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Can't spell 'medicine' without 'me': finding the spirit of co-design in multidisciplinary collaboration

Thornton, Chris*[a]; Thiessen, Myra[b]; Stanek, Jan[a]; Kalisch Ellett, Lisa[a]; Lim, Renly[a]

[a] University of South Australia, Adelaide, Australia
[b] Monash University, Melbourne, Australia
* christopher.thornton@unisa.edu.au;

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In this article we reflect on our experience as a multidisciplinary project team with backgrounds in communication design, clinical pharmacy, and software systems development. Teams such as ours face challenges when implementing different methodological processes and can struggle with communication when vocabularies may be understood in vastly different ways. We reflect on our experience, for better and for worse, within the context of an ongoing and active project, and aim to contribute to recent dialogues around participatory and human-centred design for improved healthcare outcomes. For us, this is an active, critical case study, and we speak more about our experience of multidisciplinary team-building than the outcomes of the project itself – they are still in progress. We hope this dialogue will prove useful to inform future multidisciplinary collaborations.

Keywords: co-design; human-centred design; adverse drug reactions; heuristics

1 Introduction

Medicine use is the most common healthcare intervention (Lim, Semple, Kalisch Ellett, & Roughead, 2019), which means the likelihood that each one of us takes, or will take one or more medications to improve our wellbeing, is high. Medicines are intended to make us feel better and for the most part they succeed; however, side effects or adverse drug reactions (ADRs) resulting from taking medicine are very common. ADRs are unintended and harmful effects that occur following medicine use (Edwards & Aronson, 2000). The degree to which an ADR affects a person's well-being depends on the severity (mild to severe) and frequency (rare to common) of the experience. Many ADRs that consumers experience go unreported because the reporting process can be both difficult and complicated. Reporting may be time consuming, labour intensive, or seen as burdensome by the consumer and a waste of their healthcare practitioner's time, especially if the resulting discomfort is not severe, or they have grown accustomed to it (Hazell & Shakir, 2006). In many cases ADRs may only be reported when a consumer visits a healthcare professional, or after harm has already occurred, such as when the consumer is admitted to the hospital (Parameswaran Nair et al., 2017). Consumers

may also take other medicines, such as those sold over the counter, in addition to those prescribed by their clinicians. Consequently, healthcare professionals may have an incomplete view of the medicines that a consumer takes.

Traditionally, medical and pharmaceutical knowledge rests in the hands of domain experts, where language and technology, as tools of power, are exercised for the benefit of consumers, but rarely shared, or created with consumers (Beisecker, 1990). As a result, consumers may unquestioningly, and often actually, 'place their life in the hands of experts', without a full understanding of the implications. Even if the decision about a specific course of medical action is ultimately their own, consumers typically have, or can feel like they have, little influence on the shaping of an intervention before it is prescribed for them. This may feel like their wellbeing rests wholly with the expertise of healthcare practitioners and that they have very little agency in shaping their own care.

Research has shown that consumers detect medicine side effects first, and, where consumer engagement is implemented, consumer self-reporting of side effects do alert regulatory bodies to new and previously unknown ADRs prior to health professional reports (Egberts, Smulders, de Koning, Meyboom, & Leufkens, 1996; Hasford, Bruchmann, Lutz, Thürmann, & Schmiedl, 2021). Despite the very low reporting rate by consumers, the majority of interventions to improve ADR reporting are targeted at healthcare professionals and not consumers (Paudyal et al., 2020). The end-users (in this case healthcare professionals and consumers) are not involved in the development of many of the reporting mechanisms. Therefore, it is not surprising that the interventions to improve ADR reporting so far have had mixed results (Paudyal et al., 2020).

SideRep is a cross platform digital tool that aims to mitigate the power imbalance in healthcare and is designed to make the reporting of ADRs easy, instant, and seamless (Lim, Thornton, Stanek, Kalisch Ellett, and Thiessen, 2022). Enabling consumers to report their experiences is not only a means to involve them more actively in shaping their healthcare journey, but also creates a feedback loop to improve understanding of the effects that medicines may have on a consumer's personal context, their medical condition/s and history, and other products they may be taking concurrently. The impetus for the project was the very low reporting rate of ADRs by consumers to regulatory health authorities, with less than 5% of ADR reports to regulatory bodies provided by consumers (Therapeutic Goods Administration, 2021). ADR reporting to and monitoring by regulatory bodies are critical because rare and serious ADRs often appear only after medicines are on the market and used by many people worldwide. SideRep aims to address this by providing pharmacists and clinicians with data reflecting how medicines, and particularly newly prescribed medicines, are affecting their patients. It also aims to amplify the voices and needs of consumers individually and collectively, to ensure their interests are understood, respected and used constructively to improve medical interventions. Practically and symbolically, SideRep is a valuable step towards more personalised treatment for consumers, where the system that supports therapeutic treatment, and eventually the treatments themselves, are directly informed by complex consumer engagement reinforcing the need to integrate with consumers stakeholders, along with medical practitioners and regulators, throughout its development, implementation, and monitoring. It will enable timely interventions for the prevention of more serious medication-related harms and long-term deployment may result in a rich database of medicine reactions reported by consumers themselves. This database will complement data reported to the Australian national medicines regulator, the Therapeutic Goods Administration (TGA) medicine

side effect reporting system, a system currently mainly used by pharmaceutical manufacturers and healthcare professionals (Therapeutic Goods Administration, 2021).

2 Our approach

The SideRep project has been multidisciplinary from its outset, bringing together researchers from Communication Design, Pharmacy and Software Systems Development, and employing a framework informed by human-centred and participatory design. Human-centred design methodologies aim to learn from the people who will use the objects, systems, environments, and services that designers develop. It is a means of understanding the contexts, needs, preferences and motivations of particular user groups, to inform outcomes that can improve an individual's way of living (Steen, 2011). However, this approach operates on inherent power structures (Akama, 2009; Steen 2011; Bratteteig and Wagner, 2014) that typically position end users as 'subjects' and designers as 'experts'. In discussing the complexities of Human-Centred Design, Steen (2011) explains, 'each project can be conceived of as a series of decisions, in which certain knowledge of certain people is privileged over other knowledge of other people. With each decision, power is exercised, and some actors have more agency in the decision-making process than others' (Steen, 2011, p. 47). Furthermore, imbalances of power can be both overt and subtle; they exist in the knowledges, histories, cultural structures and institutions we live by, and which are exercised daily, knowingly and unknowingly, in our languages and the social and professional relations we have.

When designing healthcare systems to improve human wellbeing, approaches must consider the lived experience of consumers. Learning from people is therefore integral to the design process; however, a human-centred approach alone is unlikely to reveal the many nuances in how people live with, think about, and use designed objects and systems. To address this, our human-centred design methods are embedded in a participatory methodology and aim to dismantle the power structures that can otherwise exist in a wholly human-centred process. Participatory design is an approach that deeply involves those who will use a designed outcome, in the design process itself (Andersen, Danholt, Halskov, Hansen, & Lauritsen, 2015; Luck, 2018; Robertson & Simonsen, 2012; Sanders & Stappers, 2008). It facilitates collective creativity between stakeholders so designers can better understand the problem and how it affects people or the systems they use (Sanders & Stappers, 2008). Aiming to equalise power relations is a core tenet of participatory design research (Luck, 2018), and contributes to efforts in decolonising design theory and practice more broadly (Tlostanova, 2017; Schultz et. al., 2018) and critiques power on local and global scales. At a practical level, navigating this process among stakeholders of differing needs and attitudes is complex.

Admittedly, our first phase of work saw only limited involvement of consumers. We recognise that participatory design methodologies involve user groups at all stages of planning, design, development and testing and we intend to engage user participants fully in future phases of the work, and to integrate their contributions directly into the design process, outcome, implementation, and monitoring. Our participatory approach stumbled initially, but we have attempted to understand and rectify our missteps through a collective, critical reflection on our working dynamic. We offer this reflection here in an effort to demonstrate the value of such thinking, to encourage other interdisciplinary teams to do the same, and to engender a more transparent dialogue about negotiating diverse working and research relationships. Although participatory design traditionally

sees ‘participation’ as the involvement and contribution of the end user (Andersen et al., 2015; Luck, 2018; Robertson & Simonsen, 2012; Sanders & Stappers, 2008), in the context of our project thus far, and in this reflection, we consider ourselves as participant stakeholders in the project itself. Together, we are designing methods for working and ways of interacting, communicating, and understanding each other and each other’s contributions. Following Latour and Schuman on the inherent function of agency, ‘the appropriate object of analysis for participatory design research [is] not the method or the designer but the designer using the method’ (Light and Akama, 2012, p 61). Therefore, this paper will not report on our project outcomes to date, but instead reflects on our experience of working through the process itself, learning to understand and ‘speak each other’s language’, and develop an ethos of trust. In the following sections we reflect on our individual experiences in coming together, responding and adapting to each other as part of our team building. This is offered through our individual voices, which are shaped by the lens of our own disciplinary perspectives. What we discovered undertaking this reflection process was an emergent and unexpected data set, one we think is valuable in understanding and developing methods of collaboration across diverse domains of research. Between these substantial differences in attitude and methodology, common themes still emerged in our own personal reflections. We think these spaces ‘in between’, which are focused on how we are learning to work together, are as important as the SideRep project itself, and are here discussed as a contribution towards developing collaborative practices.

3 Communication design

Designers anticipate and respond to people’s needs and facilitate the scenarios that enable those responses. In doing so, the need for fair relations of power is paramount but difficult to achieve in practice. It can be hard to enable cooperation where people’s assumptions or past experience may influence their perception of particular social and disciplinary roles. Designers, for example, are often expected to assume one of two roles in a project: either, a) authority, where they might frame and steer a project and determine what is ‘good’ or ‘right’ for the end user, or b) one that is more passive, working to instruction on outcomes without meaningful input on the overall system or strategy they serve, or the impacts they have. Conversely, the aim of a participatory design methodology is to reveal, critique, and address such tensions, whether before or during a research project, so that the power manifest in both design process and outcome, is understood more as relational and emergent (Light & Akama, 2012) than given, and where it can be shared fairly and cooperatively among all stakeholders.

In the context of SideRep, design researchers Thornton and Thiessen were as much concerned with nurturing an environment conducive to mutual learning across the research collaborators, as they were with the student and participant contributors. At its heart, the co-design process is democratic and caring, aiming to equalise contribution and resist the formation of power hierarchies that can easily arise in group dynamics (Steen, 2011; Luck, 2018; Sanders & Stappers, 2008). However, bringing together and contributing to such diverse and paradigmatically different backgrounds as Communication Design, Pharmacy and Software Systems Development, while integrating their methodologies, is not without its challenges. Pharmacy and Software Systems Development might typically share approaches founded in scientific positivism, whereas Communication Design often (though not exclusively) operates from a grounding in the humanities. Therefore, what is methodologically more familiar to designers and design researchers, when applying qualitative and

very often participative, or people-centred approaches more typical of action-based research, may seem contrary to the objectivist rationale of the hard sciences. This raises the need for researchers from such differing perspectives to establish and agree a common understanding of, and approach to, their working methods, particularly when handling the propositional, abductive stance required for design decision-making.

As Thornton and Thiessennote, 'working closely with clinical pharmacists has shown us how important it is to uncover the gaps in reporting ADRs and how this can otherwise limit pharmacists' ability to care for their consumers in the most effective ways. It is interesting to observe the genuine care pharmacists feel for their consumers' wellbeing, but also that research practices typical to medical sciences like pharmacy may not always provide the means to address behaviour-related questions, or ways to apply findings within the social realm'. Thornton and Thiessen see this as a key contribution for design to make in multidisciplinary teams like this and for problems affecting human interactions, whether face-to-face or virtual. The most pressing challenge may be in communicating what constitutes a design problem to non-design disciplines, and what role designers can play in translating complex systems and services for public understanding.

4 Clinical pharmacy

The pharmacist researchers involved in SideRep are primarily quantitative researchers who run randomised controlled trials, conduct medicine utilisation studies using large datasets and undertake health services research to improve medicines use. This means that pharmacist researchers conducting analyses based on statistical methods have limited experience in qualitative research and the methods used in other research fields. The pharmacist researchers had no practical knowledge of user experience design and most certainly do not speak 'languages' that are commonly used in this space. At the start of the project, the pharmacists on the team found themselves having to explain terms and acronyms typically used in pharmacy and medicine, as well as needing to ask for explanation from other team members for the terms they used.

For pharmacy researchers Lim and Kalisch Ellett, multidisciplinary projects like SideRep are not common and the way they engaged with it was, for them, unusual. They reported that pharmaceutical researchers take 'by the book' quantitative approaches to research where there is little room for nuance, differences in interpretation or subjectivity. Working in a multidisciplinary team with researchers and research methods that are more focused on the subjective experience of consumers and team members, and which are much more expressive 'has been eye-opening, fascinating and intriguing for the clinical pharmacy team. It has taught them to be more flexible and to work more fluidly as the project progresses.'

The pharmacy researchers agree that 'the strength of this approach is its multidisciplinarity and the use of robust research methods from across disciplines'. Combining sound quantitative research methods and knowledge of medicines to improve the lived experience of people in need of better health outcomes, demands a methodology that is informed by principles of co-design. As such, the project is grounded in empathy and the personal expertise of the people who will use the outcome. Building teams and projects to work this way is not easy and the need to adjust to colleagues and learn entirely new ways of thinking, working and connecting often challenge established conventions.

Lim and Kalisch Ellett add that, ‘from the beginning it was our goal to work collaboratively because we were bringing in people from different fields and working toward a common goal. It soon became apparent the team was developing a synergistic relationship. It was clear by the way the team interacted with each other that there was mutual respect, and that each member valued the skills and expertise of the others. Part of this ‘growing into’ is to come together on the same ‘wavelength’, so that we can understand each other’s work and what our roles and contributions to the team involve. With this mutual understanding in place, we can do ‘better’ work and create a vastly improved product. We have yet to create our ‘great solution’, but we will continue to work toward it. At the end of the day, if we want consumers to use the digital tool we are developing, it must be well designed and fit for purpose.’

5 Software system design

Software systems researchers comprised team member Stanek, and four undergraduate students who worked directly on system prototyping. Stanek notes, ‘the project was a challenging one, but was framed well from the outset, having clear goals (formulated in clinical pharmacology terms). This helped to establish a solid backbone throughout. The involvement of communication designers helped build a mutual understanding between the team members—co-design is not yet very common in software systems design, especially in small projects. Typically, software development teams are quantitatively oriented. Involving team members more oriented towards qualitative research and the cognitive aspects of communication, added value to the project.’

Stanek’s role on the team was as a mentor to the students, as well as advisor on health informatics and information systems perspectives to the team over-all. This meant that the main burden of technical software development was carried by the students. This required significant focus on explaining clinical concepts, since the students had not worked in a health-related domain before. On the other hand, as Stanek again notes, ‘the need to explain everything to students led to more open and explicit communication across the wider multidisciplinary team, forcing us to rely increasingly less on the tacit knowledge of team members. This not only helped the students adjust to their task, but also helped build a mutual understanding across the disciplines. The resulting discussion helped to grow team cohesion.’

Initially, the software systems team remarked that some of the design nuances appeared rather ‘nit-picking’, slowing the project down, but subsequent testing with user volunteers showed the value of meticulous design and attention to user experience. While user interface design can be part of software development, working with colleagues experienced in communication—and co-design was important and the students remarked it was ‘a real eye-opener—observing how consumers used the prototype and talking to them during and after the testing, all helped the software developers to put themselves into the shoes of non-technical users and walk a mile with them: exploring interaction with the prototype, errors, perceived difficulties, and hearing the comments and suggestions at the end’.

What was learned was that clear formulation and explanation of the goals of the project is essential in multidisciplinary projects. The challenge is to ensure all participants genuinely understand the project. This was seen in the initial phases of the project involving numerous discussions, which, as Stanek notes, meant ‘the project appeared to be moving nowhere. However, such a team and an

approach were necessary to create mutual understanding of concepts and jargon'. And, as Stanek concludes, collaborating with designers 'certainly helped to support understanding between the client domain expert (Lim) and the software developers. The resulting digital tool prototype, while far from optimal, is nonetheless a solid start and was an enjoyable experience'.

6 Discussion and reflection

Participatory Design methodology does not prescribe a particular approach for engaging with audiences. It is 'not defined by formulas, rules and strict definitions but by a commitment to core principles of participation in design' (Robertson & Simonsen, 2012, p. 3). This can mean that its application is difficult to pin down, which may have contributed to early hurdles for our team. We struggled to agree on how to engage fully with a participatory methodology and in some cases determine what participation means specifically within the scope of the SideRep project. This was a result of differing disciplinary vocabularies and understanding of what constitutes participatory design in principle. But it was also driven by differences in research priorities and research questions, which are deeply embedded in disciplinary epistemologies and practices. In the same way that practitioners of human-centred design must acknowledge their own biases and find ways to balance them with those of the people they are designing for (Steen, 2011), our team has come to realise the importance of defining our own common ground as we move forward. This is evident in our reflection on the need for developing clearly formed goals for the project as it progresses, and that these are co-created by the team. What has emerged from this process is the realisation that design is not only an epistemological process, but an ontological tool, able to inform and transform the experienced realities of all participants at all levels of subjectivity. As Tlstanova (2017, p. 51) notes, 'design is clearly one of the spheres in which ontology, epistemology and axiology intersect in a dynamic and creative way.' The philosophy of science has made clear distinctions between ontology, epistemology, methodology and the way problems and solutions are perceived by different domains of research (Schmidt, 2007: 59). Despite this tradition, growing argument in recent decades suggests that these areas can be more closely aligned than first thought. Crotty (2020: 10) states that 'ontological issues and epistemological issues tend to emerge together, [therefore] to talk about the construction of meaning [epistemology] is to talk about the construction of a meaningful reality [ontology]'. In this respect, the conscious rejection of the objectivist/subjectivist dichotomy presents an opportunity instead to recognise their interplay and codependence in the construction of meaning. Crotty terms this the principle of 'intentionality' in which 'consciousness is directed towards the object [and whereby] the object is shaped by consciousness.' (44). Heron and Reason (2008: 366) take this notion further still, in their argument for an 'extended-epistemology' that converges 'experiential, presentational, propositional and practical ways of knowing'. Methodologically speaking, these four ways of knowing are central to co-operative research for they help to position enquiry as an open, dialogical process that, a) recognises its situated nature, b) is open to novel forms knowledge-production, c) tests sense-making conventions through robust critical debate, and d) invests individuals and collectives with the responsibility to apply knowledge ethically and meaningfully (Heron and Reason, 2008: 378).

For the SideRep project, Lim and Kalisch Ellett point to the value of lived experience when they discuss the fact that the consumers are the first to know when an ADR has occurred, but that they are rarely consulted in the development of interventions designed to help them report those side effects.

Valuing the domain of lived experience is foundational to participatory design and 'the design of technologies for that domain offers a way to increase product and service quality because the resulting technologies work better' (Robertson & Simonsen, 2012, p. 6). By recognising that design exploration, decision-making, testing and evaluation may be shared at all levels of experience and expertise, whether it be that of the design researcher, the clinician, the pharmacist researcher, the software developer or the consumer themselves, agency emerges as an equally shared phenomenon, ensuring that power is distributed fairly across all domains or stakeholder interests.

By operating dialogically, what seems to have emerged, albeit unconsciously for a multidisciplinary team as new as ours, is the recognition that our working method is based on social heuristics, rather than strict empiricism. For example, the involvement of undergraduate students necessitated alignment to particular and often narrowly defined learning outcomes, which did not always align with the aims of the project. This project provided a valuable learning opportunity for students in that they were able to develop early user experiments to test prototype designs but these 'workshops' did not closely follow a participatory methodology and as such did not satisfy the project's research objectives. This phase revealed differences across our disciplinary practices and knowledges that have proven valuable as the project progresses, such as identifying the need to clearly define roles and contributions to the project's development. It brought to the surface Thornton] and Thiessen's desire to be more deeply embedded in the design and planning of participant experiments and workshops. It also revealed a need to be more sensitive to the needs of Stanek and his team in understanding what is necessary from the perspective of a software developer to arrive at a robust working prototype.

For collaborators as unfamiliar with the methodological conventions of each other's disciplines as we were at the beginning of this project, the process of thinking heuristically—taking cognitive shortcuts analogous to areas of knowledge more familiar to our own—and positioning ideas speculatively, tends to ease cognitive load otherwise required for communication on more specialist and exacting grounds. It makes collaboration playful and facilitates trusting and open-minded propositions to design problems, while also suspending the anxieties around any immediate need for empirical proof. By nature, heuristics is a way of reasoning that not only helps to temporarily circumvent the complexities of domain specific concepts and language, but can also help to consolidate working relationships and promote trust and cooperation. Social Heuristic Hypothesis (Rand et al., 2014) suggests that this is in fact a typically intuitive and social phenomenon that aids both the experience and efficacy of the collaboration process, and while it does not replace the need for more deliberative reasoning, it does appear to take place as a way of bridging, relating to and making sense of problems and their contexts, while cognitive adjustments to more domain specific concepts and language can grow over time for all parties involved.

As a team, we know that constructive forms of sharing between stakeholders are central to the success of a participatory approach and the integrity of the project aims, but arriving at a practical means to do this was not as simple as using a prescribed protocol. A participatory approach is 'not a single method that can be applied like a boilerplate… [by] necessity it is situated, [concerned with] located accountabilities, where each project is contextually relevant' (Luck, 2018, p. 3). Therefore, our common ground had to be built 'feelingly', by reading and responding to the implicit, as well as the explicit expressions shared, and the individual characteristics we each present as team members.

The issue central to all of this is the way ideas, opinions and views are shared through the language, tone and intent each stakeholder employs. In practical terms, we discovered and began to apply our exchanges as modes of interaction more than as specific strategies, and now frame our discussions in terms of speculative, propositional opportunities and possibilities, rather than concrete assertions. This process seems to align with what Sennett describes as the 'subjunctive mood' in cooperative exchange (Sennett, 2013, p. 22). More than mere politeness, subjunctives operate both as linguistic and logical arguments based on conditional cause, tentative in tone, but nonetheless critical in terms of engagement, subjunctives present a proposition for what could be—a possible world (Pollock, 1976: 13).

There is an affinity between the emerging use of subjunctives by the SideRep team and Heron and Reason's (2008) notion of extended-epistemology, outlined earlier, as a methodological premise. The outward-facing, propositional nature of both approaches allow space for the play of ideas and opinions, points and counterpoints, and for the acceptance of vulnerability as part of intellectual and practical risk-taking, without fear of failure or judgement. For designers, this is a disposition crucial to creative process and the successful development of effective and equitable solutions. Importantly, Sennett believes use of the subjunctive mood is most effective as a dialogical process, in which deliberation is permitted to take tangential directions for the sake of curiosity, and which is decidedly different from dialectical procedures that operate otherwise by the play of 'contraries leading to agreement' (Sennett, 2013, p. 24). Instead, dialogical engagement, by way of the subjunctive mood, offers permission to disagree, explore open-endedly, and thus build trust and empathic understanding through active listening and respectful sharing. Sennett adds that dialogic exchange exists within dialectic procedure, but does so to enable cooperation, rather than simply arrive at logical outcomes (2013, p. 25).

7 Conclusion

The SideRep project addresses an important gap in knowledge for clinical pharmacists, but importantly, the means by which it achieves this reveals a design problem. When Lim recognised that her ability to improve medicine safety was limited by not knowing the full extent of adverse reactions experienced by consumers themselves, and in what way this might be addressed, she was asking questions that exist firmly in the realm of communication design: how can I reach consumers; how can I tell them about why it is important to report ADRs; how can I encourage them to provide data about their experiences; how can I make sure they feel safe doing so; how can I create a platform for them to report easily and efficiently; how can I record, manage, and store the data securely once it has been provided? For Thornton and Thiessen this is a particularly interesting observation and points to a problem often observed with how medical information is communicated to the public. Since these are not questions that Lim and Kalisch Ellett may ask as part of a typical scientific, positivist methodology in clinical pharmacy, their value, or the means to investigate them, may not be front of mind. But these questions, as the domain of Communication Design, demonstrate why multidisciplinary collaboration is fundamental to addressing big problems. Lim identified not only an important research problem, but also a social one. Like most important research problems at scale, they can typically only be addressed with multidisciplinary collaboration. In order to provide measurably safer care for consumers (Clinical Pharmacy) it is essential to understand consumer behaviour and help them build agency through a participatory process to develop a solution that they

can understand, use, trust and value (Communication Design), and which is implemented securely, efficiently and reliably (Software Systems Design and User Experience).

In research with multidisciplinary teams, particularly where technical language and paradigmatic approaches may differ across collaborating fields, there seems to be considerable scope for exploring and developing awareness of the social practices and modes of exchange that help to foster a successful research team ethos. In the case of the SideRep project, this realisation developed for us through critical reflection on our processes and our personal experiences of what it means to navigate both research and social environments. While modes of exchange such as Sennett's subjunctive mood (2013) and the social heuristics of Rand et.al. (2014) may come unconsciously to some and seem par for the course in good collegial relations, it is nevertheless valuable to understand why these terms of correspondence can contribute to trusting, creative and respectful, collegial relations without sacrificing criticality, intellectual rigour or empirical substance. If anything, critical rigour may be further enhanced by such conditions.

References

Andersen, L. B., Danholt, P., Halskov, K., Hansen, N. B., & Lauritsen, P. (2015). Participation as a matter of concern in participatory design. CoDesign, 11(3-4), 250-261. doi:10.1080/15710882.2015.1081246

Akama, Yoko (2009). Politics makes strange bedfellows: addressing the 'messy' power dynamics in design practice. In: Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK, 16-19 July 2008

Awaisu, A., Mukhalalati, B., & Mohamed Ibrahim, M. I. (2019). Research Designs and Methodologies Related to Pharmacy Practice. Encyclopedia of Pharmacy Practice and Clinical Pharmacy, 7-21. doi:10.1016/B978-0-12-812735-3.00602-6

Beisecker, A. E. (1990). Consumer Power in Doctor-Consumer Communication: What Do We Know? Health Communication, 2(2), 105-122. doi:10.1207/s15327027hc0202_4

Bernard, C. K., "Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness." Clin Invest Med 29, no. 6 (2006): 351-364.

Bourque, P., & Fairley, R. E. (2014). SWEBOK: guide to the software engineering body of knowledge: IEEE Computer Society.

Bratteteig, Tone, and Ina Wagner. (2014) Disentangling Participation. 2014th ed. Cham: Springer International Publishing, n.d. https://doi.org/10.1007/978-3-319-06163-4.

Crotty, M. (1998). Foundations of social research : Meaning and perspective in the research process. Taylor & Francis Group.

Edwards, I. R., & Aronson, J. K. (2000). Adverse drug reactions: definitions, diagnosis, and management. The Lancet, 356(9237), 1255-1259. doi:10.1016/S0140-6736(00)02799-9

Egberts, T. C., Smulders, M., de Koning, F. H., Meyboom, R. H., & Leufkens, H. G. (1996). Can adverse drug reactions be detected earlier? A comparison of reports by consumers and professionals. BMJ (Clinical research ed.), 313(7056), 530-531. doi:10.1136/bmj.313.7056.530

Hasford, J., Bruchmann, F., Lutz, M., Thürmann, P., & Schmiedl, S. (2021). A consumer-centred web-based adverse drug reaction reporting system identifies not yet labelled potential safety issues. Eur J Clin Pharmacol, 77(11), 1697-1704. doi:10.1007/s00228-021-03134-9

Hazell, L., & Shakir, S. A. (2006). Under-reporting of adverse drug reactions: a systematic review. Drug Saf, 29(5), 385-396. doi:10.2165/00002018-200629050-00003

Holeman, Isaac & Dianna Kane (2020) Human-centered design for global health equity, Information Technology for Development, 26:3, 477-505, DOI: 10.1080/02681102.2019.1667289

Huber, T. L., Winkler, M. A. E., Dibbern, J., & Brown, C. V. (2020). The use of prototypes to bridge knowledge boundaries in agile software development. Information Systems Journal, 30(2), 270-294. doi:https://doi.org/10.1111/isj.12261

Light, A., & Akama, Y. (2012, August). The human touch: participatory practice and the role of facilitation in designing with communities. In Proceedings of the 12th Participatory Design Conference: Research Papers-Volume 1 (pp. 61-70).

Lim, R., Semple, S., Kalisch Ellett, L., & Roughead, L. (2019). Pharmaceutical Society of Australia. Medicine Safety: Take Care. Canberra: PSA.

Lim, R., Thornton, C., Stanek, J., Kalisch Ellett, L., & Thiessen, M. (2022). Development of a Web-Based System to Report Medication-Related Adverse Effects: Design and Usability Study. JMIR Form Res, 6(10), e37605. doi:10.2196/37605

Luck, R. (2018). What is it that makes participation in design participatory design? Design Studies, 59, 1-8. doi:https://doi.org/10.1016/j.destud.2018.10.002

Meyerowitz-Katz, G., Ravi, S., Arnolda, L., Feng, X., Maberly, G., & Astell-Burt, T. (2020). Rates of Attrition and Dropout in App-Based Interventions for Chronic Disease: Systematic Review and Meta-Analysis. J Med Internet Res, 22(9), e20283. doi:10.2196/20283

Oktay, L. A., Abuelgasim, E., Abdelwahed, A., Houbby, N., Lampridou, S., Normahani, P., . . . Jaffer, U. (2021). Factors Affecting Engagement in Web-Based Health Care Consumer Information: Narrative Review of the Literature. J Med Internet Res, 23(9), e19896. doi:10.2196/19896

Parameswaran Nair, N., Chalmers, L., Bereznicki, B. J., Curtain, C., Peterson, G. M., Connolly, M., & Bereznicki, L. R. (2017). Adverse Drug Reaction-Related Hospitalizations in Elderly Australians: A Prospective Cross-Sectional Study in Two Tasmanian Hospitals. Drug Saf, 40(7), 597-606. doi:10.1007/s40264-017-0528-z

Paudyal, V., Al-Hamid, A., Bowen, M., Hadi, M. A., Hasan, S. S., Jalal, Z., & Stewart, D. (2020). Interventions to improve spontaneous adverse drug reaction reporting by healthcare professionals and consumers: systematic review and meta-analysis. Expert Opin Drug Saf, 19(9), 1173-1191. doi:10.1080/14740338.2020.1807003

Pollock, John L. (1976) Subjunctive Reasoning. D. Reidel Publishing Company.

Rand, D. G., Peysakhovich, A., Kraft-Todd, G. T., Newman, G. E., Wurzbacher, O., Nowak, M. A., & Greene, J. D. (2014). Social heuristics shape intuitive cooperation. Nature Communications, 5(1), 3677. doi:10.1038/ncomms4677

Reason, P., & Bradbury, H. (Eds.) (2008). The SAGE handbook of action research. SAGE Publications Ltd, https://doi.org/10.4135/9781848607934.

Robertson, T., & Simonsen, J. (2012). Participatory Design: an introduction. In Routledge international handbook of participatory design (pp. 1-17): Routledge.

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. CoDesign, 4(1), 5-18. doi:10.1080/15710880701875068

Schubert, L., Tsitsipas, A., & Jeffery, K. (2018). Establishing a basis for new software engineering principles. Internet of Things, 3-4, 187-195. doi:https://doi.org/10.1016/j.iot.2018.08.010

Schultz, Tristan, Danah Abdulla, Ahmed Ansari, Ece Canlı, Mahmoud Keshavarz, Matthew Kiem, Luiza Prado de O. Martins & Pedro J.S. Vieira de Oliveira (2018) What Is at Stake with Decolonizing Design? A Roundtable, Design and Culture, 10:1, 81-101, DOI: 10.1080/17547075.2018.1434368

Schmidt, J. C. (2008). Towards a philosophy of interdisciplinarity. Poiesis & Praxis : International Journal of Ethics of Science and Technology Assessment, 5(1), 53–69. https://doi.org/10.1007/s10202-007-0037-8

Sennett, R. (2013). Families Against the City: Middle Class Homes of Industrial Chicago, 1872–1890: Harvard University Press.

Simon, H. A. (1990). Invariants of human behavior. Annual review of psychology, 41(1), 1-20.

Smith, Rachel Charlotte, Heike Winschiers-Theophilus, Daria Loi, Asnath Paula Kambunga, Marly Muudeni Samuel, and Rogerio de Paula. (2020). Decolonising Participatory Design Practices: Towards Participations Otherwise. In Proceedings of the 16th Participatory Design Conference 2020-Participation(s) Otherwise - Vol. 2 (PDC '20: Vol. 2), June 15–20, 2020, Manizales, Colombia. ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3384772.3385172

Steen, M. (2011). Tensions in human-centred design. CoDesign, 7(1), 45-60.

Szinay, D., Jones, A., Chadborn, T., Brown, J., & Naughton, F. (2020). Influences on the Uptake of and Engagement With Health and Well-Being Smartphone Apps: Systematic Review. J Med Internet Res, 22(5), e17572. doi:10.2196/17572

Thaler, R., & Sunstein, C. (2009). Nudge: improving decisions about health, wealth, and happiness. London: Penguin Books.

Therapeutic Goods Administration. (2021). Annual performance statistics report 2020-21. Therapeutic Goods Admistration: Canberra, ACT.
Tlostanova, Madina (2017) On decolonizing design, Design Philosophy Papers, 15:1, 51-61, DOI: 10.1080/14487136.2017.1301017

About the Authors:

Chris Thornton: A researcher in the Design Clinic, part of The Australian Research Centre for Interactive and Virtual Environments (IVE) at the University of South Australia. His current work iis particularly concerned with participatory and decolonising methodologies and the socio-ecological impacts of design and design practice..

Myra Thiessen: A researcher in the Design Health Collab at Monash University, Thiessen has an expertise in design for legibility, readability, and usability with a particular interest in how motivation, context, and environmental factors affect comprehension and decision making in healthcare settings.

Jan Stanek: A specialist in the development of intelligent systems in medicine,data mining/process mining and analytics in medical practice data, and genetic and clinical databases.

Lisa Kalisch Ellett: A pharmacist and Enterprise Fellow in Pharmacy, working in UniSA Clinical and Health Sciences. Her research focuses on identifying and resolving quality use of medicines issues in older people. Other research interests include medication safety, dementia and pharmacoepidemiology.

Renly Lim: A pharmacist and Senior Research Fellow at the University of South Australia. Her research focuses on advancing roles of pharmacists, developing and implementing digital tools to improve medicine safety, and evaluating health programmes.

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