

Using Anthropometric Avatars in Fitness Applications: A Responsibility-Informed Design Study

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Abstract

Attempting to address the complex challenges of exercise demotivation and body dissatisfaction, NXT LVL is an upcoming mobile application that uses anthropometric avatars to gamify user interactions with fitness. Culminating in a set of design considerations to guide future development, this study employs two Value Sensitive Design methods to assess how facets of NXT LVL align with stakeholder values, along with the potential impacts of solution misuse/ misappropriation.

Introduction

Project at Large

Around 39% of UK adults are failing to meet Government recommendations for physical activity[1]. In turn, physical inactivity accounts for one in six UK deaths and is estimated to cost the UK £7.4 billion annually[2]. The rising prevalence of sedentary lifestyles can be correlated to the nation's increasing consumption of digital media[3], with today's society spending more time online than ever before[4].

With the current explosion in virtual reality (VR) content, immersive virtual worlds command an increasing portion of users' time and the production and consumption of virtual avatars is becoming increasingly commonplace. As part of a team enterprise venture, a new application is being developed which employs avatars in the digital representation of users' fitness journeys. Using gamification techniques to retain user motivation, the platform (called NXT LVL – pronounced 'Next Level') allows users to set fitness/ wellbeing goals and track their progress towards said goals, with improvements being reflected in their avatar who 'levels up' over time.

Project Aims

The NXT LVL platform uses anthropometric avatars as a relatable expression of the physical self, enhancing the connection users feel with their fitness journeys. This use of avatars also detaches perceived progress from bodily changes – prompting the user to fixate less on visual signs of improvement and more on the incremental progress they are making. It is hoped that creating a disconnect between the physical self and evidence of fitness progress will help people to feel more confident in their bodies, addressing body dysmorphia/ dissatisfaction and encouraging individuals to focus on health and wellbeing holistically, rather than its visual representation alone.

Using Value-Sensitive Design (VSD) methods, this study aims to explore the potential impacts of using NXT LVL and, more generally, the use of avatars in health and fitness applications.



Figure 1 Preliminary UI Mock-ups for NXT LVL

Stakeholders

A revised stakeholder map is shown in Fig. 2, indicating the parties directly and indirectly linked to the NXT LVL platform. A number of stakeholder groups were deemed especially valuable in conducting this study, and these are the ones who were selected to participate in the VSD activities detailed below. On the stakeholder map, these are highlighted in blue.

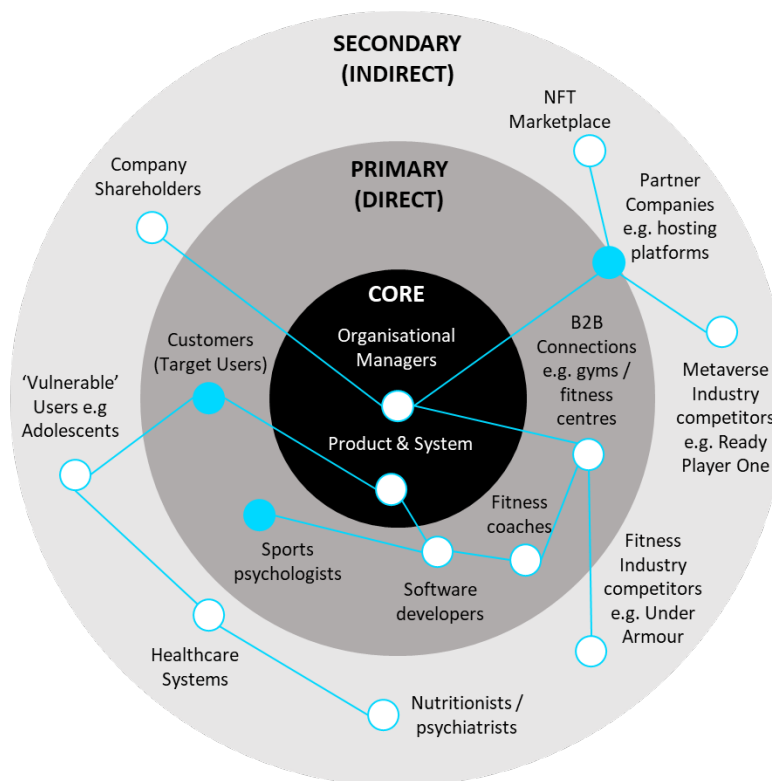


Figure 2 Stakeholder Map

Methodology

VSD Method 1: Semi-Structured Stakeholder Interviews

Using primary research methods (in this case, interviews) diminishes the need to rely on assumptions relating to stakeholder goals, agenda and purpose, giving interviewees a direct means of voicing concerns and identifying challenges relating to product development. Engaging with stakeholders in a semi-structured manner also has the potential to provide unexpected insight into how design solutions could be misunderstood, misappropriated or judged – broadening the designer's field of view.

Per the project plan, a total of 4 semi-structured interviews (minimum 30 minutes in duration) were conducted with representatives of various stakeholder groups. The interviewees, consisting of a sports psychologist, avatar creation platform founder and two projected end-users, were selected from the contact-base of consumers and experts amassed during the primary research phase of NXT LVL's development. Consent to participate in the study was re-affirmed prior to the interviews taking place, and permission to record and transcribe the interviews was also obtained. With consent established, one-to-one online interviews were held via Zoom and Microsoft Teams, with the transcriptions of each interview being later deconstructed and used to highlight participant values and any value-tensions present.

The questions asked during interviews varied depending on stakeholder roles and any specialisms that could be addressed. For projected end-users, questions concerned present and past consumer engagement with fitness, technology and the intersection of the two, along with some hypothetical, open-ended queries relating to the use of avatars the NXT LVL environment. For the sports psychology expert, the interview centred around the psychological facets of exercise motivation and participation, along with a discussion on how the features of our platform would

impact user wellbeing. Finally, an interview was conducted with the co-founder of Ready Player Me, a cross-game avatar platform for the metaverse. Somewhat shorter than the other interviews due to the participant's time restrictions, this meeting questioned what makes avatar-centric platforms valuable and moreover profitable, as well as the potential for using avatars as digital representations of fitness consumers.

VSD Method 2: Envisioning Cards

Envisioning cards were used to address the long-term and systemic issues arising from the deployment of virtual avatars in fitness applications. 3 envisioning cards were selected: 2 from the *Time* category (Fig.3, Fig.4) and another from *Stakeholders* (Fig.5). The cards were chosen to complement and build on the findings from the semi-structured interviews conducted earlier in the project. Areas unaddressed by the interviews related to non-targeted use of the product, its impact on lifestyle changes other than improving fitness, and the broader impact of the technology on friendships and family relationships over an extended timeframe. It was surmised that the input of stakeholders would not be required for the envisioning activities, so these were conducted independently with the outputs of each activity being documented in Miro to aid creativity and flexible formatting.

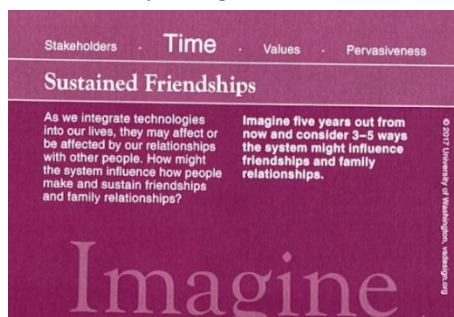


Figure 3 Envisioning Card: 'Sustaining Friendships'

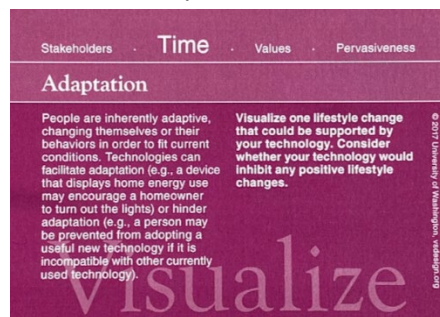


Figure 4 Envisioning Card: 'Adaptation'



Figure 5 Envisioning Card: 'Non-Targeted Use'

Results

VSD Method 1 Results

The first interviewee was a reader and senior lecturer in exercise psychology at the University of Essex. The interview, which ran for an hour and 15 minutes, elicited a total of 17 values – evidenced in Figure 6.

Participant #1		Occupation: Sports Psychology Expert			
Value	Quote	Value	Quote	Value	Quote
Enjoyment - intrinsic motivation	But essentially, you do things because you enjoy them, because they're thrilling, because they're stimulating that those are the types of activities that you don't have to think about, you just do	Self-reflection	So that's knowing that, you know, I may not be where I need to get to, but I'm better than what I was before	Understanding needs of different audiences	We did an experiment with dementia patients, and got them to see if they could wear [fitness trackers] for three months... And what you find with the elderly is that they have thinner skin, also with the medication that they're on their limbs swell, and they couldn't adjust the strap. So a lot of the patients ended up with bruising from where they were wearing the device and couldn't adjust the fit of it.
Embracing ulterior motives - extrinsic motivation	The reality for exercise is that it's extrinsically motivated - most people's exercise is about improving their body shape or staying healthy. You know, there is some other motive that's driving them	Incremental Progress	You know where you're trying to get to, and then see the incremental steps that you've taken, and that you're not falling further down staircase towards the fear itself.	Respect & independence	They had adult children who were treating them like children. And they didn't appreciate it. They want their independence, and it's about how we adapt technology to allow them some freedom and independence
Autonomy	So you need some level of choice or free-will that you're not coerced into doing the thing.	Reassurance	Because when people are struggling, it's good for them to revise, you know, just how far they've travelled	Providing support	You can always do a signpost that, if [users] get to the point of you know, needing extra support, you would list other websites or other sources of support that they could go to.
Competence	You need to feel as if you are improving, essentially	Realistic goal-setting	And what you then find out is actually it's not only an unrealistic goal, but the timeframe that they've got for that goal is unrealistic as well.	Focus on function	What we know is that getting people to focus on what the body can do rather than how the body looks is what's going to keep them motivated for longer. So de-emphasising the aesthetic, and emphasising the functional.
Relatedness	What many people have lost over the last two years is that sense of connectedness within their exercise, so they become stale and bored, because they're not exercising with other people	Cyclic progress	It's not only about doing them in a linear fashion, but also then consolidating. So, you know, we want to get you to the end of this this week. But let's see if we consolidate that in the next week and you continue to maintain that goal	Preventing triggers	And I think the avatar is really useful because it's less confronting.
Prompt feedback	Feedback that's given on the spot, when it's most relatable for people, is more motivating than when you have to wait a couple of weeks	Feeling comfortable in oneself	Social physique anxiety - a shyness attached to not displaying their bodies in public. So they are your typical people who tend to wear baggy clothes not to draw attention to the shape of their body and try and stay away from mirrors. And the gym is full of them.		

Figure 6 Codebook of Values for Participant #1 - Sports Psychologist

The second interview was held with one of the co-founders of Wolf3D (the parent company of Ready Player Me, a cross-game avatar platform for the metaverse). In spite of this interview's relatively short duration, thorough analysis of its transcript revealed 8 key values (Figure 7).

[illegible]

Figure 7 Codebook of Values for Participant #2 - Avatar Platform Co-Founder

Participant #3		Occupation: Gym Goer - End User 1 (Nico)	
Value	Quote	Value	Quote
Time efficiency	Like with time - we're studying and like job searching and I don't have time to participate in a team activity	Balancing priorities	I obviously sacrificed the gym and then I just focus on my studies. But say when my studies finish and everything I have time to go back.
Health	I'd say it's more out of like a necessity like because I want to stay healthy.	Routine	Let's say if I miss my morning time that I usually go to, I don't really have motivation to go to gym at any other time of the day, so for me it's important I go in the morning.
Sense of duty	I know I need to stay healthy so I need to go to the gym regardless of whether I like it or not. So yeah, it's more of a necessity for me rather than like an enjoyment thing.	Holding self accountable	I'll go right, I need to get out the next day like yeah, it's more like a self motivating thing.
Community	Oh yeah, it's 100% better with my mates 'cause I can just chat while doing the activity, which is a lot better. It helps to be with a friend in the gym as well.	Privacy & security	If there are measures I can put in place where I can limit how much my data is being used or how, or if it's allowed to be sold or not, then yeah, I would obviously like opt in
Measuring progress	I keep tabs on like a gym notebooks sort-of thing on my phone. So I keep tabs on my progression as weeks progress.	Transparency	I've just seen that there's like a lot of big data scandals or how people's data is being sold to third parties without our knowledge
Convenience	It's just really convenient. There probably would be an app that's better for it, but if it's working like I don't have to fix it, you know what I mean?	Flexible decision-making	It would have to be sort of like retrospective - so later on down the line if I want to withdraw consent for using my data that would have to be a mandatory option

Figure 8 Codebook of Values for Participant #3 - End User 1 (Nico)

The final two interviews were held with previously surveyed members of NXT LVL's target audience who had

expressed consent to engage in future research ventures. User 1 (Nico)(Fig. 8) is a full-time student and regular fitness participant, and user 2 (Arman)(Fig. 9) is a young working professional based in London. Cumulatively, these interviews denoted 40 consumer values, some of which can be considered to overlap.

Participant #4		Occupation: Gym Goer - End User 2 (Arman)			
Value	Quote	Value	Quote		
Social integration	If I were to go with friends it would be more consistent; I'd feel more inclined to go	Practicality	You can have an actual item and scan the barcode to get the calories in it... that was really helpful	Fairness	It's your data so you should be allowed to know what's happening with it
Self-confidence	I go to feel good about myself and be happy with my body	Tailored information	It would be good to have some different exercises according to your body type and your goal	Fiction	It isn't anything I would take to heart because it's all online; it's not reality
Mental health	Whenever I go the gym I get a mental boost afterwards, you know, I feel more confident - not just physically, but mentally	Humanisation	If it was more personalised it would really help	Validity	It's just art made by a bunch of adults/ kids and you just don't know with this stuff... it's not a legit currency
Goal setting	If I don't work for what I want, then I'm always gonna live an unfulfilling life	Institutional trust	It's really weird because you really don't know what people can do with those details or what people are out there	Responsiveness	If it's animated you can see that all these people are doing so and so right now, it gives you an incentive - like, now is my time to train also
Self-acceptance	I wanted to gain 3 kilograms; I mean, I only gained 2 not 3 but it was still pretty good for me	Transactional gain	Targeted ads - if it's something I want, then I will actually just buy it... they can be quite useful	Control	You have no way of controlling it... it's dangerous because it fluctuates
Informed decisions	If I have actual numbers to go by then I know then I'm making progress	Competition & feeling superior	You'd be a lot more motivated to go to the gym because you're seeing the progress of your friends as well, and you want to progress as well to catch up and beat them	Digital embodiment	It would be really good to have something that represents how you look - like a cartoon version of yourself
Insecurity / Introspection	It's more a thing you're fighting yourself over; people care about it because they don't want other people to see it.	Simplicity	If you have a basic smiley face spectrum from happy to not so happy - you can just click away and then it averages out how you're feeling	Extrinsic motivation	If it were to turn into an NFT at the end of a big goal - it would create more incentive

Figure 9 Codebook of Values for Participant #4 - End User 2 (Arman)

The values from each interview were clustered into meta-themes, which were then cross-compared to identify any value tensions/ conflicting motives between stakeholders. This output of this process is illustrated in Fig. 10.

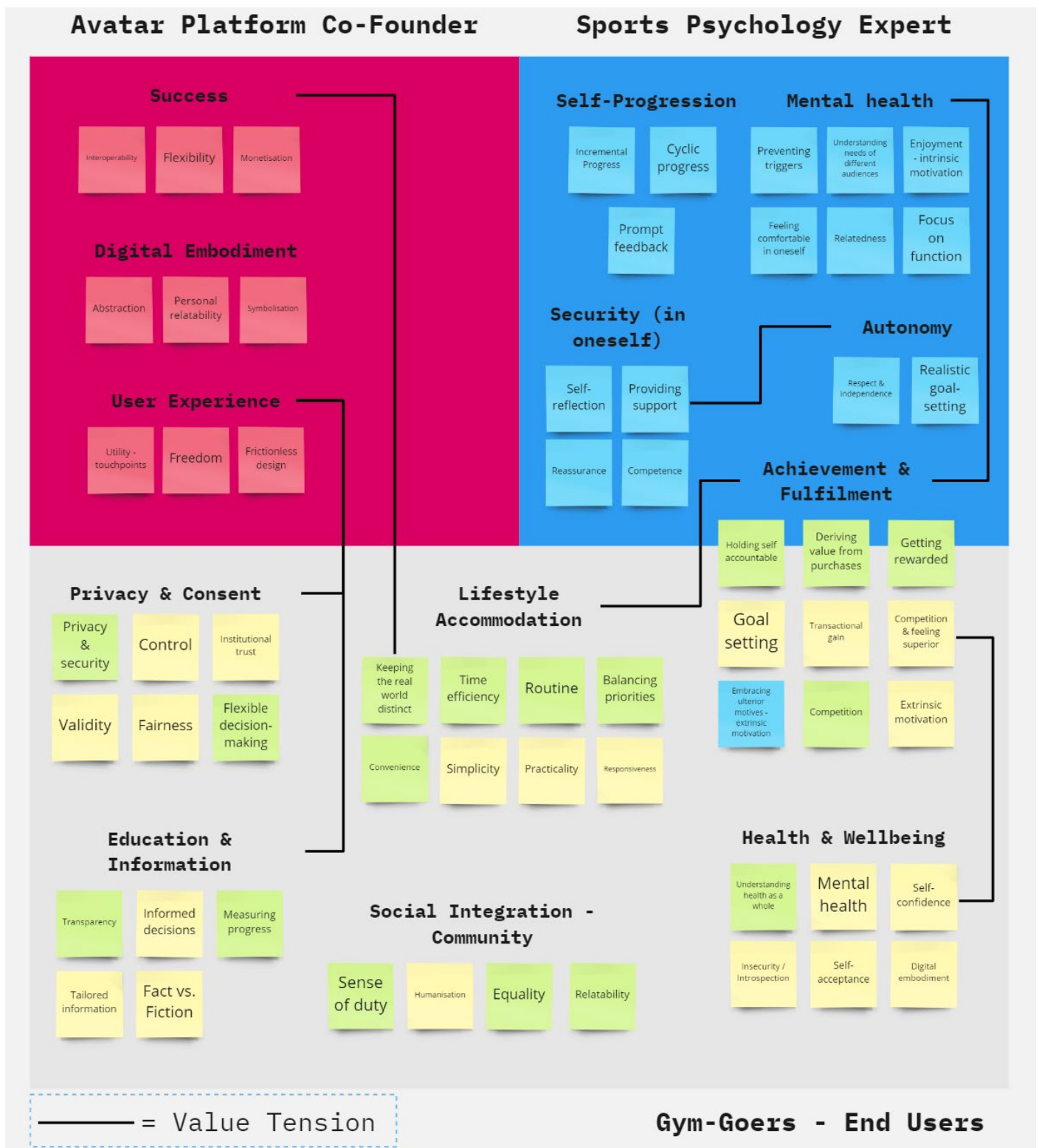


Figure 10 Value-Theme Analysis of Interviews

VSD Method 2 Results

The outputs of the Envisioning Card activities were documented and structured using Miro. The associated diagrams for the cards 'Non-Targeted Use', 'Adaptation' and 'Sustained Friendships' can be seen in figures 11, 12 and 13 respectively.

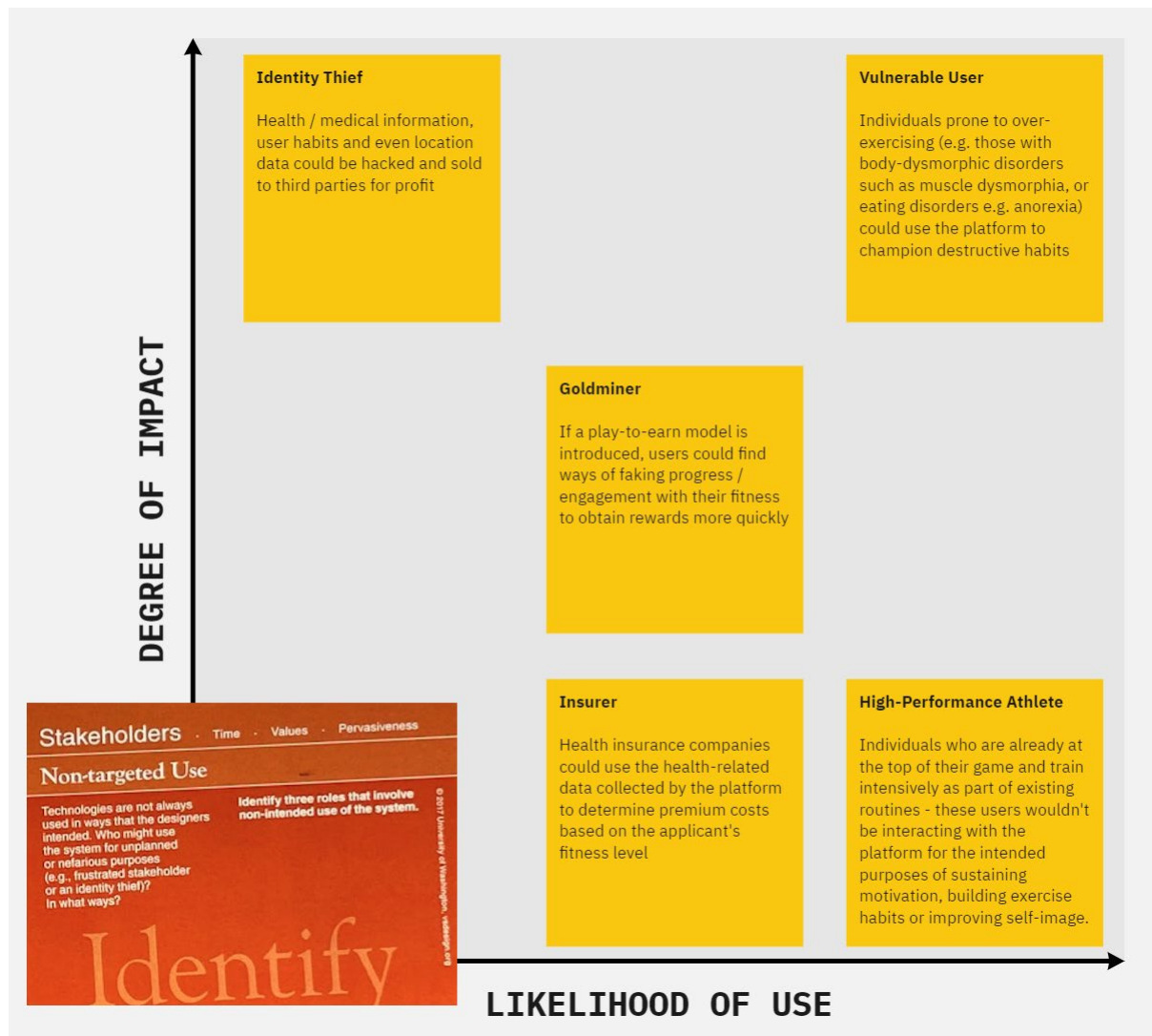


Figure 11 Output of Envisioning Card 1: 'Non-Targeted Use'



Figure 12 Output of Envisioning Card 2: 'Adaptation'

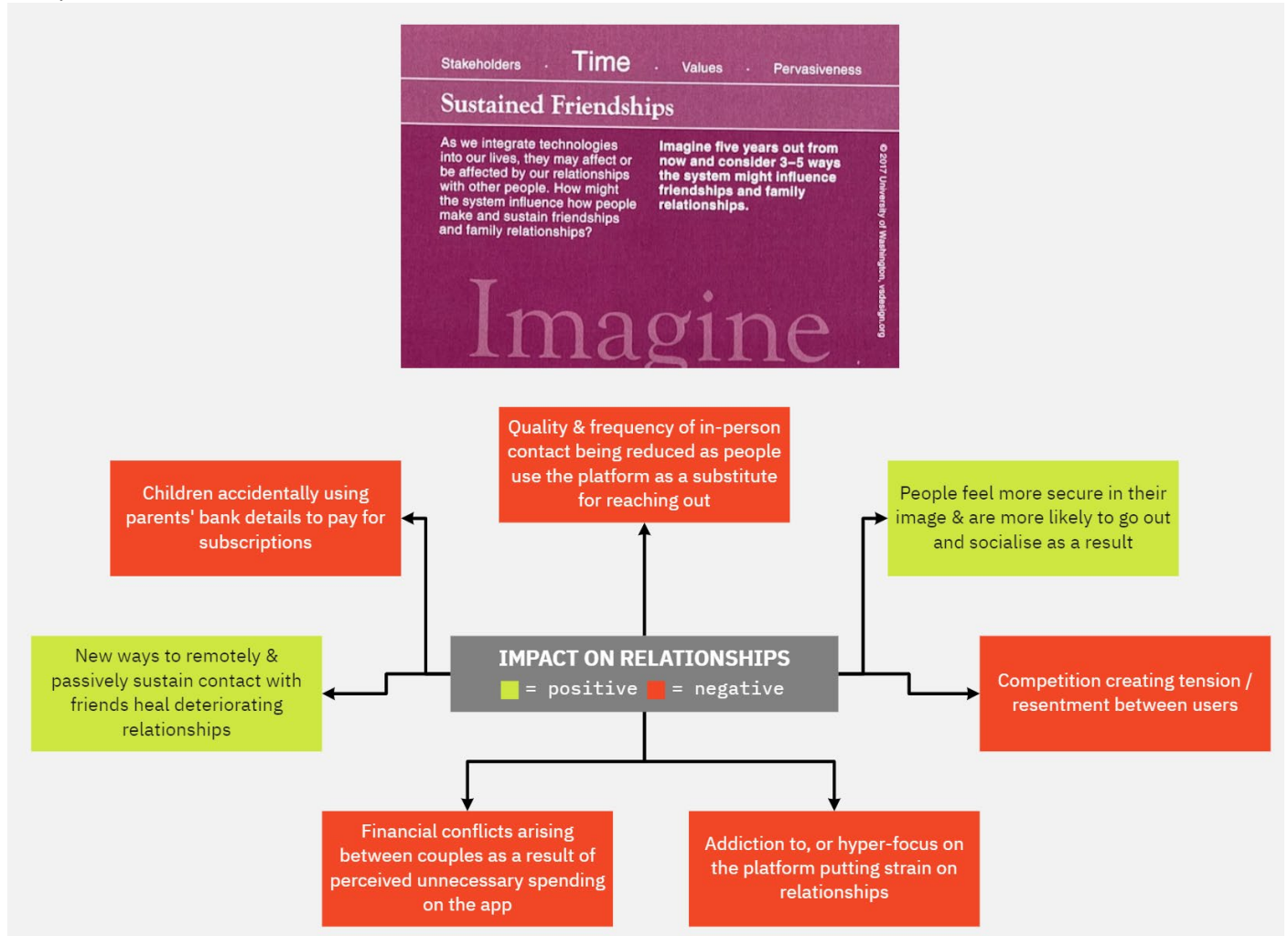


Figure 13 Output of Envisioning Card 3: 'Sustained Friendships'

Discussion

The outputs of the VSD methods above provided colossal insight into the direction the Project at Large ought to take. These insights culminated in a set of design considerations, given in Table 1. The sections below expand on the topics covered by these considerations.

Table 1 Set of Design Considerations for the Project at Large

Criterion #	Category	Description
1	Change	Users should be warned of the implicit risks of interacting with the technology prior to signing up
2	Autonomy	The platform should be autonomy-supportive - allowing users to exercise preferences relating to platform settings, data collection, and which features they engage with
3	Friction	Any seams in the UX design should be well-considered - the platform should be learnable without being completely frictionless
4	Competence	The platform should be rewarding and supportive, but in moderation - it shouldn't undermine the user's sense of intrinsic motivation and self-efficacy
5	Consent	Users should be able to easily withdraw consent to participate in certain activities, without negative consequences

6	Transactional Value	The value of interacting with NXT LVL should be clearly communicated to the user so they know exactly what they're paying for
7	Safeguarding	Mechanisms that detect potential misuse or damaging behavioural patterns (e.g. overuse) should be incorporated into the platform design to safeguard users
8	Inclusivity	The platform should accommodate variability in experience levels interacting with technology, along with user age, race and socioeconomic background.

VSD Method 1 Discussion

Responses elicited from the end-user interviews were particularly congruent in terms of value themes. A common need of end-users was having the platform acknowledge their achievements and reward them in some way for committing to the process of self-improvement. From a motivational standpoint, a combination of intrinsic and extrinsic factors were highlighted to drive consumers' use of the NXT LVL app. In some instances, it was the lure of competition and feeling superior to other participants that would result in sustained use, but in others, the potential of a 'play-to-earn' model and financial rewards was most compelling. One user who reported being self-motivated to exercise stated that routine and a sense of duty were the factors that kept him active – typically intrinsic factors – however he would be open to external/ extrinsic motivation if he perceived the 'rewards' generated by the platform to be of value. Both consumers highly valued their mental health, with facets such as self-confidence and - acceptance being regarded as important to build upon. A value tension is presented between the maintenance of self-confidence whilst competing with others in a desire to feel superior. Though this makes sense (competence is a core psychological need according to self-determination theory[5]), it warrants consideration that competition may have the opposite effect, instead undermining the individuals' sense of self-efficacy shouldn't they prevail.

The use of avatars in the platform was received positively by consumers, who felt them to be a novel way of relating to the data and visualising progress. On the topic of data collection, consumers highly valued their privacy and security with transparency in, and control over the nature of data collected being pivotal to establishing trust in the platform. Consumers ultimately value the ability to make informed decisions, so presenting them with curated, tailored information in order to do so is monumental. Another value tension arises here when we consider the co-founder's objective of providing a frictionless user interface – by presenting users with reams of terms and conditions or the full scope of data they may need in order to make a truly informed decision, we are creating seams in the user experience. Accordingly, a balance needs to be found between granting users full freedom, and creating an interface that isn't overwhelming.

A separate value theme denoted by user interviews regarded the way in which the new technology would integrate with their current lifestyles. Consumers highlighted a desire for a platform that they can use efficiently and according to their established routines, that doesn't detract from other priorities such as work or studying. Another value tension is thus presented between the consumer and the avatar provider, to whom success is based on the amount of time consumers devote to using the platform and, ultimately, the amount of money they spend on it. By nature, the co-founder suggests the platform ought to be addictive and immersive, but this contradicts user preferences for keeping the real world distinct from their online profiles. The need to balance priorities and uphold current routines could also clash with the achievement-related values of users; for instance if other endeavours compromise the amount of time users can put into working on their fitness, then the rewards generated by the platform in response to exercise will be diminished. The user will thus be left feeling discouraged and perhaps even cheated, as they aren't getting any value from their subscription to NXT LVL.

From the sports psychologist interview, two major value themes were elicited in response to our proposal of NXT LVL: fostering mental wellbeing alongside physical and nurturing a sense of security. A potential value tension was identified between the provision of support and reassurance to consumers, while still retaining their sense of autonomy and independence. The consumers interviewed were not adverse to receiving supportive prompts from

the NXT LVL app as long as their frequency was regulated – thus, a balance needs seeking between providing sufficient encouragement and leaving users to their own devices.

The use of semi-structured interviews facilitated discussions across a broad range of themes. Stakeholders largely felt comfortable elaborating on their responses when prompted, allowing greater insight into their views and values. Unfortunately due to time constraints, only two end-users were interviewed for the study, and their perspectives were heavily aligned. In the interest of generating a more diverse (and potentially less biased) set of results, it would have been useful to interview a larger set of end-users with more varied backgrounds and/or degrees of experience with fitness and technology.

VSD Method 2 Discussion

The envisioning cards addressed a range of previously undiscussed long-term, systemic issues that could arise from the widespread adoption of NXT LVL. One area discussed was that of non-targeted use, where the technology is exploited or adapted by stakeholders in ways unintended by the designer. It was particularly useful to consider different stakeholders' perspectives when assessing how the product could be misinterpreted and, by considering the full value proposition of NXT LVL, a range of misuse scenarios were highlighted. These concerned parties such as vulnerable users whose objectives don't align with the intended value delivered by the platform, or health insurance providers who could leverage the data collected to generate competitively-priced insurance packages. Completing this envisioning card helped to identify ways in which the NXT LVL platform could be safeguarded against misuse, and how certain stakeholder groups could be protected from its negative consequences.

The second envisioning card, 'Adaptation', assessed the impact NXT LVL use would have on different lifestyle changes, and whether these would be inhibited or supported as a result. Since the primary function of NXT LVL is to sustain exercise motivation and promote healthier body image, the lifestyle changes supported by the platform were directly tied to the benefits of increased exercise e.g. losing weight, reducing stress, or improving sleep quality. The inhibited lifestyle changes were more correlated with the delivery and monetisation of NXT LVL. For instance, since the platform is app-based, individuals must use a mobile device to engage with it so potential efforts to reduce their screen-time would be counteracted. Moreover, while the use of avatars in the platform serves to disconnect fitness improvements from body image/ the physical form, a conflict of interest could surface where users are trying to spend more time being mindful and grounded in the real world, but the platform is prompting them to focus on their digital, data-driven profiles. From completion of this card, it was prompted that the lifestyle changes supported by NXT LVL should be clearly defined for users, and that disclaimers should be implemented where potential conflicts or harms could arise. It would likely be useful to consider the impacts of relevant prior art (such as habit-building applications) to help contextualise and build on this assessment. Conducting more tailored interviews with target users would also be useful in highlighting the strains such technologies place on their relationships specifically.

The final card to be selected explored the ways in which NXT LVL could influence friendships and family relationships. By and large, the outputs of this card stemmed from the addictive nature of 'gamified' products, the use of NXT LVL as a substitute communication channel, and the financial costs associated with the platform's use. It proved somewhat difficult to ascertain how friendships or socialising would be impacted by online communication and metaverse interactions taking prevalence – at the end of the day, the findings of this study are largely speculative due to the recency of metaverse technology, thus beta product testing would be beneficial to provide concrete evidence.

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Appendices

Appendix A

[Folder containing interview transcripts](#)

Appendix B

[REDI Project Miro Board](#)