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SCIENCE AND INNOVATION MANAGEMENT REPORT 2020

Julian Johannes Grah
osb international consulting AG,
Universität St Gallen HSG

Jonas Friedrich
Research Center for Organizational Psychology
Universität St. Gallen

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TABLE OF CONTENT

The SARS-CoV2 pandemic has underlined how crucial scientific progress, advice and innovation are for helping us to find solutions to the greatest challenges of our times. In Berlin, we aim at strengthening higher education and research institutions to support science-based innovation in all sectors: in health, mobility, in digitalization and information technologies, in solutions for a smart city and its administration, or new energy concepts. Of course, strong academic institutions and excellent research rely not only on outstanding researchers but also on efficient and innovative supporting structures and the engagement, creativity, and dedication of managers in science and innovation.
Berlin supports the Falling Walls Foundation as a unique global forum for the discussion of breakthroughs in science and innovation. The Berlin Science Week, the Falling Walls Conference, and the Falling Walls Circle enable interdisciplinary dialogue between scientists, science communicators and science managers from all over the world.

Photo: Carolin Weißkopf

In 2020 and for the first time, the Falling Walls Foundation honored ten extraordinary initiatives in Science and Innovation Management as part of a global competition. I cordially congratulate all the successful entries and am of course particularly proud that two of these winning initiatives originated in Berlin:

- Breaking the wall to enable the next impact-driven generation of scientists: An Interdisciplinary early researchers program.
  Benedikt Salmen & Oliver Mai-Kolerus; Einstein Center for Neurosciences Berlin

- Breaking the wall to pooled lab capacity: An online tool to match researchers.
  Tobias Opialla; Max Delbrueck Center for Molecular Medicine

We are delighted to support the work of the Falling Walls Foundation. Its competition presents Berlin as a meeting place for extraordinary science and innovation management to the world, and it offers important opportunities to discuss international best-practice examples and to learn from each other. Berlin is not only a place of excellent research but also a place where visionary science and innovation managers meet to discuss the best ways in which the full potential of research is unleashed.

STEFFEN KRACH
Permanent Secretary for Higher Education and Research of the Federal State of Berlin

SCIENTIFIC ADVISORS

→ **JULIAN JOHANNES GRAH**
osb international Consulting AG (Consultant),
University of St Gallen (Ph.D Student)

Julian Grah has earned a B.A. from Witten/Herdecke University and a M.A. (HSG) in Management from University of St Gallen. He works as an organizational consultant with osb international consulting AG. In his work with corporates, start-ups, NGOs and public administration he focuses on projects in the fields of strategy, innovation-management and digital transformation. He pursues his core themes "strategy and innovation" in research projects, working together with corporates and SMEs around practices, entrepreneurship and managerial action for "organizing innovation initiatives". His Ph.D project aims at contributing to the strategic management literature from the perspective of entrepreneurship as strategic opportunity creation. He is based in Berlin and Düsseldorf, Germany.

→ **JONAS FRIEDRICH**
Research Institute for Organizational Psychology
Universität St. Gallen

Jonas Friedrich is a PhD Candidate and Research Associate at the Research Institute for Organizational Psychology at University of St. Gallen. He currently researches at the intersection of Sustainability and Democratic Organizing in Enterprises. He has a background in Economics and Philosophy through a Bachelor at the University of Witten/Herdecke, and in Sociology through his Masters at Oxford University. For two years, he worked as a personal assistant for Prof. Dr. Dr. Bruno S. Frey at the University of Basel supporting research in the field of Behavioral Economics, Political Economy and Democracy Theory. Beyond that, Jonas headed research on Sustainability Innovations in Smart Cities at the Chair of Innovation Management at University of St. Gallen for and with Prof. Dr. Oliver Gassmann.

EXECUTIVE SUMMARY

In 2020, the Falling Walls Breakthroughs of the Year 2020 competition in the category of Science and Innovation Management Competition has awarded 10 highly distinguished and sophisticated projects and initiatives, which impress with their creativity and ingenuity to create better environments for science and innovation to flourish. Among the finalists we can see a focus on institutionalised initiatives originating from academia and science which are frequently linked to government agencies and programs. Following an analysis of the winning projects, this report has identified and compared four key aspects to successful science and innovation management:

MEGATRENDS

By applying the Megatrend Map by the German futurology think tank Zukunftsinstitut (2018), the set of nominated projects are all connected through the mega trend line "Knowledge Culture", and partly touch upon trending topics like "Open Knowledge", "Collaborating", "Crowdsourcing" or "Open Innovation" and "Connectivity". Others, like the category winner Center for Hybrid Intelligence are connected to the mega trends "Health", "Individualisation", "Silver Society" and others. With its 28 finalists, ten winners and the "Breakthrough of the Year" category winner, the science and innovation management competition is thus clearly aligned with central mega trends of our time. In the future, the competition could be opened up to more corporate initiatives of innovation management fostering megatrends in fields like "New-Ecology", "Urbanisation", "Security", "Mobility" and other, which are sparsely represented this year.

INNOVATION UNDERSTANDING

By providing an overlook of nine perspectives on innovation, our analysis offers a multi-level overview on what is considered an innovation in management- and organisational science literature. Derived from this, nine types of innovation are introduced after which the nominated projects are analysed. All finalists can be clustered with (at least) two types of innovation. Among the Finalists, all nine types of innovation can be identified, while in the group of Winners, Organisational Innovation, Business Model Innovation, Management-, Design- and Product Innovation are predominant. Social-, Culture- and Technology Innovation are not represented among the Winners of the Science and Innovation Management Competition. This reports recommends increasing the diversity of types of innovation and paying close attention

to highly represented and dominant types such as Organisational Innovation (61% of Finalists, Business Model Innovation (40% of Winners) and Design Innovation (36% of Finalists). Furthermore, ensuring an even broader representation of types of innovation in future iterations of the competition would allow for an added societal perspective of innovation.

GENDER EQUALITY AND INNOVATION GEOGRAPHY

61% of the finalists come from Europe with a strong focus on German initiatives (12 out of 17) and 21% originating in North America with a strong focus on the US (5 out of 6). Future selection processes could take more into focus innovation hubs in urban agglomerations, global innovation networks and international corporate driven R&D. The gender difference is punctuated with 18% of the nominees being female and 82% male, while for the winner the gap could be closed to 30% female and 70% male. Although there are many efforts of Fallings Walls to ameliorate gender equality for example through the Female Science Talents Program, the focus should stay to reach equal representation.

APPLICATION PROCESS

The selection process of the Winners was conducted by a highly distinguished and world-dass jury of ten experts. The jury voted for every finalist along the following four evaluation criteria "Contribute to better Research, represents a new approach, Increase Quality & Performance, Application to other Areas". We see opportunities to **a)** further diversify the jury beyond academic institutions, **b)** apply the broader and more open concept of "value creation" and **c)** introduce further evaluation criteria which foster responsible, inclusive, social and ecological innovation.

POTENTIALS

Comprehending innovation and how it can be organised and managed, means to understand innovation as co-evolutionary ecosystems in which various agents are relevant players, owning different roles. States and governments, private corporations and academic and scientific organisations are three of the engaged players. Among the finalists, three projects (11%) originate from a non-public institution and many bridges between science and potentials fields of application.

Converging these findings with the analysis in the sections on megatrends and target groups, potential for an increased number of candidates originating from researched-focused corporates or the industry is identified to represent the spectrum of the innovation eco-system even closer.

A currently strong focus on science and science-related organisations and professions could be complemented with an additional attention to projects working closely on megatrends such as "mobility", "neo-ecology", "new work" and "gender shift", providing a focus for issues related to a societal perspective. Incorporating state-driven innovation projects more broadly might be one lead to pursue this end.

The performance of this first Falling Walls Breakthroughs of the Year competition in the category of Science and Innovation Management makes us highly optimistic that it can continue its strong record with marginal adaption and changes. One pathway this report finds potentially interesting to follow would entail to focus selection and communication of the competition more on corporate research and innovation management practices, and those people who are so essential to breakthroughs but often are little celebrated: Organisational managers.

SCIENCE AND INNOVATION MANAGEMENT AT A GLANCE

In 2020, the COVID-19 pandemic has challenged the status-quo of living in society, business, academics and science worldwide. Though not overcome yet, the crisis has stimulated the spirit of innovation and spurred to work on novel creative approaches of reinventing what has been considered successful and unquestionable.

The Falling Walls Foundation has used this disruption to inaugurate a global competition for best practices and novel approaches in Science and Innovation Management, one of ten categories celebrated at the World Science Summit in November 2020 as the Falling Walls Breakthroughs of the Year 2020. This report provides a brief introduction to the Science and Innovation Management competition in general and explores its underlying purpose. Subsequently, the ten winners of the competition will be briefly introduced.

Driving forces behind the winning initiatives, programs and projects will be extracted in order to allow further analysis and comparability. A central analytic dimension this report introduces, is a distinction of types of innovation which the awarded initiatives display. Therefore, each initiative is thoroughly scrutinised according to the following question:

What about the introduced innovation did the finalist consider as main reference point for added value to their organisation or operational context?

Innovation as a term has rejoiced high levels of attention over the 20th century and the first decades of the new millennium. This can be observed in the citations of the term in books, but also is present in our everyday lives in organisations, where many of us cope with the field, often-times in close association with the question: How and with what does my organisation move forward? One learning that many of us draw from operating in the field is, we do not have a clear-cut understanding of what is actually meant by the term. This might be related to the high number of publications related to the topic, might be an output of myth-building, as Berkun (2010) depicts, or looking from a perspective of social sciences, could also be considered an indication for a lively scientific debate with no concluding definition of innovation (Berkun, 2010; Damanpour, 1991).

PERSPECTIVES ON INNOVATION AND INNOVATION TYPES

The field of innovation research, which is found mostly in economics, managerial and organisational science, has created a plethora of different terms and understandings of innovation, of which a few are presented below. We allow ourselves to start rather abstract here, to subsequently derive concrete types of innovation activities, which we related to the Science and Innovation Management Competition.

Embedding innovation into the organisational context, we usually associate it with organisational activities such as moving forward, exploring opportunities and creating strategic leverage. For Rumelt, innovation can be the discovery and engineering of new ways to do things (Rumelt, 2012). This is mostly in line with Alverez and Barney (2013) or Garud and Karnoe (2010) who capture innovation from two fundamentally different

perspectives: One being focused on creating, the other more onto discovering. The latter view would consider innovative opportunities as already existent; they merely have to be unveiled by agents. Looking at opportunities from a perspective of creation, puts innovation into being a result of activities and practices of agents (Alvarez, Barney, & Anderson, 2013; Garud, Kumaraswamy, & Karnoe, 2010). What we learn from this little mind-game, is that innovation always has to do with two questions: "What is new?"and "how does something new come into the world?". Following that, we can understand opportunities for innovation as endogenously created by action, reaction and enactment of agents (entrepreneurs) who explore ways to bring something new into the world (Alvarez & Barney, 2007). This new thing could be a product, service, processes or technology (Gassmann, Frankenberger, & Csik, 2014).

However, something innovative does not necessarily have to be an invention: A before unseen recombination and transformation of existing elements or resources, can just as well be successful innovation (Garud & Karnoe, 2003). Zooming in, onto an entrepreneurial understanding of innovation, we find questioning the status qua and imagination of the world how it could be, as another major perspective of defining new (Dyer, Gregersen, & Christensen, 2008).

Of course, what many of us associate with innovation is making the impossible possible through new ways of resource-allocation or establishment (Christensen, Raynor, & McDonald, 2015; Mazzucato, 2011). Moreover, creating, discovering, recombining, questioning, are all central perspectives and practices defining innovation, which however becomes not important if the invention is not successfully commercialised, introduced or used (Gassmann et al., 2014).

In some areas (e.g. in the field of "haute couture"), creating something new, such as a product, is considered innovative, because it fulfills a need to an existing and recurring demand (inspiring clothing). How-ever, fulfilling this demand over and over again (each season), requires new ways to organising the process of innovating those objects. Here, the processes and practices of innovating are to be considered the innovation (Garud, Gehman, Kumaraswamy, & Tuertscher, 2016; Garud, Tuertscher, & Van de Ven, 2013; Grand, 2016). This hints at the market characteristic of innovation, which is another valuable perspective: Innovation can merely be considered as such, when value creation of some kind result out of innovating. This of course can be the invention of a much needed vaccine, but also a piece of high-class fashion or art is only innovative if it can be commercialised towards an audience or market (Gassmann & Sutter, 2013). Certainly, finding new ways to commercialise successfully, would again be an entrepreneurial creation and therefore one before mentioned element of innovation, which we here call business modelling (Gassmann, Frankenberger, & Choudury, 2020).

Through innovation we are able to seek for missing solutions to existing problems and often times, are in the pursuit of economic growth (Mazzucato, 2018). To promote growth through innovation, it is vital to understand innovation as an ecosystem consisting of a multitude of elements and agents. Among them, the state is one of the active agents, sometimes acting entrepreneurially but often times taking over a role of a risk-taker, while private corporations realise innovation schemes with high applicability (i.e. product innovation or process innovation) (Mazzucato, 2014)[1].

1 Examples of the state being a risk-taker can be dated back all the way to the construction of railway tracks in Europe in the 19th century, the investment into research and development leading to the invention of the internet or the expenses into military research for mobile telephone communication in the region that we today call "Silicon Valley" (Mazzucato, 2014).
When taking into account the role of public-private partnerships in this context, conflicting goals become obvious: private corporations will want the state to take most of the financial risk, while in case of entrepreneurial success private companies are intending to benefit. While states are macroeconomically usually interested in the common good, private corporations have promised profits to their shareholders which again creates a structural tension for successful partnership of public and private.

OUR IMPACT ON SCIENCE AND INNOVATION MANAGEMENT

MEGA-TRENDS AND TARGET AUDIENCES

The world in the 21st century changes in ever faster ways making adaptive innovations to complex issues a central theme for policy, economy and science. Thereby, it is helpful to consider broader, globally encompassing developments and needs which can be exemplified in mega trends.

The futurologist John Naisbitt (1982), who pioneered the concept of megatrends, established three criteria; (**a**) a mega trend has a half-life period of 25 to 30 years, (**b**) it encompasses all areas of life (ubiquity) and (**c**) it is of global character. The UN Report of the UN Economist Network for the UN 75th Anniversary on Shaping the Trends of our Time (2020) considers in its mega trends analysis five megatrends which shape our world:

a. **Climate Change and Environmental Degradation;** encompassing climate change, biodiversity loss, water and soil contamination

b. **Demographic Trends in an Aging World** including decreasing fertility and increasing life expectancy

c. **Urbanization** with an expected 70% living in urban environments in 2050

d. **Digitalization** with its links to globalization, ease of access and broad commercialization

e. **Inequalities** rising globally despite of general income gains and the reduction of extreme poverty

These five tends go in line with a series of other reports and publications for example by the OECD (2018), the think tank Zukunftsinstitut (2018) or the consulting firm EY (2020). Taking a quick look at these broad megatrends and linking them back to the 28 finalists and 10 winners including the Breakthrough of the Year, shows a selection of timely and future oriented projects especially reflecting the megatrend of digitalisation. For the upcoming years there seems to be potential to focus on the communication and selection the mega trends of climate change, demographic change and inequalities.

In order to involve a more finely grained perspective on megatrends and relate them to the nominees and winners of the Falling Walls Breakthroughs in Science and Innovation management, the Megatrend Map (see Figure 1) by the German futurology think tank Zukunftsinstitut (2018) is introduced.

The graphic, which is inspired by a metro map, displays 12 fundamental mega-trends; Knowledge Culture, Connectivity, Security, Individualisation, Gender Shift, New Work, Neo-Ecology, Silver Society, Health and Globalisation. The power of the map lies among others in the ability to display intersections, co-developments and junctions of the trends.

The set of nominated projects work on a variety of megatrends displayed on this map. Most of them are connected the mega trend line "Knowledge Culture" and as part of that aspects like "Open Knowledge", "Collaborating", "Crowdsourcing" or "Open Innovation" (see Figure 1). Furthermore, for example the winner LabHive with its establishment of an online platform to match scientists and labs, or the Siemens Innovation Ecosystem clearly answers the megatrend of "Connectivity". Others, like the category winner Center for Hybrid Intelligence are connected to the mega trends "Health", "Individualisation", "Silver Society" and others. Thereby, with its 28 finalists, ten winners and the just referred to "Breakthrough of the Year", the science and innovation management competition is clearly aligned with central mega trends of our time.

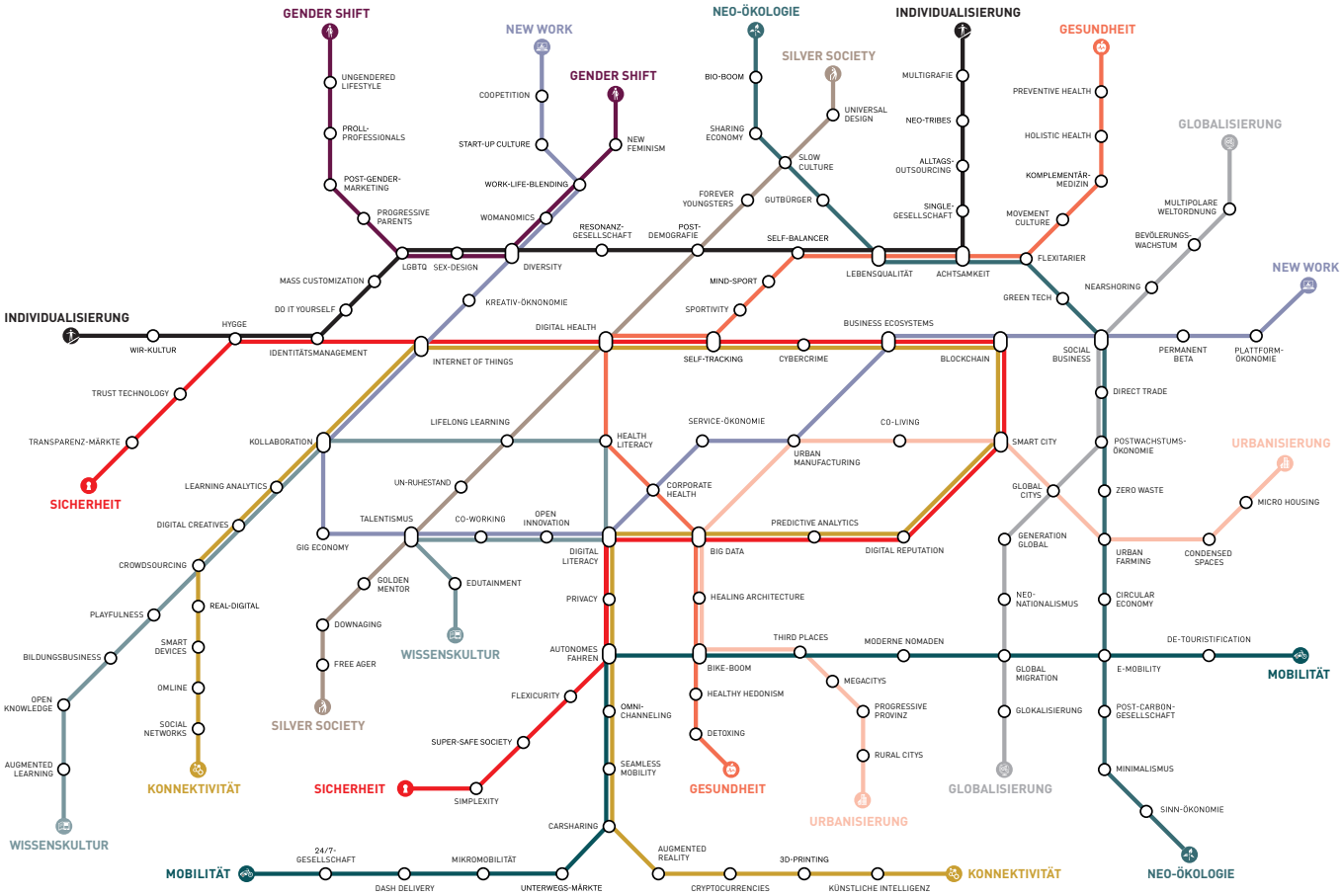


Figure 1 MEGAtrend MAP, zukunftsInstitut

Taking a more abstracted view on the finalists, the fields they work in and the audiences they are related to, display a strong focus on institutions in science. A look at Figure 2 shows, 18% of all projects address in their core scientists, 29% scientists and entrepreneurs and 18% scientists and students and 14% scientists, general public and entrepreneurs. Entrepreneurs as target groups of the initiatives make up 14% and only one project each can be found targeting local citizens and employees. This shows the selection for this category was very much science related, while it could be further discussed whether the category of "Science and Innovation Management" could additionally focus more on entrepreneurship and corporate innovation issues, which are this year only marginally presented. A strength of the selection of this year's competition in "Science and Innovation Management" can be seen in projects which clearly bridge target groups and sectors, especially seeking to work on bringing science and entrepreneurship, for which a series of projects like ATTRACT or the Creative Destruction Lab can be seen as examples. This neatly matches essential demands for science and innovation from a public policy perspective (OECD, 2018). Another strength in this year's group of finalists can be seen in the projects initiated or co-driven by governmental agencies such as European Innovation Council, SprinD – Bundesagentur für Sprunginnovation or Universities, Industries and Government Co-creation platform each connecting strongly to megatrends such as "Knowledge Culture", "Globalisation", "Open Innovation" and "Connectivity" and focusing on sciences and entrepreneurship.

However, as indicated before, the competition could be opened up to more corporate related initiatives of innovation management, which might be partly different in nature and potentially allow to more easily integrate megatrends in other fields like "New-Ecology", "Urbanisation", "Security", "Mobility" and other, which are sparsely represented this year.

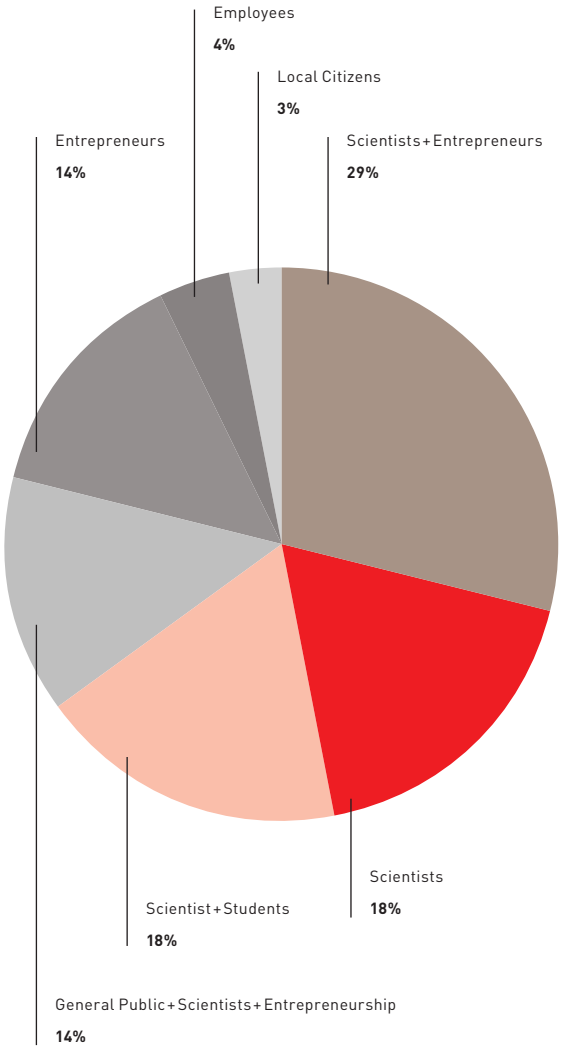


Figure 2 Target Audiences of the finalists' initiatives

TYPES OF INNOVATIONS AMONG THE WINNERS

All finalists of the Science and Innovation Management Competition can be clustered with at least one type of innovation. In fact, following the portrayed innovation understanding, we consider actions and practices of creation and discovery of new not as an isolated, but rather as embedded practices in specific contexts and environments, that combine multiple types of innovation in one episode of creation or discovery (Garud et al., 2010; Garud et al., 2013). To make them tangible, we have translated the perspective into what we call types of innovation, which are matched to innovation perspectives in Table 1.

Scrutinising firstly the Finalists shows that every type of innovation is represented in the competition, while a high focus lies at Organisational Innovation (61% of the finalists drive organisational innovation), Design Innovation (36% of the finalists drive Design Innovation), Management- and Business Model Innovation (each are represented in 25% of the projects). Considering potentials for the future, one could try to ensure more diversity through all nine innovation types. This could be achieved by firstly increasing the number of less represented objects such as Technology Innovation, Process Innovation or Culture Information. Secondly, being sensitive to the in 2020 highly represented types such as Organisational Innovation and Management Innovation in future selection processes.

Innovation perspectives	Types of Innovation	Example or Case
Creation of a new product or service	Product innovation	Tesla, Health App, Babbel (language course)
Creation of a new processes	Process innovation	Automation of a manual process / Car assembly
Creation of new technology	Technology innovation	Space flight
Creation of new business model	Business model innovation	Subscription access to music / Spotify
Creation of environments (structural, processual, institutional) for innovation	Organizational innovation	Innovation funnel / SAP Innovation Center Network
Creation of management and leadership practices for innovation	Management innovation	Innovation methods such as Design Thinking, Agile Way of Working, Scrum, Dedicated leadership towards a greater impact
Creation of new solution for existing or new problems	Design and purpose-driven innovation	Braille alphabet
Creation of new societal norms, practices and foci	Culture innovation	Fridays for future
Creating Policy Frameworks, creating movement towards societal change	Social and political innovation	Social security system

Table 1 Innovation perspectives and Types of Innovation

3.2 TYPES OF INNOVATIONS AMONG THE WINNERS

Taking the same look at the Winners, the main focus remains at Organisational Innovation (60% of the winners), followed by Business Model Innovation (40% of the Winners) and Design Innovation (30% of the Winners). Among the Winners, with missing Social Innovation, Culture Innovation and Technology Innovation, the distribution of winners is not anymore spread across all nine objects of innovation, but merely six. With the Breakthrough of the Year we have a Winner who is driving a clear purpose of his project, which we associate with Design Innovation, through an applied and hands-on approach of creating an innovative product (Product Innovation).

When taking into account the theoretically derived nine innovation types, it has some sense of logic, that not all can be represented in the pool of the finalists. However, since we often times associate innovation with something new, something materially palpable, we can be extra sensitive when it comes to innovative forms of socialising in groups and society as a whole. That Culture Innovation and Social Innovation are both not represented in the group of Winners (and below average in the group of Finalists) might be a hint, that the focus in this year's competition did little look at the societal perspective of innovation, but more from an organisational and stronger institutionalised point of view.

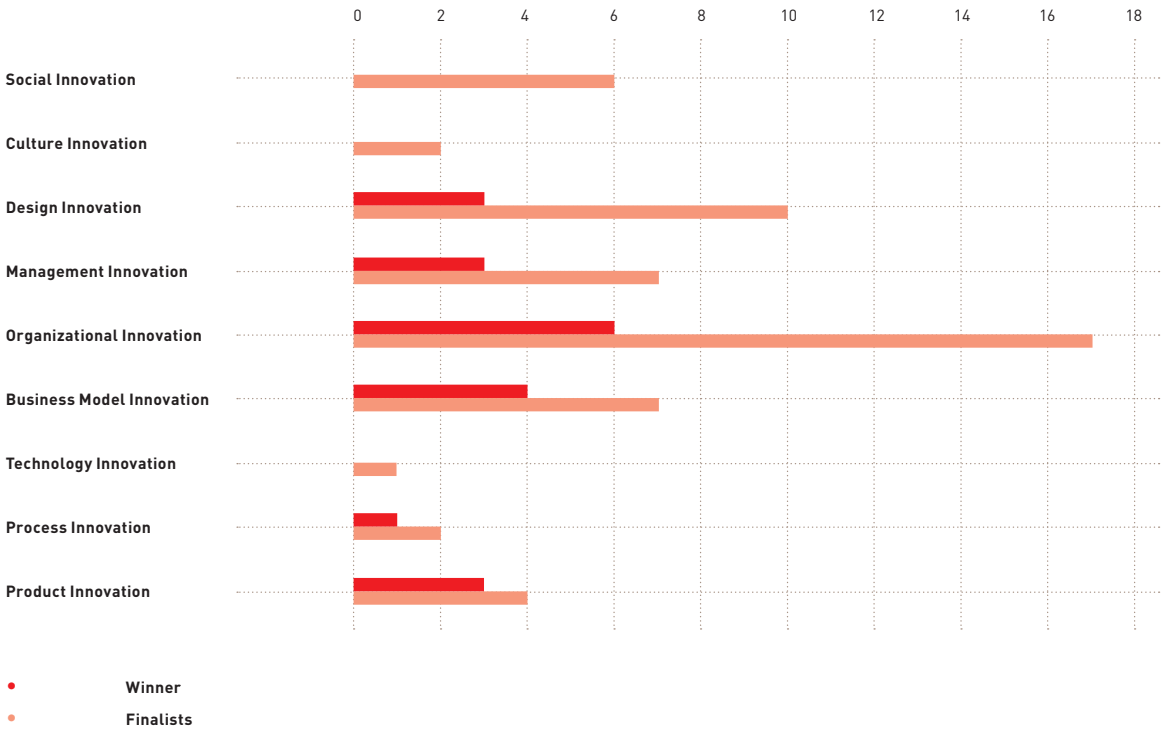


Figure 3 Distribution of Types of Innovation among Finalists and Winners

One central requisite for innovation management, coordination and funding is a sensitivity for representation a diverse set of genders as well the reduction of geographical, cultural and ethnic inbalances representation in order foster equality, diversity and anti-discrimination (OECD, 2018).

GEOGRAPHIC DIVERSITY

Geographic foci of innovative activity have undergone vast changes in the last decades. From the 1970s until 2000 the United States, Japan and Germany accounted for two thirds of the all patenting activity worldwide (WIPO, 2019) . Including the rest of the western countries, captures about 90% of the patent issuing (ibid.). From 2000 onwards, however, the picture changed dramatically with China, the Republic of Korea but also Australia, Canada, India and Israel increasing their share of innovation, patenting and research activity substantially. One third of all patenting activity now lies outside the West and published scientific data has risen from less than a quarter to around half in the last 20 years (Crescenzi, Iammarino, Ioramashvili, Rodriguez-Pose, & Storper, 2019).

Considering the geographic distribution of finalists displays, that 61% come from Europe with a strong focus on German initiatives (12 out of 17) and 21% originating in North America with a strong focus on the US (5 out of 6). With one project each, South America and the African Continent are represented. In general, the draw of finalists thereby roughly represents the geography of innovation dynamics in patenting and research output worldwide. For the next year, the competition could, however, work on mechanisms to include more initiatives form Asia and the Middle East and

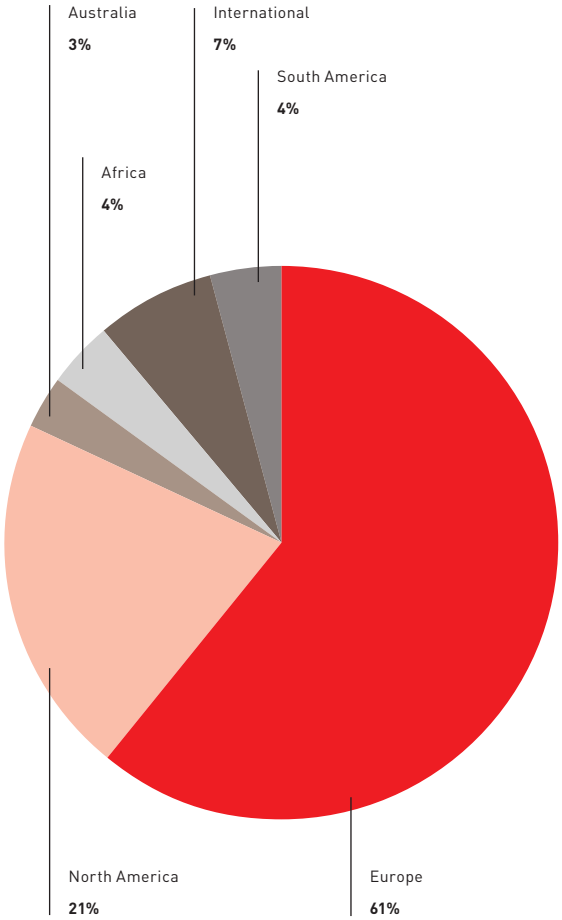


Figure 4 Geographical Distribution of Finalists and winners

other non-western countries. Furthermore, one substantial literature in social science assumes that the dominance of western sciences and innovation activities constitute a novel form of colonialism, which works through power and control of the issuance of knowledge and all related economic, political and social practices (see e.g.: Harvey, 2005; Lo, 2011). Since the Falling Walls Foundation's mission is "bringing together those who set out to tear down the next walls in science and society" a critical reflection on neo-colonial support could be continued to make next steps to consider this issue. For future communication and application processes of the Science and Innovation Management Breakthrough a further few interrelated developments could be taken more closely into account (WIPO, 2019);

A. Most innovations take place in a few urban agglomerations (Silicon Valley, greater NYC, Shenzhen), but metropolitan areas itself are not the single explanation for the hotspots. Furthermore, a paradox arises since the most innovative urban agglomerations are at the same time the most connected and open to the rest of the world.

B. This links to the rise and importance of global innovation networks. Innovation has been in international phenomenon for long, but only since a few years and partly thanks to digital technologies, it has become truly global. Teams already produced 64 percent of all scientific papers and 54 percent of all patents in the 2000s. But by 2010s around 80 percent of the publications showed international teams as authors.

C. Patent data shows that also for corporate driven R&D global innovation networks play an increasingly central role: Only 9 percent of US filed patents included foreign inventors in the 1970s and 1980s, while in by the 2010s, this share had risen to 38 percent. In Western Europe a similar picture is seen with companies displaying a sharp increase for foreign inventors from 9 percent to 27 percent.

GENDER EQUALITY

Gender equality is a central area of reformation in science and innovation while the COVID-19 crisis has even worsened the situation (Alon, Doepke, Olmstead-Rumsey, & Tertilt, 2020). The OECD reports that in the field of science innovation policy more than 100 initiatives have been taking place to enhance gender equality in science. For example, the funding scheme of the Australian Research Council concretely takes into account career interruption as parental leaves, or part time employment, offers a female fellowship program which creates a female ambassador position or taking adjustments for institutional block grants according to diversity criteria. Other international policy measures range from female professor schemes, equal opportunity programs at Universities, to "Mothers Heads of Households Scholarships", aimed at single, divorced, widowed or separated mothers who are pursuing professional studies in Mexico (OECD).

For the "Science and Innovation Management Breakthrough", we see the partly punctuated differences in gender representation´, with 18% of the nominees being female and 82% male (see Figure 4). For the selection of the winners the jury could increase the share of women to 30%. The Falling Walls Foundation has not only recognized this structural challenge, which does not stop for their conferences, but has proactively created the Female Science Talents Program, which creates a global platform for talented young women in science by initiating workshops, a conference and building a network. Nevertheless, for the category of Science and Innovation Management a variety of measures can be established to increase female representation. These may range from **a**) focusing advertising the award in female innovation management and science networks, **b**) creating a dedicated female award for this category **c**) or asking every initiative to at least list one female and one male representative for each project to increase visibility (where possible).

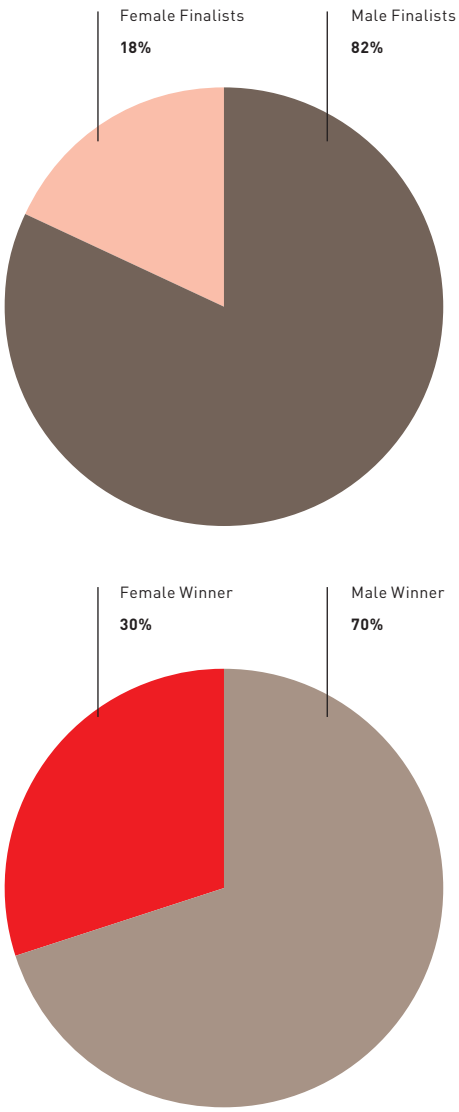


Figure 5 Gender Distribution Among the Finalists vs. Winners

10 EXTRAORDINARY WINNER INITIATIVES

The Science and Innovation Management Competition is one out of ten awards conferred by the Falling Walls Foundation as part of the "Falling Walls Breakthroughs of the Year". The COVID-19 pandemic restricted the traditionally physically held Falling Walls Conference and gave chance to overcoming this challenge by creating a newly designed virtual format pivoting in a global digital meeting on November 9th. Under these new and complex conditions of 2020, the organising committee of the conference has decided to add two new categories to the traditional areas in the sciences and the engagement with various groups of the scientific community. Along with Science and Innovation Management, the competition of Digital Education has been rewarded for the first time in 2020.

The Science and Innovation Management Competition is specifically meant for nominations related to the field of management science and innovation contexts: "We are looking for outstanding representatives and best-case examples of science and innovation management, both in the realms of academia and research-driven companies."

With the Science and Innovation Management Competition, the Falling Walls Foundation has been calling for applications matching the following three criteria related to the respected field of management:

- International best-case examples in science and corporate research, which embody outstanding new approaches to innovation management
- These relevant well-documented cases demonstrate a process that has led to successful results and increased performance – with the aim of improving or maintaining the ability to innovate
- These case studies highlight how successful innovation management can serve as a basis for breakthroughs in science and corporate research and represent good examples which can ideally be transmitted and adapted in other fields

Overall, 50 nominations have been submitted, of which 28 matched with the criteria mentioned in the call for application. Out of these 28 finalists, the jury selected 10 winners and one breakthrough of the year.

With the intention to depict the selection of the projects nominated for the competition, we are here briefly introducing the ten winners of the Science and Innovation Management Competition 2020. Additionally, to the text-based project pitches the Falling Walls Foundation's website (Foundation, 2021) offers for each winner, other layers of information are added to the description of the projects consulting recorded video-interviews with the nominees and the initiatives' websites. This step was conducted in order to add a concrete innovation management perspective to the descriptions. This perspective entails the value the project offers for the organisation it is attached to and to society in general . Therefore, we scrutinised each winner according to the following question: What about the introduced innovation did the finalist consider as main reference point for added value to their organisation or societal context? These value propositions are underscored in the following text.

1 BREAKING THE WALL OF HYBRID INTELLIGENCE

Online Laboratory;
Jacob Friis Sherson, Center for Hybrid Intelligence, Aarhus University

How can the world truly benefit from artificial intelligence without dividing between techno-enthusiasts (who are fascinated about the potential of Artificial Intelligence) and skeptics who fear the total replacement of humans through technology?

Jacob Sherson brings together researchers from all branches of natural science with social and cognitive scientists and hundreds of thousands of volunteers to create an online laboratory for human problem solving and collaboration.

Exploring both the efficiency of citizen scientists on complex challenges and novel ways of involving them in all aspects of the research cycle could give unique insights into distinctly human skills like creativity. The jury found Jacob's approach fascinating, as it pushes the boundaries of citizen science, and features a potential powerful project bridging quantum mechanics, artificial intelligence and citizen science.

2 BREAKING THE WALL TO DEMOCRATISING SCIENCE

Physical Lab to assess crucial Scientific Gear;
Kristin Persson, Director, Molecular Foundry

Especially complex innovative ideas in natural science face challenges in having access to partly very capitalintensive equipment and lab spaces.

The Molecular Foundry tackles this problem by provides visiting researchers ("users") with access to leading-edge scientific instruments. In an innovative twist on the traditional user facility model, users also gain access to world-renowned scientists who devote their expertise to the users' research goals in a uniquely multidisciplinary, collaborative environment. Selected through an external peer-review process, over 1000 academic, industrial and government users come from around the world each year, free of charge. The jury found this to be a great effort in democratizing access to science, accelerated greatly during the pandemic.

3 BREAKING THE WALL TO POOLED LAB CAPACITY

Online Tool to match Researchers;
Tobias Opialla; Max Delbrueck Center for Molecular Medicine

Knowledge, knowhow and well-equipped scientific laboratories are an essential challenge to innovation in natural science, especially biochemistry and medicine.

Born out of the "We Vs Virus" hackathon in March 2020 and further developed at "EU vs Virus", Tobias has co-created LabHive - an online-tool to match qualified researchers and labs offering their under-utilized resources. This means matching skilled scientists with the equipment, reagents, experience with lab techniques or data analysis, and needs of diagnostic laboratories. This innovative concept emerged as a response to the Covid-19 testing crisis, however, it has potential to change science management and collaboration in the future. The jury found this to be a refreshing, young, and energetic initiative trying to solve one of the many shortcomings of a society in lockdown: Ensure that research can be kept going.

4 BREAKING THE WALL OF MAXIMIZING IMPACT FROM BREAKTHROUGH DEVELOPMENT

Market Opportunity Navigator Tool;
Marc Gruber; Vice-President for Innovation, EPFL

The commercialization of novel ideas is a core challenge in innovation management.

Marc Gruber's conceptual work focuses on bringing new technology to the markets that need it. He significantly advanced the practice of innovation with the "Market Opportunity Navigator" which helps in the highly critical phase of identifying the best markets for new technology. This conceptual tool helps scientific or technological innovations to find the right sport for commercialization and application, bolstering transferability and knowledge transfers. Launched in 2017, the tool has become an international success and, in 2019, was added by Silicon Valley legend Steve Blank as the 4th tool to his renowned "Lean Startup" method.

5 BREAKING THE WALL TO SCALING UP BREAKTHROUGHS FOR EUROPEAN INNOVATION

Innovation Ecosystem Builder for Fundamental Research; Pablo Tello; ATTRACT Coordinator, CERN

Transferring fundamental research to the market may seem in many cases impossible.

With ATTRACT, Pablo Tello runs a successful EU-funded initiative to create breakthrough innovations at CERN in Europe especially creating a research-ecosystem for detection and imaging technologies. It is a new and novel co-innovation scheme engaging research infrastructures, industry, private investors and students in entrepreneurship, using the principles of Open Innovation and Cascade Funding. Currently, it is fostering 170 selected projects for the planned 2nd phase to further increase their Technology Readiness Levels. Thereby, ATTRACT excels at bringing a diverse set of stakeholders together and bridging diverging interests.

6 BREAKING THE WALL TO ENABLE THE NEXT IMPACT-DRIVEN GENERATION OF SCIENTISTS

Interdisciplinary Early Researchers Program; Benedikt Salmen & Oliver Mai-Kolerus; Einstein Center for Neurosciences Berlin

Science education often still work in silos and lacks inspiring, open and interdisciplinary programs.

Benedikt and Oliver champion the concept of Open Innovation. They offer a different way of doing research to address urgent global challenges and developed a unique training strategy that empowers early-stage researchers to apply Open Innovation concepts directly into their projects. Embedding this training into neuroscience research encouraged necessary competition, more disruptive research and better trained scientists. The jury approved this project because of their track record of already over 10 PhDs approaching neuroscientific research in novel ways, e.g. by including the roles of relatives and social networks in schizophrenia diagnosis.

7 BREAKING THE WALL OF BIASED GRANT PROPOSALS

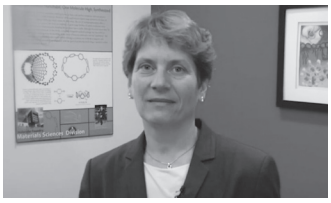
Grant allocation involving a lot; Henrike Hartmann; Executive Management, Volkswagen Stiftung

The commercialization of novel ideas is a core challenge in innovation management.

To tackle those issues, the VolkswagenStiftung has developed a new selection procedure circumventing the impossibility of absolute objectiveness: In the funding initiative "Experiment!", part of the funded projects are selected by an independent jury. Additionally, further projects are drawn from those applications that are suitable for the program and eligible for funding but were not chosen. They got a second chance by chance, in a kind of peer reviewed lottery. The jury approved this initiative because whether funding is biased by selection is a key question for innovation, and this provides more fairness to a bulk of grantees, not just the top/most-volume projects.

8 BREAKING THE WALL BY TRANSFORMING HEALTH INTERDISCIPLINARILY

Interdisciplinary Lab;
Carolyn Bertozzi, Chem-H Stanford University



A cross-disciplinary science environment between chemistry, engineering and clinical sciences would allow a holistic approach for researchers to address long-range challenges in Human health (better diagnostics, better disease control, better prevention).

Until ChEM-H at Stanford University no such institution has been founded. The institute focuses on molecules, allowing researchers to study human biology at a more fundamental level than cells, thereby paving the way for new tools to cure or prevent disease. Above all, ChEM-H educates a new type of student who will transform healthcare – someone with the eyes of a clinician, the wisdom of a scientist, and the problem-solving skills of an engineer. The jury thought that Carolyn Bertozzi's institute truly represents the need for novel, interdisciplinary applied research to identify new ways to better public health.

9 BREAKING THE WALL OF DISRUPTIVE INNOVATION

Disruptive Innovation Incubator;
Rafael Laguna de la Vera, SprinD,
German Agency of Disruptive Innovation

Today, the interplay between the science- and economic communities does not work well when it comes to disruptive and breakthrough innovations.

SprinD brings a proven approach to breakthrough innovation to Europe at last. It does not rely on peer-review-based identification and selection processes, but rather aims at recruiting forward-looking innovation managers to select research and innovation projects which are both research-intensive and application-oriented. Rafael Laguna is an essential figure driving forward this mode of thinking in Europe by identifying, selecting and funding high-risk, high-gain breakthrough innovation projects. The jury selected this initiative because its first approved projects so far have awarded impact-oriented, socially beneficial transformative innovation, setting the pace for a new European innovation culture.

10 BREAKING THE WALL TO MASSIVELY SCALE SCIENCE PROJECTS INTO PRODUCTS AND SERVICES

Grant allocation involving a lot;
Ajay Agrawal, Creative Distruction Lab

How can scientific findings of a specific discipline be brought into the industry to deliver true benefit to humankind?

Ajay and his team really pioneered the translation of regional excellence in research and innovation into entrepreneurial and commercial success. The program employs an objectives-based mentoring process to enhance the performance of new founders. They learn from the insights of experienced entrepreneurs, with the goal of maximizing equity-value creation. In 9 campuses around the world, the Lab's specialty streams are developed regionally to leverage ecosystem strength. With this final project of excellence, the jury wanted to highlight the track-record an initiative like the Creative Destruction Lab can have on regional and global innovation ecosystems. It truly stands for Science & Innovation Management.

After introducing the Breakthrough of the year and ten winners in closer detail, all 28 finalists of the competition are displayed in Tables 4 and 5. Besides general information on all projects which is displayed in green, a series of new categories is added which have to be seen here as an anticipation of the following chapter:

APPLICATION AND SELECTION PROCESS OF THE COMPETITION

To most organizations around the world, 2020 was a year of tension, of experiment, of crisis, but to many a year of opportunity. The Falling Walls Award for Science and Innovation Management depicts this spectrum of challenging demand for change and imaginativeness. It shows what wealth of ideas can create under the highpressure of exogenous factors such as the COVID 19 pandemic. In this section, we will give a brief overview of the implemented application process for the award, shortly introduce the distinguished jury and give an overview of the selection process. This section is finalized by developing first ideas how to further develop the application and selection processes through measures of targeted and strategic management.

APPLICATION PROCESS

The application process for the Science and Innovation Management Award has been designed as a worldwide "Call for Application". An application could be submitted recommending another individual as well as submitting an own project. Applications from universities, research organizations, companies, private and public research centers, academies, research funders, foundations and individuals were possible. They were all asked to submit applications matching three criteria:

1. International best-case examples in science and corporate research, which embody outstanding new approaches to innovation management
2. These relevant well-documented cases demonstrate a process that has led to successful results and increased performance – with the aim of improving or maintaining the ability to innovate
3. These case studies highlight how successful innovation management can serve as a basis for breakthroughs in science and corporate research and represent good examples which can ideally be transmitted and adapted in other fields

While a set of very promising projects were submitted in the first part of the rolling application process, the public call using the Falling Walls Foundation's and affiliated institutions communication channels did not fully correspond with the desired response rates. Taking more targeted communication measures from there, the foundation targeted hubs of potential applications, which they had access to out of their organization and professional community. This resulted in a higher number of applications, totaling at 50 qualified intakes. Out of these, the project management sorted 28 finalists, which all met the call for application criteria. Those were presented to the jury of the award.

Considering high number of high-impact applications, the application process of 2020 can be considered a success. Taking into account, that the Science and Innovation Management Award has been awarded for the first time in 2020, this achievement should be even more emphatically stressed. We highlight this, because we consider awards as usually "living" from their recurring character and reputation.

When looking into potential measures that could be pondered upon for future iteration, one focus could be to pursue with an actively managed three-element call-for-application-strategy right from the beginning: The first and focus element being the known and publicly noticeable call for applications through already established communication channels of the Falling Walls Foundation. The second being a targeted and well planned approach of communication-hubs for innovators (innovation-centers, social innovation labs,...), to target not only highly institutionalized organizations but to induce smaller and innovative "speed boats". And thirdly, systematically use the professional community already known to Falling Walls Foundation right from the beginning of the call for applications, as multiplicator's.

SELECTION PROCESS

The selection process of the Winners was conducted by a highly distinguished and world-class jury of experts in the fields of science and innovation management. The jury was chaired by Michael Kaschke, who currently serves as a chairman of the Supervisory Board of the Karlsruhe Institute of Technology (KIT).

The selection process started with an individual voting of each finalists through every jury member. Along a range from one to five (one being "very low fulfillment" and five being "very high fulfillment"), the jury voted for every finalist along the following four evaluation criteria:

1. **Contribute to better research**
2. **Represents a new approach**
3. **Increase Quality & Performance**
4. **Application to other areas**

THE JURY

MICHAEL KASCHKE

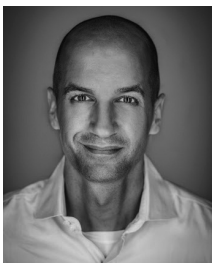
Jury Chair
KIT
Chairman of the Supervisory Board

KUMSAL BAYAZIT

Elsevier
CEO

MARION PÖTZ

Copenhagen Business School / LBG Open Innovation in Science Center
Associate Professor / Scientific Director



PASCALE FINETTE

Singularity University
Chair Entrepreneurship

HENRY SAUERMANN

ESMT
Professor

DIETMAR HARHOFF

Max Planck Institute for Innovation and Competition
Director

PAULA STEPHAN

Georgia State University
Professor of Economics

CAROLIN HÄUSSLER

University Passau
Professor, Member of the Expertenkommission Research and Innnovation / BUND

NELSON TORTO

Botswana Government
Permanent Secretary, Ministry of Tertiary Education, Research Science and Technology

SARAH HUNTER

x, the moonshot factory
Director of Global Public Policy

REINHILDE VEUGELERS

University Leuven
Professor

Additional to the voting on the four categories, the jury was required to highlight candidates they would strongly consider to be considered as the Breakthrough of the Year.

In a second selection process step, the project management created a ranking out of the individual jury responses. In a three-hour virtual jury session, the jury determined 10 unranked Winners and one Breakthrough of the Year of the 2020 Science and Innovation Management Competition.

Considering possible future developments in the selection process and jury, the following steps could be considered:

A. The highly distinguished jury to a large part consists of members of university institutions. If one decides to strategically align the competition to also involve more actors from corporate contexts, the institutional affiliation of the jury members could be diversified.

B. The evaluation criteria could be adapted in a way that it for example in aspect 1 does not only "contribute to better science and corporate research" but for example generally contributes to broader societal and organisational value creation.

C. The OECD (2018) points in their Science, Technology and Innovation Outlook out that science, technology and innovation (STI) policy and governance ought to become more mission-oriented including environmental, social and human rights related criteria. This reflects a general shift of attention in corporate contexts, but also in policy and society in general towards integrating sustainability performance consideration. This could mean introducing further evaluation criteria which foster responsible, inclusive, social and ecological innovation. Seminal concepts which could be relied upon for selection and evaluation criteria could be:

a. The seminal concept of triple layered sustainability by Elkington (1997) which assess sustainability on a social, environmental and economic level and is widely used in economics and policy literature.

b. The UN Agenda for Sustainable Development (2016) with its 17 Sustainable Development Goals (SDG) which can provide a broad and well-defined set of evaluation criteria.

c. The "Safe and Just place for Humanity" (or Doughnut Economics) concept in which Raworth (Raworth, 2012, 2017) creates a sustainable development assessment framework along the planetary boundary framework (Rockström et al., 2009) and the Declaration of the Human Rights.

POTENTIALS OF THE SCIENCE AND INNOVATION MANAGEMENT COMPETITION

Taking an historic perspective on innovation and the development of innovation understandings, bears great potential for our analysis linking it back to section 3 on megatrends and section 4 on types of innovation (Hirschi, 2013; Langley & Tsoukas, 2017).

Following the historical analysis of innovation by Mariana Mazzucato and Caspar Hirschi (2013; 2011), since the 1960s government-driven funding for science and innovation has created a variety of government related initiatives and funds such as DARPA or the Orphan Drug Act by the US in 1983 or the EU in 2001. This development created fundamental structural changes in the areas which received large amounts of funding and others which did not. Triggered by Soviet launch of their Sputnik Satellite in 1957, the fear of losing technology-leadership in the United States, fostered the initiation of governmental driven innovation funds. An entirely new scale and category of innovation funding was born and the dramatic increase in available resources created a stretch for fundamental research: suddenly, fundamental research had to be highly applicable, because funding programs would only then allow grants for the projects. This logic has been in place into the 21st century, even though times have changed substantially over the last decades and today, many of the innovations we see are driven by economic considerations (Hirschi, 2013). We therefor often times associate innovation with something that is applicable or designed to cure a problem and fundamental research has been supplanted by this understanding. What might tend to be neglected at times, is the role of the state when it comes to innovation. Innovation projects can go wrong. In fact, the likelihood of being unsuccessful is high and, especially considering the uncertain character of business opportunities for fundamental research, we see that states carry most of the financial risk, due to the uncertain opportunities for (financial-) return for others players (Mazzucato, 2011; 2014, p. 82).

Comprehending innovation and how it can be organised and managed, means to understand innovation as co-evolutionary ecosystems in which various agents are relevant players, owning different roles (Mazzucato, 2014, p. 243). Three of these players are I) states and governments II) private corporations III) academic and scientific organisations. Those players interact in various forms, networks and partnerships to create and discover new markets, products, business-models, processes and knowledge.

Using this background to look at potentials for the Science and Innovation Management Competition, with These Hands Social Enterprise, Volkswagen-Stiftung and Siemens AG we see only three Finalists (11%) not originating from a large and highly institutionalised science institutions - or public organisations. Many of the finalist are to some degree related to bridging between science and a potential field of application for their findings in a market. This hints at three points: (I) the conditions science and innovation managers deal with, are often times not friendly towards fundamental research. (II) Therefore, a majority of managerial actions and practices are closely related to commercialisation, business modelling and market research. (III) The role of the states for innovation schemes has been important throughout the past and nowadays remains key when promoting high risk proposals, such that drive social innovation or such with yet little applicability (e.g. fundamental research).

In relation to the megatrends and target groups, we have not found a representative number of candidates originating from researched-focused corporates or the industry. However, corporate research and corporate driven research networks play an important role in the innovation landscape.[2] Thus, this could be a new area more closely targeted for the competition. Already having included state-initiated and academic-scientifically-driven projects in width, a stronger adaption of private-corporations would represent the zeitgeist of innovation and its broad spectrum even closer.

Moreover, what can be looked at as another perspective of potentials, springs from the analysis of innovation types (section 5) in alignment with the mega-trends (section 4). With lower representations of process, culture and social innovation and the high representation of mega-trend-lines such as "Knowledge Culture", "Open Knowledge", "Collaborating", "Crowdsourcing" or "Open Innovation" we see a tendency towards mega-trends highly relevant for the broader societal sub-field of science and science-related organisations and professions. Aligning the focus of the competition here would mean emphasising initiatives and projects in the field of science and innovation management which dedicate time to finding innovative solutions in the fields closely related to the mega-trends of "mobility", "neo-ecology", "urbanisation", "globalisation", "new work" and "gender shift" would spread the potential impact of the finalists onto society on an even broader base. With the GEOMAR Helmholtz Centre for Ocean Research Kiel and The University of Tasmania two strong finalists have been nominated, both pursuing culture innovation and both with an ambition related closely to the megatrends little present this year. We assume that state-driven projects might be strong actors to diversify the portfolio of projects and potentially seise opportunities to work on mega trends and innovation types missing this year. Thus, additional projects initiated by governments might bear fruit towards a wider representation of for example the innovation ecosystem. Upon this strong base we see perspective to diversify the competition in the upcoming iterations.

Aligning and diversifying the target audiences of the competition as we explored in section 6, could for example be achieved by calibrating the application and selection process, variegate the communication channels used by the Falling Walls Foundation, including also jury members which are concretely embedded in corporate contexts and extending selection criteria. As part of such an endeavor, a novel strategic orientation towards "responsible" science and innovation management could be considered.

2 An example could be seen the German-based smaller enterprise BioNTech, which has been a leading developer for the first vaccine based on the mRNA methodology, currently helping to fight the COVID 19 pandemic. Also, the Swiss-based pharmaceutical company Roche, which has found an innovative way to quick-test for the COVID 19 virus, helped changing the way many of us currently live through the pandemic

SUMMARY

This report investigated the Science and Innovation Management Competition 2020 by the Falling Walls Foundation. Investigating the set of 28 Finalists and 10 Winners along megatrends and targeted audiences (section 3), innovation types (section 4), geographical and gender distribution (section 5) and the selection process (section 6) could show that the first issuance of the competition was a substantial success. The competitionhas not only attracted highly innovative and impactful candidates from all over the world but is also supporting the nascent broader valuation of innovation management as one central driver for breakthrough innovation and societal value creation as a whole.

As we have seen in the distribution of innovation types, "organisational innovation", "design innovation" and "business-model innovation" are strongly represented among the finalists. These innovation types align with the activities and practices that ground-breaking management in the field of innovation constitute. Those innovation types are closely linked to practices innovation managers in public, corporate and non-governmental organisations can make in overcoming the impediments of bringing new into the world.

Bearing the first year's success in mind, we see a few areas for potential refinement of the Competition. This year's cast is dominated by academic institutions, academia linked organisations, other public institutions and governmentally (co-) initiated projects. Furthermore, in the field of gender equality and innovation geography, a focus of institutions of the western hemisphere as well as an over- representation of male winners is seen. Strategic alignments of target groups and audiences could therefore be reflected upon. Considering megatrends indicates there are potentials to motivate topics like "Neo-Ecology" and "Mobility" in order to broaden the already impressively diverse cast of initiatives. The consideration of innovation types could show that "management-related innovation" and "organisational innovation" is often awarded. This could be again linked to the frequent draw of initiatives from public and university related fields. Considering diversifying the focus in the next year including more corporate and industry related innovation projects might potentially result in displaying more innovations types which are product or process related, or what we have seen as sparsely this year social- and cultural innovations. Furthermore, taking issues of sustainability, anti-discrimination and conflict resolution into focus might allow to shift the strategic orientation of the competition more towards "responsible" science and innovation management as the OECD motivates it.

Relating to these potential strategic considerations, a series of possible operational pathways in the communication, selection and conferment processes are presented.

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Authors
Jonas Friedrich
Julian Grah

Contributors
Design by Viola Vogel
Editing by Fabio Haenel & Matthes Lindner
Header image by Alex Knight

Our mailing address is:
Falling Walls Foundation gGmbH
Kochstr. 6-7
Berlin 10969, Germany

T +49 30 60 988 39 70
F +49 30 60 988 39 79
M office@falling-walls.com