Local Ambivalences Toward the Maker Ideology: Makerspaces, the Maker Mindset, and the Maker Movement

ANDREAS HEPP[1]
ANNE SCHMITZ
Center for Media, Communication and Information Research (ZeMKI), Germany
University of Bremen, Germany

At the core of the globalized Maker movement are the "Maker mindset" and imaginaries of a "new industrial revolution." Both embody elements of the Californian Ideology in an ongoing yet asymmetrical conversation between the U.S. organizational elite and local Makerspaces. This article explores these dynamics on the basis of a media ethnography carried out at four Makerspaces in Berlin and London. First, we will address the extent to which the Maker ideology provides a framing discourse for the establishment of local Makerspaces. We then look at casual references that are made about the Maker ideology. Finally, we reflect on how the Maker ideology is appropriated into the local realm. All this amounts to what we call local ambivalences toward the Maker ideology: The local spaces refer critically to the larger Maker movement, and it is precisely through this critique that parts of the Californian Ideology are embedded.

Keywords: Maker movement, pioneer community, Californian Ideology, Makerspaces, Maker mindset

The globalized Maker movement has a multilayered relationship with local spaces, whereas their requisite Makerspaces have their own history as places of tinkering, experimentation, and community. At the same time, references made to the Maker movement arouse the valorization of local engagement and an association to a Maker ideology. At its core is the "Maker mindset" (Dougherty, 2013) and imaginaries of a "new industrial revolution" (Anderson, 2012), which embody many elements of the more general Californian Ideology in an ongoing yet asymmetrical conversation between the U.S. organizational elite and local Makerspaces. In this article, we want to explore these dynamics on the basis of four Makerspaces in Berlin and London. More specifically, we set out to answer two research questions:

RQ1:   How are the general Maker mindset and the idea of the Maker movement's power to transform society appropriated in local Makerspaces?

RQ2:   To what extent are the essential tropes of the Californian Ideology spread in this way?

To answer these questions, we will discuss the state of research on the relationship between the Californian and the Maker ideologies. We will then present our media ethnographic study of four Makerspaces along three stages: First, we will address the extent to which the Maker ideology provides a framing discourse for the establishment of local Makerspaces. Then, we look at casual references to the Maker ideology made by local Makers. Finally, we reflect on how the global Maker ideology is appropriated. This all amounts to what we call local ambivalences toward the Maker ideology. On the one hand, the spaces refer critically to the overall Maker movement; on the other hand, it is precisely through this critique that parts of the Californian Ideology are locally embedded.

From a Californian to a Maker Ideology

As Richard Barbrook and Andy Cameron (1996) put it, the essence of the Californian Ideology is the coming together of "the freewheeling spirit of the hippies and the entrepreneurial zeal of the yuppies" into "a profound faith in the emancipatory potential of the new information technologies" (p. 45). As such, the Californian Ideology is inseparable from Silicon Valley and associated with a "global imaginary" (Marwick, 2017, p. 317) that positions technology as of the solution to local problems.

There remains the question, however, of how to appropriately grasp ideology. Although there is a long-standing discussion of this concept (Eagleton, 1991; Hall, 1988), for the purpose of our analysis, a sociology of knowledge approach can prove useful, not least because it involves questions of power. Karl Mannheim (1936/2013) has already argued that ideology should be seen relationally, an argument Peter Berger and Thomas Luckmann (1966) elaborate on when they suggest an ideology is "a particular definition of reality [that] comes to be attached to a concrete power interest" (p. 141).[2] Defined in this way, we can approach the Californian Ideology in terms of the interest-led nature of its definition of reality.

When questioning its definition of reality, the Californian Ideology invests confidently in a "digital utopia" as an "optimistic vision of the future" (Barbrook & Cameron, 1996, p. 45) according to which digital technologies independently represent the potential to transform society. Yet although the idea of creating an "electronic agora" emerges from the American counterculture, fragments of a libertarian position flow through it in confidently defined "electronic marketplaces" (Barbrook & Cameron, 1996, p. 50). Both are connected by a critical attitude toward the state and the argument that the unregulated use of digital technologies will ignite the realization of "both visions at the same time" (Barbrook & Cameron, 1996, p. 52).

This kind of discursive truth operates in the interest of a certain group of people who, following Arthur Kroker and Michael Weinstein, can best be described as a "virtual class": "the techno-intelligentsia

---

[2] An ideology is not limited to discourse. If we follow Foucault (1970), discourse is always power-driven, but questions of ideology are about specific definitions of reality being used by specific groups with power interests (Berger & Luckmann, 1966, p. 141).

of cognitive scientists, engineers, computer scientists, video-game developers, and all the other communications specialists" (Kroker & Weinstein, 1994, p. 15). These individuals will mostly be white, middle- and upper-class men who are invariably the economic beneficiaries of digital technologies. Their appropriation of countercultural positions that locate the digital as a benefit to society, both social ("electronic agora") and economic ("electronic marketplace"), allows them to resist the need for a "major redistribution of wealth [that] is urgently needed" (Barbrook & Cameron, 1996, p. 60).

Caution must be applied so as not to oversimplify or homogenize the contradictions that have always existed in Silicon Valley and its tech communities (i.e., Berlin, 2017). Nevertheless, in this interplay of certain definitions of reality and the assurance of certain group interests, a line can be drawn from the Californian Ideology to what Fred Turner (2018) would later define as the "Maker ideology" (p. 180). The rudiments of this connection can already be found in Barbrook and Cameron's (1996) original text in which they address the countercultural role played by "do it yourself" (DIY) culture during the emergence of the Californian Ideology: Whether it is the development of ideas surrounding the personal computer that bounced around meetings held by the Homebrew Computer Club (Markoff, 2005, pp. 275–285), the emergence of the first "virtual communities" (Rheingold, 1994) in the San Francisco Bay Area, or aspirations to develop digital community media (Ratto & Boler, 2014b, pp. 9–11), they all share an intimate bond with the tradition of DIY culture, and it is through this culture that the market orientation of the Californian Ideology generates its countercultural appeal.

Certainly, DIY in the United States was and is far more inclusive and contradictory than it appears in Californian tech culture (Day, 2016; Ratto & Boler, 2014a). Nevertheless, DIY becomes an important building block in its construction. This can be seen in detail when looking at the Maker movement as one of many "pioneer communities" (Hepp, 2016) that emerged from the San Francisco Bay Area. The term refers to a very specific nexus that the Maker movement shares with other figurations such as the Quantified Self (Neff & Nafus, 2016) and Hacks/Hackers movements (Lewis & Usher, 2014), in that they ignite certain kinds of (global) movement that have their roots in diffuse technology-related discourses. In the case of the Makers, these were widespread DIY, hacking, and tinkering discourses that were circulating around the turn of the millennium, from which a specific "organizational elite" (Hitzler & Niederbacher, 2010, p. 22) formed and was self-defined as the Maker movement. Turner (2018) called this elite the "movement's most visible promoters" (p. 162), referring in particular to Dale Dougherty and Ariane Conrad (2016), who claims to have given the name to the Maker movement; Neil Gershenfeld (2005); Cory Doctorow (2011); Chris Anderson (2012); Mark Hatch (2014); and David Lang (2013). These individuals, through publications, TED Talks, and other speaking engagements, have created what can be called the "ideological archipelago" (Turner, 2018, p. 162) of the Maker movement. This ideological framework would be the basis for what was originally called Maker Media, which, together with *Make:* magazine (Nguyen, 2016), its associated websites, and the Maker Faires (Nascimento & Pólvora, 2018), would organize along a kind of "franchise model" (Hepp, 2020, p. 945) its cross-national curation of the self-proclaimed Maker movement.

When it comes to the "definition of reality" (Berger & Luckmann, 1966, p. 141), the Maker ideology condenses a general "techno-utopianism" (Dickel & Schrape, 2017, p. 289) into a particular philosophy related to individual making and its power to transform society. At the individual level, the Maker ideology refers to what Dougherty (2013) called the "Maker mindset": this assumes that Makers are "active, engaged, playful, and resourceful" and "self-directed learners" that "use tools and technology to create new things" (Dougherty & Conrad, 2016, p. 144). Making, as Hatch (2014) argues, is an expression of a fundamental aspect of being

human. The core of the Maker ideology at an individual level is a particular understanding of "creativity" (Turner, 2018, p. 161), or rather, the assumption that an emancipative power is inherent in individual making.

At the societal level, by virtue of its organizational elite, Makers are not simply defined as individual tinkerers; they are also defined as part of a wider community: the Maker movement, whose locales include Makerspaces and whose translational networking takes place through the aforementioned Maker Faires and online platforms (Nascimento & Pólvora, 2018; Rosa, Ferretti, Pereira, Panella, & Wanner, 2017). It is in these ways that the Maker movement is oriented toward "new" forms of social practice centered around the sharing of resources and knowledge as well as mutual support. Makers share an imagined utopia in which the practices that take place in Makerspaces operate as a process of prototyping, the starting point for a "third industrial revolution" (Rifkin, 2011): a comprehensive transformation of the economy, crafting, and prototyping in Makerspaces to "scale" ideas toward new forms of decentralized manufacturing that are more sustainable and connected to the (local) community from which they emerged (Anderson, 2012).

This begs the question of whose "concrete power interest" (Berger & Luckmann, 1966, p. 141) with this construction of reality is being served. An initial response might say that it is exactly this "virtual class" that Barbrook and Cameron (1996) describe. In the Maker movement, it is precisely the creative people they had in mind who are most active. However, we can argue that it is the "visible promoters" (Turner, 2018, p. 162) who profit most from the construction of reality they circulate: Not only do they declare the establishment of a movement that did not previously exist, but through their publications, they also position themselves as its central representatives. They construct, in a way, the movement and their own position as an organizational elite at the same time.

We must be careful, however, to not paint too crude a picture of what this kind of self-positioning means—a deeper analysis of the Maker movement also provides a better understanding of the Californian Ideology's general mechanisms. Certainly, the "proclaiming constitution" (Hepp, 2022, p. 244) that becomes evident at this point, that is, the creation of a movement through the act of revealing it, is far more than "branding" (Bean & Rosner, 2014, p. 27). It is also about a (power-driven) locating of the individual within the proclaimed social entity. But this does not mean that the resulting Maker movement should be homogeneous, nor that DIY would be completely absorbed by it. The definition of the term Maker and what constitutes the core of the Maker movement remains contested globally (Irie, Hsu, & Ching, 2019), and those who were originally critically oriented continue to try to regain space in these discursive disputes.[3] Likewise, the economic ventures of the self-proclaimed organizational elite of the Maker movement have been generally unsuccessful. This financial instability is exemplified by the bankruptcy of the commercial Makerspace chain TechShop in 2018 (formerly cofounded by Mark Hatch), that of Maker Media in 2019 (from which the current Make: Community emerged), and most recently the 2022 winding down of MakerEd.

Nevertheless, the self-proclaimed organizational elite remains at the center of the Maker movement and manages to keep this pioneer community alive by curating (online) events and media publications. Curation is characterized by a certain fragility with regard to organization (the pioneer community splits into various organizations), discourse, and finances. However, it is precisely this fragility that can be seen as one of the reasons

---

[3] "The critical makers reader" (Bogers & Chiappini, 2019) contributes to this discussion.

why pioneer communities can succeed in spreading globally (Hepp, 2020): The fragility makes a necessity of generating local alliances to take up existing discourses and develop locally anchored financing models.

When it comes to local Makerspaces, research has tended to mainly study them as places of communitization (i.e., Davies, 2017; Nascimento & Pólvora, 2018; Rosa et al., 2017), social innovation (i.e., Aryan, Bertling, & Liedtke, 2021; Corsini, Dammicco, & Moultrie, 2021; Smith, Hielscher, Dickel, Soderberg, & van Oost, 2013), and learning (i.e., Papavlasopoulou, Giannakos, & Jaccheri, 2017; Peppler, Halverson, & Kafai, 2016; Schrock, 2014), and less in terms of whether or not they relate to a self-proclaiming and globally active Maker movement and its organizational elite. Such an approach, we argue, opens up an addition to the existing understanding of this pioneer community, its global spread and its role in turning the Californian Ideology into part of a "global imaginary" (Marwick, 2017, p. 317).

Methods: A Comparative Media Ethnography of Local Makerspaces

Our empirical study is part of a larger research project funded by the German Research Association (DFG) on pioneer communities. Within this project, we investigate the role of the Quantified Self and Maker movements in relation to media transformation within Germany and the United Kingdom. The underlying approach is a media ethnography consisting of an analysis of the pioneer communities' organizational elites (Hepp, 2020), their transnational Twitter networks (Schmitz, Kirschner, & Hepp, 2022), media coverage on pioneer communities (Hepp, Benz, & Simon, 2021), and the engagement of those communities during the COVID-19 pandemic (Hepp & Schmitz, 2022).

For the investigation of the study presented here, we were guided by a process of "theoretical sampling" (Charmaz, 2014, p. 192): We carried out initial exploratory interviews with influential members of the local Maker movement and then investigated four Makerspaces in cities in which the Maker movement is already firmly anchored. In Berlin, we studied a smaller space called "eLab Berlin" (electronic laboratory) and a larger Makerspace called "Happylab Berlin." In London, we selected a small space called the "Richmond MakerLabs" and the larger "South London Makerspace." The ethnography of the spaces is based on observations, interviews, and technology ensemble sortings (see Table 1).

Table 1. Makerspaces in Our Media Ethnography.

Spaces in Germany		Spaces in UK	
eLab Berlin ca. 10 members	9 interviews 4 observations 5 technology ensembles	Richmond MakerLabs ca. 40 members	5 interviews 2 observations 1 technology ensemble
Happylab Berlin ca. 500 members	9 interviews 3 observations 3 technology ensembles	South London Makerspace ca. 300 members	14 interviews 3 observations 5 technology ensembles

The data were collected between 2018 and 2022, which, during COVID-19, was achieved through several online channels. The interviews were transcribed and analyzed within the framework of a grounded

theory approach (Charmaz, 2014; Glaser & Strauss, 1999), and the resulting data were analyzed using MaxQDA through a process of open, axial, and finally, selective coding (Strauss & Corbin, 1998).

For the technology ensemble sorting (Hasebrink & Hepp, 2017), we asked active members to select frequently used technologies in their Makerspace from a set of prepared tokens and to then weigh these tokens in terms of their relevance for the Makerspace on a technology sorting board. Further tokens could be manually added. We transferred the ensembles into a circuit circle within MeSort software (https://mesoftware.org/; see also Hohmann, 2021) and triangulated the results.

Table 2. Coding Scheme.

Main Category	Subcategory
Development of the space	Foundation
	History
Relation to the Maker movement	*Make:* magazine
	Maker Faire
	Other events and publications
	Global movement
	Media coverage on the Maker movement
(Self-)perception of the Maker movement	Characteristics of a Maker
	Characteristics of the community
	Changes within society through making
	Drivers of change
	Vision of the Maker movement
Organization of the space	Funding
	Legal form
	Membership
	Decision making process
	Internal communication
	External communication
	Subgroups (offline/online)
	Equipment/areas
	Recurring events
Media and technologies	Frequently used media technologies
	Relevance of media technologies
	Statements on media technologies
Typical practices	Exchange
	Information research
	Project management
	Prototyping
	Tool manufacturing/maintenance
	Purchasing
	Archiving
	Tinkering
	Collaborating
Meaning of the space	Community gathering
	Leisure activity
	Neighborhood location
	Coworking space
	Shelter
	Tool-sharing workshop

The procedure resulted in seven main categories and 39 assigned subcategories through which our data were organized (see Table 2). Based on this coding scheme, we created detailed memos for each Makerspace (Charmaz, 2014).

Our analysis shows that we are dealing with a process of three interwoven patterns through which the local Makerspaces relate back to the Maker ideology: An initial pattern relates to the spaces' formation in which the Maker ideology sets a framing discourse. A second pattern is that of casual references to the Maker ideology, and the third pattern is that of local appropriation. Our categories were developed from the data accumulated through a grounded theory process, though we connect to existing research in the naming of these overarching patterns: The term *framing discourse* draws on the notion of the "frame" coined by Erving Goffman (1974), who used it to refer to interpretive schemes that categorize and define everyday experiences, social occurrences, and events. Our point is to emphasize the extent to which certain interpretive schemes are set by the discourse of Maker ideology. With the designation of *casual reference*, we follow on from media research in the tradition of the sociology of knowledge, which has shown that references to media (content) in everyday conversations take place particularly casually and are only in exceptional cases the subject of comprehensive reconstructions (Keppler, 2004)—a condition that is also characteristic of the Maker ideology. By naming the third pattern *local appropriation*, we refer to domestication research (Berker, Hartmann, Punie, & Ward, 2006; Silverstone & Haddon, 1998) that understands the term as making something one's own and thus locating it in a localized facet of everyday life.

Establishing Local Spaces Under the Framing Discourse of the Maker Ideology

The foundation of a Makerspace is also always an act of positioning oneself within the wider Maker movement. It is striking that three of our four spaces were founded in 2013, a time when the Maker movement shared the spotlight in the United States and in Europe, and when the Maker Faires enjoyed their first wave of global success.

The eLab Berlin (eLB) initially grew out of the activities of a few acquaintances using the facilities from an independent Internet service provider to share electronic equipment with each other. In 2013, they began publicly advertising their meetings through the community-building platform, Meetup, opening them up to more interested tinkerers.

The Happylab Berlin (HLB) was founded in 2016, with two initial sites in Austria (2006, 2014). The founding idea can be traced back to a university professor and two of his students who took up the initiative to share tools with a wider community, leading to the establishment of the space.

The origin of the Richmond MakerLabs (RML) was the coming together of two groups: While one of its founders organized events via Meetup focusing on amateur radio, the other rearranged a storage room in the course of his involvement for the Ham United Group, which set out to provide voluntary assistance for individuals interested in computing. In 2013, they joined forces and started a noncommercial Makerspace for the local community around Richmond, London.

The South London Makerspace (SLM) also began as a Meetup group who called themselves the "Maker Guild." Some of the participants collaborated to find a location for the development of a Makerspace to exchange ideas and share equipment. In 2013, they were successful and registered the space as a company limited by guarantee.

Putting these foundations into context reveals that opening up a Makerspace during this period was neither a rare nor a local phenomenon: According to a survey by Rosa et al. (2017), there was a European "boom" (p. 22) of new Makerspaces from 2007 until a peak in 2013 (i.e., Browder, Aldrich, & Bradley, 2019; Sleigh, Stewart, & Stokes, 2015). Moreover, the idea to participate in Makerspaces also reached a broader public, which was decisively driven by Dougherty and Maker Media/Make: Community and their engagement with the Maker Faire and *Make:* magazine. Mini Maker Faires, which are mainly organized by local Makerspaces but with guidelines set by the wider Maker Media/Make: Community, have been held in the United Kingdom since 2009, leading to the first major flagship *Maker Faire* in London in 2015. The first Maker Faire in Germany took place in 2013 and was visited by approximately 4,000 attendees. Framing these Maker Faires as family-friendly DIY events brought making to a wider audience. The German edition of *Make:* magazine started in 2014. In addition, a key publication, Chris Anderson's "Makers: The New Industrial Revolution," was published in 2012 and was translated into German in 2013. Other key texts appeared around 2013 (i.e., Dougherty, 2013; Hatch, 2014), leading to the movement gaining wider media coverage (Hepp et al., 2021; Rosa et al., 2017).

This framing discourse was not only orienting, in the sense that it spread the idea of the Makerspace as a place of tinkering and communitization, but also legitimizing in that it gave a sense of depth to individual participants' tinkering through a wider Maker ideology.

Casual References to the Maker Ideology

Beyond the founding act, we notice in the daily practices at the Makerspaces an often casual, yet continuous reference back to the Maker ideology. This becomes evident in publications, events, platforms, and technologies.

Publications

Across all Makerspaces, publications play a certain role among members, whether in the form of books by the main representatives of the Maker movement or magazines, most notably *Make:* magazine. In Germany, Makerspaces can obtain a free copy of the German edition on request. There is no such policy in the United Kingdom, and the spread of *Make:* magazine is correspondingly lower; however, many of the members we interviewed reported knowing of and occasionally reading it (i.e., Interview 25, SLM).

Such publications reveal an ambivalent attitude toward the Maker mindset and the movement written about in them. On the one hand, they provide easy access to the self-proclaimed movement and build guides for projects—this is what is valued most about them. One member from eLab Berlin highlights the simple instructions for projects that can be found in *Make:* magazine (Interview 8, eLB), and one member from the South London Makerspace acknowledges the role it plays in community building when

they say that "it does a lot of good stuff for the scene" (Interview 20, SLM). Whereas for other Makerspaces this is accompanied by the willingness of individual members to contribute with articles, those we interviewed are rather reluctant. One member from the South London Makerspace received a request to write an article for *Make:* magazine, but for him, the process of documenting is "only second priority" (Interview 20, SLM). This kind of literary participation clashes with the mindset of the crafting Maker: "we tinker around but we do not document things for others in epic breadth" (Interview 2, eLB).

On the other hand, a certain skepticism is held toward *Make:* magazine in that it is seen as an expression of commercialization. Such a position goes beyond the fact that some interviewees assess the magazine as "quite shallow" (Interview 18, SLM) or prefer other publications (Interview 35, RML). The point is that members across all spaces closely associate the magazine with the much more commercialized branch of the U.S. organizational elite centered around Maker Media/Make: Community. For example, one interviewee criticizes *Make:* magazine as "commercially driven from America" (Interview 20, SLM). This resembles a statement by another member, who is afraid that "*Make:* becomes more [commercial] at some point" (Interview 6, eLB).

We see in this ambivalence an initial characteristic of the tendency to casually relate to the official publications. In their references to the magazine, the members position themselves in solidarity with their local Makerspaces and as part of the globalized Maker movement, and in so doing, they express the extent to which they have internalized parts of the Maker ideology: being a Maker is about open experimentation, community, the democratization of learning, and so on. However, this "Maker mindset" (Dougherty, 2013) is turned against Maker Media/Make: Community, whose publications are understood as an act of commercialization and monopolization.

Events

To a far greater degree than through publications, the local Makerspaces are integrated into the wider pioneer community through events. The eLab Berlin members, for example, regularly participate in Maker Faires, set up their own booths, and eagerly plan in advance (Interview 4, eLB). Since its foundation, the Happylab Berlin even cooperates with the organizers of the Berlin Maker Faire, organizing an entire "Happylab Area" where visitors are invited to get involved in small DIY projects (Interview 16, HLB). In the United Kingdom, the situation is somewhat different in that there are no longer any large fairs organized by Maker Media/Make: Community or a licensee, whereas in the past, approximately "thirteen of them [were] held every year" (Interview 18, SLM).

These assorted circumstances are linked to different attitudes toward the Maker Faires. For the German Makerspaces, the Maker Faires are considered highlights of the year and are truly accepted as valuable community events: "Talking to people in person, it's a completely different thing compared to communicating through the internet or magazines" (Interview 1, eLB). They regard the fairs as a "networking" opportunity (Interview 16, HLB) and a forum for promoting the space (Interview 8, eLB).

The attitude toward the Maker Faires is more diverse among the members of the United Kingdom Makerspaces. On the one hand, members highlight the inspiring atmosphere at past events: "to walk around

and see the other things that were going on, really exciting" (Interview 34, RML). Attending the large Maker Faires abroad, such as the Maker Faire Rome, the largest in Europe, was described as "cool … just amazing" (Interview 20, SLM). On the other hand, these experiences made them somewhat skeptical about the curation of the Maker Faires through Maker Media/Make: Community. One of the former directors of the SLM used to be involved in the organization of a Mini Maker Faire in cooperation with the United States organizers, which was "really, really successful, it was probably one of the largest in the UK" (Interview 18, SLM). But he attributes the success mainly to their deviations from the regulations and framed it as an "art and design" event, which stood in contrast to how Maker Faires are typically branded: "They have very strict brand guidelines, aesthetically speaking, but also in terms of the curation of the content they want … they're all the same" (Interview 18, SLM).

Interestingly, both spaces in the United Kingdom either organize their own events, such as the "South London Maker Festival," or attend Maker Faires abroad to fill this gap (i.e., Interview 23, SLM; Interview 34, RML). We can understand the South London Maker Festival, then, as a counteridea to the Maker Faire. Since 2019, the South London Maker Festival has been organized as a one-day event for Makers. However, while unregistered as an official Mini Maker Faire (Interview 20, SLM), this event, "full of hands-on workshops, demos, games and more for young and old" (South London Maker Festival & South London Maker Space Ltd, n.d.) is very similar to an official Maker Faire. One member of the South London Makerspace even refers to it as such, experiencing it as a "successful event" that was full of "interesting stuff to show" (Interview 24, SLM). Likewise, RML regularly participates with a booth at the "Ham Fair" (http://hamandpetersham.com/ham-fair), an event in Richmond to raise money for the local community.

Platforms

Online platforms play an important role in the daily activities of a Makerspace; YouTube and Instagram stand out as useful means for "presenting" projects (Interview 20, SLM) as well as "research and problem solving" (Interview 12, SLM). Tutorials (Interview 13, SLM) and Maker channels on YouTube (Interview 4, eLB; Interview 36, RML) are particularly appreciated: "before the internet, knowledge was expensive and only affordable through books … Today … you can read everything online" (Interview 5, eLB). One member even estimates that research through online platforms takes up about 85% of his time when at the space (Interview 12, SLM).

The Meetup platform is also an important tool for the spaces; it is considered as a "recruitment pool" (Interview 2, eLB), especially in the foundation phase, for finding people interested in making, to meet and inspire them, and to build up a larger community:

> There have always been some hobbyists who have somehow tinkered with others together … but I just haven't had the channels to find like-minded people and I think that's just much easier today and that's what makes the movement within the movement. (Interview 1, eLB)
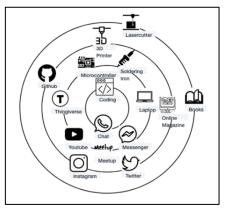
The ongoing, casual use of platforms contribute to the Maker movement's network that spreads beyond local Makerspaces. Through YouTube videos in particular, various aspects of the Maker ideology are communicated across different spaces and the *Make:* channel on the platform is one of the most popular channels producing Maker-specific content. In the sorting of the Makerspaces' technology ensembles YouTube and Instagram were also considered relevant for daily activities (see Figure 1).

However, ideas of sharing and collaboration are inscribed with more sincerity than the framing discourse through platforms specifically related to an individual's own Maker practice. The Thingiverse platform, developed by MakerBot Industries, for example, was launched in 2008 and facilitates the sharing of digital design templates and instructions (https://www.makerbot.com/). Another frequently mentioned platform is Instructables, where you can upload DIY projects and collaborate with other Makers. The platform started as a PhD project for DIY geeks in 2006 and was acquired by Autodesk in 2011 (https://www.instructables.com/). The members of the spaces expressed a great deal of enthusiasm for these platforms (see Figure 1). Thingiverse is mainly mentioned in relation to 3D-printing, as exemplified by one member of RML: "[T]hey tend to do a lot practical things as well on there when you are trying to solve a problem somebody has probably done it at Thingiverse that you can just download and print" (Interview 36, RML). In addition, Instructables serves as "resource for creative input in case [you] run out of ideas, for checking out other projects, finding out what's possible and what's not" (Interview 11, HLB). One member from Happylab Berlin even explicitly asked to add Instructables to the set of tokens for the technology sorting board (Interview 11, HLB). Hackaday.io (now owned by Siemens), which began as an online magazine in 2004 and expanded into the global community platform it is now, is mentioned as an inspiration for collaborative, open hardware projects (Interview 34, RML).
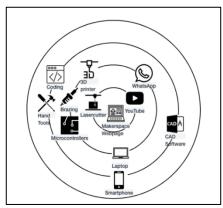
We can understand these platforms as the materialization and institutionalization of parts of the Maker ideology; they embody the Maker aspiration of sharing ideas with a like-minded community. But again, it is evident that these platforms are closely coupled with the key companies for which the Maker movement primarily offers an opportunity for value creation. Autodesk and MakerBot Industries are prominent examples, and this annoys some participants. One interviewee in Berlin complained "that the industry, a bit like what's happening with *Make:*, are skimming off some of the Makers and turning them back into consumers" (Interview 6, eLB). Once again, the skepticism toward the platforms refers to the Maker ideology. Some Makers criticize them for fostering a lack of basic knowledge, because project solving through predefined instructions is not considered as "real" making (Interview 2, eLB). With statements like these, we again encounter a remarkable shift: a critique of "anticipated problems" at the heart of current Maker platforms is grounded in the fundamental values of the Maker mindset that places the creating and self-learning individual at the center.
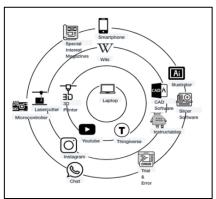
Technologies

Technologies play a central role in the practices within each Makerspace, as we can see in these exemplary sortings of the spaces' technology ensembles (see Figure 1).

eLab Berlin, Germany
Happylab Berlin, Germany

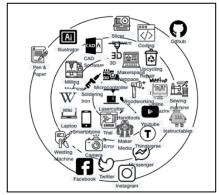*Richmond MakerLabs, UK*
South London Makerspace, UK

Figure 1. Technology ensemble sorting of active Makerspace members.

It stands to reason that certain tools fundamental to Maker projects are positioned within this technology ensemble sorting for each Makerspace, as the Makerspaces "provide all [the] tools and materials, the machines, the expertise … and help from other people" (Interview 24, SLM). But if we take a closer look at the attribution and use, it becomes clear that they are considered much more than simple tools, however normatively loaded they may be.

In fact, 3D-printers, laser cutters, and microcontrollers are repeatedly mentioned as having particular significance for the foundation of the Makerspaces. As a member of the South London Makerspace states: "Arduinos and 3D-printers, they were the fire starters" (Interview 23, SLM). A similar assessment is provided by the founder of eLab Berlin, who considers the "Arduino Wave" (Interview 1, eLB) a key driver for their own Makerspace, as well as the increasing accessibility of 3D-printers, while another member from eLab Berlin told us that: "3D-printing is a thing … and when Arduino became affordable … that did, of course, generate momentum for the Makers" (Interview 1, eLB).

In their daily use these technologies become constitute parts of the spaces' identity formation. Using the 3D-printer, for example, becomes a meaningful act by assembling "a 3D-printer from scratch" (Interview 19, SLM; see also Interview 34, RML; Interview 5, eLB) or customizing it to improve its performance (Interview 4, eLB). This approach is clearly preferred to buying a commercial 3D-printer (Interview 8, eLB) and is a typical practice, which can be observed in all four spaces—often as a community project (Interview 2, eLB). Moreover, a growing interest in specific tools within a space is not only a matter of (self-produced) availability, it can also increase if members provide each other with safety training and guidance on the use of different materials. In this way, it becomes gradually more popular (Interview 37, SLM; Interview 38, SLM).

These examples reveal another dimension of how a certain understanding of the Maker movement and the Maker mindset seeps into the space through the use of tools: as a Makerspace you need to have certain technologies and with a Maker mindset you work with them in a certain way: open, hacked, modified, in an experimental manner. Moreover, these technologies are closely tied to certain ideas about how they might shape the future of manufacturing. One member is convinced that 3D-printing is a "method of the future" (Interview 11, HLB); another one hopes for a time when "more flexible print materials […] [will allow them] to design futuristic clothing solutions" (Interview 36, RML). 3D-printing is considered to have great potential, because "the technology is just getting better and better […] it will be exciting when the first 3D-printers become recyclable" (Interview 10, HLB). In short, the Makers' technologies will "simply revolutionize the industry" (Interview 11, HLB) with its "open" (Interview 1, eLB) character and suitability for "prototyping" (Interview 18, SLM).

Appropriating the Maker Ideology Locally

So far, we have discussed how the founding of the Makerspaces takes place within an overarching framing discourse of the Maker movement, to which casual references are made in the members' daily practices as time passes. In what follows, we will take a closer look at the way in which the local appropriation of the Makerspace takes place in relation to the Maker ideology. We can identify a total of three patterns across all Makerspaces: First, claiming the Maker mindset as one's own; second, embedding it within local traditions; and third, reverse commercialization.

Making the Maker Mindset One's Own

We came across a number of members who told us that they "don't feel that there's a Maker movement" at all; instead, they simply see "people in society who like working with their hands" (Interview 34, RML). Such statements were the exception, however. When asked about the term *Maker*, ideas of the Maker mindset are expressed in a fairly similar manner. Being a Maker was typically considered as having a particular "state of mind" (Interview 23, SLM) or "mindset" (Interview 23, SLM) with an "explorer's urge" (Interview 1, eLB) to "combine techniques and skills to produce something that ideally has a purpose, to solve a problem" (Interview 36, RML). Referring to the Makers' engagement during the COVID-19 pandemic, members of the South London Makerspace describe an "entrepreneurial mindset" (Interview 29, SLM) and explain that "being a Maker [means] that you're probably more flexible and find it easier to adjust" (Interview 30, SLM).

In remarks like these, one is struck by the proximity to the Maker ideology championed by the American organizational elite in publications or events. Our interviewees seem to have acquired the Maker mindset; however, this remains as merely the basis for further appropriations.

Embedding Within Local Traditions

In contrast to ideas that the Maker mindset originated solely with the U.S. Maker movement, our interviewees emphasize connections to their own local traditions. From a German point of view, they underline that "being a Maker" is something that has "always existed" (Interview 1, eLB). People always "tinkered along in their basements" (Interview 3, eLB), "with others" (Interview 1, eLB) just like "father and son at the lathe in the old days" (Interview 10, HLB). Makers, for these interviewees, are considered simply as a "new term for *Bastler* [tinkerer]" (Interview 6, eLB). At this point the United Kingdom Makerspaces are not particularly different. One of the founders of the RML argues that the word *Maker* is "an all-encapsulating term," and "it feels a bit unfair because now you know it takes over some of the existing crafts groups that existed" (Interview 35, RML). As one of the former directors of the SLM puts it, "lots of people … just happen to be craft people that were doing stuff and then discovered [that] there's actually a community that has sort of [been] reinitiated" (Interview 18, SLM). In his further remarks, he draws a contrast between the "American understanding of a Maker which is a Dale Dougherty kind of approach" appropriating the term *Maker* and remolding it into something "almost like a tech industry type thing" and the "English understanding" in which "people just see themselves in a different light" (Interview 18, SLM). For most of them *making* refers not only to new technologies but also to more traditional craftmanship.

This suggests an ambivalence toward contemporary making as being embedded in local traditions. On the one hand, the Makerspace members are committed to not abandoning local crafting traditions, which they position as more fundamental to the concept of the Maker and the imaginary of the United States organizational elite. In this sense, they use the discourse around the Maker movement for their own objectives, because the fact "that you're a Maker, well that sounds better than being a *Bastler*, that always has such a negative connotation" (Interview 33, HLB). On the other hand, it is precisely through such an endeavor that they integrate preexisting local traditions into the curated discourse of the United States organizational elite, confirming and solidifying parts of the Maker ideology, namely, that this kind of making is a universal human need and that the Maker movement provides this need with a global home (i.e., Dougherty & Conrad, 2016; Hatch, 2014).

Reverse Commercialization

Across the four Makerspaces, reverse commercialization is a multilayered pattern of appropriation that we can understand as an expression of an ambivalent attitude toward commercialization as part of the Maker ideology itself. We deliberately choose the term because of its ambiguity. It can mean both the reversal of commercialization and the process of reverse engineering it. The latter is known as the process of extracting design elements from an existing product by examining its structures and characteristics (i.e., Eilam, 2011). In this sense, reverse commercialization can result in creating one's own approach for commercial success.

Among the people we interviewed, the focus on criticizing the commercialization of the Maker movement is less about the fact that successful Maker projects can themselves become commercially viable than it is about how the Maker movement and the Makerspaces have become a commercial endeavor (i.e., Interview 33, HLB; Interview 10, HLB; Interview 18, SLM). We can understand this process as a process of reverse commercialization, which emphasizes making as an anti-commercial practice. A common position states that making is about "producing instead of consuming" (Interview 1, eLB) and is understood as an emancipative element of consumer critique. Typically, Maker practices are linked with "a lot of upcycling" and a "lot of recycling" (Interview 11, HLB). With ideas like these, many visitors to the spaces would often turn "up with some cheap product and want to make something new out of it" (Interview 11, HLB). For the members that share this point of view it is important that the skills around making enable them to repair products and to modify them in ways that fit their needs (i.e., Interview 36, RML; Interview 33, SLM). As an eLab Berlin member argues, making "leads us to the fact that we think a little more independently about technology" (Interview 6, eLB).

Yet such a critique is repeatedly combined with the idea of reverse engineering commercialization. The starting point for this is positions like that held by the eLab Berlin member who argues that "making is also an industry." He goes on to say:

> Many companies have jumped on to show that, hey, we can somehow provide you with small things so that you can implement into your electronics projects more quickly. To be honest, I think it's super cool that this has now become an industry. (Interview 6, eLB)

He is essentially arguing that it is about finding one's own position in the Maker "industry." The arguments, therefore, are not directed against the general circumstance of commercialization but rather deal with the question of the stage at which commercial interests have reached a point where they should no longer be realized in a Makerspace (i.e., Interview 24, SLM; Interview 25, SLM; Interview 34, RML).

Besides scaling, another difference is whether a Maker project develops into a commercial venture or whether someone comes to a Makerspace to use it for their commercial interests from the outset. The latter is consistently viewed critically. For example, one member skeptically refers to "start-up founders" who come to the Makerspace with a "business plan in their heads, but usually have no idea about technology" (Interview 1, eLB). The tension becomes even more apparent this participant explained that he does not mean to "exclude or demonize someone if they are wearing a business suit in addition to … his Maker shirt" (Interview 1, eLB). He continues by saying: "I think that is somehow quite alright, many people in the scene also do that … by not only taking the purchase price, but still selling it for a small profit." It is a question of balance: It is acceptable for Makers to make money from their projects or even make a living with them. What is not accepted is when the spaces are misused as (cheap) workshops for commercial production.

Conclusion: Local Ambivalences Toward the Maker Ideology

The starting point for this article was to question how the general Maker ideology becomes appropriated by local Makerspaces, as well as the extent to which the basic tenets of the Californian Ideology are distributed through them. As has already been indicated, the answer to this question leads to what we call the local ambivalences toward the Maker ideology. These mainly become apparent when we consider the results.

We were able to show that the foundation of local Makerspaces already takes place under a framing discourse, which provides both orientation and legitimation for the foundation of local spaces.

There is a tangible ambivalence when we consider the casual references back to the Maker ideology in the spaces' practice through publications, events, platforms, and technologies. It is striking that the Maker mindset conveyed by *Make:* magazine and other publications is directed against them as soon as they are seen as an expression of commercialization. When it comes to the Maker Faires, we again note a skepticism toward the United States organizational elite and their curation. At the same time, the events are seen as important to individual Makers' identities, and even completely independent events are organized along at least some of their ideas. On the question of platforms and technologies, we notice once more an ambivalent attitude: they are widely criticized for their commercial roots and orientations, but at the same time, they are used enthusiastically and extensively and are customized in an experimental, sometimes playful way.

Against this background, we then looked more closely at patterns of appropriation as they apply to the Maker ideology and how it is localized. We identified a three-step process: the interviewees comprehensively *embrace the Maker mindset*, embed it within local traditions, and develop an ambiguous reverse commercialization. On the one hand, they oppose commercialization when it contradicts the Maker mindset; on the other hand, they try to reverse engineer the commercialization strategies of the U.S. organizational elite so they might be able to replicate them for their own local projects and initiatives. For this process of reverse engineering, however, a limit is reached when the commercial pursuits override the simple principal and act of making.

Overall, the members of the spaces we studied are anything but uncritical of the United States organizational elite. Some of them have a deep insight into their curation and question it at many points, especially when it comes to the idea of business. Interestingly, however, they ground their critique in the Maker mindset, which—as we have seen in previous research—lies at the core of the Maker ideology and has many connections with the broader Californian Ideology: If we follow the Maker movement's (self-appointed) thought leaders, the Makers are a "community of equally obsessed people from around the world" (Anderson, 2012, p.15) who share the vision that the Internet of things and related technologies of production would bring about a "new industrial revolution" (Anderson, 2012), coalescing DIY, handicraft, and self-made technological innovations.

It is precisely this kind of justification of the Maker mindset that reiterates a vital part of the Californian Ideology, namely that of reshaping the economy through specific technologies. We do not mean to say that practices of making cannot be emancipative, insightful and beneficial for one's own personal development (Gauntlett, 2018), it is, of course, also possible to include them alongside comprehensive technology development projects (Costanza-Chock, 2020; Webb, 2020). What seems crucial, however, is that something else fades into the background, namely the influence of structural contexts, politics and the state, and the question of beneficiaries, especially the digital industries. Perhaps this is the real danger the Californian Ideology poses, as it is also solidified within parts of the Maker ideology. It glorifies the structural problems of ownership, influence, and power by celebrating individual engagement and the emancipative potential of (media) technologies, tensions that are embedded within the ideas of the Maker mindset and the wider Maker movement.

References

Anderson, C. (2012). *Makers. The new industrial revolution.* New York, NY: Crown Business.

Aryan, V., Bertling, J., & Liedtke, C. (2021). Topology, and dynamics of commons-based peer production. *Creativity and Innovation Management, 30*(1), 63–79. doi:10.1111/caim.12392

Barbrook, R., & Cameron, A. (1996). The Californian ideology. *Science as Culture, 6*(1), 44–72. doi:10.1080/09505439609526455

Bean, J., & Rosner, D. (2014). Making. Movement or brand? *Interactions, 21*(1), 26–27. doi:10.1145/3320495

Berger, P. L., & Luckmann, T. (1966). *The social construction of reality.* London, UK: Penguin.

Berker, T., Hartmann, M., Punie, Y., & Ward, K. (2006). *Domestication of media and technology*. London, UK: Open University Press.

Berlin, L. (2017). *Troublemakers.* New York, NY: Simon & Schuster.

Bogers, L., & Chiappini, L. (2019). *The critical makers reader*. Amsterdam, The Netherlands: Institute of Network Culture.

Browder, R. E., Aldrich, H. E., & Bradley, S. W. (2019). The emergence of the maker movement. *Journal of Business Venturing, 34*(3), 459–476. doi:10.1016/j.jbusvent.2019.01.005

Charmaz, K. (2014). *Constructing grounded theory.* London, UK: Sage Publications.

Corsini, L., Dammicco, V., & Moultrie, J. (2021). Frugal innovation in a crisis: The digital fabrication maker response to COVID-19. *R&D Management, 51*(2), 195–210. doi:10.1111/radm.12446

Costanza-Chock, S. (2020). *Design justice*. Cambridge, MA: MIT Press.

Davies, S. R. (2017). *Hackerspaces.* Cambridge, UK: Polity.

Day, A. (2016). *DIY utopias*. New York, NY: Lexington.

Dickel, S., & Schrape, J.-F. (2017). The renaissance of techno-utopianism as a challenge for responsible innovation. *Journal of Responsible Innovation, 4*(2), 289–294. doi:10.1080/23299460.2017.1310523

Doctorow, C. (2011). *Context*. San Francisco, CA: Tachyon Publications.

Dougherty, D. (2013). The Maker mindset. In M. Honey, & D. E. Kanter (Eds.), *Design, make, play* (pp. 7–11). New York, NY: Routledge.

Dougherty, D., & Conrad, A. (2016). *Free to make.* Berkeley, CA: North Atlantic Books.

Eagleton, T. (1991). *Ideology.* London, UK: Verso.

Eilam, E. (2011). *Reversing.* New York, NY: Wiley.

Foucault, M. (1970). *The order of things*. New York, NY: Pantheon Books.

Gauntlett, D. (2018). *Making is connecting*. Cambridge, UK: Polity.

Gershenfeld, N. (2005). *Fab*. *The coming revolution on your desktop.* New York, NY: Basic Books.

Glaser, B. G., & Strauss, A. L. (1999). *Discovery of grounded theory*. New York, NY: Routledge.

Goffman, E. (1974). *Frame analysis.* Cambridge, MA: Harvard University Press.

Hall, S. (1988). The rediscovery of "ideology." In M. Gurevitch, T. Bennett, J. Curran, & J. Woollacott (Eds.), *Culture, society, and the media* (pp. 56–90). New York, NY: Routledge.

Hasebrink, U., & Hepp, A. (2017). How to research cross-media practices? *Convergence, 23*(4), 362–377. doi:10.1177/1354856517700384

Hatch, M. (2014). *The maker movement manifesto.* New York, NY: McGraw Hill.

Hepp, A. (2016). Pioneer communities. *Media, Culture & Society, 38*(6), 918–933. doi:10.1177/0163443716664484

Hepp, A. (2020). The fragility of curating a pioneer community. *International Journal of Cultural Studies, 23*(6), 932–950. doi:10.1177/1367877920922867

Hepp, A. (2022). Zum Lebenszyklus von Pioniergemeinschaften und ihrer Rolle beim Entstehen einer digitalen Gesellschaft [The life cycle of pioneer communities and their role in the rise of a digital society]. *Köln Z Soziol, 74*(1), 231–255. doi:10.1007/s11577-022-00835-6

Hepp, A., Benz, S., & Simon, P. (2021). Zwischen utopie und dystopie [Between utopia and dystopia]. *Medien & Kommunikationswissenschaft, 69*(2), 270–298. doi:10.5771/1615-634X-2021-2

Hepp, A., & Schmitz, A. (2022). The limits of the Maker ideology. *Continuum, 36*(2), 199–213. doi:10.1080/10304312.2021.2003755

Hitzler, R., & Niederbacher, A. (2010). *Leben in Szenen* [Living in scenes]. Wiesbaden, Germany: VS Verlag.

Hohmann, F. (2021). Co-Creation als Entwicklungsmethode [Co-creation as development method]. *Medien & Kommunikationswissenschaft, 69*(1), 97–116. doi:10.5771/1615-634X-2021-1-97

Irie, N. R., Hsu, Y.-C., & Ching, Y.-H. (2019). Makerspaces in diverse places. *TechTrends, 63*(4), 397–407. doi:10.1007/s11528-018-0355-9

Keppler, A. (2004). Media communication and social interaction. In K. Renckstorf, D. McQuail, G. Schaap, & J. E. Rosenbaum (Eds.), *Action theory and communication research* (pp.103–114). Berlin, Germany: Walter de Gruyter.

Kroker, A., & Weinstein, M. A. (1994). *Data trash*. Montreal, Canada: New World Perspectives.

Lang, D. (2013). *Zero to maker.* San Francisco, CA: O'Reilly.

Lewis, S. C., & Usher, N. (2014). Code, collaboration, and the future of journalism. *Digital Journalism, 2*(3), 383–393. doi:10.1080/21670811.2014.895504

Mannheim, K. (1936/2013). *Ideology and utopia*. London, UK: Routledge.

Markoff, J. (2005). *What the dormouse said.* New York, NY: Penguin.

Marwick, A. (2017). Silicon Valley and the social media industry. In J. Burgess, A. Marwick, & T. Poell (Eds.), *Sage handbook of social media* (pp. 314–329). London, UK: Sage.

Nascimento, S., & Pólvora, A. (2018). Maker cultures and the prospects for technological action. *Science and Engineering Ethics, 24*(3), 927–946. doi:10.1007/s11948-016-9796-8

Neff, G., & Nafus, D. (2016). *Self-tracking*. Cambridge, MA: MIT Press.

Nguyen, J. (2016). Make magazine and the social reproduction of DIY science and technology. *Cultural Politics, 12*(2), 233–252. doi:10.1215/17432197-3592124

Papavlasopoulou, S., Giannakos, M. N., & Jaccheri, L. (2017). Empirical studies on the Maker Movement. *Entertainment Computing, 18*(C*)*, 57–78. doi:10.1016/j.entcom.2016.09.002

Peppler, K., Halverson, E., & Kafai, Y. B. (2016). *Makeology*. New York, NY: Routledge.

Ratto, M., & Boler, M. (2014a). *DIY citizenship.* Cambridge, MA: MIT Press.

Ratto, M., & Boler, M. (2014b). Introduction. In M. Ratto & M. Boler (Eds.), *DIY citizenship* (pp. 1–22). Cambridge, MA: MIT Press.

Rheingold, H. (1994). *The virtual community*. London, UK: Addison-Wesley.

Rifkin, J. (2011). *Third industrial revolution*. London, UK: Palgrave Macmillan.

Rosa, P., Ferretti, F., Pereira, Â. G., Panella, F., & Wanner, M. (2017). *Overview of the maker movement in the EU*. Luxembourg, Luxembourg: Publications Office of the European Union.

Schmitz, A., Kirschner, H., & Hepp, A. (2022). Transnational networks of influence. In A. Hepp, J. Jarke, L. Kramp (Eds.), *New perspectives in critical data studies* (pp. 47–73). Cham, Switzerland: Palgrave Macmillan.

Schrock, A. R. (2014). Education in disguise. Culture of a hacker and maker space. *InterActions, 10*(1). doi:10.5070/D4101020592

Silverstone, R., & Haddon, L. (1998). Design and domestication of information and communication technologies. In R. Mansell & R. Silverstone (Eds.), *Communication by design* (pp. 44–74). Oxford, UK: Oxford University Press.

Sleigh, A., Stewart, H., & Stokes, K. (2015). *Open dataset of UK makerspaces*. London, UK: Nesta.

Smith, A., Hielscher, S., Dickel, S., Soderberg, J., & van Oost, E. (2013). Grassroots digital fabrication and makerspaces (SPRU Working Paper SWPS, 2). Retrieved from https://www.sussex.ac.uk/webteam/gateway/file.php?name=2013-02-swps-aps-sh-gdf-working-paper.pdf&site=25

South London Maker Festival & South London Maker Space Ltd. (n.d.). *Latest news and events*. Retrieved from https://londonmakerfestival.co.uk/

Strauss, A. C., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. London, UK: Sage.

Turner, F. (2018). Millenarian tinkering. *Technology and Culture, 59*(4), 160–182. doi:10.1353/tech.2018.0153

Webb, M. (2020). *Coding democracy.* Cambridge, MA: MIT Press.