Digital Nudges for Social Behaviour Change: A Platform Fostering Inclusion through Personal Interactions

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Abstract

Research indicates that fostering an inclusive culture is valuable for organisations, leading to better job satisfaction, higher innovation in teams and higher company profits. However, there is no consensus on how to effectively stimulate inclusive behaviour of employees through technology. Moreover, research is lacking on how individual employees can contribute to this problem by having one-on-one interactions with other employees. That led us to explore how digital nudges can be used to promote inclusive behaviour through workplace interactions. The study was conducted through the use case of Burst my Bubble, an application developed by PricewaterhouseCoopers. The research question was answered through three sub-questions regarding the effect of the current implemented nudges, the impact of the app on inclusion and the design of new digital nudges. A think-out-loud study, 6-week pilot study and interviews pointed out the difference in barriers experienced by users, resulting in a variety of adoption behavious. By applying digital nudges aimed at increasing adoption, enhanced engagement with making diverse connections can lead to increased platform impact on inclusive behaviour by its users. However, our results should be viewed in the light of several limitations, mostly due to a relatively low number of participants and a low adoption rate. Still, based on combining the Persuasive Systems Design framework, Persuasive by Design model and personas, we have been able to create promising suggestions for improved nudges could be created. The outcome of our proposed list of ten digital nudges strongly indicate that designs promoting inclusive behaviour should comprise reduction, tailoring, social influence, reminders, timing, social comparison, normative influence, self-monitoring, trust and liking. These digital nudges may well sketch a roadmap for future research into interventions that aim to improve inclusiveness within organisations. Furthermore, our novel design method was found useful for designing new nudges. We would recommend future research to further test and improve our design method and results, in order to demonstrate the usefulness of technology based nudges with regards to influencing human behaviour in other contexts.

Glossary

Concept	Definition
Adoption	The intention, decision, or initiation of using a behavioural intervention technology [1]
Behaviour Change Design	The process of designing an environment in such a way that it can influence the user's experiences, choices and behaviour [2].
Behavioural Science	The study of how people make decisions and how they translate those decisions into action [2].
Burst my Bubble (BmB)	An application promoting inclusive behaviour by matching users with others outside of their bubble, based on similarities and differences between user characteristics.
Digital Nudge	An element in the user-interface altering the user's choice environment, aiming to influence the user's decisions [3].
Inclusive Behaviour	Actively looking for connection with people outside one's social bubble, as well as openness towards others who look to connect with you.
Organisational Inclusion	The degree to which an employee perceives that they are an esteemed member of the work group through experiencing treatment that satisfies their needs for belongingness and uniqueness [4].
Persuasive Technology	Technology designed to change people's attitudes and behauiors [5].
Social Bubble	A group of people one socialises with most often.

Contents

Chapter 1

Introduction

1.1 Motivation

Accumulating research evidence shows how valuable fostering an inclusive culture is for organisations. When employees feel a sense of belonging their work quality increases, due to higher innovation in teams and better job satisfaction [6]. Nishii [7] shows that in inclusive environments, people are less biased towards each other. Higher inclusion also causes less employee turnover [8], while exclusion means lesser involvement in decision making and results in lower job commitment [9]. In the end, inclusion positively impacts company profits [10].

In an inclusive workplace, all employees feel included and are valued equally [11, 4, 12]. Individual differences are acknowledged and contribute to the organisation's business outcomes [13]. Inclusivity in an organisation means that diverse perspectives are encouraged and valued, and all employees should be able to speak with anyone in the organisation, be assigned projects based on skills, and have learning and growth opportunities [13]. Other pillars for inclusion are a transparent and fair compensation structure, work-life balance and recognition for participation. People's personal traits should never interfere with any of these themes.

This work fits the emerging trend of companies increasingly putting organisational inclusion high on their agendas over the last two decades [14]. Companies feel more political and regulatory pressure to participate in diversity and inclusion related interventions [15]. Examples of initiatives are the Charter Diversity (SER) with which companies can show they commit to promoting an effective inclusion and diversity policy [16]. Moreover, socially, creating and developing a diverse and inclusive organisation is important to combat social inequality [17]. Still, there is no consensus on how to effectively and sustainably stimulate inclusive behaviour [18, 19].

1.2 Problem statement

Technology enables us to build solutions that help people change their behaviour and various studies have suggested successful interventions, for instance to improve health habits [20], lower food waste [21] or improve well-being [22]. Research focusing on promoting inclusive behaviour however is often theoretical [23, 14] and related to specific contexts such as school environments or health institutions [24], instead of the workplace. Miller and Manata [25] recognise this need, and suggest to study whether their findings on stimulating inclusion through social interaction can be generalised to corporate environments. Even though inclusion can make a tremendous impact on success of organisations, a knowledge gap exists on how exactly to promote workplace inclusion and how digital systems can support that.

For an organisation to become more inclusive, different stakeholders have a responsibility. Inclusive

behaviour is key, and this behaviour can be pursued on many levels, from leadership to individual employees. For instance, commitment from leadership has shown to be an important contributor to making progress with inclusion [26, 23, 27]. However, participation from all stakeholders within a company is needed to create a sustainable inclusive workplace environment.

Individual interactions between employees seem to play a significant role in employees' feelings of inclusion. People that have had positive personal interactions with each other are likely to be more open to each other [19]. When people are more familiar with each other, they are more understanding to each other thus tend to act in an inclusive matter. In addition, by interacting with others and reflecting on those interactions, biases that normally impede inclusion can be overcome [27]. Hence, an increase in positive personal interactions could indirectly lead to a more inclusive environment.

By leveraging the influence of technology on behaviour, these interactions can be supported. Therefore, this thesis will explore how a digital system can be used to nudge people towards making new connections. Through a case study of the application *Burst my Bubble*, we will investigate how inclusive behaviour can be shaped.

1.3 Case study of Burst my Bubble

Burst my Bubble (BmB) is a mobile platform that organisations can use to enable their employees to become more included, designed by PricewaterhouseCoopers (PwC). The app connects users with colleagues that are outside their existing social bubble by letting users choose an anonymous match, based on a matching algorithm. After two users have been matched online, they can schedule a meetup in real life.

Matches are made based on similar and differing user characteristics, aiming to create unexpected, refreshing connections between users. This means that users with different characteristics, and with that different motivations, should be involved for optimal results. Thus, for the success of the intervention, it is important to understand the different users' motivations. Persuasive strategies can then be applied to further increase the effect the app has on users' experience with inclusion. Outcomes of intervention technologies are often measured in adoption, which is the intention, decision, or initiation of using the technology [1]. Effective interventions may motivate users and help them stay engaged, increasing the adoption of the app [28, 29, 30].

1.4 Research Question

Following, the aim of this thesis is to explore how technology can mediate inclusive behaviour. Our research will contribute to the field of human-computer interaction (HCI) by gaining insights into how computer-mediated interactions between people can shape complex behaviour and attitude. Further, lessons about app adoption in the context of inclusion may generalise to other contexts. For this reason, our study can be useful to HCI scientists developing behaviour change applications for other domains as well. By studying adoption of *BmB* in a 6-week pilot study with 340 employees, this thesis aims to answer the following research question:

> "How can digital behaviour change nudges be used to promote inclusion through workplace interactions?"

The research question will be answered based on three subquestions. In the first two questions, the current application is evaluated. In the third question, new nudges are designed. To understand the

user's journey when interacting with the application, this thesis will start with testing the effect of already implemented nudges. Second, the influence of the platform on behaviour will be investigated. Finally, new nudges can be developed that will improve the impact of the platform. This results in the following set of questions:

1. "What are the effects of the current application nudges on the user journey?"

2. "How does the use of the Burst my Bubble application influence participants' experience with inclusion?"

3. "What nudges can be used to enhance adoption of the application?"

1.5 Contents

The next chapter will discuss the most relevant knowledge on organisational inclusion, the role of inclusive behaviour and how to design for influencing behaviour. Then, we explain the *Burst my Bubble* case study, which is provided by PwC. Based on our literature review and case study, study methods are designed. In chapter 4, we will describe the methods for researching the effect of the nudges and the impact of the platform on inclusion. Next, the methodological approach we take for designing new nudges is explained. After carrying out the planned research, results can be discussed. The results are given separately for each subquestion. Then, within the discussion, we will elaborate on the meaning, clarification, and implications of the results. Lastly, a concluding section will summarise the main findings of this thesis.

Chapter 2

Related Work

What does inclusive behaviour look like in the workplace? And how can that behaviour influence the experience other people have with inclusion? The related work chapter aims to answer these questions by first exploring how inclusive behaviour is formed. Then, in order to influence behaviour, we must get a more detailed look of the human decision process. After explaining how people go from cue to action, we can further explore how behaviour can be changed. Several theories will support our explanation.

Next, we will discuss the influence of technology on behaviour. Digital systems can be designed for changing user behaviour by implementing nudges. Hence, we elaborate on the potential of using digital nudges to support people in acting more inclusive. The chapter finishes with a summary of the impact and contributions of our approach.

2.1 Organisational Inclusion

Inclusion is a multi-faceted concept and is influenced by many factors, making it a complex challenge to tackle. An inclusive workplace is dynamic and is constantly being created, which explains why one-time interventions promoting inclusion are not effective on its own [31]. Employees that experience inclusion feel valued and recognised for their efforts in the organisation [11]. Other contributing factors are active recognition of the importance of diversity and inclusion by organisation and leadership [10], individual employees being involved and engaged in work groups [24], being able to bring the authentic self to work [11], and being able to impact decision making [8, 7].

Oftentimes, the concepts inclusion and diversity are used interchangeably. However, where *diversity* means the difference between people, *inclusion* means that all those different people should have the same opportunities, regardless their differences. Thus, for diversity measures to work, inclusion is essential [32]. Without inclusion, diversity may even have negative effects [26, 12]. Because diversity does not automatically lead to more inclusion, it is pivotal to study how inclusive behaviour can be stimulated.

The term *organisational inclusion* can be explained as "the degree to which an employee perceives that they are an esteemed member of the work group through experiencing treatment that satisfies their needs for belongingness and uniqueness." [4]. This definition is based on the *Optimal Distinctiveness Theory* [33] and argues that people have to balance their need for a feeling of belonging to a group while at the same time maintaining a unique identity. According to *Maslow's Pyramid*, belonging to a group is fundamental for people [34]. This psychological need comes next after the basic human needs such as food, water, sleep, safety and health are fulfilled. In the workplace, this is no different. In addition, inclusion is affected through *Social Comparison Theory* [35]. This theory explains that people attempt to maintain a positive self-image through comparing themselves with others who are similar to them, and therewith create a perception of

inclusion. The same goes for *Social Identity Theory* [36], which proposes that the groups people belong to are a source of self-esteem, influence their sense of fitting in, and therewith affect feeling of inclusion.

Thus, inclusion partly origins from psychological, internal processes, sometimes hidden in subconscious behaviour. Inclusion can seem intangible, making it a complex problem to understand. Another challenge is that inclusion is often invisible for those who already feel included, in contrast to those who feel excluded. This contrast may result in unaligned motivations for employees to participate in inclusion interventions. Though non-included people may seem to have a clearer value proposition for pursuing inclusive practices, already included people will also benefit on the long term, albeit indirectly. In the end, fostering inclusive workplaces means creating an environment in which every member can succeed, contributing to the overall success of that organisation.

2.1.1 Promoting and Measuring Inclusion

Becoming an inclusive organisation requires a multi-faceted approach, from talent management to education, to leadership and accountability measures. One example intervention is the *Everyday Inclusion* app, which aims to create awareness about inclusive behaviour through nudging the user with daily messages [37]. Promoting inclusion in a sustainable way is a long process, in which habits and mental models have to be changed. Testing an intervention that targets inclusion can therefore take a long time, making it a complex subject to study.

Nonetheless, methods such as Jansen's 16-item *Perceived Group Inclusion Scale (PGIS)* [38], the theoretically based 10-item scale of *Work Group Inclusion* by Chung et al. [39] and the *NIM Medewerkersscan Inclusiviteit* [17] attempt to measure inclusion through self-assessments of individuals. Another example is the *Inclusion of Community in the Self* single-item scale, measuring inclusion with just one question [40]. Even though self-assessments may give a biased view due to people's tendency to overestimate their performance, most methods depend on this approach for evaluating personal experiences. Other measures include deriving data from indicators such as decision-making influence, access to sensitive information, and job security [41].

Besides, when promoting and measuring inclusion, average ratings are not adequate. In an inclusive team, everyone needs to feel included. Without attention for individual measures, results of non-included people may be overlooked [27]. Therefore, we aim to account for individual experiences when specifying what inclusive behaviour entails, and how it can be measured.

2.1.2 Inclusive Behaviour

The previous sections illustrate that there exist many angles to take for defining inclusive behaviour. It is no surprise that studies often focus on a smaller part of the subject, e.g., concentrating on a specific domain, such as the classroom [42], or a specific aspect influencing inclusion, such as leadership or communication strategies [10].

Previous behavioural research proves that it is beneficial to start with specifying and defining a target behaviour [2]. Defining a target makes it easier to decide how to influence that behaviour and makes the behaviour more measurable. Moreover, limiting the scope to a specific behaviour increases the feasibility of the study. For this reason, our research will focus on the way people interact with one another, directly and indirectly contributing to inclusion.

Personal interactions

Previous studies indicate that one on one interactions between people can play a significant role in feelings of inclusion. More one on one connections between people makes them more open and understanding to one another [19]. Openness to get involved with people who have different perspectives and actively listening to their viewpoints is the basis for reciprocal understanding. This understanding between individuals enables the creation of more diverse and inclusive cultures. Moreover, healthy and sustainable relationships in the workplace are key to working effectively in diverse teams and serving clients [19]. Emotional recognition through relational commitment fosters for example self esteem, which is important to be able to perform in high-pressure environments.

When people interact with each other all sorts of cognitive biases occur, which may negatively impact inclusion without the person being aware of it [27]. For instance, the *similarity-attraction bias* means that people tend to connect more easily and deeply with people who are similar to them. Next, *implicit stereotypes* may lead people to judge others subconsciously. Other biases that could occur are *in-group favouritism*, when people automatically tend to favour in-group members over out-group members, *confirmation bias*, explaining how people tend to seek for information that confirms their existing beliefs, and *group-think*, where group harmony overrides rational decision making. These biases can be overcome when people consciously reflect on them during the interactions they have with others, therewith contributing to an inclusive culture.

In addition, social relationships can provide people with a greater sense of belonging [43]. A study by Miller and Manata [25] also investigates the effect of social interactions. They suggest that these interactions have a positive impact on inclusion, by positively impacting employee assimilation outcomes. Organisational assimilation means the social integration of employees, which contributes to involvement in the workplace, job-satisfaction, decision-making and role competency. The study also explains that for new joiners, connections with coworkers form a critical source of information. Finally, they suggest doing further research into whether their results can be generalised to different types of corporate businesses, which is what our study can contribute to.

However, like Miller and Manata highlight, more research is desired to confirm the causality between interactions and inclusion. Moreover, while more mutual self-disclosure between people develops and deepens their connection, it can have an opposite effect. Stronger friendships may also cause negative organisational outcomes [44]. Cliques within the workplace between similar people miss out on the benefit that diverse groups have in complex decision making. Therefore, making connections between individuals across groups can counter that effect. For instance, high quality interactions between supervisors and employees are an important predictor of inclusion [23]. Moreover, diverse friendships can have positive effects on cooperation in groups of people [45]. Better cooperation within and between teams evidently increases performance of those teams.

Thus, the potential positive impact of diverse, personal interactions in the workplace offers an interesting and practical method for improving inclusion. Both for leadership teams aiming to top-down foster inclusive workplaces, and for enabling individual employees to contribute to this problem bottom-up. For this reason, inclusive behaviour will from now on be defined as actively looking for connection with people outside one's bubble, as well as openness towards others who look to connect with you. So, acting inclusively means engaging in making and being open to diverse connections.

2.2   Behavioural Change

Now that we have defined inclusive behaviour, we can further explore the cognitive processes involved. Understanding these processes will help to find when, where, and how to design interventions to influence decision-making. Human beings have limited time, attention and energy when making decisions. Thus, to balance our resources we use simple rules of thumb, resulting in shortcuts and biases. Human decision making is not a perfect process, and those decisions can be influenced when the right strategies are used. This section will discuss the relevant behavioural science involved when creating a diverse network through personal interactions.

2.2.1   Cue to Action

Behavioural Science studies how people make decisions and translate those decisions into action [2]. Hence, in order to understand how to influence behaviour, understanding the way people make decisions that lead to certain behaviour is essential.

A behaviour is an observable and measurable action, activity, or process, occurring in response to a stimuli [2]. It can be innate, genetically determined, or learned, as a result of experience. What brings certain actions to the fore and not others, can be explained by the *CREATE funnel* [2] (Figure 2.1).

Figure 2.1: CREATE funnel by Stephen Wendel, showing how a cue moves to an action [2].

An action starts with a cue, reminding the user about the action. This can be any form, e.g., a mobile notification pop-up. The cue starts an automatic reaction, which may result in an evaluation being made about whether the action would be worth the effort. The evaluation can be based on potential costs, benefits, and outcomes. Next, the ability to act the behaviour is assessed, the user must believe they are able to come to the action. In addition, an assessment is made of the timing and experience. If the action happens at the right timing, the user is more inclined to act on the cue. Last, prior experience may still determine at the end of the funnel whether the behaviour will actually occur. For a behaviour to happen, all stages must be passed. A habit means that the presence of a cue generally results in a certain action or routine.

Thus, for inclusive actions, the different stages need to be taken into account. For instance, a cue can remind the user to think critically before searching a connection. Also, having a positive experience with a diverse connection can increase the value a person gives to pursuing inclusive behaviour in the future.

2.2.2   Understanding Inclusive Behaviour

Throughout the stages described in the *CREATE funnel*, various cognitive processes influence the outcome of the action, and thus how you choose who to connect with. Because inclusive behaviour is partly automatic, choosing new connections can be influenced by biases [27]. This may lead to non-inclusive environments, even without conscious thought from members. As Bourke [27] found, awareness of the topic inclusion is crucial for influencing the needed behaviour, and overcome bias. In addition, theories such as *Optimal Distinctiveness Theory* and *Social Comparison Theory*, discussed in the previous section, may have an unwanted effect, subconsciously.

This way of thinking can be explained by dual-process theory. Generally, the thinking that results in
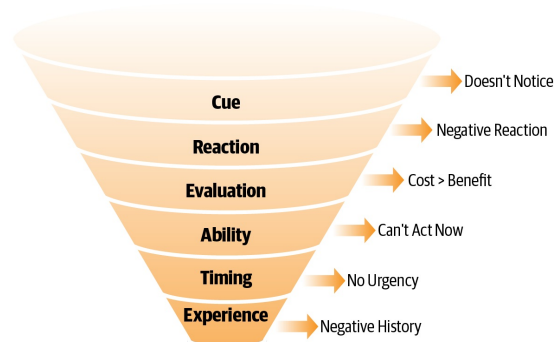
behaviour is divided into two types: system 1 and system 2 thinking [46]. The first is fast, intuitive, automatic, and includes innate behaviour as well as behaviour that has become automatic through prolonged practice, like habits. The second is slower, controlled, analytical, and involves more awareness of motivations and actions. The advantage of the reflective system 1 is that it requires lower cognitive capacity, freeing up space for other matters. Yet, non-reflective, automatic behaviour comes with loss of flexibility and becoming out of touch with conscious desires, even when the consequences are unwanted [47]. People switch between the two types of processes, and almost all cognitive processes involve a mix of both. This explains how inclusive behaviour can be affected by subconscious, automatic processes, but can also be improved when increasing awareness.

Next, inclusive behaviour is affected by an individual's attitudes, norms, and motivations. The *Theory of Planned Behaviour (TPA)* explains that behaviour is determined by behavioural intentions, which are influenced by an individual's attitudes, subjective norms and perceived control of the action [48]. Attitude towards the behaviour is based on beliefs of the consequences of the behaviour. Thus, a subjective probability that the behaviour will lead to a certain outcome affects the valence of the attitude. Besides, whether a person's social referents approve the behaviour and do it themselves forms the subjective norms that influence behaviour. Third, people need to think they are able to make diverse connections, increasing their perceived control of the action. The ability to make one on one connections may increase the level of control, especially for those who struggle approaching people in groups.

Likewise, a clear value proposition for the behaviour increases intention for behaving inclusively. In the context of inclusion, this means that people must understand how their actions can contribute to the workplace culture. People need enough incentives in order to close their intention-action gap.

Additionally, the context in which a behaviour occurs is relevant for the outcome of the action. The context has many instances and can be divided into social, physical or mental [2]. Our choices -and thus our behaviour- are shaped by the people we interact with, by what we see and by what we have learned over time. Hence, this context can be designed in a way that influences the outcomes of our decisions, and potentially increase or reduce our intention-action gap.

2.2.3 Change Theories

Change generally starts when people experience a contrast in current habits and new goals. People tend to deal with the anxiety of the competing ideas by changing their behaviour in order to restore consonance [49].

Various theories describe how behaviour is formed and changed. The *Transtheoretical Model* explains people go through five phases: pre-contemplation, contemplation, preparation, action and maintenance [50]. In each phase, other intervention strategies apply for moving people forward. For instance, a person that is in a pre-contemplation phase can be motivated through self-monitoring, tailoring or simulation, while someone in an action stage profits more from cooperation and competition [51]. Another commonly used theory is The *Behaviour Change Wheel (BCW)*, which is based on an evaluation of 19 previous frameworks, resulting in an overarching flexible model that is applicable to different contexts [52]. However, the large applicability of the *BCW* makes it harder to map the detailed cognitive process of (inclusive) behaviour change.

A common challenge with complex and detailed behavioural models is implementing such theoretical models into design in a practical way. Tromp et al. [53] presented a set of heuristics to navigate choosing an appropriate behavioural design method. With the wide range of tools available, it is important that

designers can choose a method that fits their preferred way of working. The given heuristics distinguish methods based on the double-diamond model and plots methods against several axes, showing contrasting approaches. For instance, some methods are for understanding a behaviour problem, while others start with searching for opportunities for change. At the same time, some methods embed empirical research while others rely on theory, or a combination of both.

When investigating inclusive behaviour, a certain level of detail is needed to comprehend the many influences on that behaviour. Moreover, because the aim of this thesis is to explore the use of a mobile application promoting certain behaviour, it would be beneficial to find a model that applies to the design of digital products.

Persuasive by Design Model

The *Persuasive by Design (PbD)* Model (Figure 2.2), first developed [55] and then simplified [54] to a usable and intuitive tool, aims to bridge the complexity of human behaviour and usability for design practice. This theory-driven design model helps professionals in the creative industry design evidence based interventions.

In comparison to alternative models such as *TPA*, *HBM*, and the *Fogg Model*, the *PbD* model addresses a more complete view on behaviour, thus offers more possibilities for mapping persuasive interventions.
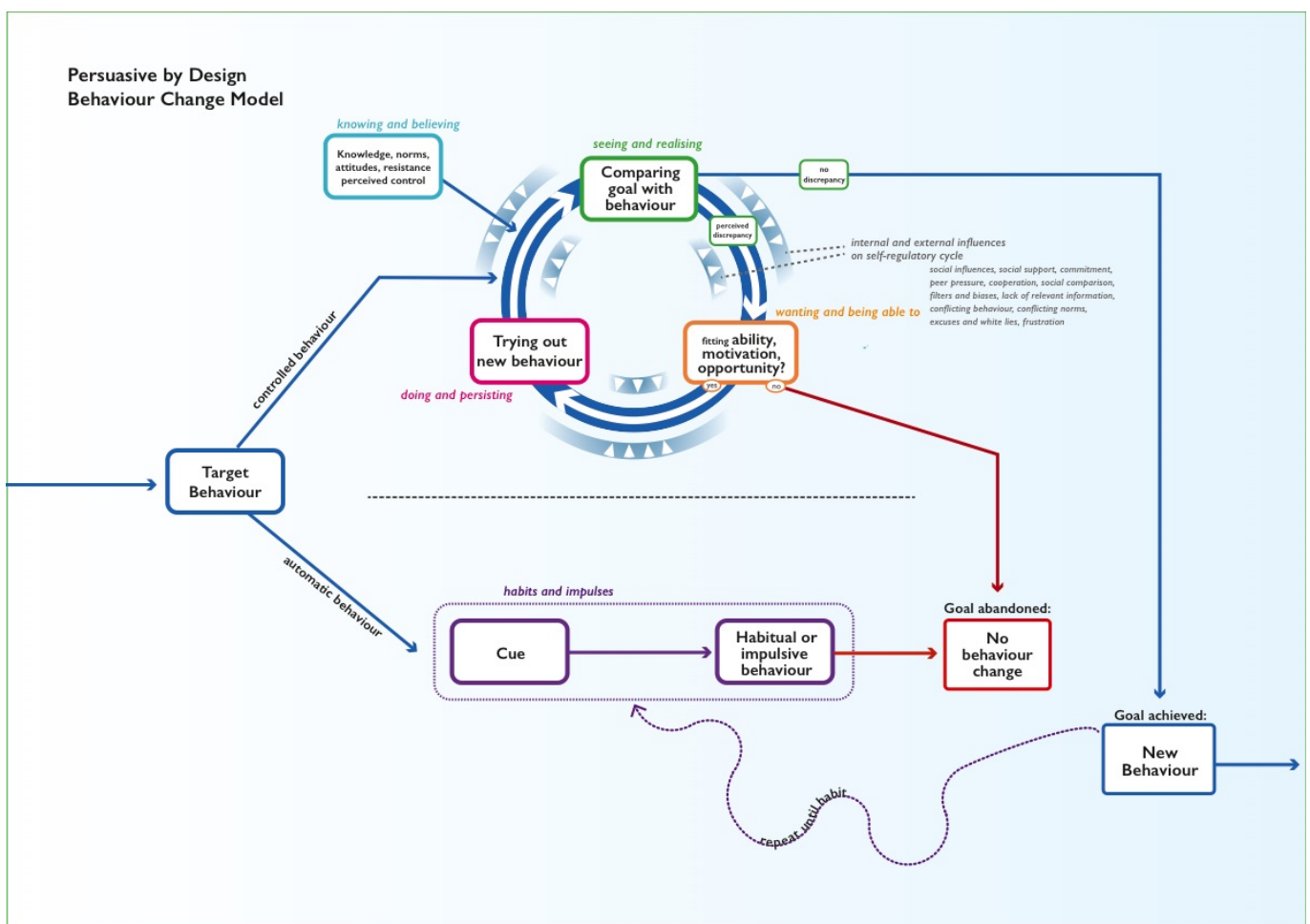

Figure 2.2: The Persuasive by Design Model, a model and toolkit for designing evidence-based interventions by Sander Hermsen et al. [54]. A cue must pass the entire behaviour cycle to turn into a behaviour.

For instance, the *PbD* model considers the dichotomy between reflective and reflexive behaviour. Moreover, it includes internal and external influences such as social influences and cognitive biases, and explicitly addresses attitudes, which are key to sustainable change. Hence, the *PbD* model will first be used to gain insights into the behavioural processes involving inclusive behaviour.

2.3 Designing for Behaviour Change

Our environment affects our choices and behaviour. Behavioural design involves the process of designing an environment in such a way that it can influence our experiences [2]. According to The *Fogg Behaviour Model*, motivation, ability and a prompt must converge in order for an action to happen [56]. The technological context can provide the prompts needed for shaping these actions.

For instance, *Github* persuades users to consistently use the platform by adding social features and gamification elements in the form of contribution scores [57]. The language learning application *Duolingo* persuades users to finish small learning exercises with similar techniques. In the serious game *ClimbTheWorld*, monitoring is used as a persuasive strategy for promoting health behaviour [58]. Strategies can even be applied in offline contexts, e.g., with *Twinkly Lights*, ambient lighting was used to subconsciously engage people in taking the stairs instead of the elevator [59].

These examples illustrate how designers can implement strategies for affecting the choices users make. These so-called persuasive technologies have been introduced by [56] and since that time many studies have looked into influencing human behaviour with technology.

2.3.1 Types of Change

Oinas-Kukkonen introduced the concept of *Behaviour Change Support Systems (BCSS)* and suggests that behavioural change can be divided into three components: C-, B-, or A-change [60]. *C-change* is about a change in Compliance, where the goal is that the user complies with requests from the system. With *B-change*, the aim is to evoke more enduring Behaviour change, which naturally is more complex to achieve. In *A-change*, next to behaviour, the user's Attitudes are changed. While the most difficult type to achieve, A-change is needed for sustainable B-change. Therefore, A- and B-change are often tackled together.

Likewise, three potential outcomes of successful persuasion are the formation (F-outcome), alteration (A-outcome) or reinforcement (R-outcome) of a type of change. The combination of changes and outcomes can be plotted in a matrix (Table 2.1), and designers of persuasive systems should carefully consider which result to design for.

Thus, persuasive systems for behaviour change can target different, related outcomes. In the case of inclusion, Attitude change is essential for sustaining Behaviour change. While complying with requests from the system is important, it is not the ultimate change needed for inclusion. For this reason, when designing for inclusive behaviour, behaviour and attitude alteration should be taken into account. As a result, further in this thesis, design for behaviour change will mean design for a change in behaviour and attitude. The matrix will function as a guideline during the design process further in this thesis.

2.3.2 Digital Nudging

"What is chosen often depends upon how the choice is presented" [61]. Digital nudges come in all forms and shapes and generally are designed to change behaviour. By altering the user's choice environment, their use of heuristics will be affected, and thus behaviour can be steered [62]. A digital nudge can be any element in the user-interface, e.g., feedback on progress with a health activity, a reminder about food delivery at dinner time, or personalised recommendations about choice options.

	C-Change (compliance)	B-Change (behaviour)	A-Change (attitude)
F-Outcome (formation)	Forming an act of complying (F/C)	Forming a behaviour (F/B)	Forming an attitude (F/A)
A-Outcome (alteration)	Altering an act of complying (A/C)	Altering a behaviour (A/B)	Altering an attitude (A/A)
R-Outcome (reinforcement)	Reinforcing an act of complying (R/C)	Reinforcing a behaviour (R/B)	Reinforcing an attitude (R/A)

Table 2.1: Outcome/Change Design Matrix, showing the potential outcomes for different types of change in a persuasive system [60].

So, a nudge is an application of a persuasive strategy, implemented in a persuasive technology. The goal is to persuade the user that uses the technology. Important to note is that persuasion is aimed at the voluntary participation of a user.

The mechanisms of persuasion can be explained by the six principles defined by Cialdini: authority, social proof, commitment, liking, scarcity and reciprocity [63]. These concepts explain how our brains are wired to automatically respond to cues, and how that influences our behaviour. Within many frameworks, applications of these principles can be recognised.

Many distinctions can be made in types of nudges, each applicable to different contexts. Categorisation can be based on behavioural outcomes, cognitive processes, or design elements. Within the field of HCI, published research into digital nudging has ten-folded over the last five years [3]. The great availability of techniques allows us to choose a suitable and well-tested framework that is relevant for nudges targeting inclusive behaviour.

One commonly used framework is the *Theoretical Domains Framework (TDF)* [64], which is also implemented within the *Behaviour Change Wheel* [52]. The *TDF* consists of 15 domains relevant to understanding influences on behaviour. Likewise, Michie et al. [52] distinguished 26 theory-linked behaviour change techniques called the *Behavior Change Technique (BCT) Taxonomy*. This list can be used for characterising nudges across domains. The *Persuasive Systems Design (PSD)* method by Oinas-Kukkonen and Harjumaa [65] is a similar framework, but specifically designed for studying persuasive interfaces. The *PSD* method distinguishes nudges in four categories: primary task support, dialogue support, system credibility and social support. All categories include specific techniques that can be used for recognising and applying nudges in persuasive systems. The *TDF* and *BCT Taxonomy* are developed to be more broadly applicable. For these reasons, the *PSD* method will be used in this thesis for designing nudges.

2.3.3 Nudges for Increasing Adoption

When designing for a system that promotes inclusive behaviour, nudges targeting that behaviour must be applied. However, there is little research available on what nudges exactly are effective for stimulating social behaviour, or in specific, inclusive behaviour. Therefore, this section will explore the potential of digital nudges for influencing elements of inclusive behaviour.

Inclusive behaviour can be promoted through a combination of B- and A-change, and may happen both during and after the user interacts with the app. So, the app is not always changing behaviour directly, but also depends on the experiences the user has had with it. Moreover, inclusive workplaces are built over time and need to be grown in a sustainable way. Thus, when discussing adoption in the context of inclusion, different types of engagement with the application can impact the target behaviour.

Both short- and long-term engagement is important for success of an application, especially in the context of social change. Short-term engagement is needed so users for example create a profile or invite someone to connect with them. If the first experience a user has with an application is positive, they will be much more likely to use the app again in the future [2]. This experience is crucial for long-term engagement and potentially influencing attitude. For a user to keep making an effort to make diverse connections, they have to become motivated to do so.

While many nudges successfully influence short-term engagement, long-term engagement is a bigger challenge [66]. Previous research points out that maintenance related behaviour emerges based on five themes [28]. The themes explain the importance of users having the right maintenance motives and a clear view of positive outcomes of the behaviour. Also, the importance of developing self-regulation, facilitating habit development, reshaping the environment, providing sufficient resources and providing social support are highlighted.

Many factors influence app adoption. For instance, personality is found to impact adoption behaviour [67]. Besides, personality can affect the influence that nudges have [68] and even improve effectiveness of the nudges [66]. Previous studies show that sufficient time for app usage is key to adoption, and that users should be shown how the app fits in their daily lives [30, 69, 70]. If using the app interrupts the workflow, adoption rates decline. Unobtrusiveness is a nudge that can be used to make this experience more fluent, and more effectively influence motivation and behaviour [71]. Especially in the context of work at a large corporate organisation, time is a scarce resource and work pressure is high.

Besides, lack of perceived need and lack of perceived benefits are shown to be barriers for participating in applications [30, 69]. Through the design of the app, the user's experience can be influenced in order to increase engagement.

2.3.4   Designing Nudges

Frameworks can form a guideline for deciding what nudges to choose, when, and where to implement them. The *Persuasive Systems Design* framework illustrates how to design for persuasive systems, considering three relevant viewpoints to the process Figure 2.3 [65]. First, the fundamental underlying issues behind persuasion are analysed. Then, the context must be fully understood, including the aim of the persuasion, the end goals, the user goals. At the end of this stage, the strategy will be defined. After that the design principles can be designed or evaluated, based on a shortlist of most common and appropriate persuasive features.

To further explore the behavioural processes involved with inclusive behaviour and complement the findings of the *PSD*, the *Persuasive by Design (PbD)* model can be used. The *PbD Model* also offers a set of lenses through which fitting interventions can be designed Figure 2.4. The lenses allow the designer to form different perspectives on the behaviour change process [72]. The lenses can be used to identify possible interventions in the design. Multiple studies show promising results for the *PbD* model and its lenses. Ploos et al. [73] showed the method was beneficial for facilitating theory-driven Agile design, in the case of improving waiting experiences at airport security. In two other cases, about improving safety of elderly cyclists and stimulating daily water intake of young children, the *PbD* model enabled development of significantly effective interventions [74].

Though both studies pointed out the complexity of the model itself may still be a problem for novice behaviour change designers, when the more intuitive lenses are used, designers are able to use the model to inform their designs in all phases of the design process. The lenses can be used as a critical reflection tool
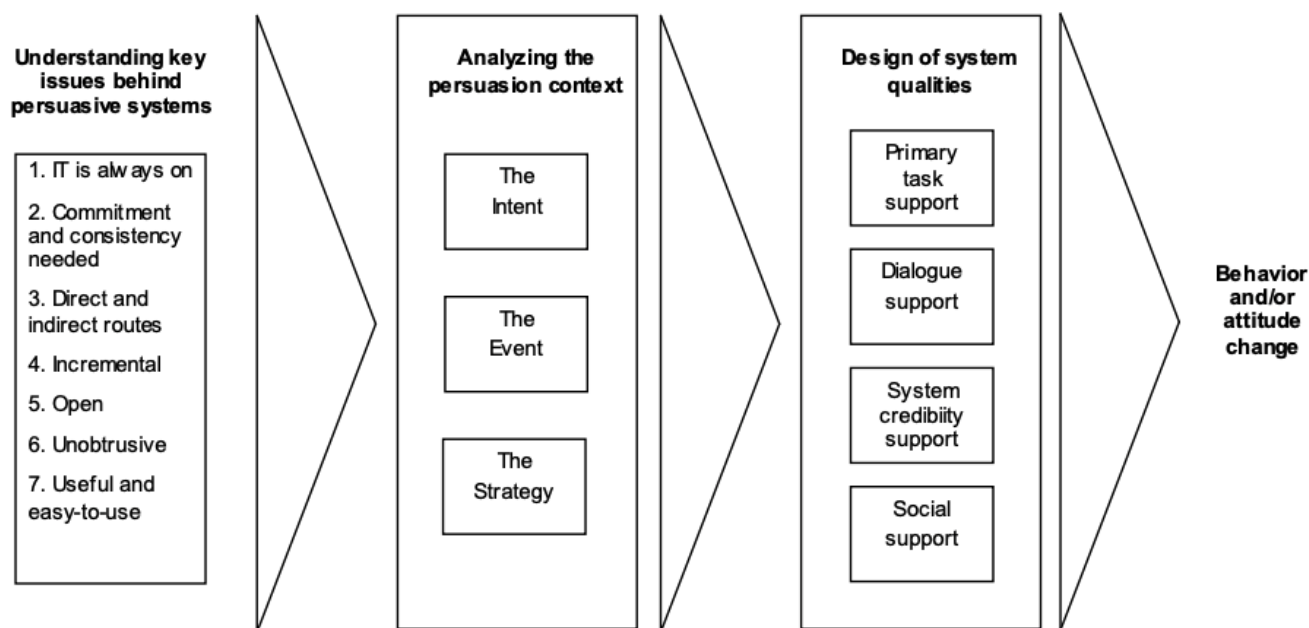
Figure 2.3: Phases within the Persuasive Systems Design framework [65]. Illustrating how understanding the key issues behind persuasive systems, analysing the persuasion context and designing new principles can lead to behaviour/attitude change.

on the coherence of the interventions and can help refine the interventions towards the original intended behaviour [74]. The lenses are;

1. Habits and impulses

2. Knowing and feeling

3. Seeing and realising

4. Wanting and being able to

5. Doing and repeating

A combination of these two methods will be used to create a design that aims to enhance adoption of the application in the case study. The exact steps will be defined within the study design (chapter 4).

2.3.5   Measuring Effectiveness of Nudges

Though the effect of nudges has been well researched, each system is unique and can elicit different experiences for users. For this reason, methods such as the *Technology Acceptance Model* [75], *Susceptibility to Persuasion* scales [76] or *Perceived Persuasiveness* scales [77] can provide insights into the effects of digital systems.

For instance, to predict whether a user will accept and adopt a new technology, the *Technology Acceptance Model* can be used [75]. The model is based on the *Theory of Reasoned Action* and implies that perceived usefulness and perceived ease of use influence attitude and intention to using a system.

In addition, the effect of implemented nudges can be tested for more insights into the strength of the system. For instance, a *Susceptibility to Persuasion* scale can be used to test how likely a user is to engage with and be persuaded by a persuasive system [76]. Predicting factors can be someone's susceptibility

Figure 2.4: Behaviour Lenses from the Persuasive by Design (PbD) model providing different perspectives on how a behaviour forms [54]. Each lens translates to a phase in the PbD model.

to influence of authority, social influence, self-control and needing consistency. Individual differences in susceptibility can be used to design systems with adapted interventions for attitude and behaviour change.

Next, the perceived persuasion of a system can be measured to assess the extent to which the user feels the system tries to influence them [77]. High perceived persuasiveness indicates how valuable the system is to the user. Still, a higher score does not always translate to actual persuasion or the ethical working of a system.

2.4   Contributions

The previous sections illustrate the potential positive influence of digital nudging in social behaviour change systems. By exploring the effect of nudges in the *Burst my Bubble* case study, we aim to gain a better insight into how nudges can influence user behaviour. The platform aims to bring user groups together who have different perceptions and motivations. We need to study their interactions with the behaviour change app in order to learn how to improve it. Using these lessons in a behaviour design process, recommendations can be made for better fitting nudges that allow users to be and feel more inclusive. Our work's main contributions aim to add knowledge to the following research gaps:

1. **Promoting inclusive behaviour through one on one interactions** Organisations are challenged with creating more inclusive workplaces [14]. Without inclusion, diversity in teams does not sustain [32]. However, research is lacking on how to promote inclusion in a practical way that enables individual employees to contribute [23, 25, 18, 19]. Our research will therefore explore how connecting people with others outside their bubble can promote inclusion. This thesis builds further on previous research that shows the potential of one on one interactions on inclusion [19, 27, 25, 43]. Our contributions add value for PwC and other organisations who face the challenge of promoting inclusion.

2. **Effective nudges for adopting a target behaviour** Various systems have proved the effectiveness of behaviour change nudges, supporting users in reaching their goals [3, 61, 62]. There exist many types of nudges that can be applied, but each context calls for different nudges. Yet, there were no studies found that explain which nudges target inclusive behaviour. Research in this field is beneficial for those designing interventions that promote inclusion, and for those who want to be better supported in changing habits. More knowledge is needed about how to design for a persuasive system on which users with contrasting needs are active. This research aims to contribute to current knowledge on which nudges are effective for increasing adoption of a behaviour change application, resulting in reaching a target behaviour.

3. **Designing for persuasive systems targeting social behaviour change** After we gained insights into the effectiveness of nudges and better understand how user behaviour is formed, new nudges can be designed. To design for changing complex behaviour, we need to get a more detailed overview of the decision making process of different target groups. Thus, while the *Persuasive Systems Design* framework is a validated method for designing nudges, we add the *Persuasive by Design* model as well as *behaviour personas* to our design process. By doing this, we aim to suggest a method that is relevant to use for designing for complex (social) behaviour change. The method could then also prove useful for designers in a corporate context.

Chapter 3

Case Study: Burst my Bubble

The case study was commissioned by PricewaterhouseCoopers (PwC), a network consisting of firms in over 158 countries offering assurance, tax and advisory services [78]. Their purpose is to build trust in society and make a difference for clients by helping them solve complex problems.

[confidential]

Chapter 4

Study Design

To answer the research question and three subquestions, the case study of *Burst my Bubble* will be used in a mixed-method approach. For the first subquestion, a think-out-loud study will provide insights into how the current nudges are perceived. Then, during a 6-week pilot study, the actual use of the application and its effect on inclusion will be investigated. Lastly, the insights from subquestion 1 and 2 will be used to explore how the nudges can be improved, answering subquestion 3. The study design is visualised in Figure 4.1.

SQ1: Investigating effect of current nudges

chapter 5.1

"What are the effects of the current application nudges on the user experience?"

Methods:
1. **Think-out-loud study** for investigating how people perceive the nudges in the app.

SQ3: Improving platform

chapter 5.3

"What nudges can be used to enhance the engagement with the application?"

Methods:
1. Following the **Persuasive Systems Design** framework for developing improved nudges.
2. Completing the **Persuasive by Design** model for understanding the psychological process for inclusive behaviour.
3. Creating **behaviour personas** for understanding different user behaviours.

SQ2: Investigating actual platform use

chapter 5.2

"How does the use of the application influence participants' experience with inclusion?"

Methods:
1. **Analysing user data** for exploring how and which participants used the platform.
2. **In-depth interviews** with participants to understand their needs, attitudes and behaviours towards inclusion.

miro

Figure 4.1: The mixed-method approach we take for answering the research question: "How can behaviour change nudges be used to promote inclusion through workplace interactions?".

4.1 Participants

In this research, all participants are employees working within an advisory team. The team consists of 340 people, distributed amongst different function levels. In total, the sample group includes 91 associates, 82 senior associates, 58 managers, 40 senior managers, 36 directors and 33 partners.

In the think-out-loud study, 8 participants of the sample group will participate. These people have not yet seen the application. Then, for the pilot study, all people from the advisory team will be invited to use the application. After the pilot, 11 participants who have created a profile will be interviewed. The people participating in the interviews have not participated in the think-out-loud studies.

4.2 Subquestion 1: Effects of Nudges

Within the application, several persuasive nudges can be recognised. To investigate how participants perceived the implemented nudges, think-out-loud experiments are conducted with participants seeing the app for the first time.

4.2.1 Think-out-loud Method

The think-out-loud method goal is to understand users' interactive behaviour and their rationale for that behaviour [79]. A think-out-loud session focuses on the interaction a user has with a system. The user is asked to articulate their thoughts as they interact with the system, making their otherwise unspoken experiences tangible and insightful. This method is well-suited for identifying strengths and limitations of interfaces. Therefore, this method will be helpful to answer SQ1, which requires insight into the users' experiences with the interface and nudges.

Clear advantages of this method are the feasibility, low cost and flexibility of the experiment. Besides, think-out-loud sessions can be used in many development stages. The downside can be that participants may give filtered statements and say what they think they are supposed to say during the experiment [80]. Hence, it is important to make the participant feel at ease at the beginning of the experiment and make it clear that there are no wrong answers. On top of that, interruptions during the experiment should be carefully considered, to prevent biasing behaviour.

Several approaches to thinking aloud exist [81]. In the traditional way, no communication with the participant is allowed as they go through the system. In a *coaching* approach, small interventions are allowed, provided that the question is in line with the experiment and does not distract the user. The coaching approach was found to be most accurate compared to other approaches and will be used in this study. Examples of allowed interventions are verbal feedback and probes about areas of the interface where the participant is having difficulty, assisting if the participant is struggling, asking questions about rationalising their choices and having a practice session before the experiment [81].

4.2.2 Experiment Set-up

All experiments will be conducted in a silent room with the participant and the researcher. First, the researcher explains the aim of the study and the approach of the think-out-loud method. The participant will be asked to interact with the *Burst my Bubble* app (chapter 2) whilst verbalising their thoughts.

The user will get the task to create an account and search for matches via the web-app on their phone. Following, the participant is asked to imagine they have met up with a colleague through the app and reflect on their experience. This way, the participant can also walk through the feedback part of the app.

Lastly, the researcher asks follow-up questions based on the participant's interactions with the app

and choices made, to better understand the rationale behind decisions. During the entire experiment, the researcher takes notes of the participant's choices, comments on nudges and other observations made.

4.2.3 Analysis

A qualitative analysis will be performed on the experiment results by coding the participants' comments. Each of the codes will translate to one of the nudges currently implemented in the *BmB* app (chapter 3). Due to the relatively small sample size, coding will be done via highlighting the transcribed interviews in a document. After that, the feedback and observations per nudge will be qualitatively discussed.

Important to note is that in the analysis, *mentioning* of nudges by participants will not be equal to *recognising* nudges. People can recognise nudges and not mention them. However, from their comments about the interface and the choices they make, interpretations can be made about how participants perceive the nudges. The actual effect of nudges will be more closely measured with the second subquestion.

4.3   Subquestion 2: Influence on Inclusion

Subsequently, we wondered how the one on one interactions through *BmB* influenced feelings of inclusion and intention of pursuing more inclusive behaviour. This subquestion will be answered based on a 6-week pilot study of the app and interviews with participants.

4.3.1   Pilot Study

The actual use of the application will be tested and observed within the advisory team discussed in section 4.1. *Burst my Bubble* will be available through a web-application that users can visit via a browser on their phones. Invites will be sent to all 340 participants via an email and during a webcast event.

The pilot will officially take six weeks, but participants are free to keep using the app after that time. At the start of the pilot, ten members of the team were asked to create a profile in advance. This way, people that create a profile do not start with an empty platform.

During the pilot, user interaction metrics will be collected via Pendo, a software that tracks user behaviour. The metrics describe which users got to which adoption phase on the platform. The first stage is an initial login. Next, users can choose interests, choose goals and send or receive invites. Understanding adoption behaviour of different user groups is crucial for ensuring that all types of people are included on the platform.

Additionally, user data will be retrieved from the Content Management System behind the app. This includes information on users' gender, age, role, years of work, goals, interests, match invites and acceptations and whether they are part of an under-represented group.

4.3.2   In-Depth Interviews

Through interviewing, insights can be gained into the participant's perceptions and experiences [79]. For this reason, in-depth interviews will help answer the second subquestion. The aim of the interview is understanding what people's experiences are with the one-on-one interactions and how they perceive the contribution of these interactions to their intentions for behaving inclusively.

The interviews will be semi-structured, meaning that there are overall themes distinguished, along with several prepared questions per theme. The advantage of this method is the room for discussion and asking follow-up questions during the interview on interesting leads. In (Appendix B) the script is written out.

The interview will begin with an introduction of the research and interview aims. Then, the interviewee is asked to share some background information on themselves and their position in the company. Next, the

stages within the app are discussed: onboarding, matching and reflecting. The next questions are about inclusive behaviour and people's motivations, intentions, attitudes and awareness, because these topics were found to be relevant factors in predicting behaviour (subsection 2.2.2). Then, the interview is closed and participants have room to add any comments or questions.

Two researchers will conduct the interviews with participants, with one of them asking the questions and the other transcribing.

4.3.3 Analysis

Within this second subquestion, data is collected from three sources: interviews, user interaction metrics and user data. This data is qualitatively and quantitatively analysed.

The data gathered during the interviews will be qualitatively analysed. Because of the manageability of the dataset size, a pragmatic approach can be taken for structuring the data and finding insights. A Thematic Analysis [82] is a common tool used in HCI research and will be a useful process to investigate themes and patterns within participants' experiences related to inclusive behaviour. In six steps, the Thematic Analysis allows the researcher to iteratively study and connect emerging themes from the data. First, the researcher should familiarise themselves with the data, by reading the data and making notes. Then, initial codes will be generated by systematically adding codes within the dataset which describe interesting features. Then, the codes will be combined into themes. Next, the themes can be reviewed and revisited, after which a thematic map is designed. The map visualises themes and the relation they have to each other. Lastly, after all themes have been refined and re-iterated, a report can be produced. In the report, themes will be explained and reflected on. Quotes from participants will support these insights. The coding is done in Dovetail, an application for qualitative analysis. Further analysis and note-taking is done in Mural, a digital whiteboard tool.

Next, the user interaction metrics collected via Pendo will be quantitatively analysed. On top of that, user data from people that created profiles and interacted with other users on the platform is collected and reviewed. These quantitative insights will show which users were or were not motivated to join the platform and find matches. Besides, the adoption behaviour can be visualised in a funnel that shows which users got to which phase. By then adding the qualitative insights from the interviews, a deeper understanding can be formed of the reasons for the behaviour. Combining all data sources during this mixed-method approach will contribute to a better overall understanding of inclusive behaviour in practice.

4.4 Subquestion 3: Enhancing Engagement

For the third subquestion, a retrospective approach is taken. Based on the analysis of results from the first two subquestions, new methods and ideas can be explored for improving the adoption of the application. The think-out-loud studies will give insights into how nudges influenced the user. The interviews will build further on that, and provide insights into the effect of the app on people's experience with inclusion.

By walking through a five-step method, new nudges will be developed, based on the *Persuasive Systems Design* (PSD) framework [65]. For diving deeper into the psychological process of inclusion, the *Persuasive by Design* (PbD) model will be used [54]. On top of that, personas will be created to give an oversight of the different user groups identified.

4.4.1 Intent

In the first step, the intent behind the system should be explained. Who is the persuader and what are their motives? Within a persuasive system, there is always an entity with a certain intention towards

the outcome of the system. Three sources of intentions are distinguished: *endogenous*, *exogenous* and *autogenous*. In endogenous systems the persuaders are those who create or produce the interactive technology. In exogenous systems it is about who gives access to or distributes the technology and in autogenous systems it is the user, the person itself that adopts the technology.

Following, another question to ask is: "What is the type of change that is intended?". Behaviour change can be forming, altering or reinforcing a behaviour, attitude or compliance [60]. The overall aim of the system should be clear before progressing to the next step.

4.4.2 Context

Subsequently, the context around the system will be mapped. This includes the use, user, and technology context. In all steps, data input can be used from earlier research, including pilot insights, interviews, user testing, and literature.

Use context

For the use context, influences on using the system must be understood. Relevant influences can be related to the environment in which the behaviour takes place or potential obstacles impacting the system use, but differ for each use case.

User context

Then, in order to create nudges that target specific moments in the decision making process of inclusive behaviour, the Persuasive by Design model is embedded (Figure 2.2). The lenses in the model will function as viewpoints towards different parts in the psychological cycle. Having an overview of the inclusive behaviour process allows the researcher to pinpoint possible interventions.

Personas Next, personas will be developed to ensure different types of users are accounted for in the design process. A persona is an archetype of a user, representing the goals and characteristics of a type of user of a system [83]. It can help stakeholders better understand and imagine a user in a certain situation. On top of that, it can guide the design process by ensuring the different types of users are accommodated in the design. Meeting the motivations, needs and behaviours of people using the *BmB* app are important for enhancing the design of the app. While not leading, the personas do provide different viewpoints and experiences that can be considered in the design.

The method used for creating personas is based on the work from Huynh et al.[84]. They propose a qualitative, data-grounded and thus reproducible approach for creating personas. The steps are as follows;

1. Articulate design problem
2. Collect user data
3. Assemble phenomenographic categories
4. Build personas
5. Check the personas
6. Solve the *Burst my Bubble* design problem

Firstly, the design problem must be specified and the user data must be collected. Following, phenomenographic categories can be distinguished. These categories describe variations in user characteristics and experiences. Based on qualitative iterations of the collected data, a list of categories will be created. These categories, or themes, then form the basis for the next step, building personas.

By finding variations between participants' answers per theme, personas can be sketched. These personas must be complemented with more personal characteristics, making them more lively. After, the personas will be checked to ensure validity and reliability. The created set of personas is compared with the actual participants. Every participants ideally has a persona representing their experience.

Last, the personas must be ordered in design priority. This can be based on the number of users representing a persona, or a persona that has a low number of users but is key to the system. In the case of inclusion, this can be people identifying as minority groups. Then, it must be reviewed how detailed the personas still are. During the iterative process of this method, individual needs may become lost. Checking back with the data to see any missing details is needed to create a finalised set of personas, that reliably represent the users of the system to be designed.

Technology context

Finally, the technology context plays an important role in the behaviour change system. Choosing the technology to be used on the one hand impacts how the user's needs can be met and on the other hand impacts what nudges are possible to add. Besides, technical issues to overcome, specific to the use case or to the user can be discussed in this section.

4.4.3 Strategy

Next, the message that the system propagates influences how users are expected to interact with the system. Defining a strategy helps guide the design process in summarising how the target behaviour can be achieved. So, the message, the objectives and strategy are discussed.

4.4.4 Design

Following, based on the insights gained in the previous steps, we can start designing the strategy. At this stage, we understand how the users' needs, experiences and behaviour are shaped. By setting up requirements, new persuasive strategies can be formed.

The requirements origin from the results of the first four steps of this design method. For each persuasive strategy, the requirements will be listed in the form of user stories, along with the source on which the strategy is based and the priority of implementation. The strategies translate to one or more of the persuasive principles defined by Oinas-Kukkonen and Harjumaa [65].

As a result, the new nudges can be designed. The software used is Figma, a collaborative interface design tool. The newly designed nudges will be the final deliverable in the behaviour design method. By reviewing the results of subquestion three, together with the insights from subquestion 1 and 2, the research question will be answered.

Chapter 5

Results

The findings of our three subquestions are discussed separately in this chapter. First, subquestion 1 and 2 are answered by analysing the think-out-loud studies and pilot feedback. The answers provide insights into the effects of the nudges and the platform on users' experience with inclusion. Next, we answer subquestion 3 by using an iterative design method described in chapter 4. As a result, we suggest new nudges to implement for enhanced engagement with *Burst my Bubble*.

5.1 Subquestion 1: The Effect of Implemented Nudges

To test how the implemented nudges are perceived, think-out-loud studies were performed with 8 participants. Amongst the participants were two associates, three senior associates and three managers, all working within an advisory team (Table 5.1).

	Gender	Age	Years at PwC	Level
P1	Female	23 - 29	0.5 - 1	Associate
P2	Male	23 - 29	< 0.5	Senior Associate
P3	Male	23 - 29	0.5 - 1	Associate
P4	Female	30 - 39	1.5	Manager
P5	Male	30 - 39	4	Manager
P6	Male	23 - 29	< 0.5	Senior Associate
P7	Male	40 - 49	< 0.5	Manager
P8	Female	23 - 29	< 0.5	Senior Associate

Table 5.1: Participants in the think-out-loud study.

5.1.1 Think-out-loud Study Results

While the participants walked through the app and verbalised their thoughts, together they made comments about almost all the implemented nudges. All conversations were transcribed. In Appendix C, an overview is shown on how frequently nudges were mentioned.

We will evaluate the nudges that were mentioned most often and had the most effect on the user journey. For each nudge, a short explanation is given, together with the role of the nudge in the behaviour lenses (Figure 2.4) [72]. Next, the most influential findings are discussed.

Reduction

The aim of the *reduction* nudge is to reduce behaviour into simple tasks. Within the entire app, reduction was used for helping the user reach the target behaviour more easily, taking away any resistance that may happen during *Lens 2* (Knowing and Believing).

However, during the onboarding phase, the introduction screens that aimed to help the user were noticed in varying ways. Five participants found the screens helpful, but two participants skipped over the screens. Later in the app, many users still had questions that could have been answered by reading the intro screens. Hence, we can infer that the reduction nudge was not effective enough. There were no differences observed between types of users and how they perceived this nudge.

Tailoring & Suggestion of profile setup

By *tailoring* to the potential needs or interests of a user and offering fitting *suggestions*, a system can be more persuasive. This nudge can help users pass *Lens 4* by increasing value and therewith motivation (Wanting and Being Able To). Most participants found it useful to be able to choose personal goals and interests, and recognised themselves in the suggested options. For example: "*I do like how you can both choose to focus on business and personal hobbies.*" (P1).

Still, one participant said they wanted to be able to write their own interest. Two managers also wanted to make their profile even more personalised, because they expected this would result in better matches. On the other hand, these managers did not want to focus too much on personal interests, because they were less interested in connection on these. Another manager explained he wanted more focus on connection goals related to sharing skills and experiences, next to learning.

Besides, added explanation about how many interests to choose could be beneficial, because users were confused they could choose as many interests as they wanted, but were limited to choosing three goals. Further, while people spent a relatively long time choosing their interests, only one participant mentioned this to be annoying. Lastly, the tagline suggestion was negatively mentioned two times, because it was not accurate for some users.

Overall, we can infer that the effect of tailoring and suggestion was relatively positive for users, but that senior participants may need an adjusted version of these nudges.

Self-monitoring of goals

If a system provides *self-monitoring*, the user can track their performance and is supported in achieving goals. By facilitating reflection, attitude can be shaped, and *Lenses 2* (Knowing and Believing) and *3* (Seeing and Realising) can be passed.

The act of setting goals was perceived useful by three participants, others did not explicitly mention the self-monitoring nudge. However, P4 said: *"Setting goals can be a good reminder of where you want to be in your career, what you care about. So I think this is a smart addition."*. Another participant said: "*I think I can reach goals through this app, although its not about the app but about people. The app will mostly support your connection making, that behaviour. In the end it is what you do outside of the app, but the app can definitely help.*" (P2). So, while goal setting is not the key feature of *BmB*, it can support some users in achieving goals.

Further, reflecting on those goals can have a positive effect on people's behaviour. After a user had chosen goals and interacted with matches, they could reflect on their goals. Generally, participants explained they would be motivated to meet up more if their first meetup turned out to be valuable, and that this moment of reflection could positively shape their motivation. Therefore, nudges that emphasise reflection in the app could benefit users showing more inclusive behaviour.

Personalisation & Suggestion of matches

The *suggested* matches were *personalised* for each user, which should theoretically increase persuasion by lowering the effort needed for a task and increasing relevancy. More relevancy can increase motivation, needed in *Lens 4* (Wanting and Being Able To). In addition, the bias that is taken away in the match suggestions plays into *Lens 1* (Habits and Impulses).

During the matching process, personalisation of the matches was mentioned positively two times, though one person found the suggestions still quite generic. On the home screen, six matches were suggested. Most people based the choice of their match on common interests and profile taglines. One senior associate enjoyed the suggestions: "*I am an expat, and I find it nice to go out of my bubble but with still some common things to talk about.*" (P2). On average, associates and senior associates focused more on interests when choosing a match than managers. Also, participants who were looking for social connections liked the anonymity of profiles better than participants that had other motivations for using the app, like the participating managers.

On the other hand, the match choosing process evoked questions with participants. People had questions on the reason why profiles were recommended to them, what would happen if they clicked the profiles, and why the profiles would be valuable to them. As a result, people were more hesitant to choose a user to connect with, indicating room for improvement for the suggestion nudge: "*(...) I do not fully understand the algorithm so I am not sure what to expect of it, that's why I'm afraid to add certain stuff. As a person looking for a mentor, I do not want to be connected to someone who is not fit to be a mentor.*" (P4). Most of the (senior) associates did not comment on the algorithm however and found the matches quite engaging, only one of them had questions about why a profile was recommended to her.

On the whole, personalisation and suggestion of matches could positively affect the user journey by making matches seem more relevant. However, unclear design of this page inhibited participants' willingness to invite matches.

Rehearsal of behaviour

BmB allows users to *rehearse* making diverse connections via the matching process, which can enable people changing this behaviour in the real world. Trying out the behaviour is an essential step in the change process (Lens 5, Doing and Persisting).

While the full process of inviting a match and meeting up with a match could not be tested during the experiment, participants had positive expectations. P8, a new joiner, said: "*Going from connecting to meeting up in real life is hard, but the app can make that more easy and accessible.*". However, a veteran explained she preferred network events, where she would meet more people at once.

Of the five (senior) associates, three would meet people through the app again, depending on the valence of their experiences. A senior associate explained: "*I would be motivated to join just because I want to meet more people. And I like this way of connecting, its new.*" (P8). Yet, even when people were motivated, they still questioned how feasible meeting up would be, looking at how busy their agenda is.

So, while rehearsing the target behaviour could help people see the value of that behaviour, other aspects impacting their perceived ability for the behaviour can still mediate the positive effect. Overall, the general opinion could be described with the quote of one manager: "*I think the app could work great, but that it's mostly a starting point for people. It's a piece of the puzzle.*" (P7).

Feedback reminders and trustworthiness

Within the system, users could receive *reminders* about evaluating their experiences. However, too little *trustworthiness* with the data collection sometimes lowered their motivation, resulting in too high resistance (Lens 2, Knowing and Believing).

The think-out-loud study showed that reminders were evaluated variably. Five participants said they would give feedback, while others showed a more negative attitude because they did not like pop-ups or generally dislike giving feedback. One participant explained other doubts about the feedback forms on inclusion, saying "*I think there is a chance that people overestimate their inclusion behaviour, some people act like they are inclusive even though they might not be.*" (P6).

Further, five out of eight people found the input forms easy to understand and use. One person found the goal evaluation slider confusing, while another said "*the slider allows me to follow my feelings more.*" (P1). Another comment was made questioning how useful it would be to evaluate after just one match.

While people were quite open towards providing feedback, not being aware of how this data may be used lowered their motivation. Especially when asked about the sensitive data about feelings of inclusion, people's willingness to share information was negatively impacted.

Thus, while reminders can have a positive effect on users' journey towards more inclusive behaviour, if the purpose of sharing data is unclear, the positive effect is reduced.

Liking the interface

Lastly, a smooth and appealing interface is more effective for persuasion, also known as the *liking* principle. The majority of the participants liked the interface design and user-friendliness. The interface was found recognisable due to the company branding and the similarity to common dating apps. "*I noticed the PwC branding which I like, the design and purpose of this app fits with the company, where networking is also important.*" (P1). Besides the few design ambiguities that will be discussed in the next section, there were no impactful comments made about the liking of the app.

5.1.2 Technical and Design Issues

During the think-out-loud sessions, several technical and design issues appeared that influenced the users' experience. These issues may have impacted the way nudges were perceived. The following items were recognised:

1. **Clicking interests multiple times.** It was not clear for most of the participants that interests could be clicked multiple times in order to give it more priority in the matching algorithm.

2. **Inconsistency in instructions.** Some participants did not understand why they specifically had to choose three goals, but were able to choose as many interests as they wanted. The difference in instructions between the two screens were confusing.

3. **Number of interests.** Choosing interests took a relatively long time for many participants, potentially causing users to drop out.

4. **Connection goal sections.** The sections in which the goals were distributed, were not fitting for every participant. Needs were expressed about a separate section for sharing skills and social skills.

5. **Ambiguous design match suggestion page.** The screen that showed six match suggestions, was interpreted incorrectly by many users. People did not seem to comprehend that each suggestion

linked to an individual, instead of a group. Also, the design of the avatar images did not make it clearer for participants. Besides, people did not understand why there were specifically six suggestions and where they came from.

6. **Tagline and text bubble mismatch.** Some comments were made about the profile taglines and text bubbles not matching up, which made it harder to choose a profile.

5.1.3   Summary of Findings

The feedback we gathered on the implemented nudges illustrates the need for several nudges to better steer people towards engaging with the app and expressing more inclusive behaviour.

The nudges translated to different Lenses in the PbD model, with a form of support in each Lens. Yet, the effect of the nudges was not always enough to support the user through the Lens.

First, further *reduction* of steps towards the target behaviour is needed for better support, in specific for people with less motivation. Also, *tailoring* the system and *suggesting* the user how to tailor their profile helps users gain more value from matches. Next, *self-monitoring* can be beneficial for reflecting on behaviour and influencing attitude. As long as there is enough *trustworthiness*, users are open to sharing experiences through the app.

However, *suggestion* as well as value of *personalisation* of matches must be improved for better effectiveness. Then, by allowing the user to *rehearse* the target behaviour online, people can change this behaviour in the real world. By mitigating observed technical and design issues, we can further optimize the effect of nudges within *Burst my Bubble* can be optimised. Designing even better fitting nudges increases the chance that users will keep engaging with the app, resulting in a supported change for inclusive behaviour.

5.2 Subquestion 2: Effect of Platform on Inclusion

During the think-out-loud study, we gained insights into the effects of certain nudges within the application. Now, we dive deeper into the role of nudges by investigating engagement with *Burst my Bubble* in a real-world setting. The platform was evaluated during a 6-week pilot study within an advisory team. During the pilot, data was gathered about the usage of the platform. Afterwards, in-depth interviews were conducted with employees participating in the pilot. The insights from the platform usage and interviews were used to investigate the effect of the platform on experience with inclusive behaviour, aiming to answer: *"How does the use of the Burst my Bubble application influence participants' experience with inclusion?"*.

5.2.1 Pilot Study

In this section, we will analyse the user data collected throughout the pilot study. We start with describing the participants and the adoption of the app. Then, we elaborate on chosen connection goals, matches, and patterns in user groups. Lastly, we shortly discuss the pilot study itself.

Participants

In total, 340 employees were invited to join the programme. During the pilot, 163 employees logged in onto the platform (Figure 5.1). This means that almost half of the team (47.9%) was initially motivated to join the platform. Of the 163 people there were 49 associates, 37 senior associates, 30 managers, 16 senior managers, 12 directors, 13 partners and 6 interns, trainees or administrative staff. In total, 40.7% of these participants was female, 58% male and 0.6% other.

During the onboarding process, 48 users dropped out after using the single sign-on on the platform, before or during choosing interests and goals (Figure 5.1). In the end, 115 complete profiles were created, ready to be matched. The below results will be therefore be compared with the number of complete profiles.
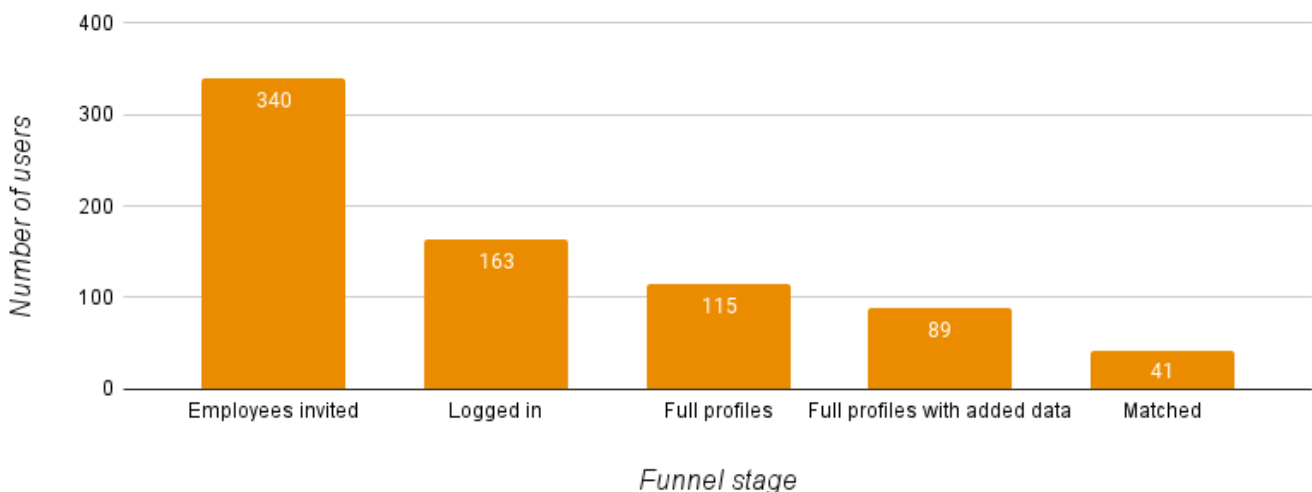
Figure 5.1: The adoption funnel during the Burst my Bubble pilot, showing the number of users per phase.

Of the people with complete profiles 39 were associates, 26 senior associates, 18 managers, 12 senior managers, 7 directors and 8 partners. Of these people, 37% was female and 63% male (see Figure 5.2).

Also, users could add additional data to their profile such as their start year, age and whether they were part of an under-represented group. In total, 89 users did this, enlarging their chances of finding a fitting match. About a third of the users with added data said they were part of an under-represented group (32.5%).

Apart from 1 person who did not want to share this data, the rest of the people said they were not part of an under-represented group within PwC (66.3%). Amongst the under-represented group were 10 women, 15 men and 1 non-binary (Figure 5.3). The positions of people in the under-represented group were divided, with 17.2% associates, 44.4% senior associates, 45.5% managers, 55.6% senior managers, 25% directors and 25% partners (Figure 5.2). Of the people who said they were not part of an under-represented group 19 were women and 34 men.

Amongst the users with completed profiles, most were working at PwC for a relatively short time. 40 users were working at PwC for up to two years. 17 users worked at the firm for two to five years. Then, 14 users worked for five to ten years and another 14 users for longer than five years. Given this data, a division can be made between new-joiners (47.1%) and veterans (52.9%).

To summarise, the initial group of people that onboarded the platform was quite diverse when comparing genders and under-represented groups. However, users did drop off in each stage of the funnel, which the next section will dive deeper into.
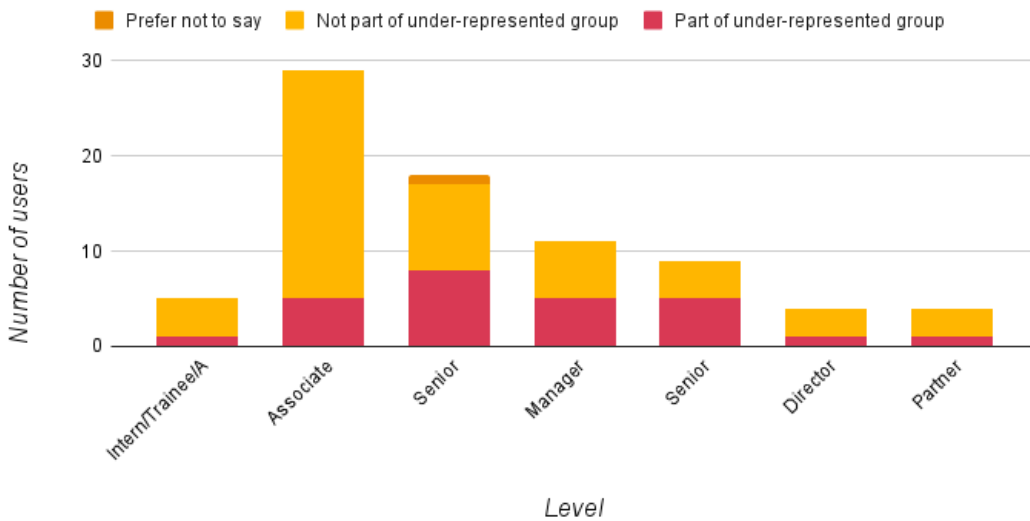
Figure 5.2: Under-represented groups distribution by level, also showing the total number of users per level.
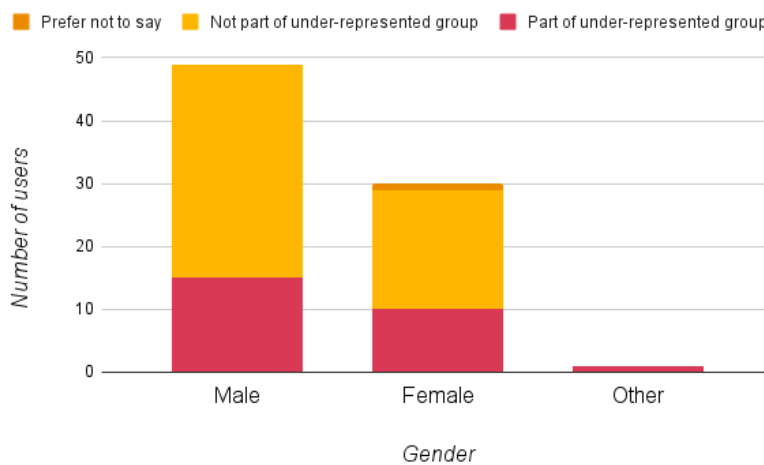
Figure 5.3: Under-represented groups distribution by gender.

Adoption

As illustrated in the adoption funnel (Figure 5.1), 163 people were initially motivated to join the platform. Over a period of 6 weeks, users were able to create a profile. In the first week *BmB* went live, most users registered (Figure 5.4). Another peak was visible in week 26, when lunch sessions were planned within the team promoting the platform. However, registrations lowered over time.
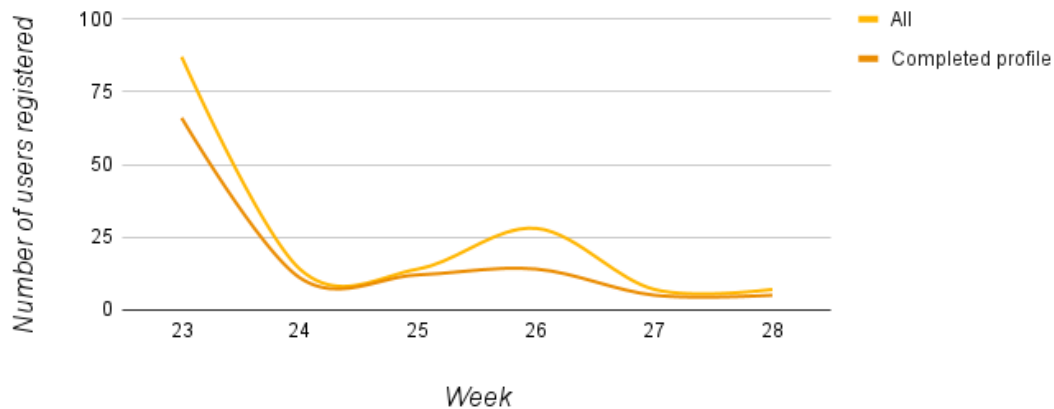
Figure 5.4: Weekly registrations on the BmB platform.

By zooming in on drop-out rates in each stage of the funnel, we can investigate what type of users did or did not complete their profile. Because the aim of the app was promoting inclusivity, it is important that the group of onboarded users is inclusive and diverse as well. The available data for analysis between stages from beginning to end were gender and role.

First, we noticed that more women stopped during the onboarding process than men. Figure 5.5 shows a drop-out rate for males of 44.6% and a drop-out rate for females of 54.5% after login.
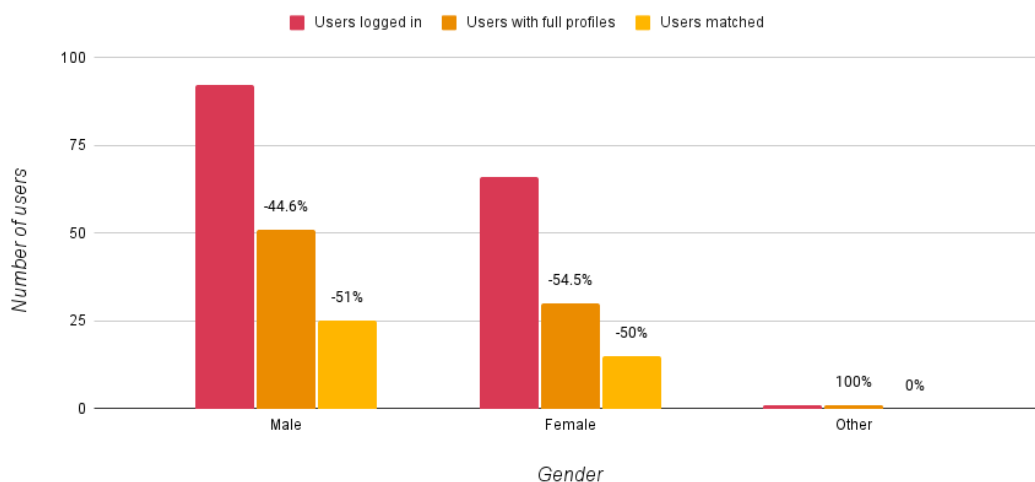
Figure 5.5: Users who dropped out compared to gender.

Then, when looking at the drop-outs per role, it stood out that directors and partners had the highest rate (Figure 5.6). More than half of these users did not complete their profile. Associates and senior managers had the lowest drop-out rates, with about a third of the people dropping out. However, senior managers

were the least likely to have found a match in the end. To better understand what different types of users wanted to be matched on, we need to review what connection goals they chose.
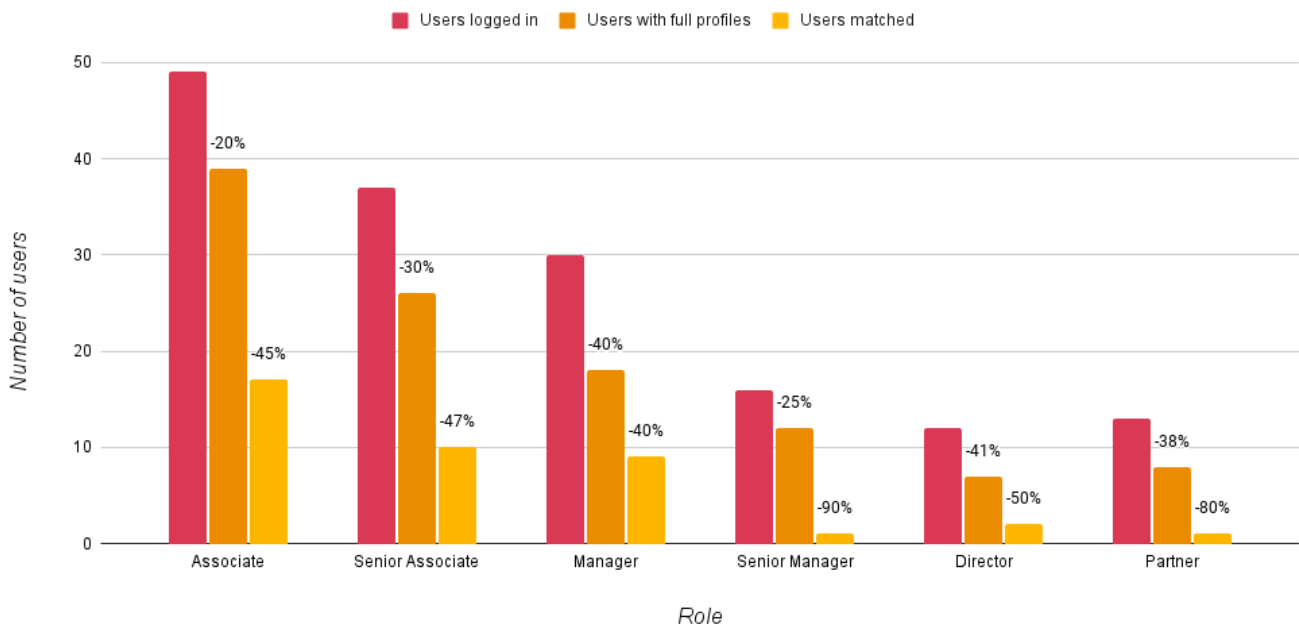
Figure 5.6: Number of users who dropped out per role.

Connection goals

During onboarding, users got to choose three personal connection goals (Appendix D, Table D.1). The most chosen goal was *connecting with peers*, chosen 56 times. *Learning from new perspectives* was the second most chosen goal, with 38 choices. Next, *learning PwC tips and tricks*, *learning about different expertises within the team* and *learning about networks/initiatives within the firm* were chosen most. The goals related to sharing were the least popular, such as *find a mentee*, *helping people learn technical skills* or *sharing knowledge about my industry*.

Roles Within the group of people that chose connection goals, several patterns appeared. For instance, certain goals were chosen more or less often, dependent on the function a person was in (Figure 5.7). Table Figure 5.7 shows the 9 most frequently chosen goals, retrieved from the top five chosen goals by each level.

Connecting with peers was important for many participants, though the need decreased when the function level increased. The same goes for *connecting to other new-joiners*, while starting at a lower level, decreased in importance when the function level increased. Similarly, *learning PwC tips and tricks* was highest for (senior) associates and lowered over time.

Contrary, *learning from new perspectives* increased in priority for people in higher positions. Also, *sharing work experiences* was chosen more often by senior managers, directors and partners. In the same manner, directors and partners chose to *help colleagues understand the PwC career trajectory* most often.

Noticeable is the sudden increase in priority for *learning about networks/initiatives within the firm* by senior managers, compared to other levels. Similarly, the need for learning about different expertises within the team increases from associate to manager level and then decreases for directors and partners.

Lastly, interest in *technical skills* was quite steadily chosen by people from all levels, expect for directors

and partners, of whom nobody chose this goal.
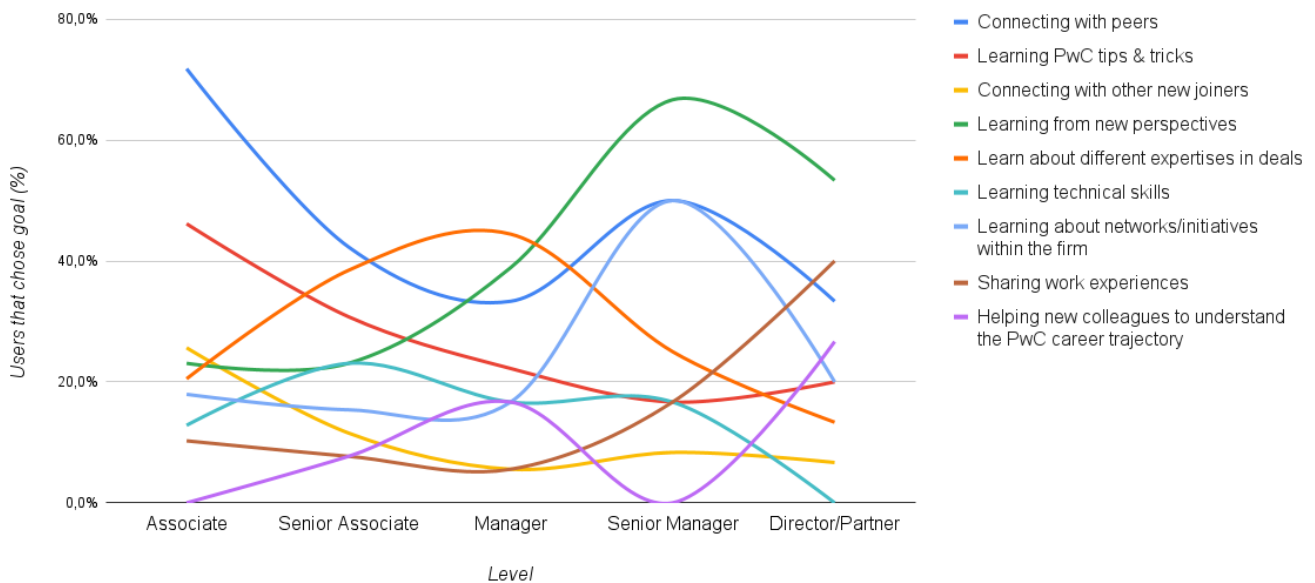
Figure 5.7: Level distribution and chosen connection goals.

Work experience A difference was also visible when comparing the goals chosen by new-joiners and veterans (Appendix D, Figure D.1). The most frequently chosen goals were chosen by both groups, though *learning PwC tips & tricks*, *connecting with new-joiners* and *finding a friend to hang out with* were chosen more often by new-joiners than veterans. On the other side, veterans were more likely to choose *learning from new perspectives* and *learning about networks/initiatives*. Next, veterans were more motivated for *boosting well-being and mental health*, *finding a mentee*, *sharing tips & tricks* and *helping colleagues share knowledge* on skills, the industry and the firm.

Genders Next, figure Figure 5.8 shows the connection goals with the largest differences between men and women. While for every gender the connection goals related to *networking*, *meeting peers* or *learning company tips and tricks* were most popular, some goals related to other subjects were more popular in one group than the other. For instance, men more often chose to focus on *learning from new perspectives*, where women were more focused on *finding a mentor* and *a friend to hang out with*. Also, *boosting mental health* was more popular for women. *Learning technical skills* on the other hand was more chosen by men.
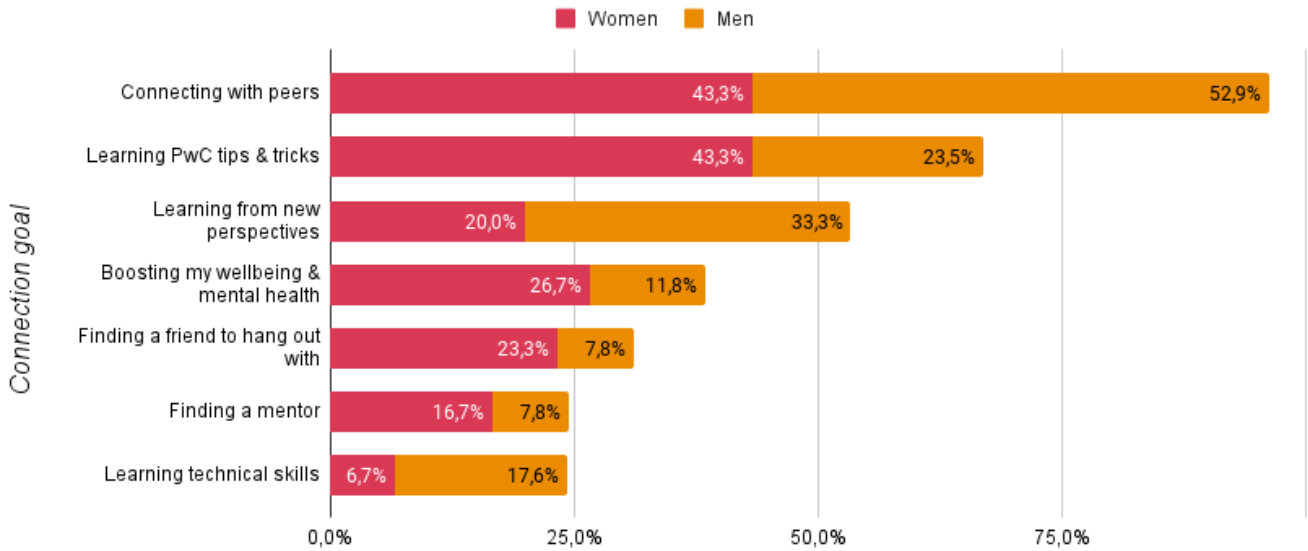
Figure 5.8: Distribution of chosen connection goals amongst men and women.

Under-represented groups Last, some patterns can be recognised when comparing the goals chosen by people in under-represented groups versus people not in those groups (Figure 5.9). Users in that group chose more often to *find a mentor, learn from new perspectives* and *find a friend to hang out with*. People not part of an under-represented group were more focused on *networking*, and chose goals like *learning about networks/initiatives within the firm, connecting with peers* and *learning technical skills*.
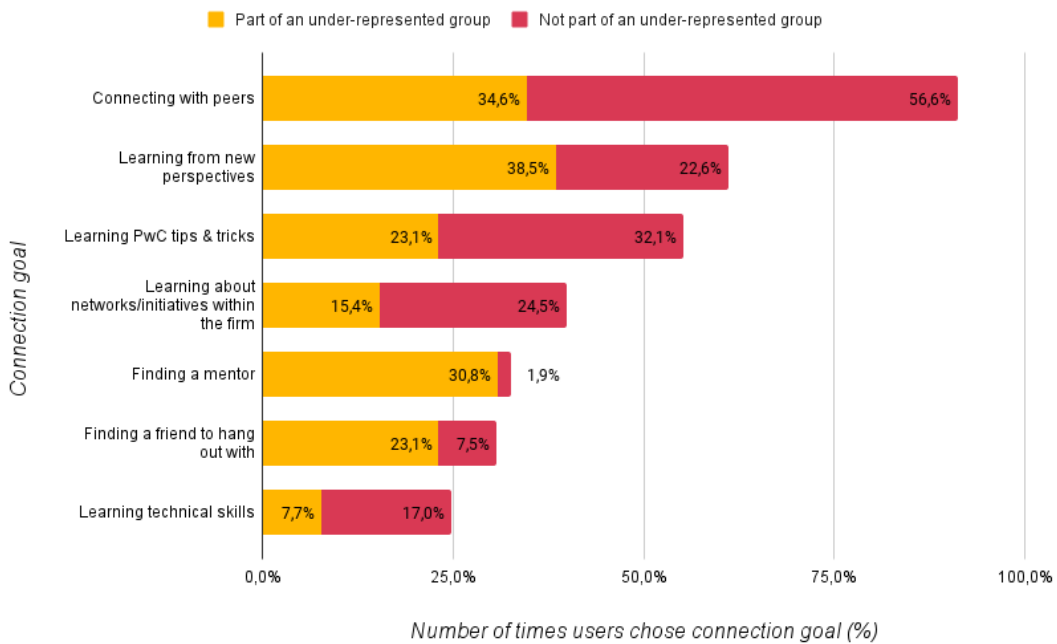
Figure 5.9: Chosen connection goals with biggest difference between users part of an under-represented group and not.

Matches

Of the 115 people with complete profiles, 61 invited or accepted a match. So, over half of the users was involved in a (potential) match (53%). Overall, there were 45 accepted matches between 41 people.

Roles On top of that, a pattern can be seen when comparing roles with being matched (Figure 5.11). The graph shows the highest match percentages for the associates, senior associates and managers. Senior managers had an extremely low match percentage. Directors and partners had relatively low percentages as well.

Work experience Next, the data shows that the same number of new-joiners matched as did not match (Figure 5.10). Veterans matched relatively less, and the people who did not add their start year at PwC had a similar share in the matched group as not-matched group.

A similar pattern can be seen in the graph comparing the number of matched users with the number of years they work at the firm. The employees who most recently started were more often matched than veterans, who had been at the firm for longer. 62.5% of the people working 0 to 2 years at PwC matched, 70.6% of the group working 2 to 5 years matched and 64.3% of the group working 5 to 10 years matched. Of the people who had been at the firm over ten years, the largest part did not match. Their match percentage lied at 28.6%.

Genders In total, this group included 26 males and 15 females. Though the groups were different in size, both genders participated equally in the matchmaking, with a match rate for women of 50% and men of 49%. The average age of matched people was 29 years and on average, they worked at PwC for 3 years.

Under-represented groups Of the matched group, 12 said to be part of an under-represented group, 21 said they were not, 1 preferred not to say and 7 did not add this data. This means that of the people part of an under-represented group, 44.4% found a match (Figure 5.11). Of the people that were not, 39.6% found a match. Of the people that did not fill out this data, 58.3% matched.
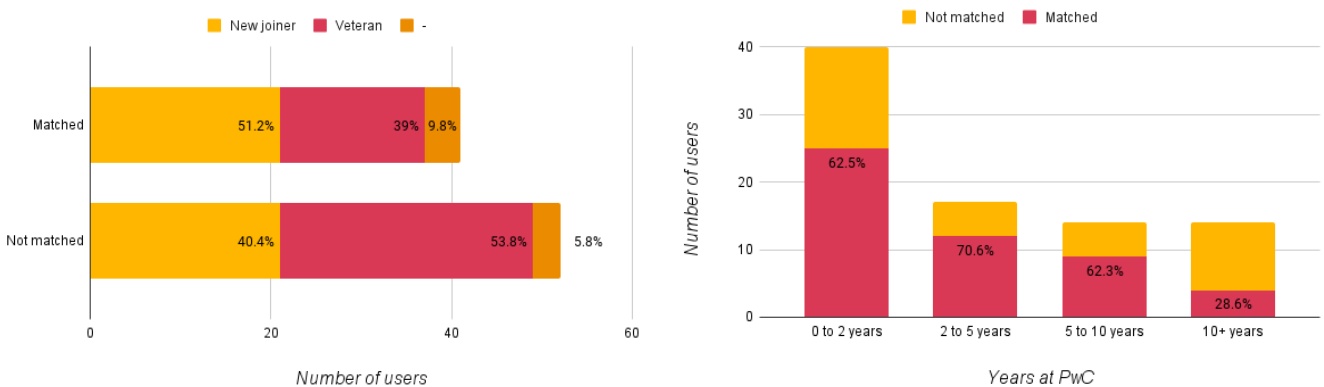
Figure 5.10: Distribution of matched profiles amongst new-joiners vs. veterans. Distribution of matched profiles amongst years of work.
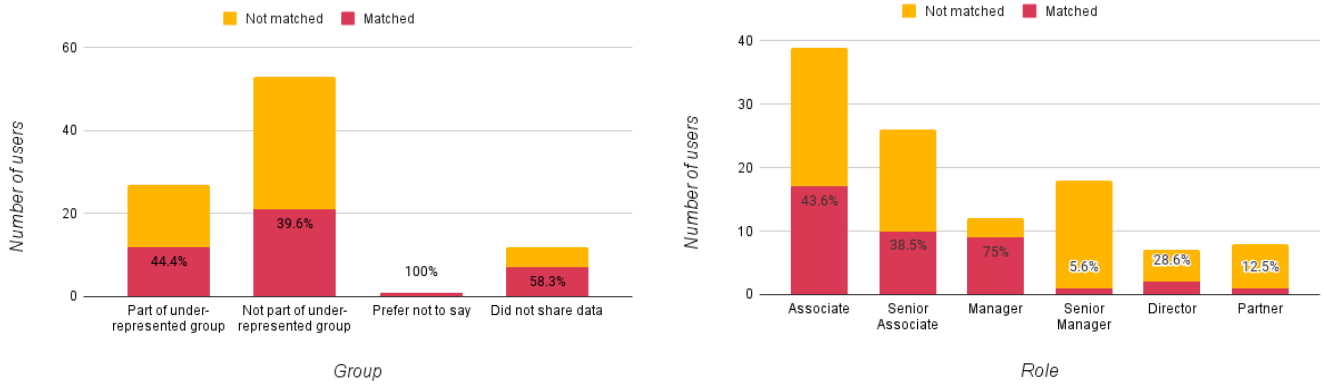
Figure 5.11: Distribution of matched people in under-represented groups and roles.

Users were matched based on interests and goals. If the goals of two users complemented each other, they were more likely to match. The people who found another profile that interested them, mostly got profiles with the goals related to connecting and learning (Figure 5.12). Users who did not match had some goals similar to people who matched, but Figure 5.12 shows that *sharing work experiences* was an often chosen goal that people did not match on. On the contrary, *finding people working on interesting projects* was a goal chosen by people who often matched.
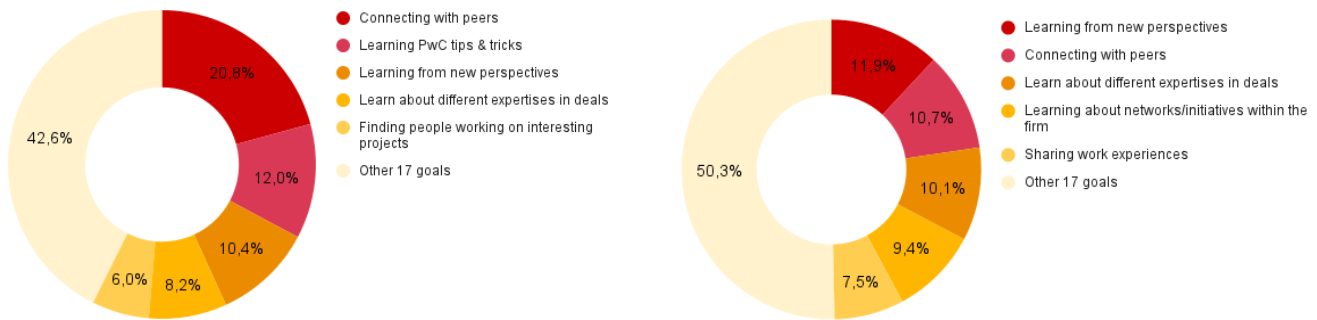
Figure 5.12: Distribution of chosen connection goals between matched and non-matched users on the BmB platform.

Patterns in user groups

By further comparing the data from different user groups, the goals they chose and their match percentage, new patterns can be discovered. To start, employees from associate to manager who recently joined the company, were relatively most motivated to participate, seen by their higher adoption rates. Users in this group most often chose goals related to connecting and networking. People in the active group that were matched most, were often interested in creating social connections. Other people in the active group who matched relatively less, were more interested in networking and career related connections and included more males.

Another interesting group of users consisted of people who were, next to networking, focusing on finding a mentor relationship or a friend to hang out with. It stood out that matches were generally not based on these goals. Users in this group had roles from associate to manager, with varying years of work at the firm. They were relatively more female and more often part of an under-represented group.

Besides, it is visible that the least active people were mostly veterans, in the highest roles. Users in

director or partner position were often males, and had a low number of people part of under-represented groups. A highly chosen goal amongst this group was sharing work experiences of learning from new perspectives. However, there were very little matches amongst the users in the higher roles.

Although these patterns were only qualitatively investigated, they do show general differences in the motivations users have for being active on the platform.

Pilot evaluation

Apart from differences in motivations or attitudes for participating in the pilot, other external factors influenced adoption. First, the single sign-on for logging in to the platform did not work outside the office. This issue was resolved within the first week. Next, the advisory team in which the pilot study was conducted had an extremely busy period due to the ending of the fiscal year. This impacted people's ability to make time for the platform. Lastly, the feedback forms could not be tested during the pilot, because of unexpected technical issues.

5.2.2 Pilot interviews

At the end of the pilot, 11 interviews were conducted with people who participated (Table 5.2). The insights will be discussed based on the outcome of a Thematic Analysis, starting with the impact of *Burst my Bubble* on being and feeling inclusive. Following, the factors influencing engagement with the app, thus affecting impact of the app, will be explained.

	M/F	Management level	Time at PwC	Group	Minority	Connections
P1	M	Senior Associate	< 6 months	New joiner	No	3 matches, 1 meetup
P2	F	Director	10 years	Veteran	Yes	none
P3	F	Associate	1.5 years	New joiner	No	1 invite received, 1 meetup
P4	M	Senior Manager	3 years	Veteran	-	none
P5	M	Manager	6.5 years	Veteran	Yes	none
P6	M	Associate	< 6 months	New joiner	No	none
P7	F	Manager	5 years	Veteran	Yes	5 matches
P8	F	Senior Manager	0.5-1 year	New joiner	No	4 invites sent
P9	M	Manager	< 6 months	New joiner	No	1 match, waiting for meetup
P10	M	Associate	< 6 months	New joiner	No	1 invite sent
P11	M	Associate	0.5-1 year	New joiner	No	1 invite received

Table 5.2: Overview of interviewed participants who participated in the pilot study.

Themes

After all the notes made during the interviews were written out, the data was uploaded in Dovetail. With the data, codes and themes were iteratively generated (Appendix E, Figure E.1). The themes were reviewed and visualised in a map (Figure 5.13).
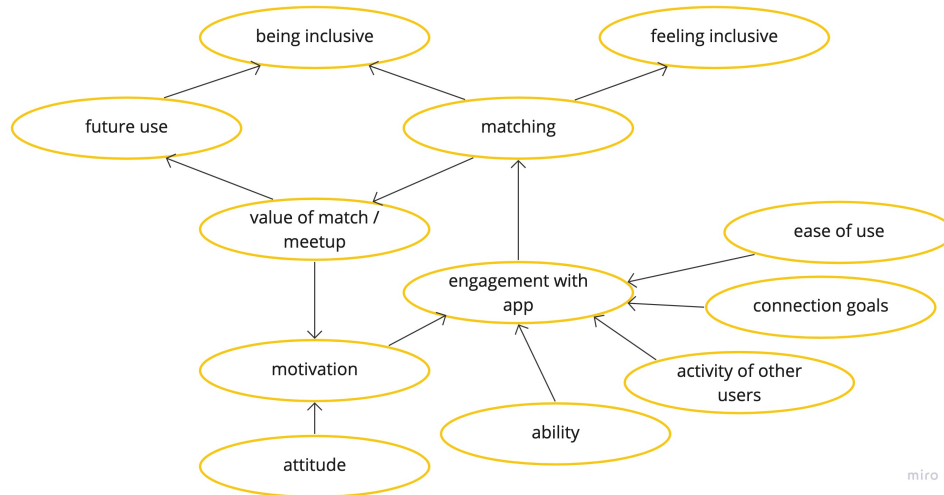
Figure 5.13: Themes based on coding of interviews about experience with inclusion during the pilot study, showing how being and feeling included is influenced by several factors.

Feeling included

Impact on feeling of inclusion Half of the participants explicitly mentioned the platform could positively impact their feeling of inclusion. P8 elaborated: "*I think it could! Definitely for people who joined recently. You feel more part of it when you can be connecting to people who work here longer.*" P9 also saw the potential: "*It could work, you feel more involved in the company family. If you have been working here for longer, you subconsciously create groups that others have a hard time getting in. These types of initiatives can help with that and make you a part of such groups*".

A few participants were unsure about the impact of the platform on their feeling of inclusion. For instance, participant 5 answered he had not even thought about it, and participant 6 explained: "*inclusion is not that important to me, I don't feel like a minority, so I'm not really involved.*"

Value of matches The value of a match affected the impact that match had on people's experience with inclusion. Because not every participant had matched or met up with someone, not everyone was able to reflect on it. However, most people expected the outcome of the matching to be positive. Because the matching was done based on personal interests and goals, people said they were able to estimate better how valuable a match would be. For instance, P8 said: "*I could see the value that one can extract from it, its simple and I like that. (...) I think the interests make it interesting, you have more control on who you're meeting. I see the potential.*". Similarly, P9 expected that all matches would have value in a way, saying "*all matches were useful, because I want to meet many new people anyway.*".

The success story from one participant shows the potential for people who meet up with others who have similar interests: "*A girl from another team found my profile and invited me. On our work trip to Paris we met up and had beers. Turns out we both want to learn Dutch so we bonded on that and have weekly meetups scheduled now!*". However, the interviewees who had more work experience generally were less confident. A director said: "*I would accept an invite. But what if I am matched with a new joiner? I want to be matched with someone in the same age group or management level. But don't make the distance too large, that makes it less casual.*". So, depending on years of work at the company and connection goals, the (expected) impact varied.

Being inclusive

Attitude towards inclusion Interestingly, people who generally had a positive view on inclusion, expected their attitude and behaviour would not change much: "*No, I already consider myself inclusive.*" (P3) or "*My intentions don't change, I have always had this mindset. I've always been trying to meet people with diverse backgrounds.*" A few participants were not as involved with the topic of inclusion, and less motivated to be active on the platform, saying "*it's a nice to have*" (P8) or "*I would survive without the app*" (P10).

So, the interviews indicate that people expect the platform has limited impact on their attitude. However, because most interviewees did not meet up with matches, the impact is only based on expectations, and not on actual perceived attitude change.

Changing the way you connect Another aim of the platform was to enable people to become more inclusive. When participants were asked if this was the case, they gave varying answers. "*If you are not inclusive, you would not participate in the first place, so I don't know if you can test that. But yes, it will probably help.*" (P7). P8 had similar thoughts: "*you already have this in you probably, some existing motivation*".

Though, many other participants did expect the platform could positively affect their behaviour. One interviewee explained how the platform enabled her to be more active in making new connections: "*I like it, it pushes me to different boundaries. I am too lazy to search for it myself. Actually, I don't have time to, but this is a quick enabler.*" (P8). Another participant was similarly positive, but for a different reason: "*I am 50-50 introvert/extrovert, and not so easy with meeting new people. This way it's a lower threshold for me, so I think that's really great. In my team we also have a programme in place for random meetups, but I like Burst my Bubble better, because you have the mutual hobbies and interests.*" (P9).

Engagement with the app

Burst my Bubble supported users in making new connections, aiming to positively impact their experience with inclusion. However, the effect the application could have on users was mediated by their engagement with the app. The interviews showed that several factors influenced users' engagement with the app and thus the impact of the app on their experience with inclusion.

First, a user's motivation and attitude influenced how active they were with making matches. In addition, people's perceived ability to be active on the platform and the activity of other users affected their experiences with *BmB*. Besides, the ease of use of the platform influenced their engagement with the app. Below, the most notable factors promoting or inhibiting engagement are discussed.

Motivation How important someone considered inclusion to be for their work, influenced their motivation for being active on the platform. For instance, many interviewees acknowledged how important networking was for their job and job satisfaction. Hence, because networking was the basis for *Burst my Bubble*, participants all had some form of motivation for creating new connections.

Even so, the interviews showed that differences in people's connection goals resulted in different levels of motivation for engaging with the platform. When choosing goals, new joiners were focusing mostly on connecting to peers, getting to know the company and broadening their network. Veterans were more interested in mentor relationships and less on connecting on private hobbies. It became clear that people looking for social connections were more optimistic when being asked about whether the connection goals would add value. A new joiner (P8) answered: "*Yes, it would be valuable, because connecting based on the same reasons makes the match and time you spend on it more efficient. You are not matching for no reason, you will be more sure to be aligned in motivations.*". However, people who had doubts about whether the platform could help them reach their goals were less motivated. Amongst these were mostly the veterans,

but also some new joiners, who all found the use case for *BmB* not clear enough. P4 said: "*Some other goals would be good, they make sense but feel a bit limited, additional ones would help. Connecting with anyone for instance and not only with peers, it's too limited for growing professionally.*".

Lastly, it stood out that some participants used the app mostly because they knew they would be interviewed about it. Even though they were interested in the app once they discovered it, they needed this external motivation for actually creating a profile. Overall, most participants were quite motivated though to use the platform more. As long as the value the platform brings is clear enough, people explained the programme could function as a motivator for more inclusive behaviour.

Ability In the same manner, when participants were able to choose fitting connection goals, they were more likely to engage with the app. Personalisation of profiles increased the ability of users to find a meaningful match. P8 answered she was able to find what she was looking for through the platform: "*I was looking for social connections and there was an entire category for it!*".

On the other side, participants' perceived ability lowered when they had too little time in their busy work week. One participant explained why he was not active, even though he found it a valuable initiative: "*Yes, for me it is definitely valuable, but I have to watch out that I don't forget about it. People have busy jobs here and these things tend to be forgotten about.*" Another associate said: "*I'm open to it, but it's not my number one goal*". So, when time is limited, initiatives like *BmB* are not prioritised and users may need to be reminded and persuaded more.

Inactivity of other users Another inhibiting factor for platform engagement identified by interviewees was inactivity of other users. A senior manager who said she was highly motivated to create connections invited four people, but did not yet get a response. Through the interviews, it became clear that many people had a hard time keeping their mind about it. A lack of reminders was identified as one of the main reasons for people not checking in with sent or received invites. Besides, lack of talk outside of the app caused doubts for some: "*nobody has heard any stories yet, but that is important. I don't take the lead in these things.*". In general, it can be said that the inactivity of users resulted in lower engagement with matches and decreased motivation to participate.

Findability of app In addition, findability of the platform was an issue for participants. People had to visit BmB via a web-application instead of an installed app on their phone. Many participants mentioned this to be an obstacle and expressed the need for a more easily findable, reachable platform.

Ease of use Overall, the usability of the platform was experienced positively by participants. The onboarding was found self-explanatory and straightforward. However, a better overview of the interaction history would be useful. Participant 7 elaborated: "*Have a list of people that you have been connected to, have a list of your own activities or create a way to connect via the app (e.g. make the connection via the app instead of going to mail)*". More support during the smaller steps towards making a match can help people be more active on the platform.

Ambiguous design of match page One example of a need for support during the matching process is about the design of the match suggestion page. Some younger people recognised this page and compared it with existing dating apps, helping them understand how the app worked. However, not everyone understood the match suggestions page. Participants had questions about why they were matched to the shown profiles, and what the expectations were after being matched with someone. A manager said: "*What is the required follow-up after the connections? What are the expectations? Do I need to make 10 connections and meet*

once or twice and meet multiple times?". The ambiguous design of the match suggestion page hindered users to engage with suggested matches.

Overwhelming match suggestions Moreover, the match suggestion page was not fitting for many of the interviewed veterans, who did not invite any colleagues through the platform. It stood out that all of the four veterans did not create new connections, except for one person connecting to a close teammate. For one senior manager (P4), only 2 of the 6 suggestions seemed fitting. A director (P2), who had been with the company for over 10 years, was overwhelmed when the match suggestions appeared: "*No, I did not match. I was startled because it looked like opening an entire LinkedIn or dating site with people from the office.*".

Overall, the veterans would be happier with less match suggestions. For some, the step from receiving match suggestions to an actual meetup was too big. To P2 and a few other users the list of six suggestions was too long: "*Never mind, now I have to choose myself, this is too much work. I'd rather have one match.*".

Future use

In retrospect, the above mentioned topics did largely impact engagement with the platform. When participants were asked whether they would want to use the app again, most answers were positive. However, for people to be more active on the platform, they do need other people to be online as well, actively engaging with connections. Besides, the app should be easily findable, intuitive to use and not overwhelming them with content. Users want to be able to easily choose matches that fit with their interests and goals, providing them the value they expect to get out of the app. All these topics can increase motivation to use *Burst my Bubble* more in the future.

Still, the few participants who did meet up with colleagues through the app reflected positive on their experience. Besides, participants expected they would be better supported in being more inclusive through the app. While some people had questions about how they would find an interesting match, most said they would be motivated to use the app more if the meetup would indeed be valuable. So, tackling the engagement issues identified during actual use of the app in a pilot, the impact of *Burst my Bubble* on inclusion could be increased. More positive experiences with new connections can alter attitudes and then target the interplay between attitude, motivation and behaviour change.

5.2.3 Summary of Findings

The aim of subquestion 2 was to explore the following question: "*How does the use of the application influence participants' feelings of inclusion?*". The user data gathered throughout the pilot study provided insights into the activity of users on the *BmB* platform. The adoption funnel showed which users proceeded to which stage; crucial information when designing a platform that promotes inclusion. Results from the interviews can give deeper insights into visible patterns and show how to ensure that all users have the same opportunity to participate. In this section, the outcomes of the user data and the interviews are summarised.

In general, the pilot study and interviews showed a beneficial influence of *BmB* on people's experience with inclusion. However, this influence was largely based on expectations. Due to the limited time of the pilot study and occasionally low user engagement on the platform, participants were often unable to fully complete the matching process. Still, the few positive outcomes of matches indicated the potential impact of the platform. For instance, the participant who scheduled weekly meetings with her match experiences the influence of *BmB* on the longer term. Also, the participants who felt the platform enabled them to connect in new ways experienced a positive influence of the platform.

Nevertheless, engagement with *BmB* should be increased in order to create more similar success

stories. By further investigating user behaviour, it became clear that engagement was dependent on a variety of factors. While almost half of the team was initially motivated to log in, only 35% of the team ended up creating a full profile. The more detailed insights gained through the interviews can help identify reasons for drop-outs in the adoption funnel.

Gender To begin with, different user characteristics had relations with different behaviours. For instance, when zooming in on gender, we can see that women had higher drop-out rates at onboarding than men. However, while there were more men with full profiles, men and women had similar match percentages. The pilot data shows that besides the regular popular goals, women focused relatively more often on finding a mentor, a friend to hang out with, or improve mental health. Men focused relatively more often on connecting with peers, learning from new perspectives and learning technical skills. Besides differences in connection goals, no clear differences were found in the interview data.

Under-represented groups People who said they were part of an under-represented group minority group expressed different needs for connection. Their most popular goals were relatively more often about learning from new perspectives, finding a mentor or a friend to hang out with. In hindsight however, being part of an under-represented group did not influence match percentage. Further, the interviews indicated that people who did not feel excluded themselves, found it harder to see the exact value of the platform. Quoting one participant: "*Inclusion is not that important to me, I don't feel like a minority, so I'm not really involved.*".

Roles Another impact on motivation for engagement origins from roles. A pattern was visible in activity from junior to senior roles, showing that people in higher positions were less active. Senior managers, directors and partners were rarely matched and the least likely to add additional profile data. Based on the interview results, it becomes clear that senior employees found it harder to see the clear value the platform offered, and the potential value of a new match, than junior employees. The hesitance that senior employees had, negatively impacted their engagement with the platform. Associates, senior associates and managers on the other hand had the lowest dropout rates and were generally more content with the features of the platform.

Still, connection goals differed per person, and motivation for the app increased when people thought they would be able to reach their goals through the app. This results in scenarios like junior employees looking to create connections of value to their career being less motivated than employees focused on making social connections.

Work experience Further, the people who were newest with the company were generally more motivated to use the platform, and may have experienced the highest impact. Compared to veterans, new joiners found the most matches. Veterans were less active and less motivated, which also came up during interviews. An unclear value proposition and little explanation about the expected efforts made it harder for them and other users to put their motivation into action.

Finally, the influence BmB can have on inclusion is dependent on the diversity of the user group. Because the progress of each user in the funnel was different, the platform may not have reached its full potential. By establishing a fitting platform also for those who did not engage with the platform during the pilot, more employees will have an increased chance positively impacting how inclusive they feel and act.

5.3 Subquestion 3: Designing Improved Nudges

After analysing the situation as-is with the nudges and impact of the Burst my Bubble platform, a retrospective approach was taken. Insights from the literature review, think-out-loud study, pilot study and interviews were used as input for answering the third subquestion. The central question in this section: "*What nudges can be used to enhance adoption of the application?*".

In the original design a collection of nudges had already been included. However, based on direct and indirect feedback from users, it became clear there was opportunity for improvement in the design of the nudges. The environment in which the platform is used, requires a thoughtful design process. With the high pressure work environment in which employee behaviour is targeted, extra dimensions are added to the process.

To ensure new nudges were created that fit different types of users, a behaviour change design method was used (see chapter 4 for all steps). First, the intent of the system and its persuader must be discussed. Then, the use, user and technology context are explored. Next, the strategy along with objectives are defined. Lastly, a design can be created, based on selected persuasive principles and a requirement list.

5.3.1 Intent

A persuasive system has no intentions of its own. Behind a persuasive system is a persuader who intends to affect behaviour by creating, distributing or adopting the technology. Understanding who this persuader is and what their motives are, helps reveal the designer bias behind the system. The user must always be aware of the persuader's objectives for the system to be truthful and effective. Thus, this section discusses the *intent* behind the system, by exploring the persuader and the targeted change type.

The persuader

Behind persuasive systems can be three sources of intentions: *endogenous*, *exogenous*, or *autogenous*. In *exogenous* systems, the effect of the persuasion depends on goal-setting by the user. So, users must still be able to personalise their goals, even if the distributor of the technology has pre-set goals themselves. In the case of workplace inclusion, it is most likely that an *exogenous* technology applies. The leadership team distributes the system and employees may use it to their liking. The designer of the system will not be the main persuader, which would make it an *endogenous* system. The designer is the enabler for the distributor to provide the system to all employees and communicate the importance of it. If the system would be *autogenous*, it would assume the user itself is intrinsically motivated to participate, which could lead to low adoption by employees not initially motivated for promoting inclusion.

Accordingly, on a platform that stimulates inclusive behaviour in the workplace, the leaders of that workplace are the main persuaders. In the case of *Burst my Bubble* this is the PwC leadership and HR team, but naturally this can be any leadership team from any company. The fundamental motives PwC identified are related to making social impact, improved decision making through input from more perspectives, higher innovation, retention of talent and profitability. Moreover, a diverse environment only sustains if it is inclusive. The firm identified a similar need in many other large organisations.

On top of that, the main belief of the distributor of the platform is that building a diverse network and keeping getting to know more people has a positive effect on its users. This '*designer bias*' should be made clear for users on the platform.

Change type

The change that the *BmB* platform aims to pursue is about creating and being open to making diverse connections. The act of making the connection is a behaviour. However, before the act comes the attitude, subjective norm and perceived behavioural control that form intention towards the act and actual behavioural control on the act [48].

Inclusive behaviour vs attitude cycle In the context of inclusion, attitude and behaviour follow each other. First, a positive attitude towards inclusion helps to start participating on the app and create a profile. Then, through matching with other people, the behaviour is practised. After, the person may reflect on the experience and decide to change their attitude, which later will affect their behaviour again. This cycle may go on and cause change in how connections are made through the app as well as in real life. Though, starting with the app may not be fully dependent on having a positive attitude towards inclusion. It could be enough if a person is motivated through another means to create a profile on the platform and be invited by another user to meet up. If the meetup turns out to be valuable and the behaviour is reflected on positively, the attitude shifts. Thus, it seems that there is an interplay between inclusive attitude and inclusive behaviour Figure 5.14. Different theories describe this effect, of how attitude and behaviour interplay [McGuire 1973, Fishbein and Ajzen 1975]. While behaviour can inspire attitude, attitude can also form the likeliness of behaviour taking place.
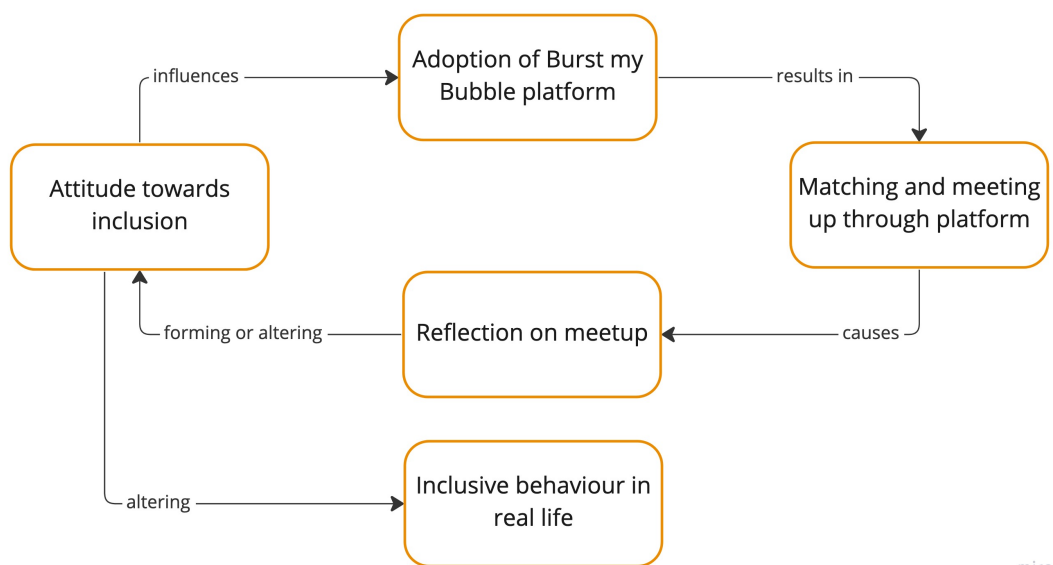
Figure 5.14: How behaviour and attitude interplay

Type of change So, following the *Types of Change* (Table 2.1), it can be said that the type of change of the *BmB* system is focused on forming or altering attitude and altering behaviour. Connecting with people is a behaviour people already know how to do, *BmB* just alters the way they do it. For attitude however, some people have no awareness of the value of a diverse network, while others do know and have an existing attitude towards it. Thus, attitude can be formed or altered through the system.

How to change Finally, it is important to define how the system will support that change. The entire process of changing inclusive attitude and behaviour can be divided in multiple smaller steps. The *BmB* system aims to support people in those steps.

Starting with a form of motivation towards inclusion, a person can open the app and create a profile. Then, the person can look at potential matches, invite someone, match with someone or accept an invite, schedule a meetup and have the meetup. After, they can reflect on the meetup and then return to matching again through the app. Additionally, users can take their lessons learned and apply them in real life. Reducing the steps for people may make them more likely to follow all steps and engage in the target behaviour.

Next to that, the system can support people who are at different stages in the inclusive behaviour cycle. By keeping the steps simple and providing reflection moments, also less motivated people can walk through.

5.3.2 Context

The second step in this method is about exploring the context relevant to the problem domain. Burst my Bubble is a platform implemented in a corporate environment, for employees with existing habits. Promoting inclusive behaviour thus requires a multifaceted approach in which the context the persuasive system will be used in must be understood. Hence, the following subjects will be discussed:

1. **The use context.** Exploring the environment in which inclusive behaviour takes place, including potential factors impacting the use of the system.

2. **The user context.** Exploring the user that enacts the behaviour, along with how the attitude and behaviour is formed or altered.

3. **The technology context.** Exploring the technology that supports changing inclusive behaviour.

Use context

Users will engage with the system in different situations, in different environments. Where the persuasive system will be used and what the existing culture is, affects how users will interact with the system.

Connecting in a professional context The application will be used within the workplace. Users of the app are employees and colleagues. This means there are existing habits and values that influence how people engage with one another. For instance, at PwC, the importance of networking is part of the norm and deeply embedded in their culture. Thus, it can be expected that employees always have some level of motivation for networking initiatives. On the other side, people's agendas impact their ability to meet new people. Busy periods greatly affect how much time someone has left for social activities - and for a networking app.

Company culture In addition, the existing culture in an organisation impacts the use context. Non-inclusive workplaces are formed when a certain majority group does not include a certain minority group. This tendency can be recognised within PwC with the division between employees working there for many years and new joiners, respectively in management or associate positions. Employees who just started at the company have more need to connect to new colleagues, whereas veterans have already had years to build a network. Further, already included employees may not notice how other employees may perceive the workplace a lot differently. This discrepancy results in varying perceptions of the importance of inclusion.

User context

Before a person engages in inclusive behaviour, they go through a decision making process. Existing habits, beliefs, motivations and opportunities are evaluated and determine the outcome of the behaviour.

The Persuasive by Design model helps to map this psychological process through five lenses: habits and impulses, knowing and believing, seeing and realising, wanting and being able to, doing and persisting [72].

This section will discuss all relevant influences on inclusive behaviour: actively looking for and being open to making new, diverse connections. Insights from answering the first and second subquestion in this thesis are used for input. As a result, behaviour personas could be identified. The *Burst my Bubble* platform aims to facilitate making diverse connections for a large, diverse group of users. Therefore, understanding the different behaviours per user group helps us design nudges that target those groups.

The Persuasive by Design model Following the behaviour change cycle visualised by Hermsen et al. [54], each of the five lenses will provide a more detailed view on inclusive behaviour.

Lens 1: Habits & Impulses

Behaviour can be *controlled* or *automatic*. This lens focuses on automatic behaviour, where a cue always leads to a habitual or impulsive behaviour. In the case of inclusive behaviour, this can happen when someone is looking to connect with someone and automatically reaches out to someone they already know or who is similar to them. So, biases like *in-group favouritism* and *similarity-attraction* impact how interactions are formed [27]. By the platform facilitating reflection on behaviour and creating awareness, such biases can be overcome.

On the contrary, if the behaviour is controlled, other evaluations are made before the outcome of the action is decided. The next four lenses describe what happens during these stages.

Lens 2: Knowing & Believing

For controlled behaviour a person first reviews what they know and believe. First, *knowledge* about the value of a diverse network is important for a person's motivation for creating one. This knowledge then influences one's *attitude*. Some participants explicitly mentioned they greatly value making diverse connections: "*I find it nice to go out of my bubble, but with still some common things to talk about*" (senior associate, male). Attitude towards making diverse connections impacts whether those connections are made.

As many participants also explained, during the meetups their attitudes may be changed. People expected they would search for even more connections if their first meetup was valuable to them.

When information about the value of inclusion is not clear, lack of knowledge can also form a *resistance* for adopting the goal behaviour. As a male associate said: "*Inclusion is not that important to me, I don't feel like a minority, so I'm not really involved*". Or the example that a director gave, explaining her questions about how valuable her match would be: "*What if I am matched with a new joiner?*".

Second, the *norms* we feel in the workplace influence our behaviour. In a corporate setting this may have a positive influence when it is the norm to reach out to new people and keep building your network. However, it can also work against you if the method of connecting does not fit you, e.g., networking events versus one on one coffee meetups.

While some people may be aware of the importance of diverse networks, they do not always feel able to create such networks. *Lack of time and resources* can affect the way people make connections, especially in a high-pressure work environment.

Lens 3: Seeing & Realising

Next, the goal is compared with the behaviour. If there is no *discrepancy*, a new behaviour is formed. However, if the person perceives discrepancy, *internal and external influences* may affect the behaviour.

First, *social support* is needed for the user to engage with the behaviour. For *BmB*, support from the organisation and leadership shows people the value and importance of inclusion, making them more likely to engage with the programme. A few participants indicated they wanted to hear success stories about people using the platform, a form of *social influence* that can positively affect behaviour. Next, seeing how you measure up with colleagues on the subject of inclusion may evoke some competitiveness in people. This form of *social comparison* may make inclusive behaviour more visible and tangible, and thus increase motivation. Also, setting goals, a form of *commitment*, can steer behaviour. People like to be consistent in their behaviour, and may be more inclined to engage in the target behaviour after setting goals.

However, *conflicts* may arise in people's actions. For instance, if you act like you value inclusion and have a meetup with someone outside of your bubble once in a while, but if you do not incorporate the mindset of inclusiveness in your daily work, it is questionable how inclusive you really are.

Besides, people may make *excuses* for not engaging with the goal behaviour. For example, not having time could also mean that one does not give inclusion a high enough priority. However, not engaging in inclusive behaviour can also be outside of one's control. If people around you are resistant towards connecting, it may make it hard to connect yourself.

Lens 4: Wanting & Being able to

Then, the *ability*, *motivation* and *opportunity* must fit with each other for the behaviour to succeed. Based on the interviews, it became clear that people have different combinations of these three factors.

Some people have a high *opportunity* and *ability* to be more inclusive, especially those who already are included and enjoy meeting new people. However, this group often has lower *motivation*, because they do not see the clear value for them. Other people have a high *motivation*, but low *opportunity* because of a lack of time or resources, e.g., those who are excluded and do not know how to connect to those included. This means that for each user, different types of needs must be met for them to successfully engage in the goal behaviour.

In addition, people's connection goals impact their *opportunity* for making matches. For instance, people looking for social connections can do that with basically any employee. Those who are looking for a mentor relationship however may find it harder to find an appropriate match. Also, the number of people with similar goals on the platform influences your success in finding a match.

Lens 5: Doing & Persisting

Further in the cycle, trying out the new behaviour predicts whether the user reaches their new behaviour goal. The experience with the platform or value of a meetup affects the likelihood a person will repeat the behaviour. Still, even if this experience is positive, the other stages must remain consistent for the behaviour to happen and to repeat, until a habit is formed.

Behaviour Personas Because the design problem was already defined and the user data already collected, development of the personas began with assembling phenomenographic categories. The categories were qualitatively identified and are as follows;

- Demographics (the user's role, years of work, age, gender, being part of underrepresented group)

- Connection goal

- Motivation (what the user wants to get out of connecting with new people)

- Attitude (what the user's attitude is towards inclusive behaviour)

- Intention (how inclusive the user intends to act)

- Tech affinity (ease of use of the platform, user experience, what do they need)

- App adoption (behaviour in the app, whether the user found matches, drop-off rates)

For each category, variations of experiences were compared. First, within the user data from the pilot, 14 variations could be made. Next, insights from the interviews and user tests could be added for further detailing the personas.

Within these variations, common themes could be distinguished. The connection goals indicated the largest differences between groups. Because the *BmB* platform targets behaviour change, it is relevant to look at these goals, which explain motivation and engagement with the app. Therefore, the main segmentation for personas was based on connection goals. On top of that, divisions could be made based on a user's work experience, gender and whether they are part of an under-represented group. Data from interviews was added to define more details on motivation, attitudes and intentions. This resulted in a set of five personas, visible in Figure 5.15. The full personas are described in Appendix F.

Create social connections and get to know the company

pwc ● ● ○ ○

- **New joiners** and mostly associates, motivated to meet new people.
- **Mixed** in genders and minority groups.
- Found matches during pilot.
- Experience little tech related obstacles.

Building career connections and growing professionally

pwc ● ● ○ ○

- Mostly working **0 to 5 years at PwC**, from associate to senior manager.
- **Not** often part of under-represented groups.
- Want to have **valuable matches** worth their time.
- Experience little tech related obstacles.

Learning from new perspectives: being mentored and mental health

pwc ● ● ● ○

- Varying years of work experience and roles.
- Relatively more **female** and part of **underrepresented** groups.
- Quite **motivated** to join, know the value of diverse networks.
- **Overwhelming** match suggestions can inhibit adoption.

Sharing knowledge: mentoring and connecting

pwc ○ ○ ○ ●

- **Veterans** in senior positions.
- More often part of **underrepresented** groups.
- Aware of the importance of networking, but unsure about expectations on the platform and thus **less motivated** to participate.
- Want higher certainty their match will be valuable due to little time available and low motivation.

Sharing work experiences & perspectives

pwc ○ ○ ○ ●

- **Veterans** in senior positions.
- **Not** part of underrepresented groups.
- Have a relatively **low motivation** to engage with the platform, need a clearer benefit.
- Veterans want higher certainty their match will be valuable due to little time available and low motivation.
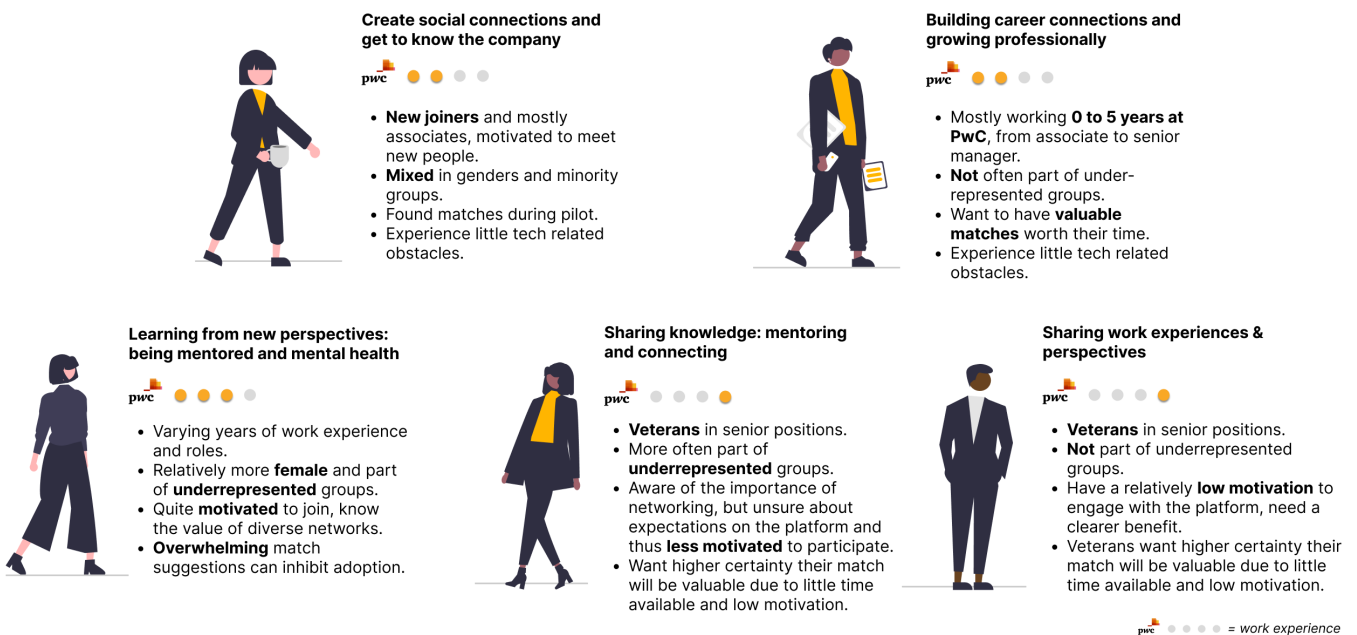
pwc ○ ○ ○ ○ = work experience

Figure 5.15: Five personas that exist in the target group of Burst my Bubble, based on pilot user data, interviews and user testing. The personas describe the different needs and barriers users experience.

Technology context

Making new connections can happen in any context, in the real world or online. Meeting people outside of one's social bubble can however be harder in a normal setting, especially for those who do not know who to approach or how to approach them. Connecting via a digital platform can then be an accessible medium.

Moreover, if new connections are suggested anonymously, via a platform, most biases in the decision making process can be mitigated. Next to the many opportunities online environments have, risks must be kept in mind. Important subjects such as privacy and openness about data collection must be made clear to the user. Especially in the case of feelings of inclusion, which can be considered personal and sensitive data. The pilot showed users had questions about what their data was used for exactly, lowering their motivation for sharing information.

Other inhibiting factors for easy platform usage were findability of the app and issues with sign-in. Though these issues do not impact the interface design, they must be considered when enhancing adoption of the platform. The perceived usefulness and ease of use affect the actual usage of a system [85]. During the think-out-loud sessions and interviews several issues arose that affected the ease of use of *BmB*.

Mostly, the page showing the suggested matches was not clear for all participants. The value of matches was not highlighted enough so that users thought their meetup would be worth their time. The more senior employees also wanted more personalisation, which can be compared to the need of better highlighting the matching algorithm and value of suggestions. Next, users expressed the need for an overview of friend request history. Moreover, app reminders are needed to remind people of the platform and accept invites, a need mentioned by many participants. These issues must be resolved for the nudges to be more effective.

5.3.3   Strategy

Subsequently, a strategy is needed to summarise how we will achieve the objectives of the persuasive system.

Target behaviour The behaviour promoted through the *Burst my Bubble* platform is the act of making more diverse connections and being open to new connections.

Message So, the shared message is that having a diverse network is valuable for employees within a firm, as well as for the firm in its entirety.

Objective In the end, the objective of the platform is connecting people with each other who normally would not meet.

Strategy For *Burst my Bubble*, the strategy will be about enabling people in finding connections outside their social bubble. The platform will allow employees to make one on one interactions with colleagues based on interests and goals.

First, participants highlighted they wanted their matches to be valuable to them. It should bring them new insights, a fresh perspective, a friend, a mentor or a chance to share knowledge with others. A clear value proposition was key to participants' motivation. Therefore, the platform must increase the perceived value for each match, instead of matching as many people as possible. Still, regular interactions via the platform are necessary for people to stay engaged.

In addition, participants explained they expected a positive experience with a meetup to motivate them to further engage with the platform, thus practising inclusive behaviour. Thus, the platform will facilitate reflection in order for people to evaluate their experience and potentially change their attitude and behaviour.

5.3.4 Design

The next question then is: how will we reach the objective, and take action on the strategy? After walking through the entire design process, we were able to suggest actions to take. Combining insights from literature, subquestion 1, subquestion 2 and the design steps resulted in a selection of 10 fitting persuasive principles, nudges.

For each nudge, a few requirements were created. The requirements can be viewed in separate tables in the Appendix G, together with a source and priority. By following these requirements, new nudges can be implemented that can enhance engagement with *Burst my Bubble*. Note that these are *additions* or *adjustments* to the existing prototype.

Most of the recommendations can be implemented for all users. Some of the recommendations are for tailored nudges, adapted to different user types. These user types are based on the personas distinguished in section 5.3.2. For tailoring the nudges, a few data points are needed: role, years of work, gender, minority and connection goals.

Nudge 1: Supporting diversity

For the app to be successful in promoting inclusive behaviour, all types of people should have the same chance of finding a match through the platform. The think-out-loud and pilot study indicated differences in preferences between users. First, the pilot showed that women had relatively higher drop-out rates than men during onboarding. To support them, more attention should be paid to connection goals they often choose. Also, the pilot showed people in minority groups more often chose goals related to finding a mentor or find a friend. These goals should be highlighted as well.

For interests it is just as important that people are able to choose one that fits their unique needs, the reason for the feature of writing your own interest. Lastly, to fully remove the biases and relations that goals may have with types of people, the user must also be able to choose a random match.

Nudge 2: Supporting meetups

Many users were aware of the importance of networking, but did not always take the steps necessary to make valuable connections. In addition, the think-out-loud studies and pilot interviews showed that users needed to be better supported throughout the entire matching process. Thus, the system can support users by reducing the steps and suggesting actions to get to the target behaviour.

It starts with being able to invite someone easily and through a clear process. Users must be able to see what connections they made, when, and what the expected follow-up is. The system should also be able to lower the user's mental load by giving them a quick overview of their previous interactions and to do's.

Also, adding a personal message to an invite can result in someone faster accepting that invite, similar to a feature LinkedIn has implemented [86]. Lastly, suggesting to connect via LinkedIn after a meetup has taken place could make people more likely to keep in touch.

Nudge 3: Social influence

Employees can inspire each other to join the platform. People explained during the interviews they needed more awareness within the team and wanted to hear success stories from colleagues. A motivator could be a feature that allows a user to share their successes online, to not only inspire others but also to get recognition. Besides, allowing people to invite employees they know on the platform could increase the number of registrations. More visible activity from other users can increase engagement.

Nudge 4: User-friendliness

A smooth design that is attractive and self-explanatory helps users to do their intended tasks on the platform. During the think-out-loud study, participants ran into a few issues that can be solved by improving the design of the app. For instance, users questioned what was expected of them within the application, a topic in which the introduction screens did not support them enough. Moreover, during choosing interests, they did not always know how many interests the system expected them to add. Solving these issues will allow for the other persuasive nudges to be more effective. Finally, in order to provide a better user experience throughout the entire application, the menu bar will be lowered for optimal reachability.

Nudge 5: Simple match suggestions

The insights from following the Persuasive Systems Design method illustrate that each persona perceived the match suggestions differently. However, the aim of the application is for all types of participants to successfully find a match. Thus, to also speak to veterans who found the match suggestion page overwhelming, this page must be simplified for them. We suggest an adapted match overview for veteran users.

Besides, people wanted more assurance their match would be valuable, as they had little time for meetings, especially the veterans. Compared to new joiners, they are less open to taking the risk to invite an anonymous profile. So, the value of a match must be highlighted to further motivate users to send an invite. Similarly, skeleton screens with progressive loading elements may provide users with a sense of progress as their matches are calculated.

Nudge 6: What's in it for me?

The main source for this nudge were the interviews. Users need a clearer value proposition that shows them why they should participate, a value that is more tangible than "higher company profits". Also, better expectation management could lower the boundary some users experience for matching with people. If a user knows they only are expected to have a coffee for 30 minutes, that could positively affect their cost-benefit evaluation. For these reasons, the expected efforts and benefits will be clarified. Using UX writing, persuasive messaging can be applied for targeting different personas who are motivated by different goals and benefits.

Nudge 7: Notification schedule

Multiple participants expressed the need for more reminders to not forget interacting with the application. So, the first nudge added is a notification schedule, in which more reminders are sent at various steps in the match process. Next, to actually and consistently use a system, it must fit within the user's daily workflow. Knowing the target group is working in a fast paced environment, it is key that *BmB* does not interrupt the user. Thus, reminders to use the app should be pushed around times that the user is able to pay attention to socialising. This can be around lunch time or the beginning and end of a workday.

Nudge 8: Social norms

Based on the design process, we found that social influence can play a big role in people motivation for a behaviour. Moreover, users indicated that involvement in networking was a social norm felt by many within their firm, making networking a key factor in the use context of the app. Showing users how others use the platform may increase their motivation to perform similar behaviour, based on the principles of social comparison and normative influence. Participants explained themselves that they could be motivated by other users' experiences and behaviours. So, adding persuasive messages may drive users to engage with

the platform more.

Nudge 9: Creating trust

Creating trust with the user is crucial for them to interact with the system and share data. The think-out-loud study showed that users were uncertain with sharing information because of the unclear design of nudges that promote sharing data. Part of the data sharing is focused on reflection on meetups, an essential phase for changing attitude. Moreover, to share sensitive data about feelings of inclusion, trustworthiness is a prerequisite for sharing such feedback. Thus, the privacy statements, data collection, data usage should be well explained.

Nudge 10: Facilitating reflection

If enough trust is created, users can reflect on their experiences. Our research pointed out that reflection is an important part for future use of the app, and eventually pursuing the target behaviour in real life. Allowing users to keep track of behaviour more easily, can nudge them to reach their goals for inclusive behaviour.

5.3.5   Summary of Findings

We found many opportunities for improving the engagement with *BmB*, which if integrated correctly can support users in not only being more inclusive but also experiencing a greater feeling of inclusiveness. The ten nudges were based on a mixed method approach that illustrated the moments in which users need o be supported the most in changing their behaviour.

When designing for social behaviour change, a complex decision-making cycle affects the outcome of cues. By nudging the user, the system can aid the user in all the steps needed to reach the target behaviour. For instance, nudges focusing on **(a):** reduction of steps and **(b):** better support during those steps, potentially tailored to different user needs, can help users more easily try out the behaviour. In *BmB* these nudges can take form of highlighting specific connection goals or showing simpler match suggestions. Next, **(c):** social influence can be used as a nudge to inspire colleagues to join, or get recognition for progress. Further, **(d):** increasing motivation by highlighting the value a user gets out of the target behaviour, in *BmB* seen by increasing perceived value of a match, can make users more tempted to behave as the persuader intended.

Then, **(e):** adding reminders that fit in a user's workflow can help them maintain their attention towards the application, even in busy periods as described by the target group in our pilot study. In addition, by leveraging the effect of **(f):** social comparison and normative influence, a system can be more persuasive. By adapting to the existing norms in the target group, in this case networking, which is strongly related to the target behaviour, users can be influenced by showing them how others behave.

Another important nudge is **(g):** creating trust. Creating trust increases the chance of users sharing their data which helps them to **(h):** reflect on their experiences, which is important to facilitate when aiming for attitude change. Conclusively, providing a **(i):** user friendly design takes away any small obstacles that could impede effectiveness of other nudges.

To summarise, a combination of nudges is likely to be most useful for inclusive behaviour change. If different user needs are taken into account and a system can be tailored to these needs, users will be optimally supported.

Chapter 6

Discussion

The aim of this research was to investigate how digital behaviour change nudges could be used to promote inclusion through workplace interactions. This exploratory study offers us new insights into the development of fitting nudges, as well as into the potential impact of those nudges on inclusion. In our research, we found that by implementing nudges for different types of user groups, engagement on *Burst my Bubble*, a social platform promoting inclusive behaviour, can be increased. Respectively, we expected enhanced engagement to lead to an increased platform impact on inclusive behaviour by its users.

6.1 Limitations

The methods and findings of our study pose several limitations which we will discuss in this section.

The most evident limitation to our research is the fact that changing attitude and behaviour is an extensive and time-consuming process [31], because participants were employees in a high-pressure work environment, it was difficult to find sufficient time to meet with a match. Also, multiple repetitions of a behaviour may be needed before a new habit is developed [2]. Therefore, the reader must bear in mind that some of our conclusions are based on participants' expectations of their behaviour changes and their experiences in a relatively short time. This was mainly caused by the available timeframe for the pilot within the advisory team being fixed. Hence, we suggest to further investigate the long-term influence of nudges on inclusive behaviour change in a larger study with a larger time frame.

Secondly, we were limited in evaluating the adoption rates for our pilot study, because exact adoption target rates were not defined in this study. Due to the exploratory nature of our research and the lack of existing research on measuring the influence of interactions on inclusion, we did not include such metrics in our analysis. However, not using pre-defined targets made it harder to determine the successful outcomes. For this reason, we suggest further research, specifically into producing and incorporating measurement characteristics that apply to inclusive behaviour to ensure measurability and reproducibility.

Furthermore, it stood out that there were some patterns in user characteristics in relation to the chosen connection goals. While a common ground can be a great motivator for people to meet up, it should be kept in mind that this aspect could prevent people from exploring connections outside of their bubble and must therefore be kept in mind. Still, the patterns we found were only indicative, and not proven significant. Nonetheless, we want to highlight the importance of adding our suggested nudge that features random matching to overcome this effect in future applications.

Another limitation is that the effect of nudges was only tested cohesively. For that reason, direct links to the effect of individual nudges could not be confirmed. Because of the high number of implemented nudges and limited time frame, we chose to evaluate all nudges together, via a think-out-loud study. Using this

approach however, means we can only derive limited conclusions on individual nudges. Moreover, because testing the effect of nudges was mainly based on comments and observations made during think-out-loud sessions, it is possible we missed feedback on nudges that were not noticed or mentioned by people. For these reasons, we suggest future research to study the individual nudges and their effects in more detail, e.g. through A/B testing.

In addition, the small sample size in the think-out-loud study and interviews leaves uncertainty on the generalisability of our results. The number of participants was too small to accurately make distinctions between user types that experienced the platform differently. With a larger sample, the findings could more reliably describe differences in user needs. Another factor influencing the generalisation of our findings is that *Burst my Bubble* is not a scientifically validated prototype. While that does not have consequential implications for the reliability of our results, it must be acknowledged the nudges we researched can have different effects in implemented in other applications.

Lastly, during the pilot study, feedback requests within the app were not implemented, limiting our insights into the actual effect of reflection on inclusive behaviour and the progress on reaching goals. Because our case study was commissioned by an external company, the technical development process was outside our reach. Even though we were still able to get feedback on the potential positive influence of reflection, we recommend future studies to investigate reflection in a pilot study as well.

6.2 Effect of Current Nudges

The aim of the first subquestion was to answer what the effects of the current application nudges were on the user journey. Based on the think-out-loud study results, we found the implemented nudges had varying effects on the users' experiences, supporting them or hindering them in reaching the target behaviour.

The *tailoring* nudges, which allowed users to personalise their profile and find personalised matches, made the platform more useful to users. From these results, we can infer that in the context of inclusion, tailoring is especially important. Key to inclusion is that people can be their authentic selves [4], meaning they can personalise their profile based on unique needs. However, users who had different motivations for participating in inclusive behaviour expressed the need for better tailoring. These results indicate users with a lower motivation for a target behaviour may benefit from nudges that provide a clearer value proposition and clearer expectations. This finding is in line with prior research into behaviour change in general [28, 30, 39].

Moreover, results showed that nudges focused on *reduction* were not functioning optimally, resulting in unclear expectations and hesitation with users towards matching. Therefore, we can infer less motivated users seem to need more reduction. The reduction nudge could assist with the complexity of inclusive behaviour and the occasional lack of motivation by breaking up the behaviour in smaller steps. Taking away any barriers and lowering cognitive load will better support users throughout the behaviour cycle.

In addition, *personalised*, *suggested* matches generally had a positive effect on users, because it made the outcome of the action seem more valuable. However, some design ambiguities mediated this positive effect, especially for more veteran users. Besides being confused with the design of the suggestions, veterans also explained they needed more assurance their match would be valuable. These results indicate veteran users could benefit from nudges that improve the perceived personalisation.

Next, nudges that created *trustworthiness* with the user did not have the intended effect on users'

willingness to share data to reflect on their experiences. This feedback could be explained by the fact that inclusion is a very private experience, possibly resulting in participants considering data about inclusion as sensitive. Therefore, we indicate trust is a highly important nudge to include when designing for inclusion. We are confident that more room for other important nudges such as *self-monitoring* can be created once trust is gained, which can facilitate the reflection needed for changing attitude, similarly confirmed by [2].

Lastly, *rehearsal* of the target behaviour was expected by participants to have a positive effect on their actual behaviour. However, this effect could not be tested during the think-out-loud study.

User feedback on perceived nudges not only shows the effect of using nudges in the *BmB* app, but also teaches us what nudges can be considered important when designing for inclusion. Because little to no research has focused on the effect of nudges on inclusive behaviour, our findings make new contributions that can be valuable to organisations who want to understand how to promote inclusion as well as designers of systems that target inclusive behaviour.

6.3   Impact of Platform on Inclusive Behaviour

The aim of the second subquestion was to explore how the use of Burst my Bubble influenced participants' experiences with inclusion. We investigated the impact of the platform through a pilot study and interviews. The results illustrated the distinct user needs and barriers experienced in adopting the platform, which must be overcome by re-evaluating the design. Even when initial motivation is high, nudges are needed to support users to schedule personal interactions, which may positively impact experience with inclusion.

While only a few participants met up with a match, their success stories together with positive expectations of other participants, suggest a positive effect of one-on-one interactions on inclusion. Prior research also indicates a positive relation between personal interactions and feelings of inclusion, by creating reciprocal understanding and overcoming biases [19, 27]. Most studies however focus on the impact leadership has on inclusion, with little attention for the influence individual employees can have. Hence, our findings show the benefit of further exploring the role of interactions in inclusive workplaces. For organisations who are challenged by inclusion, promoting one on one interactions can be a practical and effective method for enabling employees to contribute to inclusion. Besides, our research illustrates how mobile platforms can facilitate influencing behaviour and play a significant role in social issues our society encounters.

In the pilot study of *Burst my Bubble* however, we found that depending on gender, being part of an under-represented group, role or work experience, people behaved differently. These results show that barriers for adopting a target behaviour can be caused by contrasting motivations, an unclear value proposition, unsure expectations, low ability and low usability. All of these issues influenced user inactivity, which in itself also affected engagement. Our findings are in line with previous research into interventions aiming for behaviour change maintenance, for which clear positive motives, sufficient resources and a supporting environment were found essential [28].

What stood out though was the difference between men and women in their preferences for connection goals and a lower adoption rate for women during onboarding. Not being able to find fitting goals could explain these perceived differences and indicate the need for other nudges. Insights into the relation between gender and inclusion are valuable for future research aiming to promote inclusion. Similarly, people in under-represented groups had differing goals from people not part of those groups. However, drop-out

rates were comparable in both groups, suggesting the platform currently supported under-represented groups sufficiently. Additionally, we found employees in senior positions were less active and less motivated compared to those in junior positions, suggesting a lower impact on their exposure to inclusive behaviour. Our findings have also elicited that a strong focus on social connections by employees has a direct relation with motivation and activity, which signifies this employee group will have benefited the most of *BmB*.

In conclusion, understanding the needs, motivations and barriers of different user groups is necessary for designers of similar systems promoting social change. Interventions striving to promote inclusive behaviour should allow anyone stuck inside their personal bubble to experience an increased feeling of inclusiveness.

6.4 Designing for Enhanced Adoption

The third subquestion aimed to answer which nudges can be used to enhance adoption of the application. Based on a design process with input from our first experiments, we suggest a set of ten nudges that can increase adoption of *BmB*.

The nudges intent to persuade the user by (a) reducing steps towards the target behaviour, (b) tailoring and supporting during those steps, (c) using social influence to get recognition for progress, (d) highlighting value of the action, (e) fitting reminders in the user's workflow, (f) leveraging social comparison and normative influence, (g) creating trust, (h) facilitate self-monitoring and (i) a user friendly design. These persuasive principles could steer users towards more inclusive behaviour, leading them through the phases described in the *Persuasive by Design* model.

Because to our knowledge no studies have specifically done any research into which nudges apply to inclusive behaviour, we believe the findings of our research will contribute to the development of technology supported nudges in the promotion of inclusion. These nudges may well sketch a roadmap for future research and future apps that can be used for improving inclusiveness in organisations such as PwC, as well as in other settings in which the success of the setting can be improved by a higher degree of inclusiveness.

6.5 Methodological Implications and Insights

The design method in subquestion three allowed us to create new nudges to influence user behaviour. Designing for social behaviour change means designing for a complex cycle of behaviour and attitude. The model that was composed in this thesis can guide other researchers or designers in approaching complex behaviour design (Figure 6.1).

Adding the validated *Persuasive by Design* model [54] and *behaviour personas* to the *Persuasive Systems Design* method [65] allowed for a more detailed view of behaviour as well as the influence nudges had on elements of that behaviour. Therefore, the design method allowed us to be more precise in our recommendations. Also, the method was intuitive to understand and carry out, which indicates it is fitting for other designers in a corporate context.

Because the scope of this thesis did not allow for evaluating the outcomes of this design method, further research is recommended into the strength of the model. In addition, we suggest to include evaluation moments in all phases in the design process, allowing for quick re-iterations. Lastly, we want to highlight that our personas were only indicative of the user archetypes, and additional measurement or validation could be useful when determining how to tailor the system in future studies.

We would recommend future research to further test and improve our model, in order to demonstrate

the usefulness of technology based nudges to influencing human behaviour in other contexts.
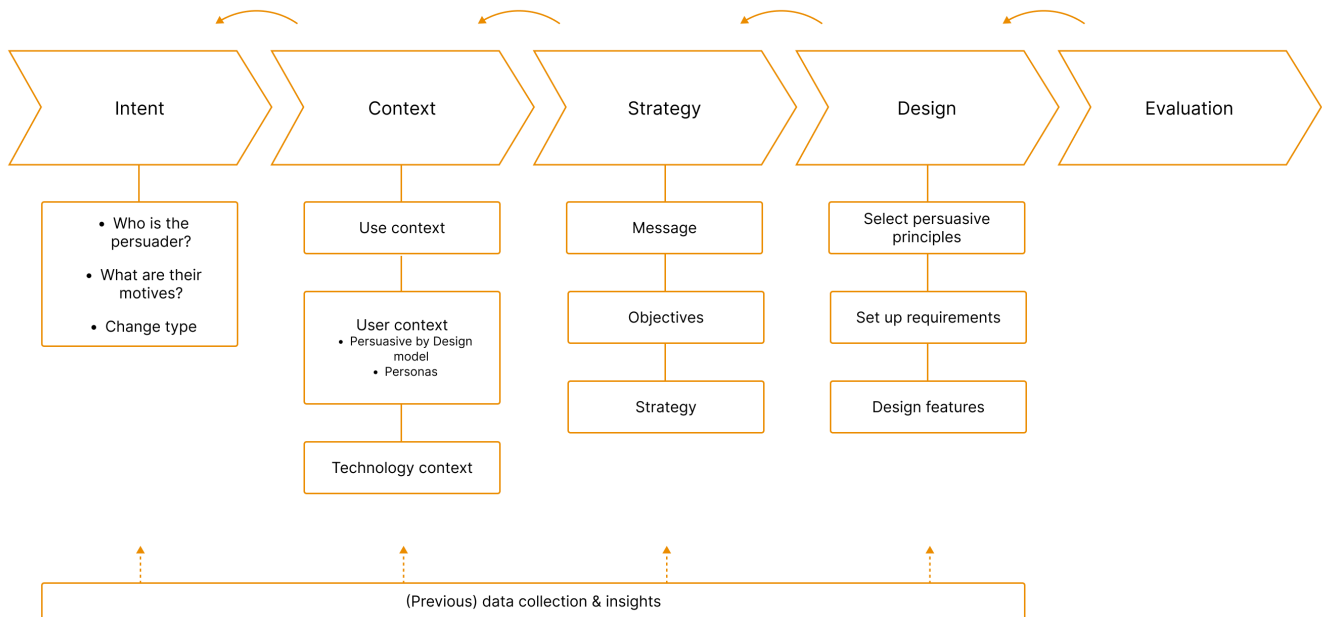

Figure 6.1: Iterative design method for designing persuasive nudges, based on Persuasive by Design model [54] and Persuasive Systems Design [65], proven a useful guide during this thesis.

6.6   Future Work

Our study findings and limitations leave a number of opportunities for future work.

First, more knowledge of the relationship between one-on-one interactions and inclusion is needed to be more specific about the platform effect on inclusion. Namely, a group that is more inclusive could eventually also lead to an increase in the number of interactions in said group [25], which suggests a two-way influence. Further, understanding how many and what types of interactions are most beneficial for feeling included will allow us to more reliably measure degrees of inclusive behaviour. We would also suggest to explore to which extent interpersonal biases can be overcome after positive interactions, a subject which did not fit in the scope of this thesis.

Also, it would be valuable to improve or alter some of the techniques used for collecting data. For instance, the personas were created based on a qualitative, data-grounded approach. However, using software such as *Atlas.ai* could have made the method more traceable /citefaily2011persona. Also, *Perceived Persuasion* or *Susceptibility to Persuasion* scales could be added to evaluate the nudges in more detail [76, 77].

In a future study, we would suggest approaching the pilot study differently for more valid results. For example, if participants had had more free time, they would probably have been more likely to schedule meetups. Therefore, it can be expected a pilot study with other participants may be more useful to better measure the impact of the matches. Furthermore, comparing multiple versions of nudges in the app would allow for better comparison between effects of nudges. As a result, it would also be interesting to compare random matching with matching based on the algorithm, and to further analyse what is needed to make people connect outside of their bubble. Lastly, the personas that were created in this research would have to be validated to increase the generalisability of the results/findings.

Finally, the ethical considerations relevant for the nudges we tested and suggested could be explored. As Oinas-Kukkonen [65] said, persuasion must always aim for positive change, without coercion or deception. Users must always be aware they are interacting with a persuasive system, and change must be voluntary. Future research could evaluate the ethical aspect of nudges promoting inclusive behaviour.

6.7   Implications for PwC

Because of the positive indications about the impact of *BmB* on inclusive interactions, PwC is aiming to further investigate the platform in another pilot, with new focus on the suggested nudges.

Chapter 7

Conclusion

In this study, we explored how digital nudges can be used to promote inclusive behaviour through one-on-one interactions. The study was conducted through the use case of Burst my Bubble, an application developed by PwC. The following research question was formulated: *"How can digital behaviour change nudges be used to promote inclusion through workplace interactions?"*.

The question was answered by identifying three subquestions: *"What are the effects of the current application nudges on the user journey?", "How does the use of the Burst my Bubble application influence participants' experience with inclusion?"* and *"What nudges can be used to enhance adoption of the application?"*. For these questions, we used a think-out-loud study, a 6-week pilot study, interviews and a persuasive design method. As a result, we presented ten digital nudges that can be implemented for more effectively targeting inclusive behaviour change.

7.1   Main Findings

Overall, the results from this study are promising and lay the basis for future research into technology-based interventions promoting inclusive behaviour. Our findings provide guidance on how to design digital nudges that indirectly improve inclusiveness. We hope our work will contribute to increasing employees' feeling of belongingness and will inspire others to build on our findings.

From the evaluation, the following conclusions can be drawn:

- Increasing one-on-one interactions through digital nudges between employees is a promising method for promoting inclusive behaviour. This work shows a positive indication of the impact of one-on-one interactions on inclusion, based on participants' experiences and predictions.

- Our novel design method was found useful for designing new nudges. The method, based on the *Persuasive by Design* model [54], *behaviour personas* and *Persuasive Systems Design* method [65] provided the necessary detailed view on behavioural processes, while still intuitive and practical to use.

- The currently implemented nudges in Burst my Bubble elicited positive and negative experiences in the user journey. Evaluation results indicated that tailoring, reduction, personalisation, suggestion, trustworthiness and self-monitoring had the most notable influence on changing behaviour towards more inclusiveness, and should be re-iterated in future designs.

- Different user needs must be acknowledged when tailoring a persuasive system promoting inclusion. The context of inclusion calls for an approach in which all voices are equally heard and all types of users have a similar opportunity to improve.

- – Our study showed women were more likely to search for social connections and mentor relationships, resulting in more perceived obstacles during profile setup than men. Women may be supported best through better personalisation and suggestion nudges.

- – Employees in under-represented groups expressed different connection needs than employees who are not in under-represented groups. Despite the relatively low degree of adoption of the app, both employee groups were similarly supported by the app.

- – Employees in high senior positions, with more years at the firm, were less motivated compared to junior employees, and experienced more barriers when adopting the platform. Less motivated employees may become more motivated through nudges that reduce the target behaviour in smaller steps and increase the perceived value of a match.

- Finally, inclusive behaviour can be increased by implementing nudges that persuade the user towards trying out and reflecting on the target behaviour. The results indicate a recommendation for leveraging the following nudges: reduction, tailoring, social influence, reminders, timing, social comparison, normative influence, self-monitoring, trust and liking. These nudges sketch a roadmap for future research into interventions that aim to improve inclusiveness within organisations.

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Appendix A

Burst my Bubble App Screens

[confidential]

Appendix B

In-Depth Interview Script

Duration: 30 minutes.

0. Introduction

- Researcher and interviewee introduce themselves
- Researcher thanks interviewee for their time, explains the study and setup of the interview, answers any questions.
- Interviewee signs consent form

1. Interviewee background

- What is your position at the company?
- When did you start?
- What is your age?
- What gender do you identify yourself with?

2. Onboarding

- Did you create a profile, and why?
- What motivated you to join?
- How did you experience the communication around the programme?
- What were your connection goals?
- How did you experience onboarding onto the platform?
- Could you choose goals and interests that were relevant to you?

3. Matching

- How many matches did you have? And how many people did you meet? If you did not meet up or match, how so?
- How valuable were the matches for you? Why?
- Did the matches contribute to your chosen connection goals? How?
- Did choosing the connection goals add value for you for finding a right match? How?

4. Reflection (left out, feature was not implemented yet)

- Did you share data about your goal evaluation and inclusion experiences through the platform? Why (not)?
- What was the effect of reviewing your goals? Did this reflection help you further?
- Do you feel your feedback is taken seriously?

5. Evaluation

- Did you face any obstacles using the app? Why?
- Was the experience how you expected it to be? Why (not)?
- Does the programme influence the feeling of inclusivity for you? How?

6. Behavioural

- Do you feel that after using this app you will be more aware of inclusion and the value of a diverse network?
- What is your attitude towards meeting up with people outside your social bubble?
- Does the programme influence your motivation for creating diverse connections? How?
- Do you feel that this app enables you to be more inclusive?

- Do you intend to look for more diverse connections in the future? Why?
- Do you think you would keep participating in this programme? Why (not)?

7. Closing

- Do you have anything to add?
- Do you have any questions?
- Thanks a lot for your time.
- Do you have a colleague we can also ask for a short interview?
- Would you like to be updated with the results of this research once it's completed?
- Thanks again. Closing the interview.

Appendix C

Results of Think-out-loud Study

Nudge	Stage	Nudge type	Application	Times noticed	Valence
1	Onboarding	Reduction	Three introduction screens explaining the application, the aim and functionality	5	both
2	Onboarding	Tailoring	Being able to choose personal goals and interests	5	positive
3	Onboarding	Recognition	Recognising yourself in the list of interests	7	positive
4	Onboarding	Recognition	Recognising yourself in the list of goals	5	both
5	Onboarding	Suggestion	Predefined set of goals and interests suggested to the user	1	positive
6	Onboarding	Self-monitoring	Setting your connection goals	3	positive
7	Onboarding	Suggestion	Suggesting a tagline for your profile	2	negative
8	Matching	Personalisation	Matches are personalised	2	both
9	Matching	Suggestion	Suggesting a set of 6 personalised matches	1	both
10	Matching	Similarity / Tailoring	Matching based on interests and seeing common interests	2	positive
11	Matching	Similarity / Tailoring	Matching based on goals and seeing common goals	1	positive
12	Connecting	Rehearsal	The application guiding you to connect with a person outside your social bubble	1	positive
13	Connecting	Tunneling	Link to email with agenda for scheduling a meetup	not tested	-
14	Connecting	Cooperation	Being able to invite one another to meet up and adopt target behaviour	not tested	-
15	Connecting	Normative Influence	Connecting and meeting up with users based on similar goals	not tested	-

16	Reflecting	Reminders	In-app reminders to give feedback	10	both
17	*Reflecting*	*Reminders*	*Email reminders to open app and give feedback*	*Not tested*	*-*
18	Reflection	Liking	Data input forms are easy to understand and use	5	both
19	*Reflecting*	*Praise*	*Showing a positive feedback message after the user filled in a feedback request*	*Not tested*	*-*
20	Reflecting	Self-monitoring	Evaluating your goal progress	3	positive
21	General	Reduction	Grey explanation texts for buttons and next steps	1	positive
22	General	Trustworthiness	Explanation of privacy statements and data security	1	positive
23	General	Liking	Visually attractively and user-friendly designed application	5	both
24	General	Similarity	Recognisable interface based on company branding	1	positive
25	General	Similarity	Recognisable interface based on common dating apps	1	positive
26	General	Reduction	Reducing the effort needed to reach the target behaviour (inclusion) in smaller, easy to achieve steps	1	positive
27	General	Personalisation	Initials of name in profile title	0	*-*

Appendix D

Pilot Study Graphs

Connection goal	Freq.
Connecting with peers	56
Learning from new perspectives	38
Learning PwC tips & tricks	33
Learn about different expertises in deals	31
Learning about networks/initiatives within the firm	23
Connecting with other new-joiners	16
Learning technical skills	16
Sharing work experiences	15
Boosting my wellbeing & mental health	15
Finding people to join my network/group	14
Finding a mentor	13
Finding people working on interesting projects	13
Finding a friend to hang out with	12
Helping new colleagues to understand the PwC career trajectory	9
Learning about general expectations related to my grade	9
Looking for a better fit on my skills and talent	8
Sharing PwC tips & tricks	8
Find a mentee	7
Learn about a new industry	4
Share knowledge about my industry	3
Helping people to learn technical skills	2
Meeting people that could join my project	0

Table D.1: Frequency of chosen connection goals during pilot from 115 completed profiles.
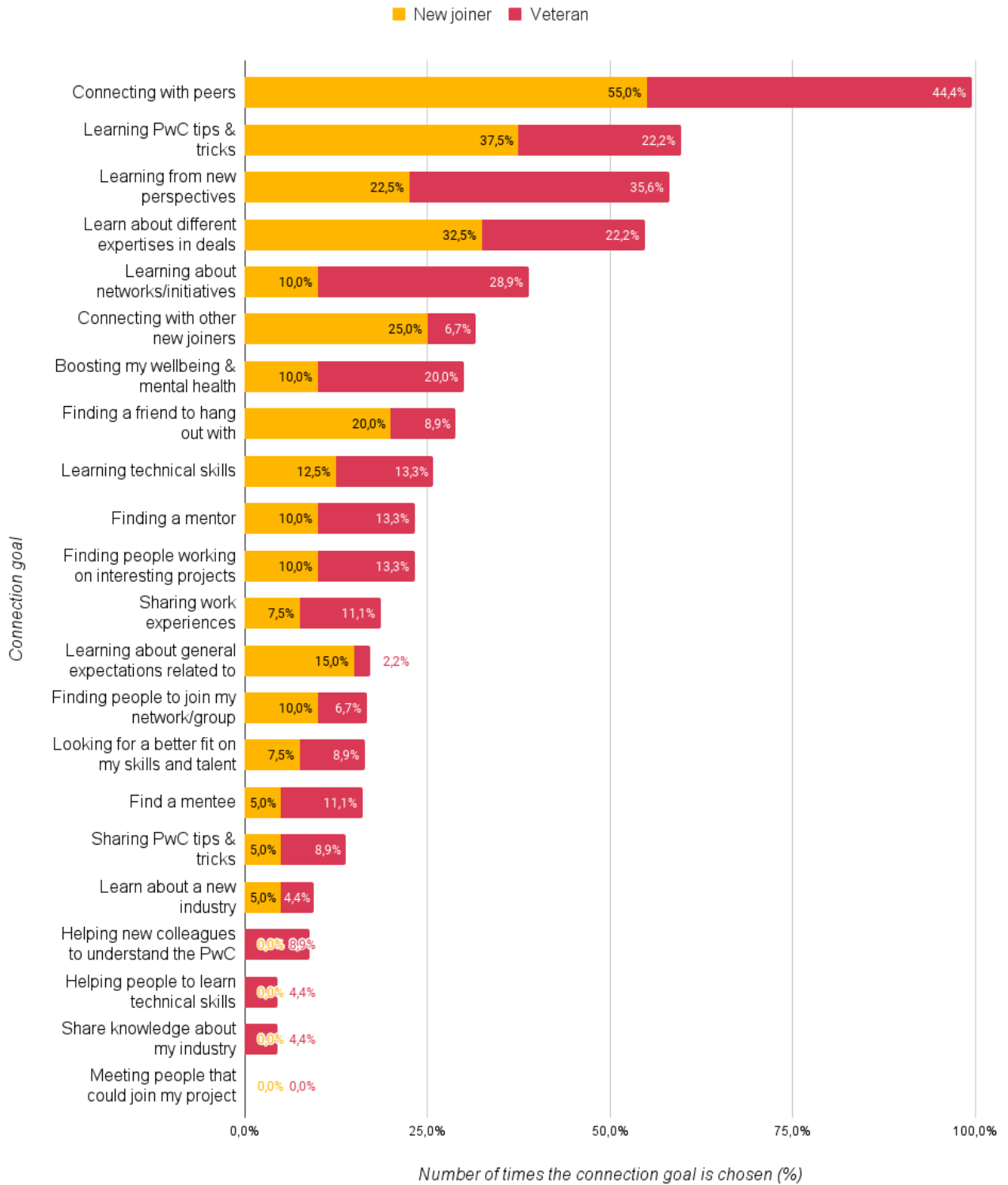
Figure D.1: Distribution of chosen connection goals amongst new-joiners and veterans during Burst my Bubble pilot

Pilot Interviews Analysis

Feeling inclusive   + ···
- Feel more included 1
- Expect to feel more included 4
- Feeling of inclusion 4
- Not focused on inclusion 3
- No influence on inclusion 1
+ New tag

Being inclusive   + ···
- Being more inclusive 7
- Not being more inclusive 4
+ New tag

Matching   + ···
- Matches 11
- Connection goals 13
- High value of match 10
- Lower value of match/ Not ma... 4
+ New tag

Engagement   + ···
- Future use 10
- Ability 6
- Unclear expectations 3
- User inactivity 4
+ New tag

Motivation   + ···
- Attitude 9
- Motivation 13
- Lower motivation 5
- External push 3
+ New tag

Ease of use   + ···
- Usability 4
- No reminders 2
- Match page design 5
- Findability 3
- Onboarding 4
+ New tag

Figure E.1: Code counts and themes for pilot interviews qualitative analysis, made with Dovetailapp.

Appendix F

Behaviour Personas

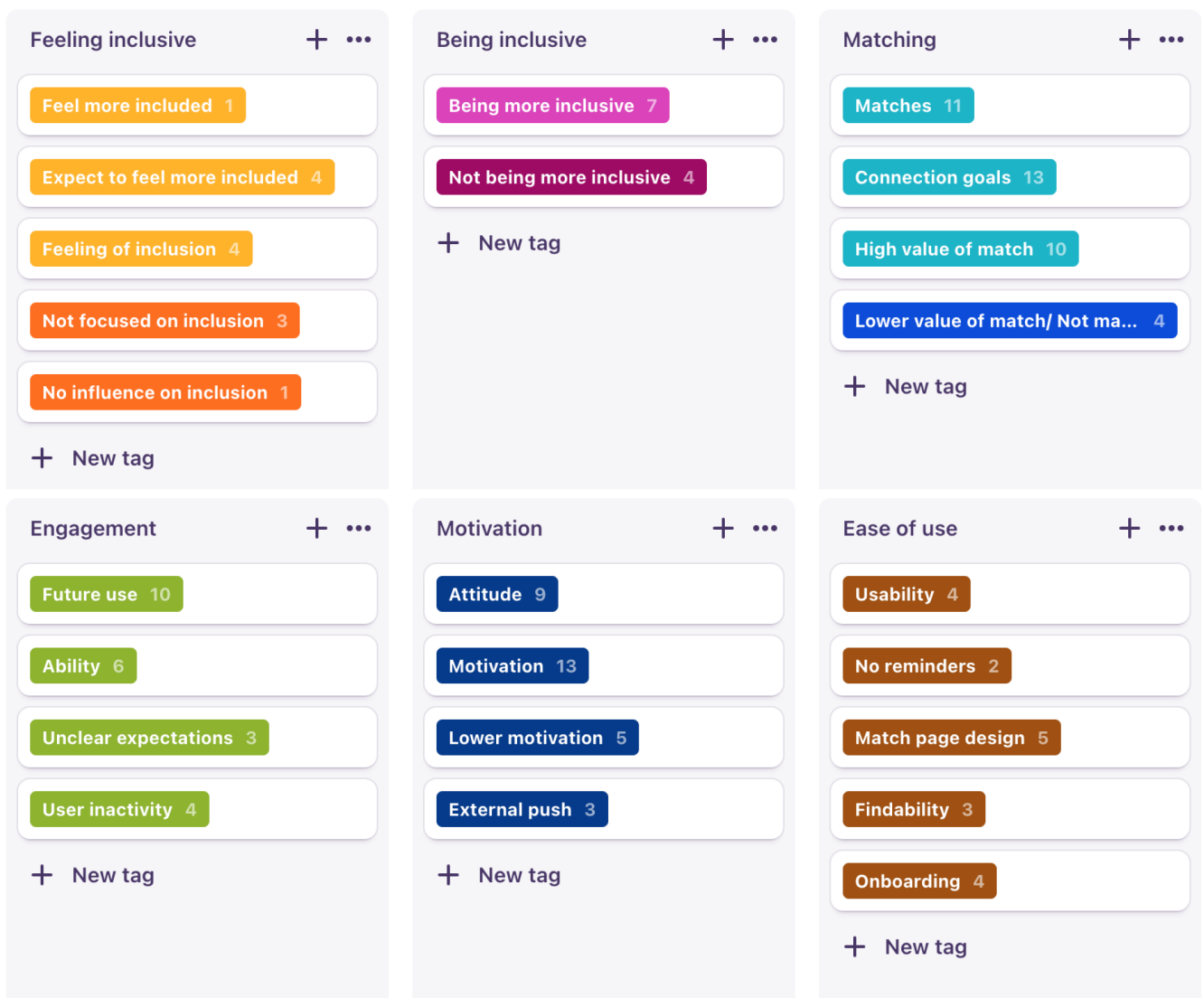| Persona 1: Creating social connections & getting to know PwC	
Work experience	New joiners and mostly Associates, Senior Associates, and Managers.
Part of under-represented group	Half are, half are not.
Gender	All genders.
Motivation, attitude and intention	Highly motivated to meet new people and willing to use a platform for that. Generally open to meeting up with people they do not know. Mostly looking to connect with peers and learn about the firm. Often for a social purpose, but also for broadening their network in general. Feel the norm to network and want to participate.
Adoption during pilot	Relatively large group of users. Many of these people were involved in making matches.
Tech feedback	Have a high affinity with technology and are used to the design of dating apps, so the anonymity of profiles is no surprise. They perceive little obstacles when using the app.

Persona 2: Building career connections & growing professionally

Work experience	Mostly working 0 to 5 years, so often joined quite recently. From Associate to Senior Manager.
Part of under-represented group	Not often.
Gender	Relatively more male.
Motivation, attitude and intention	Have a medium high motivation for making diverse connections. They find social connections a nice to have and are more focussed on broadening their network in relation to their career, or growing professionally. They want to plan more meetups if they turn out to be valuable, they expect an attitude change after the behaviour. They look for a clear value proposition before engaging in making matches. Sometimes don't prioritise inclusion or make time for it Feel the norm to network and want to participate.
Adoption during pilot	Relatively large group of users, with some involvement in matches.
Tech feedback	This group has a high tech affinity and perceive little obstacles when using the app, though unclear expectations may inhibit their adoption. They need better reminders and explanation when using the app.

Persona 3: Learning from new perspectives: being mentored & mental health

Work experience	From Associate to Manager, with varying years of work at the firm.
Part of under-represented group	Yes, relatively often.
Gender	Distributed, but a bit more female.
Motivation, attitude and intention	Quite motivated to join. Always open for similar initiatives and know the value of (diverse) networking. Can be hesitant to fully engage with the platform due to unclear follow-up expectations or if they do not find what they are looking for. Feel the norm to network and want to participate, but are not always able to find the people they are looking for in existing events.
Adoption during pilot	Some matches were made, but people who chose goals related to mental health and finding a mentor were matched less than people looking to broaden their network.
Tech feedback	Some say they need more reminders to stay engaged. Generally, they find their way through the app without many obstacles.

Persona 4: Sharing knowledge: mentoring & connecting

Work experience	Veterans, at the firm for quite some years.
Part of under-represented group	Relatively more often part of an under-represented group than persona 5.
Gender	All genders, though veterans are relatively more males.
Motivation, attitude and intention	They are initially motivated to join the platform, but have high drop-out rates and are little involved in matching. Mostly this archetype is looking to share knowledge and connect with others, in the form of a mentoring relationship or sharing tips and tricks. They have a positive attitude towards inclusion and are aware of the importance of diverse connections. However, they have little free time for networking, so they want their match suggestions to be valuable and want to know what the expectations are for participating. Conflicts arise in behaviour. They may say they want to promote inclusion by creating a profile, but do not actually engage with meetups.
Adoption during pilot	A small group found matches.
Tech feedback	Due to ambiguous design of the match suggestion page, people tend to drop out at the matching phase. Unclear expected value of a match suggestion makes them less likely to match.

Persona 5: Sharing work experiences & perspectives

Work experience	Veterans, at the firm for quite some years.
Part of under-represented group	No, rarely.
Gender	All genders, though veterans are relatively more males.
Motivation, attitude and intention	They have a medium motivation for participating, though the initial adoption rate may seem high. They generally drop off after login. Due to little time available they want more personalisation for the most valuable match suggestions. Moreover, they want the steps towards meeting up to be small and not overwhelming. Though personal meetups interest them, they are sometimes more interested in network events. Don't see the value of making their network more inclusive. Biases like in-group favouritism and similarity-attraction bias may occur. Conflicts arise in behaviour. They may say they want to promote inclusion by creating a profile, but do not actually engage with meetups.
Adoption during pilot	Almost no matches.
Tech feedback	People in this category dropped out relatively more often during the onboarding phase, and did not reach out to matches. The match suggestion page seemed overwhelming.

Requirements for Burst my Bubble for Enhancing Engagement

Source	Description
S1	Results from think-out-loud study with participants interacting with the Burst my Bubble platform.
S2	Insights from user data collected during 6-week pilot study.
S3	Insights from interviews with participants from pilot study.
S4	Design process subquestion 3.
S5	Persuasive principles by Cialdini [63]

Priority	Explanation
Must have	Critical requirements.
Should have	Important, but not necessary.
Could have	Desirable, but not necessary.
Won't have	Least critical.

Strategy 1: Supporting diversity

ID	User story	Source	Principle	Priority
R1.1	The user should be able to add personal interests.	S1, S3	Tailoring	Should
R1.2	The system should show a separate section for mentorship.	S2	Reduction	Must
R1.3	Highlight match suggestions that are based on mentoring or wellbeing, and embed in messaging.	S2	Tailoring	Should
R1.4	The system should provide the user with a random match, next to the calculated match suggestions.	S4	Reduction	Should

Strategy 2: Supporting meetups

ID	User story	Source	Principle	Priority
R2.1	The user should be able to view their interaction history on a separate page, showing their received, waiting and accepted invites.	S1, S3	Reduction, tunneling, rehearsal	Must
R2.2	The user should be able to add a personal message to a match invitation.	S5	Reciprocity	Should
R2.3	The system should suggest a connection via LinkedIn after a meetup.	S4, S5	Suggestion, Commitment	Could

Strategy 3: Social influence

ID	User story	Source	Principle	Priority
R3.1	The user should be able to share their successes with others via social media.	S3, S4	Social facilitation, recognition	Could
R3.2	The user should be able to invite a team member to the platform.	S4	Social facilitation	Could

Strategy 4: User-friendliness

ID	User story	Source	Principle	Priority
R4.1	Shorten texts on introduction screens	S1	Reduction	Should
R4.2	Better explain all steps in the app with a timeline	S1, S3	Reduction	Must
R4.3	Suggest nr of interests to choose	S1	Suggestion	Could
R4.4	Menubalk on the bottom of screen	S4	Liking	Should

Strategy 5: Simple match suggestions

ID	User story	Source	Principle	Priority
R5.1	The system should clearly show the suggested profiles as individual users.	S1, S3	Reduction	Must
R5.2	The system should show only one suggested profile for users in the personas 4 and 5.	S1, S3	Reduction, Tailoring	Must
R5.3	The system should highlight the value of a match.	S1, S3	Reduction	Should
R5.4	The system should show a loading icon when calculating the matches.	S1, S4	Reduction	Could

Strategy 6: What's in it for me?

ID	User story	Source	Principle	Priority
R6.1	The system should show the expected effort it costs users to participate.	S1, S3	Tunneling	Should
R6.2	The system should highlight more specific benefits, such as improving retention for veterans and finding social connections for associates.	S3, S4	Tailoring	Could

Strategy 7: Notification schedule

ID	User story	Source	Principle	Priority
R7.1	The system should send the user reminders for each step in the matching process.	S3	Reminders	Must
R7.2	The system should time the reminders to intervene at a fitting moment for the user.	S3, S4	Timing, reminders	Should

Strategy 8: Social norms

ID	User story	Source	Principle	Priority
R8.1	The system should add persuasive writing in which behaviour of other users is accentuated.	S4	Social comparison, normative influence	Could

Strategy 9: Creating trust

ID	User story	Source	Principle	Priority
R9.1	The system should highlight privacy statements.	S1	Trust-worthiness	Must
R9.2	The system should highlight explanations of data collection, purpose and usage.	S1	Trust-worthiness	Must
R9.3	The system should highlight explanations of the matching algorithm.	S1	Trust-worthiness	Must

Strategy 10: Facilitating reflection

ID	User story	Source	Principle	Priority
R10.1	The user must be able to easily keep track of past behaviour and progress via a separate overview.	S4	Self-monitoring	Must
R10.2	The system should enable the user to reflect on their progress through simple feedback forms.	S4	Self-monitoring	Must