Crisis mapping before a crisis: a trans-situational map for the CDEM sector

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1.0 Introduction

New Zealand is a seismically active country, geographically isolated from its neighbours. This isolation, coupled with a relatively small population, earmarked government resources, shifting communications technologies and the changing nature of civil society, all underscore that when the next big crisis or event occurs, communities will need to share and be encouraged to work together.

Christchurch's experience has at least reminded people that a large, centrally coordinated response is not on standby for immediate mobilisation.

Prepare Wellington (a working title for this experience design proposal) is a proposed mechanism to connect the community, its latent resources, and to enable the information generated in the event of a crisis to be captured, documented and made available to the relevant agencies, as well as the community itself. Through this process, the resources of emergency services, local and national government can be allocated in an informed manner.

The ideas that are explored in this document are the basis for ongoing work should WREMO wish to take up some of the challenges and opportunities presented. It is also our hope that some of the techniques and information collecting processes might help diversify WREMO's communication practices and engagement with the people of the Wellington and Wairarapa region.

2.0 Project background

Wellington Region Emergency Management Office (WREMO) is a semi-autonomous organisation that coordinates Civil Defence and Emergency Management services on behalf of the nine councils in the Wellington region. As an organisation, they have been at the forefront of using social media as a civil defence communication tool. WREMOS's *Facebook* following is the largest for any civil defence/emergency management group in the country.

With an increase in the use of crisis maps during disaster response situations, WREMO instigated this project to consider how crisis maps could be used post-emergency, but also in an everyday context in order to 'socialise' the platform to allow for immediate deployment as an emergency response and management tool.

Massey University has expertise in the fields of emergency management (through the Joint Centre for Disaster Research) and within visual communication, user experience and interface design (through the School of Design). Massey design researchers were engaged to consider the feasibility of, and inform directions for, a potential crisis mapping tool.

This work builds on two years of exhaustive work by WREMO staff, particularly Lisa McClaren and Jason Paul. Initially WREMO posited a hub for events as a conduit for socialising the tool, and a map-based repository for information collected through community planning processes.

This project explores and evolves WREMO's original concept via human-centred design principles. No predetermined platform or technological response has been supposed; needs and opportunities were identified through user and stakeholder interviews, surveys, and testing. A key value in this approach is that the solution should be technologically agnostic and as free from commercial pressure as possible.
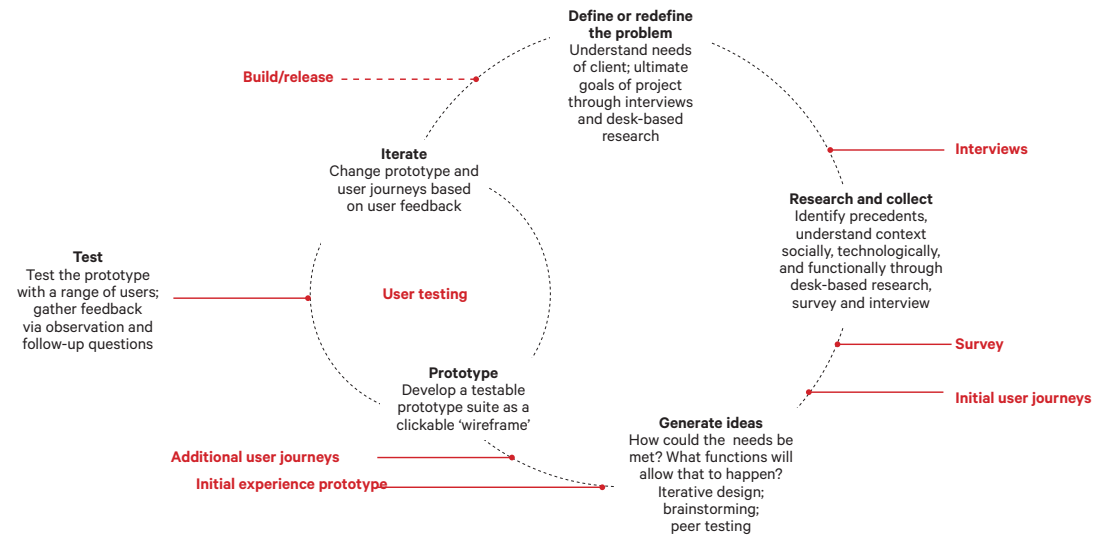
Visual mockups by Lisa McLaren (WREMO) showing ways to display event information, and information from Community Planning Processes

3.0 Research process

In user experience design (UXD), the product is research and the research is product: a prototype formed through research is used for first tests, and these go on to inform the shape of the product in the next iteration. User testing is critical to defining functional steps, and the resulting experiences. Through interrogating the decisions made, user testing underwrites and extends the assumptions of the designer, by adding insight into how the users interpret what they are seeing.

Initial prototypes are informed by survey and interview data, which bring to light otherwise unobservable behaviours, and inform and underwrite a designer's assumptions about the user's perspective on the problem and how they would respond. The difference is the gathering of a user's impressions before and after the experience. Surveys and interviews help to inform or confirm design assumptions based on business or stakeholder needs; a user test helps to focus the design decisions to do the same.

Define or redefine the problem
Understand needs of client; ultimate goals of project through interviews and desk-based research

Build/release

Iterate
Change prototype and user journeys based on user feedback

Interviews

Research and collect
Identify precedents, understand context socially, technologically, and functionally through desk-based research, survey and interview

Test
Test the prototype with a range of users; gather feedback via observation and follow-up questions

User testing

Survey

Initial user journeys

Prototype
Develop a testable prototype suite as a clickable 'wireframe'

Generate ideas
How could the needs be met? What functions will allow that to happen? Iterative design; brainstorming; peer testing

Additional user journeys

Initial experience prototype

The process for the design research, loosely based on Stanford Design Innovation Process ME310

4.0 Context and considerations

4.1 The changing nature of Civil Defence

The role of civil defence organisations is moving from a (perceived) 'emergency service' situation to one where capacity and capability live within a community. WREMO's Community Response and Resilience Plans focus predominantly on building communities that are empowered and equipped to survive a disaster situation.

As the plethora of new technologies enables new communication platforms to be produced, they also need to support this effort in extending and complementing the response tools currently shared with communities through WREMO's Community Response and Resilience Planning process.

4.2 WREMO processes and resources

4.2.1 SMIRTS and SMARTS

WREMO has workflows that follow established research into how human beings respond to a crisis. Part of the process may include the activation of a Social Media Initial Response Team (SMIRT), where WREMO staff publish appropriate news to social media channels, and monitor online sources for information. This can, if required, be escalated to a Social Media Active Response Team (SMART), which takes responsibility for gathering online information for situational awareness, and sharing pertinent information with the public through social media channels.
The SMIRT/SMART system should take into account the need to monitor, moderate and manage data within the *Prepare Wellington* platform. Learnings from previous crisis map situations suggest a significant volunteer task force and supplementary information management tools will be needed to ensure content accuracy and timeliness. The SMIRT/SMART process offers a sound basis for future workflows.

"individuals and communities are ultimately responsible for their own safety and the security of their livelihoods… individuals and communities must be able to care for themselves and each other, as much as possible, when the normal functions of daily life are disrupted."

National Civil Defence Emergency Strategy (New Zealand Department of Internal Affairs, 2008)

4.2.2 Capturing other crisis information

WREMO has processes in place that are built on people in the field phoning or radioing in reports and the information being recorded on paper (Field Reports) by EOC (Emergency Operations Centre) staff. The *Prepare Wellington* experience should inform the relationship between WREMO and the crisis zone, offering a streamlined alternative process for gathering pertinent information.

### 4.2.3 Community-Driven Response Plans

CDRPs are created via consultation with the community and stakeholders. They contain information about resources in the community that could offer immense value in a crisis situation. At present, this information is housed within PDF documents available on the WREMO website. WREMO's intention is that the CDRPs become a "living document". *Prepare Wellington* offers an opportunity to change the practice from creating static information requiring updates by WREMO, moving to a dynamically updated database that is accessible to the whole community, anywhere, and at any time.

4.3 Information Technology

Although still very common in the distribution of information to the general public, traditional printed communication forms offer no mechanism for two-way dialogue, nor do they enable people to share information in a manner that can be utilised, or retrieved by those who can respond, or do something with it.

"Crisis mappers leverage mobile platforms, computational linguistics, geospatial technologies, and visual analytics to power rapid crisis response"

(Crisismappers, n.d.)
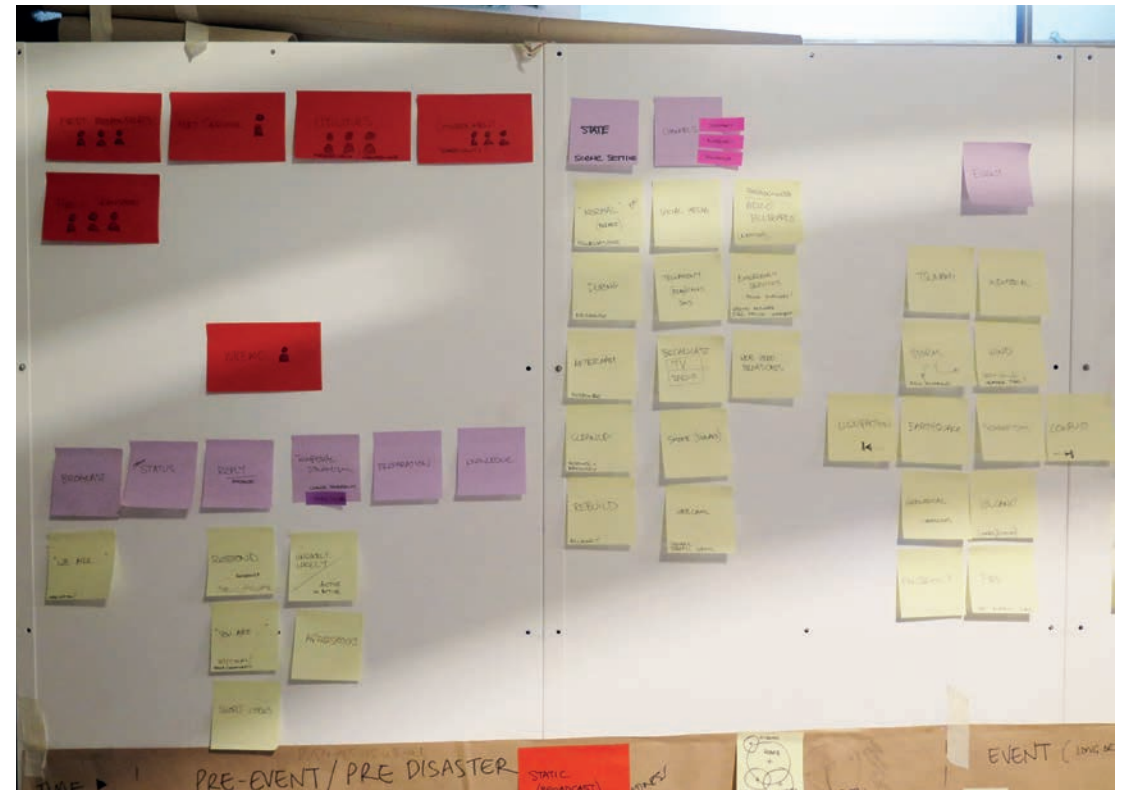
The plethora of communications options available to connect the observations made during a crisis situation, and the centralised agencies responsible for addressing it

By using the available locational awareness, resilience and multimedia capabilities – tracking reports available in pre- and post-crisis situations – *Prepare Wellington* could become an invaluable resource for citizen and government alike.

While this research proposal recommends exploring and deploying new interaction opportunities on the smartphone in the first instance (partly due to their near ubiquity), eventually a responsive web experience can be provided on the same code base suitable for computers that rely on desktop and tablet displays, thus ensuring that the ability to contribute and confirm information is open to anyone outside of the crisis area.

4.4 Crowdsourcing

"People want to do something to make the world a better place. They will help when they're invited to. Access to cheap, flexible tools removes many of the barriers to trying new things. You don't need fancy computers to harness cognitive surplus; simple phones are enough."

(Shirky, 2010)

Crowdsourcing is a contemporary form of volunteering that takes advantage of the opportunity provided by online communications and programming. This is partly explained by Clay Shirky's concept of "cognitive surplus": communities who volunteer their time and labour, almost exclusively for an online output, in order that information based tasks are performed rapidly and at scale.

The aim of the first release of this product is to take advantage of a 'mobile first' strategy where the public can input and share geolocative data. In the *Prepare Wellington* region, this may take the form of logging potential resources or events.

Users outside of a crisis zone – perhaps following events via social media – should not be overlooked. These potential volunteers, with available 'cognitive surplus', ability and interest, may be invaluable in helping WREMO staff, volunteers and affected individuals in the crisis zone contribute, police and qualify information input within *Prepare Wellington*.

"In the words of Waikato Region Emergency Management Group, "Civil Defence is not one thing … We are all Civil Defence"

(Waikato Civil Defence and Emergency Group, 2015).

4.5 Crisis Maps

Crisis maps are the real-time gathering, display and analysis of data in a crisis situation such as a natural disaster, period of political unrest or a conflict situation. These are usually short-term deployments active for the duration of weeks or months.

After the success of the defining crisis map platform Ushahidi in 2010, most iterations of crisis maps – especially those that have garnered publicity – have been 'quick-up' – 'quick-down' in nature (Hall, 2012).

These maps, generally undertaken by Volunteer & Technical Communities (V&TCs) such as the Standby Task Force (www.standbytaskforce.org) react quickly to an unfolding crisis. The Haiti Earthquake (Meier, 2012), the Japanese Tsunami (Seki, 2011), and the Christchurch Crisis Map (Beatson, Buettner, & Schirato, 2014) were all in this mode.

There are few examples of crisis maps established for long-term deployment. Bushfire Connect was a crowdsourcing and alerting system that was continually active throughout the fire season in Australia. It existed for about two years (up to the end of 2012) but did not continue as it was unsuccessful in securing funding and it was not feasible to sustain it on a volunteer basis (Hall, 2012). *Prepare Wellington* will a be a pioneer in the space of 'permanent' crisis maps that serve their immediate populations.

"The crowd has learned it can make its own map, they can jump on Twitter to learn breaking news before the news and can text and contribute to live, real-time and georeferenced maps during a crisis"

(Ziemke, 2012, p106)

Powered by the web, V&TCs are by nature decentralised and non-hierarchical. They are also unencumbered by bureaucracy, do not need to adhere to system or protocol, and can deploy software quickly.
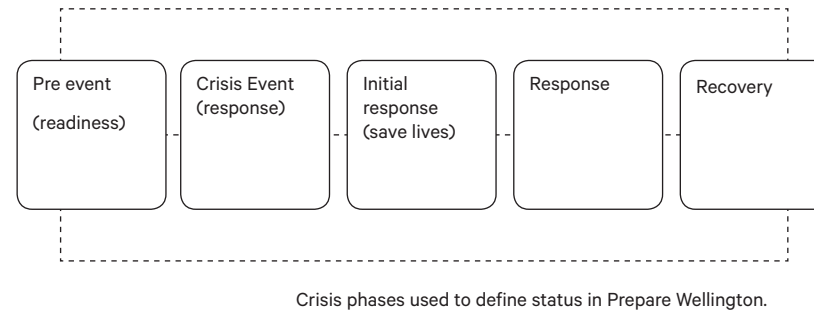
In a crisis situation, other maps will, undoubtedly, appear. In Christchurch (2011) three crisis maps were initially deployed (Beatson, Buettner, & Schirato, 2014, p41). It has been observed that "the crowd has learned to first ask: Who is [setting] up the Crisis Map?... it is better to converge and swarm around a single crisis map ... to help the system find that equilibrium" (Ziemke, 2012, p106). Becoming 'the map' will require due consideration and inclusion of the V&TCs and local volunteers.

4.6 Crisis phase model

WREMO operates on the basis of a series of status levels or crisis phases that have been used as a model for the *Prepare Wellington* design research project.

Unlike the standard crisis maps model where deployments are "ramped up and continue for a limited period, based on volunteer effort only" (Hall, 2012), *Prepare Wellington* needs to remain active at all times, and offer engagement opportunities and information relevant to the user's situation.

Interrogation of this model allowed for the inclusion of functions within the design of the experience that, beyond the mitigation and preparedness phases, might address predictable changes in psychological health (such as post traumatic stress), following extended time in a crisis area.

Crisis phases used to define status in Prepare Wellington.

PROJECT WORKSPACE
MAY 2016
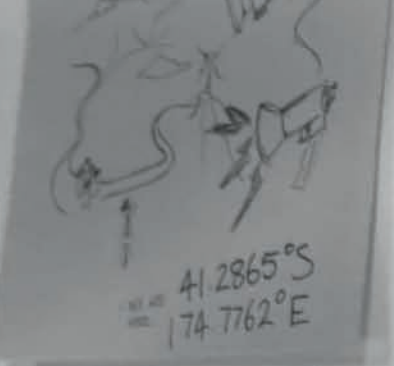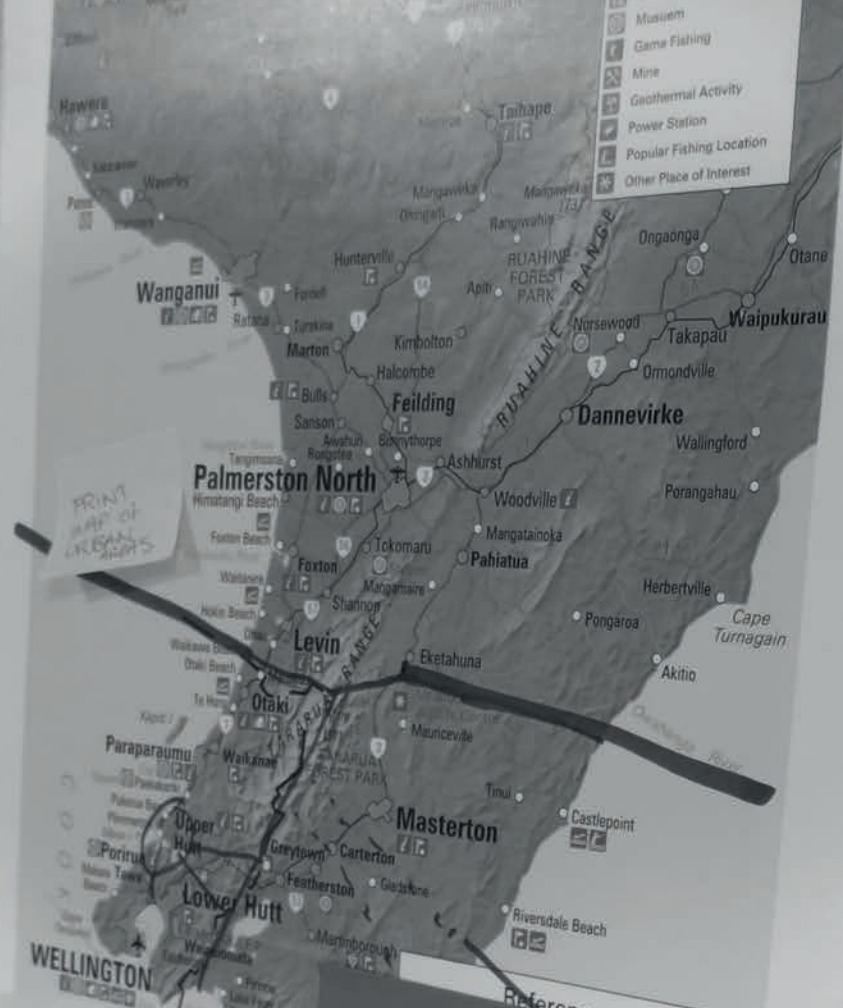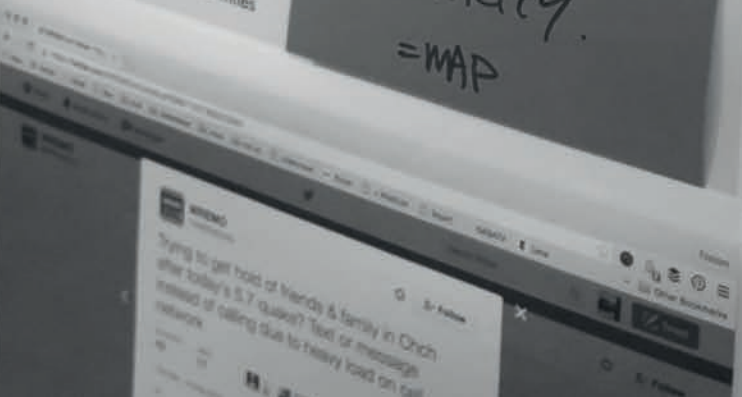
5.0 Design research

Unlike most consumer facing applications which have very specific target groups, the audience for *Prepare Wellington* needs to be as inclusive as possible. As the population matures and 'digital natives' become the majority within the community, WREMO will still need to produce information across various media to ensure as many people as possible remain within reach.

5.1 User interviews and workshops

To initiate the design phase and build empathy with our users, interviews helped to deliver an understanding of how people anticipate and prepare for a disaster, and to discover what plans they may have made for themselves and their family or household. The interviews focussed on a scenario involving a medium to high magnitude earthquake occurring in Wellington City.

All of our interviewees are permanent Wellington residents. From these individuals, the experiences of two participants (both male, 52 and 45 years old) highlighted different ends of our sample spectrum. While both had family, the duration of time spent living in Wellington meant their understanding of a potential situation, and their level of emergency preparedness were markedly different.

Interview transcript discussing the interviewees' possible
response scenario and knowledge of what they might do in a
significant seismic event

Subject 1.2 52 year old male. Married, 3 children. Long term (5 years+) resident of Breaker Bay at the time of the interview.	Subject 1.3 45 year old male. Married, 3 children. Immigrant who had been living in Khandallah for nearly a year at the time of the interview
"Preparedness is easy [to consider]: …when you're a Wellingtonian, live by the sea and have kids."	"I have never experienced an earthquake…"
"The community tried to organise its own [warning] siren. But it fell through…"	"I'd like to know more about un/safe housing…"
[Direct neighbours?] "Not tried to talk to them. Maybe we should…"	[I met our neighbours at a Christmas party] "Small talk mostly… [There was] No way to associate people to properties…"
[Sources?] "The usual: the paper, TV, leaflets"	"I need to check the web for more information"
"Geography defines the community"	
Interviews conducted on 21 April 2016. Low risk ethics approval granted.	

These two individuals are very similar demographically, yet confront
different geographic challenges in the same city (tsunami zone vs. landslip
risk). This diversity of risk scenarios, preparedness levels and community
cohesion underlines that while *Prepare Wellington* can integrate the
pre-existing information that crisis maps have displayed to date (what is
happening and where), it should also do something new: present the social
relations and diversity in geography that is represented by the combination
of hazard maps and the location of people and community resources.

5.2 User surveys

An online survey conducted during this research had 310 respondents from across the region. 92% of respondents owned a smartphone, and of these the split is relatively even across operating systems (52% Android, 44% iOS with a range of unknowns and others) compared to international levels, where Android has over 70% market share (Netmarketshare.com, 2016). This high level of ownership, and international trends towards online consumption on mobile (internet browsing is now at over 30% mobile and rising at over 10% a year (Netmarketshare.com, 2016)), validates a 'mobile first' approach.

What follows are some key points of interest. The complete survey accompanies this research proposal as a separate document.

5.2.1 Do you use apps? Do you have any Hazard warning apps?

88% of users are either frequent app downloaders or regularly use a handful of useful apps, but 67% of users had no apps related to emergency preparedness or hazard warning. Where people indicated they did have this kind of app installed, *Geonet* was the overwhelming leader, followed by CPR/ First Aid apps, and the *Red Cross Hazard App*.

App usage amongst survey respondents
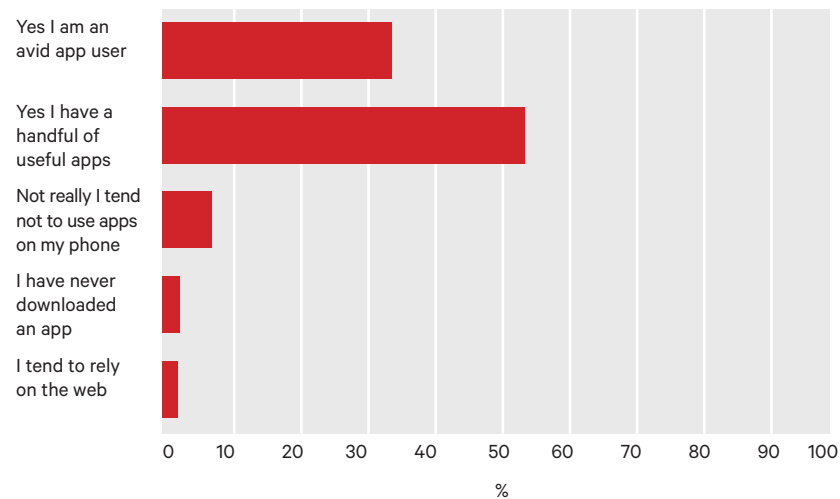
5.2.2 What social networks do you use?

In terms of social media, *Facebook* reigns supreme, but *Neighbourly* usage at over 25% is unexpectedly high.

Social media usage amongst respondents
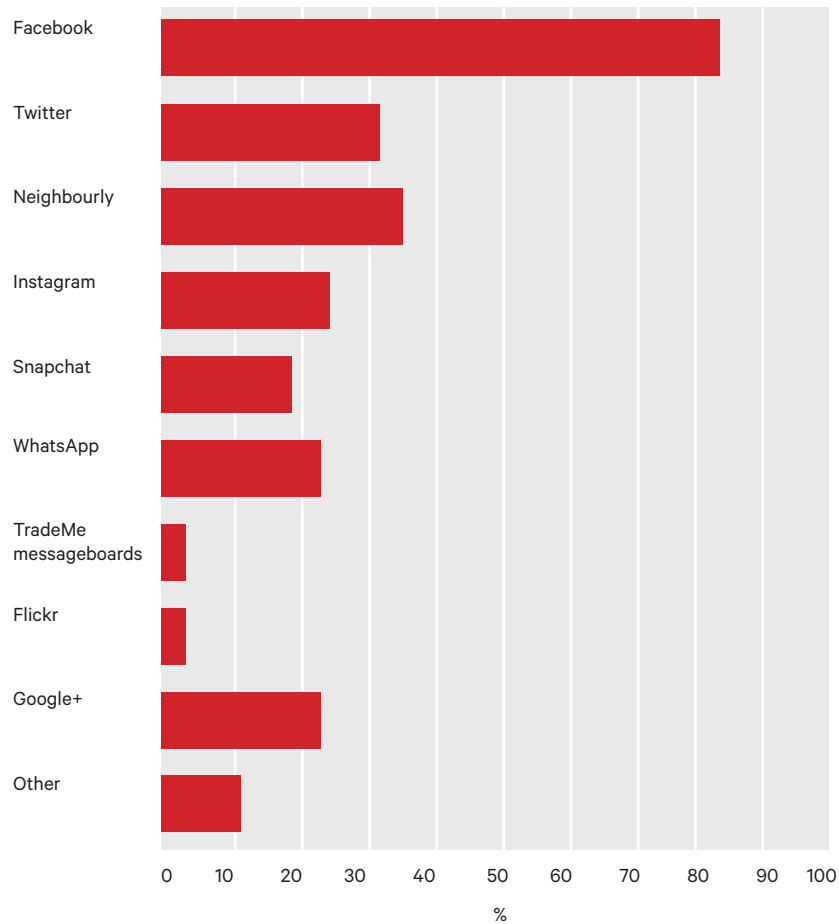
5.2.3 How did you hear about the 2011 Christchurch earthquakes?

This question was designed to reveal the relationship between New Zealanders' information consumption habits and large scale disaster situations. Surprisingly a quarter of respondents became aware of the Christchurch earthquakes via television. More than email, the web and social media combined (20%). Word of mouth accounted for 18%.

How users became aware of the Christchurch earthquakes
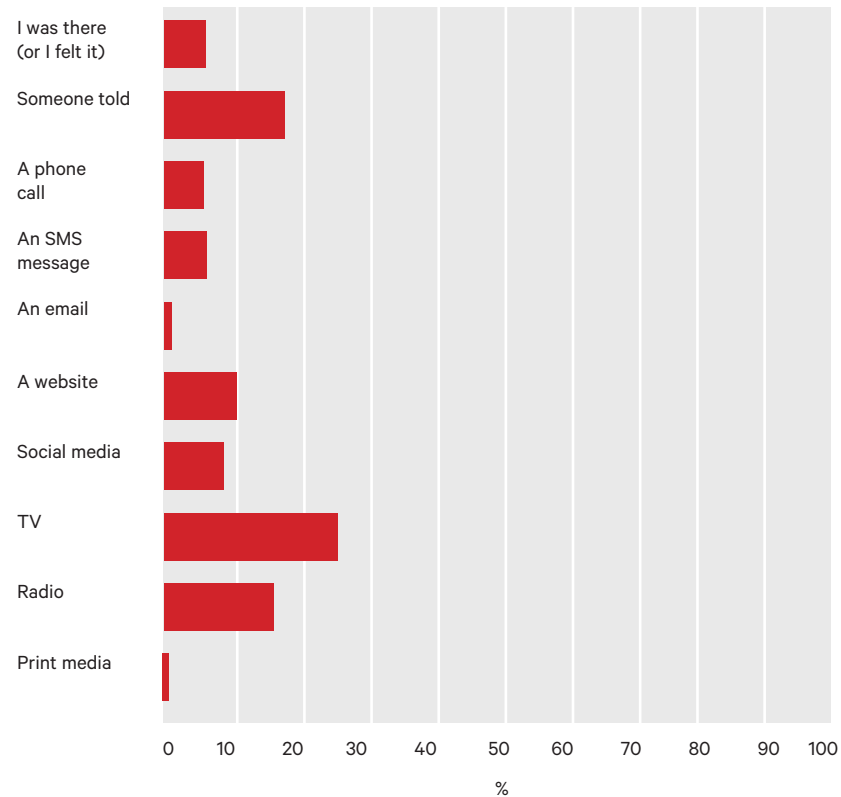
5.2.4 How do you know what's happening in your community?

In an everyday context, though 54% of respondents highlighted social media as a place they found out about community events, traditional means such as a flyer in the mailbox (44% of respondents) remain important. In both the Christchurch question above and in regards to events, word of mouth remains a key communication channel.

17% of respondents knew none of their neighbours by name. 40% knew ~30% of their neighbours.

But, despite the surprisingly high level of *Neighbourly* users in our sample, over 76% of respondents did not use online social networks to maintain connections with their immediate neighbours. Anecdotal feedback from an interview participant highlighted that *Neighbourly* is seen more as *'Suburbly'* – not about conversations over the fence, more about conversations across the suburb.

Where users find out about events in the community
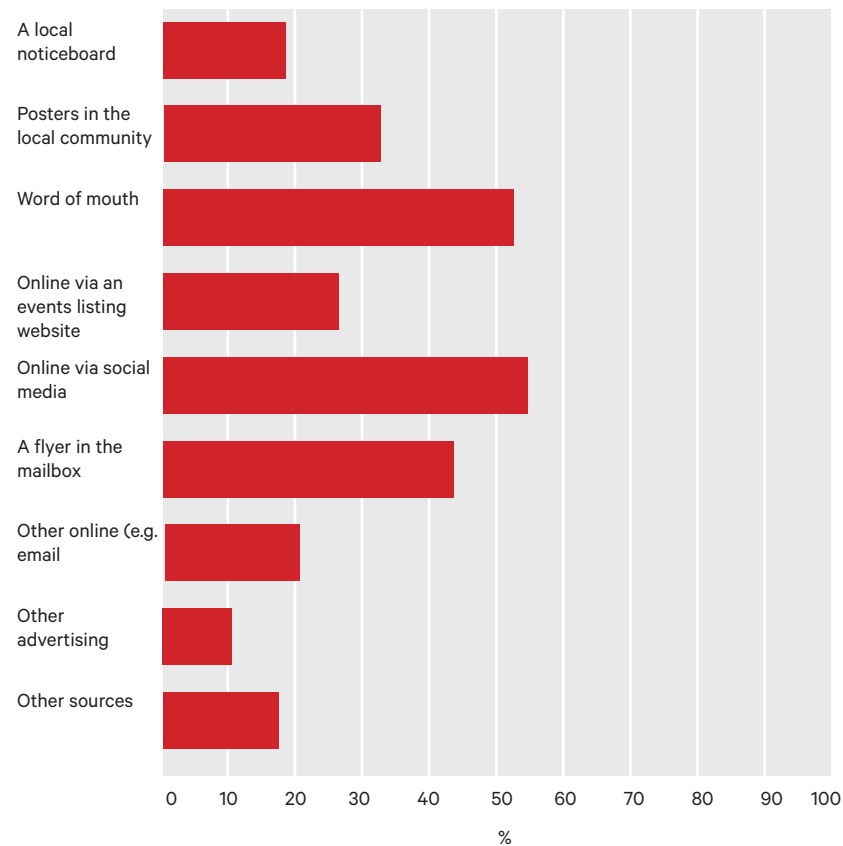
Respondent breakdown to the question 'of your nearby neighbours, how many of them do you know at least by name?'
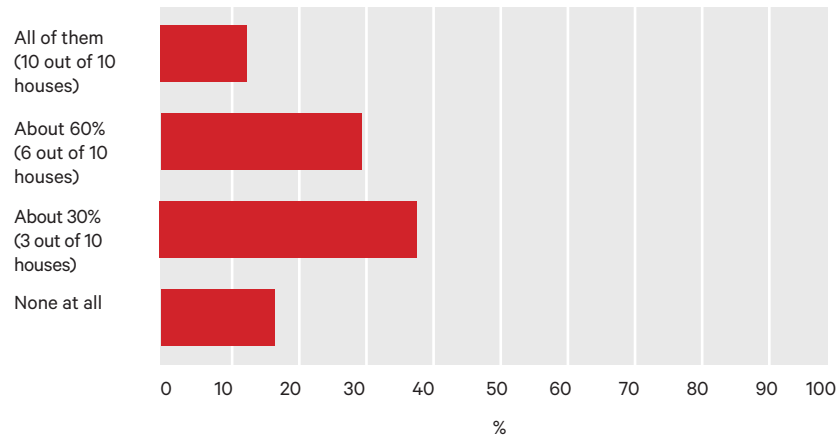
Respondent breakdown to the question 'Do you use online social networks to maintain your connections with your neighbours?'
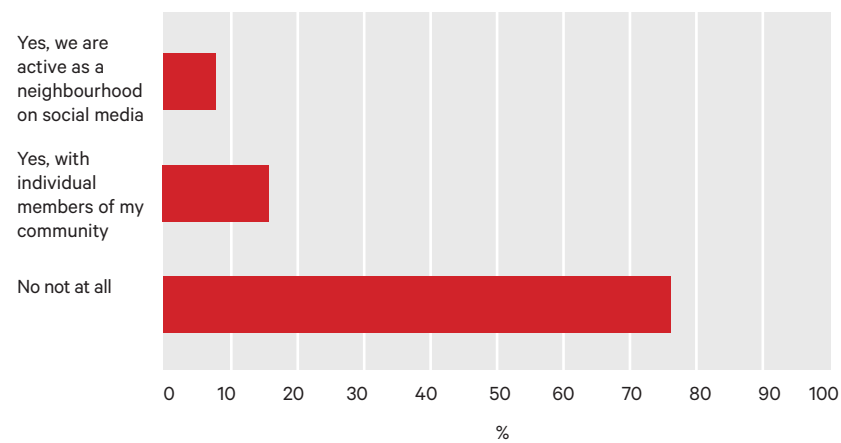
5.2.5 Other responses of interest

In terms of preparedness, despite a possible bias towards people interested in civil defence, less than 30% of people have a comprehensive plan for an emergency situation from this survey, though 88% store water, and 41% have a nominated 'out of region' contact person.

92% of owners use maps on their smartphone, overwhelmingly *Google Maps* (94% of map users), suggesting a familiarity with geospatial systems on mobile devices. This relationship with Google became pertinent during user testing.

In conclusion, the relationship between people and their relations to social media is complex. While some figures suggest that online communication encourages people to get out more, in some manner that is down to engagement with like minded individuals with common cultural interest. Of course, the popular press is replete with stories about how social media is a distraction in itself.

5.3 Visual communication

Currently 'Community Emergency Hub' (CEH) is the term used by WREMO pending sector agreement for a name to be applied to community led centres. The visual language of the WREMO CEH guides are consciously different to the blue/yellow Civil Defence palette inherited from the Ministry of Civil Defence and Emergency Management and employed across the sector. The rationale for moving away from the yellow and blue palette has been to clearly delineate this as a community, not a WREMO document. How this relationship between 'community' information and WREMO or other official information is managed in *Prepare Wellington* will need careful consideration.

The shared equities that make up the 'identity' of the sector (e.g. the colour palette; round circle with yellow triangle CD icon; chevron patterns and to a certain extent the name 'Civil Defence') do convey a sense of recognition and credibility in the minds of the audience. There is a tension to balance between a visual vocabulary that semiotically suggests knowledge, expertise and authority, and with the need to avoid a suggestion that civil defence is something that is provided to a community, not developed and managed within a community. The strength of WREMO's 'brand' is associated with high levels of goodwill and trust, and is therefore a powerful tool for engaging potential users, attesting by association to the platform's quality, reliability and purpose.

It may be possible to shift perception whilst retaining a useful visual shorthand that is already established (in fact, many survey respondents framed the term civil defence as involving community). There is a case to be made too that retaining a sector-wide identity allows the public to make quick credibility judgements about a source, especially online. A consistent sector identity (beyond the scope of this project) also allows for scaling of a tool with little aesthetic intervention. The Hub Guide retains the WREMO logo, and it is possible that this common thread is enough to leverage

The logo used by the Ministry of Civil Defence and Emergency Management, and across the sector

WREMO's Community Emergency Hub Guide (draft version)

WREMO's reputation.

5.3.1 What does civil defence mean to you?

Although this design research is not intended to inform the brand values of WREMO itself, understanding the contemporary public's perception of what "Civil Defence" means, helps to inform how the *Prepare Wellington* experience may be visually represented. This perception issue is related to the vital issue integral to reputation and trust as mentioned above. The following example responses were drawn from the survey mentioned in §6.2 (above).

A sample of survey responses to the question 'What does civil defence mean to you?'

"Taking care of people in a widespread emergency situation"

"Communities, with help from local and central government, being prepared to cope in the event of an emergency"

"People have to organise themselves in an emergency"

"Storing emergency water, alternate cooking, reserves of canned food, looking after ourselves"

"Ensuring my family are safe, and then local community safety"

"Planning for and reaction to natural disasters/severe events"

5.3.2 Accessibility considerations

Accessibility refers to the inclusive practice of removing barriers that prevent interaction with, or access to websites, by people with disabilities. This could include blind or visually impaired (including colour blind), hearing impaired, mobility impaired or cognitively impaired users. Though not technically an accessibility consideration, a range of languages in an increasingly multicultural Wellington and Wairarapa region should be

provided for.

Development should be undertaken in line with the New Zealand Government Web Accessibility Standard 1.0.

Before development commences, UI and UX specifications and guidelines that govern the application's behaviour and how people's data is respected should be developed.

Web accessibility issues: blindness, visual impairment, hearing impairment, mobility impairment or cognitive impairment

6.0 Prepare Wellington

6.1 Concept

From 'business as usual', to a hole opening up in the street in front of you, from a clear summer's day to a gradual onset of stormy weather, the stages outlined in §4.3 Crisis phase model are seldom easily separated from one another. In terms of bringing an attitudinal and potentially behavioural change within the mind of the public towards crisis preparedness and crisis mapping, the research and observations described to this point suggest that the term 'trans-situational' is appropriate.

Therefore as a trans-situational crisis map, *Prepare Wellington* needs to harness the interest of the local community by offering useful information, but in a way that bridges both 'business as usual' and an unknowable amount of time that may follow an event.

Might the provision of this experience also supply a populace, who suffer from what might be described as 'disaster fatigue', reasons to feel differently about their neighbourhood and the nature of their own preparedness?

And as we are accustomed to having access to everything else via the smartphones carried in our pockets near permanently, might there also be an opportunity to make that experience encourage crisis preparedness to become part of our everyday lives by including a friendly agent on that platform?

6.1.2 Prepare Wellington's values

Within this concept of trans-situational crisis mapping, *Prepare Wellington* should provide participatory experiences that may promote behaviours that reach across the five crisis phases, encouraging contributions and volunteerism within preparedness across:

— Time — the platform should be constantly available, but never expectant. Relevant over long and evolving situations; during pre- and post-crisis. Or perhaps never actually being used in an crisis

— Location — provide information appropriate to the situation

— Event — not just the original use of crisis mapping or the identification of the minor events that make up a larger crisis, but also the creation of localised events in 'peacetime'

— Personal — a place for people to document their emergency plans on their own terms, and ways to connect to other people.

Through this, an individual, household or self defined community has just the right amount of information and access to local resources, at the right time and at the right moment.

Wellington is a geologically-dynamic place. Frequent 'shakes' become prompts to get online (for instance, to check Geonet alerts and log 'felt it' reports). These geological nudges could become a great reminder and catalyst for people to manage their preparedness if they are integrated into the functionality of *Prepare Wellington*.

6.2 Human centred design

"Personal value is the kind of value we receive from being active instead of passive, creative instead of consumptive."

(Shirky, 2010)

6.2.1 What's being crowdsourced?

To understand how people might approach the usage of a 'permanently' accessible trans-situational crisis mapping tool, the proposal needs to identify what a member of the public might be able to share prior to an event unfolding. This should provide an experience in some way that takes into account the affordances enabled by a smartphone. For example: location, time and resultant relevance.

If the data being collected across a geographic location during a crisis will be similar to other 'crisis maps' that have been deployed before, how might Prepare Wellington look to encourage people to use the map during times where life remains 'business as usual'?

As a concept, the 'sharing economy' – making resources available via web-based services – has been around for at least 15 years. Alongside 'mutualisation' (of assets) the core value: "Access trumping ownership" ("The rise of the sharing economy," 2013), is usually presented through the lens of accessing latent utility in a neighbourhood that may be available for borrowing or hiring (streetbank.com, for instance). But the specific need of the object being borrowed is seldom part of the equation.

In most peer-to-peer sharing scenarios, the lender makes an item available knowing its intended use, and seeking for it to be used as much as possible (especially in a monetised relationship like AirBnB). If we turn this equation

Revealing a community's hidden tractors. *Prepare Wellington* in a nutshell. © Copyright Brian Robert Marshall and licensed for reuse under this Creative Commons Licence

on its head and tie the utility and availability of an item to the occurrence of a situation that affects everyone in a community, might there be a way to ask people to privately record their ownership of something so that its potential is revealed and unlocked at a later date, for the relief of that community? With *Prepare Wellington* a 'lender' would lists an item as a potential community asset with no predetermined timeframe of use, and no specific use scenario in place – an inversion of the normal 'sharing economy' model.
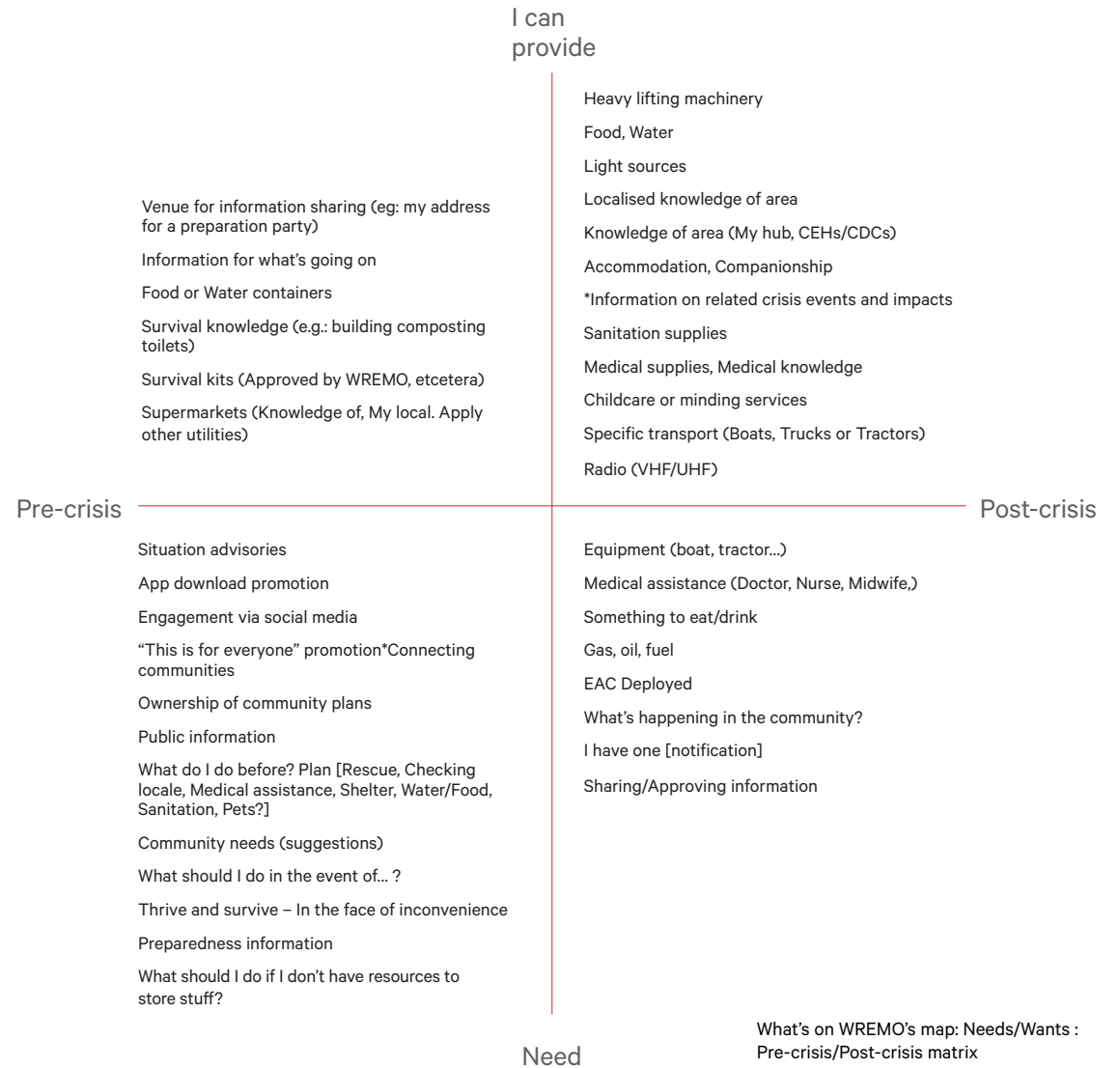
6.2 User journeys

Within the design of an experience framework, a user journey is a linear flow that identifies one specific task to be completed by a probable user. Usually these tasks are matched to user profiles analogous to actual people.

However, in this preliminary phase of establishing and designing these tasks for Prepare Wellington, user profiles will be established at later date. The following user journeys were designed to prioritise the communication of the concept so that it could be further discussed and user tested.

6.2.1 Structure of experience within the five crisis phases

As noted in §4.6 Crisis phase model, WREMO uses an established framework that identifies the different phases of the pre- and post-crisis environment. *Prepare Wellington* proposes that these loosely identifiable phases also act as the framework for the experience.

Even if an amorphous 'timeline' of event categories, the broad identification of phases allows different functions to be aligned against and applied within, the proposed experience. This way each purpose of each function can be proposed for any particular citizen at the relative phase of the event. This is especially important for separating the functions which might be available between one form situation awareness or engagement and another.

I can provide

Pre-crisis ——————————————————————————— Post-crisis

Venue for information sharing (eg: my address for a preparation party)

Information for what's going on

Food or Water containers

Survival knowledge (e.g.: building composting toilets)

Survival kits (Approved by WREMO, etcetera)

Supermarkets (Knowledge of, My local. Apply other utilities)

Heavy lifting machinery

Food, Water

Light sources

Localised knowledge of area

Knowledge of area (My hub, CEHs/CDCs)

Accommodation, Companionship

*Information on related crisis events and impacts

Sanitation supplies

Medical supplies, Medical knowledge

Childcare or minding services

Specific transport (Boats, Trucks or Tractors)

Radio (VHF/UHF)

Situation advisories

App download promotion

Engagement via social media

"This is for everyone" promotion*Connecting communities

Ownership of community plans

Public information

What do I do before? Plan [Rescue, Checking locale, Medical assistance, Shelter, Water/Food, Sanitation, Pets?]

Community needs (suggestions)

What should I do in the event of... ?

Thrive and survive – In the face of inconvenience

Preparedness information

What should I do if I don't have resources to store stuff?

Equipment (boat, tractor...)

Medical assistance (Doctor, Nurse, Midwife,)

Something to eat/drink

Gas, oil, fuel

EAC Deployed

What's happening in the community?

I have one [notification]

Sharing/Approving information

Need

What's on WREMO's map: Needs/Wants : Pre-crisis/Post-crisis matrix

Pre event (readiness)/ BAU	Crisis Event (response)	Initial response (save lives)	Response	Recovery
Invite	Checklists	Report event(s)	Report event(s)	Invite
Attend		Confirm event(s)	Confirm event(s)	Attend
Contribute			Request	resources
Prepare				Prepare
				Advice
Stay informed	Preserve	Confirmation	Follow up	Stay informed

Phases and functions

6.2.2 Onboarding

In lieu of a registration process, onboarding (information given at first use) helps a user initiate *Prepare Wellington*. In the first stages of design, development and deployment, it is not anticipated that the experience requires a user account. However, the conventional inline permission notifications may be required.

Welcome	About map	Near me	Set location	Enter planning information

6.2.3 Business as Usual

The following tasks are aligned with "Business As Usual", the first period in the five crisis phases.

The first user journey asks the user to add an asset to the 'community bank' of items that might be accessed in the case of a crisis.

Home Business as usual	Our map Neighbour-hood	Add community asset	Add describe asset	Add asset permissions	Add asset conclusion
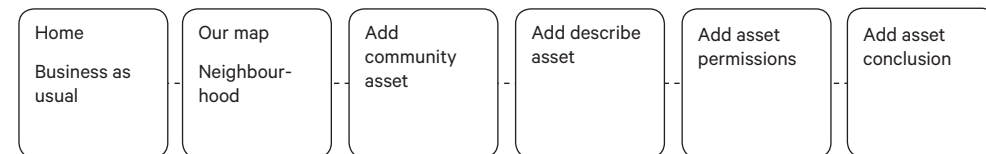
The second user journey asks the user to create an event and invite people for the purpose of making connections in the neighbourhood.

Home Business as usual	Our map Neighbour-hood	Add community event	Add event description	Add event invitation	Add event conclusion
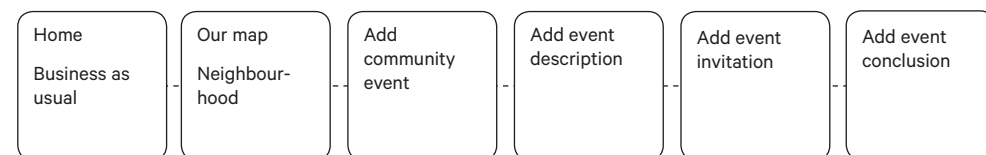
6.2.4 Post crisis

The following tasks are aligned with the 'Initial response' or 'Response'. These are the third and fourth periods in the five crisis phases.

The first post-crisis user journey asks the user to report and describe a situation that may be otherwise unreported.

| Home
Crisis event | Our map
Neighbour-hood | Report
Situation | Report
Describe situation | Report
Describe damage | Report
More information | Report
Conclusion |
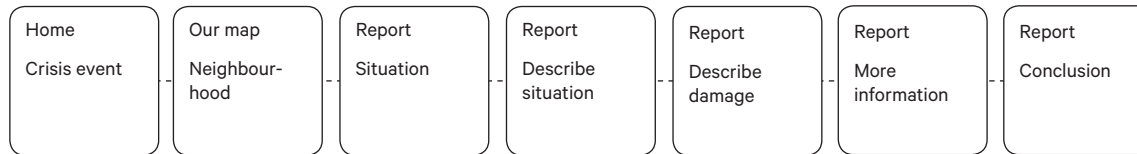
The second user journey asks the user to review and confirm a situation that is ongoing.

| Home
Crisis event | Our map
Neighbour-hood | Review
Browse events | Review
Confirm event | Review
Conclusion |

BAU   EVENT   INITIAL

SITUATION

CONTRIBUTE | community event | CONFIRM | OBSERVE & REPORT EVENT(S) | OBSERVATION & REPORTING

OME ㅇㅇㅇ   ᅇᅁᅁ
        MINE   ME   vs COMMUNITY
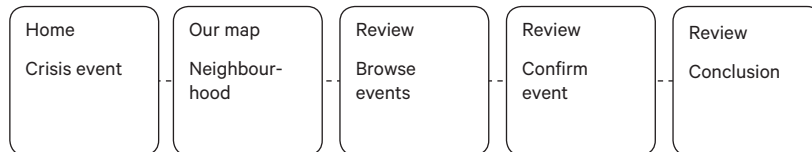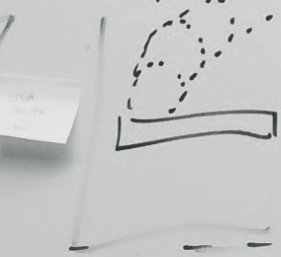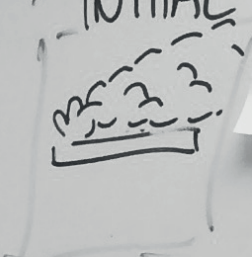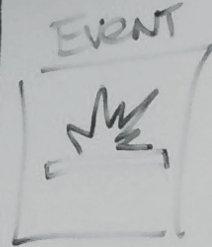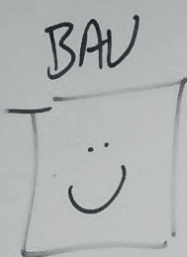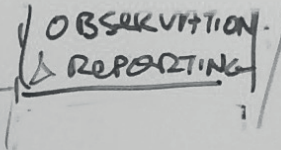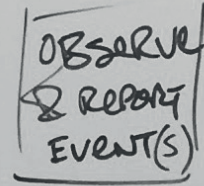
ATTEND / JOIN
CONFIRM

ACCEPT	1 ——		CONFIRM EVENT(S)
HOST	2 ——
	3 ——
	4 ——

ㅇㅇㅇ
ㅜㅜㅜ

| A —— |
| B —— |
| C —— |
| D —— |
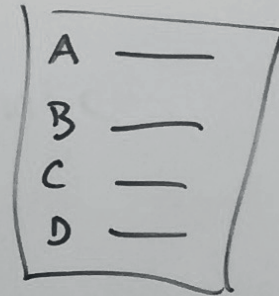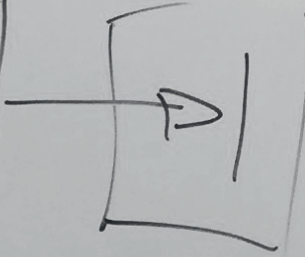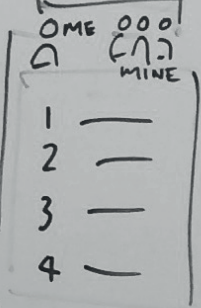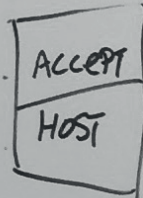
C 2

CHECKLIST
(DYNAMIC)
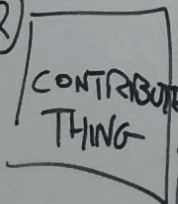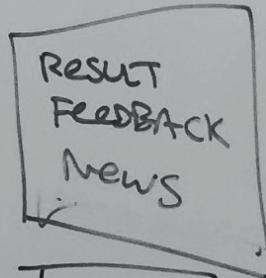
RESOURCE
RELATIONSHIPS

① FILL
CHECK
LIST

RESULT
FEEDBACK
NEWS   ·····>   RESULT
FEEDBACK
NEWS

C 3

② CONTRIBUTE
THING

REQUEST
THING

NOTIFICATION
TYPE ①   NOTIF...
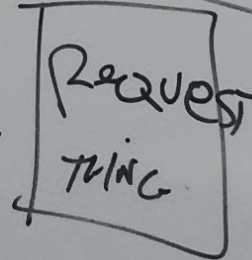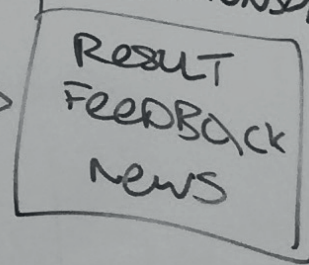
MINE
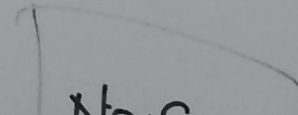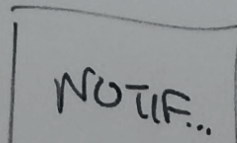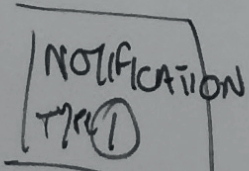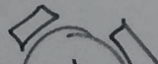
7.0 UI/UX design and testing

As a basis for testing, each step in the above user journeys are transformed into wireframes: each an illustration of an interface that enables the user to complete the task as may be required in each scenario.

7.1 Experience prototypes

Like blueprints for architects, 'wireframes' are sketches for interface designers. Their low level of aesthetic resolution (simple typography, no photographic imagery, no colour) is intended to do two things: ensure that the viewer focuses on function rather than 'how it looks', and how it enables the user to perform a set task (Brown, 2011).

This in mind, the following sequence of interfaces (derived from discussions with WREMO about what they considered were the most important functions of the first release of *Prepare Wellington*) all attempt to funnel a user towards the completion of a specific goal.

The following two screens feature the tasks that were given to each user when they loaded the prototype. Each of the blue links directed the user tester to the task that they needed to complete. At this point of the proposal, the design research was only interested in subjective and qualitative feedback.

Each of the following sequences represent a different position or new state that is possible to trigger by a user. Each task sequence follows the journey proposed and presented earlier in §6.2 User journeys.
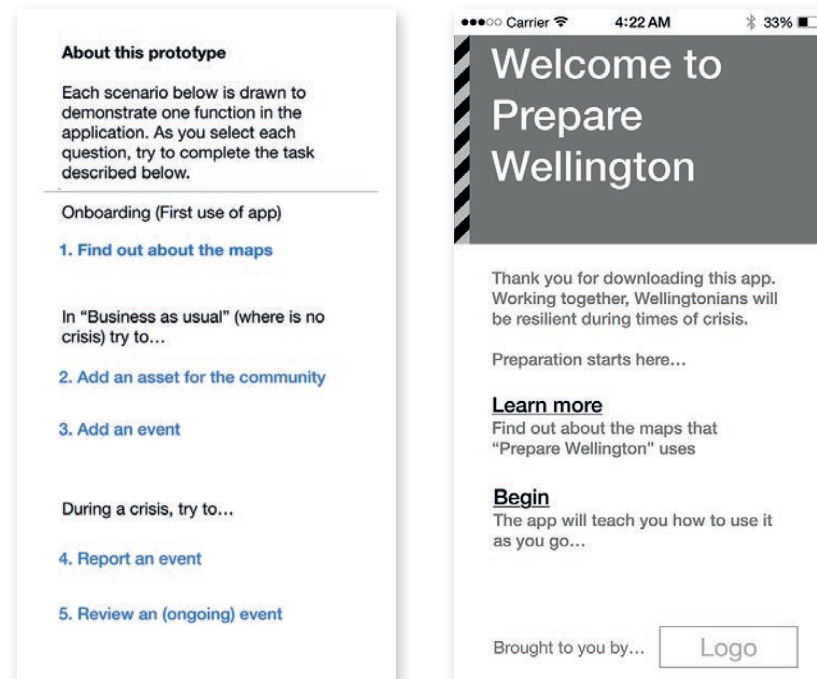
The starting position for all users, the experience prototype listed instructions for each task that the user could attempt (left). The wireframe that illustrated the loading or start page for a user who had opened the page for the first time (right).

Onboarding – First use of app

About maps

The loading or start screen that describes the experience for a user who has opened the page for the first time. User selects 'Begin'

...and is presented with an explanation of the 'Your' map page. User selects 'Next' or 'Ours'...'
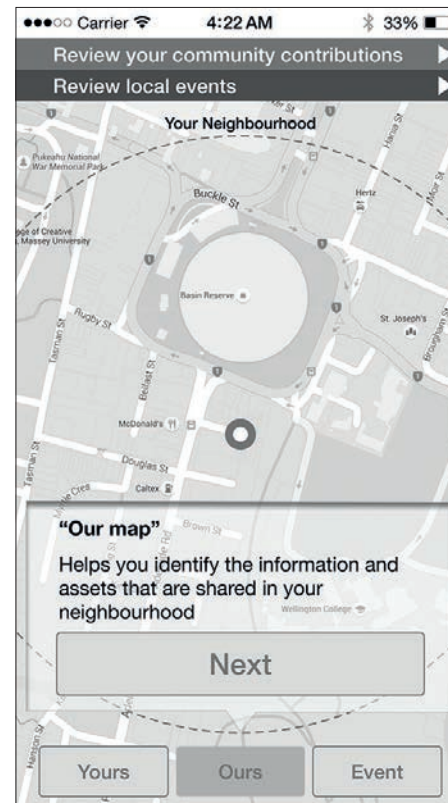
...and is presented with an explanation of the 'Our' map page. User selects 'Next' or 'Event'...
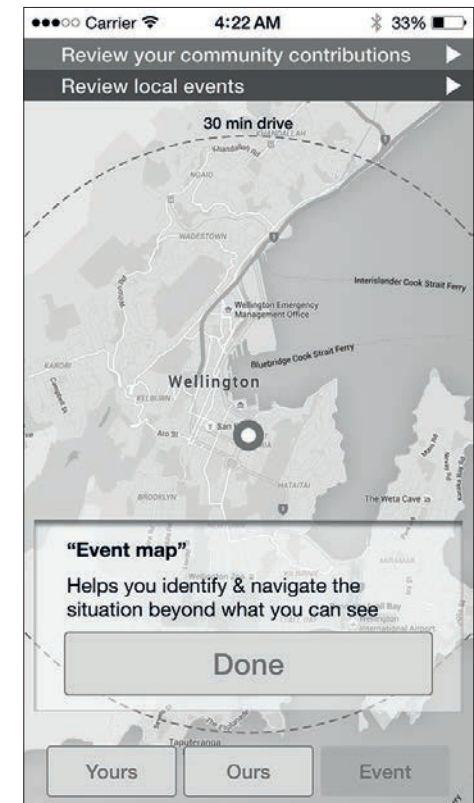
...and is presented with an explanation of the 'Event' map page. User selects 'Done' or another map view. In BAU the user is taken to the screen in the next section.

Business as usual – Pre crisis

Add community asset
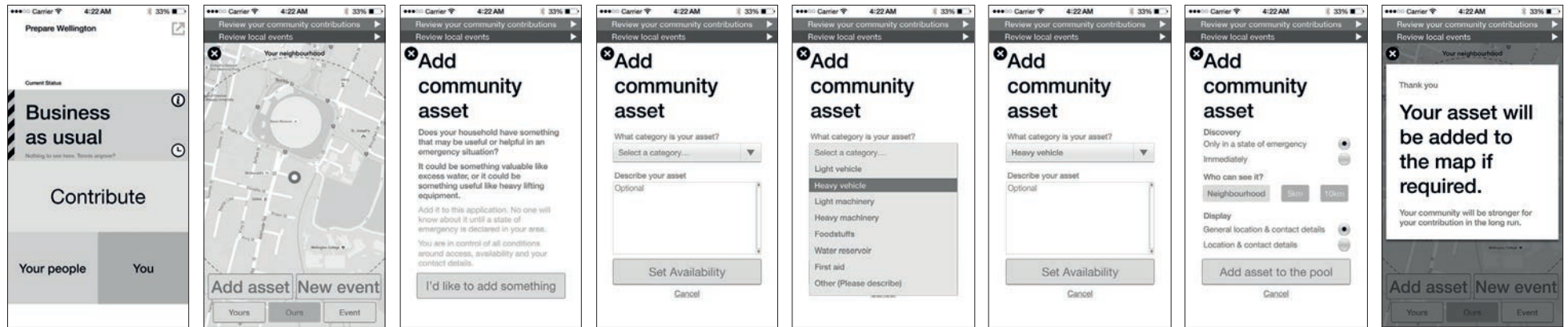
Initial screen when the user is experiencing BAU. Relative UI Focusses user toward preparation. User selects 'Contribute'...

...and is directed to 'Our map'. Two options are presented: User selects 'Add asset'

...'Add community asset' allows user to find out more about the purpose of a community asset. User selects 'I'd like to add something'

...'Describe and categorise the community asset'

...'Categorise the community asset'

..."Describe the community asset" User selects "Set availability"

...'Set availability and allowance permissions for community asset" User selects "Add asset to the pool'

...'Process conclusion and confirmation.' User can press the [x] to leave the task.

Add event
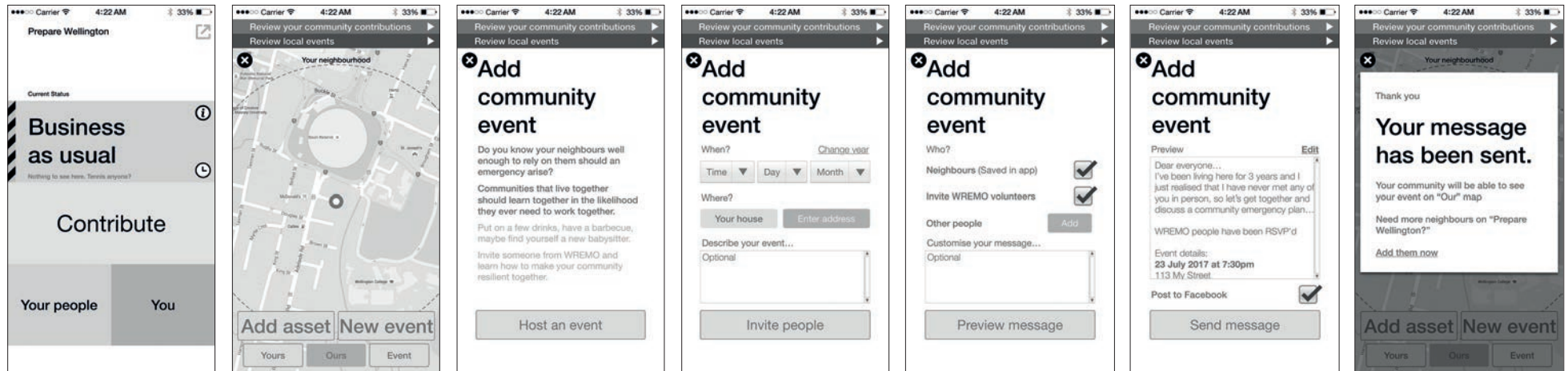
Initial screen when the user is experiencing BAU. Relative UI Focusses user toward preparation. User selects 'Host an event'

...and is ...directed to 'Our map'. Two options are presented: User selects 'New event'

...'Add community event' allows user to find out more about the purpose of a community event. User selects 'Host an event'

...describe the details around the time of the event including the location. User selects 'Invite people'

...Invite people includes details that allow the user to include people in their proximity and WREMO volunteers. User selects 'Preview message'

...Options made in the previous steps are assembled into one message preview

...Process conclusion and confirmation. User can press the [x] to leave the task.

Post-crisis – What's around you?

Report event
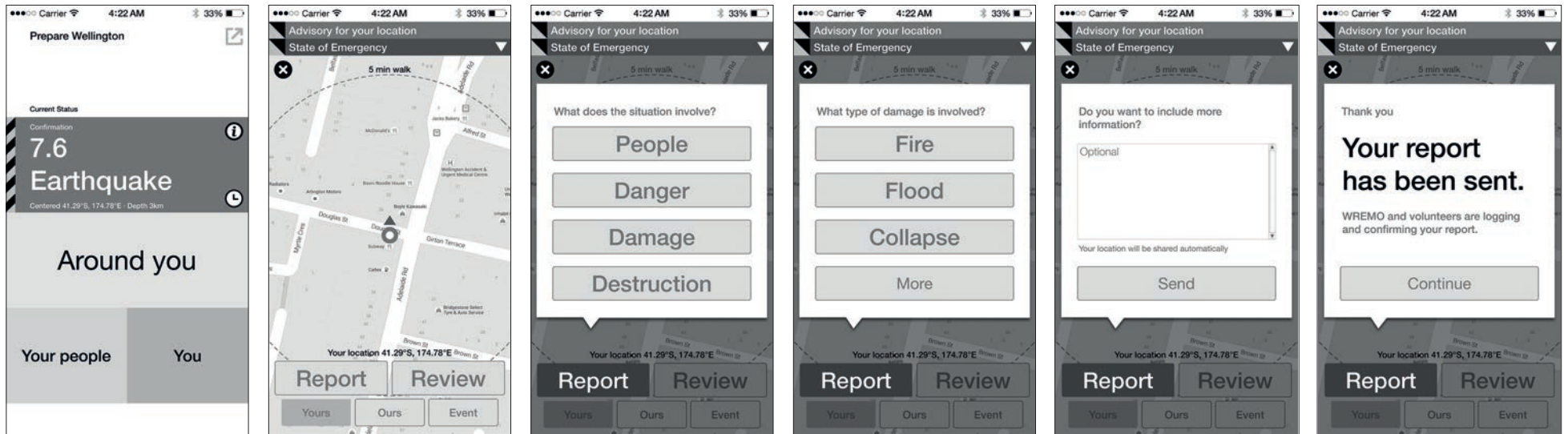
Initial screen when the user is experiencing a confirmed crisis relative to their location. Relative UI Focusses user toward response. User selects 'Around you'

...and is ...directed to 'Your map'. The information presented is slightly different from the BAU view. Two options are further presented: User selects 'Report'...

...and is presented with a form encouraging them to describe an ongoing situation. User selects 'Danger'...

...and are asked to describe the type of danger. User selects 'Fire'...

...and is presented with an option to enter further information. User selects 'Send'...

...and concludes the report with a confirmation screen. User can press the [x] to leave the task.

Review event
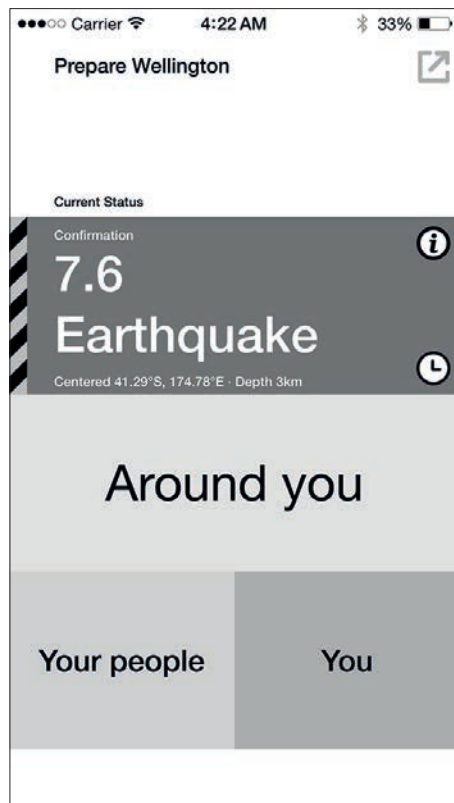
Initial screen when the user is experiencing a confirmed crisis relative to their location. Relative UI Focusses user toward response. User selects 'Around you'

... and is... directed to 'Your map'. The information presented is slightly different from the BAU view. If there are active situations around the user, they will be displayed on the map. Two options are further presented. User selects 'Review'...
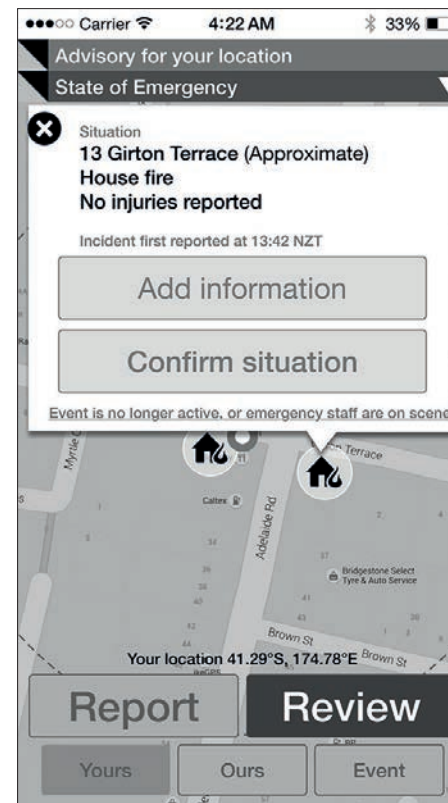
... and a modal overview of the information surrounding the situation and its location is displayed. Two options are made available. User selects 'Confirm' situation...
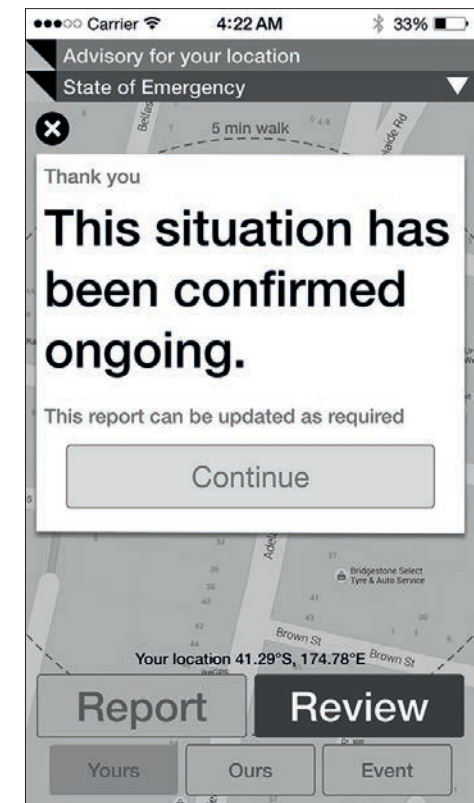
...and concludes the review with a confirmation screen. User can press 'Continue' or the [x] to leave the task.

7.2 User testing

On 26 May, this research project was given the opportunity to test an experience prototype at a WREMO volunteer evening. Of the approximately 20 volunteers in attendance, most had their own smartphone and were able to access this project's supplied prototype.

In a controlled test, the user is normally led through the experience. This allows the test host to enquire after the reason that prompted the user to make so that user considers and explains their decisions in response to how the prototype encourages them to behave.

On this occasion, the testing environment did not allow for a lead situation, so the users were given test scripts to follow independently within the experience prototype and to write down their responses. This process amounted to 18 (documented) responses to five user journeys each with a specific task.

7.2.1 Feedback from user testing process

Practically none of the testers had used a 'crisis management' tool, or similar application related to civil defence on a mobile phone.

Most users were comfortable with the idea of maps on their smartphone as most of them had used a mapping service on their phone before. Ultimately this is the first overarching lesson learnt: the ubiquity of maps on a smartphone device dictated how the users approached it.

The testers aired concerns regarding whether they would have control over the map (as opposed to a static image-only map), and whether the map would show their location "...like on Google Maps." A screenshot of a Google Map was used to simulate live data, but despite this, the appearance of the map gave users pause to consider how they thought the map might respond in terms of their prior experiences.

Navigating a crisis – user testing in action, 26 May 2016

The second key finding from the test regarded the use of language. Many people disagreed, or disliked the terminology of the prototype. In some ways, this could be brought down to the limitations of linear test in a static environment, but it also suggested that the 'civil defence jargon' language used by emergency management organisations sounded too much "like government speak" (User 18), or simply not friendly enough.

The user test was, by a matter of circumstance a blind test. Not only did the user tester have to enter the URL of the prototype themselves, they had to parse a test script that described each assigned task. The wide array of backgrounds ages and technical competence made for an unexpectedly varied and diverse test.

All users had the option of choosing their own task(s). They were:

1: Scenario: Business-As-Usual (No Emergency), Setting Up

— Locate the 'learn about the maps' function. Do you think this would be useful?

— Where would you look for information about the app from the home screen?

— What kind of information would you expect to find here

2: Scenario: Business-As-Usual (No Emergency), Day-To-Day Use

— Locate the event map – what do you think this map would be for?

— Add a 'potential community asset'. What is one of these? How would you add it?

— Add a privacy setting for your 'potential community asset

3: Scenario: Business-As-Usual (No Emergency),Day-To-Day Use

— Locate the map – what do you think this map would be for?

— How would you add an event?

4: Scenario: Post-Event (Emergency) Tasks:

— Add a report of some damage (a fire)

— Locate a report on the map and confirm or add to it

In addition to the diagram above, please see Appendix 3 for the questionnaire that guided the volunteer users through the different journeys.

The following verbatims are included to highlight some of the more notable feedback encountered:

Observation type	Observation	User	Commentary
Assumption	"Will it show different maps for 'BAU' (Business As Usual) vs 'Crisis'?"	User 17	Noted early-on in the experience, this suggests that the user could anticipate where the concept was taking them
Assumption/ Expectation	"Overall - Great idea. [I] Assume it would update automatically during an emergency. Would be great to plot the 'Emergency Hubs' on the map"	User 9	The user anticipates the value of the map and starts to suggest alternative, but related, uses of the map
Discovery	"Easily got to the 'Add asset' page – Nicely constructed and phrased. I couldn't actually add anything though!"	User 15	The user made their way through a BAU scenario. As the experience prototype was sometimes unresponsive, occasionally people could not complete the journey on the first attempt
Discovery	"Opening page should be more intuitive. Maybe [the] map should already be in the first page."	User 16	Valuable feedback that helps to ensure that the products intent is clear in the experience as early as possible
Expectation	"I couldn't see the CD symbol on it"	User 1	This may refer to the branding on the app in general, or information that displays on the map, possibly representing a CEH or other WREMO asset, itself.
Expectation/ Assumption	'Host an event' implies you have to run the event. What if you just want to know of an event happening in the area but not hosting?"	User 3	Although an anticipated function that would eventually be surfaced from the design proposal, the user anticipates the functionality from multiple viewpoints over time
Functionality	[Listing a] Community asset: "Who can see this?"	User 18	A valuable insight into how people understand the ramifications of their contributions online
Functionality	"Can you also add to Neighbourly? As well as Facebook? Don't know if their API is open or not"	User 18	Sophisticated comment that realises that online platforms outside of the experience should be used to distribute contributions
Language	"Action first; 'Add' is good, [but] not 'Contribute'"	User 14	This comment was based on the complexity of the user interface and the language that it uses to invite people into each function within the experience. Comments regarding the "tone" of the language used in the user experience was quite common.
Language	What's an "Asset"? — "Useful 'thing' / useful resource, add an item"	User 14	A comment on the choice of language. Most user testers were happy to speak aloud as they attempted to understand what the experience was asking them to do.

Language	"[I] Liked the 'Tennis anyone'"	User 2	In the "Business as usual" scenario there is a flippant comment added under the current status inquiring whether the user would like to play tennis to offset the serious aspect of the experience. User 2 liked the humour involved. Other people were wary or disliked it outright.
Language	"'What category is your asset?': plainer English better if possible, this sounds like government speak"	User 18	(In place of 'Asset', the word 'Resource' is suggested by User 9)

In conclusion, there is one more scenario that was unexpectedly brought to light. An elderly gentlemen (possibly in his 70s) was quite familiar with a smartphone but was not necessarily comfortable with the idea of the web (accessed in a browser), or maps in general (he stated he didn't need them as he was a long time resident). When asked how he used his phone, he said that he only used it for email and short form messaging.

This observation was informative for understanding how the elderly might benefit from, or otherwise ignore, a tool like this. This one lesson also suggests that in the next few years, organisations like WREMO will have to maintain targeted messaging for certain sectors of the society.

J CLICK ON?	DID IT DO WHAT YOU EXPECTED?	COMMENTS
		On the home screen it would be g⸱ the graphic shows a map in
	USER ⑨	Onboarding - a technical ter⸱ maybe - getting started.
		Business as Usual — again not is plain enough terminology. If about adding assets & events ma⸱ abo—t being prepared.
all- great idea	it would update dynamically during an emergency.	Crisis — ~~tigh~~ , suggest usi⸱ language as used by WREM⸱ Emergency Event.
		Asset — maybe call this

8.0 Minimum Viable Product

In contemporary product management parlance, a MVP (or Minimum Viable Product), should result in a product that can be used in the field, performing some level of identifiable and agreed minimal functionality that progresses toward an ever 'richer' experience.

From the outset, priorities that stakeholders consider the most valuable to make available in the nearest term, should be transformed into 'user stories' that are written from the user's point of view. These practices are derived from the 'Agile' project management methodology.

The user stories seen in Appendix 3: MVP User stories, are descriptions of the required functionality derived from the user experience prototypes illustrated earlier in this proposal (see §7.1 Experience prototypes and Appendix 1: Expanding Experience). Ultimately these functions and other ideas within this document may provide a basis for the addition of further functionality. Which in turn may also respond to ongoing user and stakeholder feedback.

This cycle establishes a tighter relationship between designers, developers, users and stakeholders in the production environment. Ideally the product moves from a 'beta' version MVP and towards the anticipated 'complete' product.

When the *Prepare Wellington* MVP is in an operational environment (and hence utilising a responsive map) it will make relationship between situation and context easier for users to understand, as well as their needs and feedback as proposed in the design of this experience.

The resilience of the experience for any publicly accessible MVP is paramount. Typically, this is where much of the short term investment should fall. To achieve this resilience (considering the extreme use contexts required), any server side architecture should be scaleable. Ideally the *Prepare Wellington* MVP should provide some value if a crisis occurs while it is constantly being improved, moving towards some of the opportunities described in this proposal.

As this design research proposal has established experience benchmarks for the form of *Prepare Wellington*, it can now be built and tested to see if the product performs as the designers anticipated. Under the guidance of WREMO and using the MVP User stories created as one of the results of this research proposal, the first version MVP is currently being built by the design and development agency 3Months (www.3months.com) in Wellington.

9.0 Recommendations

A crisis affects everyone, but the immediate concern for anyone within a crisis is themselves, their family and the ability to pick up the pieces as soon as possible.

By setting the stage for resiliency in the individual and community at large, the *Prepare Wellington* concept aims to be part of a solution that might encourage or enable this to occur.

Should WREMO and its associates choose to take forward the concepts presented in this proposal, here are some broad recommendations as this project transitions from research to the creation and further establishment of close relations between designers, developers, stakeholders, users, the public and the evolving state of experiences created by the product itself.

The recommendations in §9.0.0 are written with reference to the design of the experience, not to the technical build requirements. They would benefit from further discussion with stakeholders and development teams.

— Even the most well-resourced and vetted software is not infallible. However unlikely, the introduction of a web based experience that people turn to for advice in an unpredictable event that may occur at any time may create unforeseen issues.

— While ensuring that people's data is protected to the highest level, the product should be owned by the stakeholder and public. The role of the public may take on many guises, such as: assisting in the creation as developers, providing feedback on the data and experience, or contributing the data that other members of the community utilise.

— A mobile first strategy ensures that the experience is placed into as many hands as possible, as early as possible. It also helps to provide a focus for the experience thereby limiting 'feature creep'.

— An individual's mobile phone is their identity expanded. Through the device's capabilities, a phone can help describe more about the user than they might be able to describe themselves (through data collected by the device). The initial experience should take this into account as, treated respectfully, contributed data in the short term will encourage people to trust it when they need it.

— Whether in the 'business as usual' or 'crisis' phase, the experience of *Prepare Wellington* has to record and reflect back to the user their **situation and not their location**. People know where they live in terms of their city; what they will want (or need) to know is the availability of resources immediately around them and specific hazards, if any.

— The relationship that a person may have with *Prepare Wellington* and information within should be relevant and timely. Stale information, or a lack of response from someone in the community, will only prove to frustrate to the user and underline why they may not use or trust the experience.

— While some of the experiences and ideas in this project have been tested in the field (albeit in non-dynamic, linear user journeys) the entire proposition requires more prototyping and testing with the public to ensure that it is understood, and that the user experience, and the concept more generally, is correctly vetted.

— Beyond the experience, which will always transition as needs and trends change, the data underpinning the whole enterprise should be structured and constantly maintained to be accessible at least a decade at a time.

— The likelihood of it ever being used in a crisis is low: the chance of an earthquake of ~7.5 is 10% in next century and 5% within the next 50 years (Rhoades et al., 2011).

— The long-term nature of this project will necessitate ongoing investment in software and volunteer relationships – it needs to be ready to be used at any time. The trans-situational aspect of the concept well help ensure that the site is always up and operational.

9.1 Operating in public

"How we treat one another matters, and not just in a 'it's nice to be nice' kind of way: our behavior contributes to an environment that encourages some opportunities and hinders others."

Clay Shirky, Cognitive Surplus: Creativity and Generosity in a Connected Age (Shirky, 2010)

Beyond examining the literal functions that help to guide and suggest its eventual rhetorical presence and the raison d'etre for the *Prepare Wellington* experience, one thing stands out: the product must be public in all senses of the word.

To achieve even the barest minimum of experience allowing for a trans-situational scenario in software, like all social experiences from cities to social media, the people who use it, make the values it becomes imbued with.

As a semi-autonomous organisation, WREMO appears somewhat private, or invisible until they are needed. This presents a fine line that must be walked: the quiet security that WREMO gives society will need to be balanced with the promotion and dialogue that comes with owning software that may come to becomes part of people's day to day activity if not also representing their feeling of security.

This balance may require some form of cultural change so that the idea of partnerships, expressed in the National Civil Defence Emergency Strategy (2008), are also explicitly visible on any participatory and democratised product relative to the citizens that it will come to enable and ultimately serve.

— Alongside active language, the name *Prepare Wellington* helps to communicate the communal value of the service in addition to promoting engagement: helping focus the use, and encourage respectful behaviour.

— As discussed in §5.3, alongside identifiable trusted branding, people also need to see that a produced experience is reliable, maintained and safe to use. Additionally: no software is foolproof, nor is it impervious to misuse.

— Like any other considerations in the design of social media platforms and even before the intended purpose of the site is stably identified, brand and reputation, user tracking, privacy, moderation and security are all things that may affect people's impression of the site.

— Having an open website that requires as little registration and identification of its users is, incongruously, one of the values that will enable this experience to succeed in the short term, immediate trials, despite the risk of 'vandalism'. However, eventually the utilisation of a light sign-in will help to provide an impression that the site is trustworthy and that contributors do not risk unwanted attention.

— People may not contribute if they feel that they need to expose too much private information in public (especially concerning who they are and where they live). As a result, people will need to control and protect their privacy. The potential for abuse of that information by third parties is a real issue requiring analysis to mitigate.

—   People need to contact a site's owner about questions/concerns. and provide feedback on operation. The owner needs to be visible and accessible.

—   The moderation and quality of the information entered into the software requires constant policing. This underscores the relevance and trust that people have in the service should a crisis eventuate and the experience tips from pre- to post-crisis.

—   Software that governs the security of data voluntarily contributed within this experience should be open-source to ensure the widest possible validation of its security is sought and found.

9.2 Build and maintenance

This broad list of thoughts suggest the direction of discussion required as the design proposal moves closer to operational software.

— Identifying where the data 'lives' and what is done with it is as important as the data itself.

— Resilience of the information and the experience will need to take into account client side download and storage of data that allows the experience to operate whether there is a data signal from a cell tower or not. This download should occur regularly to lessen service to the user regardless of what even is underway. This download and caching should occur with the user's knowledge and permission.

— Unless any secured budget is significant, the first version of this experience should be produced as a responsive web application in order to reach as many people as possible.

— A brief, separate proposal will need to be created that looks at the fragmentation of the market should iOS and Android applications be deemed necessary at some point in the future.

— Design note: the experiences illustrated in this document are shown on iPhones. However this is not a recommendation for the creation of an iOS native application.

— PDFs should not be used in a public experience online outside of long form reading as they are not semantically structured documents; they elicit some of the same experience limitations of printed media and enforce a static one way relationship. As long as they are formatted appropriately they may be used to fill some experience gaps within the MVP. But on a mobile phone they use excessive processor capacity and are hard for most users to manage.

— The processor intensive use and battery consumption issues highlighted in the application of a PDF within an experience apply also to data responsive mapping technologies.

— With the potentially patchy availability of a cellular signal in a crisis area, alongside clientside caching, *Prepare Wellington*'s UI will need to degrade.

9.3 Build locally

Leaving 'Buy NZ' discussions aside for the moment, why do we recommend building something essentially from scratch? Why not use Ushahidi, Google's crisis map, or New Zealand's own Thundermaps?

— *Prepare Wellington* should be personally relevant, socially and culturally specific information. The data that it collects and protects should be guaranteed within New Zealand law and potentially the primary data stored within NZs boundaries.

— The product should be open to local software development volunteers to help provide a sense of wider public ownership.

— Ushahidi is constantly changing its public/private relationships with the open source community and their business model locks account usage to a flat fee: only a few people can contribute to it. Despite that and in a 'normal' use context that the platform was designed for, it would be permissible to sign the contract, but the trans-situational use-case that WREMO has stated is not compatible with the Ushahidi deployments are usually made.

— As a 'startup' with European Commission funding, it is not hard to conceive that Thundermaps may find itself in a similar situation. That this mapping service is also built on proprietary code also means that the local V&TC community cannot support WREMOs goals and the

locked platform cannot respond to how WREMO sees the growth of their own product serving the local community.

— In the creation of the experience, a partnership between the public, private entities and the stakeholder should be created to ensure community ownership and a condition of transparency that helps encourage widespread adoption. Again, this should include dialogue with V&TCs.

— Wellington's own Koordinates open GIS database should be explored as we consider the development of, and data sources for this product.
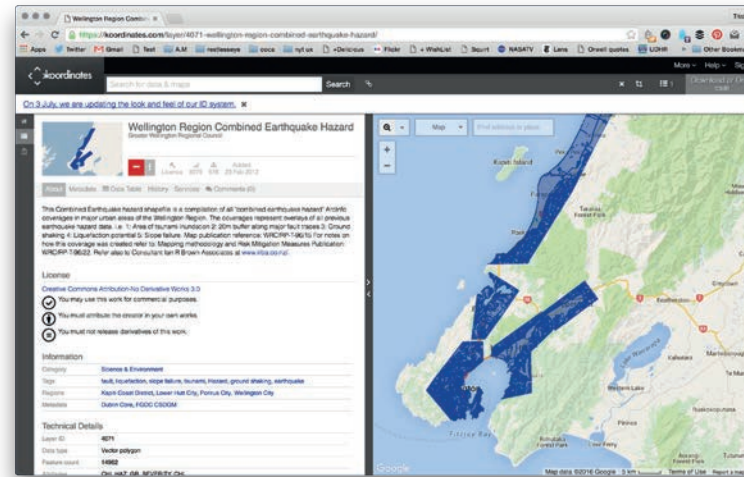
Wellington region Combined Earthquake Hazard Map on Koordinates (www.koordinates.com)

10.0 Conclusion

That online communications, the democratisation of publishing, has changed every human relation in the past 20-30 years is without doubt. How much more it continues to change our relationship with our civil institutions remains to be seen. It is up for us to decide the forms, disruption and integration of that ongoing change.

Prepare Wellington and trans-situational crisis mapping may yet become an unexpected and powerful contribution to that changing relationship between civic institutions and the public, bringing us into an unexpected partnership with our neighbours and the shaky isles we walk upon.

If there is a specific contribution to the ongoing experiment between code and civic society, *Prepare Wellington* would be a distinctly New Zealand contribution.

Thank you for the opportunity to explore this concept with you.

Tristam Sparks & Jo Bailey
Design researchers

School of Design
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Wellington

Appendix 1.0: Expanding experience

A1.1 User interface concepts

Following on from the experience prototype tests, where some lessons could be brought to bear, the following studies were created to see how some of the core concepts considered for inclusion would work within an operational environment of an iPhone 6.

It is not anticipated that a native application is necessary at this time, but the examples below in the most case could easily be web applications accessed through a browser.

Both examples use a similar user interface colour palette as an nascent direction, but each display information and situate the user in a completely different manner. In some respect the first user interface proposal may prove to be more successful for a wider variety of users. In the other example, the UI proposal may allow for a more modular rollout of functions as they are included with *Prepare Wellington*'s suite of abilities.

Note that these two proposals also start to communicate how similar experiences could complement one another in a 'degraded' user experience.

A UI that degrades gracefully is one that can respond, not only to the type of screen it appears on, but also the quality of data that has been revealed. In this case the map doesn't display due to it not having been cached, downloaded prior or due to a current lack of signal.

A1.1.1 Trunk and branch navigation

An examination that brings to light some of the opportunities around the integration of the "Preparedness kit" into a flow that allows the user to complete it incrementally at their leisure or perhaps in relation to known locations.
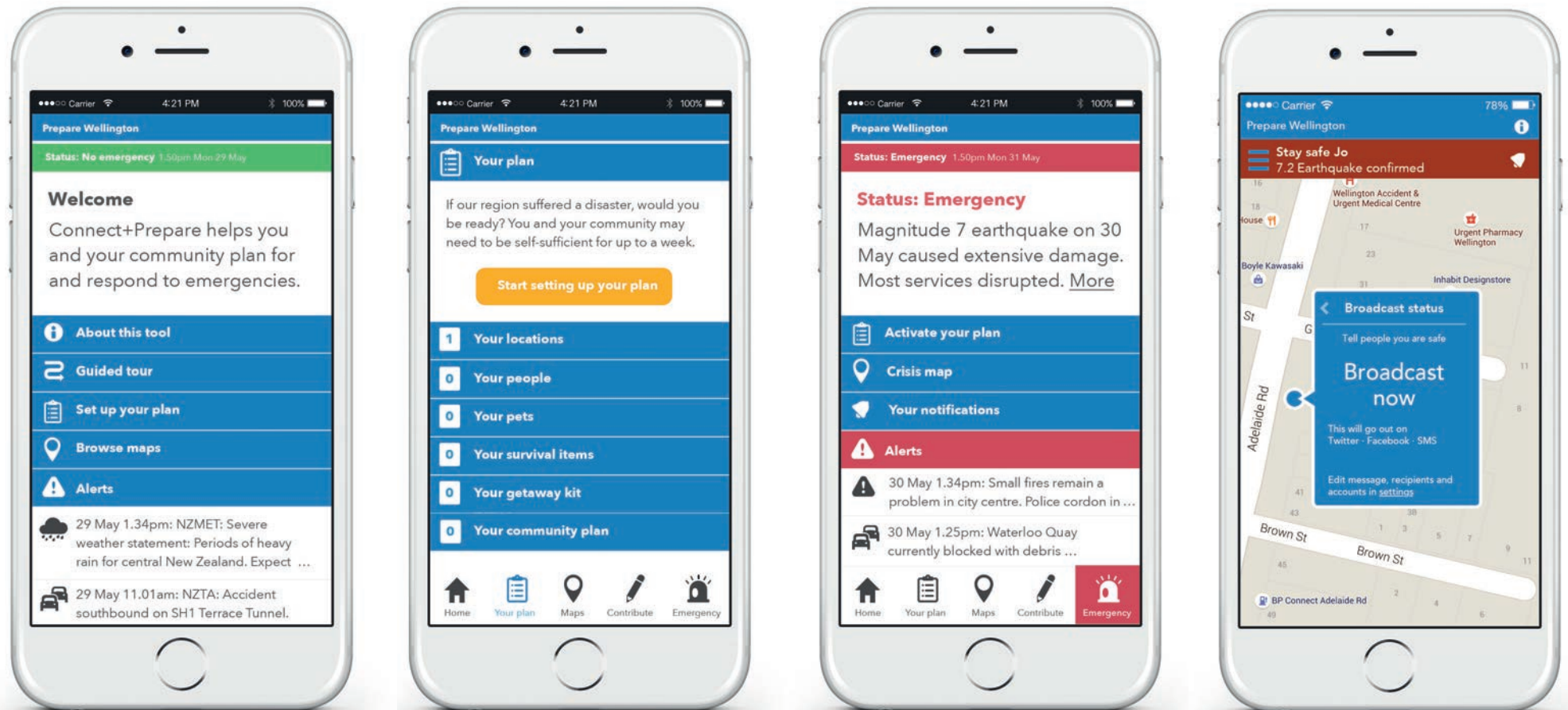
A1.1.2 Contextual navigation

With the experience design concept proposed at the wireframe level and tested (§7.2), this work in the visual design level includes some of the discoveries and observations.

"Business as usual" — Onboarding
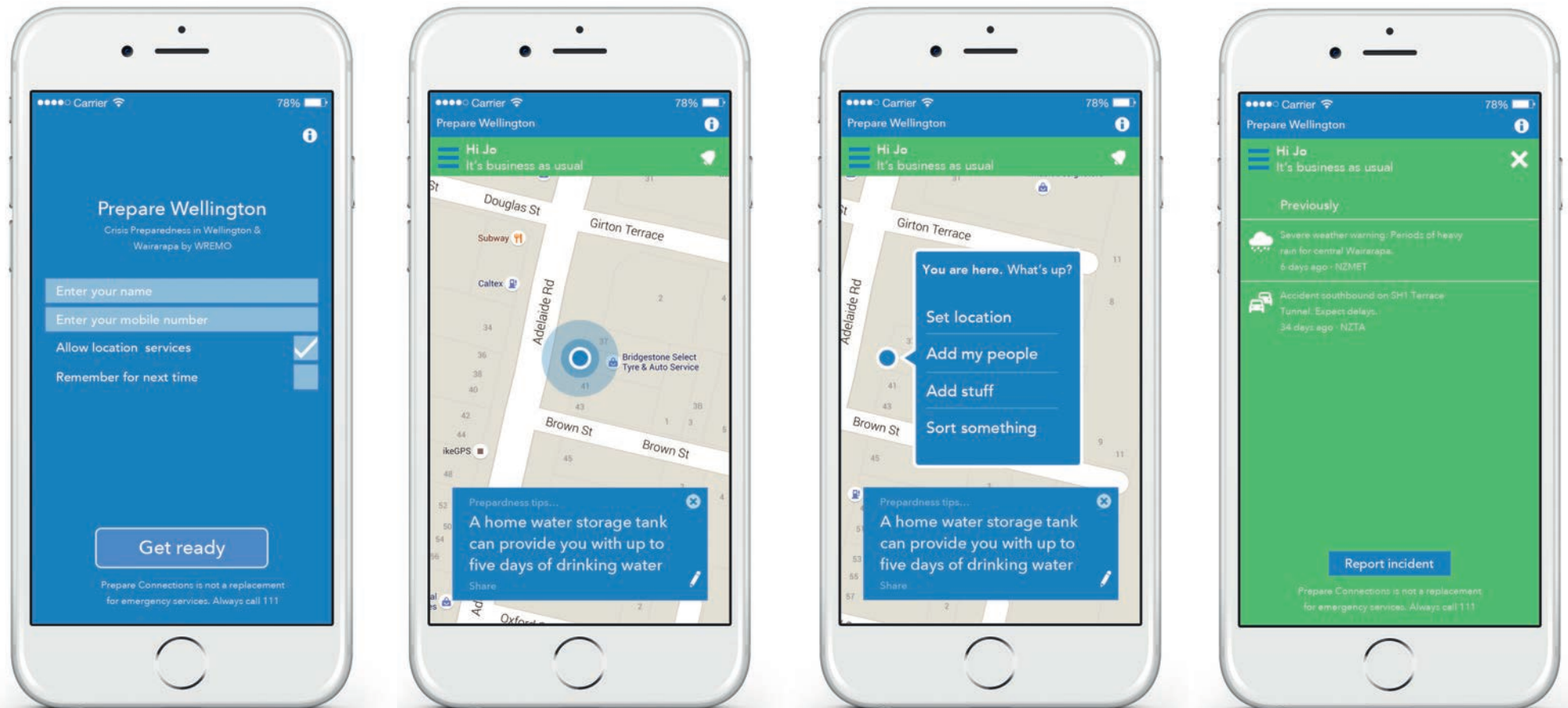
Post-crisis confirmation — "Status broadcast"
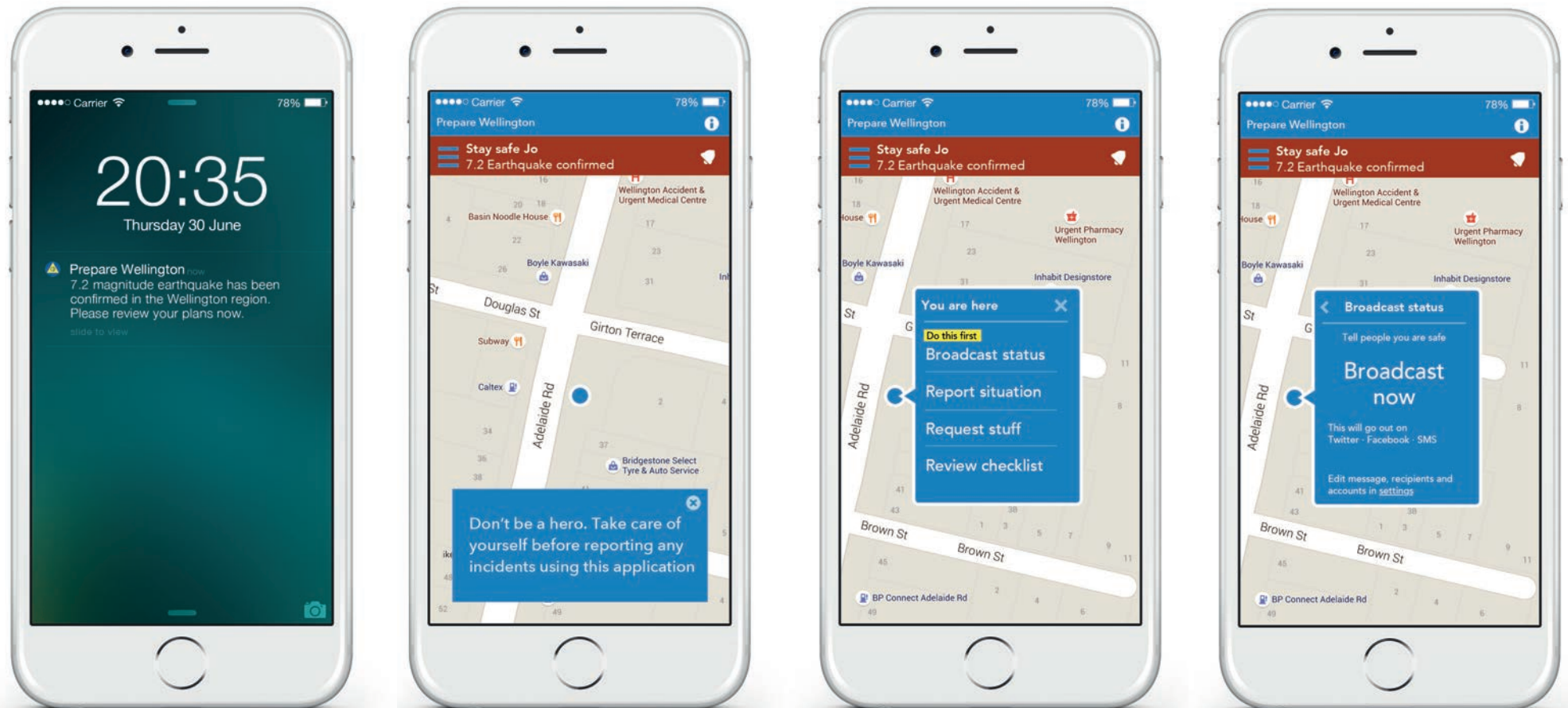
Appendix 2: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.1

Appendix 2 cont'd: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.2

							Family: 3 kids, 5 total		
							Breaker Bay: house is between cliff and water		
		Meeting with WCC representatives	Breaker Bay Residents association		Own Events	Community Hall	[Neighbourhood collaboration?] "Not with the direct neighbours, no…"	"No plan for an emergency"	Paper, TV, Leaflets
	"I didn't attend [it though]"	WCC seawalls preparation					Geography defines the community		"We have a shack up the hill…"
		Crime awareness					[Neighbours] "Don't tell us when they leave"		60 liters of water	plus 2l pp/pd for 2we
Preparedness is easy [to consider]: "…when you're a wellingtonian, live by the sea and have kids."										
Christchurch made us aware… made it more real.		Tsunami awareness					[Direct Neighbours] "Not tried to talk to them. Maybe we should…"		Food (probably expired)	Not on hill
Prior to Christchurch, I never thought about aftershocks										
Interesting to note the psychological impact of the earthquake on the citizens of Christchurch		"Community tried to organise it's own siren. But it fell through…"					The neighbours are "welcome to use the escape"		We should probably [Experience prototype] an evacuation	
Considering buying a second property, a bolt hole after Christchurch							We have cut our own evacuation route. ~30m		[Shack] we have gloves [clearing the thorny track], sleeping bags	
We'll never buy coastal property again [though]		Food preparation					Need to keep the path clear		"[We should] underline where the meeting place(s) are"	
							[Otherwise] "We have a designated meeting point… the Ataturk memorial"		[Shack] We have a radio, torches, batteries, etc	

							EQ at work	
							Drop, hold, cover	
							I keep walking shoes in my car	Blanket	[Used to] keep a bicy
							[As dad] I'm designated to get the kids		
							pickup people redundancy (Mutual pick ups if one not available)		
						Not updated the plan since our kids were kids	[No plan for a distributed scenario – where family is in different parts of the city or on irregular activities]	[individual assumes] "…because the phone network will go down"	
							[getting or leaving home] Miramar peninsula istmus is at sea level		
							walking home is easy		

Appendix 2 cont'd: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.3

"I first noticed [Wellington] was in a seismic area when i saw a refurbishment plaque at the museum building…"

"I have never experienced an earthquake…"

"I would look for guidance"… [I would probably need it]

"I would try to call my family…"

"I would probably hop on my motorbike and head home…"

No plans – "Completetly unprepared…"

No neighbourhood conversation

"Small talk mostly" – No way to associate people to properties

Street Christmas party

I get my information from what other people tell me (WoM)

"I have not seen any formal information"

"We're renting"

We have "A couple of smoke detectors"

With the car purchase, we were given "An emergency kit"

I'd like to know more about un/safe housing…

We should probably get a food bin. or organise a backpack [of supplies]

"My wife mentioned that we should organise petty cash"

"I need to check the web for more information"

Appendix 2 cont'd: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.4

Appendix 2 cont'd: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.5

Appendix 2 cont'd: Initial interviews

Scenario: daylight 7.6 earthquake
User 1.6

			Awareness of being in Crisis zone			
		Check Twitter		Check Geonet	Check "Online"	Awareness of the local environment
	We moved house because of Tsunami	Aware of Tsunami escape routes	Head for the hills			
		Aware of Tsunami blue lines (inundation zones)				
Have a wind-up radio (pre tuned to RNZ)	Stored with the camping equipment	Have a "much plundered emergency kit" food				
		If there's no information…				
	Find out where [my] important people are	Meet [my partner] at a pre-selected meeting place				
		"I'd go see my WREMO mate"				
		"If all else failed, I'd go to the local school"				

storm awareness
twitter
radio
metoffice   NZTA

Appendix 3: User journey testing questionnaire

User Journey testing:
Prepare Wellington digital prototype

26 MAY 2016

test URL: http://bit.ly/1NOJhMz

Thanks for your time this evening. We'd like to gather your feedback on a concept for a tool to help the public prepare for emergency situations, and to share information in the event of an emergency.

We are showing you a low-fi clickable prototype. We would like you to approach the tool with the aim of completing the tasks in one of the following hypothetical user scenarios. The aim is to test some assumptions we have about how people will interact with the information and the interface.

Please write down your step, and things you didn't understand, and any comments. All feedback welcome. Note: only some interactions work at this stage. If your clicks don't work, note them and try something else!

The scenarios are as follows:

1: SCENARIO: BUSINESS-AS-USUAL (NO EMERGENCY), SETTING UP

TASKS:
– Locate the 'learn about the maps' function. Do you think this would be useful?
– Where would you look for information about the app from the home screen? What kind of information would you expect to find here (note: there is nothing there at the mo!)

2: SCENARIO: BUSINESS-AS-USUAL (NO EMERGENCY), DAY-TO-DAY USE

TASKS:
– Locate the event map – what do you think this map would be for?
– Add a 'potential community asset'. What is one of these? How would you add it?
– Add a privacy setting for your 'potential community asset

3: SCENARIO: BUSINESS-AS-USUAL (NO EMERGENCY), DAY-TO-DAY USE

TASKS:
– Locate the map – what do you think this map would be for?
– How would you add an event?

4: SCENARIO: POST-EVENT (EMERGENCY)

TASKS:
– Add a report of some damage (a fire)
– Locate a report on the map and confirm or add to it (note: you'll need to choose the RH fire!)

MASSEY UNIVERSITY
TE KUNENGA KI PUREHUROA
UNIVERSITY OF NEW ZEALAND

ARIO: BUSINESS-AS-USUAL (NO EMERGENCY), SETTING UP

the 'learn about the maps' function. Do you think this would be useful?
would you look for information about the experience from the home screen? What kind of information would you expect to find here (note: there is
there at the mo!) Any comments on the names of things and if they make sense, what you would like or expect to find, etc would be very useful.

WHAT DID YOU CLICK ON?	DID IT DO WHAT YOU EXPECTED?	COMMENTS

Appendix 4: MVP User Stories

— User/Role

— Task/Goal description

— Reason for functions inclusion

From a user's point of view:

— As a member of the public...

— I would like to...

— So that I might...

and in context:

— As a member of the public...

— I would like to see the nearest CEH(s) relative to my location

— So that I might understand the ultimate purpose of this map

User/Role	Task/Goal description	Reason	MoSCoW	WREMO's notes	Design notes
	I would like to...	So that I might...			
As a member of the public...	"	"			
	Browse the map withough signing in	Understand the proposition through exploration	Must		
	Browse anonymised events without signing in	Understand the specific goal of the experience	Must		
	See general location of anonymised events in a suburb relative to me without signing in	Understand what's near me [right now]	Must		
	See exact time of anonymised events without signing in	Know when forthcoming events will occur	Must		
	See general information of anonymised events without signing in	Get a sense of forthcoming events	Must		
	Be invited to add events to the map	Understand that this is a community resource	Could		
	Be invited to sign in before I can add events to the map	Understand that authenticated people contribute	Should		
	Sign into the map with Facebook	Publish my event on Facebook	Could		How else would people add information to the map? there are no provisions for any site specific additions
	See a map centered on my location	Understand that this map is for me	Could		regardless of mapping platform this ensure that the user is only seeing data immediately relevant and that they aren't downloading unnecessary information
	See a map centered on my suburb	Understand that this map is for me in my neighbourhood	Should		
	See the nearest CEH(s) relative to my location	Understand the ultimate purpose of this map	Must		
	See local event(s) in the suburb relative to me when I am signed in	See the event locations in context with my specific location	Should		
	See the exact location of an event in the suburb relative to me when I am signed in	See an events locations in context with my specific location	Could		

	See extended event information the suburb relative to my location when I am signed in	Learn about the event's proposed purpose	Could		shouldn't need to sign in to see this level of detail - JP	note on row 22
	See who is hosting the event when I am signed in	Understand that this is an event driven by another member of my community	Could		shouldn't need to sign in to see this level of detail - JP	note on row 22
	See when an event is approved by WREMO	Understand that there will be specific and exclusive information available at this event	won't		Not relevant? - JP	suggested in the case where WREMO staff/volunteers present
	See a list of the events I have contributed when I am signed in	Keep track of events I have hosted and will host	Could			
	Access general invite information when not signed in	Get a sense of a specific event	Must			
	See that I need to sign in to get more information about an event	Be encouraged to sign in to find out more	won't		Ony sign in to create events, or register to attend an event, all ínformation'should be available without signing in - JP	people may not contribute if they feel that they need to expose too much private information in public (who they are, where they live). potential for abuse of that info by third parties is a real concern. people will need to control & protect their privacy. the sign in and reveal of information helps to provide an impression that the site is trustworthy and that contributors do not risk unwanted attention. new stories: Rows 53 & 54
	Be invited to sign in to make event invitation active	Be encouraged to sign in to indicate my interest	Should			
	Access further event information when I am signed in	Have my engagement rewarded with further information	Could			
	Accept event invitation when I am signed in	Connect with the host and the event information	Could			
	Add events to the map when I am signed in	Contribute to the event options available for other people	Must			
	Invite people to events when I am signed in	Ensure people know about the event that I am hosting	Could			the sole purpose is to show events are occurring? how would people know how to attend an event? or who to approach?
	View who owns the map	Understand why I should trust the map			Need to explore what this would look like - JP	applying an organisation's reputation provides context to the platform's quality, reliability & purpose
	Access information about the map	Understand why I should use the map and what it might be in the future			"	
	Find out why I should add an event	Contribute to the map's usefulness	Must		How? JP	user interface design descision
	Provide time and date of the event	Ensure people know when the event that I am hosting occurs	Must			
	Change the year of my event	Invite people to an event that happens next year	Must			
	Provide the location of the event	Ensure people know where an event that I am hosting will be	Must			
	Describe an event	Ensure people know what the event that I am hosting will be about	Must			
	Use my location as the location of an event	Not have to enter my own address	Could			
	Share the map experience	Tell others of the map's existence via social media or email	Could		Site or specific events? - JP	site. new story added: Row 37
	Share event information	Tell others of an upcoming event via social media or email	Could			
	Understand how my information will be used	Trust that the experience will not use my data for any other reason than what I supply it for	Must			
	Accept terms and conditions	Understand that the application contains information that might change, but that the publishers of the map might not be liable (etc)	Must			

	Set my suburb independent of relative location	Understand that the map is useful for people in their own neighbourhood when they are outside it	Should		
	Request WREMO volunteers at an event	Have expertise on hand to aid the "crisis education" aspect of the event		I don't see this as relevant - JP	
	Discover "community crisis plan" information	Learn about the information that WREMO has for members of the WW region	Must	even if only Hub info PDF	as a general rule: PDFs should not be used for online comms. however in terms of the MVP: production qualities & form of the PDF must be discussed: this may added user stories to the MVP as a result
	Discover further information about WREMO	Trust that the experience is from a trustworthy provider		Need to explore what this would look like - JP	[as above] applying an organisation's reputation provides context to the platform's quality, reliability & purpose
	Report an event that doesn't seem to be genuine when I am signed out	Help maintain the accuracy and trustworthiness of the information	Should		
	Download an event to my phone's calendar when I am signed in	Remember the event details independent of my using the map	Could		
	Automatically have my attendance notification displayed on my Facebook newsfeed	Plan my attendance in context with other events on my social media calendar and displayed to other people in my social network	Could		
	Set the privacy settings of any information shared with my Facebook account	Control the information published on the map and on Facebook	Could		
	Know what information is being placed in the public domain	Make a decision on whether to host an event based on information that I am willing to share	Must		
	Supply feedback on the experience when I am signed in	Contribute to the social resilance of the experience		Context? not sure what this is about?? - JP	people need to see that the experience is maintained and safe to use. additionally: no software is fool proof. nor is it impervious to misuse. people need to contact a site's owner about questions/concerns. and provide feedback on operation: catching bugs, etc
	Sign up to be a map supporter and/or development partner	Contribute to the technical resilance of the experience	Should		
	See locations of existing CEHs	Know where I might get/provide help in a crisis			
	Learn about CEHs	Know the intended purpose and capability of a CEH			
	As a signed in user I would like to click through to the event detail on Facebook	Participate in any information exchange related to the event			
	As a signed in user I would like to see the Facebook user who is organising an event	Learn who is arranging an event			
As a WREMO employee...					
	Access a list of all event information added to the map	So that I can quickly report on community interactions	Must		
	Access a map of events that are not restricted to a single suburb view	So that I can get an overview of community interactions in the WW area	Must	should it ever be restricted to s single suburb? I'd have thought you'd just have a continuous map - JP	the map is continuous. but its default view is related to the users location/suburb. encouraging: management of numbers of people at events and relationship between local/immediate neighbourhood/suburb and specific CEH
	Receive email when an event has been added to the map	Keep track of success	Should		
	Enter locations of CEHs	Ensure everyone has access to accurate information in their suburb	Must		
	Enter addresses of CEHs	Ensure everyone has access to accessible information in their suburb	Must		
	Enter general description of CEHs	Ensure everyone has access to understanding the purpose and capabilities of a CEH	Should		

	Assign CEHs to suburbs	Manually associate known and potential CEHs to a specific and known population area		what would this look like?? - JP	specific location marker and associated information related to a specific/ earmarked "installation". added two stories above: Rows 51 & 52
	Assign volunteers to suburbs	Manually associate known volunteers to a specific population area		Which volunteers? NOt WRMEO ones, maybe volunteer admns have an area they look after in the site?? - JP	
	Post moderate entries	Remove information that maybe harmful to the community	Must		
	Contact an event owner through Facebook	Create connections with members of the community	Could	Through Facebook? Not through the map itself? - JP	through facebook for the MVP. onsite comms is a huge undertaking initself. new stories: rows 53 & 54
	Confirm WREMO attendance	Confirm connections with members of the community	won't	Not relevant? - JP	surely self organisation requires some expert guidance? or the ability to seek it out at the least?
	Receive feedback from identified users	Create a database of interested parties in the community	Could		
	Receive feedback from anonymised users	Receive reports on map information for verification, deletion or fixing	Could		
	Add an event to the map identified as a WREMO [employee]	Invite "special" events independant of the community's activity	won't	Not relevant? - JP	
As a WREMO volunteer...					
	Receive email when someone in my area has requested a vounteer at an event	Know when a WREMO emplyee has vetted a request for my attendance	won't	Not relevant? - JP	
As a UX designer...					
	Ensure events are only visible to people who are currently in a specific suburb	Help to maintain the relationship between individuals, households and neighbourhoods	Won't		see comment on row 58
	Display a message that encourages users to bookmark the experience	Introduce this experience to a person's routine	could		
	Display a site icon and description when shared on social media and email	Underline the apparent trustworthiness of the experience & shared info when an individual is sharing information independently	could		
	Import user photo and account name into the map	Allow users to align their contribution to their personal identity	could		
	Display a message that allows the user to opt out of location services	Allow the user to maintain control of their device and broadcasted data	could		
	Display a message that ensures the user knows the experience is more useful when location services are enabled	Allow the user to understand the purpose of their location's use	could		
	Display a message that allows a user to know the experience requires space on their phone	Inform the user that location services require acceptance of cookies	could		
As a developer...					
	Ensure that all information entered onto the map is stored securely	Limit opportunities for any contributed information or activity on the experience to be stolen or misused	Must		

Ensure information is kept in an encrypted database	Ensure any contributed information or activity on the experience is protected	Must	I wonder if we should ensure the map and our volunteer database are working of compatable back end databases - JP	
Ensure the experience uses HTTPS	Ensure users trust the experience and minimise chances where information is intercepted in transmission	Must		
Ensure that all GIS information entered onto the map is stored securely	Ensure users trust the site enough to share accurate locations to a signed in audience	Should		
Make the experience available on Chrome (Mobile)	Provide Chrome users with a supported experience	Should		
Make the experience available on Safari (Mobile)	Provide Safari users with a supported experience	Could		
Make the experience available on iOS 8+	Provide iOS web users who are reasonably up to date with a supported experience	Could		
Make the experience available on Android Kit Kat+	Provide Android web users who are reasonably up to date with a supported experience	Could		
Display a message to users with incompatible devices	Help users understand that their device is not suitable at this time	Should		
Ensure GIS information is compatible with the map selected for the experience	Ensure GIS information can be moved from one presentation layer to another should it be required	Should		
Ensure information is kept in a database that can be ported to future experiences	Ensure there is no disruption of service when future UX is added	Must		
Save a suburb on the user's device	Allow the user to set their suburb independent of their location	Should	Device or account/sign in?? - JP	
Select a map service that is appropriately detailed for the WREMO region	Ensure even users in rural regions can identify with their map display			
Ensure experience can accept account creation independent of Facebook in the future	Preserve existing user records and allow them to migrate or upgrade in the future	Should		
Export event data from map to Facebook account associated to signed in Facebook user	Allow the user to give permission for event data on map to be displayed on facebook	Could		

Appendix 5: Hazard/crisis digital tools

The following examples are some of the many examples we examined that brought to crisis or attempted to bring civil defence information online and into the hands of people who may need it.

Hazard app (Red Cross)

https://itunes.apple.com/nz/app/hazards-red-cross/id1022344440?mt=8https:/play.google.com/store/apps/details?id=com.cube.gdpc.nzl.hzd&hl=en

Analysis:

This app, beyond the alerts, is heavily weighted towards content giving general information on hazards and providing some checklist type information. It is informative, but beyond alerts (that do seem to be relatively geographically unspecific) it is not particularly personalised or localised.

User comments:

Averages 2.5 stars (out of 5) on Apple App Store
3 stars (out of 5) on Google Play Store

"The location of our place as recorded by the app during the initial startup process is incorrect, though the description is ok. There is no way to change it to show the correct location. This, in case of emergency, can lead to serious problems if the rescue used the map to locate our place."

"...Programme needs to be far more selective and only issue relevant warnings. The auto GPS location is well out. But this is a google maps fault as well. Very irritating."

"... it's badly written and delivers multiple identical warnings when a widespread warning intersects multiple geographical areas."

"Not ready: Great idea but as of June 2016 this app appears not ready for android release. ... Suggest lots more testing before it is released again and publicised. It's too important to be a muck up."
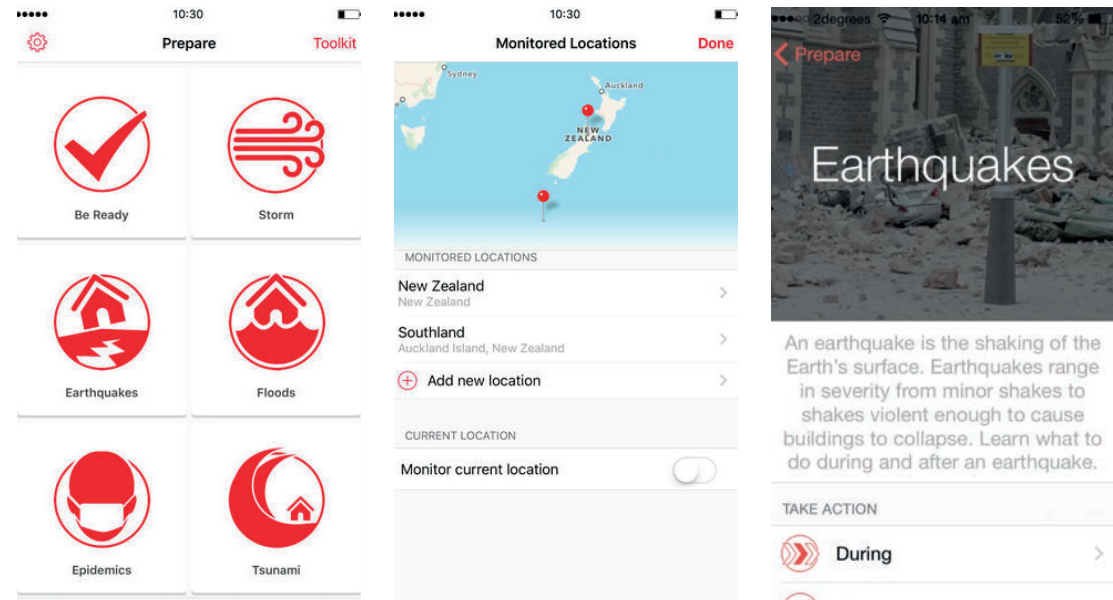
Auckland Civil Defence

Note: this app is being decommissioned as of June 30 2016.

Analysis:

Very slow to load, and Auckland-centric in content (though not in vocabulary–there was clearly an intention to roll this out further). Uses the Civil Defence visual language heavily (without any regional indication). There is a space for events within this app, but in the period of research, none were ever visible. This app is a good example of a good idea, unresourced and inadequately maintained.
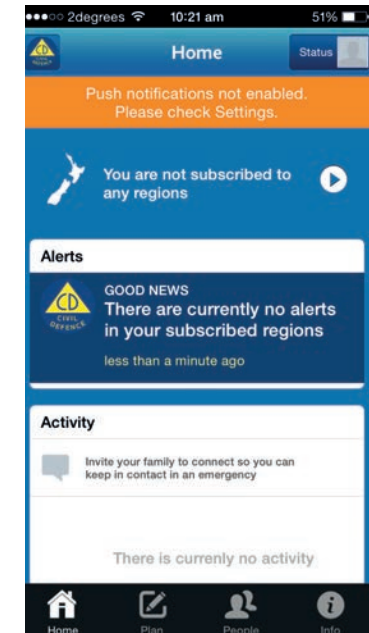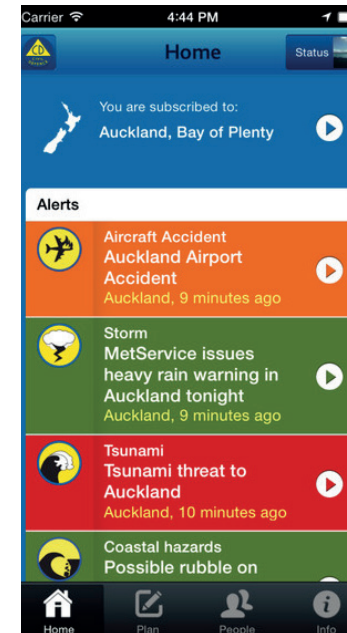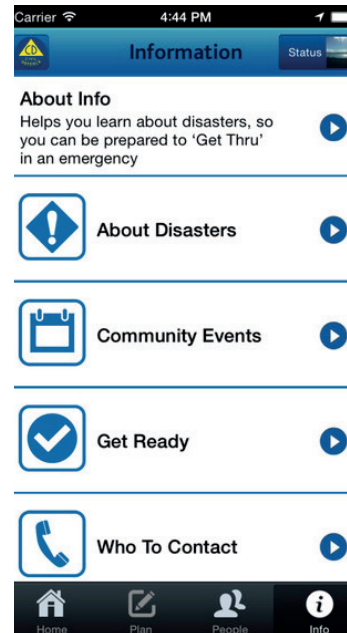
User comment:

3 stars on Apple App Store
3.7 on Google Play Store

"How many years has this app been available and still the only region available for alerts is Auckland? Come on! There is more to NZ than Auckland. What a waste of time."

"Can't use it without logging in! Guys, don't you know how big a turn-off that is. Get your act together and do a guest version"

Geonet

https://itunes.apple.com/nz/app/geonet-quake/id533054360?mt=8
https://play.google.com/store/apps/details?id=nz.org.geonet.quake&hl=en
https://www.geonet.org.nz/

Analysis:

This app has real value for users, and has a clear and well defined purpose. It offers tailored information via alerts (though recent issues reported by users underline the need for constant updates to software to deal with changes in OS systems). The collection of citizen data via 'felt it' reports on the app is straightforward, though requires social media sign in which alienates some users. The web interface for reporting is not as refined, but collects comprehensive data.

User comments:

4+ stars on Apple App Store

4.2 stars on Google Play Store

"Simple and to the point, but also very informative and always up to date."

"Yes, we look at it after any decent jolt. Good stuff"

"Good job Still prefer the website, but getting better"

Emergency AUS

https://itunes.apple.com/au/app/emergency-aus/id567636545?ls=1&mt=8
https://play.google.com/store/apps/details?id=com.gridstone.emergencyaus&hl=en
http://emergencyaus.info/map
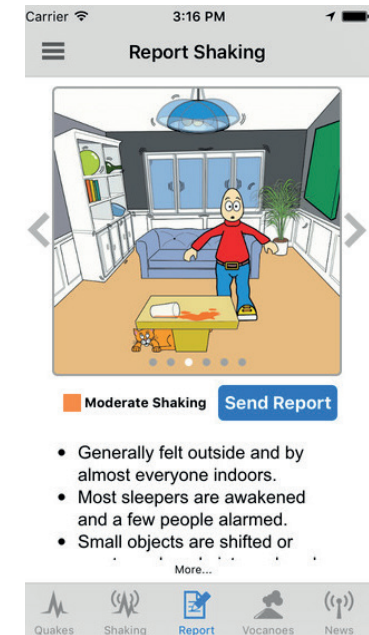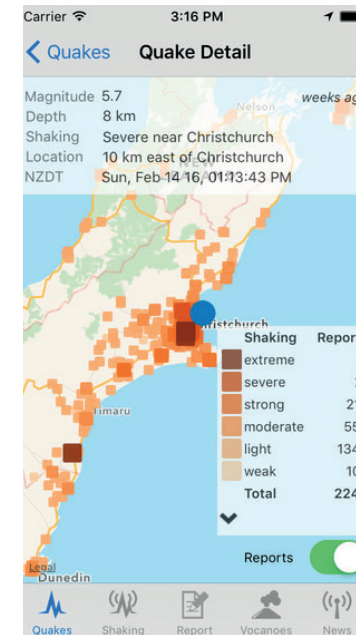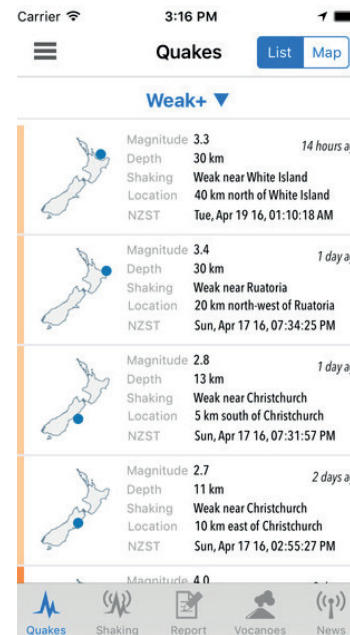
Analysis:

Available via the web and via an app, giving real time hazard information from emergency services. Web version does not allow the addition of public observations, but is otherwise a straightforward and useful experience. Icon system is comprehensive and available as an open source toolkit.

## User comments:

4 stars+ on Apple App Store
4 stars on Google Play Store

"…not shareable on social media or even by email, so I use this in conjunction with other emergency apps which are.This is the only app that allows you to pinpoint areas for continual monitoring."

"Need to be able to filter out total fire bans… don't need to be constantly updated on these when nothing else is happening."

"…I see that the app will only be suited for the current devices, and they've shut off app functionality to older devices. If this is an emergency app, it shouldn't have to be so demanding on what version of iOS it should run on."

"…Kept us up to date and correctly informed, especially helped in being on top of events and ready to evacuate, which we did have to do."
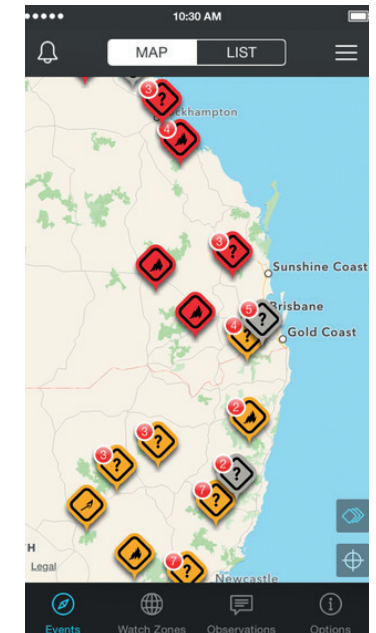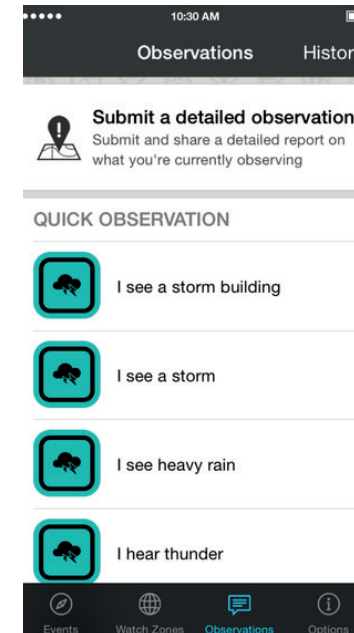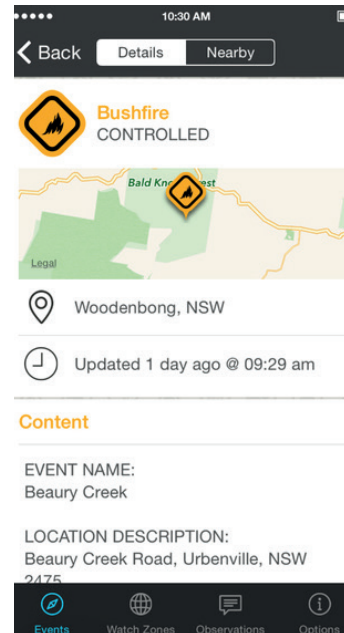
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Glossary

Crowdsourcing

From Beatson, Buettner, & Schirato, 2014:

Estellés and González (2012, 9) define crowdsourcing as 'a type of participative online activity in which an individual, an institution, a non-profit organisation, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary Undertaking of a task'.

The Cloud/Cloud Computing

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (Mell & Grance, 2011)

Platform

A software code base that runs on The Cloud. This is usually proprietary: eg: Facebook, Twitter, Google Maps and the WREMO community map, when it exists.

User Experience Design

The design process usually framing the creation of software in a human- or user-centered, or needs focussed approach. Although definitions vary in specificity, sometimes used interchangeably with IxD: Interaction Design and XD: Experience design.

Acronyms

BAU   Business as usual
CEH   Community Emergency Hub
CDRP   Community-Driven Response Plans
EOC   Emergency Operations Centre
MCDEM   Ministry of Civil Defence and Emergency Management
MVP   Minimum viable product
UI   User interface
UX   User eXperience
UXD   User experience
UCD   User Centred Design
V&TC   Volunteer and technical communities