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; design research; improvisation; judgment; repeatable.

ACM Classification Keywords
H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous;

Introduction
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. This is a key criterion used for reviewing papers (see this light-hearted catalogue of methodological failings [19]). 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].

We argue in this paper 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. 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. We employ reflexivity in looking at response to unexpected obstacles and circumstances and consider how they hindered or accelerated understandings critical to the way methods were executed.

**Reviewing the Literature**

As HCI moves away from studies based on stable groups and/or controlled user-testing into broader fieldwork, Williams and Irani [24] argue that a method’s portability must not be taken-for-granted, and that some improvisation is necessary to ‘fit’ encountered situations. This becomes more critical as HCI responds to initiatives in ubicomp, pervasive computing (eg [7]) and the Internet of Things, with their complex social and ethical issues. Garfinkel [8:22] quips that the wish to ignore 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’. To remove these features from accounts, or to sanitize their role to fit an objective, generalizable, replicable model of knowledge is to deliberately ignore the richness of human phenomena.

Goodman et al [11] suggest that ad-hoc, intuitive improvisations are designerly processes which practitioners also bring to researching contexts. They note the gap between HCI researchers and interaction design practitioners, detailing the epistemological and methodological divides. Their paper calls for the HCI community to broaden its research agenda and attend to designer experience in context: ‘design complexity emerges within activities of designing, experienced through acts of reflection, decision, and judgment’ [11:1063]. 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 ethical and epistemological implications of privileging one form of knowing over others on the basis of methods alone, and cautions against elevating 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 pursuit of method in interaction design, user experience and participatory design work (eg. [14]) makes processes unusable in community settings.
This paper reviews a design project and, in doing so, explores the way that methods were used. We have chosen to comment upon design interventions to facilitate communication for fire awareness as it involves many social and community factors and the evidence indicates that, when designing with/for communities, purity of method is one of the first things to be abandoned [16]. Light [16] also suggests that initiating participative community process requires a social commitment at many levels, since it engages people in making change. Processes of change are messy, unpredictable and iterative. They require agile, collaborative, systemic interventions with stakeholders. In this study, commitment was made to 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. We use a critical magnifying lens to examine the micro-level of analysis where designers’ thinking and experience is at play [16]. In this way, we reestablish 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. Consequently, there were many challenges for the research 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 [18]. It can show connectedness as part of understanding community [20]. 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 involve 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 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 their members were not concerned about fire mitigation. These became dead-ends. The team realized that the ‘community of interest’ networks expected to yield these key people were more fragile than anticipated, often representing loose social ties or temporary and ad-hoc gatherings. Many networks did not have meeting schedules, a membership system, or dedicated space.

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 [18:20]. 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, given that Network Theory
heavily relies on statistical analysis of networks of many individuals. Our qualitative data was insufficient to consolidate as a full graphical visualization of the community networks. The researchers could have sourced data in other ways. 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 information about 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 how temporary residents sought their advice. This provided a new research question: how might these serendipitous interactions be fostered or strengthened? The team adopted the question 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 permanent residents would pick up these postcards and give half to someone else, ideally an ‘itinerant’ neighbor.

**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 the Southern Otways and first-hand encounters in the field became crucial. 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 set out to 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 misinformed and in denial. Seeing these social threats in addition to environmental ones was a design stimulus – producing the postcards – and an insight into how and what to communicate. What shocked the researchers would also shock residents. 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, even to the extent of tuning the function and content of the postcards. 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 [21], a common knowledge in organizational management. Similarly, designing within complexity requires dexterity, inventiveness and reflexivity towards behaviors, situations and values that emerge, often unexpectedly. By analyzing with candor and valuing outcomes and relationships more than purity of approach, the project was able to achieve its goals, showing good design as an emergent, engaged, and iterative process of adaptive methodology.

Discussion
The analysis of this case study shows the value of intuitive improvisations in research design. The description is unlikely to surprise designers since responding to contingency with ingenuity is a major part of the stock in trade. Yet, detailing this ingenuity is not the norm in reports of process. In presenting a contrasting way of reporting, which stresses moments of judgment and decision-making, we demonstrate the value of the designers’ experience, expertise and intuition, not only in coming up with ideas, but in guiding the next step to explore or understand the design space. By drawing out choice points where a social, political or practical factor has sent the work in a different direction from originally conceived, we show how design decisions came about – through pragmatic response to contingency, interest in community wellbeing and focus on effective intervention. Several examples of choice points appear in the account (eg abandoning SNA, adopting postcards) and we have illustrated 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 and responsible solution.

In the final sections, we consider two questions: why might a strategic emphasis on specific modes and means overshadow more subtle analyses of impact? And what becomes ‘lost in translation’ in the accounts?

How Methods perform
It is evident, even from the short study above, that all process has method to it, ie a means of conducting it, but that the transition to formalized method – a means of conduct that has been theorized and abstracted for repetition – can be precarious. Abstraction here would have resulted in us glossing over the complex, situated nature of the original design work and hiding evidence that adaptation was repeatedly needed to meet the brief. Why then is abstraction in reporting design work so common? We suggest, in interaction design, there are at least two ways that methods are called on to perform beyond a simple concern for reproducibility.

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 addressing 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. Now, as humanities-infused methodology grows in impact, there is more recognition of the role of judgment in design [11], but still little take-up of reflexive reporting.

Second, there is pervasive pressure for case studies of success. Commercially, methods become a branding exercise, distracting from the trust that goes with commissioning design work, brushing over particular consultants’ insight and skill and making practitioners look interchangeable. In academia, researchers must display competence - and method is central to showing it. There are repeated calls for reports of ‘failure’ to support learning in the community. A rare example is Gaver et al’s account of a disappointing exploratory design study [9]. However, when presenting it, Gaver admitted that if he were to appear every year with an account of things going wrong, he would no longer find himself published. Activities like publishing, winning funding and obtaining ethics approval, all encourage controlled variables, disciplined data and specified findings as quality assurance measures [12]. Researchers submitting work to scrutiny through any peer-review 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’.

Thus, each successful human-centered design method becomes a product. It allows 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 presented in competition. We see this most clearly when ‘zealots’ [6] are sought as part of job descriptions.

So there are good reasons why many case studies stress methods at their most abstracted and interchangeable, but some 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 [23]. Yet ironically, there is now a tendency to report on techniques as if they had a life beyond the context of application within the very disciplines that initiated human-centered methods as a response to overly formalized software systems.

The Benefits of Candor
Researchers of all kinds need methods (and rigor in applying them) to show their discoveries are valid. Abstraction of method allows for continuity, learning, analysis and controlled revision. 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 and has its own notions of validity and rigor. We can recall the backlash to Jones’ [13] seminal book, Design Methods, that many took as an attempt to make design an explicable and rigid process.
Designers may see method as a tool to be used as needed, be less interested in the methodology and more concerned with impact on the world. To design, we ideate, make, reflect and execute iteratively ([4],[22], etc). It is a complex social activity involving many individual phases, processes, issues and whims, and a range of stakeholders with different orientations to the process. And it has a goal of making change. Even what it is to know is challenged by these factors. It is impossible to stand outside the data when you are deliberately making an intervention, as designers do. This implicates us in the outcomes in a way that a simple process of implementing a method would seem to avoid. It also introduces criteria for validity and rigor that are distinct from ‘objective’ repeatability.

Light et al [17] look at the researcher’s responsibilities in participative research practice and offer a notion of rigor as explicit accountability, pertaining to community design where interventions have direct impact and people may have intense feelings about their locale and the issues to be tackled together. Asking how to do design in this context, Light [16] suggests purism of methodology and comparability of technique are lesser concerns than innovating responsibly. Micro-moments of interaction should be considered as critical, and personal and professional integrity as a virtue (with a call to listen well, accommodate, and articulate constraints comprehensively). This highlights the role of expertise in social dealings as well as ideation, and judgment in the moment as well as familiarity with relevant approaches. Validity emanates from accurate insights into impact. However, as noted, these aspects are underreported in HCI work because they are not reproducible. What use are features of a program that cannot be repeated?

Methods can fail and still lead to successful design learning. Appropriation of method allows for the heterodoxy that constitutes good design rather than a worldview constrained by the tools used. More candor and attention to this detail can have a beneficial knock-on effect, enriching practice as well as reporting, since we learn from the accounts of practices we share. This has especial potential where complex social aspects need to be considered alongside more predictable design factors. In these contexts, the stakes are higher than involving users, say, to test a new product. We have shown, for communities in Victoria, the issues addressed through design were deadly serious.

The will to involve communities in designing their futures is growing as ICT moves to occupy previously untouched spaces. This move 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 digital 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 proficiently from each other about what we are doing and why as well as how we are doing it, in the uncharted territories ahead.

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