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FROM TECH SOLUTIONISM TO COMMUNITY-CENTRED DATA CAPABILITY FOR DISASTER PREPAREDNESS

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Introduction: Community data capability and resource mapping

Information is vital to disaster resilience, helping to protect communities and enhance preparedness. Digital humanitarianism is a transdisciplinary field of research and action that was originally built on concepts of crowdsourcing and the affordances of social platforms (e.g., Twitter, Facebook, Instagram) along with open mapping tools like Ushahidi and OpenStreetMaps (OSM) (McCosker et al., 2022; McCosker, 2013; Herfort et al., 2021). However, commercial social platforms and open-source maps have not delivered major solutions to disaster preparedness, prediction and recovery. Early uses of Twitter data, Facebook, Instagram and other social media platforms via API and data scraping showed promise but faced challenges in reliability and more recently deliberate misinformation before those platforms closed or restricted API access (Bruns et al. 2012; Shaw et al., 2013; McCosker et al., 2021).

While disaster data and analysis has become its own industry and research field (Cuthbertson et al., 2021), new approaches are needed that are not premised on imposing 'techno solutionism' (Morozov, 2013) from the outside on communities vulnerable to disaster and climate change. This paper presents findings from a research collaboration with Australian Red Cross, exploring how to best centre communities and

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enhance community resilience through data capability. The foundation of our work stems from the recognition that communities possess invaluable local knowledge, but this has not been well leveraged to support disaster preparedness. The project aimed to design and develop a model and prototype data sourcing and mapping platform. The model and platform sought to enable local community disaster preparedness and resilience by improving the quality of data about community strengths, resources and assets, and enable data donation within an ethical and scalable framework.

The initial scoping work resulted in two core guiding research questions:

1. How can communities vulnerable to disaster risks be more effectively included in data and decision-making process so that they are better prepared to respond to emergencies?
2. What are the core features of a useful resource mapping platform and what data types and data access can enable community participation in building disaster resilience?

Our contribution lies in the formulation of a community-led resilience model that not only has the potential to enhance disaster preparedness but also can improve community engagement.

Methods

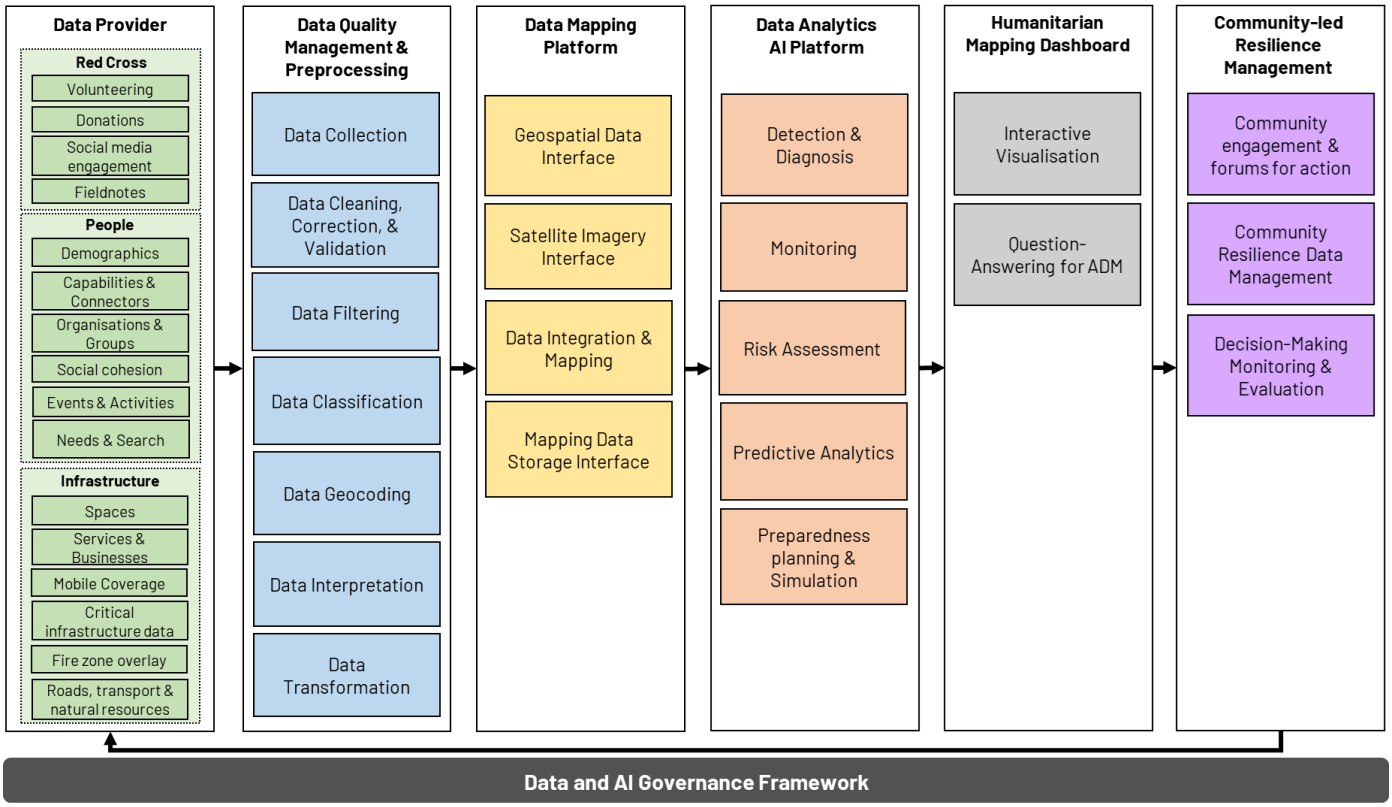
The project took an organisational participatory approach (Bush et al., 2017), through workshops that enabled co-shaping of the problem and research questions, within a human-centred and design justice framework (Costanza-Chock, 2020) that aligns with Australia Red Cross' trauma informed approach to humanitarian technology development. This involved a series of partner workshops scoping the problem and questions followed by design workshops focusing on establishing core data sets with representatives from the partner organisation and three other key stakeholder organisations (n=9). Additionally, an evidence review was undertaken to synthesise the academic literature, digital humanitarian practice and technology use cases. These steps then led to the platform prototype design, development and review.

Findings and platform development

Our review of humanitarian mapping found that it has moved in two main directions:

1. Open, crowdsourced and public data mapping has shown promise in disaster response scenarios and identifying risks but is restricted by a lack of resourcing and uncertainty about data access, reliability and rights.
2. Commercial mapping and analytics have developed to incorporate remote sensing and satellite imaging and increasingly deploy machine learning to offer sophisticated predictive capability, but at a cost, with restricted access and often a narrow focus on risk and predictive modelling (McCosker et al., 2022).

From the scoping work and evidence review, the project developed an approach that shifts the established focus from mapping vulnerabilities and using data for predictive purposes to 'resource mapping' and community-led data capability building (McCosker et al., 2023). We proposed a Community Resource Mapping Pipeline to ensure a



community-centred and harm reduction approach that is grounded in data capability building and self-reliance (Figure 1).

Figure 1. The Community Resource Mapping Pipeline for disaster preparedness, including suggested data sources.

The Community Resource Mapping Pipeline sets out a process for building datasets and mapping community strengths and risks, making these available through an open platform. The platform aims to build community resilience through data collection and sharing, and digital and data capability building. This aligns with the work of 'community asset mapping', aiming to identify and enhancing strengths toward shared goals such as disaster preparedness (Jakes et al., 2015).

The co-development stage and workshops with industry stakeholders, along with the research and practice review, resulted in three core design principles to guide platform development. Firstly, we saw the need to better involve communities in disaster preparedness efforts by harnessing local knowledge – the collective understanding, awareness, and resources available within a community that play a vital role in disaster preparedness. The platform therefore needs to enable recording of observations and insights, as well as tangible assets and resources.

Secondly, technologies are less helpful if they do not support capability development. Community involvement promotes collaboration, enabling information flows that are tailored to meet community needs, fostering a sense of ownership. Finally, information access would be best supported through an open access community resource mapping tool. This enhances the identification of strengths, assets and useful amenities. This knowledge can be used to inform decision-making and support proactive preparation activities.

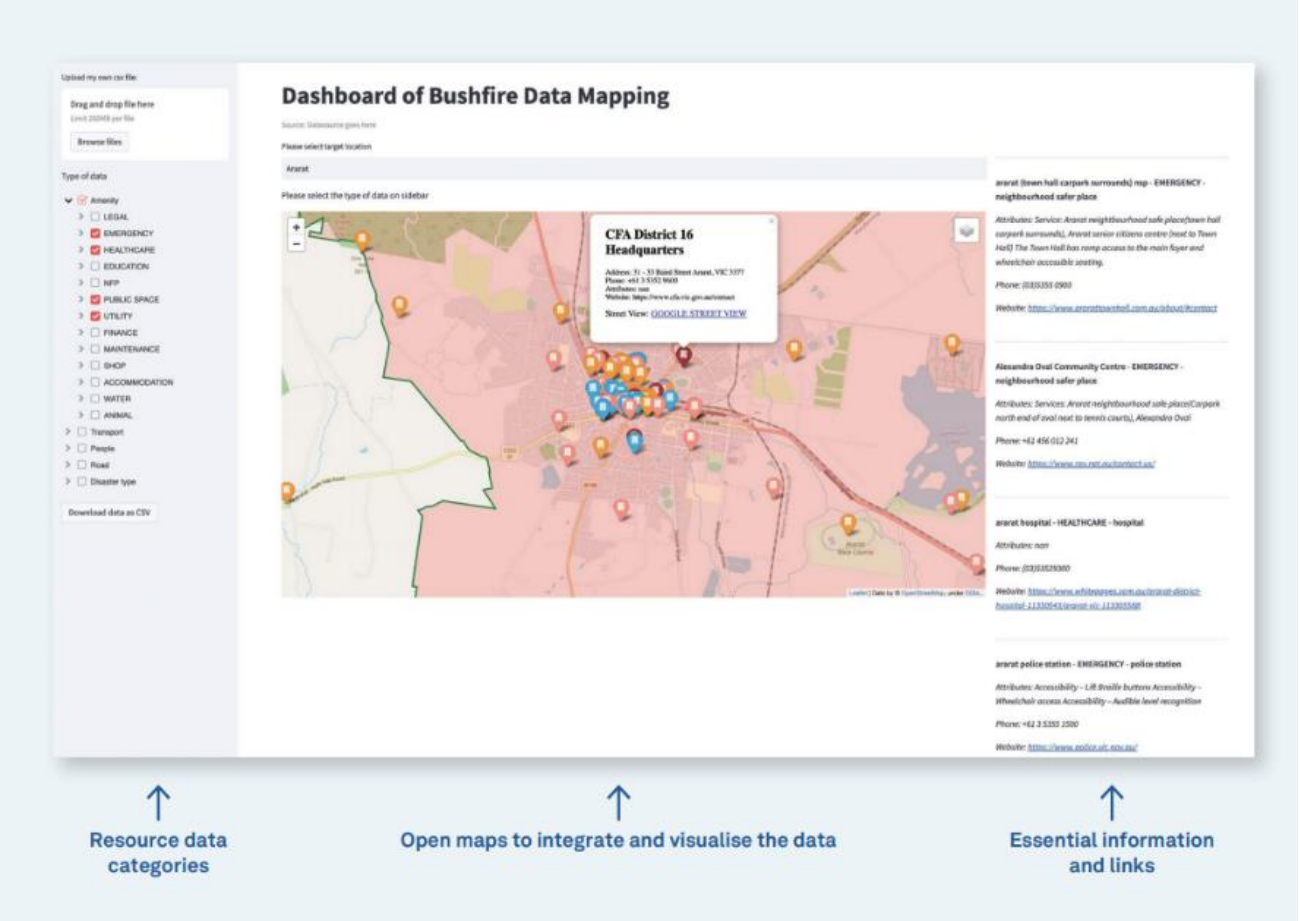


Figure 2. Core elements of the Community Resource Mapping platform prototype, showing historical bushfire data overlay area.

The platform design and build first considered data types and sources, drawing on stakeholder workshops, and planned interface design elements and navigation. To test the prototype platform and geospatial dashboard, we collected the following data for the fire prone regional area of Ararat in Victoria: a) Amenities, including organisations, facilities, services, accommodation; b) People, demographics and groups; c) Infrastructure: roads and transport.

The process involved a phase of Data sourcing, followed by data processing to clean and define attributes. Finally, data augmentation involved enhancing the information available in each of these categories to enable decision making, ensuring that essential information and links are included in the geospatial dashboard for each data point. The

notion of affordising is useful here for considering the transformative work of metrics, analytics and visualisation (Pollock, 2012; McCosker and Graham, 2018). For Pollock, choices made at this stage establish the kinds of information and decision making available at the point of analysis and application. (Full open source platform code and data repository: https://github.com/ADMSCentre/community_resource_mapping_platform).

Conclusions

The prototype has been developed to simulate the first three phases of the Community Resource Mapping Pipeline. The pipeline is not a universal solution for disaster preparedness, however through prototyping, we were able to test and implement the community-centred data capability model. We have demonstrated how communities vulnerable to disaster risks can be proactively included in data and decision-making processes to enhance disaster preparedness. Some of the challenges in data sourcing and classification led to valuable insights into how to deploy the platform in the field through engagement with local community members and organisations. A central finding for the model of community data capability developed through the project workshops and platform design is the role that data donation can play as a new form of volunteering and humanitarian action (Boeschoten et al., 2022). This will be a core component of the next phase of testing and community deployment.

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