The Foundation for Science and Technology
Discussion Event Record Note

Increasing Interdisciplinarity in UK R&D

Date and Location: 18th May 2022 at The Royal Society

Chair: The Rt Hon. the Lord Willetts FRS
Chair, The Foundation for Science and Technology

Speakers: Professor Dame Ottoline Leyser DBE FRS
Chief Executive, UKRI
Professor Rachael Gooberman-Hill
Head of Customer Engagement, Rolls Royce SMR Ltd
Professor Graeme Reid FRSE
Chair of Science and Research Policy, University College London
Professor David Soskice FBA
Professor of Political Science and Economics, London School of Economics

Report Author: Hanna George Bader
Communications Officer, The Foundation for Science and Technology

Audio/Video Files: www.foundation.org.uk

Hash tag: #fstinterdisciplinary . Twitter Handle: @FoundSciTech .

LORD WILLETTS opened the meeting by highlighting the main theme of the meeting, which was 'breaking barriers' and debating the various aspects and impacts of interdisciplinarity in the research and development sectors in the UK. The origins of this event on the subject stemmed from a meeting at the UKRI board, where Professor Ottoline Leyser, one of the speakers at the event, spoke with passion on the subject. Interdisciplinarity was in many ways one of the founding principles of UKRI, in an attempt to promote interdisciplinary practice between different sectors and industries. Sir Paul Nurse picked up in his original report on the lack of interdisciplinarity as a weakness of the British science system and called for proper recognition and funding.

PROFESSOR DAME OTTOLINE LEYSER begun her speech by emphasising her passion for interdisciplinarity in research and innovation. When people debated interdisciplinarity, they tended to approach it from diverse angles, which highlighted its importance in various fields, especially in the UK. As a relatively small country with an exceptional track record in research and innovation across sectors, the UK could highly benefit from interdisciplinarity that could be achieved through creative coordination and agility. UKRI was one of the bodies in the UK that promoted and implemented the interdisciplinarity agenda through diverse means to initiate research and collaboration between different sectors and brought advancements that would benefit the wider public.

Defining interdisciplinarity in a robust way was virtually impossible, and thus measuring it was even more challenging. However, it could be categorised under at least 3 overarching categories that needed to be individually and uniquely supported to achieve a well-connected network of sectors. Firstly, research where the questions being addressed were core to one particular discipline yet may have benefitted from input from other disciplines. This field was where Professor Leyser had the most personal experience. For instance, while computationally modeling plant development biology, Professor Leyser had to learn to source input from mathematicians and computation scientists to develop a shared language from which all three ends could benefit.

Interdisciplinarity and its challenges in the aforementioned case were different than the second category which was challenge-led research. In this case, an interdisciplinary team was assembled to address a particular challenge, like climate change for instance. In this category, interdisciplinarity was essential to the approach being developed, as each member of the assembly brought forward their own expertise to solve one target challenge.

Finally, the third category of interdisciplinarity was the one that built a whole new discipline that laid at the borders of all the sub-disciplines. The issue with this category, according to Professor Leyser, was that it left experts who contributed to the invention of the new discipline out of their home turf, and thus much was left unexplored due to lack of expertise.

There was a consensus that interdisciplinarity was important, yet challenging, mainly because of the ambiguous feelings towards the subject, which created the barriers and even more challenges. However, these genuine challenges could be overcome if they were assessed properly. These challenges included funding, interdisciplinary publications, assessment of interdisciplinarity and career progression.

The recently published UKRI strategy listed a list of issues that were at the nexus of numerous challenges in the research and innovation system; among which were competition and highly specific criteria for excellence, segregating disciplines, as well as separating research and innovation from the wider society. To change that system, there was a need for more capability to withstand shocks and creating new opportunities, as well as implementing a portfolio approach to risk and concerted effort to bridge the disconnects between research, innovation and wider society. These changes were encapsulated in four principles of change: diversity, connectivity, resilience and engagement. Overall, the aforementioned principles were key elements of interdisciplinarity, which was needed to address the issues facing the research and innovation system.

Professor Leyser concluded by emphasising the importance of trading off excellence for diversity, leading to better connectivity and interdisciplinarity that would enrich research, drive innovation, and benefit the wider society.

PROFESSOR RACHAEL GOOBERMAN-HILL begun by noting her own experience in working in an interdisciplinary context for more than 20 years. Throughout her speech, Professor Gooberman-Hill defined what interdisciplinarity meant to her, she spoke about the subject in practice, as well as the challenges facing it.

The lines between interdisciplinary, multidisciplinary and transdisciplinary work overlapped in different areas. Therefore, Professor Gooberman-Hill's advice was not to dwell on definitions and simply "do what was best" as there was nothing intrinsically better about any of the three as compared to the others.

Interdisciplinarity in research had been around for a very long time, yet it had not been given the value and recognition it deserved. That was mainly because people tended to define their fields based on the discipline they worked in, making it easier to define their work. On the other hand, people who worked across various disciplines found it harder to define their work as interdisciplinary work did not draw rigid lines around one discipline.

In order to boost the confidence of researchers who engaged in interdisciplinary work, it was important to highlight the benefits interdisciplinarity brought to the fields they worked in, the answers it provided to the questions posed, as well as the challenges it tackled in the research and innovation system. By highlighting the advantages interdisciplinary work offered, interdisciplinarity gained its definition and importance become clear.

Professor Gooberman-Hill recounted personal experiences that involved work and collaboration from across disciplines. The main takeaways that she highlighted were all related to the collective experience which promoted openness to learning and collaboration, as well as respect among participants from the various disciplines. Additionally, the "absence of big egos" facilitated by the diversity of the disciplines and the openness for conversation and learning was a salient aspect of such experiences. Finally, the result of such interdisciplinary work was always a progressive approach to the challenge at hand, and an environment that facilitated conversation and collaboration between members from various disciplines.

Interdisciplinarity comes with its challenges, which included the time and energy it took to do interdisciplinary work, as well as the assessment of situations that would not allow interdisciplinarity. However, a recommendation that Professor Gooberman-Hill provided was working with infographics that laid out the different tasks and targets for members from across the disciplines involved, as well as not forcing interdisciplinarity when not needed.

Professor Gooberman-Hill concluded by reiterating the importance of the absence of big egos whilst engaging in interdisciplinary work, as it was a signal about the importance of openness, the value of diverse disciplines, and enabling a sense of equal contribution in research.

PROFESSOR GRAEME REID begun his speech by providing a counter-argument to those presented earlier by the first two speakers. Professor Reid defended disciplines as they were "the cornerstone of the research ecosystem" and "provided a sense of identity and a framework for professional training." Individual disciplines allowed space for knowledge discovery and professional training, which was needed when it came to employing professionals to fulfil a certain job.

Collaboration between people from different disciplines came with its own challenges, including different values, different funding sources, and a need for an administrative overhead. However, despite all these challenges, the collaboration could be viewed as a creative process which "allowed people with different professional backgrounds to view a research challenge from different perspectives." This creative process also helped define the research challenge in a more creative way that compensated for the extra costs needed to initiate and maintain the process.

When speaking on the subject of "increasing interdisciplinarity", one could address it under three different headings: funding structures, institutional structures, and career structures.

Even though the scarcity of funding was often seen as a key factor in determining the viability of interdisciplinary work, the variety of funders available made it more of a step along the process than a prerequisite. For instance, government funding was not oriented towards interdisciplinarity, rather at solving policy problems. Interdisciplinarity came into play when one found the right combination of disciplines that were needed to address the problem, which allowed the funding to feed into interdisciplinary work.

The need of independent interdisciplinary research institutes was often overstated. Universities offered a wide range of advantages that were ideal for interdisciplinary research, such as containing a diverse population of disciplinary expertise, the flexibility of adopting governance models for institutes structures, and finally the agility to regroup depending on the disciplines involved. Whether carried out in universities or independent research institutes, interdisciplinary research required diversity, as well as the willingness to be flexible, agile, and adventurous.

Finally, adhering to one professional domain led to a specific defined career track, which Professor Reid noted could be unfortunate. 'Discipline hopping" was what promoted interdisciplinary work and research and was actually rewarding. Role models who pursued a "discipline hopping" track could encourage interdisciplinarity by testifying to the rewards it provided.

Professor Reid concluded with three take-aways: funding was not the only key element, institutions were good but not necessary for interdisciplinary work, and finally, celebrating role models who exemplified "discipline hopping" promoted the pursuance of interdisciplinarity.

PROFESSOR DAVID SOSKICE begun his speech by noting the importance of a certain skill set in driving innovation. These skills may be acquired during university studies through various disciplines. However, Professor Soskice implied that disciplines can also be a hinderance to allowing students to acquire the skills set needed to drive innovation later on in their professional lives.

There were four major interacting skill sets to be acquired and developed at a graduate workplace that could drive innovation. The first skill set included management skills, which were under-taught in the UK, according to Professor Soskice, as compared to the US and Germany, where management skills were key skills that people sought to learn. The second type of skills was software engineering which had become a key requirement for almost all innovation and research projects. The third type was social skills or psychological empathetic skills, and finally, the fourth type which included creativity and imagination. All of these skills set have proven to be key elements in any system or project that had to do with innovation.

Professor Soskice provided a few examples where all the essential aforementioned skill sets were central in education systems. For instance, third year students in a business school in the US would spend half a year working on a project through which they have to collaborate and solve a certain problem, or innovate new concepts and products. It was through these kind of projects that students learnt how to interact and collaborate, create and experiment with their imagination. Likewise, in Finland, children between the ages of six and nine were asked to collaborate on building a simple shack after being given a number of clues. The main objective was not building the shack,

rather the sheer interaction between children through which they gained their social skills early on in life.

Professor Soskice concluded by recommending the UK to adopt an education system similar to the American and the Finnish ones, in which the aforementioned skill sets were central, in order to foster innovative thinking through education.

IN THE DISCUSSION PERIOD, panelists were asked about the innovation in the work done by UKRI, and the way it differed from interdisciplinarity in Europe. Professor Leyser stated that the whole culture that UKRI developed, through its values, grants, rewards and training projects, was inherently innovative given the interdisciplinary environment it created and operated in. In comparison to Europe, Professor Leyser thought that the UK valued and promoted a more interdisciplinary research culture, as opposed to "the traditional way of thinking" in research. Moreover, Professor Reid suggested that a comparison to or imitation of European funding system and criteria was not reasonable since one was comparing an individual country to a body of 28 countries. However, Professor Leyser believed that ties and collaboration with Europe must be maintained.

Another topic raised during the debate was the inclusion of non-conventional research groups as part of interdisciplinary research projects. The view was that the inclusion of such groups was a great opportunity to bring diverse fresh perspectives and disruptive thinking into various contexts. However, the challenge was that non-conventional groups might sometimes lack the rigour and level of professionalism that were required to operate within any research system. On that note, it was suggested that in order for the research and innovation system to be more inclusive, selection criteria must be amended and broadened to allow people from different disciplines to access research and thus promoting interdisciplinarity.

For instance, when the topic of including finance as a discipline in interdisciplinary contexts, the view was that it was essential to bring the discipline into various research contexts. However, due to the way that finance was researched academically, as compared to other disciplines, integrating it would be a challenge to be tackled.

The panel discussed the need for diversity and its role in an interdisciplinary environment. The views were varied, yet it was agreed that diversity was essential. Even though diversity could bring forward opinions from opposing poles, these disagreements were essential in supporting an interdisciplinary discourse and driving innovation. Ethnic diversity was put under the spotlight and celebrated as it provided fresh perspectives and disruptive thinking feeding into an even more inclusive and constructive interdisciplinary discourse. Finally, diversity went hand in hand with other essential elements that were needed to drive innovation like imagination, creativity, trust, respect and empathy.

Among the other topics raised was the recognition and reward of roles that coordinated interdisciplinarity, in a research context for instance. The views were that these roles should be recognized and rewarded as they were an essential element driving the system.

Other topics discussed were freedom of speech and research, psychological safety in interdisciplinary environments, and funding scales.

To watch the full event and discussion, visit the following link: https://www.foundation.org.uk/Events/2022/Increasing-interdisciplinarity-in-UK-R-D.

Hanna George Bader