

Hacking the “wicked problems” of search: A hackathon as a collaborative approach towards capturing query variability

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Looking for information using search engines and other digital platforms is an activity deployed in diverse situations. These range from the most mundane, like looking up soup recipes, to the most critical, like escaping a bushfire. Given how quickly the search task happens, the searchers themselves cannot reflect on search-related practices (Sundin et al., 2017). Moreover, small differences in query formulation can have a profound impact on the results returned. As Töpfl and colleagues (2023) demonstrate, adding the keyword “truth” to a query “COVID-19” significantly increased the proportion of conspiracy narratives returned by Google Search. Such query formulation is, in turn, affected by a user’s values and beliefs, their information needs, search literacies, and many other factors. We refer to differences in query formulation as “query variability” to more explicitly account for how contextual aspects of information-seeking practices (Belkin, 1980; Ingwersen & Järvelin, 2005; Saracevic, 1997) manifest in search queries.

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While it may be impossible to account for all these factors, connecting these diverse contextual elements with query variation and, in turn, search results, is key to understanding the role of search engines in social cohesion, online safety, and more. To highlight these contextual connections, interdisciplinary methods reflecting the expertise and experience of diverse groups are necessary. While hackathons have gained attention as an example of such a participatory method (Chau & Gerber, 2023; Demarchi et al., 2024; Hope et al., 2019; Stardust et al., 2025), they have also been criticised for failing to accommodate diverse needs or deliver sustainable long-term results beyond “illusory agency” (Chau & Gerber, 2023). This paper highlights insights gained from using a hackathon as a participatory method to capture search query variability, along with approaches to overcome its limitations.

The hackathon, organised by the ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S), was held in Melbourne, Australia, in November 2025. Participants included 16 PhD students and early-career researchers (organised into five teams) from various disciplines of computer science and the humanities. To recognise their role in collective knowledge production, this paper, which further outlines the results of the hackathon, is co-authored by 38 authors, including participants, mentors, judges, and organisers of the event.

On day one, the participants identified a “wicked problem” to explore and created concise representations of information-seeking behaviours. On day two, they evaluated search results. The teams used computational modelling, interviews, and digital ethnography (Ridgway, 2024) to develop frameworks for assessing cross-platform search results in the Australian context for topics such as online dating, disaster response, and domestic violence, and to identify sensitive content in children's information-seeking practices. During the hackathon, we observed that wicked problems are fractal in nature. It is challenging to grasp the full depth of their characteristics, as there are many complex layers to consider. Things become even more complicated when we uncover the limitations of commercial search systems in handling these complexities (Graham, 2023). To tackle these challenges, participants employed an agile, mixed-methods approach to identify either the central research problem or the solution they were pursuing. We also noticed constructive and consistent negotiations regarding shared epistemologies, task scopes, and the level of social impact involved. We argue that embracing these tensions can support context-sensitive interdisciplinary research of search systems and societies reliant on them.

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