A Candor in Reporting: designing dexterously for fire preparedness

Abstract
This paper challenges the domination of repeatable methods in HCI discourse and, instead, offers a design case study that details ad-hoc, contextually-driven decisions as to how processes can unfold in a community-based project, taking on fire awareness in Australia. The paper draws out details which enable us to understand why and how methods were modified or abandoned to overcome obstacles, and what was made a priority in arriving at greater understanding of communicating risk. This reporting differs from an established research accounting, but offers complexity and richness in human-centered research as we seek to develop our epistemologies of design research practice.

Keywords
Method, human-centered design, process, community engagement, design research

ACM Classification Keywords
H5.m. [Miscellaneous]; K.4.3. [Organizational Impacts]

General Terms
Human Factors, Design.

Introduction
Human-computer interaction's (HCI) research has a commitment to rigorous, systematic analysis which emphasizes a scientific description of methods, requiring the reporting of best possible methods to
address a given problem in an appropriate and repeatable manner. Indeed, this is a key criterion used for reviewing papers (see, for instance, this light-hearted catalogue of methodological failings [18]). Though this has been a tenet and tradition for HCI, the science-dominated view of knowledge generation and dissemination provides a limited framework in which to report and understand the complexities of design research where methods may be created, improvised or mutated dexterously to the end of producing a socially effective design. It is obvious to an experienced HCI researcher that deploying methods involves a reflexive approach. Yet, when academic disciplines focus on narrowly defined dimensions of social phenomena derived from lab-based studies but implemented ‘in the wild’, it leads to particular biases in the development of conceptual frameworks and research methods [1].

In this paper, we argue that moments of connection, inspiration and creation appear in modifying methods for new contexts, often in unplanned ways. We narrate an example of applied qualitative research where responsiveness and dexterity were central to the project outcome. We employ reflexivity in looking at response to unexpected obstacles and circumstances that hindered or accelerated understandings critical to the way methods were executed. And we show how these relations contribute to what ensued. In so doing, we acknowledge that every undertaken process has method, ie a means of conducting it, but reflect on which aspects are reported. We argue that the transition to formalized method – a means of conduct that has been theorized and abstracted for repetition – can be precarious. The process of abstraction can result in authors glossing over the complex, situated nature of the original design work. Methods and tools alone cannot enable agency for designers or engagement for stakeholders, nor can they guarantee successful outcomes. So we consider reasons why a strategic emphasis on specific modes and means may have overshadowed more subtle analyses of impact and we ask what becomes ‘lost in translation’ in these accounts. The study we use explores early attempts to engage an Australian community in rural fire preparedness. We document how new responses were born out of necessity in trying to elicit the information needed to conduct human-centered design work.

Reviewing the Literature
Goodman, Stolterman and Wakkary [11] critique the gap between HCI researchers and interaction design practitioners, observing epistemological and methodological divides. Their paper calls for the HCI community to broaden its research agenda and attend more closely to the designer’s experience in a particular design context. They explain that ‘design complexity emerges within activities of designing, experienced through acts of reflection, decision, and judgment’ [11:1063]. As such, it is the experience of the practicing designer that determines the actions taken, rather than attributes of function, form, performance and design problem alone. Similarly, Allen [1] raises concern as to the epistemological and ethical implications of privileging one form of knowing over others on the basis of methods alone, cautioning against the tendency to elevate academic knowledge production over people’s experiential knowledge of the social world. Our paper builds on these scholars’ critique and heeds Light’s [16] concern that the pursuit of method in interaction design, user experience and participatory design work (eg. [14]) makes many processes unusable in community settings. Indeed, as
Garfinkel [8:22] quips, the wish to ignore any ad hoc features in a system is ‘very much like complaining that if the walls of a building were only gotten out of the way one could see better what was keeping the roof up’. As Goodman et al [11] suggest, ad-hoc, intuitive improvisations are designerly processes that practitioners also bring to researching contexts. To remove them, or to sanitize their role to fit into an objective, generalizable and replicable model of knowledge is to deliberately ignore the richness of human phenomena. This may not be a useful process as HCI looks to respond to initiatives in ubicomp, pervasive computing and the Internet of Things (eg [7]), with their complex social and ethical issues.

How Methods perform
There are at least three ways that methods are called on to perform in interaction design that distinguish it from in other fields of design, such as architecture.

First, HCI brings a disciplinary tradition that enshrines methods. With antecedents in cognitive psychology, which is critiqued for taking a positivist stance [3], HCI-related design is still coming to terms with its legacy of a quantitative approach to social research. In the early discipline, emphasis on experimentation, reproducibility and lab-sanctioned findings gave credence to a new genre of research. Methods were a way to perform reliability, deliberately referencing scientific process.

Second, there is pervasive pressure for case studies of success in practitioners’ lives. In a competitive market, studies can provide a reason to commission a particular company. Because design has inspirational elements rather than predictable deliverables, there is always a substantial component of trust in handing over business. It benefits companies to show a tangible process resulting from methodical hard work and application, since this suggests less risk and instills more trust. If a company has a known successful method, it can mitigate the risk posed by staff leaving or becoming unavailable on a particular project. Performing the company’s reliable method may be a branding exercise and distracts from the loss of particular consultants’ insight and skill.

Third, academics must show their value, and do so by winning funding, proving research money has been well used and publishing findings. And publications require a display of competence. Unexpected outcomes can be attributed to researcher error or poor judgment; a change in method can count as methodological weakness. There are repeated calls in academia for reports of failure to support learning in the community. A rare example is Gaver et al’s discussion of a disappointing exploratory design study [9]. However, when presenting his paper, Gaver admitted that if he were to appear every year with an account of things going wrong, he would no longer find himself published. Other activities, such as obtaining ethics approval, also encourage controlled variables, disciplined data and specified findings as quality assurance measures [12]. Researchers submitting work to scrutiny through any kind of peer-review process are disposed to tidy up or obscure the messier aspects of the activities that actually ensued, a process that Law [14:9] calls ‘methodological hygiene’.

Performing a method is a key form of demonstrating competence. Ironically, there is now a tendency in academic research to report on techniques as if they had a life beyond the context of application, even in the
disciplines that initiated human-centered methods as a response to software development processes that produced overly formalized systems.

Thus, each successful human-centered design method, whether devised by business or research lab, becomes a product. It allows researchers’ claims for an approach to be vindicated and, as such, it places methods in a design research landscape that is as competitive as it is collaborative. In trying to convince designers and developers of the wisdom of human-centered approaches, methods have become the arsenal as well as the toolkit—sometimes used in concert but sometimes presented in competition. We see this most clearly when ‘advocates’ and ‘zealots’ [6] are sought as part of job descriptions and complaints are made to designers for paying too little attention to the user to the detriment of the conceptual work conducted.

So there are good reasons why our work should stress methods at their most abstracted and interchangeable, but many of these reasons have less to do with the practice of design itself than the context in which designing takes place. Working conditions, as well as the desire to capture or share knowledge, impact on how methods are integrated into practice [22].

That said, the abstraction of method allows for continuity, learning, analysis and controlled revision. Researchers of all kinds need methods (and rigor in applying them) to show the substance of their findings is valid. Effective methods are as much a technological breakthrough as other tools. But describing a process is valuable for different reasons if, as a designer, you are doing contextual research by way of design intervention - as much iterative work is approached.

Design is not science, as was demonstrated by the backlash to Jones’ seminal book of the 70s, Design Methods, that many took as an attempt to rationalize and make design an explicable, rigid process. In design, we ideate, make, reflect and execute iteratively (see [3, 21] etc). Designing is a complex social activity involving many individual methods, phases, processes, issues and whims. Designers may already see method as a tool to be used as needed and be less interested in the detail of the methodology and more concerned with the impact it has in the world.

This contrasts with empirical science disciplines, where repeatability amounts to observation. The very existence of the phenomenon takes its credibility from the repeatability of the process/observations, and variability in process might result in a different phenomenon being defined. This is an important distinction for our argument here as blurring the different value of repeatability in different epistemologies is one reason for an inappropriate emphasis on purity of method in design processes.

The rest of the paper goes through a project to explore the way that methods were used. We have chosen to comment upon design interventions to facilitate communication for fire awareness because it involved many social and community factors and the evidence indicates that, when designing with and for communities, purity of method is one of the first things to be abandoned [16]. Light’s work [16] also suggests that initiating participative community process requires a social commitment at many levels, especially when engaging people in making change. Process of change is messy, unpredictable and iterative. It requires agile, collaborative, systemic interventions with key
stakeholders. In this study, commitment was made to the participants of the community whose safety depended on the project intervention, rather than to following a theoretically constructed research outline. This was both a professional and an ethical choice.

The Case Study
We first provide a summary of the project intended to improve communication for fire awareness, followed by a more detailed reflection on intuitive decisions that were made in response to unexpected incidents during the design process, allowing us to draw upon the distinction between ad-hoc approaches and intended methods. We use a critical magnifying lens to examine the micro-level of analysis where the designers’ thinking and experience is at play. In this way, we re-establish the contexts in which methods performed and show how their performance was mediated.

Examining the micro-levels of dexterity
The case study draws from investigations in community-level awareness of bushfire (or wildfire) risk in the Southern Otways, Australia, which is a regional, coastal area that has been identified as high risk. The project is a collaborative partnership between design researchers from a university and local community organizations. The case study draws on the data collated over a year, and, in particular, elaborates on the design research interventions that were carried out to engage and understand the ‘community of place’.

The design researchers, having little familiarity with the local area, community or networks, began with a mapping exercise to establish how the community connected, with the idea of using this understanding to pass along information about fire preparedness. The intention eventually was to run participatory design workshops with people who would then become advocates in fire preparedness. A variety of methods were explored to reveal tacit knowledge of who and what community is. Consequently, there were multiple challenges that the research sought to address:
1) Identifying the structures of the community and key figures to engage;
2) Engaging these people and eliciting their ideas about localized knowledge on risk mitigation;
3) Collaborating effectively to produce a viable social tool for preventing risks from fire;
4) Spreading knowledge on preparedness to have maximum impact through community’s networks;
5) Strengthening relationships between neighbors and small co-located groups as a form of increasing resilience in the community.

A failure in methods, leading to insight
The researchers used a Social Network Analysis (SNA) visualization method to map the community networks. SNA is a study of complex human systems through the visualization and characterization of relationships between people, groups and organizations [17]. It can show connectedness as part of understanding community [19]. And the method has been used widely to inform policy in areas such as terrorism prevention and public health improvement, and its contribution to disaster and community resilience is emerging as it can reveal the potential for functional, structural and interactional connections between networks. However, social networks have asymmetry of activity that makes them challenging to understand, predict or model.

The research team began analyzing 161 community-network groups in the Southern Otways. These included groups like surf life-savers’ club, lawn bowls club,
country women’s association, the football and cricket club, etc. Among them, the team contacted several groups expected to appeal to elderly people, to involve families with children, to have recently re-located residents and those who lived outside of the town (ie, near national parks and forests). These residents were identified as being more vulnerable to bushfire risks and were targeted for the study. Through this mapping, the researchers intended to identify potential ‘connectors’ and ‘brokers’ [10]. These are people who can spread an idea to a large network quickly and with credibility and they could be expected to spread messages on fire awareness widely and effectively.

However the team encountered several obstacles when collecting data for the SNA. Some were communication problems – defunct emails, phone numbers and so on. Some groups had so few memberships that it was unproductive to pursue them. And many group leaders were not co-operative, indicating that their members were not concerned about fire mitigation. These became dead-ends. The team realized that the ‘communities of interest’ networks were more fragile than anticipated, often representing loose social ties or temporal and ad-hoc gatherings. Many of these networks did not have a membership system, dedicated space or schedules for meetings.

The team was mistaken in its initial assessment that a composite of these 161 community groups would provide a picture of community fabric. In fact, the community was far more fragmented and disconnected than was anticipated. The method enabled the researchers to question both their first impression of a ‘cohesive’ community and the assumption that the community would want to be prepared for fire.

In the SNA discourse, ‘proper use of tools’ is highlighted as important to avoid errors in network modeling and statistical analyses [17:20]. Instead, the use of the visualization method enabled a realization that a large group of residents were not captured and represented on the diagram. A majority of these residents were holiday homeowners, tourists who stay in holiday homes, and non-permanent residents of the local area who spend weekends or public holidays intermittently – people outside all social notions of ‘community’. This group of people represented about 70% of the total residents, and increased even more during summer, with its heightened risk of bushfire.

Temporary residents are the least likely to prepare for fire or know how to respond in an emergency, so these people represented a large gap in the researchers’ knowledge both in numbers and risk. The exercise also revealed that what could be deemed the ‘local community’ didn’t know who these temporal residents were or how the research team could initiate contact with them. There was no network that connected these various constituents. This resulted in a significant deviation from the original research plan.

**Analysis:** It is certain that the SNA was undertaken in other than ‘proper’ ways, not least because the data gathered was insufficient and too fragmented to consolidate as a graphical visualization. A statistical social scientist seeing the work might have found the execution faulty and incomplete. The researchers could have gone door-to-door to find out more. They could have sourced other ways to gather more data. Either would have contributed knowledge about the state of community groups in the Southern Otways. But the process was intended to understand the community,
not provide measurable data. Thus, the partial process contributed valuable learning. It led to a critical awareness of the social networks in the area, which was the pragmatic goal of the initial research.

_Improvising a means to reach a fragmented community_

Understanding the fragmentation of networks and being alerted to the ‘invisible’ members of the community forced the researchers to come up with other means to identify and capture residents. This gave rise to a more improvised process, one which demonstrated design innovation in a way that working to follow a social science method had not.

As no one had the means of targeting less permanent residents socially, the researchers turned their focus to where they would be – this being the thing known about them. The researchers conceived that the only way to communicate with temporary residents was through their place of lodging ie, holiday homes. No one knew them, but they knew where they stayed. Established residents could identify which houses were holiday homes in their neighborhood.

Research into bushfire preparation in Colorado, USA, talks about serendipitous chats across fences and instances of collecting mail as common forms of informal interaction [2]. These then led to conversation about fire preparation (mainly fuel reduction and land clearing). This study describes the role of permanent residents as ‘interpreters or conduits’ of information and temporary residents sought their advice. This provided a new research question: how might these serendipitous interactions be fostered or strengthened? The team adopted it to help define the design space and considered ways to facilitate informal, person-to-person interaction. They hit on the idea of a postcard that can be torn in two, inspired by sharing a Kit Kat™ chocolate bar. It was envisaged that the permanent residents would pick up these postcards and give half to someone else, ideally an ‘itinerant’ neighbor.

_Imagery_

_ANALYSIS:_ Having abandoned the formal structure of the research project, the researchers revised their means completely so that the end goal – of improving communication – could be maintained. At this point, new, more targeted research was introduced which dealt specifically with non-permanent residents and this was used to focus the questions being asked. But it was having a break over coffee, not a straightforward insight from the research, which led to the inspiration that gave the thrust to the innovation that emerged.

_Getting the message right_

In generating fire preparedness messages for the postcards, visits to Southern Otways and the first-hand encounters in the field became critical. One lady was particularly influential. Her house was on a narrow, winding dirt track through forest, isolated in a valley where, if the fire came, it would engulf her and her husband from all sides. The couple had no car. To avoid the flames, they had built a fire bunker in their garden from designs they had downloaded from the internet. She proudly invited the researchers to see how proactive and prepared she was. What frightened the researchers most was that she did not realize that the bunker could become a serious death-trap. The construction was similar to a pizza oven, about the size for two people to sit in. Instead of protecting her and her husband, it could potentially suffocate them or cook them with radiant heat through the thin metal door. The researchers were painfully aware of this potential.
**Analysis:** Although the researchers had gone out to help shape messages for residents to exchange, they found that they were also learning more about the problems facing them. Meeting the locals served to demonstrate their vulnerability to fire; how at risk they were from poor understanding; and the enormous task of overcoming/challenging misguided advice for preparedness. This and many similar observations began to build a picture of risk in a way that the Social Network Analysis had not. Not only was the community fragmented, but it was partly misinformed and in denial. Seeing these social threats in addition to the environmental ones was a design stimulus – producing the postcards – and also an insight into how and what to communicate. What shocked the researchers would also shock residents and those passing through. As the researchers became sensitized to the threat, they learnt what to pass on to others. In this way, empathy for the residents as well as knowledge propelled the design process.

**Putting out postcards**

The postcard presented two scenarios featuring neighbors who have not talked about their bushfire plans, and the negative consequences of this if fire came unexpectedly. By highlighting the need for communication and preparation, as well as the kind of events that could happen, the pair of scenarios was designed to trigger conversation between neighbors about mitigating the risk of sudden fire. Half of the postcard could be torn off and left under a neighbor’s door with a message. The cards were also intended to prompt people to attend the researchers’ bushfire awareness workshop in town. A few hundred postcards were distributed through the community ‘connectors’.

At the bushfire awareness workshop, the researchers learnt that the majority of participants had heard of the workshop through the local newsletter, not a postcard. The device of using the postcards was discovered to suffer from a circular problem. Without coming to the workshop, ‘connectors’ could not see the importance of involving neighbors in fire defense. The need to collaborate was one of the principal messages to be conveyed by running these events and, as has been repeatedly noted, not one that the neighborhood had grasped. Without understanding the value of interdependence, no one was motivated to distribute the cards to strangers. This did nothing to bring in people who functioned outside the existing networks. However, the postcards became more useful as a communication tool after the workshop, once the value of involving others became established. Thus, postcard distribution could be managed iteratively – with people coming out of the workshop and using the cards to engage further people in learning about fire prevention. But this was an insight gained through running the workshops, not one that was apparent at outset.

**Analysis:** The postcards were effective, but only after the residents had been sensitized to the risks and how to mitigate them. The researchers were again learning about the territory as they were influencing it. The eventual improved process of communications (and thus increased readiness) evolved through an iterative design process of trial, error and evaluation. It is a familiar method, but a very broad one. In this way, the team slowly negotiated an understanding of the social links in the area, of how fire risks were understood and of what a designed engagement might look like. This understanding came
through a mixture of relatively unsuccessful research and design activities which eventually led to some highly effective interventions. Initiating an intervention is often the only way to learn the essential dynamics of systems [20], a common knowledge in organizational management. Similarly, designing within complexity requires dexterity, inventiveness and reflexivity towards behaviors, situations and values that emerges, often unexpectedly.

**Discussion**

In the preceding sections, we describe the activities that led to a process of improved communication and analyzed how method and contingency interplayed in the dexterous work with community to achieve these ends. The description is unlikely to surprise designers since responding to contingency with ingenuity is a major part of the stock in trade. However, as noted, these aspects are underreported in HCI work because they are not reproducible. If they are not reproducible, what use are they?

We present a contrasting way of reporting, stressing moments of judgment and decision-making in our analysis. We draw out choice points where a social, political or practical factor has sent the work in a different direction from originally conceived and, by doing so, show how design decisions came about. Several examples of choice points appear in the report (eg abandoning SNA, adopting postcards) and we have provided detail of the transitions that resulted. Our aim here is not to show how to design better social processes for fire mitigation, but to demonstrate a different way of thinking about research reporting that does not provide the impression of a ready-made process involving ‘how’. It offers a look at ‘what’ has to be achieved to keep the focus on a viable solution. The researchers undertaking the work took an expedient view of methods, aiming for a broadly negotiated ‘fit for purpose’ rather than any purity of performance.

In this paper, we have demonstrated the considerable work that was not formally part of the method but that gets assumed in accounts of conducting it and we have acknowledged some of the reflection and judgment work that must take place. We have shown how methods can fail and still lead to successful design learning and how an appropriation of method allows for the heterodoxy that constitutes good design rather than a worldview constrained by the tools used. We do so to argue that more candor and closer attention to detail would enrich understanding of our practice and that of others, especially where complex community-related aspects need to be considered as well as more predictable design factors. In these contexts, the stakes are higher than involving users, say, to test a new product. We have shown here that, for communities in Victoria, the issues surrounding neighbors talking to one another are deadly serious.

The will to involve communities in designing their futures is growing as ICT moves to occupy previously untouched spaces. This brings with it an ethics of what is designed as well as questions about process. As we look to understand designing in new contexts such as how networks will impact on group behaviors, greater attention to research and design choice points and how decisions are motivated will be as important, if not more important, than reporting based on lab-based models - so that we can learn from each other effectively about what we are doing as well as how we are doing it in the uncharted territories ahead.
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