The Datacatcher: Batch Deployment and Documentation of 130 Location-Aware, Mobile Devices That Put Sociopolitically-Relevant Big Data in People's Hands: Polyphonic Interpretation at Scale

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ABSTRACT

This paper reports the results of a field trial of 130 bespoke devices as well as our methodological approach to the undertaking. Datacatchers are custom-built, location-aware devices that stream messages about the area they are in. Derived from a large number of 'big data' sources, the messages simultaneously draw attention to the socio-political topology of the lived environment and to the nature of big data itself. We used a service design consultancy to deploy the devices, and two teams of documentary filmmakers to capture participants' experiences. Here we discuss the development of this approach and how people responded to the Datacatchers as products, as revealing sociopolitical issues, and as purveyors of big data that might be open to question.

Author Keywords

Research through design; location-based systems; big data; batch production; batch deployment

ACM Classification Keywords

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

INTRODUCTION

If you had happened to be visiting an open-air market in London during the second week of November 2014, you might have seen, amidst the clothing stalls, vegetable sellers and purveyors of inexpensive household items, a bright yellow wheelbarrow stacked with cardboard boxes, festooned with large yellow and blue balloons showing statements (e.g. "People in this part of town can be called 'urban cool'") also printed on t-shirts worn by a group of people circulating nearby (Figure 1).

If you had paused to take a look, one of these people might have approached you saying *'Hello there, would you like to be involved in a research project? This is the Datacatcher, brand new device, brand new device. It's unique. There's only 130 of them in the world.'* They would have shown you a brightly coloured, handheld apparatus with a screen on one end that *'scrapes the internet for interesting information about your area, the area you happen to be in'*, and pointed out a dial that allows you to explore previous messages and enter your own opinions by answering a series of playful multiple-choice questions.

And if, intrigued, you had acceded to their request that you *'take it for a couple of months and play with it'*, they would have asked you to fill out forms with your contact details, to sign an ethical consent form, and agree to having a film made about your experiences with the device, before giving you a box containing a manual, a charger and – most importantly – one of the Datacatchers our team had produced.

Figure 1: Encountering Datacatchers in a street market.

Figure 2: A Datacatcher: '*The Government say that 6% of people in this community are unemployed. That is 339 people.*'

The Devices

Datacatchers are mobile devices with a screen on one end and a large control dial set in a recess underneath (Figure 2). Short statements about the surrounding area appear on the screen every few seconds, addressing topics including average house prices, typical incomes, and the number of pubs or GP surgeries nearby (see Table 1). Turning the dial one way scrolls through all the messages that have appeared on the device, showing when and where they were received and the source of the data. Turning it the other way accesses a set of poll questions that can be answered by using the dial to select among alternative responses. Questions cover a range of topics from pollution to politics, often in a tongue-in-cheek way (e.g. *'What are the dogs like here? handbag / working / attack'*). On the end opposite the screen is a small on/off switch and a charging socket.

The Datacatchers use the mobile phone network to transfer information to and from a central server. They send the server the location of the phone tower to which they connect, and the server sends back blocks of messages appropriate for that location. Messages draw on data from hundreds of data sets from 14 online sources such as the UK Census, Department of Energy and Climate Change, Mozaic by Experian and Twitter, with templates used to transform numerical or category data into sentences such as those shown in Table 1.

Research Devices

We produced the Datacatchers as part of our ongoing programme of pursuing research through design to investigate new possibilities for technologies to reflect human values, and for devices to reveal people's practices and orientations. They are *research devices* that are designed both to embody our conjectures about certain issues and to act as tools helping us to further investigate peoples' orientations around those issues.

The Datacatchers' design does not simply operationalise a research agenda, however. Instead it emerged from a process in which concern shifts between our research imperatives and the work needed to produce an integrated, well-finished and engaging *product* [2]. Typically our research imperatives guides the choice of a domain for design and – in this case – an initial design direction. As design progresses from initial conceptual explorations through to initial implementations and final construction, our attention progressively shifts to focus on the craft of producing a well-rounded artefact. This reflects our intention for our devices to be approached similarly to the way people approach the (typically commercial) technological products they use in everyday life. From this point of view, designing successful research devices requires attention to their immediate appeal and the experiences they offer to people who are relatively unconcerned and uninformed about the research that motivates them, as well as to their embodiment of research-related ideas and possibilities. Below we discuss each of these aspects in turn.

Datacatchers as Embodied Research

As research devices, the Datacatchers were produced to address two objectives of a large-scale research project:

The *domain objective* was to investigate whether research devices can raise and resource engagement with important societal issues while maintaining openness to interpretation and avoiding didactic or judgemental stances [8, 9]. Our design for the Datacatchers particularised this objective by focusing on two issues: a) sociopolitical issues in the UK, particularly involving inequality and deprivation, which are

People around here earn £25,300 per year.
A 4-5 bed house will cost £500 p/w to rent.
People from New Cross are in the bottom 50% of health in England.
Air pollution levels in Deptford are lower than in nearby Lewisham.
The average house price in Lewisham is low and there are 551 homeless families.
The Government say that 6% of people in this community are unemployed. That is 339 people.
They say 7% of dwellings in this borough are vacant. That is 6,710 properties.
A lot of people around here think that reports on violence and crime affect their lives.
Someone has just described the politics in Greenwich as "neo-liberal".
The census suggests there are 3,240 people in this borough who are in very bad health.

Table 1: Sample messages

extremely topical under an austerity government; and b) the scope, intrusiveness, representations and power relations of big data [3]. A primary concern in this field trial, then, was whether and how people's engagement with the Datacatchers might reflect issues of inequality and data.

The *methodological objective* was to investigate batch production and deployments as an approach to capturing the multiple, situated orientations we expected the devices to occasion. If devices are viewed as providing resources for engaging with issues while remaining open for different orientations and interpretations, then viewing the ways different people relate to them becomes interesting both from the product point of view (because support for multiple orientations might broaden a product's appeal) and from a research point of view (because this might reveal people's values and orientations around topical issues). This implies methodological merit in being able to produce and study research devices in relatively large multiples, to gather evidence for many different engagements at once. Thus a second question for the field trial concerned the practicalities and benefits of batch production and deployment as a methodology for research through design.

Datacatchers as Products
The Datacatchers embody and allow investigation of our research objectives, but this was by no means a straightforward achievement. This is because during the design process most of our attention was on designing an artefact that would be engaging, appealing, and interesting for people, over and above its role as a research device [2]. This involved a 'conversation with materials' [17] that included many factors – sintered nylon, database entries, mobile phone networks, batteries, dyes, microprocessors and dials – that were only indirectly relevant for our research concerns. All these factors were entangled to produce the final design, so that, just as its form and appearance reflect our research interests, so those interests were shaped and particularised in the process.

Designing around research questions without consideration of seemingly irrelevant factors risks producing artefacts that people will not find appealing or engaging. Thus in addition to attending to our research interests, we also had to refine the devices' interactions, technological functionality and aesthetics. These all contributed to the identity of the Datacatchers as they would be perceived by their users. So what sort of device is the Datacatcher?

First, Datacatchers are not intended to address any particular need or problem, but rather to offer a new resource for engaging the social environment in ways we hoped would be engaging. We designed the devices to be portable, and left on continuously, with the expectation that people would (usually) carry them with them for viewing either while moving around in various settings or to collect messages for later review. They were designed to appear attractive yet distinct from current product genres, as a way of highlighting the attention to detail put into them and to

indicate that they were intended to be out of the ordinary. Finally, we designed them for a nonspecific public, with the intention that they be generally appealing in appearance and action, much as many consumer electronics are meant to appeal to broad audiences. All of these factors both added to and particularised the research objectives behind the design, and thus the field trial investigated not only our research objectives, but also what people did and didn't like about the Datacatchers as devices to be lived with in their everyday lives.

In the rest of this paper, we describe our study of the Datacatchers. We start by discussing how we sought to shape the nature of this trial and the data we collected, and how this played out in practice; our experiences and reflections here are all germane to our methodological objective. Then we focus on using the data to understand how participants engaged with the Datacatchers, first as a kind of product to be used in everyday life, and then as devices embodying our research objectives.

PREPARING THE DEPLOYMENT
HCI has shown increasing interest with 'in the wild' studies of communities and neighbourhoods [4,19], but large scale trials of computational products have rarely reported in the CHI literature, and were of limited assistance in planning a study for diverse and disparate participants. For instance, SenseCam [21], a wearable, sensor-based camera, has been produced in large multiples, but these have tended to be studied in numerous small-scale studies (e.g., [13]). Pierce and Paulos' [14] experiments with semi-random deployment of 'counterfunctional' cameras are inspiring, but have been pursued at a smaller scale than we had in mind, and with less of an intention to capture outcomes. Finally, the Tenison Road project has also studied multiple devices deployed for relatively lengthy trials [16,20], but while their findings are relevant for our own, their approach to development and study relies on continuous contact and discussions with a participant community. For this study, in contrast, we considered a community-based approach, but also envisioned ways to deploy to a large number of otherwise unconnected participants, allowing different engagements to emerge independently.

Our interest in the diversity of engagements people had with the Datacatchers as well as their overall popularity and ease of use, had important implications as for our approach to the field trial:

- We were committed to letting people live with the Datacatchers in their everyday settings long enough for their engagements and orientations to evolve and settle.
- We wanted to recruit a wide range of participants, to assess the devices' reception by a wider demographic than usually targeted by new technologies.
- We wanted to capture experiences in a way that would preserve, insofar as possible, their individuality and richness, preferring 'thick descriptions' [10] to summary descriptions.

In previous, smaller-scale batch deployment studies (e.g. [8, 9]) we had approached field studies by essentially up-scaling single device studies. Thus recruitment, deployment and data collection were treated as a series of encounters with individual participants. The result was that deployments, which often took place in peoples' homes, could extend over weeks or even months and were not only resource intensive but 'smeared' the trial over time. From these considerations came another desirable feature for our field trial:

- We aimed to recruit participants and deploy devices in as short a period as possible.

Help Wanted
We considered many options for deployment, ranging from distribution via an e-commerce site to signing up an existing community. As we weighed the requirements of recruiting and deploying so many participants so quickly, however, we realised that our team was too small and engaged with too many other activities to realise our ambitions without help. Thus we decided to engage an outside group for assistance.

Rather than specify detailed plans for deployment, we wrote a brief outlining our general aims for the job and circulated it to a number of different consultancies, art groups and practitioners in our network. Several submitted outline proposals, and we met with three to consider their ideas. These included:

- An architects' collective involved in sustainable urban regeneration, who proposed distributing Datacatchers from a converted milk float that could circulate through various events and locations.
- A freelance designer with experience in community events who suggested setting up stands in post offices, using a 'pop-up shop', or holding a community dinner party to recruit participants and deploy devices.
- A 'communications and service design' consultancy with experience working with organisations such as the NHS, who suggested recruiting in a local housing estate or a series of local markets.

After much discussion about the different visions proposed by the groups, we finally decided to hire the service consultancy to form a deployment team, as the group likely to reach the broadest range of people and to frame the device in the most 'neutral' way.

Creating the framework for the deployment team to recruit participants to a research project and distribute novel electronic devices proved a design challenge on its own. We had to ensure that, not only would the Datacatchers be accurately framed, but that a range of issues ranging from ethical consent to requirements for posting lithium batteries were addressed clearly and responsibly. In addition we needed to be clear about where the Datacatchers were going and to try to ensure that participants would be available for data collection. In the end, the Datacatchers were deployed

in relatively simple packages with labels indicating their colour, identity and postage instructions, a charger, a four-page instruction manual, an ethical consent form, and a registration form (Figure 3). The simplicity of this packaging belies the work involved in its achievement.

Lessons in Preparing Deployment
Over the course of these preparations, we began to learn our first lessons about batch deployments. On the one hand, working with outside help made it possible for our small team to undertake a large deployment. On the other hand, we had to negotiate our ideas about the Datacatchers and their potential audiences with the deployment team's understanding and preconceptions. Overall, we found that working with an external team to address multiple participants meant that we had to be much more explicit about concerns that could be addressed implicitly and through on the spot negotiations in smaller scale engagements. In this case, our focus was on bringing the deployment team into alignment with our instincts about appropriate ways to frame and deploy the Datacatchers.

Documenting Experiences
In parallel with working on a strategy for large-scale recruitment and deployment, we also started to consider how to gather information about peoples' activities and experiences with the Datacatchers. Given our plans to work with participants recruited on the street, we were concerned that their commitment would be minimal and thus that we should ensure their experience would focus on the devices rather than data collection. Video diaries are too demanding in this setting, and our concern with collecting rich data in situ mitigated against using lab studies, questionnaires, or focus groups. Interview protocols would risk missing aspects of the lived experience with Datacatchers, whereas the scale of the study meant that ethnographic observations or interviews, which have provided a foundation for previous studies, would be pragmatically impossible.

Based on these considerations, we decided that we would use documentary video as the backbone of our efforts to capture the field trial results. This offered two advantages. First, videos provide an audiovisual record of participants'

Figure 3: Packaging and materials for deployment.

actual words and settings into the research environment, a record that can be revisited over time. Second, we could hire filmmakers outside the core team to produce them. Not only would this cut the research team's workload, but it would build on previous projects in which we have used *cultural commentators*, such as filmmakers, journalists or poets, to provide a richer understanding of how the artefacts might be understood [7], as well as previous work on documentary film for user research [15]. Working with outside commentators also allows evaluation to be relatively independent from the research team (who, having produced the devices, might be biased).

In previous projects we have arranged for filmmakers to know little about the devices we had produced so that they could discover them for themselves. In contrast, for this project we briefed the two filmmaking teams hired – one specialising in social documentaries, the other in producing films with artists – about the Datacatchers, and the overall aims of the project. We explained that we wanted films of 1 to 5 minutes for each participant, and that they could experiment with different styles in producing the films as long as the Datacatcher appeared in each.

Lessons in Preparing Filmmaking
Similar to our experience with the deployment team, working to prepare the filmmakers required negotiating our understandings of the Datacatchers and their proper presentation in ways that are unnecessary for smaller, in-house trials. In this case, however, we welcomed the filmmakers' independent voices as potentially offering new perspectives on our work. Thus while briefing them about our research, we tried to leave open the room for their own observations about what turned out to be important in the field trial. The contrast between the two experiences may reflect differences in how the external teams oriented to the devices and our overall endeavour. Beyond this, however, it reflects our desire to exert control over the framing of the Datacatchers, while allowing greater freedom over the ways they would be understood in action.

RUNNING THE FIELD TRIAL
After a protracted period of development, and months of preparation, about 100 Datacatchers were deployed over three days at two markets and a boot sale in London, with the filmmakers interviewing a number of them to capture their expectations and first impressions. Concerned over recruitment, the deployment team had already allocated 25 of the devices to volunteers recruited from their existing network (we saved the final five for our own use), but in the event the team had to limit the devices they gave away to ensure they had enough for all three days.

Achieving Deployment
Though successful on the whole, we encountered a number of difficulties during the deployment events and subsequent filming. When visiting the first day's event, for instance, we were disturbed by the deployment team's resemblance to chuggers (paid street fundraisers) or marketers handing out free merchandise (see Figure 1). This was brought to a head when we heard one of the deployment team calling out *'want to try something for free?'*

Incidents like this, as well as discussions with the deployment team, reminded us that their objectives were not always aligned with ours. They were mainly concerned with the task of recruiting participants and deploying devices, and their tactics for achieving this could be at odds with the projects' larger objectives. Thus we found ourselves, for instance, reminding them to stop talking about *'getting rid of the devices'*. We reiterated our concerns via post-event conversations and emails, and during the following two deployment events the team took greater care in presenting the Datacatchers and ensuring that participants understood what involvement would entail.

Nonetheless, given how brief and hectic many of the streetside encounters were, it was not surprising that some of the Datacatchers were given to inappropriate participants. For instance, one person returned his device on reading that it was unsafe to use near pacemakers. Others simply never turned theirs on. Alerted by these events, we hired a graduate intern to telephone every participant to discuss the project and arrange meetings between the participants and the filmmakers. In the end some 10-15 Datacatchers were returned by people unwilling to continue, and redeployed to members of our personal and professional networks.

Despite these difficulties, as the two months of the field trial passed, the filmmakers met with participants, in their homes, in public spaces, and in cafés and restaurants (Figure 4). In accordance with our brief, they edited the films – largely by extracting interesting or representative segments – and uploaded them to an internet repository.

Deployment as World-Making
Our experiences highlighted numerous issues for batch deployments. Most generally, it became clear that, far from simply giving the Datacatchers to people, the devices were playing a leading role in a much larger production that required extensive front- and backstage work (c.f. [1]). Not only did this include the work done to allow them to be distributed and filmed independently, but also sufficient negotiation with the deployment and filmmaking teams to, more or less approximately, align their understandings of the undertaking to our own. Moreover, this work was ongoing during the deployment, as we continued to work with the deployment team to frame the handovers, the filmmaking team to shape their videos, and occasionally with participants themselves. This work flowed from the pragmatic (e.g. arranging filming dates) to the conceptual (e.g. explaining to participants why they should be filmed in the first place).

Reflecting on the deployment's preparation and development, it is useful to think of the process as creating a 'world' for the Datacatcher. Different deployment

Figure 4: A filmmaker interviews a participant in a café.

strategies and tactics attract different audiences, situate designs in different contexts, and thus frame the devices differently not only intellectually but culturally, emotionally and aesthetically. This can never be 'neutral' or 'natural'. We were aware of this in general, but in previous field trials, working within our own community of practice meant that many of the decisions behind this worldmaking were tacit and unproblematic. Working at this scale, and with external partners, raised unexpected questions about what sort of world we should be making for the Datacatchers and who would play a part in that making, questions that we had to negotiate in the doing.

Results! Experiencing the datacatchers
By the end of the two-month field trial, we had collected 54 films showing participants discussing their experiences with the Datacatchers. This amounts to over 2 hours of footage, and represents only limited editing on the part of the filmmakers to select reactions they believed most relevant for our research. Because the filming took place throughout the field trial, the results show participants' reactions after varying amounts of exposure. Though short, we believe the films provided a highly effective way of capturing not only participants' remarks, but also a sense of their lived experience of the devices in context (Figures 5-8).

Detailing the range of participants and the wealth of stories, insights and opinions they shared in the videos is practically impossible given space constraints. Here we construct a thematically organised narrative of what they told us, following our introductory distinction to consider first their reactions to the Datacatchers as products, and then as reflecting our research objectives. This reflects the fact that participants' engagements with the aspects of the Datacatchers relevant to our research objectives are embedded in, and dependent upon, their engagements with the Datacatchers as a integrated products.

ENGAGING WITH DATACATCHERS AS PRODUCTS
In this section, we summarize the sorts of responses participants had to the Datacatchers as devices to be used in everyday life. We start with their early impressions of the devices and their purpose, before considering the other sorts of considerations that affect their overall assessment of and engagement with the devices.

Early Impressions
The deployment team were challenged by the need to enthuse people about trying a Datacatcher while framing it as an exploratory rather than utilitarian device. Some participants had the impression that the Datacatcher primarily gathered information from them: 'I travel a lot in London, so I'll be able to give you masses of data' (063). Others were confused about the nature of data to expect: '…I'm a home baker so I would like to know what cafes have opened up so I can go and ask them if they want to buy my fruit cake for Christmas' (039).

Perhaps because it didn't live up to such expectations, or recreate approaches to localised information used by systems such as Google Maps™, a number of people quickly dismissed the Datacatchers as uninteresting. For instance, one participant (Figure 5), filmed soon after he took possession, complained that 'I found a lot of the data I picked up quite inane and boring' (020). A common explanation was that the information could be found elsewhere: 'You could use Google… because then you get the facts when you need them… I can't really take facts in unless actually I need them on the spot' (118). For these participants, the value of the Datacatchers was unclear. Others, on the other hand, had more positive reactions: 'We turned it on and we were completely mesmerised. We sat there for maybe 15 minutes…' (101). In part, this hinged on how they related to the data. As one participant explained : 'When you experience the device for a few days you realise that it's not about keeping an eye constantly, but about having a look every now and then.' (113).

In general, then, early impressions of the Datacatcher seemed to depend on whether people maintained expectations of narrow utility and task support, or could appreciate the more open-ended, ambient sorts of information it provided.

Aesthetic Design and Sociality
Most participants expressed positive opinions about the Datacatchers' design: 'Absolutely everybody who saw it was completely intrigued by the design, the shape of it and

Figure 5. *"I found quite a lot of the data I picked up quite inane and boring."*

stuff… it is a really beautiful design…' (102). This extended to the aesthetics of interacting with it: 'It's really satisfying when you use the wheel, because you get that lovely clicking feel… as opposed to just flicking through a bunch of messages' (019). However, some remarked on its size: 'The thing is quite big. Obviously that might be inconvenient' (118). This could pose pragmatic difficulties – 'you can't really put it in your pocket' (102) – but also could make people feel conspicuous: 'because it's bright and flashy, it takes a bit of getting used to carrying it in public for instance' (068). The device could also make people feel conspicuous for other reasons: 'I was on the train… and people were looking at me wondering why I was reading a torch' (067).

Participants often reported that the Datacatcher's unusual appearance often sparked social interactions (Figure 6): 'It immediately gets people asking questions.' (026). As one participant explained: 'People around the office were kind of like, "Wow, what's that? Is this like a toy? What is this device?" So the design, the colour, the shape, that was quite a good talking point' (009). Moreover, what started as discussions about the Datacatcher's appearance would often merge to conversations about the issues it raised: '…so in a group we had discussions around "Is this useful or is this just an interesting fact? Or what does this mini survey tell us about the area?" So it was a great, I think the social value, the entertainment factor was great' (035). In part, such discussions were valued as drawing attention to rarely discussed issues: 'You start discussing the facts and it brings you to bigger issues in the area that normally in your day to day life are not really brought to attention' (065).

In sum, the Datacatchers' design was considered very positively overall. We speculate that this helped motivate engagement by the participants themselves as well as other onlookers. Moreover, the devices' appearance served to engage people, often together, with the content it provided, and thus in the discussions of sociopolitical conditions and big data we hoped the device would support.

Not an App
Several participants suggested that the Datacatcher should be an app, e.g.: 'It might be more productive to have it on an app for your mobile phone… People could download it, it would save you the cost of producing one of these, and I'm sure people would be more likely to carry it' (105). Other participants, in contrast, articulated the Datacatcher's value as a standalone device. For one participant, this had to do with the focus of the device: '…it's like a dedicated tool to explore your area. Whereas an app, I mean your phone does pretty much everything… I think that's really nice that it's a custom device that's really dedicated to one purpose' (017). For another participant, it was the social nature of the Datacatcher that made it more valuable than an app: 'If it was just done with the same functionality but as an app for your phone then immediately you would be disconnected from the people around you' (026).

Whether we could justify a standalone device was a question that plagued us during our design process. In the end, it seemed that some people might have dismissed the Datacatchers as irrelevant or old fashioned because of our choice. Others, on the contrary, valued it more highly for maintaining a distinct identity. While it is unclear whether our choice affected overall engagement with the Datacatchers, this suggests that the hegemony of apps is not complete and that dedicated devices may serve better to maintain persistent experiences and spur social encounters.

ENGAGING WITH INEQUALITY AND BIG DATA
In this section, we report reactions to the Datacatchers that resonate with the *domain objective* of our project: to construct a device that would highlight issues of sociopolitical inequality and big data without prescribing the point of view participants should take on them. We start by reporting how the Datacatcher's message extended participants' experiences of their local environment and some of the emotional orientations this engendered, before turning to questions about the data and their role in contributing to it via the poll questions.

Extending the Environment and Sociopolitical Contrasts
As we have seen, some participants dismissed the Datacatcher's messages as irrelevant or 'boring' (020), and this was often linked to unfulfilled expectations of utility. Another cause of dissatisfaction came when people felt the device was offering information they already knew: 'So a lot of the facts that came up I was expecting.' (018). The Datacatchers were appreciated by many as extending the environment, however, by adding 'a new layer to the city with the data and information that you can't really see when you walk around.' (017).

Such positive reactions seemed most likely in two related situations. The first was when people used in the Datacatchers when moving through unfamiliar areas: 'Some information about the area makes travelling around London really interesting' (091). As one participant explained: 'On the Datacatcher you see something slightly different about the neighbourhoods as you pass through them, which I thought was really nice' (008). This led some participants to see the Datacatchers as potential tools: 'If I was moving to an area and I wanted to know a lot about it, it'd be really

Figure 6: *"Do 'nonsense'!" "I want to say 'soulless'."*

useful 'cause you could take it with you and learn what type of area it is via the devices' (005).

Related to this, people also found interest when areas were compared, whether explicitly by the Datacatchers themselves or by participants' making their own connections. Often these comparisons were made along the sociopolitical dimensions that interested us: 'there was a big contrast between where I work and where I live… So I'm looking here where I live, four to five bed house costs £570,000 to buy. But obviously the average house price [in Central London] was something like two and a half or three million quid' (066).

The Datacatchers could lead to positive perceptions areas: 'where I grew up in the North West it had a very high level of happiness which is great, made me think of having a nice childhood, that sort of thing' (114). Often, however, the data showed areas in a disquieting light: 'I think the thing that really shocked me first was what a depressing area I live in, because all the statistics are about crime and health and how unhealthy the people are in my neighbourhood and in my community. You know that immediately starts you thinking, "Is this the place that I live in?"' (008).

Sometimes, this led people to speculate about what these conditions might mean: 'What surprised me about this area, also Stratford and Southwark, they're quite young communities… another thing on here that surprises me is how few people claim the state pension… So you start thinking do people don't live long enough to claim this benefit depending on where you live in London?' (051). For others, statistics emphasised the socio-political distinctions we intended: 'If you'd asked me where do you think it's got a higher life expectancy, Islington or Bulwell in Nottingham, I would have told you Islington's higher. But I don't think I would ever have guessed how stark those differences are… that was a main thing I took away from it was walking around different areas in London and seeing quite how stark the differences were, which is the sort of thing you kind of have in the back of your head but it's never is obvious' (050).

Overall, then, if participants didn't demand that the Datacatchers be narrowly functional, and if they found them aesthetically justified, and if they didn't reject them for not being apps, then they started to engage with the localised information they conveyed. This was most interesting when that data told them about new areas, or allowed them to assess contrast between areas. In these cases, concerns about sociopolitical inequality or deprivation could and did appear. What we did not see, however, were these concerns linked to clearly political interpretations – an issue to which we return.

Questioning Data

The Datacatcher might reveal areas in new ways, but sometimes people questioned the data it provided, for instance when it contradicted their experience of their local neighbourhood. For some, this led to the conclusion that 'Some of the data was quite old, which you know wasn't that interesting' (041). As one participant described: 'It said the house prices around here were really low. I was like, "Definitely not." So that was a bit frustrating' (084).

For some, the perceived authority of data overruled any doubts they might have (Figure 7): 'Some of the facts I was like "Really?" like I almost questioned whether it was true, *obviously it is* but I was like "Oh."' (005; emphasis added). Others, however, were more sceptical in questioning the data: 'So where does this data actually come from?.... where's the evidence to back up this data?' (105). Sometimes their questioning was less about the data per se, but about the way it was used to characterise the surrounding area: 'you start to think, "Well, what are the borders that are being defined here by the data, by the entry?" When they talk about neighbourhoods or boroughs or whatever, who has defined that border?' (008).

Doubts about the data could also lead to worries about potentially harmful effects that misrepresentation might have. One participant remarked: 'I think what's missing is the ability to judge the validity of the information… from my experience it can be incredibly misleading and it could actually make you believe things are completely wrong' (101). This might undermine the Datacatcher's potentially agitating role: 'The next one just said, "The government says that 1,720 people in Hackney have never worked." Well, what is the population of Hackney? Like, you know, is that normal?... If that got into the wrong hands, they could start making people politicised around kind of certain issues that maybe aren't correct.' (084).

Finally, the Datacatcher could also lead more general reflections about data: 'it was an opportunity to reflect on how many different information we are exposed to on a daily basis…' (087). For one participant, this had an emotional tone (Figure 8): 'I just started to find it really depressing. It was a more overall impression of, "Oh my God, is this what life is boiled down to?"… an awful lot of this data, you know, you can understand why it's gathered, why it's disseminated, and you know unfortunately an awful lot of it is about money, and it's all very sad' (041).

Figure 7: *"I almost questioned whether it was true, obviously it is but I was like 'Oh'."*

Questioning the Questions

The poll questions were intended to complement or respond to data presented by the Datacatchers, but participants didn't always perceive this link: 'I didn't see any point in the questions… I'm not sure what they're there for.' (074). In part this was because their tone contrasted with the data messages: 'I didn't really see the correlation between the questions that it asked and the information it gave you. The information that it gave you is all statistics and it's all facts and it's all based on truth whereas the questions that it asked you were all opinion based' (005). To some, the idea of asking for personal questions was suspect in general: 'I couldn't understand why you wanted the answers to those… It's a personal view. It's not a factual view. So I can't see what value it will be in that' (063). Others, in contrast, appreciated this distinction: 'I liked that the questions were socially based... It was very much personal data; how do you feel right now?' (009). Others reported that the questions prompted discussion about issues: 'sometimes I would turn to my neighbour… or my friend, like "What do you think about this question? Like, what do you think the revolution will be like in this area?"… Some questions were irrelevant, some sometimes were more far-fetched, but overall I think all the questions were thought provoking.' (068).

In sum, the questions seemed to work well to allow interaction with the Datacatchers, and many participants appreciated their playful tone. Nonetheless, crafting them to be better aligned with the devices' messages may well have increased the experience of conversing with big data, rather than working as a relatively parallel layer of expression.

Engaging Data

Overall, participants engaged with the nature of the data informing the Datacatchers's messages as much as, or more than, the sociopolitical realities those data were intended to illuminate. In addition, their remarks show an ambivalent relationship, with some seeming to acknowledge data's authority, others doubting its accuracy, and some questioning its representational politics and the motives behind its collection. In many cases, too, their remarks indicated that the Datacatchers were not seen as neutral conduits from big data, but that many questions might be asked about the authority, accuracy, and politics of the devices themselves. Interestingly, questioning the Datacatchers in this way may have undermined their ability to raise issues about the sociopolitical conditions around them, while somewhat paradoxically exemplifying their success at spurring critical reflections about data itself.

DISCUSSION: DISCOVERING THE DATACATCHER

Over the course of these short documentary videos, then, the Datacatchers emerges in many guises. In participants' discussions, the Datacatcher is variously seen as boring, entertaining, interesting, disturbing or amusing. It is a failure because it should be an app, or a success because it isn't one. It is beautifully designed, too big, looks somewhat embarrassing to be seen with in public, or is a

Figure 8: *"…an awful lot of it is about money, and it's all very sad."*

resource for social engagement around important issues. It adds a new layer to the city, or provides information for homebuyers. It asks questions that are valuable or worthless because they tap individual opinions. It reveals stark differences in society, or agitates about issues that may be totally misleading.

Given this complexity, any single narrative about the Datacatchers is inevitably partial. Moreover, constructing a narrative by combining many different voices – as we do here – risks blurring the individuality that motivated our pursuing such a large-scale trial. Nonetheless, we believe such an approach allows discussion of some trends in the data, and we offer them here. In keeping with the rest of this paper, we organise them according to our methodological reflections, before turning to how participants engaged with the Datacatchers as products, and what they taught us about our methodological and domain-specific research objectives.

Batch Deployment as a Methodology

We suggest that our field trial of the Datacatchers successfully demonstrates the potential of batch production and deployment as a methodology for revealing multiple narratives about research devices. We successfully reached a large number of diverse participants with our design, and collected 54 distinct accounts of their experiences. Our experiences raised many challenges for the approach, however. First, it was difficult to construct and maintain a coherent 'world' for the Datacatchers across the network of partners and participants we worked with, and while the explicitness this forced may appear preferable to the implicit negotiations that occur in smaller studies, it may be easier to achieve a sense of 'naturalness' in the latter than the former, allowing focus to be on the research devices rather than the oddity of the trial itself. Second, running such a large-scale trial is huge endeavour, and we experienced a level of waste – in terms of nonresponding participants, chiefly – that may be difficult to avoid. Third, capturing data from a large trial of minimally committed participants is a special challenge, arguably militating against many of the methods commonly in use in HCI.

It is here that we believe we have made our largest methodological contribution, in the form of the documentary films we collected. We suggest that the documentary videos worked well to achieve a balance in capturing rich data without producing an unmanageable amount – it is possible to watch all the films in a single sitting, for instance. If it is inescapable that the films reflect their makers' sense of what is important, this was mitigated by their previous training, our briefing, and the limited amount of editing that they did. Watching the videos, we believe that their high quality, manageable length, and the compelling accounts they portray justify our belief that this is a highly effective approach to capturing large-scale data. Readers may judge for themselves: all the films are available at www.vimeo.com/channels/datacatcher.

Datacatchers as Products
Our field trial design meant that the Datacatchers were released into a harsh environment for acceptance as products. They were deployed to a demographically diverse audience, on the street, with little attempt to control for previous interest in similar devices, and without training, publicity, or advertising. Considering this, they fared reasonably well. Although a minority of participants either stopped engaging with them after a few days, or never turned them on at all, most tried them for at least a week or two, and another minority persisted throughout the two months. Participants' comments reflect this, too: if some thought the Datacatchers were too big, or too obtrusive, or should have been apps, others thought they added a new layer to the environment, or raised questions about data, or were entertaining socially, or were well-designed.

What becomes clear from the trial, too, is that participants' engagements with the research-motivated aspects of the Datacatchers were contingent on their acceptance of the devices of products on the whole. Insofar as this acceptance depends on successfully aligning a huge number of design concerns, this means that this sort of research through design endeavour depends on more than embodying research concerns in an artefact: it requires producing a good design on its own terms.

Datacatchers, Sociopolitical Conditions and Data
Finally, the Datacatchers were at least partially successful at demonstrating the potential for relatively open-ended devices to give rise to new engagements with the sociopolitical contrasts that characterise the UK, as well as with the big data the often reveals them. As we have seen, participants engaged particularly with the devices as conveyors of data that might be informative, but which might also be inaccurate, out of date, or biased. We believe this sort of questioning is a healthy response to the growth of big data as a social and political influence, and that it is a success of the Datacatchers that they encouraged this.

Less clearly successful was their ability to provoke increased awareness of, and critical reflection about, sociopolitical inequalities. On the one hand, this may reflect

participants' questioning of the data itself, as well as their varying engagements with the Datacatchers. It may also reflect the fact that politically-pointed data was surrounded by other, less clearly salient information; this may have diluted the tactic of *concentration* we used to try to create a public around these issues [8,5]. Finally it may reflect our reluctance to take a prescriptive stance in the system's design: this may have allowed participants to maintain their existing stances towards such issues despite the Datacatchers ability to highlight the 'stark differences' characterising current society.

CONCLUSION
We hope to have made clear that our deployment of 130 Datacatchers taught us a myriad of lessons – some difficult – about batch deployment as a methodology and about the design of a research device that both uses and questions big data to reveal sociopolitical realities. Methodologically, the endeavour made clear that research devices do not simply embody research concerns, but entangle them with the technical, aesthetic and interactional considerations involved in creating well-finished products. Similarly, research devices are not simply deployed as such, but within a complex 'world' created through strategies and tactics that shape their audience, identities and meanings. The resulting complexity is reflected by the ways participants oriented to research products both as products and as embodied research. For some, the Datacatchers were unsuccessful when compared to more familiar commercial offerings. For others, they provided intriguing information about their environments that often had a social component. Sometimes this information inspired critical questioning which might extend to big data generally; sometimes it might lead to the sociopolitical questioning we hoped for. Overall, the many stories that emerged provide rich material for future reflection, and reinforce our objective of designing to raise issues without resolving them.

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