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A Laboratory as the Infrastructure of Engagement: Epistemological Reflections

Urszula Pawlicka-Deger[1,2]

[1] Aalto University, FI

[2] King's College London, GB

pawlickadeger@gmail.com

Today's big challenges—the COVID-19 pandemic, climate change, migration, and refugee crises—are global in scale, transcending geographical, national, and cultural boundaries, but responded to at the local level. It has therefore become necessary to reflect on the following questions: what kind of new forms of organizations are needed to tackle real-world problems? How can we enhance the humanities as a responsive field with the ability to translate knowledge into actions? How can we design a better humanities laboratory that is more attuned to contemporary challenges? The social labs as innovative institutions have opened up new epistemological directions for understanding a lab as a platform for addressing complex issues. A laboratory can be understood as a way of thinking and acting that entails new social practices and new research modes. Drawing on social lab theories, critical infrastructure studies, and digital humanities infrastructure theories, this essay aims to present a new theoretical approach to conceptualizing a laboratory in the humanities. I discuss two epistemological perspectives represented by Bruno Latour and Graeme Gooday in order to disclose the power of the laboratory. Next, I present the principles and network structure of social labs. Then, I introduce the concept of the infrastructure of engagement as a new analytical framework for understanding a laboratory as a site of intervention for the humanities as they are involved in addressing pressing global problems. Based on the Humanities Action Lab, I seek to reimagine a laboratory guided by the principles of collaborative infrastructure, participatory approach, and public engagement.

Introduction

The term 'infrastructure' brings to mind images of heavy material things, such as bridges, roads, railways, sewers, and other public services that enable daily functions, communication, and transportation. This common sense definition is not, however, as obvious as it may seem. In seminal works on ethnographic studies of infrastructure, sociologist Susan Leigh Star revealed the complexities, multiformity, and multilayers of infrastructure described as 'something that other things "run on," things that are substrate to events and movements' (2002: 116). The infrastructure comprises not only heavy operations but also soft materials, such as intellectual and institutional structures and documentations (e.g., bureaucratic forms, technical protocols, work spaces, and equipment). Infrastructure is thus a flexible term concerning situation, context, and purpose. In the following essay, I use Star's way of conceptualizing the infrastructure and refer to it as a 'fundamentally relational concept, becoming real infrastructure in relation to organized practices' (2002: 116). Infrastructure is used here as an analytical construct through which we can follow practices and values shaped and informed by intellectual and institutional substrates. I also refer to Shannon Mattern's 2016 analysis of infrastructure as a critical scaffolding used to address critical issues, including environmental health, the distribution of public resources, and social justice.

The essay that follows deals with one form of infrastructure, that is, a laboratory: a place equipped with specialized instruments and technologies for experimental and practical studies that require manual skills as well as conceptual knowledge for their construction and deployment (Hannaway, 1986: 585). A laboratory has played a central role in Science and Technology Studies (STS) since, during the 1970s, sociologists (Latour and Woolgar, 1979; Latour, 1987; Knorr Cetina, 1981; Lynch, 1985) began ethnographic studies of laboratories aimed at disclosing the mechanism of scientific work and the power of this place in constructing reality. The lab has become a gateway for understanding how scientific knowledge is produced. From this moment forward, STS and the history of science have seemed impossible to accomplish without investigating this scientific space. While the study of scientific

labs is well-grounded, a discussion of laboratories in the humanities has been largely underexplored. Thus far, only a few researchers have studied laboratories used for the humanities from the socio-material infrastructure perspective (Emerson et al., n.d.; Svensson, 2016; Smithies et al., 2017; Foka et al., 2018; Smithies and Ciula, 2020; Pawlicka-Deger, 2020; Pawlicka-Deger, n.d.). Laboratories have entered the humanities as a new research infrastructure, transforming this into an experimental, collaborative, and technology-driven field. This well-established institutional model of science has been adopted as a place that provides equipment and technologies for supporting the application of digital tools and methods to the humanities.

The spread of the concept of a laboratory into city spaces and cultural institutions has significantly transformed the definition and realization of a lab as a physical place rooted in the scientific tradition. The social labs, community labs, and citizen labs have opened up new epistemological directions for understanding labs as platforms for addressing complex challenges through prototyping-based techniques (Hassan, 2014). A laboratory goes beyond the concept of a fixed place involving material instruments and hands-on scientific exploration, becoming, instead, a widely understood project set up for a specific period which can be managed without any equipment. A laboratory is thus imagined as something more than material infrastructure; it is the concept that makes it possible to provoke 'new ways of engaging with public audiences' (FHI, n.d.) and 'change the way faculty and students approach instruction and research' (ASU, n.d.). A laboratory can be conceptualized as a way of thinking and acting that entails new social practices and new research modes. Therefore, a lab can be established anywhere. The only condition for creating a lab is community: a lab is constituted by, and for, the people gathered together to address particular challenges.

In light of the conceptual changes of a laboratory, many new questions arise as to how to understand emerging lab models, such as a lab as a challenge-centric space, a lab as a coalition, and a lab as a distributed network, and how to reimagine a laboratory in the humanities as a site of intervention in public spaces and social problems. The term 'humanities labs' is used here to cover entities that engage

humanities knowledge and methods of inquiry, and there can be both institutional and technology-based labs and conceptual, non-digital labs. I pose the following questions aimed to delve into the epistemology of laboratories and discuss them within a framework that approaches infrastructure as a relational concept: how does a laboratory grow from a physical work space into actions taken around challenges? How can changes be accomplished *through* the humanities infrastructure? How can we design a better humanities lab, more attuned to the challenges of today's world?

This essay aims to present a new theoretical perspective on a laboratory in the humanities that draws on STS, Digital Humanities infrastructure theory, and social lab theories. I seek to construct a new analytical tool for reconceptualizing the infrastructure which represents not simply a material thing but, more broadly, an intellectual structure that constitutes the way that we approach space, people, and challenges. As Paul Dourish and Genevieve Bell state, 'Infrastructure is analytically useful, both because it is embedded into social structures, and because it serves as a structuring mechanism in itself' (2007: 418). The purpose is thus to investigate a laboratory through this dual perspective to see how the lab has become critical infrastructure through practical organization (structure and operation) and activities (experiment, production, and transfer of work beyond laboratory walls). I attempt to go beyond the prevailing discussion of a laboratory as a research infrastructure to conceptualize it as the *infrastructure of engagement* inspired by social labs. Referring to social lab theorists, I propose thus to conduct an epistemological experiment that aims to reframe laboratories for the humanities in the vein of social labs and use the perspective of the *infrastructure of engagement* as a critical lens for analysing a laboratory's structure and action.

The Humanities and the Concept of Laboratories

A lab history in the humanities dates back to the 1980s when the first laboratories—serving subjects other than the natural sciences—were established in media studies. For instance, the Laboratory Paragraphe at the University of Paris 8, France was established in 1983, the Media Lab at MIT, U.S. in 1985, the Digital Writing and Research Lab at the University of Texas at Austin, U.S. in 1985, and the Aalto Media

Lab at Aalto University, Finland in 1993. Media labs were launched as production and experimental research spaces and studios. The first laboratories aimed to foster the creation of media projects which explored the impact of technology on society and the human condition, developed hardware and software within the context of artistic projects, and tested the potential of electronic technologies. Concurrently, in the late 1990s the word 'lab' was applied to humanities and technology, for example, with the HUMlab at Umeå University, Sweden, which was established in 1997, and the Stanford Humanities Lab in the U.S., founded at Stanford University in 1999. Although the institutional models for these units were not new, their conceptualization as 'labs' was an original move. Nevertheless, the end of the twentieth century and beginning of the twenty-first century remained under the domination of media labs, including, for example, the Speculative Computing Laboratory at the University of Virginia, U.S., La Camera Ottica at the University of Udine, Italy, and LIACS Media Lab at Leiden University, Netherlands (Pawlicka-Deger, 2020).

In 2006, the American Council of Learned Societies released a report on deploying cyberinfrastructure for the humanities and social sciences (ACLS, 2006). It was a specific call for developing a new research infrastructure for the humanities and social sciences that would enable new learning and teaching through digital tools and technologies. At the time, digital technologies had gradually entered the humanities area, entailing new forms of scholarly communication and knowledge production and giving rise to the field of Digital Humanities (DH). The term 'cyberinfrastructure' was thus brought from science and engineering over to the humanities domain, a move that was not without consequences for embedding humanistic infrastructure. The borrowed term was not simply a new entry in the humanistic dictionary but rather entailed the transfer of the science, technology, engineering, and mathematics (STEM) model for the infrastructure to the humanities and social sciences (Pawlicka, 2017). The evidence that the STEM notion of infrastructure was being deployed came in the form of a call for establishing a laboratory as an institutional innovation for the humanities which would foster collaborative and experimental digital scholarship. As Stanford University computer scientist Marc Levoy states:

> Once humanities faculty began using the laboratory in their research, they
> would also find creative ways to fold its technology into their teaching—for
> example, through project-based assignments in upper-level courses. This
> would bring humanities students into the lab, some of whom have dual
> backgrounds, and so could help run the lab (ACLS, 2006: 35–36).

The above-mentioned report stimulated the rise of a laboratory in the humanities—modelled on STEM practices—as a condition for deploying digital tools and technologies in scholarly research. Viewed in this context, laboratories were thus introduced as the infrastructure for facilitating and propelling the advancement of DH. The field of DH was thus both a beneficiary of the emerging laboratories and a leader in developing new spaces for inquiries modelled upon the techno-science type of labs. The concept of the laboratory was thus foregrounded as an innovative infrastructure for developing technology-based, collaborative, and experimental research. Many labs have been established in the humanities departments and libraries as a research infrastructure aiming to provide the space, community, and resources necessary for employing computational methods for art and humanities questions, including, for example, the Scholars' Lab at the University of Virginia Library, the Franke Family Digital Humanities Laboratory at the Sterling Memorial Library of Yale University, and the Price Lab for Digital Humanities at the Wolf Humanities Center at the University of Pennsylvania.

The process of advancing cyberinfrastructure and setting up laboratories may be framed as the first wave of the 'infrastructure turn' in the humanities (Rockwell, 2010). It involves a deep understanding of the role and operation of organizational structures for the humanities, which not so long ago were considered to be a set of fields without infrastructure. To comprehend the concept of infrastructure, Geoffrey Rockwell applied an infrastructure paradigm representing heavy organizational structures, such as roads and sewers, to research practices and explained the need for both physical and virtual infrastructures for the humanities (Rockwell, 2010). The first wave aimed at creating infrastructural opportunities and producing the substrates of research organizational structures for the humanities, including digital

services, tools, and laboratories. The movement towards the establishment of labs constituted a part of the infrastructure turn and was determined by the following three motivations.

The first incentive was to construct a physical place for the assembly of computers and other technological devices and thereby to provide the environment needed for facilitating digital scholarship. This aspiration led to the techno-science and work station models for humanities labs. The second impetus for accelerating the development of infrastructure was to add team-based work and interdisciplinarity to humanities practices. The existing research infrastructure, including reading rooms in libraries and scholars' offices, supported a model of individual research conducted in isolation. The individualist mode of humanities knowledge production hindered cross-disciplinary communication and collaboration. To facilitate a team-based and cross-disciplinary work, researchers increasingly advocated for developing laboratories as a place fostering collective work (Arac, 1997) and intellectual exchange (Davidson, 1999), 'building opportunities for the reciprocal interrogation and bonding that lies at the heart of what the humanities can contribute to democracy' (Dubois and Jenson, 2012), and establishing new relationships between people in the humanities and sciences (Joselow, 2016). The last motivation stemming from the previous argument was thus to provide a common place to energize collaborative practices. This space, referred to variously as a trading zone (Galison, 1999), a contact zone (Pratt, 1991), and a meeting place (Svensson, 2016), was meant to serve people representing various disciplines and epistemic traditions in terms of allowing them to gather in a common place to share and inspire creative ideas.

A laboratory place emerged in the humanities in response to its structural inefficiencies, implying that the existing infrastructure was insufficient to meet the institutional requirements resulting from deploying computational tools and digital technologies. The laboratory concept was thus adapted to the humanities based on the models of techno-science labs, computer science labs, and media labs. The lab has been conceptualized as a physical place for providing equipment and technologies and for conducting hands-on work. This perspective, however, reduces the idea of a laboratory to a site where experiments are carried out inside a

controlled environment without any connection with the world outside the room. The laboratory concept, however, has much greater applicability beyond just its work station model.

New forms of laboratories have thus emerged, disrupting the precursor models and opening up a discussion about the purpose of humanities labs for current and future research, teaching, and societies. The humanities labs have been therefore reimagined as an innovative platform for addressing pressing social concerns in the vein of the social and community labs. One example is the Humanities Action Lab (HAL) led by Rutgers University-Newark. It represents a laboratory model that operates as a coalition of various universities, issue organizations, and public spaces working collaboratively on the same initiative for a given period of time to produce community-curated public humanities prototypes on urgent social issues. Students and stakeholders in 40 cities across the world develop local chapters of exhibits, web projects, public programs, and other platforms for civic engagement. Afterward, projects travel to museums, public libraries, cultural centres, and other spaces in each of the communities that helped to create them. The goals of the HAL are to develop a new perspective on cross-institutional and cross-sector collaboration, foster a national and international exchange of local experiences, and produce systemic knowledge on a particular social challenge (HAL, n.d.). The HAL is based on the principles of inclusivity, the action-oriented method, the systemic approach, and citizen engagement. This innovative laboratory model aims to intervene in urgent social problems through the practices of the engaged humanities.

The HAL initiative, officially founded in 2014, grew out of the Guantánamo Public Memory Project, which was launched in 2012 and hosted by Columbia University. In 2011, nine universities initially came together to establish this project in order to interrogate the history of the US naval base at Guantánamo Bay, Cuba, and foster public dialogue on the urgent questions it was raising in the present: 'The project was motivated by a concern that the vitriolic public debate over "closing Guantánamo" was severely limited by ignorance of how Guantánamo had been "closed" before, and how it could open again' (GPMP, n.d.). The community-curated memory project eventually involved over 300 students from 13 universities who collaborated with

more than 600 community stakeholders, including Haitian refugees, former service people, and attorneys representing current detainees, in order to research and document the history of Guantánamo from multiple perspectives. Together they created a traveling exhibit, web platform, digital and physical archive, interview collection, and a series of public dialogues. The exhibition travelled for more than three years to 18 cities and initiated public dialogues in each place. Ultimately, after this impressive initiative, the nine original universities formed the Humanities Action Lab to advance the public humanities and foster civic engagement.

At the time of its establishment, growing numbers of people were demanding that the United States reckon with incarceration's past and the construction of the carceral state before planning new reforms. 'After four decades of feverish imprisonment, a remarkable bipartisan consensus had emerged that mass incarceration had failed and must be dismantled' (Chettiar and Waldman, 2015; cited in Ševčenko, 2017). In this context, the HAL launched its first project, States of Incarceration, which was centred on the past, present, and future of incarceration in the United States. The project brought together over 800 people in 18 states, who studied the explosion of prisons and incarcerated people in the United States and its global dimensions. The action also involved people affected directly by incarceration in these states, as each state explored a history of incarceration within its own communities, from Angola's slave plantation-turned-prison in Louisiana, to the legacy of the Dakota Wars for Native Americans incarcerated in Minnesota, to immigration detention at Ellis Island and Elizabeth, New Jersey. In the end, the participants together created the project 'States of Incarceration: A National Dialogue of Local Histories', which encompassed a series of public dialogues, a digital platform, and a national traveling exhibition:

> All the pieces—each featuring combinations of historic images, audio interviews, videos, and artwork—were compiled by a designer into a single national physical and digital exhibit that launched in New York City in April 2016 and is traveling to each of the communities that contributed to it, accompanied by public dialogues at each stop, through at least early 2019 (States of Incarceration, n.d.).

Following the success of its previous ambitious projects, the HAL launched its next three-year initiative on climate and environmental justice in 2017, which brought together 40 communities from around the world. As the project's website states:

> The initiative on climate and environmental justice will address this issue by sharing stories and strategies from the communities who bear the greatest impact, while contributing the least to environmental degradation. By exploring the roots of climate and environmental justice, this project seeks to: center frontline communities, raise awareness, build political efficacy, and develop mechanisms for accountability (Climates of Inequality, n.d.).

The HAL has continued significant growth by engaging more and more universities and organizations outside the U.S. The more recent initiative, at the time of writing, on Climate and Environmental Justice involves partners from the University of Puerto Rico in Mayagüez, the Universidad Autonoma Metropolitana-Cuajimalpa in Mexico City, and the Royal Institute of Technology in Stockholm. In the face of the COVID-19 pandemic, the HAL has organized a set of events called Climates of Inequality and COVID: Stories from Frontline Communities. The initiative has aimed to build a collective mass-listening project designed to record the impacts of COVID-19 on frontline communities. The HAL is turning into an influential and powerful global laboratory that launches projects as interventions in public discourse. This laboratory model is distinguished by the following features: the focus on a locally-grounded global problem undertaken from a broad perspective; interdisciplinary and vertically integrated projects; the application of participatory and prototyping techniques; strong collaboration across disciplines, institutes, and sectors; and a pedagogical mission realized through innovative lines of inquiry and new ways of engaging students and scholars with public audiences.

The Humanities Action Lab represents a unique type of laboratory that emphasizes the power of the humanities and engages the field in pressing global challenges. This seminal case offers a new vision of the laboratory as the infrastructure that supports the engagement of the humanities in real-world problems and bridges the

gap between the university and the public. It has also shown how the concept of the laboratory has been extended beyond a techno-science-based place and reimagined as a site for interventions in social concerns. This lab model has provoked new questions, not yet explored in the humanities debates, about the epistemology of network-based labs and the understanding of infrastructure, conceptualized not only as heavy and physical materials but also as something that emerges from practices and connects people and activities. The relational character of infrastructure makes it possible to constantly form and shift connections across space and time. The infrastructure will thus constitute a critical lens for unlocking the potential power of laboratories. The question that arises at this point is, thus: why has a lab been seen as a site imbued with certain forms of power?

Disclosing the Power of the Laboratory

In the 1990s, laboratory studies emerged as the field concerned with ethnographic and epistemological investigations of scientific laboratories, with the goal of understanding the process of scientific knowledge production and the relationships between science and society. This nascent discipline with sociological and philosophical inclinations arose from the studies of present-day laboratories in the 1970s-1990s. Numerous researchers contributed to the move towards considering science as a social practice (Pickering, 1992) with the aim to demystifying scientific practices and investigating the network of actors taking part in the construction of scientific knowledge, i.e., space, material instruments, technology, and community. Some publications, in particular, were the driving forces behind constituting laboratory studies, such as *Laboratory Life* (1979) by Bruno Latour and Steve Woolgar, *The Manufacture of Knowledge* (1981) by Karin Knorr Cetina, *Art and Artifact in Laboratory Science* (1985) by Michael Lynch, and *Science in Action* (1987) by Bruno Latour. A laboratory as a space for scientific experiments was considered as an epistemically special place, since it was an important agent of scientific development (Knorr Cetina, 1995: 144). Early ethnographic studies of the laboratory aimed to examine its inner construction and understand the factors contributing to its power.

The approach to laboratory studies has changed in recent decades as a result of the spread of the idea of the laboratory into public space.

Latour, in his seminal article 'Give Me a Laboratory and I Will Raise the World', sought to understand the positioning of laboratory practice to answer a significant question: 'Why it is that in the laboratory and only there new sources of strength are generated?' (1983: 160). As a starting point, Latour referred to Knorr Cetina's provocative statement that 'nothing extraordinary and nothing "scientific" was happening inside the sacred walls of these temples' (1983: 141). If nothing special was happening inside the lab, to repeat Latour's inquiry, why was the laboratory seen as the lever with the capacity to raise the world? Based on microstudies of Pasteur's lab, Latour provided an argument for understanding the process of how 'the laboratory gains strength to modify the state of affairs of all the other actors' (1983: 154).

Latour argued that a laboratory action entails the dissolution of the inside and outside dichotomy by transferring the knowledge from inside the lab, where it was produced, to the world outside the lab, where it is applied. As Mads Dahl Gjefsen and Erik Fisher explain,

> He argued that the laboratory has been a lever for action in and on the outside world, whereby its resources depended on capturing the interests of external actors, who assessed its performance through forms of verification that were distinct from the representational language used in the laboratory itself (2014: 427).

Experts gather within laboratory walls, and these experts conduct experiments and measurements, with room for iterations and mistakes. As Latour notes, 'It is simply that they can make as many mistakes as they wish or simply more mistakes than the others "outside" who cannot master the changes of scale' (Latour, 1983: 164). Through the multiplication of trials and errors, they produce the invisible knowledge that becomes translated into words and visible as written text spread in the world outside the laboratory. The experts, the network of actors, and the process of inscription make a laboratory a powerful and successful place that can invert

the hierarchy of forces. Therefore, according to Latour, the lab's power lies in the knowledge that is manipulated and projected in the lab by the group of people who, in the lab environment, gain the strength of experts. The transfer of such knowledge produced in a closed, controlled environment is the lever that has the capacity to change the world. Referring to Robert E. Kohler's analysis, Latour showed that 'the power of modern labs lies neither in some essential internal features nor in their social symbolism, but solely in the knowledge that labs project into the world: their exports are the levers that move worlds' (2008: 767).

The laboratory studies of the 1980s and 1990s played a significant role in understanding scientific practices and knowledge production; however, the study has met with criticism and accusations of having a reductive view of social reality. As Gjefsen and Fisher argue, 'Criticisms of early laboratory ethnography were grounded in the perceived limitations on explanatory power imposed by studying the laboratory in isolation from broader societal structures and context' (2014: 427). The shift towards an inclusive perspective of a laboratory has emerged along with the development of laboratories outside the scientific environment in public space and cultural institutions. The rise of social labs and citizen labs has begun a new chapter in the history of laboratory studies by incorporating social situatedness.

In 2008, *Isis: A Journal of the History of Science Society* released a special issue with a focus on laboratory history. This special issue brought together well-recognized historians and sociologists of science—Graeme Gooday, Ursula Klein, and Robert E. Kohler—who reviewed the laboratory concept years after establishing laboratory studies. As Kohler observed, after the 1980s and 1990s, which was seen as a productive time for the field, the laboratory was neglected until interest was revived again in the twenty-first century (2008: 761). Indeed, the interest in the laboratory was enlivened, giving new impetus and direction for its exploration.

Gooday, in the article 'Placing or Replacing the Laboratory in the History of Science?' (2008), proposes an alternative to the interpretations of laboratories, which have changed and diversified in recent decades. As Gooday claims, 'Originally, a laboratory could be a site of organic growth or material manufacture, but it can

now be a specialized domain for technological development, educational training, or quality testing' (2008: 783). This observation is a starting point for the discussion on the permeable or non-existent boundaries between laboratories and other spaces which are now arranged into experimental laboratories without being designated for such a purpose. The extension of the laboratory idea to the public space demands that the laboratory be examined from a broad and inclusive perspective. Hence, as Gooday notes, 'a lot of historians of science now devote their attention to what went on outside the laboratory: on the theatre platform or in the museum, auditorium, exhibition, or home' (2008: 784). Situating laboratories associated with scientific activities in the public domain raises a question concerning the reconceptualization of the role of science in society. Scientific experts are now replaced by citizens in white coats who gather together in a common laboratory space to produce knowledge and influence local challenges. In light of these changes, Gooday suggested a new, inclusive approach to laboratory studies. He claimed that theorists now must seek to understand 'what constitutes a laboratory, especially in relation to the difficulty of demarcating this scientific space from other less formal sites of empirical making of new knowledge or new artifacts' (2008: 784). Hence, the STS-situated research purpose, to demystify the power of scientific laboratories, has been shifted towards identifying the epistemological reasons for turning some spaces into laboratories, providing a fruitful and fresh approach for studying the phenomenon of ubiquitous, present-day laboratories that do not resemble their precursors.

Various spaces have been turned into laboratories for interventions in social challenges. The laboratory imbued with the power to raise the world, recalling Latour once again, has become a vehicle for systemic change. The social labs exemplify the extension of the laboratory to the public sector. These models have become powerful and ubiquitous due to their public engagement as well as their collaborative and inclusive infrastructure.

Social Labs as Platforms for Systemic Change

Zaid Hassan notes that 'We have scientific and technical labs for solving our most difficult scientific and technical challenges. We need social labs to solve our most pressing social challenges' (Hassan, 2014a). In this concise statement, Hassan aptly

describes the goal of social labs through a comparison with scientific laboratories. While, in techno-science labs, teams of experts are focused on advancing technological innovations, in social labs, diverse stakeholders are concerned with pressing social questions. In the excellent publication *The Social Labs Revolution*, Hassan presents a comprehensive view of social labs, which he defines as platforms for addressing complex social challenges that have three core characteristics: they are social, experimental, and systemic (2014a).

The rise of social labs, including social innovation labs and citizen labs, arose from the need to address urgent and highly complex global concerns, such as climate change, inequality, poverty, migration, slavery, and more. Therefore, in recent years, numerous social labs have popped up around the world (Hassan, 2014b), and many initiatives have been launched to support an emerging social innovation movement, including journals (e.g., Stanford Social Innovation Review) and network communities (e.g., Social Innovation Europe). Concurrently, the body of literature on social labs has grown significantly, with the aim of understanding their principles and providing practical suggestions for establishing those labs (Edwards, 2010; Torjman, 2012; Hassan, 2014a; Kieboom, 2014; Tiesinga and Berkhout, 2014; Westley et al., 2017).

The social lab movement has been built upon a series of convictions and beliefs. First, contemporary global challenges are recognized as complex, multi-causal, and unstable difficult problems that cannot be addressed with traditional linear and analytical approaches. The original method for tackling complex problems was focused on treating their micro levels in an orderly and linear way, from identifying the challenge to finding the solution. This narrow approach to difficult problems turned out to be inadequate and ineffective in the face of modern, complex challenges. The handling of complex and nonlinear problems requires holistic, macro, rather than linear, micro thinking. Systems thinking was thus proposed as a new approach to finding solutions. As Kimberly Bowman explains,

> "Systems thinking" tries to take into account the interactions between different parts of a system and understand how together they are effecting change rather than simply trying to understand specific components in

isolation. In doing so, systems thinking can be an important part of developing truly sustainable and transformative change (Bowman et al., 2015: 2).

The first conviction concerning social labs is that complex and inter-related challenges, viewed as a system, demand a new systems analysis method for seeking the perspectives of multiple stakeholders and providing solutions for sustainable development.

The second belief resulting from the previous premise is that present-day institutions relying on conventional organization and approaches are outdated and inefficient when it comes to addressing complex issues. In traditional thinking, a problem is undertaken by an individual institution focused only on a specific part of the challenge. This problem-solving process is thus insufficient to address the multiple issues simultaneously contained in the problem. Therefore, the urgent need to handle complex problems requires the construction of a new social institution to connect diverse stakeholders: public institutions, private organizations, and civil society. This new institution was thus envisioned as a platform or coalition made up of multiple inter-linked actors that would get involved in investigating the system through collaborative and iterative processes.

The next conviction underlying the emergence of social labs is related to seeking a new cross-sector and cross-disciplinary institutional model to meet complex challenges effectively. This innovative organization was designed to eliminate sector- and discipline-based silos. Hence, the purpose of the new model was to involve diverse actors in recognizing how different parts of the system were entangled and influenced by each other. Eventually, the social lab was formed as a hub that 'seeks to catalyze emergent innovations in a particular domain—through diverse strategies and interventions' (Tiesinga and Berkhout, 2014: 27). This experimental institution brings together various actors from academic institutions, cultural institutions, the government sector, private organizations, and civil society to respond collaboratively to complex problems and accelerate social innovation.

The last argument for launching social labs stems from the previous statement that the current methods used to tackle complex problems are ineffective and inadequate. In seeking successful tools, social labs have developed new change

methodologies derived from social science, design, and management studies. Thus, in the labs, the collaborators apply a wide range of methods, including experiments, participatory design, and prototyping. The purpose of these techniques is to engage diverse actors in the process of 'learning by doing' and designing solutions together inside the lab through consultations and iterations. As Torjman argues, 'Importantly, prototyping enables the team to see and feel a physical object to begin early-stage feasibility planning. Failure is embraced; prototypes that do not "work" are part of the process to find those with potential' (2012: 10). Afterward, the prototype is transferred to, and tested in, the world outside the lab. The authors of *Labcraft*, the important publication on social labs, describe the process of designing and applying the lab's products to the real world as follows:

> We translate our hypotheses into prototypes for new or improved solutions to social challenges, often in the form of products, processes, policies, or services. We test those solutions through their application, often in the form of pilots or trials with users. And we use the results of our tests to iterate and to inform the creation of still-better solutions. And we develop our own strategies and programs through a trial-and-error process of experimenting and prototyping (Tiesinga and Berkhout, 2014: 85).

The network structure of these labs is seen as an 'idea funnel' (Edwards, 2010: 10), which is filled by circulating iterative-based solutions between social institutions and public spaces.

The Sustainable Food Lab and the Parsons Design for Social Innovation and Sustainability Lab constitute good examples of the social lab models. The first one, the Sustainable Food Lab founded in 2004, operates as a platform for corporations, governments, farmers' associations, and NGOs to work together to accelerate the incorporation of environmental, economic, and social sustainability into the world's food production systems.

> Sustainable Food Lab members believe that the industry is facing critical issues that cannot be tackled by one organization. These wicked problems

include water quality impacts in every one of the world's waterways on which farmers grow crops, emissions from the whole food supply chain, and farm labor improvements that require immigration and government policies as well as employment conditions in private businesses (Hamilton, 2013: 35).

This innovative consortium-based lab aims to address climate change, farmer poverty, and soil health through iterative and system analysis methods. The cornerstone of the lab's approach is to create a 'kitchen table culture' where 'stakeholders can roll up their sleeves, speak candidly and learn from each other's perspectives […] designing and managing supply chain initiatives and collaborations among food companies, NGO's, farmer organizations and research institutions' (Sustainable Food Lab, n.d.). The lab seeks to transform food production systems through cross-sector partnerships to create outcomes that improve the whole system and solve intractable problems from multiples perspectives.

The Parsons Design for Social Innovation and Sustainability Lab (DESIS Lab) is, in turn, an action research laboratory created in 2009 at The New School. The lab collaborates with local partners in New York City and with global stakeholders through the DESIS Network, the platform that was established to bring together around 50 design labs based at universities around the world. The goals of the DESIS Lab are to explore the relationship between design and social change, advance the practice and discourse of design-led social innovation, and develop social sustainability through strategic and service design, management, and social theory. The lab launches three-year projects conducted with local partners and disseminated through public exhibitions and toolkits. The first action that the lab undertook, Amplifying Creative Communities, aimed to engage groups of citizens in sustainable and positive living in New York City. These creative communities—community gardens, food co-ops or alternative childcare—seek to solve problems of everyday urban life by promoting simple, but often ingenious, solutions (Amplify, n.d.). The laboratory practices are driven by participatory design methods, which actively involve individuals and communities in the collective design process.

The DESIS lab relies on the principles of diverse collaboration, the participatory approach, and heterarchies. The last value, in particular, constitutes the foundation of the lab culture:

> Whereas researchers have focused on social hierarchies and structural asymmetries, little attention has been paid to heterarchies — the lateral forms of collaboration through which social life is constructed. We promote such interdependent networks, as they generate more opportunities for heterogeneous forms of collaboration (Parsons DESIS Lab, n.d.).

Increasingly complex, nonlinear, and interconnected challenges, such as the above-mentioned food system and social diversity, require a new approach based on renewed commitment and unprecedented collaboration. As Lisa Torjman states:

> Complex problems cannot be solved by individual entrepreneurs working independently, or even by teams of like-minded specialists. We must engage multi-sectoral expertise in an evidence-based, design-driven approach, to advance solutions to these seemingly intractable challenges. This is where Labs come in (Torjman, 2012: 18).

Thus, new laboratories have emerged as the collaborative infrastructure for turning ideas into action.

Towards the Infrastructure of Engagement

Following the evolution of techno-science labs and social labs, we can notice how the concept of a laboratory has been profoundly transformed from a separate scientific room into a collective chain of coalition-based spin-offs capable of catalysing social change. As a result, laboratory studies have also undergone significant changes from ethnographic investigations of workplaces to tracking a network of labs' engagement in social challenges. The laboratory has been redesigned as a transformative infrastructure with the power to make changes. The shift in the laboratory concept has resulted from thinking beyond the instrumental infrastructure towards the

critical infrastructure intertwined with socio-cultural, political, and technological systems. Therefore, to envision a laboratory as something more than a solely technical-research infrastructure, it is necessary to reveal the transformative side of the infrastructure. As Paul N. Edwards et al. claim, 'Transformative infrastructures cannot be merely technical; they must engage fundamental changes in our social institutions, practices, norms and beliefs as well' (Edwards et al., 2013: 13).

Rockwell (2010) argues that the infrastructure turn in the humanities was a political move that involved redefining the idea of research in such a way that scholars would be aware of what sort of infrastructure was needed and what should be particularly supported by infrastructure. Rockwell calls for reimagining 'infrastructure not just for professional researchers at universities, but the amateur researchers in the community. If we want long-term political investment, we need to open it up to the community' (2010). Picturing the infrastructure as a bridge is important for enhancing the connection between scholars and facilitating collaborative research; however, as in sewers and power lines, it should also provide utilities for society. The type and scale of organizational structures determine what kinds of services and products are offered to the community. Rockwell suggests that we need to explore the social dimension of infrastructure where the values and principles are embodied in the provision of technical support. Therefore, large-scale investments in infrastructure for the humanities have evoked the need for the critical investigation of its layers as an inherent socio-cultural system.

The turn towards interrogating infrastructure led to the emerging field of Critical Infrastructure Studies as a mode for conducting cultural studies. This nascent field was initiated by Alan Liu and James Smithies through the establishment of a collective of international scholars from different disciplines who continue to build a theoretical foundation for reading culture through the critical lens of infrastructure (CIStudies, n.d.). The researchers have framed a wide scope of critical infrastructure studies that aim to interpret and critique culture at the level of infrastructure, 'where "infrastructure," the social-cum-technological milieu that at once enables the fulfilment of human experience and enforces constraints on that experience,

today has much of the same scale, complexity, and general cultural impact as the idea of "culture" itself' (Liu, 2018: 2). The study offers many different approaches to infrastructure explored from the perspectives of the DH, STS, media studies, and feminist studies, to name just a few. This newly established field has called for reinterpreting culture and society through infrastructure layers in such a way that the substrates reveal themselves as agents with the capacity to both drive and constrain the process of knowledge creation.

The last matter was a particular focus of a workshop held at the University of Michigan School of Information in 2012. An international group of scholars representing different domains was brought together to debate the operation and challenges of knowledge infrastructure. One theme of the discussion was devoted to the issue of how different channels of knowledge distribution encode and reinforce existing interests and relations of power. As we can read from the report:

> All infrastructures embed social norms, relationships, and ways of thinking, acting, and working. As a corollary, when they change, authority, influence, and power are redistributed. Knowledge infrastructures are no different; they create tensions and raise concerns that are best addressed early and often. New kinds of knowledge work and workers displace old ones; increased access for some may mean reduced access for others (Edwards et al., 2013: 23).

To disrupt the uneven spread of knowledge, the scholars proposed involving citizens in the process of the co-production of infrastructure. Referring to the Scandinavian participatory design movement, the researchers stressed the role of public engagement in designing infrastructure as well as the very notion of infrastructure being involved in socio-political matters. These reflections rightly show the feedback loop between infrastructure and the knowledge represented in its design. Going further along this path, we can deduce that infrastructure has the power to create the conditions for producing certain knowledge and values. Drawing upon lessons on infrastructural agency, scholars have called for engagement in critical reflections

on different forms of infrastructures: institutional, material, social, and digital. The concept of infrastructure is thus employed as a useful lens for analysing socio-cultural concerns.

One way of applying infrastructural literacy (Mattern, 2016) is to envision a new organizational structure capable of disrupting current constructions. The discourse involved in reimagining infrastructure for the humanities has been taken up particularly by North American feminist scholars. It is worth recalling two panels at Digital Humanities conferences organized by the Alliance of Digital Humanities Organizations (ADHO), which were both devoted to the issue of rebuilding infrastructure in the vein of feminist thinking: Creating Feminist Infrastructure in the Digital Humanities (2016) and Reimagining the Humanities Lab (2018). While the first discussion was focused on addressing the social and relational aspects of infrastructure, the second panel aimed at disrupting the movement towards positioning digital humanities labs in line with science labs. The scholars proposed to rebuild the lab 'as a site for humanistic rather than scientific work' (2018) and have that building process rely on the values of generativity, legibility, and creativity. In addition to these ADHO conference panels, when initiating a discussion on reconsidering the lab's structure and mission, the University of Colorado, Boulder organized the symposium What Is a Feminist Lab? in 2019. It was the first event dedicated entirely to feminist approaches to interpreting and reconstructing a laboratory. The talks revolved around building a laboratory in line with feminist thinking as well as designing the infrastructure through the lens of feminist studies (e.g., Tara McPherson discussed software and digital projects design motivated by feminist intent).

Significant principles of feminist thinking in reconstructing infrastructure are the focus on its transparent construction, the culture that has emerged from its implementation, and its co-creation of knowledge based on the values of collectivity, equality, and inclusivity. The participants in such infrastructure become aware of how knowledge and resources are manufactured and obtain access to an environment ripe with opportunities for disrupting and reconstructing such a system. A laboratory drawn upon the feminist approach represents a space for critical engagement and

new modes of knowledge production that are 'collaborative, experimental, emergent, and responsive'. As the organisers of What Is a Feminist Lab? argue:

> Despite the novel forms taken up by labs for some time, their colonial and masculinist lineages have not yet been properly addressed. This is a significant omission, as inherited lab models can have direct influence not only on the types of projects taken up by a lab, but on its overall ethos, the way equity is handled in its organization, its epistemic models, as well as on the accessibility of its methods and outputs (What Is a Feminist Lab? 2019).

The feminist perspective draws attention to a lab culture shaped by cooperative models of labour and credit, critical practices, including a speculative design that aims to imagine new futures, and active engagement in social transformations by producing community-curated projects, shaping new cultural policy and embodying the values of equality and inclusivity in the design of digital tools and projects.

The following two labs are good examples of the feminist approach-based labs built by two recognized feminist scholars in digital humanities: The Human Security Collaboratory (HS Collab) directed by Jacqueline Wernimont, and The Equality Lab at William and Mary, founded by Elizabeth Losh. The HS Collab launched by the Global Security Initiative at Arizona State University is 'a collective of artists and scholars dedicated to addressing the ways in which digital technology creation and use affects individual and community life' (HS Collab, n.d.). The lab is focused on tackling complex problems related to digital security and civil rights through the application of digital humanities tools and inquiries. The lab's projects include Border Quants, a project related to digital human rights, personal data protection, and decolonial approaches to data use, and Vibrant Lives, an immersive performance installation that served as a critical comment on the use and monetization of personal data production. The important part of the lab's activities is a public engagement through events, such as a series of lunchtime conversations about digital human security issues. The Equality Lab, in turn, is devoted to testing, experimenting, and questioning the nature of equality across many different domains by using digital tools. It provides a 'space to ask big questions about how equality has been defined in different places at

different times in history and study how equality (and inequality) can be represented in scholarly works' (Equality Lab, n.d.). The lab represents a flat, non-hierarchical, and diverse cohort of students, scholars, and community members. One of the lab's research areas is the LGBTIQ Research Project, which is conducted by students and scholars in collaboration with multiple community partners across Virginia with the aim to better understand and preserve the history of LGBTIQ people and cultures in the Commonwealth, and make these histories accessible through digitized materials and oral histories.

A critical reading of the layers of infrastructure aims to understand how they condition research practices and social experience as well as to disclose the power stemming from their structure and situatedness. Some places, unlike others, are distinguished by the specific powers assigned to them based on their essential internal features. The laboratory has been considered to have such a capacity to raise the world and has undergone a critical scaffolding, as Mattern puts it in her excellent analysis of infrastructures as critical structures through which we can address social issues (Mattern, 2016).

Drawing on critical infrastructure studies, social lab theories, and the discourse of reimagining the lab in the vein of feminist thinking, I propose to reflect on a laboratory through the lens of the *infrastructure of engagement*. The inspiration to frame laboratories this way comes from Humanities for All, an initiative of the National Humanities Alliance Foundation. The foundation has established what the Humanities Action Lab defines as the *infrastructure of engagement*: 'institutional structures that support engaged scholarship, including degree programs, centers, funding opportunities, digital technologies, and curriculum reorientation initiatives' (Humanities for All, n.d.). By developing a theoretical framework for this concept, I want to draw attention to the ways in which the laboratory has the potential to be involved in addressing social challenges via embedding its infrastructure in a social system of interconnected elements as well as by embodying social values and principles in the very design of infrastructure. The laboratory has turned into the *infrastructure of engagement*, which, through its design and actions, has become a voice for public involvement.

To set up the discussion of the epistemological foundation, I refer to Paul Dourish and Genevieve Bell's concepts of the *infrastructure of experience* and the experience of infrastructure. Dourish and Bell examined the meaning of ubiquitous computing in everyday encounters with space from the perspective of design studies and the cultural organization of space. They reflected on how we can experience and interact with pervasive computing through physical space conceptualized not just as material infrastructure but as the infrastructure through which we perceive the world. Dourish and Bell presented infrastructures as fundamental elements of the ways in which we encounter the world and, in doing so, introduced the concept of the infrastructure of experience as something that is embedded in everyday space, shapes our experience of that space, and provides a framework through which our encounters with space take on meaning. Further, they proposed 'the experiential reading of infrastructure' (Dourish and Bell, 2007: 417), upon which infrastructure and everyday life are coextensive. It is a useful theoretical framework for showing how an infrastructure that is normally taken for granted can shape our perceptions and evoke unexpected changes.

Drawing on Dourish and Bell's idea of intertwining experience and organizational structures, I determine the following implications for the conceptualization of the *infrastructure of engagement*. First, the infrastructure is socially and culturally organized and situated; therefore, the social and cultural aspects provide contexts for understanding the infrastructure as well as the framework for designing such infrastructure. As Dourish and Bell state:

> Technological infrastructures are, inherently, given social and cultural interpretations and meanings; they render the spaces that they occupy as spaces that can be distinguished and categorized and understood through the same processes of collective categorization and classification that operate in other domains of social activity (2007: 428).

Therefore, the infrastructure embodies social and cultural values and, to pursue this line of thinking further, it is capable of reinforcing and redistributing influence and power. Second, the infrastructure as a social product builds new forms of communities

and organizations through the mechanism of inclusion, by connecting actors in a network, and exclusion, by setting up physical and symbolic boundaries. Third, the infrastructure operates the mechanism of knowledge production and transfer; therefore, it can influence the ways in which knowledge is reinforced or undermined. Reflecting upon changes in knowledge infrastructures, Paul N. Edwards claims, 'New knowledge infrastructures hold great promise, and they may help address key issues of public import. But knowledge infrastructures also face limits, create tensions, and raise concerns' (2013: 13).

The above premises of the *infrastructure of engagement* reveal how the infrastructure can be used as a critical scaffolding that, through its structure and design, has the potential to interrogate and shift social dynamics. The building of the *infrastructure of engagement* is thus a critical gesture to make its substrates crucial elements in constructing the reality. Therein lies the promise of the *infrastructure of engagement* to reimagine and rebuild the world differently.

I propose to conceptualize a laboratory as the *infrastructure of engagement* to show how a lab as a physical place and a theoretical construct can bridge the inside and outside worlds of 'laboratory walls' and become a critical site for engineering, prototyping, and testing new ideas. The following elements of the lab can constitute a framework to design the lab through the lens of the *infrastructure of engagement*: a network structure connecting various stakeholders across sectors, institutions, and disciplines, and spin-off labs, enabling collaborative action; the diversity of actors constituting the engine of a lab; an inclusive lab's structure and culture embodying the values of openness and equality; transparency of research, actions, and data; rapid response to challenges reflected in the focus on a specific problem undertaken from a broad and holistic perspective; the utilization of the systems analysis approach to understand a problem's bigger picture; experimental practices (e.g., prototyping, participatory-based approaches, intervention), and co-creation of solutions with citizens (e.g., through community-curated projects).

From the perspective of this concept, a laboratory is rebuilt as a site of intervention that enables actors to be involved in real-world challenges through the very design of collaborative structures and actions. The laboratory described by the social lab

theorists as 'a container for a multitude of capabilities and perspectives' (Tiesinga and Berkhout, 2014: 53) and a 'platform for addressing complex social challenges' (Hassan, 2014a) can effectively implement the idea of the *infrastructure of engagement*. The proposed framework can provide a theoretical understanding of new lab models in the humanities that no longer resemble their precursors. The mentioned Humanities Action Lab is one exemplification of the *infrastructure of engagement*: the coalition-based lab that connects various local institutions and communities working together on a particular challenge for a specific period of time. There are more examples of laboratories that can be analysed through this category: the MediaLab at the University of Granada, which is an open lab connecting academic work with society through the exploration of new forms of prototyped and participatory knowledge; the Public Data Lab, a distributed lab coordinated by a group of researchers from different European institutions, with the critical aim to facilitate democratic engagement and public debate around the creation and use of public data; and the Rights Lab at the University of Nottingham, which is a large-scale platform-based lab devoted to ending global slavery through the collaboration of various stakeholders.

A laboratory is far more than just a place with instruments and equipment. It is a highly epistemologically and culturally charged concept that implies a specific way of thinking, experimenting, and seeing the world. The analytical concept of the *infrastructure of engagement* aims to unlock the power of the laboratory and inspire to seek new lab models with critical inflection and intervention in public space and global challenges. It also aims to catalyse the design and development of new forms of laboratories that will apply humanities knowledge with the use of digital or non-digital components, and translate that knowledge into actions beyond laboratory walls. Labs can be envisioned as an open space, a coalition, and a digital platform that, through its own infrastructure and culture, has the power to produce, test, and shape the future of society.

Conclusion

Today's big challenges—the COVID-19 pandemic, climate change, migration, and refugee crises—are global in scale, transcending geographical, national, and cultural boundaries, but these all affect and are responded to at the local level. The large

scope of contemporary challenges requires us to seek rapid and innovative solutions scaled at the global level and adjusted to local conditions and needs. In the face of complex global problems, it has become necessary to reflect on the questions: what kind of new forms of organizations are needed to tackle real-world problems? What new approaches are necessary for a cross-sectoral way of solving problems and moving ideas from one place to the other? How can we rebrand and enhance the humanities as a responsive field with the ability to translate knowledge into collaborative actions?

In this essay, I have presented an emerging model for a cross-sectoral organization that is a network-based laboratory made up of diverse actors—public institutions, private organizations, and civil society—involved in investigating the system through collaborative and iterative processes. The new institution called the social lab refers to a well-established institutional model of a laboratory characterized by experimental practices conducted in a sterile environment with the use of instruments and equipment. As Torjman notes, 'Similar to traditional science labs where the scientific method dictates the iterative process by which results are achieved, the newer class of Labs offers a neutral space dedicated to problem-solving in a highly experimental environment' (Torjman, 2012: 9). However, unlike traditional labs, social labs are focused on the diversity of perspectives, the co-creation of solutions with citizens, and the application of prototyping techniques; 'Structured as a flat rather than a hierarchical model, collaborative action can occur more freely, with everyone having something of equal value to contribute' (Torjman, 2012: 9). Social labs, along with community and citizen labs, have contributed to expanding the concept of a laboratory that can be applied to various spaces and fields where there is a need for a collaborative understanding of complex systems and rapid prototyping of solutions. As a result, the laboratory serves as a theoretical construct, rather than a physical place, used to implement an experimental and collective approach, diverse perspectives, and critical interventions. This has opened up the possibility of the formation of new forms of laboratories in the humanities that no longer resemble the science labs that they evolved in. The new models inspired by the social and community labs require, therefore, a new analytical framework for better understanding their principles and practices.

I have therefore introduced a new theoretical approach to conceptualizing a laboratory in the humanities as the *infrastructure of engagement.* The laboratory has become a powerful infrastructure with a great potential to support social engagement and drive systemic changes. The concept of the *infrastructure of engagement* is intended to be an epistemological tool for reconsidering and redesigning physical and conceptual structures for humanities inquiry. By referring to the Humanities Action Lab, I aimed to envision a laboratory as a critical and interventive space guided by the principles of cross-sector collaboration, diversity, vertical structure, inclusivity, systemic approaches, and public engagement. As David Edwards rightly puts it, 'Effective labs listen carefully to public reaction and translate what is learned into useful guidance for future experimentation' (2010: 180).

The proposed approach opens up new research questions and inquiries. First, it has been brought about through a new perspective on the networked collaboration between labs situated in different socio-cultural environments. The networking structure has the potential to 'bridge the gap between these disconnected worlds by translating ideas and resources from one world to the other' (Tiesinga and Berkhout, 2014: 14). This, however, raises the question of how to build collaboration and communication between labs conditioned by divergent socio-technical infrastructure and affected by different social and political concerns. It thus requires further research on how to both scale solutions at the global level and respond to local differences. This, in turn, can entail a critical debate on the implementation of ideas for which epistemologies vary in their perceptions across different geographical and cultural environments. For instance, the concepts of openness and public engagement are perceived differently from one country to another. While open access to resources is the desirable movement in the Western countries, in other regions it meets with uncertainty towards opening public access to indigenous cultural heritage data; e.g. in the context of Indigenous people in Australia (Bowrey and Anderson, 2009) and Africa (Piron, 2018). Therefore, network-based laboratories require further explorations and efforts towards developing the mutual understanding of epistemological situatedness and designing new flexible methods and practices that would enable various actors to engage in a global dialogue.

Second, the development of cross-disciplinary laboratories challenges the role of the humanists in team-based work. The referred laboratories represent good examples of collaborative work between the humanities and other fields; for instance, the Humanities Action Lab brings together scholars coming from the history, literature, art, design, policy studies, and so on; the MediaLab at the University of Granada carries out projects at the intersection of the digital humanities, media studies, and digital culture; the Public Data Lab, in turn, is coordinated by a group of researchers representing the field of anthropology, digital humanities, STS, design, and media studies. This triggers questions as to how a team of people with different epistemological backgrounds might collaborate. What is the contribution of the humanities in designing solutions for contemporary challenges? How can we enhance the position and the application of humanities knowledge in cross-disciplinary and cross-sectoral labs? These labs are established to produce systemic knowledge on a particular social challenge and collectively design a solution based on prototyping and intervention techniques. It raises further questions about the emergence of new research methods in the humanities, such as prototyping, participatory mapping, and design thinking. It thus requires an understanding of prototyping ideas from humanities perspectives, and developing new innovative methods for scholarly research using software development and design thinking approaches.

The discussion on the significance and the role of humanities knowledge in addressing global challenges has again revived in the face of the COVID-19 pandemic, in the form of the question: 'What can the humanities offer in the Covid era?' (Reisz, 2020). Over the years, the humanities have been challenged and developed into a field that connects research and teaching with projects to advance social justice and the public good. The engaged humanities aim to create new configurations of humanities knowledge, social relevance, and public involvement and by doing so, become a key voice in debates on tackling real-world problems. In response to COVID-19, the London School of Economics and the British Academy and Arts Council England set up the Social Sciences, Humanities & the Arts for People & the Economy (SHAPE) initiative, aimed at rebranding the arts, humanities and social sciences and promoting these as the branches of knowledge necessary for 'understanding more

profoundly the world around us and the people in it, through observation, analysis, translation and interpretation' (SHAPE, n.d.). This initiative has the potential to become a powerful movement towards reinforcing the position of the humanities that, together with STEM subjects, can contribute to addressing problems in the contemporary world. The global challenges are complex and interrelated; therefore, they require active engagement and collaboration from actors representing different perspectives, disciplines, and sectors. Under these conditions, laboratories have been reimagined as sites for interventions in pressing social challenges. Laboratories have the power to reposition the humanities in society as they can provide space for the application of humanities knowledge in epistemological and practical experiments and for the transformation of ideas into actions. This means that we must understand them as *infrastructures of engagement* in order to reimagine and rebuild the world differently.

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Competing Interests

The author has no competing interests to declare.

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