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LIVING LABS UNDER CONSTRUCTION: PARADIGMS, PRACTICES, AND PERSPECTIVES OF PUBLIC SCIENCE COMMUNICATION AND PARTICIPATORY SCIENCE

The lab, the space and the meetup: locating technological experimentation in everyday life

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Abstract

This article analyzes the role digital pioneer communities play in the localization of everyday technological experimentation based on three sites of practice: the lab, the space, and the meetup. Taking a historical view, it begins with a reconstruction of Stewart Brand's popularization of the lab discourse. On this basis, the space in the Maker movement as well as the meetup in the Quantified Self and Hacks/Hackers movements is investigated, finally arriving at a reflection on the dynamics that come and go between them. While the article is primarily a conceptual contribution, its arguments are grounded in an extensive media ethnography.

Keywords

Popularization of science and technology; Science and media; Experimentation; Pioneer Communities; Quantified Self, Maker, Hacks/Hackers

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Introduction

In scientific practice, the "experiment" is considered one of its most structured procedures: Whether it is a natural science or a social science experiment, the aim is to be able to control as many variables as possible within a methodically informed design so that statements can be made about nature or people on the basis of hypotheses. Running against the grain of this inflexible understanding, the idea of "experimentation" has become increasingly prevalent in recent years, especially in the domain of technology development: Much closer to the original Latin meaning of *experiri* which means "to try out", "to test", and "to attempt", it is about testing ideas in iterative processes, developing them further, and gradually arriving at innovations that are then close to human requirements and human needs. Experimentation understood in this way is associated with new possibilities of "design thinking" [Buchanan, 1992, p. 5] and "democratizing innovation" [von Hippel, 2006, p. i].

The idea of the Living Lab is firmly rooted in experimentation along these terms. At its core, Living Labs refers to real-life environments in which iterative feedback

processes are used not only to bring scientists and everyday users together, but to also enable sustainable innovation processes. Living Labs are closely linked to co-creation and prototyping that foreground user-centered design and rapid development. One of the key arguments for why this should work better in Living Labs than elsewhere is the ways in which they afford experimentation. In an early overview of the Living Lab approach, for example, Claudio Dell'Era and Paolo Landoni [2014, p. 139] see the core of a Living Lab in "a real-life test and experimentation environment, and users who are aware that they are co-involved in the innovation process." Hamed S. Alavi, Denis Lalanne, and Yvonne Rogers [Alavi, Lalanne & Rogers, 2020, p. 10] state in their research review "[c]onducting research in an authentic yet experimental setting is no longer what motivates the extensive investments in 'Living Lab' infrastructure and studies"; yet, in their article, the ability to experiment remains one of the key criteria for the design of a Living Lab. Furthermore, in Leminen and Wusterland's history of the Living Lab from "scattered initiatives to a global movement" [2019, p. 250], experimentation is the common thread that holds their analysis together.

The global spread of this kind of thinking has various sources and plays out across numerous dynamics.[1] However, the role of "pioneer communities" [Hepp, 2016] — those hybrids between social movements and think tanks that are curated by an organizational elite to disseminate certain imaginaries of a technology-related transformation of societies — should certainly be taken into account. The pioneer communities of interest here have their origins in the 1960s San Francisco Bay Area, where an early iteration of a pioneer community was the "Whole Earth network" [Turner, 2006, p. 8].[2] It emerged from the *Whole Earth Catalogue* edited by Stewart Brand, which would eventually give rise to the early online platform *WELL* [Turner, 2005], the tech magazine *Wired* [Frau-Meigs, 2000], and the *Global Business Network* [Beck, 2016]. A second, more recent generation can be seen in the Maker, the Quantified Self, and the Hacks/Hackers movements. While the Maker movement and the spaces where its practices play out focus on self-determined tinkering and making, the Quantified Self movement centers around ideas of self-measurement and personal development in its meetups, and the Hacks/Hackers community brings journalists ("hacks") and programmers ("hackers") together to develop new technologies centered around public discourse.

As I will show in this article, the role of these pioneer communities is to be seen in light of the *localization of technological experimentation in everyday life*. I use the term *everyday life* in the phenomenological sense, according to which it is understood as a certain state of consciousness of unproblematic practice [Schütz & Luckmann, 1973]. In this sense, there is an everyday life of work as well as an everyday life of leisure. *Experimentation* involves trying things out, which connects it to *localization* in everyday life: On the one hand, it is about finding appropriate "locales" [Giddens, 1984, p. 118] for experimentation, while at the same time, these communities are localizing themselves with their experimental practices as part of peoples' everyday lives. It is these ingredients that, brought together, produce the vital spatial centers through which pioneer communities operate: *the lab*, *the space* and *the meetup*.

[1] Important, for example, is the ideological influence of design thinking in Silicon Valley [Turner & Butler-Wall, 2022].

[2] For the broader historical context of the emergence of pioneer communities, see [Hepp, 2020a, pp. 30–40] for broader discussions around the historical reasons for the San Francisco Bay Area's role in the emergence of these communities, see Castells [2001, pp. 36–63].

To demonstrate this dynamic, I will argue along five distinct steps: First, taking a historical view, I aim to reconstruct Stewart Brand's popularization of the lab discourse, built around a portrayal of MIT, which is also considered the origin of the Living Lab [i.e. Alavi et al., 2020, p. 10:3]. This lab discourse was then later taken up to incorporate the concepts of the space and the meetup by second-generation pioneer communities. To illustrate their specific dynamics, I will discuss the space as it relates to the Maker movement and the role played by the meetup in the Quantified Self and the Hacks/Hackers movements. Finally, I arrive at a more general reflection on the dynamics between lab, space, and meetup. I am mainly concerned with describing how the particular genealogy of the Living Lab and recent attempts to construct itself as a "movement" [Leminen & Westerlund, 2019, p. 250] can only be understood if they are seen as part of the popularization of the lab discourse sustained by pioneer communities. While I am concerned with overarching nexuses in this article, its arguments are empirically grounded in a media ethnography conducted since 2016 on each of these pioneer communities.[3]

Popularizing the lab discourse: the MIT media lab and constructionism

Looking at the discourse in innovation and change not only in academia, but also in professional practice, the lab is nowadays considered a central place of innovation: setting up an innovation lab is seen as a first step of change not only in journalism [Hogh-Janovsky & Meier, 2021; Mills & Wagemans, 2021], but in other industries, public administrations [McGann, Blomkamp & Lewis, 2018] [Greve, De Vita, Leminen & Westerlund, 2021]. The positive connotation of lab even goes beyond the context of innovation, in that it is not uncommon to refer to cafés or music venues as labs to emphasize their experimental nature. We can refer to this as a "lab discourse" [Wershler, Emerson & Parikka, 2022, p. 39], according to which labs are, or should be, places of open yet methodologically informed idea creation, enabling not only the generation of new products but also comprehensive organizational change. Especially in tech-oriented contexts, the lab is considered the experimental place of innovation par excellence.

When asking how such a discourse could emerge, one quickly arrives at the MIT Media Lab, which is fundamental to our current understanding of labs as places of "interdisciplinary collaboration and rapid prototyping of communication technologies" [Wershler et al., 2022, p. 60] that are "synonymous, in the popular imagination, with innovation, entrepreneurialism and profitability, regardless of whether or not their products are successfully monetized" [Wershler et al., 2022, p. 154]. The genealogy of the Living Lab also finds its beginnings in MIT. In early publications, the concept of the Living Lab can be traced back to William J. Mitchell [i.e. Schuurman, Evens & De Marez, 2009, p. 190], who was Professor of Architecture and Media Arts and Sciences and Dean of the MIT School of Architecture and Planning, which gave rise to the MIT Media Lab and is still part of the school. In more recent publications, this genealogy is seen in a more differentiated way and other precursors of Living Labs also come into focus

[3]The media ethnography on the Maker, Quantified Self, and Hacks/Hackers movements is based on analyses of material from the Silicon Valley Archives (Stanford University), observations of different events and spaces, interviews with various members, and discourse analyses of media coverage in Germany, the United Kingdom, and the United States. See for these analyses and for details of the methodological approach, which cannot be addressed in the context of this article: [Hepp, 2020b, 2022; Hepp, Alpen & Simon, 2021; Hepp, Benz & Simon, 2021; Hepp & Schmitz, 2023; Hepp, Schmitz & Schneider, 2023].

[Leminen & Westerlund, 2019, p. 255]. Nevertheless, MIT's centrality is still maintained as the Living Lab could, by association, be presented as a legitimate method to be taken seriously further afield. A great deal of this legitimizing work has been carried out in particular by the Whole Earth Network: Stewart Brand's book *The Media Lab: Inventing the Future at MIT* [Brand, 1988, orig. 1987] can be considered one of the most important starting points for this mythologization.[4] Brand created a very powerful narrative which not only shaped the lab discourse, but the space and meetup as places of experimentation for today's second-generation pioneer communities as well.

The fact that the MIT Media Lab became the subject of the book should be seen in a broader context. For instance, MIT was presented and thereby discursively constructed early on by Steven Levy [1984, pp. 3–26] as one of the hacker movement's central places of origin.[5] At the time of the publication of Levy's *Hackers. Heroes of the Computer Revolution*, many of the people he described as hackers had never met in person, which is why Stewart Brand and other members of the Whole Earth Network, such as Kevin Kelly, organized the first hacker conference in Marin County in November 1984, which has become one of the seminal events in the hacker movement's constitution. Also of note is an encounter between Stewart Brand and Nicholas Negroponte, one of the central figures behind the founding of the MIT Media Lab, whom Brand had met at the first Technology, Entertainment and Design (TED) conference in Monterey (CA) in February 1984. Negroponte invited Brand, before the foundation of the MIT Media Lab in 1985, to spend three months as a paid guest [Markoff, 2022, p. 262]. Ultimately, the idea of a book about the lab was already fermenting in the energetic atmosphere of the Media Lab.

Brand describes this stay as "a quest for hidden structure, both in the lab and in the world" [Brand, 1988, p. 11]. He was concerned with describing "two media labs", on the one hand the *locale* of the "specific five-story pile of equipment, academics, and ideas in Eastern Massachusetts", and on the other, the *attitude* of "the worldwide media laboratory in which we all are likely to be experimenters for the rest of our lives" [Brand, 1988, p. 12]. In other words, what happened at the MIT Media Lab as a particular locale was seen by Brand as a model for a laboratory-based approach that would be needed with the global spread of computer technologies.

The book is structured along the narrative of the different departments of the MIT Media Lab, presenting the stories and activities of the people who dominate each one, and is interspersed with reflections on its general character. All of this leads into a second section, which considers the "media laboratory of the world at large" and its challenges [Brand, 1988, p. 151]. The pivot at the center of the lab discourse's rise is the merging of "computer and communications" [Brand, 1988, p. 228].

Here, the image of the MIT Media Lab is sketched along three core ideas: First, fundamental to the lab is its *creative chaos*. In particular, the "Terminal Garden" [Brand, 1988, p. 35], a space of networked computers where various members of

[4] Wershler et al. [See 2022, p. 61], who broadly cite Brand's account of the lab at this point and return to it repeatedly in their "case study" of the MIT Media Lab.

[5] For a scholarly critique of this historicizing narrative, see Jordan [2017, p. 530].

the lab repeatedly meet and functions as a metaphor that describes the entire Media Lab as an example of an interaction, a conversation, that continuously generates new ideas. A creative integration of artistic thinking was also seen as an important source of inspiration and was plainly evident in the experimental architecture of the building: "art, science, and engineering are in alliance in reshaping communication technologies" [Brand, 1988, p. 82f]. However, this open creativity is not necessarily vague, it is directed; it is also not necessary to stop at the ideas, but to concretize them in prototypes: "demo or die" [Brand, 1988, p. 3] is positioned as a key approach to working at the lab.

An air of *open experimentation* represents another central characteristic of the lab. Working with prototypes is presented as its central "experimental method" [Brand, 1988, p. 50]. With this approach to open experimentation, the lab also positions itself vis-à-vis the industry: experimentation is not a process of product development that the tech industry squints at. The Media Lab is about "providing an environment to seed [all] sort[s] of zany things happening that can't happen in [...] [a] corporation" [Brand, 1988, p. 158, quoting Negroponte]. It is precisely this openness to experimentation that is presented as the reason why companies make large sums of money available to the MIT Media Lab in the hope that they will be able to access ideas for their own future product ideas.

Third, this all happens in an atmosphere of *radical user-centeredness*. As Brand states, "the idea of intense personalization to the user [...] is at the heat of most of the Lab's projects" [Brand, 1988, p. 37], which he understands as a "valuable by-product" of the "primary theme" of focusing a "conversation, with computers and through computers" [Brand, 1988, p. 151]. Accordingly, "users as designers" [Brand, 1988, p. 175] are brought into the conversation and considered vital to the development process. Ideas of "do-it-yourself" [Brand, 1988, p. 28], the productive "homebuilder" [Brand, 1988, p. 175] and the "amateur" [Brand, 1988, p. 176] are repeatedly harnessed to capture the newly understood user at the MIT Media Lab. Everyone seems to become a hacker when the practice is formulated along the ways in which the "home manipulation of commercial information, as Media Lab projects show, is something worth encouraging" [Brand, 1988, p. 21].

This core of the MIT Media Lab is contextualized by Brand with overarching assessments: in the domain of *politics* he calls for a deregulation of digital media; in relation to *technologies* he sees the potential of their disruptive properties; for *society* he expects the emergence of a new sociality; and in terms of *theory* he anchors it all with an everyday cybernetics. Many movements of thought that were later seen as part of the "Californian Ideology" [Barbrook & Cameron, 1996; Hepp et al., 2023] are explicitly formulated here. For example, it is said that "deregulation does encourage invention" [Brand, 1988, p. 62], a "computer-subversion of all professions" is emerging [Brand, 1988, p. 151], the MIT Media Lab "flirts with dangers like addictive connectivity, total entertainment, and out-of-the-body experience" [Brand, 1988, p. 228], and all this can only be grasped cybernetically, because "complex systems produce resilience in unpredictable forms" [Brand, 1988, p. 233, quoting Schwartz].

Such statements make it easy to see why Stewart Brand's portrayal of the MIT Media Lab could become so influential for the lab discourse that continues to this day: In essence, he created the image of a place for the continuous production of

disruptive ideas and linked this closely to ideas of a "Californian Ideology". In this way, Brand laid the foundation for decoupling the lab discourse from the site of the *scientific* lab and relocating it toward various other sites of experimentation. This also marked the beginning of a decoupling of the laboratory from as a specific, experimental locale to the laboratory as an *attitude*.

Such a decoupling was already in place at the MIT Media Lab, especially with the concepts of technology-based learning that were being developed there by Seymour Papert, Sherry Turkle and others around the notion of "constructionism". Seymour Papert, in the Media Lab book, is one MIT scholar with whom Brand deals more closely. Brand was palpably fascinated by Papert's development idea of the "computer programming language meant to be used by children, called 'Logo"' [Brand, 1988, p. 120] and its related concepts of learning through which a school in a disadvantaged Boston neighborhood became a place of "amateur science", with a "preference for the tinkerers over the planners" [Brand, 1988, pp. 126, 129]. Drawing on Piaget, feminist theory, and early STS work, Papert and Turkle outlined an approach of "learning by making" [Papert, 1991, p. 1], [6] which led to the MIT Media Lab being noted as the "birthplace of many of the ideas and materials embraced by the modern Maker movement" [Martinez & Stager, 2013, p. 24] and Papert "as the father of the Maker movement" [Lachney & Foster, 2020, p. 69].

This is further supported by the fact that it was at the MIT Center for Bits and Atoms, a sub-department of the Media Lab, where based on the course *How to make (almost) anything* Neil Gershenfeld developed the concept of the FabLab: a "lab for fabrication" [Gershenfeld, 2005, p. 12] equipped with laser cutters, computer-controlled milling machines, 3-D printers and other devices began its journey into the public imagination. The FabLab is intended to offer private individuals and owners of small businesses access to the latest manufacturing processes to enable "rapid prototyping" and "personal fabrication" [Gershenfeld, 2005, p. 16f].

The Whole Earth Network propelled these ideas even further. For example, after writing his book on the MIT Media Lab, Stewart Brand began an intense engagement with questions of learning, which resulted in his book *How Buildings Learn* [Brand, 1995]. Between 1987 and 1989, Brand organized six "Learning Conferences" for AT&T, Shell and Volvo "that brought together a small group of scientists and engineers to meet with the corporate executives" [Markoff, 2022, p. 288]. At the first conference, Hillis, Minsky and Papert from MIT were invited as scientists; the Global Business Network (GBN), founded by Stewart Brand and Peter Schwartz in 1987, which into 1990s became "synonymous with the emerging Silicon Valley perspective that the world's problems could be tackled with technology-centered solutions" [Markoff, 2022, p. 296], also included Turkle and Papert.

This engagement with learning, open experimentation, and the role of places in this process also changed Brand's perspective on MIT Media Lab's building: In the book *How Buildings Learn*, he no longer regards the expensive Wiesner Building, designed by star architect Ieoh Ming Pei, as the epitome of a building for

[6] For a detailed account of Turkle's and Papert's work and its relation to the development of the Maker movement, see especially Lachney and Foster [2020], which I rely on here and in the following arguments.

"learning". Instead, he considered Building 20 to be such a "learning" building, a makeshift building from 1943 that was demolished in 1998, but which was popular with its inhabitants because they could easily adapt the layout of the rooms and the interior architecture to their particular needs [Brand, 1995, pp. 26–28]. This is quite a remarkable shift, the customizable, ad-hoc space, as opposed to more hi-tech environments, is declared *the* locational pinnacle for the tinkering and experimentation celebrated in Brand's book on the MIT Media Lab, rather than the high-tech building.[7]

In summary, the Whole Earth Network as a first-generation pioneer community, spearheaded by Stewart Brand, made a fundamental contribution to the establishment of the lab discourse: they not only made a significant contribution to the myth of the MIT Media Lab as a place of experimentation oriented toward a productive future, they also catalyzed the popularization of the associated notions of tinkering and learning. The idea of the lab, detached from the scientific context was born as a model, a primary locale, and perhaps most significantly, an *attitude* or approach to technological innovation that was about to take the world by storm.

Structuring spaces

Looking at the history of the various tech spaces — hacklabs, hackerspaces, makerspaces, fablabs, etc. — a familiar pattern emerges, a pattern that I have already identified in the "life cycle" [Hepp, 2022, pp. 242–245] of pioneer communities, that is, they form in relation to a number of other contextual figurations. In a genealogy of tech spaces, it is important to remember the part played by various autonomous movements and the squatter scenes, in whose environments hacklabs would also emerge in the late 1990s.[8] These were political projects rooted in media activism. Hackerspaces originated in the organized hacker movement, with the first emerging in Europe in the mid-1990s, such as c-base in Berlin. Hackerspaces became a broader movement through a panel at the 25th Chaos Communication Congress (25C3, 2008) entitled *Building an International Movement*.[9] The panel called for the founding of local spaces and introduced the newly created online platform hackerspaces.org, which still consists of a wiki page with instructions on how to set up a space, a blog, and a mailing list. Subsequently, many of the well-known spaces in Europe, North America, Latin America, and Asia were founded in quick succession [Murillo, 2020]. Unlike the highly politicized and anti-institutional hacklabs, hackerspaces were more politically open and were about providing hacking practices a physical space in which to flourish.

However, it was the pioneer community of the Maker movement through which tech spaces, or makerspaces, would become a widespread phenomenon. *Make:* magazine was founded in 2005 by the American publisher O'Reilly, and the first Maker Faires took place in 2006, garnering widespread attention. Dale Dougherthy, the founder of Make Media and current president of Make Community LLC, purposefully chose the name "maker" instead of "hacker" because of its positive

[7] See also Markoff [2022, p. 290f]. The images in the corresponding Wikipedia entry (https://en.wikipedia.org/wiki/Building_20 [accessed: 2 January 2023]) also provide a clear depiction of Building 20.

[8] See Maxigas [2012] and Mattos, Silva and Kós [2015] for a detailed review of the genealogy of hacklabs and hackspaces.

[9] See https://fahrplan.events.ccc.de/congress/2008/Fahrplan/events/2806.en.html [accessed Jan. 2, 2023].

connotation — and from the beginning, *Make:* magazine propagated the creation of spaces. The circular connection to MIT is close in this regard, in that even the first issue of *Make:* magazine included an interview with Neil Gershenfeld and a tour of the "Fab Lab at MIT" [Denison, 2005]. Of equal importance for the visibility of the Maker movement were the popular publications of its organizational elite; besides Dale Dougherty's [2013] *The Maker Mindset*, Chris Anderson's [2012] *Makers: The New Industrial Revolution* blazed a trail among an eager readership. The book was not only widely translated,[10] it also was promoted via the Whole Earth Network, as exemplified by a talk Anderson gave at Stewart Brand's *Seminars About Long-term Thinking* at the Long Now Foundation on February 19, 2013.[11]

In addition to their publishing activities, the organizational elite of the Maker movement set out to establish makerspaces. Since 2011, *Make:* has publicized their decentralized foundation and networking through the website makerspace.com. The special issue *Make: Ultimate Workshop and Tool Guide*, edited by Mark Frauenfelder[12] [2011], articulated the requirements for establishing a makerspace.[13] Subsequently, explicit support was given to events for the creation of spaces such as the three-day *How to make a makerspace* event at Artisans Asylum's space in Boston, at which Dale Dougherty was keynote speaker and which resulted in a *Make:* magazine article that clearly positioned makerspaces as places for collaborative tinkering against political hackerspaces, "makerspace franchises" [Cavalcanti, 2013, p. 8] such as Techshop [Hatch, 2014], and FabLabs [Gershenfeld, 2005]. In addition, Maker Faires, increasingly realized internationally since 2006, supported makerspaces in a two ways: On the one hand, these events realized — at least as Mini Maker Fairs — in cooperation with emerging local spaces. On the other hand, the large Maker Faires offer spaces the opportunity to present their own work to a more predisposed audience.

We can discern two basic patterns in this engagement by the organizational elite of the Maker movement in relation to the lab discourse. First, there is a further shift from notions of the lab as a place for sciences "inventing the future" [Brand, 1988] to accessible places of tinkering and experimentation. Thereby, makerspaces are also about collaborative working, a "creative chaos" from which new ideas emerge, ideally leading to prototypes that result in contributions to a "new industrial revolution" [Anderson, 2012]. Second, the organizational elite of the Maker movement establishes a framing discourse through which to structure these sites of tinkering and experimentation. What this means is that not only is a certain legitimacy created for the establishment of makerspaces through the "maker ideology" [Turner, 2018, p. S180; Hepp & Schmitz, 2022, pp. 200–203], there also exists a particular assumption that a new industrial revolution will emerge with a movement centered around *making*. A discourse emerges around which technologies should be available at a makerspace: 3D printing, laser cutting,

[10] Including French, German, Japanese, Portuguese, Spanish, and Swedish.

[11] See the recording at https://longnow.org/seminars/02013/feb/19/makers-revolution/ [accessed Jan. 2, 2023]. Anderson can be seen as part of this network, serving as editor-in-chief of Wired from 2001 to 2012.

[12] Frauenfelder is also closely associated with the Whole Earth Network, having been an associate editor at *Wired* from 1993–1998, founding the Boing Boing weblog, and now working as Editorial Director at the *Institute for the Future*.

[13] Interestingly, the assignment also features a paper by Mitch Altman [2011] titled *How to Create a Hackerspace*, which locates makerspaces in the history of hackerspaces rather than the other way around.

soldering stations, and computer-controlled lathes are presented as basic equipment, which can then be expanded with the addition of, for example, woodwork, sewing, and microbiology workshops. Further orientations emerge with regard to the spatial arrangements of the makerspace: the common large work table for joint meetings, soldering and other manual work, separate areas for 3D printing, laser cutters and lathes as well as the other workshops and a lounge area with a small kitchen for communitization.

In the different makerspaces, this kind of framing discourse is appropriated against the background of each specific culture within which they are situated. For example, makerspaces in China are much more oriented towards a state-centered culture of innovation and thus clearly differ from spaces in other parts of the world.[14] Likewise, makerspaces in Latin America have their own specific tradition, which remains much more firmly rooted in the countercultural than is the case with spaces in Europe or the U.S.A.[15] Our own research for makerspaces in Germany and the U.K. also makes the role of the framing discourse in the creation of the spaces apparent in this regard [Hepp & Schmitz, 2023]: For example, the spaces we studied — the eLab Berlin and Happylab in Berlin, the Richmond MakerLabs, and the South London Makerspace in London — were founded during a period during which the makers in Europe and the U.S. were receiving a great deal of media coverage [Hepp & Schmitz, 2023; Rosa, Ferretti, Pereira, Panella & Wanner, 2017, p. 4] and the first waves of Maker Faires were proving successful.[16] Mini Maker Faires, organized mainly by local makerspaces but with guidelines provided by Maker Media / Make: Community, as with other Faires, have been taking place in the U.K. since 2009 and led to the first large-scale Make Faire in London in 2015. The first Maker Faire in Germany took place in 2013 and was attended by around 4,000 participants. By organizing these Maker Faires as family-friendly DIY events, the topic of "tinkering" and "experimenting" was made accessible to a wider audience. The German edition of *Make:* magazine launched in 2014, and Chris Anderson's *Makers* was translated into German in 2013. Other key texts also appeared around 2013 [e.g. Dougherty, 2013; Hatch, 2014]. This framing discourse was not only orienting in the sense that it spread the idea of the makerspace, structurally, as a place for tinkering and communitization, it was also legitimating in that it gave a sense of depth to the tinkering and experimentation of individual participants through a broader maker ideology: making also describes the remaking of the economy. Thus, the commitment to the spread of the locality of the makerspace as an everyday laboratory is at the same time a commitment to the spread of a laboratory attitude.

Encouraging meetups

The meetup platform, founded in 2002, has played a significant role in the Maker movement in that it can serve as a "recruitment pool" (interview with the Founder of the eLab), especially in a space's startup phase, to find people interested in "making", to bring them together, and to encourage them to establish a local space. However, this platform is much more crucial for another second-generation pioneer community that was ultimately constituted around meetups in particular, namely the Quantified Self (QS) movement. This pioneer community goes back to

[14] See especially Lindtner [2014, 2020] and Wen [2017].

[15] See Pederson [2016].

[16] This is consistent with the boom in startups between 2007 and 2013 [Rosa et al., 2017; see also Browder, Aldrich & Bradley, 2019; Sleigh, Stewart & Stokes, 2015].

Kevin Kelly and Gary Wolf, the former being the co-editor of the *Whole Earth Catalog* and the *Whole Earth Review* and co-founder of *Wired*, while Wolf was a prolific writer at *Wired*. Based on the impression that more and more people in the Bay Area were experimenting with self-tracking, they called for an initial meeting (which around twenty people attended) at Kevin Kelly's house in June 2007 under the umbrella term, *Quantified Self* and started a blog of the same name under the slogan "Tools for knowing your mind and body" [Kelly, 2016, pp. 238–289]. In 2011, with the establishment of their own standalone website, their guiding mantra was changed to encourage "self-knowledge through numbers".[17] Meetups were organized via the Meetup.com platform, where Gary Wolf established the "Bay Area Quantified Self Meetup Group" in 2008.[18] During its peak phase in the mid-2010s, the number of meetup groups grew to a total of 31 in North America, 31 in Europe, 6 in Asia, and 3 in Oceania — and was supported by increasingly broad media coverage of the community [Hepp, Alpen & Simon, 2021]. This process of spreading meetups to different regions of the world was initiated and curated by QS Labs, the Bay Area office of the Quantified Self Movement's organizing elite: Through online guidance on how to set up and organize meetups, encouragement at the international QS conferences to do so, and through the indirect support provided by the documentation of meetings through video recordings.[19]

Despite any differences between the local groups, the various Quantified Self meetups are always based on the same pattern, namely that of show and tell. This format is characterized by short presentations of individual QS projects by the organizational elite, with focus placed on individual practices of experimentation. At its core, the structure of a QS meetup is as follows: After an introduction by the organizer, two or three so-called show and tell presentations of 5 to 10 minutes each follow, whereby the presentation — if a computer presentation is used — should consist of a few slides and be structured along three questions: 1. What did you do?, 2. How did you do it?, 3. What did you learn? This structure made sure that each story was "grounded in actual attempts at self-tracking and self-experimentation", as Gary Wolf puts it in his guidance from September 20, 2011.[20] Each Show and Tell round is to be followed by a Q&A session, and each meetup is to be framed by a social event, either at the beginning or at the end. It was recommended that meetups take place at locations in or around tech-oriented environments, such as "open tech labs, universities, corporate offices, design studios, start-up lofts, [or] research centers". Such curated guidance creates a highly specific social setting that is clearly distinct from other tech-related meetups, which are typically much more open in the way they are realized [Adams, Frizzo-Barker, Ackah & Chow-White, 2019, p. 53; Alarcon, 2022].

[17] At first, the URL quantifiedself.org referred to Kevin Kelly's private site http://www.kk.org/quantifiedself.

[18] https://web.archive.org/web/20140121185147/http://www.meetup.com/quantifiedself/ [3.1.23].

[19] In doing so, the QS Lab took advantage of the growing interest in the pioneer community by academia for companion research to improve its own work [i.e. Butterfield, 2012].

[20] See http://quantifiedself.com/2011/09/our-three-prime-questions/ [accessed: 9 January 2023]; the original guidance can be found at https://web.archive.org/web/20120121091229/http://quantifiedself.com/how-to-start-your-own-qs-showtell/ [accessed: 9 January 2023].

Our own field research at the QS meetups in Berlin and London, as well as field research conducted by others in the U.S.A. and Europe [Barta & Neff, 2016; Dudhwala, 2017; Nafus & Sherman, 2014], and analysis of recorded QS Show and Tells made available via the QS Lab website [Choe, Lee, Lee, Pratt & Kientz, 2014; Lee & Briggs, 2014] show that this format is consistently adhered to which leads to the creation of a specific dynamic that carries across most meetups: The focus shifts to the various types of experiments according to the "n of 1" format, i.e., "deep data" [Greenfield, 2016, p. 123], which, by contrast to the collection of "big data" [van Dijck, 2014] (a large amout of data on many people), is about comprehensive, mostly numerical data sets on individuals [Swan, 2013]: "Presentations must be expressly grounded in individual or 'self' experiments, even if the tools, techniques, and devices used come from actors with expressly commercial interests." [Barta & Neff, 2016, p. 527]

With these Quantified Self meetups, a "personal science" [Wolf et al., 2022] is realized in its purest form: The individual is not only responsible for experimentation as such, but their own personality development as it relates to lifestyle and health are also situated as its central objects. As a logical consequence, the (scientific) laboratory or the (collaborative) space is not the decisive place for the pioneer community — the places of highly individualized experimentation are too diverse. Rather, the meetup is decisive as a place for the presentation of one's own projects or experiences, the joint exchange around it, and the then much more situational communitization. The enthusiasm for meetups among in the Quantified Self movement can be understood as one more facet of second-generation pioneer communities' particular attraction to a laboratory mindset that exists as an enhancement to the lab as physical space.

Stimulating innovation settings

What the Hacks/Hackers share with the Quantified Self movement is that the meetup platform has been fundamental to the global spread of their pioneer community. One of the main differences, however, is that through meetup they are not only realizing a format but aiming for a much broader localization of experimentation in different innovation settings. To speak of settings makes sense because many of the places that the Hacks/Hackers are engaged with a very temporary character.

The Hacks/Hackers movement was founded in 2009 in the San Francisco Bay Area as a network of journalists ("hacks") and programmers ("hackers") with the objective of developing new concepts for the future of news production and journalism.[21] The pioneer community grew rapidly in the U.S. and spread internationally, with local groups ("chapters") being formed first in Latin America, then in Europe and in Australia. As of May 2019, there were 116 local groups worldwide, showcased on the movement's website and curated through a mailing list and social media platforms. As a result, the Hacks/Hackers have quickly "become the largest organization of its kind" [Lewis & Usher, 2014, p. 384]. The pioneer community has a certain proximity to the digital media and technology industry, as evidenced not least in May 2015 with the launch of a series of events, organized in partnership with Google, called, *Connect*.

[21] For more information on this network, see http://hackshackers.com [accessed January 14, 2023].

In a broader sense, we can understand Hacks/Hackers as an important community in the wider field of "pioneer journalism" [Hepp & Loosen, 2021, p. 577]. On the one hand, this is a reaction to the new journalistic possibilities opened up by burgeoning digital technologies. On the other hand, pioneer journalism has helped bring about corresponding changes by imagining journalism's possible futures. Examples include data journalism (which uses digital traces as a news source), a journalism of data-based business models (which relies on new forms of value creation through data), nonprofit journalism (which relies on donations for investigative coverage), chatbot journalism (in which a chatbot produces journalistic content), and sensor journalism (an automated form of journalism based on sensor data).

Whether or not ideas like these will lead to sustainable models, the Hacks/Hackers movement drives change by seeing new media technologies as opportunities for more productive public discourse. Enabling new kinds of public discourse through freely accessible data is one of the imaginaries discussed in local Hacks/Hackers groups as "informal trading zones" [Lewis & Usher, 2014, p. 388] between journalists and hackers.[22] This is expressed through the term "hacker-journalist" [Usher, 2016, p. 71]: from their point of view, "hacker-journalists" help people learn about their world and engage in making citizen media contribute to a better functioning democracy and society, making the world a better place overall.[23] Related to this is the notion that experimental uses of data can support a new kind of public engagement and, as a result, foster new ways of building and sustaining collectives.

As a pioneer community, the Hacks/Hackers carry the lab discourse into the everyday life of a specific professional domain, namely that of journalism. This is demonstrated in a first approximation by the newsletter through which the Hacks/Hackers are curated by their organizational elite: In 2010, the newsletter's first year, the term "lab" was used only in reference to three research-related institutions: the MIT Media Lab, the Nieman Lab at the Nieman Foundation for Journalism at Harvard University, founded in 2008, and the IBM Visual Com Lab. In 2016, the situation changed fundamentally and has continued to this day (the end of 2022): MIT Media Lab and Nieman Lab have been joined by Northwestern University's Knight Lab and NYC Media Lab as research-related institutions. In addition, the newsletter refers to various journalistic institutions as Labs (BBC News Lab, Buzzfeed Open Lab, Google News Lab, Reuters Lab, Guardian Mobile Innovation Lab) and even refers to individual local meetings of Hacks/Hackers groups as Open Lab meetings. Since 2016, the term "lab" has staked its claim in the world of established journalism — and in all these cases the term is associated with experimentation with the latest media technologies and new journalistic practices.

The role of the Hacks/Hackers in spreading the lab discourse in the journalistic field can be seen above all in the fact that they have extensively promoted such settings in which journalists meet programmers to test the use of digital tools for journalism: The Hacks/Hackers meetings are particularly focused on experimental testing, not only by sharing new possibilities and developments, but also by trying

[22] It also seems unsurprising at this point, particularly in light of the proliferation of Lab discourse apparent here, that Lewis and Usher use Peter Galison's [1997] concept of the "trading zone", which he developed in a study of different science labs.

[23] See Stray [2011] and Lewis and Usher [2013, p. 603].

them out together. There is a different set of event formats, such as informal get-togethers and discussions, hackdays, or hackathons.[24] On the Hacks/Hackers website, under "Resources", a total of seven different formats for meetups are recommended and explained — also with links to examples: Talk or Demo, Roundtable or Panel, Lightning Talks, Happy Hour, Workshop, Hackathon, and Open Lab.[25] Hackathons in particular were a popular format in the movement's early stages;[26] through these events the Hacks/Hackers — when most of their members were not firmly established in journalistic editorial offices — could create a setting that made the coming together and joint experimentation of journalists and programmers, that they themselves imagined, finally tangible with the possibility of concrete results. Today, they are still actively promoted via the Hacks/Hackers website as one principle form of meetup events. The format of the hackathon can be traced back to the open-source movement, in which intensive, collaborative programming to solve a specific task arose because participants in open-source projects are often scattered geographically. In this context, the hackathon as a format offers the opportunity "to take advantage of rare moments of geographic copresence" [Irani, 2015, p. 804]. The hackathon's salience to hacks in their early days is apparent in the account of three such events in the "Data Journalism Handbook" [Gray, Chambers & Bounegru, 2012]. [27] Two of these hackathons were hosted by the Buenos Aires chapter of Hacks/Hackers, who, at one such event, developed a tool to present preliminary vote counts from Argentina's election in the form of maps and visualized statistics on websites, and a tool to easily display statistical data in maps and timelines [Blejman, Berruezo, Sorín, Tow & Sarsale, 2012]. One other hackathon involved the Boston chapter, where they continued to develop a tool for the analysis of changes to large volumes of PDF files [Ramos, 2012].

More important to the spread of the lab discourse in everyday journalistic practice than these tools, however, is the setting of the hackathon itself: Open calls for these events were made online via newsletters and Meetups.org, the topic or task was set, and technical solutions to these (technical) challenges of journalistic coverage were then jointly developed. The setting of the event is then about step-by-step and collaborative problem solving in processes of experimental tinkering by programmers and journalists working together. It is about the implementation of experimentation in the everyday life of journalists, for which the hackathons create an opportunity, even if only situationally. Through these events, they can benefit from the "capacity of hackathons to act as journalistic laborites for news communities" [Boyles, 2020, p. 1343]. In this sense, it is not just about understanding the current labs at established media organizations as permanent settings for experimentation, as it is often the case in journalism research [García-Avilés, 2021; Hogh-Janovsky & Meier, 2021; Mills & Wagemans, 2021]. The point is to establish a laboratory attitude toward a particular professional domain — an approach the hackathon exemplifies.

[24] See also Lewis and Usher [2014, p. 384] and Usher [2019, p. 2].

[25] See https://www.hackshackers.com/resources/suggested-meetups/ [accessed January 14, 2023].

[26] As a format, the Hackathon finds mention in Hacks/Hackers newsletters between 2010 and 2013.

[27] This goes back to the Mozilla Foundation's MozFest in London in 2011 and involved various organizers and members of the Hacks/Hackers.

Conclusion

The starting point of this article was the argument that pioneer communities have a significant role to play in disseminating the lab discourse and, through doing so, localizing technological experimentation in everyday life. This was shown by taking a closer look at the first generation of pioneer communities in the San Francisco Bay Area with Stewart Brand, his book on the MIT Media Lab, and the involvement of the Whole Earth Network, and to show how, even early on, a detachment of the lab discourse from scientific institutions and the concept of the lab as much more openly associated with technology-related experimentation began to emerge. A further generalization of the lab discourse is then apparent in the second-generation pioneer communities of the Maker, the Quantified Self, and the Hacks/Hackers movements, all three of which originated in the Bay Area and can be seen in relation to the Whole Earth Network. In the Maker movement, the lab discourse is transferred to the (maker)space as a place of everyday experimentation operating outside mainstream science, in the Quantified Self movement to the meetup as a show and tell of individual self-experimentation, and in the Hacks/Hackers to settings of experimentation and technological innovation.

At its core, the influence of pioneer communities since the publication of Brand's 1987 book on the MIT Media Lab has been to make the technological experimentation associated with the lab an integral part of everyday community sites in their associated groups: Whereas the lab was a scientific place, the space (whether as makerspace or hackerspace) and the meetup (whether as show and tell or hackathons) are places of communitization. With the space, it is a stable *local community* that sustains the (technological) experimentation and tinkering; with the Meetup, it is the *situational communitization* in which the (technological) experimentation and tinkering can be experienced. The pioneer communities create "locales" [Giddens, 1984, p. 118] within which people are able to experience for themselves the technological experimentation that was originally shaped to a large extent by the lab discourse, thus localizing it within people's everyday lives. We can see in this as taking place along a three-step process in which the idea of the lab was first of all taken out of its narrow *scientific context*, then transferred to certain *locales* of everyday life as places of experimentation, and finally generalized to a laboratory *attitude* that is presented as conducive for our contemporary, deeply mediatized societies.

The transformations we are dealing with here can hardly be grasped with simple notions of causality and diffusion in the sense that a certain idea of the (media)technological lab would have spread throughout the world starting from MIT with the pioneers acting as multipliers in this dissemination process. Rather, we are dealing with co-construction and reciprocal relationships: The original imaginaries of the Media Lab were co-constructed by pioneer communities. In the generalization of the lab discourse in the spaces and meetups, the Makers, Quantified Self and Hacks/Hackers movement then acted as catalysts: they picked up on initial transmissions of the lab discourse, disseminated them extensively in their pioneer community and contributed to a further localization of technological experimentation.

In relation to Living Labs, however, such an analysis shows that we should place this idea in a much broader context: Taking MIT as a source of legitimacy is not something specific to Living Labs, but rather a general pattern that other pioneer communities have put in place. The assumption that such labs not only bring

science to everyday phenomena, but also negotiate the boundaries between science, politics, and society in a new way is also a general expression of the lab discourse that is perpetuated by pioneer communities. The idea that a general laboratory attitude of experimentation is particularly necessary in today's world is not necessarily specific to the current discussion around Living Labs, which increasingly reflects on the question of whether a Living Lab needs to be a specific locale. If one places Living Labs more broadly, other questions become apparent that have yet to be considered in any real way. Perhaps the most pressing question is whether and to what extent Living Labs also reproduce what may be problematic about the Californian Ideology, especially aspects that center around "techno-solutionist visions of the future" [Lanzeni & Pink, 2023, p. 19]. If we follow Evgeny Morozov, the core of this ideology consists of a "recasting [of] all complex social situations either as neatly defined problems with definite, computable solutions or as transparent and self-evident processes that can easily be optimized — if only the right algorithms are in place" [Morozov, 2013, p. 5]. In techno-solutionist visions, digital media and the infrastructures do not represent a challenge, but the solution to *all* of humanity's problems. Here we should always be alert to the Living Lab discourse representing an expression of such an ideology, in order to do justice to the actual emancipative objective that is readily associated with them. Sasha Costanza-Chock [2020] recently pointed out in her outline of "Design Justice" that including the peoples' perspectives can also mean *not* developing technological "solutions" in certain contexts and to explore the answers to perceived problems elsewhere. Against this background, a reflexive approach is also needed when it comes to the Living Lab.

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