabilities in order to assess the firm's capability to engage in innovation activities. Design capabilities, also design thinking skills, are deemed part of business capabilities. According to the Oslo Manual 2018, problem-solving skills, technical expertise, digital competence and other human resources skills positively influence the business capabilities of firms. In this context, other researchers have addressed organizational learning as an innovation activity. With regards to open-and cross-innovation processes, Oslo Manual distinguishes between cooperation, collaboration, and co-innovation. Whereas involved parties can gain knowledge through joint collaboration processes but do not necessarily produce an innovation, co-innovation implies the joint creation of an innovation (Chesbrough & Bogers, 2014; OECD, 2018).

The Oslo Manual describes surveys as a key tool for measurement and offers precise guidelines for companies to conduct such surveys. The Manual recommends combining quantitative and qualitative data. For open innovation processes the following measurements are recommended:

**Table 6.2. Measuring the contribution of inbound knowledge flows to innovation**

Were any of your firm's product innovations/business process innovations	
a)	Replicating products/business process already available from/to other firms or organisations, with no or very few additional changes by your firm
b)	Developed by your firm by adapting or modifying products/business processes available from/to other firms or organisations, including reverse engineering
c)	Developed by drawing substantially on ideas, concepts and knowledge sourced or acquired from other firms or organisations, directly or via intermediaries
d)	Developed as part of a collaborative agreement with other firms or organisations, with all parties contributing ideas or expertise
e)	Mainly developed by your firm on its own, from the idea to implementation

Figure 3: Table 6.2 Measuring the contribution of inbound knowledge flows to innovation (OECD, 2018, p.135)

These measurements mainly detect whether a business process innovation or product innovation originated from an inbound knowledge flow through the use of yes/no questions, it does not address, however, what the inbound knowledge flow generated as knowledge and as byproducts, what the organization learned from it, or how innovative the process was itself. It thus only focuses on the outcome, not the process, and fails to grasp the complexity of open and cross innovation processes. Knowledge transfer and spillover are two important outcomes of open-and cross-innovation-processes. Knowledge is regarded as a key strategic resource for firms. New methods to access external knowledge have been part of many firms' innovation activities, such as hackathons, awards or user feedback. The concept of spillover was introduced to capture the societal impact of the CCIs, thereby moving away from a strictly economic purpose of measurement / evaluation in cross-sectoral collaborations. "We understand a spillover(s) to be the process by which an activity in one area has a subsequent broader impact on places, society or the economy through the overflow of concepts, ideas, skills, knowledge and different types of capital. Spillovers can take place over varying time frames and can be intentional or unintentional, planned or unplanned, direct or indirect, negative as well as positive." (TFCC, 2015, p.15). This point of view is recognized in the literature, but is rarely taken into account in politics, administration and funding institutions in their measurement or indicator frameworks.

Moreover, measurement of knowledge transfer and spillover is often limited to quantitative measures (if it occurred) and does not offer solutions on how to gain a deeper understanding of these processes through qualitative measurement. The distinction between formal and informal knowledge transfer [and spillover] underlines this challenge: while formal knowledge transfer can result in measurable outcomes such as spin-offs, informal knowledge transfer e.g. via informal personal conversations, can hardly be measured (Hayter et al, 2020).

Another problem is the focus on measuring with numbers, which has existed for many decades. A departure from this guideline is a major change of great significance, because it must then be accepted that dealing with surveys and "soft" factors such as determination participant satisfaction has a higher factor of "subjectivity".

The more recent literature on innovation highlights the iterative character of innovation processes where non-technical activities play a crucial role. One concept for new types of measurement is the developmental evaluation, pioneered by Michael Quinn Patton. The largest difference between traditional measurement and developmental evaluation is that it moves away from a purely evidence-based, outcome-based approach. It argues for continuous observation and learning rather than pre-planned judgment. “Combining the rigour of evaluation with the flexibility and imagination required for development, this new form of evaluation brings critical thinking to bear on the creative process in initiatives involving high levels of uncertainty, innovation, emergence, and social complexity” (Gamble, 2008). It thus acknowledges the context dependency of non-technical innovations and is better suited to grasp the multi-dimensionality of non-technical innovations.

#### 4. Our approaches to measurement and our challenges

In the following, we will briefly illustrate our approaches to measurement and our challenges with these approaches.

We used two methods for our work: The survey and the quantitative and qualitative recording with the terminology of output, outcome and impact. For the micro-economic analysis to evaluate the operational level, it is advisable to analyze input-output connections (Lange, 2017, p. 99). We followed the structure of the “staircase for effects” evaluation model and worked with four different process levels: output, outcome and impact. The staircase of effects (“Wirkungstreppe”) was developed by phineo, a non-profit analysis and consulting company for impact-oriented social engagement (Phineo, 2013).

##### Cross Innovation Hub

The staircase of effects gives us the opportunity to analyse and differentiate between different stages of effects. We developed indicators for each stage from output to impact in order to understand when each stage is reached.

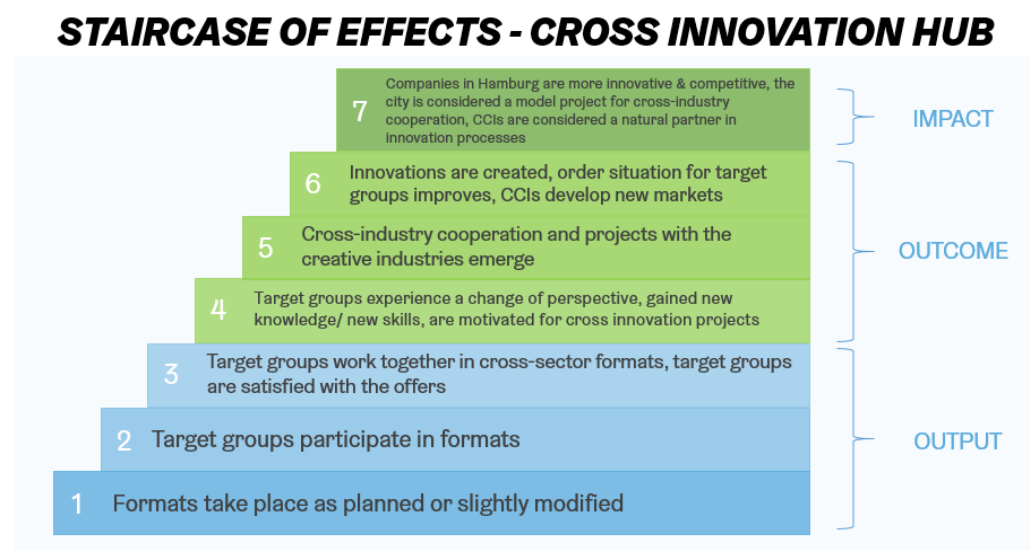


Figure 4: Staircase of Effects (PHINEO)

The staircase of effects runs bottom-up from output over outcome to impact. Whereas the categories 1-3 can be measured quantitatively, the categories 4-7 can best be measured qualitatively, as the data required is more tacit or complex (for example: change of perspective). "Impact" is the category that addresses societal developments which often occur in the long-term and are therefore difficult to measure for us as a temporary project. A project evaluation at the end of our term could potentially provide further insights with regards to the impact of our work on Hamburg's perception as an attractive location for cross innovation (stage 7).

We transfer input/output, outcome and impact to our cross innovation process in two ways: We review our own work of stimulation, matching, accompaniment and facilitation AND we document and evaluate the results that our participants develop. It is important to emphasize that our indicators are always both quantitative and qualitative.

- Process level: Which conditions of success do contribute to a successful Cross Innovation process and how do the participants rate their value within the project? (e.g. partnership at eye-level) What kind of experience did they have? Did they rate the process as conducive to the development of innovations? Would they recommend cross innovation processes to others?
- Results level: From the perspective of the participating companies, have innovations emerged? And if so, what kind? What value do companies attach to the resulting innovations? Were they satisfied with the results?

The ongoing documentation of our work and results create the basis for ongoing internal evaluation according to each format carried out. The documentation largely documents the output part of the staircase of effects (number of events, attendance figures, constellation of participants). The evaluation serves primarily the purpose to learn from our processes and the participants' experiences. We seek to find out how our different measures contributed to the outcomes, whether other influences affected the outcome, whether our programs are designed effectively, whether we reach our target groups and whether our target groups are satisfied with the results. We deliberately evaluate based on evidence and primarily use the survey method to gather data. For longer formats, we also conduct interviews to generate deeper insights. After each format, we carry out an evaluation procedure that is directed towards both process and results level.

In order to achieve comparability of survey results between different formats or years, the survey questions are usually identical. At the same time, however, we want to do the specific qualities of each format justice, which makes the design of generalizable surveys difficult. During the survey, participants are asked to categorize the result (idea, concept, business model, prototype, process, product, etc.) based on definitions we provide. Participants also determine the innovativeness of the result on a scale from zero (not innovative at all) to 100 (disruptive). In this way, the participants themselves assess whether, from their point of view, a result has been achieved that can turn from a novelty into an innovation in later phases. One of our main challenges can be described as the tension field between acting in the early stages of innovation processes and delivering innovative outcomes. Product innovations, for example, must be introduced to the market before being counted as an innovation. As

described, our work has its focus in the early phase of the innovation process and therefore ends with a prototype. Only later will it be seen whether and how the prototype can be developed into a viable product.

Like the conventional measurement, our assessment must initially follow an input-output logic in order to be able to prove quantifiable performance. However, it does not capture the essential effects of our processes, or only inadequately (see also Kompetenzzentrum, 2019). Our outcomes are often complex (as shown in 2.3) and are not limited to a single result. Our experience shows that the participants see a lot of value in results that cannot be quantified, such as cooperation skills or a new mindset for open collaboration. Valuable results such as successful knowledge transfer, learning, adaptation of important skills and continued collaboration - to name just a few - are often mentioned in our assessment framework, but go beyond the scope of the measurement categories. Those, however, might lead to process innovations in the future, such as the establishment of new workflows.

Further, the aim for compatibility urges us to use similar measurement frameworks for each format, which makes it difficult to account for a variety of different outcomes in our programs. As a public intermediary Cross Innovation Hub is fostering innovation at an early stage we can often only trigger processes but then usually are prevented from supporting the companies in the actual implementation. With these "soft" results, companies and intermediaries find it difficult to comply with the funding logic of funding programs and politics and administration must be convinced of the benefits of this type of work on innovation processes. The valuable results can be rated as "successful". The question naturally arises as to how these results of a highly complex working method can be related to the criteria of comparability and the possibility of reproducibility.

## **Science Scout**

The online platform Science Scout was published in August 2020. For reasons of consistency, Science Scout, like the Cross Innovation Hub, is guided in this paragraph by the staircase of effects model. Measurement as well as identification is particularly important, as Science Scout as an intermediary aims to discover innovation potential at an early stage in order to make potential visible and transfer it into application. This represents a challenge, especially in the humanities and social sciences, as the part that these disciplines play within innovation processes is likely to be underrated (SBFI, 2020).

At the output level it is quantitatively possible to record how many interviews or how many contacts with researchers have actually taken place. It is likewise possible to quantify contacts with companies, foundations or associations interested in cooperating with researchers. With regard to the innovation potential, the evaluation of the universities' transfer departments and the criteria for classifying the potential, as described in the scouting process above, are used at the output level. In this sense, an evaluation is carried out mainly based on expert judgements and our own scouting process criterias.

At the level of outcome, the researchers reflect on their own activities and research projects in the interviews by describing what aspects of their research projects are innovative from their perspective and explaining their vision of the future. In addition, an intensive dialogue with us begins, when we identify, structure and edit the innovation potential of the

researcher. Finally, the online publication of the researcher's profile diffuses their innovation potentials. Through this process, it is also left to the innovation seekers to decide who, from their perspective, could be relevant to their project and with whom contact should be initiated.

Science Scout is an intermediary platform that aims to highlight the innovation potential of researchers transparently, in order to initiate cooperation and knowledge transfer.

"Hence, knowledge cannot merely be transferred, but needs to undergo a process of translation so that others can realize its value. The vast array of intermediary organizations involved in knowledge exchange - beyond university technology transfer offices - serve not only as boundary spanners, they help translate new knowledge." (Hayter et al., 2020, p.6)

The main challenges for the measurement of innovation potentials occur at the output level, due to the lack of standardisation of research projects and the associated difficulty of comparing the projects. This makes it difficult and complex to rank the potentials, especially if criteria are used which also include social or ecological components. Closely related to this is the need to promote the compilation of a set of indicators for non-technical innovations in the future in order to be able to identify and promote non-technical innovations based on evidence.

Looking at the impact of Science Scout on a societal level and in terms of democratising knowledge, it is possible to record how knowledge is made accessible to the public and how often it is accessed, e.g. by tracking the number of users. But how and where knowledge is used is difficult to track, especially if you try to trace the interplay between a variety of pathways (Hayter et al., 2020). At the same time, non-technical innovations have an impact, which they generate on their own, often independent of the transfer of knowledge. However, measuring this impact is a challenge due to the heterogeneity of innovations in the field of humanities. The impact of an artistic performance, the Design Thinking method or a legal book can hardly be compared, so the measurement methods need to be as individual and flexible.

## **5. Suggestions of two intermediaries**

The explanations have shown that the expansion of the innovation system through the innovative achievements of CCI and humanities is an important step in overcoming the economic and societal challenges of our time. If these innovation achievements are to be better recorded, assessed differently in terms of their respective quality and promoted more, then the work on new or expanded measurement frameworks is indispensable.

Finally, based on our experiences and questions, we would like to present some suggestions that can move the debate forward - as we hope.

## 5.1. Terms and framework

### **Suggestion: “Differentiated terms help to work out the benefits of cross and open innovation”**

- Speak of complex innovation in a VUCA world

Although we conform with the definition of the term non-technical innovation, the term can at the same time be interpreted dismissively towards this kind of innovation through the use of negation. In search of a term that highlights the positive notion of non-technical innovation and captures the variety of outcomes that fall under non-technical innovation we would like to propose a new term that we aspire to work with in the future: “complex innovation”. The concept of complex innovation is better suited to describe our work as it relates to the variety and interplay of different parts that together constitute the innovation, ranging from technological parts to processes, knowledge transfer and learning. This kind of innovation is neither strictly technical nor strictly non-technical, it moves away from product centric innovation to participatory innovation processes and its purpose is not limited to economical aspects but also includes solving larger societal challenges. “Complex” therefore seems to be a more precise term for our context and the VUCA world.

- Assessing impact instead of measurement

The term "measurement" originates from technology and natural sciences and, as mentioned above, is predominantly based on quantitative data collection. For the sake of clarity, we therefore would like to restrict the use of the term "measurement" to classic assessments of quantifiable performance. In our projects, however, we consciously go beyond quantifiable services. When we determine input / output and result, we want to make statements about qualitative results and the social added value (effect) and evaluate them. The term “impact assessment” goes into much greater detail on the effects that open and cross-innovation processes can have. Criteria in relation to the core functions of the humanities, the criteria can be preservation, interpretation, evaluation, thinking ahead, orientation and design. They are suitable for evaluating the effects of non-technical innovations, but less in terms of quantifiable criteria and more in terms of a qualitative approach. These criteria should rather act as bridge builders in order to be able to communicate and evaluate non-technical forms of innovation. Indicators such as openness, way of thinking, mindset, co-creation, and open-ended processes that are guided by creative methods from the creative industry are relevant for cross-innovation processes.

### **Suggestion: “Name and promote distinctions in different types of innovation processes”**

- Differentiate types of innovation processes

Open and cross innovation processes run differently than traditionally carried out processes and follow a different value creation and impact logic.

To put it simply, the conventional innovation process (such as a technical improvement in the automotive industry) represents a linear development that goes from a starting point (order to improve) more and more in depth using expert knowledge and experience. This process is a process of *concentration*. The actors in this process are specialists. The open and cross innovation process, on the other hand, is a longer one, which begins with the first, as yet undefined ideas ("fuzzy front end" of innovation), needs a suitable setting for developing ideas and is characterized by the fact that it needs open actors with unexpected skills and remote experiences and a pronounced wandering competence in associating and bringing together ideas and people. This process is a process of divergence. Its actors are generalists.

This difference results in a different mindset and the need for different methods and tools.

This also makes further development of the indicator system necessary.

In addition, we stimulate the early phase of the innovation process in the Cross Innovation Hub. Consequently, we can evaluate this process phase, but not always of course a "finished" innovation (see the differentiation of the object of the evaluation as described above), as our work ends after the initial phase and leaves the participants with a preliminary result that requires continuation after our programs. A market entry, for example, would follow long after the companies have participated in our programs. In Germany, the Federal Ministry for Economic Affairs and Energy (BMWi) also names this special feature of early-stage funding: "In the early phase of the innovation, the incubation, there are hardly any starting points to specifically promote specific innovations due to the still existing indeterminacy of the idea and the process for establishing the idea and due to the high level of uncertainty regarding the further development of an idea. However, conditions can be created that increase the likelihood of generating ideas and their establishment. For this purpose, networks should be expanded for actors with different backgrounds. This can contribute to the development of ideas that form the basis of non-technical innovations. (BMWi, 2016, p. 8). On the basis of this knowledge one could think about an indicator system that consciously includes the probabilities of success.

- Make professional creativity more visible as an innovation driver

It has been shown that creativity, as an increasingly important driver of innovation, "functions" differently than research and development as a driver. The non-technical open and cross innovation process needs a different framework than the traditional innovation process. Other working methods require more trust, a willingness to take risks and a new modesty. It is to be discussed that the results in the evaluation cannot be quantified as linearly as from traditional innovation processes. It should be noted that numbers are also interpreted and have different meanings in their environment and context. In addition, we would like to emphasize once again the relevance of the *professional* creativity of creatives and humanities in a time when creativity has experienced an increase in value and is demanded by all people.

It would be desirable if this newer parameter of a professional "creativity" as a driver of innovation received more attention in science, politics and administration.



### **Suggestion: “Develop indicators for cross and open innovation processes and make them scalable”**

We see our project work as a learning process. First of all, it was relevant for the evaluation of activities of the Cross Innovation Hub to develop our own indicators for our new open and cross innovation processes in order to be able to record and evaluate the processes and results. For example, we identified twelve framing conditions for the implementation of successful cross innovation processes, which are spaces promoting the innovation process, constellation of participants, facilitation and eye-level-collaboration, among others. Our next step envisages the development of possible overarching indicators that could establish comparability with similar intermediary or company projects. From a set of indicators coordinated with other intermediaries and enriched by them, an indicator model could be developed that would ideally be scalable.

Research on social innovations faces similar challenges and already provides viable suggestions for such an indicator set. Terstriep and Wloka name the factors for successful innovation processes with the goal of social innovations that are very similar to ours: creativity, openness, willingness to take risks and the ability to introduce new ideas (Terstriep, 2020, p. 6). They propose a number of indicators, some of which may also be relevant to us, for example "type of innovation", "innovation cooperations", "digitalization" and "scaling". Also in the context of the humanities "The Metric Tide" suggests "responsible metrics", which should include criteria of robustness, humility, transparency, diversity and reflexivity, in order to consider also the impact on culture, public engagement, teaching and on policy (OECD, 2016).

### **Suggestion: Introduce a difference between “innovation” and “impact”**

Specific indicators for the successful stimulation of cross and open innovation processes should go beyond conventional indicators such as the number of participants. In our context, first indicators *for the early phase* of the open and cross innovation processes can be "number of actors involved from different companies", "assess the whole process for achieving innovations", "number of innovations that were created directly through collaboration in open and cross innovation processes" or "assessment of customer benefit".

As suggested above, the term "impact" can be used to designate effects that have not yet been captured sufficiently and that identify effects in more complex contexts and over longer periods of time. In addition, we would like to use the term to describe effects that have meaning beyond the linear innovation development. With this we want to go beyond the use of the term "impact" in the staircase of effects as we have described it above. The aim is to make relevant effects beyond the linear innovation development more visible and to bring them into the discourse:

- Diversity in the composition of the teams
- Quality of “synthesis” (Burnett, 2009) / recombination of existing knowledge from various actors
- Participation of actors from different areas of the *Quadruple Helix* from business, science, politics and civil society

- Knowledge transfer and accessibility to knowledge / democratization of knowledge in an information society
- Cultural transformation
- Personal professional development of the participants through participation in the process
  - Learning from one another across the boundaries of companies and industries
  - Mindset (particularly the development of curiosity, discomfort, unexpectedness, risk-taking, openness to results, among others) (Johansson, 2004) as particularly important factors in innovation
  - Skills / business capabilities (in reference to Oslo Manual) such as methods and forms of interdisciplinary cooperation
- early involvement of the customer and his needs (introduction of customer-/user-/human-centric approaches, importance of design)
- Consideration of sustainability and SDGs
- “Good Innovation” (NESTA, 2020) - Inclusion of social effects, among others

“Impact” has become more and more important in recent years, and it will grow in view of the complex challenges and the great relevance of the ability to innovate. Companies can no longer afford to disregard the impact of their work (and also their innovations) and it will become essential to apply a more holistic view to innovation processes as well as success measurement. It is also becoming more and more important for companies to educate their employees in new methods and skills for the increasingly important cross and open innovation processes.

### **Suggestion: Promote the bridge-building role of intermediaries**

In complex processes of generating innovation with various actors, intermediaries play an extremely important role as enablers, mediators, bridge builders, curators and, if necessary, sponsors and funding institutions.

Intermediaries make cross and open innovation processes possible through the following services, among others:

- Process development and execution
- Suitable innovation-friendly spaces
- Matchmaking
- Funding
- Documentation and evaluation
- Bridge to politics

As stated in the introduction, the shift from an industrial to an information society within an increasingly volatile, uncertain, complex, ambiguous world reveals the need to reconsider innovation in this complex context. The democratic right of an individual in an information society should include the access to information, knowledge and innovation. With regard to the academic sphere, the access to this triad may presume a level of expert knowledge. As Hayter et al. (2020, p.6) stated, the knowledge transfer requires a process of translation in which intermediaries play a crucial role. Intermediary projects like Science Scout not only

enable the stated knowledge transfer, they moreover function as a catalyst for (interdisciplinary) cooperations, spin-offs etc. and thereby support generating new forms of information, knowledge and innovation. Similarly, the cultural and creative industries are crucial agents in a new innovation ecosystem, as their expertise in new technologies, their professional creativity and invention spirit and their ability to synthesize knowledge from different fields are among the most urgently required skills in dealing with today's and future challenges in business and society.

Intermediaries are therefore increasingly creating spaces for innovation projects that complement linear innovation processes. The mediator role is very demanding, so mediators have to continuously develop in order to be future-oriented, networked and interdisciplinary - this enables mediators to initiate non-technical innovations.

The Cross Innovation Hub and Science Scout are working on new ways of creating innovation in Hamburg, bringing together creative professionals, companies and researchers under the umbrella of the program "Cross Innovation Lab 2021" - part of Cross Innovation Hub - to work on solutions for the "climate crisis".

In spite of their essential importance for the innovation landscape, intermediary projects often have to fear for their prolongation, a permanence of the same would enable long-term partnerships and probably increase innovation activities, as long as the intermediaries are willing to innovate themselves. Finally, this white paper is also a result of the connected way of thinking of intermediaries in Hamburg, who join together to achieve more impact and visibility for open and cross innovation. Even after the publication of the paper, we continue to proactively pursue the topic by establishing a think tank on the topic with relevant Hamburg actors.

## **6. Conclusions for politics, administration and research**

For the future, we demand a more open approach to funding with regards to which initiatives receive funding, which innovations (technical, non-technical) are recognised in funding, and what expectations public financiers and investors have towards success and measurement of innovation. We would like to see a new funding architecture for open-ended innovation processes and non-technical innovation. In Germany, the Federal Ministry for Economic Affairs and Energy (BMWi) has taken an important step towards this new funding architecture by acknowledging that networking offers, particularly for cross-sectoral exchange as well as projects that take on particularly complex challenges, should receive state funding (BMWi, 2016). In this study, the BMWi also makes it clear what an important role bridge builders play in stimulating cross and open innovation: "We recommend in principle to use measures in this phase that promote knowledge transfer (e.g. between start-ups and more established medium-sized companies) and / or "cross-sectoral" exchange (i.e. between different industries, e.g. the creative economy with the manufacturing industry, etc.) promote." (BMWi, 2016, p. 8).

We urge a public discourse about the impact of our doing and the above-described shift away from a one-fits-all-approach to measurement towards a more nuanced understanding of innovation processes with all its complexities. Given the societal changes we are

experiencing, we demand more visibility and recognition of non-technical innovations and the impact they can have on our economy, our society, and our environment.

We need more research on the role of the humanities and the creative industries in open innovation processes and more research on suitable measurement / impact-assessment approaches for intermediaries as well as for businesses. Above all, however, we need many pioneering projects for intermediaries who put the new ideas and solutions into practice.

In order to stimulate a discourse on the role of the humanities and the creative industries in the innovation processes, we have developed the following 6 hypotheses, based on the findings of this paper:

## **6.1 Theses**

### **1. We need an extended understanding of innovation:**

Innovation should be understood as a process interdependent with larger societal, environmental and economic structures, including non-technical innovation, an open-ended and co-creative process with many stakeholders rather than a linear process with a single outcome.

### **2. The cultural and creative industries and the humanities are drivers of innovation:**

The cultural and creative industries are innovation drivers for other sectors and can play an important role in cross innovation processes thanks to their high problem-solving skills and strong innovation orientation. The humanities expand knowledge and thus provide new ideas, which could be transformed into innovations, by creating and shaping social contexts within which knowledge can be exchanged between various actors.

### **3. Companies recognise the value of Open and Cross Innovation:**

Companies are increasingly using open innovation processes with cross-departmental or cross-company collaboration in order to breaking up silos through external input.

### **4. We need public intermediaries for Open and Cross Innovation processes:**

Public intermediaries promote new innovation processes. They function as necessary matchmakers across disciplines, facilitators, moderators and/or organizers for Open and Cross Innovation processes. .

### **5. We need new assessment frameworks for Open and Cross Innovation processes:**

New 'assessment' frameworks for Open and Cross Innovation processes and non-technological innovation are needed to leverage public funding. This means assessing

impact instead of measurement as well as thinking about an indicator system that consciously includes innovation potentials.

**6. We need a new term for 'non-technical innovation':**

In search of a term that highlights the positive notion of non-technical innovation and captures the variety of outcomes that fall under non-technical innovation we would like to propose a new term that we aspire to work with in the future: "complex innovation".

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