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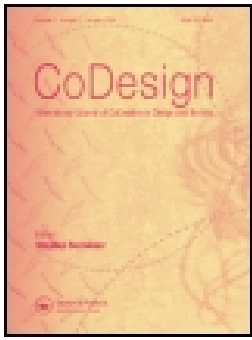
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Generative repair: everyday infrastructuring between DIY citizen initiatives and institutional arrangements

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ABSTRACT

DIY citizen initiatives exploring everyday-life practices such as collective making or repair are on the rise. These are characterised by the resources, local knowledge, and volunteer labour they mobilise but also by fragility of long-term sustainment. To understand what is at stake in sustaining them, the authors conducted a case study of a longstanding DIY citizen initiative in Berlin, cross-checking the findings by interviewing employees of two supporting institutional arrangements and organisers of three further DIY initiatives nearby. The study revealed how the DIY initiatives tie together roles and resources to provide concrete everyday infrastructure for citizens while dependent on resources such as space, insurance, legitimacy, and knowledge to navigate surrounding bureaucracy, provided largely via various institutional arrangements. Conversely, these established institutional arrangements benefit from DIY initiatives' local knowledge, authenticity, and expertise. Finally, both sides wish to gain fuller mutual understanding and dialogue-related competencies. The findings highlight the generative repair, performed by both citizen initiatives and the institutional arrangements, that makes their change agendas relevant and lasting. They also point to potential value from considering some of these attempts as forms of infrastructuring with relevance for contemporary participatory design practices.

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Generative repair; DIY citizen initiatives; institutional arrangements; relevance; everyday practices; infrastructuring

1. Introduction

While participatory design (PD) emerged with concerns about participation in the design of technologies for work practices, research interests have expanded in recent decades to include issues relevant to community activist projects in day-to-day life (e.g., Hillgren, Seravalli, and Emilson 2011; Agid 2016; Prost et al. 2019). This again is partly a response to the growing importance of civil society in countering neoliberal provisioning logics (Le Dantec and DiSalvo 2013). Accordingly, interest in understanding civic initiatives' collaborative and participatory endeavours has become critical to participatory design interventions, in terms of not only what PD can contribute to these initiatives but also, more importantly: how PD could be conceptualised, otherwise, through them (Agid 2016; Prost et al. 2019; Botero et al. 2020).

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Considering the broader research agenda connected with PD's relationship to civic initiatives, we seek to contribute to this growing body of work via insights from what are often termed do-it-yourself (DIY) citizen initiatives, which are gaining increased attention in both media domains and scholarly work, particularly in the Global North (Iveson 2013). While the phenomenon is far from new (Atkinson 2006), the recent proliferation of dedicated collective DIY spaces in urban centres (Deflorian 2020), such as 'bike kitchens', 'libraries of things', repair cafés, and open workshops, is quite significant. These spaces are not merely products of forms of co-design by particular citizen collectives (cf. Hector 2018; Prost et al. 2019); in providing space, tools, and knowledge, they can potentially constitute a form of social movements working through everyday consumption (Beveridge and Koch 2019; Iveson 2013). From a co-design standpoint, they can be seen also as engaged in infrastructuring activities (Karasti 2014), materially negotiating the collective relevance (Marres 2012) of their change agendas.

Many of these DIY spaces rely mostly on collaborative assemblies between free resources and volunteer work that fulfil several functions, from community centre to workshop proper. They cater for fellow citizens while negotiating with established actors that might hold an opposing view (e.g., on urban development). Since they tend to operate at the margins, they do not necessarily meet entrepreneurial funding mechanisms' selection criteria. Juggling these conflicting interests and expectations, they are liable to be of short duration. Therefore, we are interested in the means of making these initiatives last and how invested actors work to stabilise them as potential forms of long-term PD and infrastructuring. We explored this by studying a DIY citizen initiative in Berlin (as our main case) and three further initiatives that are part of Germany's Verbund Offene Werkstätten, or Open Workshop Association (OWA). We asked the following questions: (i) on what socio-material resources do these initiatives rely, and which do they create; (ii) who is involved in making these resources available, and how do they circulate; and (iii) how do the initiatives claim relevance (e.g., for obtaining resources)?

We begin our discussion by expanding on the phenomenon of DIY citizen initiatives and how infrastructuring and institutioning frameworks can help us understand their practices as forms of generative repair – a concept introduced here for illuminating how the complex interactions between citizen initiatives and institutions are constantly reorganised and thus repaired. Next, we introduce our cases and research approach, followed by an account of (i) who does what, (ii) the explicit and implicit resources identified, and (iii) three distinct forms of generative repair operating in the cases examined. Finally, we reflect on how everyday resources and relevance are sustained through generative repair as means of infrastructuring and on how the notion of generative repair matters for co-design.

2. The framework

2.1. *DIY as everyday politics?*

DIY initiatives come in many shapes and they can be aimed at either advancing or suppressing progressive agendas. Here, we focus on DIY initiatives that change day-to-day urban life by collectively creating new social and spatial relations, in the form of dedicated spaces for producing furniture or repairing clothes and bicycles. These

initiatives possess some common characteristics: a focus on the everyday, along with alternative practices therein (Deflorian 2020; Schlosberg and Coles 2016), and an ambiguous political standing. While some ecological concerns drive these endeavours, precisely whom they can mobilise, with what effects, is debated. Some scholars have taken issue with the supposed function of DIY practices as a form of civic participation. For example, community gardening has been criticised as a tool by which established institutions with vested interests fend off critical discussions about the use of urban space (Mayer 2003) and avoid acknowledging the inherent gulf between the culturally discontented and the dispossessed (Mayer 2013). For many, DIY practices situated in shared spaces seem to emphasise individual-level steps at a time when the complex, interlinked nature of environmental problems is evident (Scerri 2012). This political ambiguity places the practices at further risk of becoming short-term remedies where the urban settings require long-term planning. Others have concluded that such interventions may be ‘at once neoliberal and radical’ (McClintock 2014) and exemplify contested spaces of ongoing negotiation of power (Bródy and de Wilde 2020).

Because some people involved in these practices share a desire to repair not only objects but also parts of society – or at least make this claim – they engage in refiguring alternative modes of organising day-to-day life (Deflorian 2020). Beveridge and Koch (2019) posit that collective DIY practices such as those we observed in DIY spaces, while embedded in the urban everyday, bring change to it. They do this not via some wished-for future but by intervention in the here and now. Just as the production of day-to-day life is vital for the functioning of capitalism, it is vital for alternative modes of organising too, for it is in the everyday that desires are forged, contradictions resolved, and certain behaviour normalised (Lefebvre 2008).

Consequently, Seyfang (2009) has argued for developing alternative infrastructures of provision that can create subject positions other than that of responsible consumer. In much the same regard, Schlosberg and Coles (2016) have coined the term ‘sustainable materialists’ to describe how collectives bring forth networks to circulate everyday practices that differ from the conventionally sanctioned ones and thereby create lasting socio-material resources. Through highlighting the flow of resources within and between formal entities, these concepts also answer the criticism that participation in DIY practices appears ephemeral. However, a question remains as to who takes part in organising and sustaining the collective infrastructures and what sorts of resources and interventions this involves. Examining these aspects becomes especially compelling in light of the tensions such collectives can create for institutions seeking to continue established urban trajectories. Therefore, we turned our attention to insights on creating community infrastructures in the context of participatory design, which we will address next.

2.2. Infrastructuring in DIY citizen initiatives

The phenomenon of self-organised citizen groups challenges traditional understandings of urban planning, insofar as it complements existing top-down approaches and even blurs its boundaries (Horelli et al. 2015). In their study of DIY community spaces in Malmö, Hult and Bradley (2017) suggest that planning authorities should, rather than just react to emerging, fledgling initiatives, provide public infrastructure – such as

premises and longer-term financial support – to enable different uses and the long-term engagement of ‘less well-organised’ citizens. Their recommendation illustrates one side of the equation, the need for public infrastructure; however, we found their use of the term ‘less well-organised’ citizens intriguing: citizen initiatives are perceived as less well-organised because they depend on volunteers to get the work done. Voluntary work roles usually translate to a shortage of human resources, limited outreach to institutions, plurality of members and concomitant conflicting interests, etc. Yet some DIY citizens’ initiatives do last, under particular circumstances. Hence, while relying on certain resources provided by others, they must simultaneously work through other understandings of organisation and of infrastructure. For example Verhaegh, van Oost, and Oudshoorn (2016) have identified a rich variety of work types and heterogeneity of skills as involved in building and maintaining a citizen collective from within, and Huybrechts, Dreessen, and Hagenaars (2018) have pinpointed specific roles, tools, and capabilities developed in long-term PD. This implies that citizen initiatives are, or at least should be, engaged just as much in infrastructural activities as the city planners are, or should be (Hyysalo, Hyysalo, and Hakkarainen 2019).

In other work towards developing a strategy for understanding what these infrastructural activities might entail, PD researchers have employed the concept of infrastructuring (Karasti 2014), a useful lens for apprehending the emergence of infrastructures and practices that, though regarded by many as relevant, are usually dismissed as invisible work (Bowker and Star 1999). Infrastructuring opens a wider perspective on design, one that accounts for, firstly, material workarounds (Alter 2014) with lasting effects that enable completion of practices (Botero et al. 2019; Karasti, Pipek, and Bowker 2018) and, secondly, alignment of work among differently situated actors (Bødker, Dindler, and Iversen 2017). From a PD perspective, DIY initiatives establishing shared spaces can be understood also as (one) part of a collective coming together to intervene – in our case, with regard to the issue of privatised material flows. They do so by infrastructuring more open material flows in their local surroundings and the needed alliances thus contributing to what Bødker and colleagues term back-stage and front-stage interventions.

Citizens’ infrastructuring work entailing workarounds and alliance-building is not always enough to address what Marres (2012) calls the problem of relevance. This notion operationalises Dewey’s (1927) concern that collectives are too far removed from the institutions that possess the resources necessary for dealing with key issues that affect the collective. Indeed, in most cases, citizen initiatives must engage in exchange with institutions, and institutions must engage with them (Hyysalo, Hyysalo, and Hakkarainen 2019). Formal institutions’ role here is ambiguous, however, with Jalbert (2016) citing the case of a citizen science initiative that, collaborating with established institutions, proved able to overcome barriers of legitimacy yet remained in permanent flux in its negotiating power. Consequently, negotiations between citizen initiatives and institutions have been discussed both as co-option (Mayer 2013) and as a necessary way to challenge institutional frames (Mouffe 2013). To clarify our use of the term ‘institution’, we follow Helmke and Levitsky (2004), who describe formal institutions, municipalities, and other bureaucracies as composed of rules and procedures formed and circulated through channels regarded as official. Continuing in the vein of Mouffe’s work, Huybrechts, Benesch, and Geib (2017) have applied the term ‘institutioning’ to underscore that formal institutions are not fixed entities in the background but sites of ongoing change (and intervention), just as infrastructures

are. We find this understanding crucial and posit that these sites too engage in work-arounds, for staying relevant to citizen initiatives.

2.3. Generative repair

We conclude this section by stressing a crucial point: the interface between institutional arrangements and DIY initiatives will always generate glitches, tensions, things to fix. Graham and Thrift (2007) nicely draw attention to breakdown as something normal, and Drazin (2019) applies this lens to reveal brokenness in design culture. Both argue that repair and maintenance are not exceptions but vital to the functioning of society. In this sense, the notion of everyday repair is helpful to us beyond its customary understanding as a practice in relation to specific objects. Repair, as a specific form of maintenance, does not necessarily equate to exact restoration; rather, it brings forth generative moments, as exemplified by the constant upcycling of wooden planks in large ships (Jackson 2014). This conception of repair challenges us to think of mundane activities in more appreciative ways, inasmuch as they render life possible (Beveridge and Koch 2019). From this perspective, asking how to fix a thing leads to further analytical questions, about why it broke (Graham and Thrift 2007). Let us translate this into our context: When things are made to last in a citizen initiative, certain roles and resources need to be produced and repaired constantly, in collaboration. In the case of sustaining a DIY citizen initiative, both the initiatives and institutional arrangements involved in this process are likely to be engaged in repair work and therefore subject to change themselves.

3. Material and methods

The insights presented in this paper are based on ethnographically informed qualitative research conducted with Trial & Error (T&E), a Berlin-based DIY citizen initiative that hosts regular make, repair, and swap events of various sorts (see Figure 1 for their workshop offering). It has been active for a full decade, in changing locations, though operating with scarce funding in a city that is rapidly gentrifying. Its longevity has been aided by its relations and co-operation with at least two institutional arrangements. One of these is the OWA, the association of open workshops that pools resources and knowledge amongst workshops providing open maker infrastructure to citizens. The OWA was established in 2012 by a workshop in Munich and now counts 220 workshops, across Germany, as members. The other main institutional arrangement supporting T&E is a 'quarter management' (QM) entity operating nationwide as an intermediary (cf. Stewart and Hyysalo 2008) between citizens and administrative entities (Report 2020). Established in Berlin in 1999 to support self-help and civil engagements, local networks, co-operation, and enhancement of social infrastructure, QM is financed by the European Fund for Regional Development and by German state and federal authorities.

Data were obtained via participant observation (bimonthly over two years, condensed in fieldnotes) and interviews ($n = 2$) within the T&E initiative. The material is complemented by two interviews with the OWA spokesperson and three with board members ($n = 5$), alongside interviews with the district government administration's sustainability officer, a QM manager supporting repair culture specifically through



Figure 1. Workshop offerings by Trial & Error e.V. Reproduced with permission.

a repair café, and the district officer mediating between the administration and QM ($n = 3$). Interviews lasted between 30 and 90 minutes. Because the OWA members interviewed act also as organisers of DIY spaces, we exploited this opportunity to cross-check our findings from the main case (T&E) via interview questions related to their own DIY initiatives: FabLab Cottbus, Konglomerat Dresden, and Hebewerk Eberswalde. The selection of interview partners was based on interviewees' recommendations and continued until saturation was reached (Figure 2 presents the main data sets and their connections with the main case). Finally, additional research material gathered for triangulation purposes consisted of QM's twentieth-anniversary report; advertisement material by QM, the district administration, and the OWA; and the OWA's newly developed manifesto, their workshop guidelines, official presentation slides, and promotion video.

Summary narratives from the T&E fieldnotes, the documentation, and interview transcripts (both produced and translated from the original German by the first author) were discussed with the second author, during four analysis sessions facilitated by sensitising concepts. We probed (i) which material and socio-material resources were deemed important and (ii) how circulation was enabled or hindered, to arrive at an initial set of codes. For the first sensitising concept, among our open codes were 'volunteer', 'insurance', and 'space'. Regarding the second sensitising concept, we coded documentation, repair, absence of legitimacy, and different use cases. In a second round of coding, the original codes were summarised through either open coding (e.g., 'explicit resources', 'implicit resources', and 'who does what') or predefined categories from the literature, such as 'workarounds', 'infrastructuring alliances',

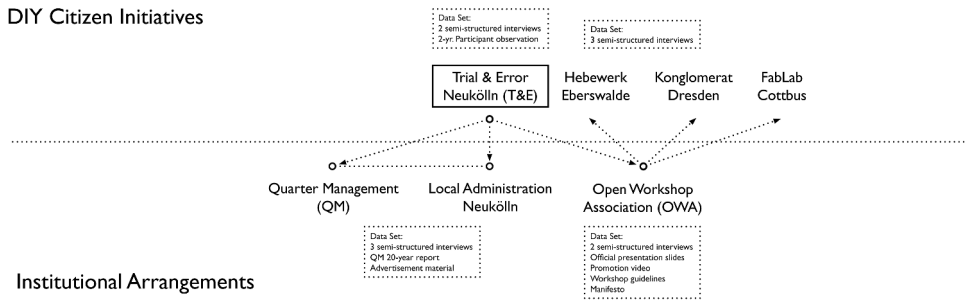


Figure 2. Data collection process.



Figure 3. Open workshop Komglomerat. Reproduced with permission.

and ‘institutioning’ (we replaced the last of these with ‘relevance-building’ after a closer reading of the literature). Finally, when reading through the materials again and pondering these codes, we proposed that the circulation of implicit and explicit resources (by means of material workarounds, infrastructuring alliances with other actors, and relevance-building) is indeed not just a cycle back to the start but a form of generative repair that affects the surrounding order. Thus, generative repair became the final selective code. To aid in the analysis sessions, the first author visually mapped the relations between the actors and the key discourses iteratively. As this process progressed, a diagram emphasising the resource flows emerged (Figure 5, presented in the discussion of results).

4. Results

We start by discussing who engages in which activities in the DIY space and which distinct roles appear to reconcile these various activities (see also Figures 3 and Figures 4 for a better understanding of what the spaces look like). Then, with the second subsection, we discuss particular forms of resources vital to sustaining the DIY space. Finally, against the backdrop of these observations, we discuss forms of generative repair: how resources are continuously made available.



Figure 4. Open Workshop Konglomerat event. Reproduced with permission.

4.1. Who does what within the DIY space

Firstly, we consider what the spaces enable. All four organisers of DIY spaces (T&E and the other three complementary sites) reported that a collective established their space to meet concrete needs, for free infrastructure to make and repair. Each group now provides such free infrastructure, and they all reported having ‘three different types of users’. One of these is practitioners who visit only a few times, to produce, for instance, a small table. Secondly, there are practitioners who want to share knowledge or even their tools. These two groups can benefit from each other; e.g., at a repair event, people who just want their items repaired can connect with engaged experts. The final group consists of practitioners who tinker on a project as individuals or collectively. Their projects are rather complex, usually showcasing local adaptation of projects created elsewhere such as ‘a solar-powered bicycle-pump station, data-driven beehives, an open-source laser cutter, or corona face shields’. Consequently, the spaces draw together diverse practices, from community-related ones such as casual meetings over a drink or helping others out, through individual hardware projects, to educational seminars and collective production work, all necessary for this alternative and open infrastructure’s existence.

Organisers reported that their ability to continuously reconcile these diverse drifts, actors, and use cases in the DIY space hinges on a set of key roles vital for their sustenance. However, one interviewee stated: ‘We say they are not five roles but five themes’, as several volunteers and also the above-mentioned practitioners might gradually get involved. The first covers duties of looking after the tools, cleaning, fixing them, and introducing them to newcomers. The second, related to social stewardship, includes

bridging differences of opinion or connecting projects with synergies. The third and fourth role/theme pertain to addressing finances and public relations, and the fifth entails networking and building momentum, mainly by developing strategies with established institutions (cf. Stewart and Hyysalo 2008 on facilitation and brokerage). Furthermore, as one DIY organiser stated, the state of all the spaces is ‘never-ending beta mode’, emphasising possible changes to roles. It is interesting also that, while every interviewee cited problems with documentation, none mentioned a separate ‘documenter’ theme, though this could arguably be listed as a sixth role.

4.2. *Explicit and implicit resources*

When investigating which socio-material resources are vital to the initiatives, we differentiated between explicit resources, i.e. those necessary materials that are visible immediately and implicit resources, i.e. that which is equally useful but rather hidden at first glance. With respect to the explicit, it is evident that space is a prerequisite for all other activities, ‘so that you do not have to worry about this and are not compromised in your work’, as one interviewee stated. Each initiative funded the space in its own way: via agreement with the mayor on funding from the city budget to pay rent, affiliation with the university to function as its ‘Fablab’, or regular production work for industry. In another case described during our research, a QM manager made an existing youth-centre workshop available for use as a repair café through reuse of an old separate entrance. Clearly, each space’s existence depended on cultivating good relations with established actors– as one organiser put it, ‘some people in the administration have us on their radar’. A position on the radar aids in obtaining tools, furniture, and waste/leftover material on sometimes industrial scale, all of which are necessary for getting started. A final example is the OWA’s ‘wandering laser’ scheme, hiring out a laser cutter to an open workshop for two months before moving on to the next.

Alongside these resources, implicit means of support are always present. The OWA created a set of guidelines describing barriers to establishing and running an open workshop. Another implicit resource is their ‘Co-wiki’, making workshop knowledge openly accessible. That said, all respondents stated that the Co-wiki suffers from documentation problems. While the OWA has a clear goal of prioritising existing community infrastructures over funding, the foundation behind the OWA does support their work with €10,000–25,000 per year, utilised for legal and tax advice, or a ‘travel and write’ programme whereby new facilities’ founders can visit existing workshops on condition that they share their findings via the community’s blog. Further funding depends on members’ own project applications (e.g., two research projects on repair), but, clearly, partnership with the OWA confers undeniable credibility. Finally, the OWA spokesperson said: ‘The magic tool provided by the association is the third-party insurance.’ Since workshops need not be officially registered associations to join the OWA, any group can obtain insurance thus. This phenomenon, not identified in other countries, is the primary reason Germany boasts 200-plus such spaces.

The implicit resources seem similarly vital in the work involving local authorities and QM in Berlin. Public servants and organisers alike discussed the administrative jungle of procedures and person-bound knowledge. The T&E organiser stated that ‘I know the urban green-space planning office people, so it saves us days of work if we want to

organise a public gathering'. Such rather implicit resources are characterised in the official 20-year report of QM as 'essential knowledge: contact addresses of partners (officers, actors), legal regulations, resources in the neighbourhood (ale-benches, technical equipment)'. These resources notwithstanding, when T&E needed to apply for funding, not knowing whom to consult on a minor formal detail led to rejection of their application. This problem becomes even more evident when one considers that citizens who are eager to contribute to their neighbourhood are likely to fail if even the intermediaries fail. Both the QM officer and the organiser with T&E cited this as their main frustration, stating that they sometimes do not understand the rules although they should be the mediators between the local administration and citizens. The latter concluded: 'Even if we were to learn how this system works, the other citizens still need to understand it as well [...] so we need to establish knowledge trees to make it accessible.'

Such problems are reduced by the 'give-and-take' relationship involved: the flow of resources is not unidirectional. The local administrative entities benefit. Firstly, they gain considerably from the authenticity of the initiatives' local surroundings, and the organisers know the local settings, resources, and problems better than officers who deal with several areas and handle internal office work. Being connected well with neighbourhood actors and having a decentralised structure, the initiatives are more flexible than the local administration. One board member of the OWA, in charge of the Hebewerk entity, based outside Berlin, stated that established institutions 'react only when money is flowing. We saw this during the refugee crisis when engaged citizens needed a place to meet and get organised. This was possible only through our free space' and indicated that 'now, some of them work with or within the institutions'. Most striking, however, is the environmental knowledge the initiatives can generate and provide to the officers. As the sustainability officer so trenchantly put it, 'they help us with their expertise, because in the department I am the only person for sustainability, and I cannot know equally much about renewable energy, waste issues, bicycle paths, and repair culture at the same time'. Additionally, all interviewees described their relevance to other actors; e.g., the OW Konglomerat developed learning strategies for sustainability of high-culture institutions and batch production to help the local plastics industry with a change of image.

The synergies aside, frustrations remain on both sides, related especially to lack of mutual understanding. One district officer stated that many colleagues would like to embody contemporary participatory culture but feel overburdened by the task. The organiser with T&E echoed this perspective, stating that officers attending a neighbourhood meeting once a year are met with a whole year's accumulated frustration: 'When the city asks for participation, conflicts appear for which they are not prepared.' Expanding on this tension, he cited lack of competencies among fellow engaged citizens too: 'On the basis of our experience, I would like to educate other citizens on how to lead dialogues in such a context.' The organiser from Hebewerk stated that, in fact, he prefers negotiation that addresses rising tensions to a homogenous activity such as a protest march. In this regard, the sustainability officer suggested a mentoring programme to support mutual understanding of the two sides' culture and needs. She stated: 'My colleagues get annoyed when not reaching any spokesperson of a citizen initiative [...] they forget that these initiatives depend on volunteer work and therefore do not have the resources to be available around the

clock.’ Likewise, she reported that cases wherein citizen initiatives receive funding but simply forget to put the right administrative logo on information material drive some of her co-workers to frustration. According to her, the problem is the limited time span for collaboration, which inhibits vital groundwork such as getting to know each other.

A final issue arising at the juncture of explicit and implicit resources is that the nature of DIY spaces renders applying for financing complex. While the initiatives try to keep the spaces open to everyone and see themselves as an emergent new modality of local needs-based production, funders represent numerous other interests, and fears. Therefore, the initiatives applying are expected to fulfil certain preconceived definitions representing justification and appropriate indicators. Willingly or not, they are then pressed into categories. Even then, district officers may not direct funding earmarked to initiatives that have proved to be capable actors. Instead, the money is channelled through federal/state programmes such as Clean City, and then needs to be appropriated by the officers to assign it to specific items the targets permit, such as educational workshops connected with a repair café on ‘reuse of items’.

4.3. Forms of generative repair

Synthesising our findings on the core issue of sustainment, [Figure 5](#) summarises three complementary forms of generative repair (GR) represented in our data. The initiatives come together in response to infrastructural shortcomings and rely on socio-material resources within the neighbourhood, such as volunteers and leftover materials. The first form of GR (1 in the figure) emphasises workarounds, repurposing existing material settings such as sources of funding or use of existing spaces/products. In the case of DIY initiatives, this entails strengthening internal resource flows, including vital roles and socio-material outcomes, but we observed institution-internal workarounds also.

The second form of GR (2) consists of infrastructuring alliances with other actors and participating in activities of a formal umbrella institution (e.g., the OWA), thereby

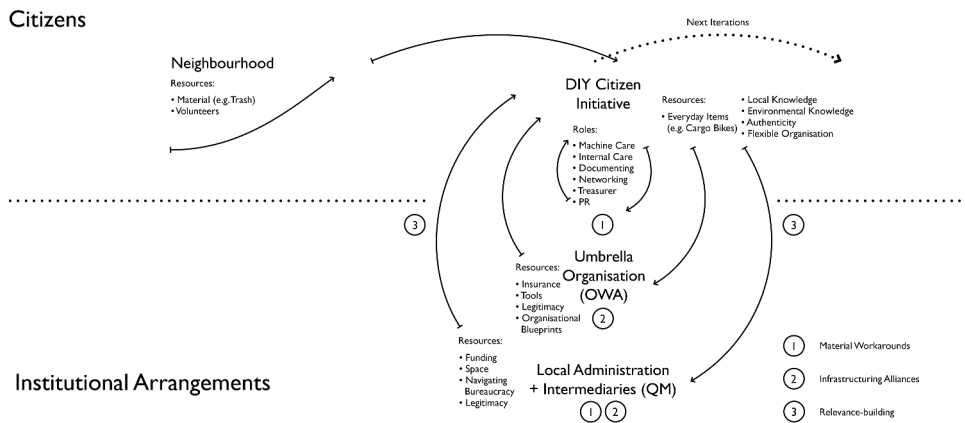


Figure 5. Gathering at open workshop Komglomerat. Reproduced with permission.

obtaining further resources (e.g., insurance). The final form (3) involves relevance-building. The initiatives receive resources such as funding, space, knowledge, and legitimacy conferred by institutional arrangements featuring district officers, intermediary organisations such as QM, etc. The initiatives' outcomes too are relevant for the institutional arrangements, including physical projects, local and environment-related knowledge, authenticity, and flexibility. The following section discusses all three forms of generative repair in more detail.

5. Discussion

The DIY initiatives we studied and the practices constituting their endeavours are grounded in everyday needs (Deflorian 2020; Beveridge and Koch 2019); the objects made and repaired in these spaces meet needs for food, shelter, telecommunications, or mobility. These objects and their creation and repair are aimed at normalising access to free workshop infrastructure and the accompanying knowledge production in day-to-day life (Lefebvre 2008). As the outcomes do, the necessary resources for DIY initiatives appear trivial at first glance. All interviewees highlighted that they need space, tools, and (cast-off) materials to produce/repair items, alongside which third-party insurance was reported as a 'magical' tool, encouraging initiatives to flourish in Germany. Finally, these initiatives highlighted alternative organisation of resource flows and knowledge production (Schlosberg and Coles 2016; Seyfang 2009), democratic and free approaches as opposed to more hierarchical, for-profit pre-existing formats. Rather than make organisation of sustainability the individual consumer's responsibility (Scerri 2012), these DIY initiatives enable people to participate as individuals in a collective, even when only some of them return regularly.

Provision of these resources relies on several people. As the term 'DIY' attests, laypersons sharing their knowledge are the most obvious workers in the circulation of resources. Additionally, the organisers of the DIY initiatives discussed the great variety of roles or themes that must be dealt with, from looking after machines or social relations to documentation – work that is mostly invisible (Hyysalo and Hyysalo 2018). This also included legitimacy-conferring work with officers representing institutional arrangements and internally disseminating the knowledge necessary for navigating the surrounding bureaucracy (Jalbert 2016). Again, these officers, whether in municipal administration, intermediary organisations such as QM, or umbrella institutions (e.g., the OWA), are equally important in enabling the circulation of essential resources and opening collaboration opportunities (Hillgren, Seravalli, and Emilson 2011; Hyysalo, Hyysalo, and Hakkarainen 2019). This highlights these sites' nature as subjects of ongoing change themselves (Huybrechts, Benesch, and Geib 2017). Indeed, we can state that as internal flows of resources are strengthened through a more formal collective (Schlosberg and Coles 2018), so too are the relations to the seemingly separate established institutional arrangements.

We argue that this work of managing resource flows, which is necessary if DIY initiatives' undertaking is to last, can be broken down into three aspects of generative repair. On socio-material level, the above-mentioned actors are involved in infrastructuring (Karasti 2014) – i.e., ascertaining what other people need for continuing their practice and making the necessary infrastructure available (Bowker and Star 1999; Botero et al.

2019; Karasti, Pipek, and Bowker 2018). Here, we distinguish ongoing pursuit of match-making interests and opportunities from *ad hoc* working around formalised material settings (Alter 2014), as with the youth-centre workshop's repurposing as a public repair café by virtue of a separate entrance. Likewise, the informants reported various arrangements that led to low-cost or free rental spaces and equipment, approaching the free provision of infrastructure that Hult and Bradley recommended (2017). On another level, officers allocating Clean City funding such that a repair café can receive it does not appear groundbreaking; however, this creative workaround did enable the café's operations to continue. The argument becomes especially compelling when one takes programmes such as Clean City as a sign of the longstanding schism between the 'culturally discontented and the dispossessed' (Mayer 2013). All the above-mentioned developments still demanded good interaction between officers and DIY organisers. Indeed, when insufficient time was provided for introducing and understanding differences between their cultures or rules, or when competencies in dialogue were lacking in general – a shortcoming all respondents decried – accessing essential resources became difficult.

The reported good relations with administrative officers highlight the third aspect of working to make things last, that of relevance. To receive explicit and implicit resources (space, funding, legitimacy, knowledge, and others), the initiatives must appear relevant for these very institutional arrangements, to at least some degree. Examples can be found in the ecological expertise highlighted by the sustainability officer and in several commissioned works for cultural institutions and industries, especially projects necessitating rapid prototyping for small production runs. Divergences in notions of relevance have further consequences insofar as the initiatives must be open in the sense of a certain independence and counter-cultural aspect (Toombs 2016) while also appearing formal enough for legitimacy in funders' eyes.

Overall, what our observations demonstrate most is that, in their quest to make their agendas last, DIY initiatives, intermediaries, and city administrations engage in forms of generative repair, work that hinges on assorted mundane resources and a constant repair of existing socio-material infrastructures and inter-organisational relations. What has been described as maintenance in PD initiatives (Iversen and Dindler 2014) closely resembles forms of generative repair in this case (Jackson 2014). Such a repair-oriented perspective on design is valuable insofar as it aids in steering away from a productionist bias and instead asking 'why did it break, and how can it be made to last?' Thus far, design has been human-centred, with a focus on our needs, relations, and experiences (Buchanan 1998), hence following a short-term logic and disregarding the destructive side effects such processes can have for the environment on which we continue to depend (Fry 2009). If the problems lie in purposes a human being has designed, all work that follows becomes an act of repurposing and, therefore, repair (Berglund 2019; Drazin 2019). An Anthropocene world, which is understood as something pre-designed, entails often maintaining assumptions about arrangements and purposes of material environments – until breakdown. Hence, generative repair potentially becomes a form of participating and collaborating in ongoing design, one further step in a chain of remaking (Drazin 2019).

6. Conclusion

To sustain themselves, the initiatives we studied depend on resources, most of them mundane and implicit. These include access to space, tools, and materials or ways to find them; knowledge of how to handle bureaucracy; legitimacy; and, very importantly, third-party insurance. All these are provided by institutional arrangements (including local government bodies and intermediary organisations); however, these institutional arrangements, in turn, benefit from the local and environmental knowledge produced and from the DIY initiatives' authenticity and flexibility.

Provision of these resources depends on everyday workarounds by the DIY organisers and on informal institutional work by officials within the institutional arrangements. Furthermore, the administrative officers' work underscores that institutions too are sites of active change. While they might pursue opposing narratives of the urban in general, both DIY initiatives and district administrations benefit from the exchange. Barriers to this productive exchange exist in the bureaucratic jungle but even more so in the dearth of mutual understanding of the different cultures at play and poor skills in such areas as conducting a dialogue.

While initiatives need to sustain their resource flows, they also need to stay relevant. Initiatives can retain relevance for fellow citizens when relatively independent from institutional arrangements, yet they must simultaneously negotiate their relevance with the same institutional arrangements to receive resources. Both aspects of relevance are connected with how the initiatives are organised: being open enough for every citizen and arising productive frictions yet solid enough to offer something to institutional actors and thereby gain resources, and even formalised enough to master the flow of these resources.

Our focus on generative repair in the everyday highlights how socio-material collectives are constantly rearranged and thus gradually change. It also highlights when problems exist in material and spatial settings pre-designed by human beings, this rearrangement offers opportunities for repair in the sense not of fixing or restoring but of moving on. Repair then potentially becomes an opportunity to participate in ongoing co-design of our socio-material surroundings.

Our findings are, however, limited by the specifics of the locations we engaged with. The most striking characteristic in this regard is the OWA's provision of third-party insurance, the absence of which would alter the picture dramatically. Similarly, while the intermediary QM operates nationwide and all our complementary cases point to analogous experiences of interacting with the respective local administration and intermediaries, our perspective, by and large, revolves around one specific site (namely, T&E). However, we hope our conceptualisation of generative repair serves useful as a starting point to explore similar sites and dynamics and enrich the theory and empirics presented here.

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