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Everybody's Hacking: Participation and the Mainstreaming of Hackathons

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ABSTRACT

Hackathons have become a popular tool for bringing people together to imagine new possibilities for technology. Despite originating in technology communities, hackathons have now been widely adopted by a broad range of organisations. This mainstreaming of hackathons means they encompass a very different range of attendees and activities than they once did, to the extent that some events billed as hackathons may involve no coding at all. Given this shift away from production of code, they might instead be seen as an increasingly popular participatory design activity, from which designers and researchers in HCI can learn. Through fieldwork at six hackathons that targeted non-technical communities, we identify the types of activities and contributions that emerge through these events and the barriers and tensions that might exist. In doing so, we contribute a greater understanding of hackathons as a growing phenomenon and as a potential tool for participatory research.

Author Keywords

Hackathons; participatory design; co-design; jams; making; innovation.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION

Hackathons have emerged as a popular activity in technology and maker communities in recent years. By bringing together participants in a single location over short periods of time, they support intensive bursts of creativity around technology. While once largely exclusive to software development, hackathons have increasingly moved into the mainstream in recent years [4]. Hackathons are now being run by organisations as varied as museums and charities, on subjects covering everything from fashion to climate change [4, 9, 37]. With this variety of goals and



Figure 1. Conventional hackathons bring together developers for intensive bursts of activity. Image © Sebastiaan ter Burg

organisers come formats and audiences that diverge significantly from the original concept. Despite being ostensibly focused on development activities, these events appear to have been successful in engaging a wider audience beyond technology communities.

As HCI researchers, our interest in hackathons stems from a belief that they represent a type of participatory design activity that is succeeding in engaging the public in thinking about the application of technology to a variety of issues. Against a growing diversification of participatory methods used in HCI and the recognition of challenges for the field [36], we see potential for hackathons—or at least some of their properties—to contribute to our array of methods. Existing research, particularly around issue-oriented hackathons [6, 17, 18], points to their ability to bring together developers and activists around civic issues such as engagement with local government, and to the value of networking at these events over the actual technical outputs. We also see the degree to which hackathon participants shape the process, mirroring recent calls to better support participants in doing this [36]. However, other aspects of hackathons are problematic from a participation perspective, as some of their defining characteristics are widely acknowledged as creating diversity issues [5, 25].

Considering this potential, but also issues including diversity and the apparent disparity between their focus on development and attempts to engage a wider audience, we

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seek to better understand how hackathons are being appropriated for different audiences and what we might learn from these events to inform the configuration of our own participatory activities. Specifically, our research asks:

- What do organisations appropriating hackathons aim to achieve when technical outputs are not prioritised?
- How did attendees with non-technical backgrounds participate and what roles do they fill? For the purposes of this research, this refers to attendees not normally involved in the design or development of technology.
- What are the tensions that arise when appropriating the hackathon format and how are they being overcome?

To address these questions, we describe fieldwork carried out across six hackathons that engaged with non-technical communities, where researchers were embedded as full participants of the event. In doing this, we contribute a greater understanding of the hackathon phenomenon and the mainstreaming of these events, with implications for hackathon organisers, for the growing number of HCI researchers utilising hackathon-style events as a tool for participatory design and for the configuration of participatory activities in general.

BACKGROUND

Hackathons

In open source communities, hackathons have long provided the opportunity for a distributed community to meet face-to-face and a burst of energy to tackle problems, innovate with software or maintain code [21, 35]. They have also been widely used within industry, where events often focus on promoting or testing a specific technology [14]. This can include bringing in coders from outside the company or harvesting untapped creativity in their own employee pool [13, 28]. They have also been taken up by government bodies, often to promote the use of open data and generate new apps [12]. In contrast to everyday work, they offer opportunities to engage with different people, technologies or issues [9] while enjoying freedom to explore new projects [31].

The common structural elements of hackathons include intensive activity over one or two days, the presentation of challenges and formation of teams, and demos of outputs at the end of the event, often with prizes [13]. Beyond these structural elements, many events share a common goal of bringing people together who might not normally encounter each other and creating dialogue between people with different skills and knowledge [13, 26, 28]. Another is the playful and performative nature of the events and the spirit of exploration [5, 9, 16]. Elsewhere, many of these key properties are shared with *jams*, a term which has been particularly popular in gaming [16] and service design [27].

It is perhaps these latter qualities that have led to hackathons being taken up with enthusiasm by a wide range of organisations beyond technologists. In recent years,

events have been applied to topics as varied as music, fashion and dance [4]. Although most hackathons still involve technology to some degree, many have shifted away from being primarily technology-oriented and towards being *issue-oriented* [18]. Examples include Code for America [8], green hackathons [37] and hackathons for disaster response [9]. In this configuration, the technologies utilised do not necessarily matter so long as they are applied to a specific challenge or problem. For the hackathon organisers, these events provide opportunities to access skilled volunteers and create longer-term engagement [9].

This opens avenues for participation by a much wider audience in a broader range of activities, to the extent that some events have been described as “hackathons with no hacking” [29]. In noting this shift, we draw a distinction between original form of hackathons, in which there is a clear impetus to develop working code as a primary output of the event, and this new form of mainstreamed hackathon in which, although there may be coding involved, it is largely side-lined in favour of other priorities. However, it is not always clear what these hackathons intend to achieve [23] or how “useful” they might be in meaningfully impacting the issue [24]. They also present significant problems in terms of diversity [5, 25]: attending a 48-hour intensive event can be unattractive to many people, but might specifically exclude people with childcare responsibilities, for example.

Hackathons as Participation

HCI has largely concerned itself with issue-oriented hackathons as a form of participatory activity. Indeed, many of the less tangible properties described above are encapsulated well by McCarthy and Wright’s genres of participation: understanding others, building personal relationships, belonging in community and participating in publics [20]. Rather than focusing on the outputs of hackathons, researchers have paid close attention to the value that attendees gain from participating: for example, Irani describes the ability of hackathons to “manufacture urgency and an optimism that bursts of doing and making can change the world” [11]. In her account, hackathons transform attendees from spectators to practitioners by creating an almost performative space where imaginaries of technological futures are insulated from the complexity of the outside world. This description of hackathons as a performative activity is recurrent in other literature [6, 29].

Lodato and DiSalvo [17] viewed them firstly through the lenses of participatory innovation as ad-hoc design events, noting the way that participatory design activities are embedded within the process of technical production. They describe this ad-hoc design activity as a design thing [2], through which attendees produce temporary assemblages of people and technologies to explore an issue. They further describe hackathons as material participation [18]—a tangible way of meaningfully engaging with an issue and exploring its boundaries, rather than an attempt to resolve

the issue [19]. The technical outputs themselves “give form to issues, instantiating them through representations of screens and enacting them through partial interactivity” [18]. In these cases, time is often spent reframing, articulating and working through the implications of technologies and issues.

Hackathons have also begun to be employed by HCI researchers themselves as participatory design tools. For example, they have been used in developing new approaches to sensitive mental health disorders [3], while others have taken key elements of the format to engage neighbourhoods with technology and support grassroots innovation [32]. In part, researchers have aimed to capture some of the key properties of hackathons, especially their more exploratory and playful nature by comparison to other participatory design activities [32, 34].

The hackathon format that has clearly captured the public’s imagination and made them attractive as participatory activities—the value of which has not been lost on HCI researchers and designers. Yet at the same time, there is an obvious mismatch between the goals of supporting participation and the frequently excluding nature of hackathons, not least the risks of marginalising those without technical skills and the privileged position of those capable of participating in hackathons. For this reason, our work focuses specifically on hackathons that aimed to recruit participants with non-technical backgrounds and the dynamics of these events. By better understanding how these events engage participants and the steps taken to support broader participation, we intend to contribute both to the understanding of hackathons as participatory activities and to possible new configurations of other participatory activities that can capitalise on this trend.

STUDY

This paper draws on data collected through attendance and participation at six hackathons in the UK. Below, we describe the process of studying the events and provide a brief overview of the hackathons, summarising their intended goals and configurations.

Data Collection and Analysis

Researchers attended a total of six hackathons, two of which took place at the same time in different cities as part of the same series of events. The duration of these events varied between six and 48 hours, although tending towards the longer duration, with most taking place over multiple days. Researchers participated fully in the hackathons by joining teams formed by other participants and lending their own abilities to the teams.

In line with our research questions, we primarily focused on the role of attendees with non-technical backgrounds in both our selection of hackathons to attend and the focus of our interviews, observations and analysis. In-depth interviews were conducted with the organisers of each hackathon that focused on the objectives and design of the

event, particularly their efforts to engage with different communities. Our interactions with participants were largely through taking part in groups and informal conversations with attendees, which were captured through our field notes. We conducted follow-up interviews with a small number of key participants who played interesting roles bridging different communities. Question prompts used by the researchers sought information about what the organiser or attendee hoped to achieve through the hackathon, experience with such events and reflections on the event afterwards, with a focus on how less experienced attendees contributed. A thematic analysis was conducted on these materials to develop the themes presented here.

Hackathon Summaries

The hackathons attended (Table 1) all took place in the UK between February and June 2016 and were identified through a combination of Google searches, Meetup listings, mailing lists and word of mouth. We specifically selected hackathons that actively aimed to recruit attendees with non-technical backgrounds to be involved, and as a result they varied considerably in their structure, audience and goals, especially in terms of duration and actual coding activity. It is notable that several were being organised by people with only limited experience of hackathons themselves. However, while not all the events were explicitly billed as hackathons, all were recognisable as such from the advertising material.

Codethecity

Codethecity is a series of civically engaged hackathons run by an Open Data group comprising computer science academics and a local council officer. The series follows a common model of creating new applications and services making use of data provided by local authorities and other sources, with an overt emphasis on open data. The specific event that we attended was billed as a History Jam and intended to build upon an application that had been developed in the previous Codethecity event. The organisers had a specific plan for what they wanted to achieve over the weekend and advertised to historians and librarians as well as developers.

Cyclehack

Cyclehack is an annual international series of hackathons around cycling, aiming to address barriers to greater uptake of cycling. The series was started by a design agency who make extensive use of hackathons in their practice. Despite being billed as hackathons, these events attracted an audience of service designers who tended to develop prototypes that were not underpinned by technology (such as “lifhack”-style ideas). Of the 35 Cyclehacks being run internationally, one researcher attended the design agency’s main UK event, while another attended a smaller Cyclehack run by a students’ union.

Local Democracy Maker Day

This event was run as a fringe event prior to a larger annual conference about local democracy, which brings together

Event	Terminology Used	Organisers	Attendees	Approx. Attendees
Codethecity	Jam	Open Data group	Developers, historians, librarians, designers	30
Cyclehack Glasgow	Hack	Design agency	Cyclists, designers, developers, activists, council workers	30
Cyclehack Dundee	Hack	Students' union	Cyclists, students, designers, developers, activists, council workers	10
Local Democracy Maker Day	Maker Day	Council workers	Council workers, politicians, developers, designers	30
Railway Codes	Hackathon	Museum group, creative agency	Developers, railway enthusiasts, designers/creatives	15
Self Harmony	Hackathon	University HCI group	Developers, designers, researchers, mental health workers, self-harmers	40

Table 1. Summary of hackathons studied.

people from a variety of backgrounds. The Maker Day was intended to bring a subset of attendees together around a set of design challenges faced by local democracy that might be addressed through digital technologies. These attendees varied from developers (typically working for councils) to local politicians and activists, many of whom were primarily attending for the main conference rather than the Maker Day.

Railway Codes

Railway Codes was organised as part of a programme of events by a regional group of museums. The programme was delivered by a major arts organisation with extensive experience in digital and creative events, with the event itself delivered by a local consultant with experience in running hackathons. The event was attended by both technologists and railway enthusiasts, including researchers and students from a nearby HCI group. The event was held over ten hours on a Sunday and hosted in a railway museum, where attendees had access to the museum's exhibits.

Self Harmony

Self Harmony was organised by a university HCI group (from a different institution to the research team) as part of a project around technology and mental health [3]. Although most of the developers and designers participating were researchers and students from the university, it also attracted many attendees from various mental health charities and support groups, as well as some undergraduate medical students. More so than at other hackathons, the event was interspersed with talks from experts and charities, as well as individuals with experience of self-harm and made extensive use of mentoring due to the challenging subject area.

FINDINGS

Below, we discuss our findings in relation to our three research questions: firstly, the motivations of organisations for running hackathons; secondly, the types of activities undertaken at these hackathons, particularly by participants from non-technical backgrounds; and finally, the tensions

that arise in attempting to repurpose the hackathon format for this audience and the steps that have been taken to ease these tensions.

Motivations

Few of the hackathons we surveyed were motivated by the development of working prototypes. Even where there was significant interest in the outputs, these were not the primary motivator. Instead, organisers sought less tangible outcomes around engagement and awareness of the issue at hand, while building networks and enthusiasm that might be leveraged in the future.

Public Engagement

For several of the events, organisers saw them as a form of public consultation where members of the public—both with and without technical skills—could be brought into an organisation to provide feedback and new ideas. This was most clearly demonstrated by the smaller Cyclehack event, run by a students' union, where the organisers saw the hackathon almost as an exercise to gain insights from both regular and novice cyclists that could feed into their plans to better support cyclists in the future (“*the idea of the CycleHack was to engage with the local community and stuff to see what the cycling is like in [the city]*”). The dynamic nature of the hackathon was seen as the antithesis of conventional consultation meetings (“*you want to be making stuff, you don't want to just be sitting down*”). Here, it was not just organisers who valued interaction with the public, but also the cycling charity and council officers in attendance, who gained an opportunity to both raise awareness of their activities and gain feedback. The council approached it cautiously as a public engagement exercise and were pleasantly surprised that the constructive nature of the event lent itself to positive suggestions rather than just to complaints.

This often meant engaging not just with the general public, but with specific communities, such as cyclists, who have an interest in the issues being tackled by the hackathon. A further example of this could be seen at Railway Codes, where the organisers sought to engage with both railway

enthusiasts and the city’s vibrant digital scene. By bringing these different communities together, they hoped to identify with them new ways to engage with the museum service’s facilities and collections.

Raising Awareness and Advocacy

For other hackathons, the end goal was more about raising awareness of the issues being discussed. As Lodato and DiSalvo [18] noted at other issue-based hackathons, the goals of these hackathons were not so much the prototypes that were created as providing a way for people to engage with an issue, even temporarily. Although all the hackathons we visited had some element of engaging with a new issue and coming away with new awareness, this was most evident at Self Harmony, as the issue of self-harm was thought to be one that few understood (“*it was more about increasing awareness and decreasing stigmatisation of this quite often stigmatised group*”). Again, doing this in a hackathon environment was intended to be less passive than other forms of raising awareness, and was described by the organiser as “*talking in a much more active way*”.

We also observed awareness and advocacy working in both directions. At Railway Codes, the organisers were partly attempting to advocate for more digital innovation within their own organisation. Running a hackathon gave them an opportunity to access expertise in this area and demonstrate to others in the museum service the value of engaging with digital technologies and thinking more creatively about the possibilities that these technologies presented.

Network Building

The value of networking and relationship building at hackathons is pervasive in existing literature, as well as in our interviews and hackathon experiences. There is clear intrinsic value in building “*a community of like-minded individuals who are excited about something*” and accessing people with different kinds of skills. Networking was especially seen as the most likely route to having any kind of sustained impact beyond the event itself. For example, the Cyclehacks were attended by council officers and representatives from a cycling charity, who were considered key routes towards policy impact. In these cases, it was hoped that they would be able to take some of the ideas forward, or at least feed them into the plans of their respective organisations.

The Local Democracy Maker Day, by contrast to the other events, was almost entirely attended by councillors and council employees. At this event, there was a very strong focus on creating ongoing relationships between different parts of local authorities who might not normally meet, in order to create ideas that might be taken forward subsequently. The organiser of the Local Democracy Maker Day described one team from the previous year’s event who had made a commitment on the day to running several pilots for their idea, which involved livestreaming councillors on walks around the area they represented. This

was also picked up and developed further by the same team at the current year’s event.

Expectations and Outcomes

At most of the events, comments from organisers reflected the consensus in existing literature, which is that the technical outcomes are less important than other less tangible outcomes. However, as the pitch to participants and sponsors often described the hackathon in terms of building things, this sometimes created a need to adjust expectations and recognise that there would be no finished products or fully conceived ideas at the events. For Self Harmony mentors, for example, this was part of a learning curve as they recognised that they “*were never going to be able to explore self-harm from all the different angles*” and instead began to appreciate other factors, including promoting sensitivity in the designs, which was a more achievable objective over the course of a single weekend.

Other organisations had a clearer recognition of this in advance and instead focused on capturing the knowledge and ideas generated through the event so that they could be shared with others in the future. Towards this end, Cyclehack placed an emphasis on capturing the outputs from the event, no matter what their stage of completion, so they could be listed in an online ‘catalogue’. This was intended to increase the chances of an idea being picked up and taken forward, either at a future Cyclehack event, or by someone able to implement one of the ideas in the real world.

However, other events retained a sense that the more tangible outcomes of the hackathon were also important. At Railway Codes, these outputs were expected to be useful as tools for helping others in the organisation to “*understand why [the hackathon] is of value*”. Effectively, the prototypes were evidence that the resources spent on the event were not wasted and had the potential to be taken forward. While the less tangible outcomes might be more valuable for attendees, they were less useful for demonstrating that value to others. For this reason, it was particularly frustrating when attendees were reluctant to share or document what they had produced. The developers saw these as throw-away experiments, but for the organisers they were important outputs that could be shown to others in their organisation to demonstrate the value of the event.

Participating Without Coding

Participants from technical backgrounds were present at all the events, but each was characterised by an emphasis on attendees from other backgrounds. Although some of these attendees were in mentoring or speaker roles, the majority were present as members of teams. Below, we describe the roles they played in these teams and the contributions made at hackathons beyond coding.

Hacking in Different Mediums

Although coding activities were limited at most of the hackathons, the spirit of rapidly prototyping ideas lived on

in other mediums, with the use of craft materials or videos being particularly common. Since even the more technical outputs normally served to demonstrate a concept rather than to be used, these outputs were equally valued: one organiser was particularly defensive of the lower fidelity outputs at their event compared to other hackathons, saying: *“our stuff is no less beautiful, or valid, or creative than their stuff”*.

This was most pronounced at the Local Democracy Maker Day, where very few of the attendees had technical backgrounds. At this event, many of the teams did not produce any kind of tangible output at all, instead presenting the outcomes of day-long brainstorming exercises around the use of digital technology in local government, often using sketches and diagrams. One team delivered video outputs, choosing to prototype content of a service for communicating with local councillors rather than the service itself. This was largely enabled and driven by two members of the group: a storyteller who made extensive use of YouTube in his practice and a charismatic local councillor who appeared in the videos.

Although these less technology-driven approaches to prototyping were obviously favoured by those with non-technical backgrounds, they were also valued by seasoned hackathon attendees. For example, at Cyclehack, the researcher’s team worked on an idea to encourage ad-hoc cycle sprints. Although the team discussed ideas for wearable devices or hacks involving a popular cycling tracker app, one of the team members actively rejected these ideas, deeming it too close to his day-to-day work. For him, the event was an opportunity to have fun and explore something new, rather than pursue his normal practice. Instead, the team focused on a less technology-focused idea: a set of stencils that could be used to transform cycle boxes at traffic lights into starting points for races between waiting cyclists (Figure 2). Much of the time was spent iterating over a set of rules for the race and attempting to achieve the right kind of playful tone, while also negotiating some of the idea’s safety implications. In general, the organisers at this event were sceptical of apps *“that nobody’s going to download”* and other technical outputs.

Working Alongside Coders

Although functioning prototypes were in the minority at the events we attended, they were by no means absent and were created by mixed teams including both coders and non-coders. At the Local Democracy Maker Day, the researcher’s team prototyped a civically-focused time banking service, including a semi-functional mock-up. This prototype was developed single-handedly by a council programmer, who worked to create his own vision of the service. His activity was informed by the rest of the team, who spent much of the day discussing issues and possibilities around the idea, producing diagrams and other materials that were shown alongside the demo. Similarly, at

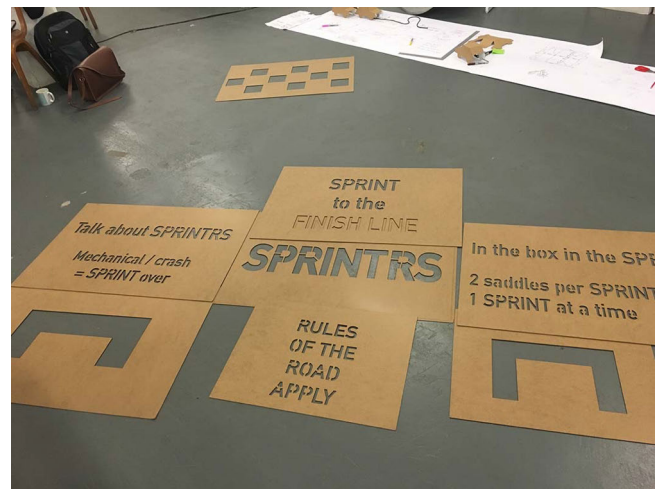


Figure 2. Rather than an app, the Cycle Hack team produced stencils that could be shared online.

Railway Codes, the researcher’s team produced a geolocative app that would display heritage content during a train journey. One of the members of the team had an existing app that provided a basis for a simple prototype, while the remainder of the team sourced content, including searching for interesting historical content from railway websites and generating image assets.

Codethecity was unique in this sense, as it was constructed around the specific task of developing a historical virtual reality tour of the city, based on an idea that had originated at an earlier event. They advertised a specific number of places for developers, historians and other roles, with loosely pre-defined tasks for each group. While the developers were coding, most of the other attendees worked on transcribing entries from a 1937 business directory and building an open data set that would be used by the digital model and made publically available afterwards. Although these tasks were largely separate—and ultimately didn’t reach the point of being integrated—there was still a sense of a shared task and considerable interaction between them. More experienced hackers were still able to define their own project and tended to break off into tasks that were related to the core topic but did not directly contribute to it.

Knowledge and Inspiration

As each of the hackathons was issue-based, those who attended were typically those who had an interest in the issue and who often had experience in that area. This was true to some extent of all the hackathons: keen cyclists and charity workers at CycleHack; local councillors and council officers at the Local Democracy Maker Day; self-harmers and mental health charities at Self Harmony; railway enthusiasts and museum staff at Railways Codes; and historians and librarians at Codethecity. These attendees with very personal experiences, especially around topics where public awareness might be low, played important roles in the events (*“helping our hackers navigate a world [...] that they’re not necessarily experts in”*).

At Railway Codes, for example, attendees gravitated around several railway enthusiasts, whose rich experience and encyclopaedic knowledge were both entertaining and useful. This stood in stark contrast to the materials provided—such as footfall data for train stations and scans of historical tickets—which were felt to be lacklustre. At Codethecity, historians played a similar role in being able to recall rich details about the city’s history and point other attendees towards resources and information. These provided what one organiser described as “*nuggets of ideas*”, as well as conversation starters that served to bring different groups engaged in different tasks together around a subject of common interest.

This role was most prominent at Self Harmony, where most of the participants had little prior understanding of self-harming. Experts from local charities, many of whom had very personal experiences with self-harm, acted as mentors who checked in regularly with teams to provide feedback, typically regarding sensitivity and the realities of self-harm. Similarly, from a series of talks held across the weekend, the one that resonated most with attendees was a candid talk from a guest speaker about his personal experiences of self-harming and his journey towards working with a mental health charity. At Cyclehack, attendees likewise responded particularly well to one speaker who described her journey from a cycling accident that damaged her confidence, to finding love and planning a round-the-world cycle trip. What these talks seemed to provide were very human experiences that attendees without experience could latch onto and take inspiration from, while developing a deeper understanding of the issue.

Tensions Within the Format

Despite the intentions of many organisations to use hackathons to reach a wide audience, the hackathon environment is not always an easy one to enter for someone who does not have technical skills and is not familiar with the format. Through our study, we identified common challenges in engaging with the events, of which the organisers were often very aware, as well as strategies they used to overcome these issues.

Reaching an Audience

Before the events even began, organisers faced a significant challenge in reaching and attracting people who “*wouldn’t necessarily traditionally see themselves as being part of a hack*”. Reaching multiple communities for a single event was particularly difficult: as one organiser noted, “*the more you have a mix, the harder it is to promote*”. Although there are common channels for promoting hackathons to developers (e.g. Meetup), identifying the right channels for other communities was often a struggle for the organisers, incurring a lot of footwork to build relationships with gateway organisations. At Self Harmony, the organiser talked about her experience of attempting to recruit through charities and the need to develop different pitches for different audiences, most of whom did not know what a

hackathon was. For others who had closer access to potential attendees this still proved difficult—despite the museum having good links with railway enthusiasts, Railways Codes still struggled to recruit from this community.

Part of the problem is explaining what a hackathon is and what it will involve, as well as the value proposition for attendees. This was not always achieved successfully: at Self Harmony, many of the attendees from charity organisations responded well to the opening talks, but were expecting a conference-style event and tended to drift away once it began to coalesce around teams and ideas. For others, it was necessary to warm them up to a concept they were not initially comfortable with: at Cyclehack, the council officer in attendance was initially sceptical, fearing that the event would be overly negative towards the city’s efforts, but was convinced to attend and ultimately made a significant contribution. Even within the technology community, there was difficulty in communicating to developers how “*their kind of hacks*” could be applied to topics like cycling.

Facilitation

Once at the event, facilitation was key to helping people unfamiliar with the format to participate. Levels and styles of facilitation varied depending on the event, its audience and the organisers’ goals. At the Cyclehack events, for example, one of the organisers’ aims was to provide a taster of the design techniques that the agency normally used, while ensuring that “*nobody’s being pushed into doing something too uncomfortable, but nobody is also allowed to just sit within their own comfort zone*”. So, although they provided each Cyclehack event with pre-printed templates that were suggestive of a specific process, there was little pressure to make use of them—indeed, the smaller Cyclehack abandoned these entirely, feeling they were not right for their event. Instead, they placed an emphasis on building mixed teams and a sense of community in the event space. This included the use of “*barrier cards*” describing things that prevent people cycling, crowdsourced over multiple years of the event, which provided a very lightweight opportunity for disparate attendees to gather around issues, rather than clustering into pre-existing groups (Figure 3).

By comparison, Self Harmony was the most closely facilitated event, with regular input from mentors, including an investment-style pitch during the second day and formal presentations and prizes at the end. This was often responsive to the needs of the attendees: for example, when less experienced attendees appeared uncomfortable forming teams, an ad hoc speed-dating process was put in place. However, facilitation was the cause of much friction, particularly between mentors—most of whom were highly emotionally invested in the topic—and the teams. Mentors had strongly held personal views, which weren’t always taken to heart by teams, but which also sometimes clashed



Figure 3. Barrier cards provided inspiration from cyclists and non-cyclists, creating conversation opportunities. Photo © Zoe Prosser for Snook.

with equally strongly-held views of team members. It was also clear that their feedback gave developers a heightened awareness of the sensitivity of their designs, which was hailed as one of the weekend’s main successes. It was clear there was an art to facilitating only as much as required—making sure everyone could do something and that groups were able to converge around something meaningful, without creating too rigid a structure.

Culture

Some of the most recognisable elements of hackathons, such as working through the night, present clear difficulties for supporting diversity. Basic elements of a typical hackathon appeal to those who are willing or even eager to give up their weekend and work intensively for long periods of time—something described as “*masochism*” by one organiser. But even without overnight work, attendees and organisers we spoke to found committing to an entire weekend difficult (“*it’s really difficult for me to do a full Friday night through to Sunday*”). This was particularly true of attendees who were there in a professional role, such as council officers, as opposed to those who saw it as a more recreational activity.

The smaller Cyclehack event was particularly conscious of this. Although they had a small core group of attendees who were present for the entire weekend, they repeatedly expressed a desire to run the event as a “*drop in*” or “*mini-hack*” event, where attendees could come and go more freely. Particularly for attendees like the council officers, it was considered important that the weekend didn’t simply consist of “*tapping on keyboards*” and that they had a role to play rather than “*just an introduction at the start of the day*”. All of this suggests a need for structures and scheduling that are accessible to a wider audience. However, when the format strayed too far from standard hackathons, there was sometimes clear disappointment or anxiety from developers, who felt that there was not enough time for coding. This was particularly notable at Railway



Figure 4. Cyclehack attendees testing prototypes on the street. Photo © Zoe Prosser for Snook.

Codes, where the 10-hour event meant only rough sketches of prototypes could be created. Perhaps for this reason, developers were reticent about showing or documenting their outputs, to the disappointment of the organisers.

Environment

Although the events aimed to inspire creativity, many were held in somewhat uninspiring university buildings or meeting rooms. While this might suit the task of intensive coding, it was less conducive to drawing in those with other skills. However, several hackathons had given more thought to the environment in which they took place and the atmosphere that they hoped to create.

For Railway Codes, the hackathon was held inside an actual railway museum operated by the organisers. This museum had been picked specifically as the subject of the hackathon, as it was already steeped in tinkering and innovation—many of the regular visitors were enthusiasts who came to work on engines—and it was thought that the hackathon might capture some of the spirit of innovation and “*build on the ethos of the museum*”. Despite this, the event was largely consigned to a small education room, apart from a brief trip on the museum’s steam engine. There was a sense amongst attendees that this was “*a trick missed*”, and that the potential of the venue to inspire had not been exploited.

Both the Cyclehack events were keen to get attendees out of the space and onto the streets, particularly given that the topic at hand concerned the urban environment so directly. At the larger of the events, a considerable number of attendees coalesced around a single idea of finding ways to demonstrate how much space should be given to cyclists by motorists. This involved building contraptions that expanded the width of their bikes on each side, after which they took to the streets en masse (Figure 4). This was seen not just as an opportunity to test out some of the hacks, but also as a way of engaging with members of the public and getting feedback on their concepts. Like engaging with the museum environment, it moved the event further outside its bubble and into the real world.

DISCUSSION

Below, we return to our initial goal of understanding what hackathons might contribute to participatory design efforts by HCI researchers. We focus on the participatory qualities that were demonstrated in the hackathons we observed, how HCI researchers might derive key properties from hackathons that can be applied to other activities, and finally some of the ongoing challenges presented by this format that need to be resolved.

Hackathons as Participation

As others have noted, the hackathons we have described are perhaps best understood as a participatory design activity. Core properties of participatory activities, such as understanding others and building personal relationships [20], are all clearly on display. Whereas hackathons in their original configuration, with their emphasis on production, might be better seen as intensive, collocated collaboration [35], these mainstreamed hackathons instead aim to support stakeholders in participating in issues and in the leveraging of technology towards these issues. It is tempting to conclude that these events are not hackathons at all—especially in those cases where development activities were eschewed altogether. However, this would dismiss how the format has succeeded in bringing varied communities of time-starved people together around a shared objective for significant amounts of time. This is not easily done, but organisers explicitly contrasted the lively hackathon environment’s ability to do this with more common workshop formats.

This leads us to consider current gaps in participatory approaches that properties of hackathons might address. Surveying participation in HCI, Vines et al. [36] discuss several issues, chief amongst them the unacknowledged influence of designers and researchers within these activities who, through their presence, facilitation and objectives, shape the proceedings and thus the ways in which people can participate. They suggest one potential way forward is to explore how participants might configure design activities themselves, directing not just the outcomes of the process, but the process itself. Light et al. [15] likewise recognise the difficulties around academic research, which is planned in advance and beholden to funders, and the goals of participatory design, resulting in uneven power structures that relegate participants to subjects. These issues suggest the need for more fluid structures that reflect a shifting, shared understanding of the problems being tackled.

It strikes us that by comparison to other approaches, the flexible, responsive structure and light-touch facilitation employed by many of the hackathons allowed participants to do just this. Together, they defined their own way of addressing the topic at hand using the knowledge and skills that their members brought to the table. Few of the events dictated outcomes or preferred media, focusing instead on

creating a friendly and creative environment in which teams were largely left to their own devices.

From this perspective, the artefacts that were produced acted not as outputs, but as boundary objects that allow disparate stakeholders to develop a shared understanding of the issue [7, 30]. In contrast to Irani’s [11] observations that hackathons are insulated from “the uncertainties of working with others”, the more varied participants at the events we observed very much brought the outside world and its complexity with them in a way that was more characteristic of participatory design [1]. This was perhaps most clearly demonstrated by the strong emotional reactions and interpersonal tensions at Self Harmony. Self-harm was not an issue that could be addressed without also addressing the complexity that comes with it. Where a more conventional hackathon might have produced outputs that avoided this complexity, the presence of people with lived experience led the developers to form a greater understanding of the issue. At the same time, bringing the outside world inside the hackathon bubble meant that less technically-oriented attendees could engage in ways that were more active and creative, with a greater focus on technology and a wider audience than those who might normally engage with the issue.

Beyond Hackathons

It is clear from our research that as the concept is taken up by an increasingly diverse range of organisations with varied goals and audiences, the events themselves are diverging significantly from the conventional hackathon model. These hackathons are not a single codified style of event, representing a spectrum between more conventional hackathons and common participatory workshop approaches. We propose instead that researchers, designers and other organisers might look carefully at the elements of hackathons that we can draw upon in configuring other participatory activities. Rather than focus on the features of hackathons that have been lost amidst their mainstreaming, we might instead pay close attention to what *remained* of the original concept that proved so appealing to organisers and attendees, which might indicate qualities that could be replicated in other contexts. In both the properties we describe below, we refer again back to the potential ability of these properties to rebalance the relationship between researchers and participants.

Firstly, we would argue that all the events set out to create *participatory spaces*, where the right mix of people and skills could come together, allowing the facilitators to step back and allow them to engage with the subject on their own terms, rather than through rigid structures. These spaces could be seen as the type of “social, technical and spatial infrastructures” described by Ehn [7], or Muller’s third spaces: a “fertile environment in which participants can combine diverse knowledges with new insights and plans for action” [22]. The value of such a space is in creating new communities of people and skills that did not

exist before, and in providing the framework for future activity that will persist beyond the event itself and could potentially make further progress towards addressing the topics raised. In some cases, organisers made tangible efforts to provide some sense of onward momentum for these new communities: for example, Cyclehack's online documentation or Self Harmony's plans to seek input from clinical commissioners. For HCI researchers, we might consider how we can harness some of the qualities of hackathons to create this type of space in other contexts where a hackathon is not appropriate. Recent work in HCI indicates some of the shapes these participatory environments might take, such as critical playshops [34] and Inventor Days [32].

Secondly, it is notable that the events were not necessarily seen just as a means to an end (i.e. the development of a prototype), but as worthwhile activities themselves. Attendees broadly enjoyed participating, met interesting people, built relationships, applied their skills and were exposed to new ones. A playful sense of adventure and excitement pervaded the events, which was markedly different from the day-to-day jobs of attendees. For HCI researchers, we might ask more often what our participants gain from being involved. This might be obvious in cases where participants are the direct recipients of designs, but in many cases our research outputs might be many times removed from any meaningful effect for the participants. Reframing participatory activities as opportunities for learning, development or networking could offer more value to participants and create a fairer relationship between researchers and participants.

Ongoing Challenges

Having discussed the attributes of hackathons that might be repurposed for participatory design, we must also consider those attributes that pose challenges. As we earlier described, one of the chief criticisms of the hackathon format is the risk of excluding certain groups—something that is clearly undesirable in participatory design. It might not be trivial to escape these issues, as some of them—for example, expecting someone with childcare responsibilities to dedicate long parts of their weekend—are closely linked to key elements of the format. Even at the most superficial level, the term 'hackathon' itself is problematic, implying specific mediums and ways of working that are no longer representative of the breadth of activity undertaken. The term 'jam' is equally opaque, but emerging terms like 'makeathon' might be more descriptive of the ways in which people can participate. We saw this most effectively at the Local Democracy Maker Day, which was successful in engaging a varied audience.

However, some of the strategies implemented by the hackathons we observed offer suggestions of ways forward in two key areas: structure and media. Most of the challenges we identified can be categorised as structural elements. Although the alterations made by organisers to

address some of these challenges were wide-ranging, what characterises them all is flexibility. For example, in creating an ad-hoc speed dating process or in abandoning pre-defined design processes. Where the hackathon structure is often rigid, relying on the ingenuity and creativity of the attendees to work around its constraints, these events were responsive to the needs, desires and skills of the attendees. Some of the greatest points of tension—such as difficult relationships with mentors—occurred when structure was most rigidly adhered to.

In terms of media, it should come as no surprise that moving away from code and electronics towards craft and physical prototyping meant that a wider range of attendees were able to take part in making. As some of the organisers pointed out, these forms of prototype were just as capable of fulfilling the roles that prototypes play at other hackathons. If the outputs will never be used beyond the hackathon itself and beyond their role as prompts for engaging in an issue, does it matter whether it is a functional prototype, a digital mock-up or a cardboard model that merely suggests certain technologies? However, it was clear that in this aspect there is the potential for conflict between catering to a wider audience and to attendees expecting to be to significant development work. Further experimentation with formats is needed to better understand how these different motivations can be navigated.

SUMMARY

In this paper, we have explored the ongoing mainstreaming of hackathons from a largely technical pursuit into participatory events that engage with a much wider audience. We have shown the motivations for organisers in running these events, the ways in which people are able to participate without coding, and the tensions that arise between the hackathon format and the desire for wider participation. We believe that the popularity experienced by these events poses many opportunities for participatory research, both in terms of repurposing hackathons themselves and in informing the configuration of other participatory research activities. Future work will need to focus on how new types of activity can be configured while also avoiding some of the acknowledged inclusion pitfalls of hackathons. However, despite these challenges, there is clear potential for engaging people with the design of technologies in new ways.

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DATA ACCESS STATEMENT

Anonymised data used in this paper is available upon request from the University of Dundee repository [33].

REFERENCES

1. Ernesto Arias, Hal Eden, Gerhard Fischer, Andrew Gorman and Eric Scharff. 2000. Transcending the individual human mind—creating shared understanding through collaborative design. *ACM Transactions on Computer–Human Interaction* 7, 1, 84–113. <https://doi.org/10.1145/344949.345015>
2. Thomas Binder, Giorgio De Michelis, Pelle Ehn, Giulio Jacucci, Per Linde and Ina Wagner. 2011. *Design Things*. MIT Press.
3. Nataly Birbeck, Shaun Lawson, Kellie Morrissey, Tim Rapley and Patrick Olivier. 2017. Self Harmony: rethinking hackathons to design and critique digital technologies for those affected by self-harm. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*, 146–157. <https://doi.org/10.1145/3025453.3025931>
4. Gerard Briscoe and Catherine Mulligan. 2014. *Digital Innovation: The Hackathon Phenomenon*. Creativeworks London.
5. Adrienne Decker, Kurt Eiselt and Kimberly Voll. 2015. Understanding and improving the culture of hackathons: Think Global Hack Local. *Proceedings of the Frontiers in Education Conference (FIE '15)*, 1–8. <https://doi.org/10.1109/FIE.2015.7344211>
6. Carl Disalvo, Melissa Gregg and Thomas Lodato. 2014. Building belonging. *Interactions* 21, 4, 58–61. <https://doi.org/10.1145/2628685>
7. Pelle Ehn. 2008. Participation in design things. *Proceedings of the Tenth Anniversary Conference on Participatory Design 2008 (PDC '08)*, 92–101.
8. Elizabeth Gerber. 2014. Design for America: organizing for civic innovation. *interactions* 21, 2, 42–47. <https://doi.org/10.1145/2567840>
9. Scott Henderson. 2015. Getting the most out of hackathons for social good. *Volunteer Engagement 2.0: Ideas and Insights Changing the World*, Robert J. Rosenthal (ed.). Wiley, 182–194. <https://doi.org/10.1002/9781119154792.ch14>
10. Youyang Hou and Cliff Lampe. 2017. Sustainable hacking: characteristics of the design and adoption of civic hacking projects. *Proceedings of the 8th International Conference on Communities and Technologies (C&T '17)*, 125–134. <https://doi.org/10.1145/3083671.3083706>
11. Lilly Irani. 2015. Hackathons and the making of entrepreneurial citizenship. *Science, Technology & Human Values* 40, 5, 799–824. <https://doi.org/10.1177/0162243915578486>
12. Peter Johnson and Pamela Robinson. 2014. Civic hackathons: innovation, procurement, or civic engagement? *Review of Policy Research* 31, 4, 349–357. <https://doi.org/10.1111/ropr.12074>
13. Marko Komssi, Danielle Pichlis, Mikko Raatikainen, Klas Kindstrom and Janne Jarvinen. 2015. What are hackathons for? *IEEE Software* 32, 5, 60–67. <https://doi.org/10.1109/MS.2014.78>
14. Miguel Lara and Kate Lockwood. 2016. Hackathons as community-based learning: a case study. *TechTrends* 60, 5, 486–495. <https://doi.org/10.1007/s11528-016-0101-0>
15. Ann Light, Paul Egglestone, Tom Wakeford and Jon Rogers. 2011. Participant-making: bridging the gulf between community knowledge and academic research. *Journal of Community Informatics* 7, 3.
16. Ryan Locke, Lynn Parker, Dayna Galloway and Robin Sloan. 2015. The Game Jam movement: disruption, performance and artwork. *FDG 2015 Workshop on Game Jams, Hackathons and Game Creation Events*.
17. Thomas James Lodato and Carl Disalvo. 2015. Issue-oriented hackathons as ad-hoc design events. *Proceedings of Participatory Innovation Conference 2015 (PINC '15)*, 328–336.
18. Thomas James Lodato and Carl DiSalvo. 2016. Issue-oriented hackathons as material participation. *New Media & Society* 18, 4, 539–557. <https://doi.org/10.1177/1461444816629467>
19. Noortje Marres. 2011. *Material Participation: Technology, the Environment and Everyday Publics*. Palgrave Macmillan.
20. John McCarthy and Peter Wright. 2015. *Taking [A]Part: The Politics and Aesthetics of Participation in Experience-Centered Design*. MIT Press.
21. Steffen Möller, Enis Afgan, Michael Banck, Peter J. A. Cock, Matus Kalas, Laszlo Kajan, Pjotr Prins, Jacqueline Quinn, Olivier Sallou, Francesco Strozzi, Torsten Seemann, Andreas Tille, Roman Valls Guimera, Toshiaki Katayama and Brad Chapman. 2013. Sprints, hackathons and codefests as community gluons in computational biology. *EMBnet.journal* 19, B, 40–42. <https://doi.org/10.14806/ej.19.B.726>
22. Michael J. Muller. 2002. Participatory design: the third space in HCI. *The Human–Computer Interaction Handbook*, 1051–1068.
23. Emily Porter, Chris Bopp, Elizabeth Gerber and Amy Volda. 2017. Reappropriating hackathons: the production work of the CHI4Good day of service. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*, 810–814. <https://doi.org/10.1145/3025453.3025637>
24. Sumen Rai and Mary Griffiths. 2016. “Useful” civic hacking for environmental sustainability: knowledge transfer and the International Space Apps Challenge. *The Journal of Community Informatics* 12, 1, 53–68.
25. Gabriela T. Richard, Yasmin B. Kafai, Barrie Adleberg and Orkan Telhan. 2015. StitchFest: diversifying a

- college hackathon to broaden participation and perceptions in computing. *Proceedings of the 46th ACM Technical Symposium on Computer Science Education (SIGCSE '15)*, 114–119. <https://doi.org/10.1145/2676723.2677310>
26. Pamela J. Robinson and Peter A. Johnson. 2016. Civic hackathons: new terrain for local government–citizen interaction? *Urban Planning* 1, 2, 65–74. <https://doi.org/10.17645/up.v1i2.627>
 27. Michael Römer, Stefan Thallmaier, Markus E Horneß, Adam Lawrence and Hagen Habicht. 2011. Jams as emerging practice of innovation communities: the case of the Global Service Jam 2011. *Proceedings of the 41st Annual Conference of the Gesellschaft für Informatik (INFORMATIK '11)*.
 28. Bard Rosell, Shiven Kumar and John Shepherd. 2014. Unleashing innovation through internal hackathons. *Proceedings of the 2014 IEEE Innovations in Technology Conference (InnoTek '14)* <https://doi.org/10.1109/InnoTek.2014.6877369>
 29. Andrew Richard Schrock. 2016. “Hackathons with no hacking”: civic hackathons and the performance of innovation. *Rethinking the Innovation Economy: Exploring the Future of Technology, Social Inequality, and Creative Labor*.
 30. Susan L. Star. 1989. The structure of ill-structured solutions: boundary objects and heterogeneous distributed problem solving. *Distributed Artificial Intelligence: Volume 2*, 37–54. <https://doi.org/10.1016/B978-1-55860-092-8.50006-X>
 31. Sophie Landwehr Sydow and Martin Jonsson. 2015. The organization of personal fabrication—hackathons and makerspaces as semi-professional places for creative making. *AA 2015 Workshop on The Future of Making: Where Industrial and Personal Fabrication Meet*.
 32. Nick Taylor, Loraine Clarke and Katerina Gorkovenko. 2017. Community Inventor Days: scaffolding grassroots innovation through maker events. *Proceedings of the 2017 Conference on Designing Interactive System (DIS '17)*, 1201–1212. <https://doi.org/10.1145/3064663.3064723>
 33. Nick Taylor and Loraine Clarke. 2018. Hackathon fieldwork 2016 (interviews and field notes). <https://doi.org/10.15132/10000132>
 34. Austin L. Toombs, Gabriele Ferri, Shannon Grimme, Shad Gross, Michael D. Stallings, Jeffrey Bardzell and Shaowen Bardzell. 2016. Making a critical playshop. *Interactions* 24, 1, 34–37. <https://doi.org/10.1145/3019006>
 35. Erik H. Trainer, Arun Kalyanasundaram, Chalalai Chaihirunkarn and James D. Herbsleb. 2016. How to hackathon: socio-technical tradeoffs in brief, intensive collocation. *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW '16)*, 1116–1128. <https://doi.org/10.1145/2818048.2819946>
 36. John Vines, Rachel Clarke, Peter Wright, John McCarthy and Patrick Olivier. 2013. Configuring participation: on how we involve people in design. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '13)*, 429–438. <https://doi.org/10.1145/2470654.2470716>
 37. Jorge L. Zapico, Daniel Pargman, Hannes Ebner, and Elina Eriksson. 2013. Hacking sustainability: broadening participation through green hackathons. *IS-EUD 2013 Workshop on EUD for Supporting Sustainability in Maker Communities*.