Jongheon Kim (Lagape, University of Lausanne), Youjung Shin (Department of Science Studies, Jeonbuk National University)

Give me a research platform, I will raise neuroscience

Almighty neuroscience? It's complicated

Since its inception in the 1960s as a highly multidisciplinary research field spanning molecular biology, cognitive science, and computer science, neuroscience has sought to investigate what is widely considered to be the most complex entity in the world: the human brain. It was hoped that research into the human brain would lead not just to discoveries but also to better methods of treating neurological disorders and creating cutting-edge computer systems. The field exploded in the second half of the 20th century, with Eric Kandel, a Nobel laureate in 2000 for his research on the physiological basis of memory storage in neurons, as an emblematic example of the growth. Increased interest on the part of policymakers in this emerging field of brain science is reflected in government initiatives, most notably the United States Decade of the Brain, launched in 1990, and the European Decade of Brain Research, established in 1993, as well as the institutionalization of the field in Korea in the late 20th century (Kim 2022; Shin, 2022).

However, the progress was not straightforward. Worse, neuroscience has constantly been in crisis. In the US, for example, the Society for Neuroscience often addressed how much the field of neuroscience underwent «the funding roller coaster» (Cohen, 1980: 2). Even when the Decade of the Brain was released in 1990, the following budget allocated for neuroscience was far from the expectation (Shin, 2019: 107-108). Compared to genomics, for example, which received unprecedented support in the late 20th century, neuroscience has been characterized as a highly interdisciplinary field which seemed promising yet confusing. Its disciplinary nature partly affected in bringing disciplinary crisis as well as hope (Shin, forthcoming). The situation of neuroscience has worsened over the past two decades as major investors in neuroscience, including Novartis, AstraZeneca, and Pfizer, have cut back or even abandoned their efforts. In 2011, David Nutt, a neuropsychopharmacologist at Imperial College London, declared, «These are dark days for brain science» (Cressey, 2011; Nutt & Goodwin, 2011).

What's interesting is that during the troubled times of neuroscience, the construction of a «database» or «research platform» (research platform, henceforth) was advocated as a means of improving research and delivering what society expects of neuroscience. In 1993, as part of the US Decade of the Brain, a Human Brain Project was initiated, and in 2013, as one of two European Flagships, another Human Brain Project was initiated. Are these efforts to construct research platforms during difficult moments just a coincidence, or do they share more in common than their name? If that is the case, what is at stake in building research platforms? By analyzing the underlying aspirations in making the research platform in the two Human Brain Projects in the US and EU, we examine the digital platform's role as a promissory infrastructure in governing the interdisciplinary discipline of neuroscience. We explore diverging yet continuing aspirations over the digital platform as a means of governing neuroscience from the American Human Brain Project to the European Human Project. By doing so, we highlight the meaning of promissory infrastructure and the way it worked in the field of neuroscience.

The American Human Brain Project

The US Human Brain Project (HBP) was launched in 1993 as the NIMH's flagship program for the Decade of the Brain. Its stated goal was to create a web-based research platform where scientists could pool their data gathered using different methods and work together to analyze the data (Shin, 2019; Beaulieu, 2000). The project was inspired, in part, (1) by the Human Genome Project, launched in 1990, regarded as the most ambitious project in life science with its goal of «decoding the book of life,» and (2) by the hype around Information Technology (IT) that would enable high-performance data treatment and global-level collaboration.

It was hoped that the platform to be developed would enable researchers to leverage the interdisciplinary nature of neuroscience by allowing them to pool data from multiple sources and apply diverse methods. In other words, the digital platform will help generate scientific consistency across related disciplines by providing a means of linking and evaluating different forms of data. Bioinformatics, which is built on the ongoing success of the Human Genome Project, supports this view.

However, the HBP could not create the promised platform before it was discontinued in the early 2000s. The lack of a unified data integration framework was cited by Brinkley and Rosse (2002), two of the project's

neuroinformaticians, as the most significant difficulty in developing the HBP's information system. Indeed, inversely, building the framework was the project's objective. While it was unsuccessful in forging the field's (meta-)identity, the work set the groundwork for the development of neuroinformatics, yet another subdiscipline.

The European Human Brain Project

In the European case, three separate but related trends coalesced to pave the way for the introduction of the European HBP in 2013, in addition to the advancements in neuroinformatics since the US HBP. First, since the early 2000s, the EC has promoted «building research infrastructures» as the engine of research and innovation-based growth of the European economy (Hallonsten, 2020). Second, in 2009, the EC developed the FET-Flagships initiative, which was geared toward Big Science enterprise by proposing two grants of one billion euros each for pan-European projects (Kim, 2022). Third, as we've already mentioned, large pharmaceutical companies have cut back on neuroscientific research due to the lack of visible success.

The goal of the HBP was to build a web-accessible research platform with a suite of informatics and simulation tools. The HBP's leaders claimed that the platform would «revolutionize» neuroscience, medicine, and IT by enabling researchers to carry out interdisciplinary and international collaboration. This, in turn, would establish Europe as the world leader in neuroscience research (HBP, 2012). The argument's emphasis on information technology (IT) is noteworthy in terms of IT's role as a research tool and, more crucially, neuroscience's potential contribution to IT development.

Despite the fact that the HBP has attracted over 600 scientists from 123 institutes, the project has been the subject of dispute (Panese, 2017; Mahfoud, 2020). First, its centralized leadership and organization were criticized by scientists, which differed from life science in general, as the HBP was close to an IT engineering project. Second, scientists questioned the need for such a massive platform. Unlike in the 1990s, when data platforms were innovative, academics now have operational research platforms at the institutional, national, and even international levels. As a result, scientists were concerned that large-scale programs would consume already scarce brain research funds.

Who needs a research platform for what?

The promises of neuroscience and information technology drew the attention of policymakers and funding agencies in both cases. The US HBP's argument that the platform would enable additional data exploitation was convincing, as demonstrated by the Human Genome Project, whereas the European HBP's statement that it would improve European IT and strengthen the European community was particularly persuasive among EC decision-makers. (Actually, there was an intermediary organization which kept up with the promise of the digital research infrastructure from the American HBP to the European HBP: International Neuroinformatics Coordinating Facility. We will further examine its role).

The promise of digital research infrastructure has hardly come to fruition so far. Yet, it did not mean that it failed without any impact. It did play a role in reshaping the neuroscience community by addressing the way of governing a wide range of research practices, traditions, ideas, and data in studying the brain. Like the Human Genome Project, the promoters of Human Brain Projects hoped to radically reshape and revive the field of neuroscience. However, this hope had not been achieved. For example, though European HBP members have emphasized the importance of large-scale efforts to make significant progress, other scientists have frequently been critical, if not hostile, to the project. This tension influenced the project's public image, which frustrated EC policymakers, leading them to abandon the FET-Flagships scheme.

It is difficult to say what the HBPs have contributed to addressing the crises above. Examining what (unexpected) knowledge those programs generated and how they (partially) impacted the research dynamics of the domain is an empirical inquiry that extends beyond the scope of this short article. In any case, it appears that, although large-scale research platforms emerged as the solution to the crises, the programs have not delivered on their promises. Still, scholars have observed that large-scale projects persisted despite criticism regarding those ventures' scientific soundness. Then, will there be another crisis in neuroscience? Certainly. Would be another more powerful research platform project launched? Likely. Would the platform building resolve the crisis? We do not pretend to know the answer, but history says otherwise.

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