# Chapter 2

# Project Synergy research and development cycle: iterative processes of participatory design, user testing, implementation and feasibility testing

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In Australia, one in four young people aged 16–24 years experiences a mental illness every year.[1] A compounding challenge is that young people are often reluctant to seek help, with data from the second National Survey of Child and Adolescent Mental Health and Wellbeing indicating that only 21% of young men and 22% of young women with emotional or behavioural problems accessed any form of mental health care in 2013–2014.[2] Technology-based mental health resources and interventions have been highlighted as a key part of the solution for better access to, and quality of, mental health services.[3,4] Not only do online health and wellbeing technologies address traditional geographical, economic and human resource barriers,[5–7] they can also provide a valuable platform for screening, prevention, early intervention and referral processes.[8–10]

There has been rapid growth in the availability of online health information technologies for young people who report feeling comfortable accessing mental health tools online.[11] Most research in this field has focused on testing the effectiveness of health information technologies; however, engagement and dropout rates have been identified as significant problems.[12,13] To address this, involvement of users from the outset is now viewed as best practice.[14] Meaningful involvement of young people in the design and development of health information technologies from the start is an important step in improving engagement and potential impact as it maximises the value of the technology to the user.

Ultimately, engagement of users from the outset, and in all design and development processes, is more likely to result in technology that is far more personalised and responsive to their needs. However, a recent systematic review of the design and development of technology-based youth mental health and wellbeing interventions reported that youth participation is variable, with 70% of projects being predominantly consultative in nature, and only 30% collaborative.[15]

## Co-designing solutions

Utilising strategies to enhance community and consumer participation is now a national priority for 2020 in the health, medical and research sectors.[3,16] Participatory design (also referred to as co-design) methodologies are one way of achieving this. As co-design positions users at the centre of the design process,[17] the user's role is not only as a consultant or tester of technology solutions but also as a co-designer who has involvement from conception to completion of the project.[18] Co-design as a principle is not new. It was developed in the 1960s in relation to technical communication, and its importance has been advocated for more than two decades.[19] It was not until recently, however, that these methodologies have been applied to design and develop health and wellbeing technologies such as telemedicine services,[20] e-health solutions for women with perinatal depression,[21] information systems in health care,[17] web-based integrated care plans,[14] and mindfulness programs.[22]

## Three principles of participatory design

In 2012, the Young and Well Cooperative Research Centre (CRC) created a guide for using participatory design for the development of evidence-based online youth mental health promotion, intervention and treatment programs.[18] These guidelines outlined three principles. The first is that young people are active participants throughout the entire design process, from problem setting to problem solving. This principle is vital — in a recent systematic review of participatory development of technology-based interventions, Orlowski and colleagues[15] reported that they did not identify any projects which had actively involved young consumers in the project planning stage, with project aims and goals unreflective of their input. The second principle is that of co-design where young people are design partners — they contribute to the project by participating in idea generation, creating solutions and giving feedback on existing design concepts. The third principle involves an iterative process in which the acceptability of the proposed technology is continually evaluated from the perspective of young people to determine if it is relevant, meaningful and engaging. This also includes considering the potential for positive and negative impacts on mental health and wellbeing outcomes.

Adhering to these principles, the Project Synergy research and development (R&D) cycle explicitly positions users as empowered participants in all stages of design, development, implementation and feasibility testing.

## Methods of participatory design

Across our studies which involved young people in four groups — those attending university, those in three disadvantaged communities in NSW, those at risk of suicide and those attending five headspace centres — the Project Synergy R&D cycle was underpinned by three phases: co-design workshops, user testing, and implementation and feasibility testing. Co-design workshops enabled representatives from all user groups (young people, supportive others, health professionals), researchers, academics and technology developers to co-design alpha prototypes (a version of the technology that allows users to interact with and test the proposed solution). Importantly, supportive others are considered a user group as it has been consistently found that young people (with or without mental health problems) report that the top sources of help they would go to are friends, parents,

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relatives and other family friends.[1,2,8] Further, supportive others (or carers) are commonly consulted in mental health settings to develop interventions.[23] User testing refers to the process of evaluating the degree to which the alpha prototype meets specific usability criteria, with evaluation by all user groups. Through implementation and feasibility testing, the beta prototype (a more polished version of the prototype that can be used directly by users for feasibility testing) is tested to determine engagement and potential impact of the final technology solution. The phases of the R&D cycle are conducted sequentially; however, time frames for each phase are dependent on the needs of each unique user group within the various target communities.

The development of the R&D cycle was overseen by a multidisciplinary team including users, researchers, academics, health professionals and technologists. Knowledge translation teams (comprising people who can implement research findings into practice) assisted with the knowledge translation and rapid prototyping during Phase 1 (co-design workshops).

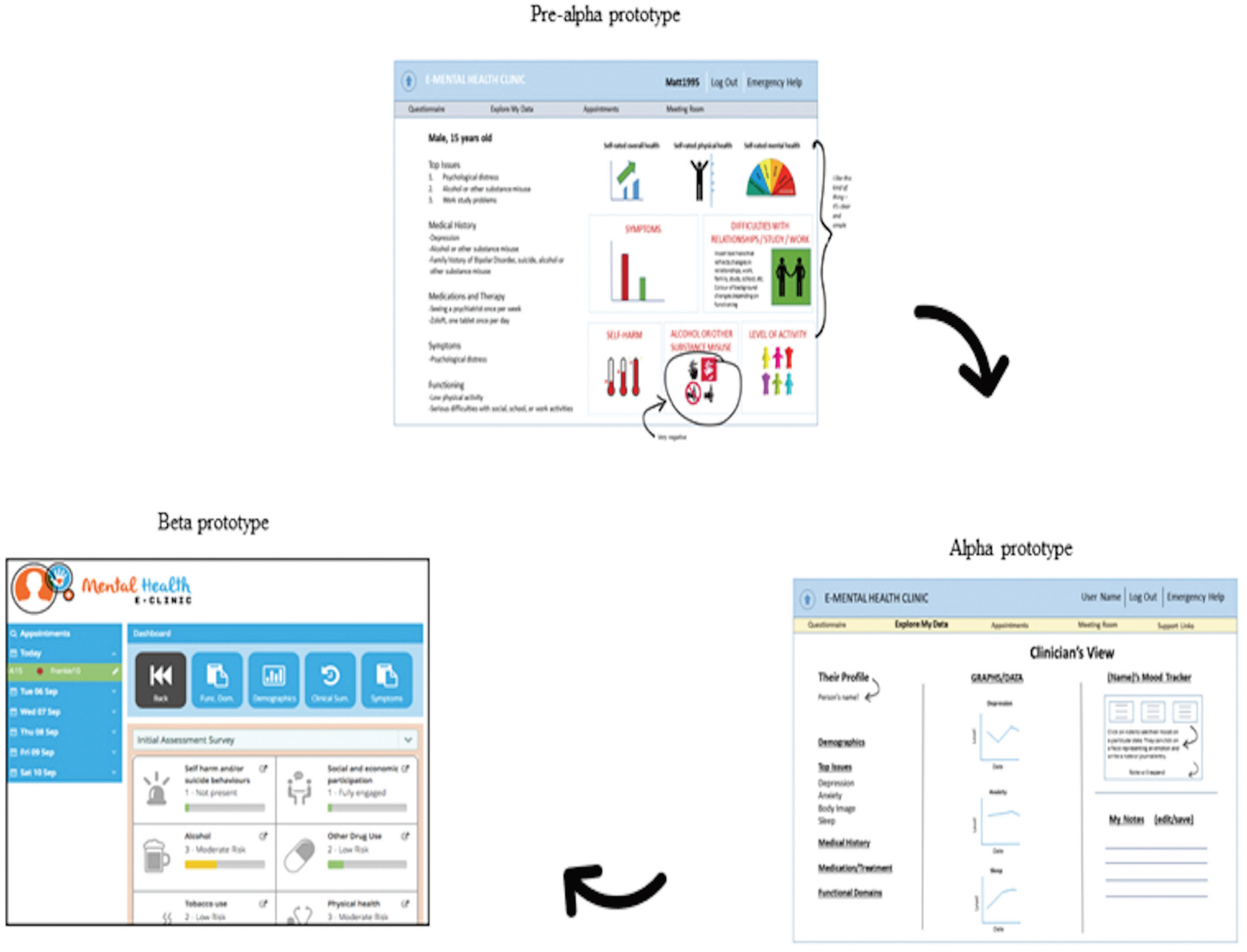
### Phase 1: Co-design workshops

Co-design workshops for each of the four research studies were facilitated by the R&D team with users including young people, supportive others and health professionals (see the studies outlined in Chapters 3–6 for details of participant recruitment strategies and additional methodologies). The purpose of these workshops was to determine user needs to inform prototype designs.

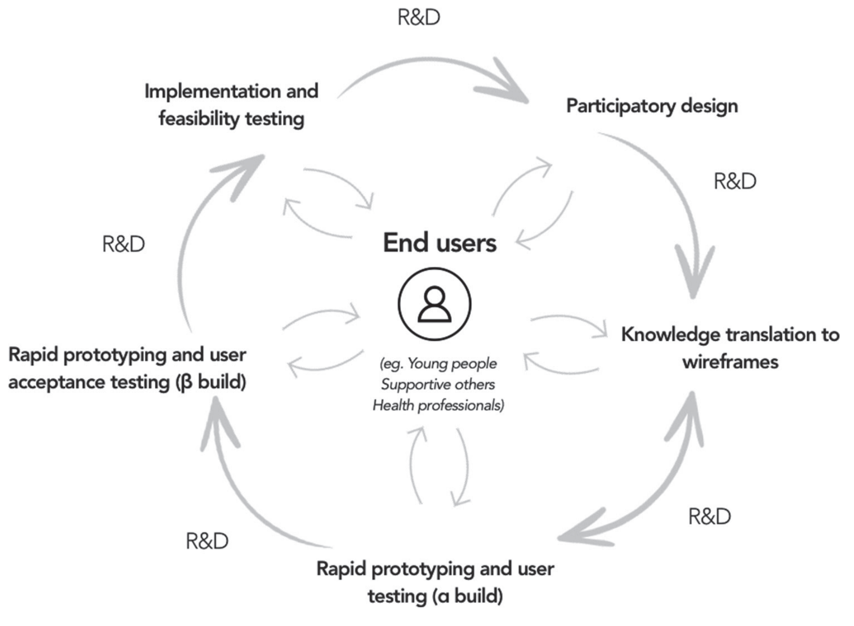
Each co-design workshop had at least one facilitator, and a health professional available for the duration of the workshop as a requirement of the University of Sydney Human Research Ethics Committee to ensure duty of care requirements could be met in the event that any of the workshop participants experienced distress during an activity.

For each study, a series of co-design workshops was conducted as rapidly as possible to maintain the momentum of idea creation, continuing until theme saturation had been reached and no new insights were identified. Each individual workshop was undertaken by participants over a 3-hour period using an agenda consisting of three stages: discovery, evaluation and prototyping. An important component of this methodology was that no digital technology was used during the workshops. Research has shown that a paper-based approach to co-design results in a greater number of ideas and design solutions being generated within a session, compared with workshops that use digital technology.[24] Data from the workshops were collected through three main sources: gathering written comments made by co-designers relating to previous real-life examples; hand-drawn mock-ups; and transcribing detailed qualitative notes of the comments made throughout the workshops.

**1 Example of prototype development in Phases 1 and 2 using the Project Synergy R&D cycle**



**2 Final Project Synergy R&D cycle**



### Phase 2: User testing

The aim of this phase was to assess the usability of alpha prototypes from the perspective of users, and to understand their views on the prototype's impact. People who were identified as target users participated in one-on-one interviews, lasting about 90 minutes. Within these sessions, participants engaged with the alpha prototype and were guided through various tasks by a facilitator. The user testing process allowed facilitators to understand how users experience the technology and consequently to identify errors within the software. As participants were guided through the alpha prototype by a facilitator, they provided verbal feedback on usability, experience and personal acceptance of the software. Facilitators used a detailed guide which applied "think aloud" methodology (a qualitative research method in which participants speak aloud any words on their mind as they complete a task, for the purpose of making their thought processes explicit and improving feedback about the testing process) and observations of a participant's online behaviour. A scribe was also present to note all comments made by participants as well as discussion between a facilitator and participants. In relation to fulfilling duty of care requirements, where relevant, the facilitator was also a health professional. Where the facilitator was not a health professional, a health professional was on standby.

The qualitative data from user testing were collated and rapid prototyping took place based on this feedback. During rapid prototyping, research and development were conducted as parallel processes. Each prototype, which may or may not evolve into the final version of the technology, was created and tested by users.[25] This was carried out through an iterative process until agreement was reached for the beta version of the prototypes.

### Phase 3: Implementation and feasibility testing of beta prototypes

Through implementation and feasibility testing, beta prototypes were tested to determine engagement and impact of technology solutions. Engagement measures how users interact with the prototypes. For example, this can include frequency and length of session, when the prototype is used and on what device, what pages are visited, what apps and e-tools are integrated, and how users exit a prototype. Data concerning the acceptability and usability of prototypes were also collected to determine, for example, user satisfaction with the product. These data may also include personal impacts on users, such as determining changes in their social, health and wellbeing outcomes.

During implementation and feasibility testing, users were given access to the technology solution for a set period of time. Data were collected directly through the prototypes, from online analytic tools as well as evaluation surveys, to provide feedback on engagement and potential impact.

## Outcomes of participatory design

To ensure all users had the opportunity to independently explore and voice their needs to inform alpha prototype designs, the first round of co-design workshops for each study grouped participants according to user category (ie, young people, supportive others, health professionals, service providers). This helped each user group to explore their needs within a safe environment and, for many participants, helped build their confidence in voicing their opinions. Once the initial round of single user type co-design workshops was completed, all subsequent co-design workshops involved co-attendance and participation by multiple user types. This ensured robust discussion and exploration of ideas from multiple perspectives, often resulting in a combined view being suggested for consideration.

At the end of the participatory design stage, knowledge translation teams independently collated and analysed the visual data as well as transcriptions generated from the workshops. Their contribution to the R&D cycle was a key point of difference from the many diverse participatory design processes described in the literature. A form of inductive qualitative analysis was then carried out by thematically coding the workshop materials using a standard approach commonly used in mental health settings.[26] Using all the available workshop artefacts (ie, data), common themes that captured important ideas and patterns of responses were identified. Knowledge translation team members used wireframing software to independently develop wireframes (hand-drawn diagrams representing the skeletal framework of a website), which formed pre-alpha prototypes. Feedback on pre-alpha prototypes was elicited through an iterative process until agreement was reached.[27] The resulting alpha version provides the initial prototype of any technology solution which can then be user tested in the next stage of the R&D cycle.

User testing specifically assessed whether participants were able to complete specified tasks successfully; how long it took to complete these specified tasks; participants' satisfaction with how the prototypes operated; changes required to improve user performance; and whether the performance of prototypes met usability objectives.

An example of Phases 1 and 2 of the R&D cycle is provided in Box 1. Additionally, the population and participation details for each of these phases for the four studies are presented in Supporting Information, chapter 2, table 1. Findings from Phase 3 implementation and feasibility testing are described in detail in Chapters 5 and 6, and the final Project Synergy R&D cycle is illustrated in Box 2. Specifically, Box 2 shows how users are placed at the centre of the co-design process, as they help inform the continuous development of the technology solution through the iterative use of participatory design (or co-design), knowledge translation, rapid prototyping and user testing methodologies, as well as implementation and feasibility testing.

## Discussion

Through four studies, the development of an iterative Project Synergy R&D cycle of co-design workshops, user testing, implementation and feasibility testing has been refined. This cycle will continue to be applied to future Project Synergy research studies, and may be used as a model for other disciplines to apply when researching and developing the application of new technology solutions.

Ultimately, this iterative R&D cycle addresses a key challenge in creating new and innovative technology solutions. While it takes 17 years on average for original research to be sequentially integrated into clinical practice,[28] by using the R&D cycle, each of the studies went from design to development to implementation and feasibility testing within a 12-month period. Importantly, this was enabled by the rapid, iterative and continuous nature of the cycle. This rapid turnaround is crucial because new evidence-based innovations are continuously being developed and they must keep pace with the rapid rate of new and emerging technologies being released on a daily basis.

The agility required for co-design, development, and implementation and feasibility testing poses a challenge for the Australian health system. However, we believe that the innovative methods outlined in the Project Synergy R&D cycle provide a framework for developing technology-enabled solutions for mental health services reform.

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## Supporting Information

Additional Supporting Information is included with the online version of this article.