

The TAC Toolkit: Supporting Design for User Acceptance of Health Technologies from a Macro-Temporal Perspective

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ABSTRACT

User acceptance is key for the successful uptake and use of health technologies, but also impacted by numerous factors not always easily accessible nor operationalised by designers in practice. This work seeks to facilitate the application of acceptance theory in design practice through the Technology Acceptance (TAC) toolkit: a novel theory-based design tool and method comprising 16 cards, 3 personas, 3 scenarios, a virtual think-space, and a website, which we evaluated through workshops conducted with 21 designers of health technologies. Findings showed that the toolkit revised and extended designers' knowledge of technology acceptance, fostered their appreciation, empathy and ethical values while designing for acceptance, and contributed towards shaping their future design practice. We discuss implications for considering user acceptance a dynamic, multi-stage process in design practice, and better supporting designers in imagining distant acceptance challenges. Finally, we examine the generative value of the TAC toolkit and its possible future evolution.

CCS CONCEPTS

• **Human-centered computing** → **HCI design and evaluation methods**.

KEYWORDS

technology acceptance, user-centered design, design cards, technology acceptance lifecycle, macro-temporal perspective

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1 INTRODUCTION

Users' acceptance of health and mental health technologies is key to their successful design, uptake and use. As new technologies, from smartwatches to virtual reality headsets, are increasingly employed for diagnosis, treatment, and monitoring [72], evidence of clinical effectiveness is critical to their success in practice, yet not alone sufficient for individuals' willingness to take on and engage with the technology. User acceptance — an individual's perception of a technology leading to its use or non-use — is impacted by numerous factors, which have been articulated by multiple models over the past three decades [21, 95, 96, 98–100]. Despite such models however, it has been argued that our understanding of user acceptance in research practice is limited by the existence of precisely such numerous and diverse interpretations of the concept, at times incongruent with theory, as well as the inconsistent use of theory to support exploration and measurement [63]. Our perception of any one technology evolves over time: we may, for example, take up a new device, and only a week later discontinue its use. In the design of healthcare technologies, it is critical to understand and address the reasons for such abandonment, in particular given the longitudinal nature of care and trajectories of many chronic conditions. Despite the concept's importance, user acceptance is often overlooked during the process of design [63]; existing methods for attending to acceptance requiring the review of a large set of acceptance factors [22], or focusing arbitrarily on a few [29, 91, 104].

This paper strives to address this gap between theory and practice, by introducing the Technology Acceptance (TAC) toolkit — a novel design tool to support designers' reflection around user acceptance and its evolution across the user journey. We report on the evaluation of this toolkit by means of 7 workshops, conducted with 21 designers of health and mental health technologies with interdisciplinary expertise. These workshops were designed to support analysis and understanding of the following research question: *What is the value of the TAC toolkit for supporting reflection on technology acceptance and designing for acceptance from a macro-temporal perspective?*

Our contributions are three-fold, including (i) the TAC toolkit as a novel design tool and method to help designers leverage acceptance theory and apply it to the design of health technologies, (ii) the macro-temporal perspective as a means to support design for acceptance featuring *temporal multi-choice scenarios*, and (iii) implications for considering user acceptance a dynamic, multi-stage

process in design practice, better supporting designers in imagining distant user acceptance challenges, and examining the generative value of the TAC toolkit and its possible evolution over time.

2 RELATED WORK

Design for user acceptance of health technologies requires first understanding existing theories and the temporal dimension of the process, and secondly leveraging this knowledge in design practice.

2.1 Modeling User Acceptance

Research has extensively explored the reasons behind users' acceptance or rejection of technology [71]. Technology acceptance research initially focused on the workplace context, leading to models including the Technology Acceptance Model (TAM) [20], its extensions [95, 96, 98], and the Unified Theory of Acceptance and Use of Technology [99], before exploring broader contexts [15, 100]. As digital innovation gained traction in the healthcare context, user acceptance theories evolved accordingly, producing many new models [12, 23, 27, 41, 46, 79]. The expansion of acceptance theories to the health domain, while welcome, has therefore also resulted in a wide range of additional models, presenting diverse and numerous influencing factors. This complexity has rendered the field of knowledge difficult to navigate for designers of health and wellbeing technologies. Although Marangunic et al. reported "continuous progress in revealing new factors with significant influence on the core variables of the [TAM] model" [50, p. 81], Nadal et al.'s review [63] showed that interpretation of user acceptance varied significantly among digital health researchers, *perceived usefulness* being the factor most investigated, and that few studies engaged with acceptance models. Additionally, a strand of the literature has argued for considering user acceptance as a multi-stage process, evolving over time [24, 32, 52, 63, 70, 80, 85, 89]. Recently, the Technology Acceptance Lifecycle (TAL) [63], for example, articulated the stages of user acceptance according to the continuum *pre-use acceptability—initial use acceptance—sustained use acceptance*.

The rich body of work on technology acceptance has thus to date proved predominantly theoretical, focusing on models and factors, with limited accounting for the temporal aspect of acceptance.

2.2 Designing for User Acceptance

Despite the rich theoretical framework of acceptance, attempts to attend to this concept at design stage often consider only a small subset of acceptance factors present in validated models. Among these, *perceived usefulness* and *perceived ease of use* are the most addressed in design practice [29, 91, 104], although researchers have stressed the difficulty of addressing these factors in design [91], and the need for novel standardized design approaches [104]. Other design approaches include Detjen et al.'s method — employed in relation to acceptance of automated vehicles — of first reviewing existing acceptance models and comparing their different sets of factors, then reviewing existing approaches for addressing these factors, and finally formulating guidelines to design for user acceptance of these particular technologies [22].

While we therefore recognize researchers' efforts to rely on validated acceptance theories, current practices seem to focus on a subset of acceptance factors. This means that other potentially

relevant factors (such as *self-image*, *technology anxiety*, etc.) are overlooked, reducing opportunities to improve the resulting designs. The lack of standardized approaches to design for acceptance furthermore leaves designers uncertain as to how to address acceptance in practice. This might result in a greater focus on acceptance at the deployment stage, instead of throughout the entire design process when challenges may more feasibly be addressed [54, 98]. Finally, while studies have occasionally attempted to account for a wider range of acceptance factors in design, doing so has required extensive reviews of the literature — an approach unsustainable for many design projects.

2.3 Temporality in HCI

The evolving nature of user acceptance furthermore suggests the need to consider how *temporality* is addressed in HCI research. Temporality has recently received attention beyond the traditional clock-time perspective, encompassing also socio-cultural and existential aspects of time [69]. These latter aspects have primarily been explored through the lens of user experience (UX), frameworks emphasizing the episodic quality of discrete experiences [31], or highlighting its felt-life quality [26, 55]. This early work has focused on discrete events, failing to capture the temporal richness and complexity of users' patterns of interaction with technology [26].

Other related work has focused on the adoption of domestication theory [83], describing the three stages of technology *adoption: commodification* raising expectations of technology's function and value before its use, *appropriation* during which users integrate technology into their lives, and *conversion* whereupon users accept the technology as reflecting their self-identity and signaling status. Karapanos et al.'s framework of user experience over time [44], additionally argues for the importance of moving from the micro-temporal perspective of how user experiences are formed, modified and stored, to how they change over time [44]; positing 4 key UX phases: *anticipation*, *orientation*, *incorporation*, and *identification*.

Temporal richness can also be surfaced by examining interactions over time intervals, rather than at discrete time points [30, 42]. Yet, limited work has explored the trajectory approach to user experience, with a small number of exceptions including Benford and Giannachi's framework for capturing the chronology of events in mobile games [6]. The concept of *interactional trajectory* also extends the traditional user journey "through a user experience" [93] to richer trajectories "over space and time [involving] multiple roles and interfaces" [7]. Most recently, temporality in HCI has been considered in speculative and futuring design [47].

The growing body of HCI research on temporality has thus mostly focused on interaction at the micro level or adopted the lens of situated and discrete user experiences — with much less work exploring the macro level perspective as to how user experiences change over time.

2.4 Design Tools to Bridge Theory & Practice and Represent User Trajectories

HCI researchers and designers have previously devised a variety of methods for bridging theory and practice [17, 94] during the early stages of technology design [76], including cards [35], personas, scenarios, cultural probes [33, 34], and toolkits [45, 48, 66, 75, 90].

Design cards in particular are often employed in early design, to support practices of reflection, ideation, and communication [8, 66].

The potential of these methods to succinctly communicate theoretically abstract concepts has led to the development of cards articulating concepts and models as diverse as the Tangible Interaction framework [40], Exertion framework [60], Playful Experiences framework [49], and child developmental concepts [5]. Designers of these card decks have drawn on a variety of means of communication, from sensitizing questions and illustrative images [40], to thematic thought-provoking questions [60], quotes, and both textual and graphical descriptions of activities [5].

The use of design cards in practice can also be supported by the parallel adoption of other design tools, including personas and scenarios, as means of depicting and anchoring users' interactions in relation to hypothetical future systems [16, 25]. Usually depicted in text form, scenarios can also be augmented visually [25], or rendered interactive, as in the case of hands-only [11], role-play [102], and design Thing'ing scenarios [82]. More recently, scenarios have also been used as means to educate designers in relation to theory (e.g. social science theories [102], psychology theories [68]), or to sensitize designers to users' feelings and lived experiences [74]. Personas and scenarios have finally been widely employed for the design of health technologies [36, 92, 101, 103].

Design cards' long history of the effective communication of theory suggests their potential as means of operationalizing the rich theoretical space of user acceptance, if made, and considered accessible, engaging and meaningful to practising designers. Employed alongside personas and scenarios, cards may furthermore prove means of usefully representing the temporal unfolding of the user acceptance journey with digital health interventions.

3 INTRODUCING THE TAC TOOLKIT

To address the challenge of designing for health technology acceptance — surfacing what matters most to designers and users in regard to health technology acceptance, and in turn supporting improved alignment of their needs and values — we developed the Technology Acceptance (TAC) toolkit. The toolkit aims to (i) render user acceptance theory more accessible to designers, (ii) produce a true-to-life context in which to weigh questions pertaining to user acceptance of technology, and 3) create a space in which to reflect upon and begin designing for health technologies. While diverse stakeholders might be involved in the use of health and wellbeing technologies, the TAC toolkit has as its primary target audience designers developing health and wellbeing technologies for users receiving support directly through these technologies. Materials in support of these aims were developed by the authors through an 8-month iterative design process.

Sensitively designed and informed by existing models of user acceptance, the TAC materials in their final form consist of five primary components: a set of 16 cards, 3 personas, 3 scenarios, a virtual think-space, and a website.

3.1 Designing the TAC Cards

Designing the cards involved the careful selection of relevant technology acceptance models, identification of key antecedent factors, and the design of the cards' textual and visual content.

3.1.1 Selecting the Models of Technology Acceptance. Drawing on the acceptance literature, we selected validated models as the theoretical basis for the TAC toolkit. We first considered those models and extensions constituting the current theoretical foundations of technology acceptance: the TAM [20], TAM2 [98], TAM2' [95], TAM3 [96], and UTAUT [99]. Next, we included models pertaining to pervasive technologies: the UTAUT2 [100], and PTAM [15]. Finally, we incorporated acceptance models devised specifically for the healthcare context: the HITAM [46], Hsu et al.'s model [41], Dou et al.'s model [27], Cheung et al.'s model [12], Schomakers et al.'s model [79], and Dhagarra et al.'s model [23].

3.1.2 Identifying the Key Concepts across the Selected Models. In order to ground discussion among designers in pragmatic terms pertinent to real-world design choices, we chose to focus the TAC cards on antecedent factors, representing explanatory variables impacting user acceptance. Table 1 provides a complete overview of the 16 antecedent factors included within the final TAC card deck, along with their definitions, and models of origin. To maintain a clear focus on the health context, we additionally excluded those constructs highly particular to the use of technology for work (e.g. *job relevance* [98, 99]). Where models overlapped, similar constructs were regrouped as a single unique factor to facilitate their inclusion (e.g. *reference group influence* [12] and *voluntariness to use* [96, 98, 99] were regrouped under *social pressure*).

3.1.3 Developing the Cards' Textual and Visual Content. Each card in the TAC deck¹ represents a single antecedent factor of technology acceptance, depicted on the front side in the form of a title and icon combination, intended to support memorability and the ability to easily distinguish cards from one another (see Fig. 1). Following both the common acceptance literature practice of categorizing acceptance factors [27, 46], and Alkhuzai and Denisova's design card heuristics recommending the grouping of cards and differentiation of groups using color [2], we created three color-coded categories pertaining to **Health** (red), **Individuality & Social context** (orange), and **Technology** (blue), linking each of the 16 TAC factors to the category most closely related to their definition. This categorization was devised to both facilitate users' familiarization with the cards and increase the learnability of the 16 acceptance factors.

Inspired by previous work concerning the value of sensitizing concepts [76] and interaction design tools intended to make frameworks (including for tangible interaction [81]) more accessible, we furthermore developed a series of thought-provoking, sensitizing questions pertaining to each factor (displayed on the back of each card). The first of these questions served to communicate the factor's definition in an accessible and engaging fashion, while the remaining questions encouraged deeper reflection in relation to different and specific aspects of the concept's definition. The cards were finally designed to resemble playing cards in support of user engagement.

¹The complete set of TAC cards is available for download from the supplementary materials.

Table 1: The acceptance antecedents covered by the TAC cards, by category, alongside their definition and models of origin.

Factors	Definitions	Models
Health		
Health status	Whether one “has any diseases or comorbidity” [46, p. 3].	[46]
Health beliefs and concerns	Perceived susceptibility and issue severity [37].	[12, 46]
Healthcare professional relationship	Trust in clinician to deliver accurate health information, and help seeking behavior [27].	[27]
Individuality & Social context		
Demographics	Gender, age, socio-economic status [15, 99, 100].	[15, 99, 100]
Resistance to change	“People’s attempt to maintain their previous behaviors and habits in the face of change required” [27, p. 3].	[27]
Self-image	“The degree to which use of an innovation is perceived to enhance one’s image or status in one’s social system” [59, p. 195].	[96, 98]
Social pressure	“The perceived social pressure to perform or not to perform the behavior” [1, p. 454].	[12, 15, 46, 99, 100]
Perceived social support	Facilitating conditions, or “the availability of resources needed to engage in a behavior” [88, p. 139].	[12, 95, 96]
Technology		
Technology anxiety	“The fear or apprehension felt by individuals... when they considered the possibility of computer utilization” [84, p. 238].	[46, 95, 96]
Perceived reliability	Output quality (“how well the system performs [required] tasks” [98, p. 191]) and result demonstrability (“tangibility of the results of using the innovation” [59, p. 203]).	[46, 96, 98]
Technology playfulness	“The degree of cognitive spontaneity in microcomputer interactions” [105, p. 204].	[46, 95, 96]
Technology enjoyment	“The extent to which the activity of using a specific system is perceived to be enjoyable in its own right” [95, p. 351].	[46, 95, 96]
Privacy protection	“Concern for loss of privacy and need for protection against uncalled-for communication and misuse of personal information” [23, p. 4].	[23, 41, 79]
Trust	Belief that “the healthcare provider [will] fulfill [the patient’s] needs” [23, p. 4].	[23]
Objective usability	Construct allowing to “compare different systems using objective measures of usability/system characteristics” [97, p. 457].	[27, 46, 95, 96]
Integration	“How well the technology is integrated into our lives” [15, p. 4].	[15]

3.2 Crafting the TAC Context

Primarily envisioned as an exploratory design method for use early in the design process, the TAC toolkit furthermore comprised personas, scenarios, a think-space, and a website.

3.2.1 The TAC Personas. We adopted the use of personas and scenarios as means of crafting a realistic context for reflection on technology acceptance on behalf of persons receiving health or mental health care, both as a means of providing examples of an implementation of the acceptance journey, and for enabling us to explore one possible use of the TAC cards in the design process. Through iterative collaborative design, we developed 3 personas², each associated with a respective scenario. While designing these personas, we aimed to ensure diversity of age, gender, and health concerns, creating three fictional characters living with common yet diverse health issues, for which technological solutions are often offered. These include Ella, a young woman and trainee solicitor diagnosed with type 2 Diabetes; Ali, an elderly bereaved spouse and retired florist, prescribed and struggling to manage antidepressant medications; and Alex, a middle-aged bus driver and father of three,

worried about the possibility of catching COVID-19 and passing it on to his family. Each persona was defined in terms of information including demographic details (i.e. age, occupation, health status, social context), experience with technology, challenges faced, and personal traits that may influence acceptance of technology.

3.2.2 The TAC Scenarios. In parallel with these personas, we developed 3 scenarios³ designed to inspire engagement with the unfolding of each persona’s *interaction trajectory* with a pertinent technology, namely a glucose monitoring sensor and app (Ella, Diabetes), medication reminder app (Ali, depression), or governmental contact tracing app (Alex, COVID-19). To account for the evolving nature of user acceptance over time, we emphasized the macro-temporal perspective of technology acceptance by employing the Technology Acceptance Lifecycle (TAL) timeline to structure each scenario in terms of the 3 consecutive stages of *pre-use acceptability*, *initial use acceptance*, and *sustained use acceptance* [63]. The *pre-use acceptability* stage encompasses the period before any interaction with a technology occurs, but when both awareness and contemplation of its use surface. Thus, drawing also from previous

²The 3 TAC personas are available at [62].

³The 3 TAC scenarios are available at [62].

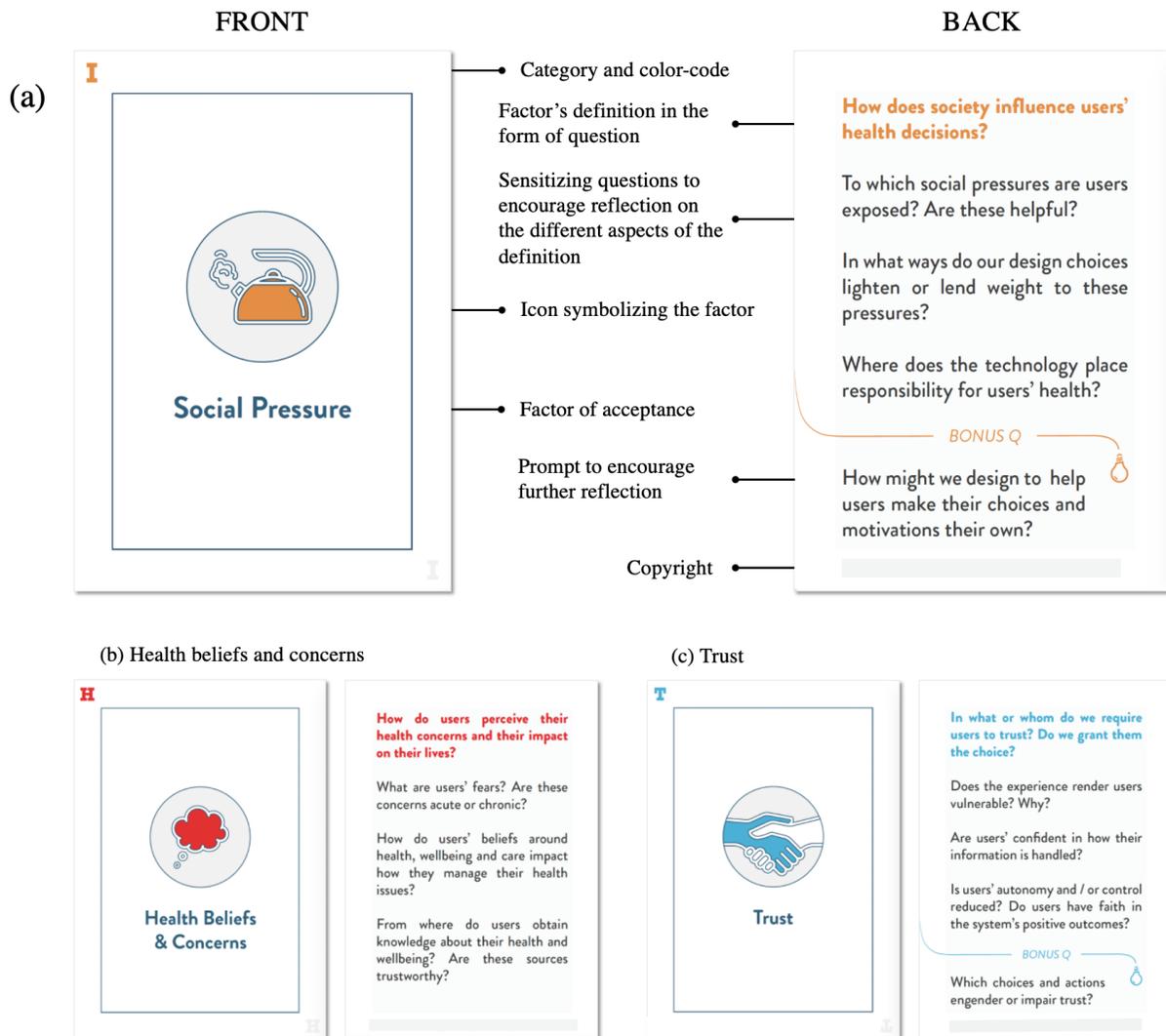


Figure 1: Examples of TAC cards showing on the front antecedents of technology acceptance: (a) Social pressure, (b) Health beliefs and concerns, and (c) Trust, and on the back sensitizing questions.

work, 2 specific and critical temporal milestones in this stage were identified as *seeking advice* (a critical step in an individual's health trajectory [67]), and *choosing technology* (the decision to start using a health technology [86]). The very first interaction with a technology marks the end of *pre-use*, and the beginning of the *initial use acceptance* stage. Here, to facilitate exploration of a more granular time scale, we considered the following 3 temporal milestones: *first interaction*, *next day*, and *a week later*. Finally, in the last stage of *sustained use acceptance*, we considered the following temporal milestones: *after 1 month*, *after 3 months*, and *after 1 year* — the first 2 of which have been suggested as milestones for long-term acceptance in previous work [98], while the last was added to reflect the lengthy or lifelong nature of many health conditions.

To support rich engagement on behalf of designers, we furthermore identified and described for each specific milestone 3 paths;

each recounting acceptance issues of either high, medium or low degrees of challenge. For this, we drew inspiration from interactive narratives [3], where multi-choice scenarios have been employed in place of linear sequence stories or traditional linear scenarios. Thus, at each temporal milestone, designers can choose among 3 different paths that which they would prefer to explore (see Appendix A).

Design tools fostering empathy have long acknowledged the value of scenarios, in the mental health context in particular, from video stories [38] to vignettes, as means of describing the lived experience of ill health [74], or supporting therapeutic role-play [53]. To further elicit empathy in this case, both personas and scenarios were written in the first person, and employing believable, colloquial language. We aimed to furthermore increase empathetic engagement through the use of role-play, as previously employed to support the design of health technologies [53].

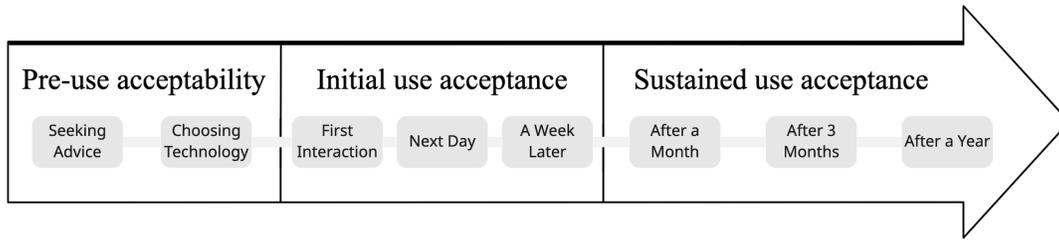


Figure 2: Scenarios’ temporal milestones, alongside the 3 stages of the Technology Acceptance Lifecycle [63]: *pre-use acceptability, initial use acceptance, and sustained use acceptance.*

3.3 Devising the TAC Process

The final step in completing the design of the TAC toolkit was to provide designers a space in which to collaborate and interact with the TAC cards, personas, and scenarios.

3.3.1 *The TAC Think-Space.* To enable designers to work collaboratively with the TAC cards in relation to specific design problems, we created a virtual board using the online platform Miro [58]. This think-space enabled participants to interact with the TAC cards in virtual-analogue form, displaying their front side only, in a collaborative digital space, at the same time as interacting with the physical deck. This space allowed designers to place selected cards against each temporal milestone of the user journey, while making notes reflecting their decision-making process to the side (Fig. 3).

3.3.2 *The TAC Website.* Finally, as multi-choice scenarios can be more effectively implemented digitally, we also developed the TAC interactive website [62] to host the digital personas and scenarios (see Fig. 4).

4 EVALUATING THE TAC TOOLKIT

We designed a study to support evaluation of the TAC toolkit as a novel exploratory design tool with the aim of gathering insight into designers’ experiences of using the toolkit, and perceptions of its value for designing for user acceptance of health technologies.

4.1 Participants

We recruited designers of health and mental health technologies through our personal and professional networks as well as Twitter postings. Participants were deemed eligible if over 18, proficient in

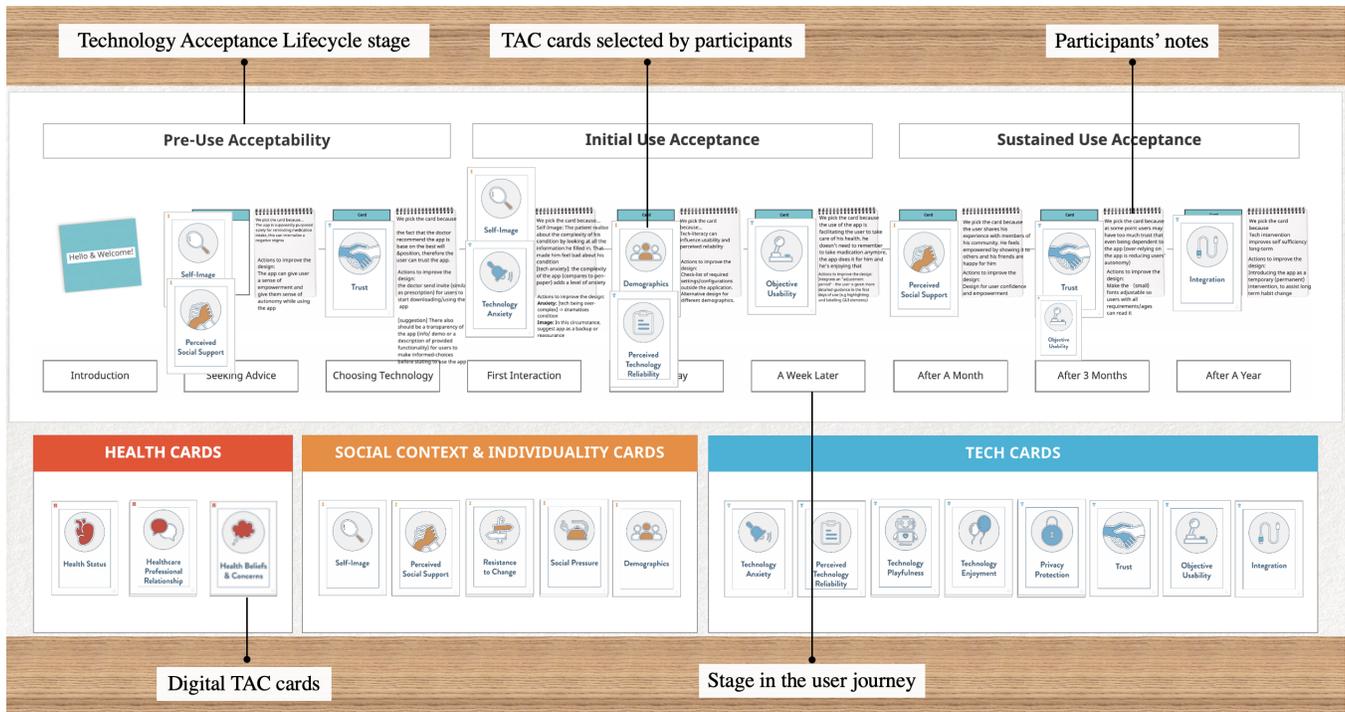


Figure 3: Post-workshop think-space (Group 5) showing the 3 stages of technology acceptance (top), the cards selected by participants for the 8 temporal milestones (middle), and the 16 TAC cards color-coded by category (bottom).

8 CONCLUSIONS

We report the design and evaluation of the TAC toolkit, a novel theory-based design tool and method, with the aim of exploring how user acceptance theory can be leveraged in the design of health technologies. Findings showed that, through playful engagement, the toolkit revised and extended designers' knowledge of technology acceptance, fostered their appreciation, empathy and ethical values while designing for acceptance, and motivated its future use in their design practice. Finally, we discussed implications for considering user acceptance a dynamic, multi-stage process in design practice and better supporting designers in imagining distant user acceptance challenges, and we considered the generative value of the TAC toolkit and its possible future evolution.

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A APPENDIX

Nodes	Neutral path #1	Neutral path #2	Neutral path #3
SEEKING ADVICE	We were watching the news when. The Minister for Health was on the news explaining how important "contact tracing" app is in terms of dealing with this whole COVID thing. They were talking about how important this is for us to download it, how it's fully GDPR compliant, we can opt out whenever etc etc. Seems important.	I talked to the family. We were having dinner, chatting & once again COVID was the topic of conversation. They're worried about me coming into contact with it working the bus route, and to be honest, so am I - especially with my heart. My son asks if I have downloaded the contact tracing app. I mention I have some hesitations, privacy and all that, but he walks me through it.	I was on the internet. I've seen a lot people talking about this "contact tracing" app on Twitter in the past few days, not all positive. There's been a bit of chat in my WhatsApp groups about it - which is far from peer-reviewed I know - but still, I've got some apprehensions about it. The health minister tweeted a series of videos explaining how important contact tracing was to the public effort.
CHOOSING TECHNOLOGY	There it was, in the AppStore. When I logged on to Twitter this morning the first Ad in my feed was from the government, for this contact tracing app. I was going to download it anyway, but decided to click in straight away and get it downloaded before I forgot.	It was on the boss's orders. We all got an email in work from the head office. They have insisted we download the COVID tracker app if we want to stay on the job. I would have probably done it anyway but still, the role is public facing & public sector so I can see why. Went onto the App Store and downloaded it.	We were chatting over dinner. COVID has been the main topic of conversation at our dinner table lately. I ask my son about this contact tracing app, tell him some of my hesitations - what I've been seeing in my WhatsApp chat. He's a bit more turned into this tech stuff. Says it's WhatsApp I should be worried about, not the contact tracing app - especially with my condition. He walks me through it a bit more, even downloads it for me.
	 High severity path	 Medium severity path	 Low severity path
FIRST INTERACTION	Is this thing working? Downloaded it from the App Store but it doesn't seem to be right. It downloaded fine but when I try to open it I get some warning about "device compatibility". I haven't gotten a new phone in a few years, I think I might have to upgrade.	I've heard it's a big drain. Downloaded it from the App Store, all it needed was my phone number to set up. It requires bluetooth to be on - all the time. I'm a bit worried about it draining my battery if it's on all day.	Well, that was easy. Downloaded it from the App Store, seemed simple enough. It needs my number & my location. It has all the information about the country's cases, regional case breakdown etc. I had to "opt-in" for the contact tracing feature so that I'll get a notification if I'm near a confirmed case. Still somewhat hesitant, privacy wise, but given the situation, I think this is more important.
NEXT DAY	I'm lost in the settings. I thought I had it set up correctly but after talking to a friend at work about it, I realised I didn't "opt-in" for the contact tracing. I'm a bit lost in the settings to be honest, but I think I have it turned on now.	My battery seems low. I "checked in" this morning before work. No symptoms obviously. I charge my phone overnight and it generally lasts me all the next day, but my battery was at 20% by lunch today. It must be the tracker app, I've heard it's a big drain.	It only takes me seconds. Checked in this morning and that was it really. Over and done with in a few taps. It has information about the country's cases & stuff but other than that, there's not much to it.
A WEEK LATER	I was really worried when I saw the notification. I got an "exposure notification" yesterday. Apparently I had been in close contact with someone who tested positive - the only thing is, I've been off work the last two days, I haven't left the house I was thinking maybe it was a family member but none of them have gotten the same notification. I have no symptoms but I called my doctor regardless. Not too confident in the app at the moment.	I think I need a new phone. I bought a new phone. My old one wasn't compatible and now is as good a time as any to upgrade I suppose. The app is set up on my new phone & seems to be working fine. I check in once a day & haven't gotten any notifications.	I use it once a day and then forget about it. I check in once a day & haven't gotten any notifications. It doesn't bother me & I've been encouraging those around me to download it.
AFTER A MONTH	I got tested. Initially I thought I was overreacting, slight cough, bit of a headache etc. But as soon as my taste & smell started to go I knew something was wrong. Thankfully I had been off work. Got tested 3 days ago & have been quarantined ever since. The doctor asked me if I had the app & then asked if they could put in a code to notify close contacts. I said yes, it was the least of my concerns. Quarantined in the spare room, slightly worried.	I picked up a power bank. I had to buy a power bank for my phone. Having my bluetooth on all day was draining my battery too much. It's quite annoying & clunky.	I barely notice it. It's routine now, I check in over breakfast each morning, close the app & forget about it. Haven't gotten a single notification.
AFTER 3 MONTHS	It keeps crashing for me. I don't know if it's my phone or the app but it crashes everytime I try to check in. I've kept the app because it has up-to-date information about the number of cases in the country but I'm not sure how much good I'm doing by having it if it doesn't work as intended.	I haven't thought of it much. I've forgotten about it to be honest. It's useful for the case data but that's on the news most evenings & I don't know how much I need to hear daily cases if we just have to live with this COVID situation. It's overwhelming. I don't usually check in but I keep the app just in case I get a close contact notification.	I got a worrying notification. I got a notification last week that I had been in close contact with someone who tested positive. Given my work on public transport, it's not surprising. It was quite worrying to be honest. I thought "if I have it, then the rest of the family do as well, not to mention everyone at work". I would hate to be the one to have given it to family & friends. Everyone at home felt fine but we got tested regardless. Negative thankfully, but those were a stressful few days regardless!
AFTER A YEAR	I don't think I need it. We haven't had a community transmission in 6 months. The threat is still there but life has returned to normal - more or less. I got a new phone a few months ago & didn't bother to download the contact tracing app.	It's no hassle to keep it. I kept the app on my phone & checked in every day for a while, gradually less & less, and now I don't use it at all to be honest but things are a lot more under control at the moment. We haven't had a community transmission in 6 months, the threat is still there but life goes on. Still hesitant with regards to sharing my location constantly but it's a small price to pay considering the national risk.	I'm glad I used it. I'm glad I downloaded it to be honest! The family had a couple of scares where we got close contact notifications and had to get tested. Having the case numbers was handy but probably a bit too much information at times. Thankfully we've all managed to stay healthy.

Figure 7: Temporal multi-choice scenario for the persona Alex (COVID-19). Each of the 8 temporal milestones presents 3 paths, each exploring acceptance issues of high, medium or low degrees of challenge. The milestones of *seeking advice* and *choosing technology* (situated before technology use) present 3 neutral paths, as acceptance issues are yet to arise.