

Putting the user at the heart of decision making: A reflection on applying the double diamond to enhance understanding of the customer for Mobility as a Service

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Abstract

The customer experience is a vital consideration for all of us working in transport – it's what makes people choose between one mode or another, choose whether to access something in one place or in another. And yet, all too often, the thoughts, needs, and desires of our customers are an afterthought, rather than something built into projects from the very beginning. In a world facing increasing climate uncertainty, we need to be designing sustainable access solutions beyond the private car that significantly improve outcomes for the customer. This paper will outline how the application of design thinking, through the 'double diamond', is enabling transport authorities and consultants to really put the customer at the heart of decision making. It will highlight how obtaining robust insights into people's travel behaviour can be achieved without talking about transport at all. And it will comment on how customer personas can be used effectively to convey critical information about consumers of mobility in a highly accessible way. This will be supported by a case study example from Queensland. It will conclude with some practical steps transport professionals can take to embed this new approach.

1. Introduction

Ultimately, our job as transport professionals is to ensure people have safe, secure and efficient access to the things that they need to live and enjoy their lives. Yet still the customer experience seems to be an add on, a tick box exercise. People are consulted, engaged. But, in general it is still not common to find people involved in and throughout the decision making. The result is something we are all too familiar with – transport and mobility 'solutions' that fail to meet the needs of the people they were targeted at.

In a world facing significant climate change uncertainty, it is imperative to be designing sustainable transport access solutions that offer realistic mobility opportunities beyond the private car. These offerings are supplied both by the transport authorities (through subsidized public transport) and by private, for-profit organisations (for example, ride share companies, micro-mobility operators). A multi-system, customer focused approach is required to understand how these offerings can be brought together to provide customers with flexibility and convenience and to meet their needs without having to own a vehicle.

There are a variety of ways in which people can be better engaged in decision making including co-design and the application of human factors approaches. This paper focusses on the application of the double diamond, a framework developed by the UK Design Council¹. It outlines the stages of the approach, how the approach has been used and the tools used to support the process. It comments on how our understanding of travel behaviour needs to broaden and accept the realities of people's lives and lifestyles. And outlines how personas can be a useful tool for aiding understanding of our customers and bringing them to life in our projects.

Section 2 of this paper provides a short introduction to our case study, the MaaS Market Scan - Customer. This is a live project currently underway. Section 3 introduces the double diamond approach adopted for this project, with section 4 and section 5 highlight the key principles used to better incorporate the understanding of the user into the design. Section 6 comments on the insights from the project, with section 7 describing personas and how they have been used. The paper concludes with a reflection on the approach and implications for policy makers, and next steps. Given this is a live project, we expect to be able to comment further this year on the opportunities and challenges with the approach described here.

2. Background to the MaaS Market Scan - Customer

The Queensland Department of Transport and Main Roads (TMR) has a clear vision for Mobility as a Service, or MaaS, that includes a plan for the next five years to develop 'the mobility system beyond the private car' (MaaS as defined by Lyons et al, 2019). In a region where the private car is the dominant form of access, success in delivering this plan will rely on a MaaS product(s) being able to meet, satisfy and continue to deliver people's wants and needs. While there is a firm commitment from TMR to develop a government-enabled business model for delivering MaaS in Queensland, a deeper understanding of the user is needed to support private enterprise to invest in MaaS businesses and products in a way that supports TMR's vision. Specifically, what kind of MaaS products do Queenslanders want, and what kinds of products might support people to reduce car use and ownership, and move towards the mobility system beyond the private car?

The MaaS Market Scan – Customer was initiated by TMR and undertaken by a Mott MacDonald project team (including sub-consultants Symplicit and Ipsos) to begin enhancing the understanding of the user, ultimately enabling TMR to make more informed decisions about the way forward for MaaS. The MaaS Market Scan - Customer has used the double diamond approach to frame our methodological approach to understanding more about what we know (and do not know) about potential MaaS users, and where their needs are not already met, to help ultimately begin to identify the potential for MaaS in a given area, and important considerations for taking this market development to the next stage. This project commenced in late 2021 and is due to finish in mid to late 2022.

3. The double diamond approach

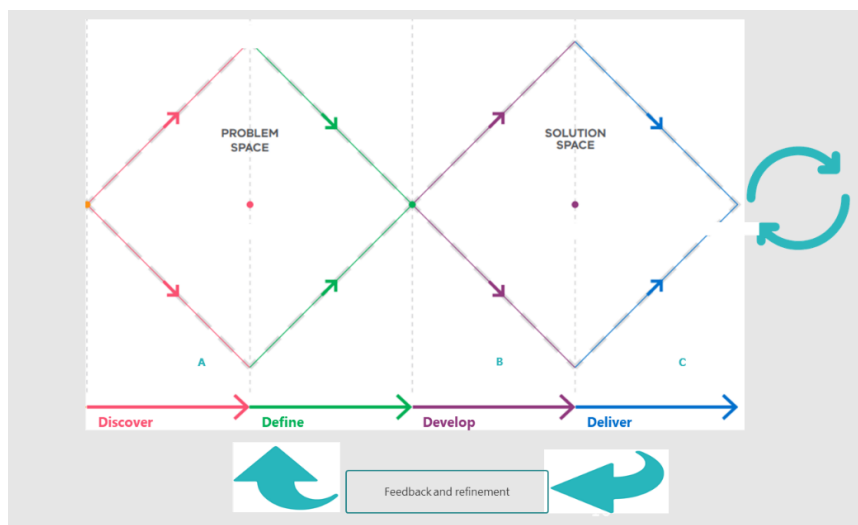
The Double Diamond provided the overall methodological framework for the MaaS Market Scan – Customer. Created by the Design Council in 2004, it provides a flexible, iterative, and non-linear approach to tackling complex social, economic, and environmental problems. Design thinking underpins the Double Diamond, which uses divergent and convergent thinking to develop creative ways to solve challenges framed around the user perspective. There are four phases:

¹ [The Double Diamond: A universally accepted depiction of the design process - Design Council](#)

1. Discover – This is the fact finding phase and involves divergent thinking, or ‘opening out’. The purpose of this phase is to collect as much information as possible about an issue or challenge affecting different users (and different ways of framing/conceiving of those challenges). It
2. Define – This involves convergent thinking, ‘closing down’ or filtering out the most important insights gained from the discover stage. The purpose of this phase is to clearly define what the key problems are for the user and to contextualize the root causes of that problem (why are they occurring and what’s stopping us from addressing them?)to
3. Develop – With a more clearly defined problem, this phase involves thinking about all the ways in which the problem could be solved. As such, it requires the use of divergent thinking again. Through the process of developing solutions, additional ‘problems’ or pieces of information may be gathered that requires revisiting earlier phases of the Double Diamond (discover and define phases).
4. Deliver – taking and testing or prototyping the solution options from the develop stage to identify what is the best solution to the problem. At this step, we converge again.

While there are two diamonds, as noted above, this approach is iterative, meaning that practitioners and designers can open up and close down as many times as needed to capture the complexity of the problem and capture the best solutions to addressing them. For example, the Queensland Government’s *HCD in Queensland Government Toolkit*² includes three diamonds with the third diamond being referred to as the implementation and evaluation space.

Figure 1 **The Double Diamond process**



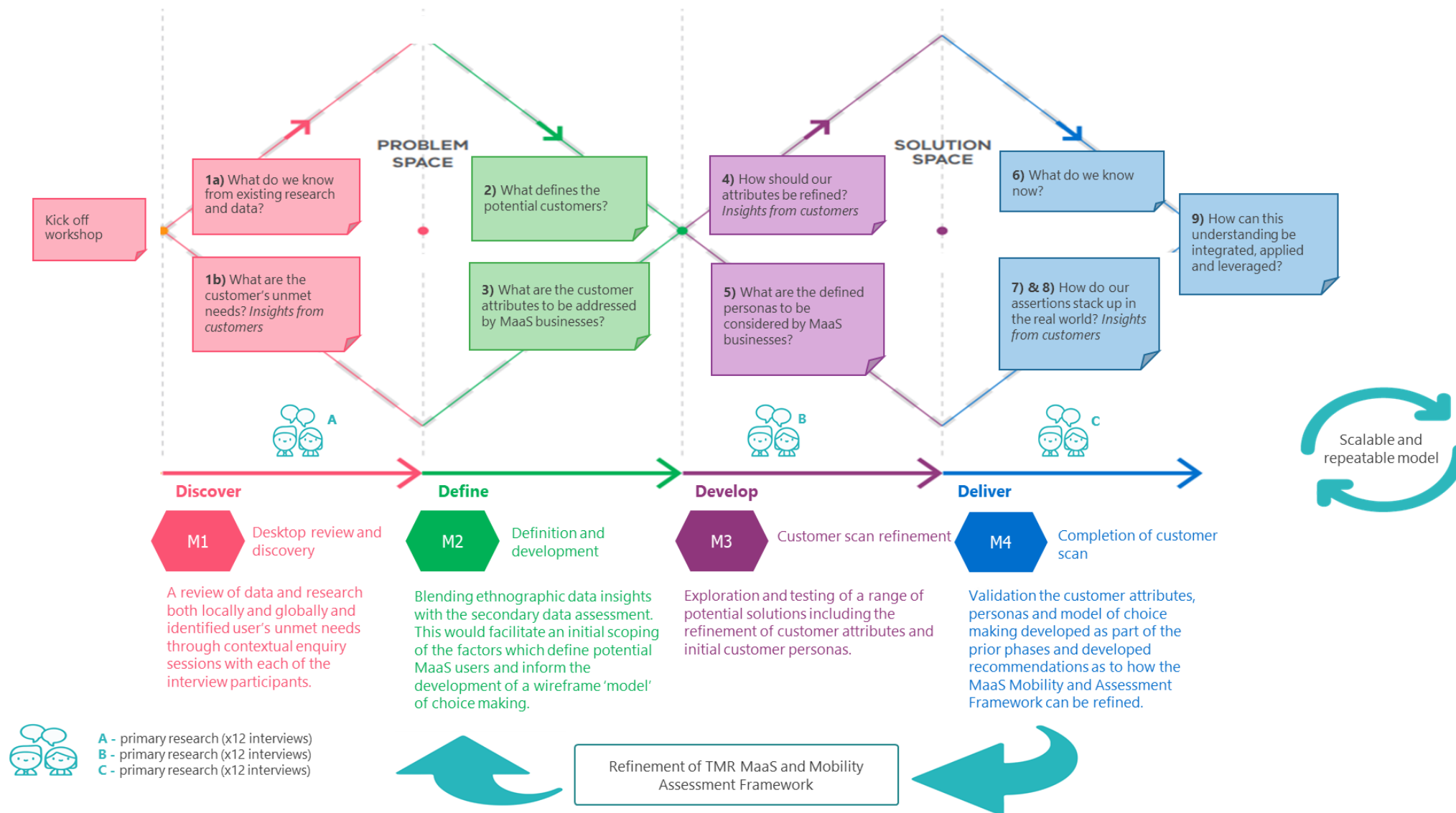
The MaaS Market Scan – Customer is an example of the double diamond approach being implemented in practice, as shown in the diagram on the following page. To support the development of the MaaS Market Scan - Customer, a set of guiding principles were developed, and these are shown below.

- The research is problem focused, rather than solution focussed (how can MaaS address an issue affecting customers?)
- Primary research was central to the engagement to ensure that real views and concerns of customers were heard.

² [Human-centred design in Queensland Government toolkit](#)

- Depth vs breadth
- MaaS is defined as ‘the mobility system beyond the private car’ although the following points are noted in relation to our ‘definition’:
 - MaaS was considered as multi-service not just multi-mode, with potential for online grocery deliveries for instance to form part of a MaaS product.
 - MaaS was not defined in the research to potential customers, given there is no current product available, and recognising the real risk of this biasing response.
- A specific discrete area was selected for the work. An area was selected on the basis of a literature review on factors that influence uptake of MaaS, supported with secondary data analysis to identify a suitable area in Queensland.
- All users in an area were considered as possible MaaS users, with no pre-conceptions on who would or would not be a MaaS adopter (early or otherwise).
- It was recognised that travel is a derived demand, meaning that people travel to access the things that they need.
- Research was focussed on the macro, meso and micro elements of people’s lifestyles, considering choice making, unmet need, and the concept of stickiness.
- A qualitative approach was taken with a view to this work providing the basis for future scaling and roll up.
- It was not possible to use a ‘true’ ethnographic approach; therefore, a series of in-depth longitudinal interviews were conducted, seeking to incorporate components of ethnographic research into the interview design and process.

Figure 2 The double diamond approach to the MaaS Market Scan in Queensland



4. Understanding the user

Supporting the double diamond framework in the development of the MaaS Market Scan - Customer was a robust understanding of travel behaviour, based on the experience of the project team and learnings from the literature.

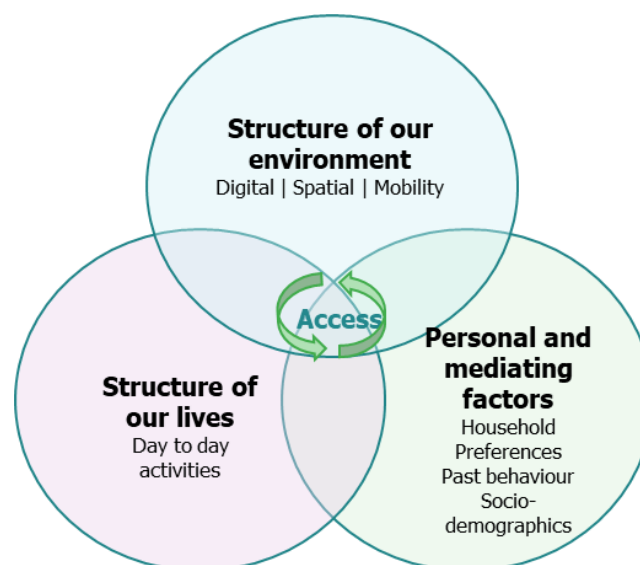
Understanding the user is ultimately about understanding that it is not all about transport. We know that travel is a derived demand. That people generally travel to get somewhere, to access something. On a day-to-day basis most people don't think about travel, they think about the things they want to do, the places they need to get to, and the things they need to do when they get there. People's lifestyles and practices are what influence decisions about travel. Asking people only about how they travel really risks missing the broader picture.

To compound this, for many people increasingly so in our post Covid world, there is rarely a 'normal' day of travel. By trying to capture this 'normality', or the average of how someone (or a group of people) access the things they need each day loses an understanding of the day-to-day variability in what people are doing.

We also know, to quote Rory Sutherland, that 'the human mind doesn't run on logic any more than a horse runs on petrol'³. We like to think that we make rational decisions, and we act on our intent, but the reality is far from this.

The work undertaken recently by authors has suggested that a multi-factor approach is needed to consider choice making with respect to travel and transport in Queensland. We have developed a three-level model based on Jones et al. 2015, Mattioli et al. 2016, Chowdhury & Ceder, 2016 and others, to better understand the factors that influence our access choice making. This model, the macro-meso-micro model, is designed to capture the intersecting relationships across the different factors in people's lives.

Figure 3 The macro-meso-micro model of choice making



Source: Mott MacDonald, 2021

³ Transport for Humans, P. Dyson and R. Sutherland, 2021

- The micro level considers personal and mediating factors, the attributes of an individual, their personal or behavioural characteristics and their preferences. It looks at the role of household factors in decision making. And it touches on considerations in psychology and behavioural economics.
- The meso level considers the structure of people's lives and day to day activities. This includes the attributes of trips, activities or practices that influences how we access the things we need. This touches on considerations in life-stage, lifestyles and competency as well as social/cultural norms.
- The macro level considers the structure of the environment, the attributes of the physical environment or other structural elements of society.

By considering each of these levels, both in isolation and in the round, we have found we gain a far deeper understanding of how higher order decisions such as where to live, where to work, and family formation impact decisions about travel.

5. Adopting an ethnographic approach

The MaaS Market Scan – Customer embraced the components of an ethnographic approach, in order to ensure a rich understanding of context in people's behaviour and to minimise the opportunity for bias in people's perceptions and considerations about travel and transport to dominate the research.

This was informed by a literature review completed prior to the research being conducted; this found recent literature indicating that the way that MaaS is described to participants can skew responses. This was also informed by Mott MacDonald's own research findings that asking people about their day to day lives, their lifestyles and practices provided richer insights about the factors that influence people's decision making (when it comes to travel) rather than asking people directly about transport-related issues.

Whilst it was not possible to undertake true ethnographic research, following the principles of ethnography helped ensure the research delivered insights into people's lifestyles and practices, and a deeper understanding into what people say and what they do (often as much by observing what people don't say or do). An ethnographic approach can help us understand the context of how people are making access decisions and is therefore well suited to understanding the potential demand for a potential MaaS product or service.

5.1 Contextual interviews

A series of three longitudinal contextual interviews were undertaken with 12 participants. These interviews were each guided by a discussion guide, designed to support a conversation around factors that influence people's decisions in all aspects relating to potential MaaS in Queensland.

The research method chosen involved 3 interviews with 12 different people. The findings of the literature review were used to refine the geographic scope of who should form part of the sample of 12 participants. The literature review indicated that the greatest opportunities for getting people to try and potentially become regular users of MaaS are locations where there is a relatively developed transport supply and reasonable non-car options. However, opportunities for MaaS can be diminished where non-car options provide a good enough service that people do not see value in using MaaS. Therefore, SEQ was selected. Specifically, three suburbs in Brisbane, and the 12 participants were selected to reflect the heterogeneity of these areas (e.g., ages, incomes).

The following approach was taken to the qualitative research, using elements of an ethnographic approach.

- Three interviews were held with each participant, with each consecutive interview between 2-4 weeks after the previous. Each interview was scheduled for an hour although the actual duration varied by respondent. .
- A discussion guide was developed for each round of interviews. This was to allow the interviewers to clearly see the purpose of each interview and what information would ideally be gathered. As is usual with discussion guides, the purpose was to support a naturally flowing conversation rather than present specific questions for answer. The interviews were structured such that the first interview was focussed more on the big picture (who people are, what they aspire to), the second on people's day to day lives and the third was more specific about people's opinions/attitudes. This broadly follows the macro, meso, micro model of decision making described above.
- The opportunity was taken to gather deep insights into less well researched factors about people's lifestyles and practices, such as trust, value and household influences. The words travel and transport were not mentioned unless raised by the participants. And the word MaaS or Mobility as a Service was not mentioned at all.
- Building rapport between the interviewers and the participants was a key component of the research; this was helped by the structure of the interview (particularly the first) which was intended to be very broad and focussed on what participants wanted to tell the interviewers was important to them.
- Repetition was used throughout the three interviews to gather more information needed about a particular issue or topic that had been gathered in an earlier interview and to 'tie up' loose ends. This helped to ensure sufficient data was collected about a topic despite taking a semi-structured approach to interviewing.
- Although the interviewers could not observe participants in their normal routine, participants were asked to bring an artefact that represented something about their everyday life as a discussion point in the second interview.

6. Qualitative insights

The insights gained from the contextual interviews in the MaaS Market Scan – Customer were used to identify the attributes considered most likely to affect MaaS uptake in future.

It was concluded that the two most important attributes were **trust and value**. Insights from the interviews suggested the broad concept of trust was a significant influence on how people made decisions and the decisions that they made. This included factors such as which organisations people would trust to provide certain information and products, through to who people trust and will follow the advice of, to how easy or difficult it is to gain and lose someone's trust.

Value is defined broadly as what a person values about services and products they use or might use; how much they value cost, time, quality, experience, and other factors and how do they make compromises between them? Value and trust are closely connected attributes. Whilst for many people, value is epitomised in terms of financial or economic value and is often reflected in MaaS product development through incentives, this research confirms the concept is much broader. It is about the overall value of something to someone's life. This could, for instance, include the opportunity in to reorganise the household dynamics through a different way of getting the kids to school and getting the groceries.

The interview insights also suggest there should also be a focus on **sharing and commitments**, if users are to be attracted to try and use a MaaS product.

Comfort in sharing access (from digital subscriptions to vehicles) and sharing physical space with others are considered to be key factors in a person's willingness and ability to adopt the mobility system beyond the private car. It was observed in the interviews, similar to secondary research, that those who enjoy driving or view it as their independence are unlikely to share (access or a vehicle) and as such are less likely to reduce their car use and/or car ownership.

Additionally, participants with a high commitment needs required flexibility in their lives to meet their regular routines. The ability of a MaaS product to meet a user's commitments is considered to be a key element in someone using a MaaS product regularly. For example, parents may struggle and be reluctant to use a MaaS product if share or hire cars do not have car seats suitable for their young children. The amount of flexibility someone has in their day, reflected by their commitments, is considered to be a key influence on potential uptake of MaaS.

Two further attributes, **competency and access**, were found to be crucial pre-requisites of any MaaS offering.

Competency is associated with how many different forms of transport someone is currently familiar with, how easy it is for them to try something new, and how comfortable they are in doing so. The interviews suggested that whilst some people may have a low level of competency, for instance in the digital space, once they have tried and become accustomed to using a particular product, they would maintain usage.

Similarly, access and unmet need have been constant themes throughout the study in advice from specialist advisors and the literature. Access relates to how important it is for people to access activities and services, and whether access is challenging for an individual for reasons other than competency. Unmet need, while more difficult to define, considers the types of activities that people desire but cannot access or undertake. Unmet needs can also include activities that people do not yet desire and cannot be fulfilled.

7. Bringing these attributes to life with customer personas

In order to help bring these insights to life, a set of customer personas were created as part of the MaaS Market Scan - Customer.

Customer personas are narratives often used in product and service development, and are designed to help those involved in this design process to think about the experiences of 'real people'. They are designed to build empathy with users and help communicate complex data or information about who the users are.

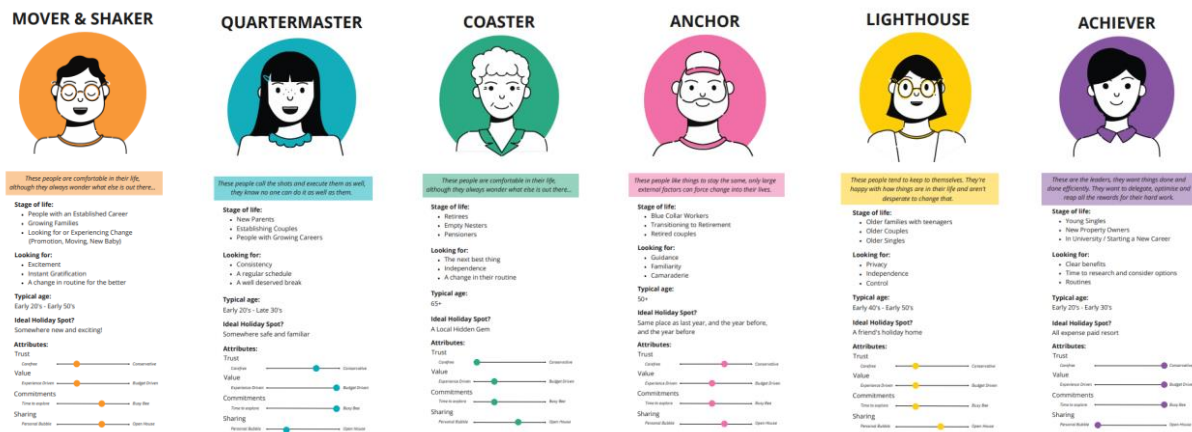
Developing personas is a powerful way of understanding the different types of 'users', their needs, their aspirations, how they behave and respond to situations. They are made up of several components, and often are given names and an image to make them feel more real.

Creating personas is an art and a science; there are several approaches that can be used. This work used a blend of manually created and expert created personas. The methodology for creating the personas was as follows:

1. Defining the purpose. The focus of the personas was to help understand the kind of MaaS users that would uptake MaaS products and what the implications for MaaS providers are for designing products.
2. The attributes of the personas. The personas were intended to include their goals, motivations, current behaviour and lifestyle, challenges and digital competency, and to be refined over the course of the three qualitative interviews.
3. Data collection- secondary research. Census and HTS data was used to identify different user groups and to develop a recruitment frame for the qualitative interviews, supported by the literature review.
4. Data collection – primary research. 3 interviews with 9 people (plus 2 interviews with an additional 3 people) to gather qualitative insights into decision making and daily practices, conversation structured using a discussion guide. To ensure findings were trustworthy, at least two members of the project team attended each interview. This allowed a comparison of notes, key insights immediately afterwards, to help ensure what the participant said was correctly interpreted.
5. Data analysis. All interviews were recorded (with consent from participants) and detailed notes taken. After each interview, the data was reviewed by the project team and key themes identified. To provide consistency in analysing the findings, an analysis frame was used - this involved putting notes against the key questions used to guide the discussion. Miro, an online collaboration tool, was used to capture, manipulate, and analyse the data.
6. Clustering of insights. Over the phases of the project, the insights were clustered and re-clustered with multiple evolutions of the key attributes. The review of key insights was undertaken separately by two of the project team, and results compared, to further ensure objectivity in the clustering.
7. Breathing life into the personas. The clusters were turned into personas by giving them socio-demographic details and a name. A day in the life of customer journey map was written to describe the persona, their challenges and normal lifestyle.
8. Sense check of the personas. The personas were reviewed by the project team to ensure there was heterogeneity among the personas, they worked together as a suite of personas, that none were caricatures, and to ensure each sounded like a real person that could exist in the Brisbane areas. This involved walking through the narrative of each persona, for example, would a person with this kind of characteristic likely also have this other characteristic?
9. Stress test the personas. Through presentation and discussion with the broader project team refinements have been made to the personas.

The result of this process was a set of six unique customer personas designed to illustrate the factors that TMR and business should be considering when planning for MaaS. These six personas are shown in the following image.

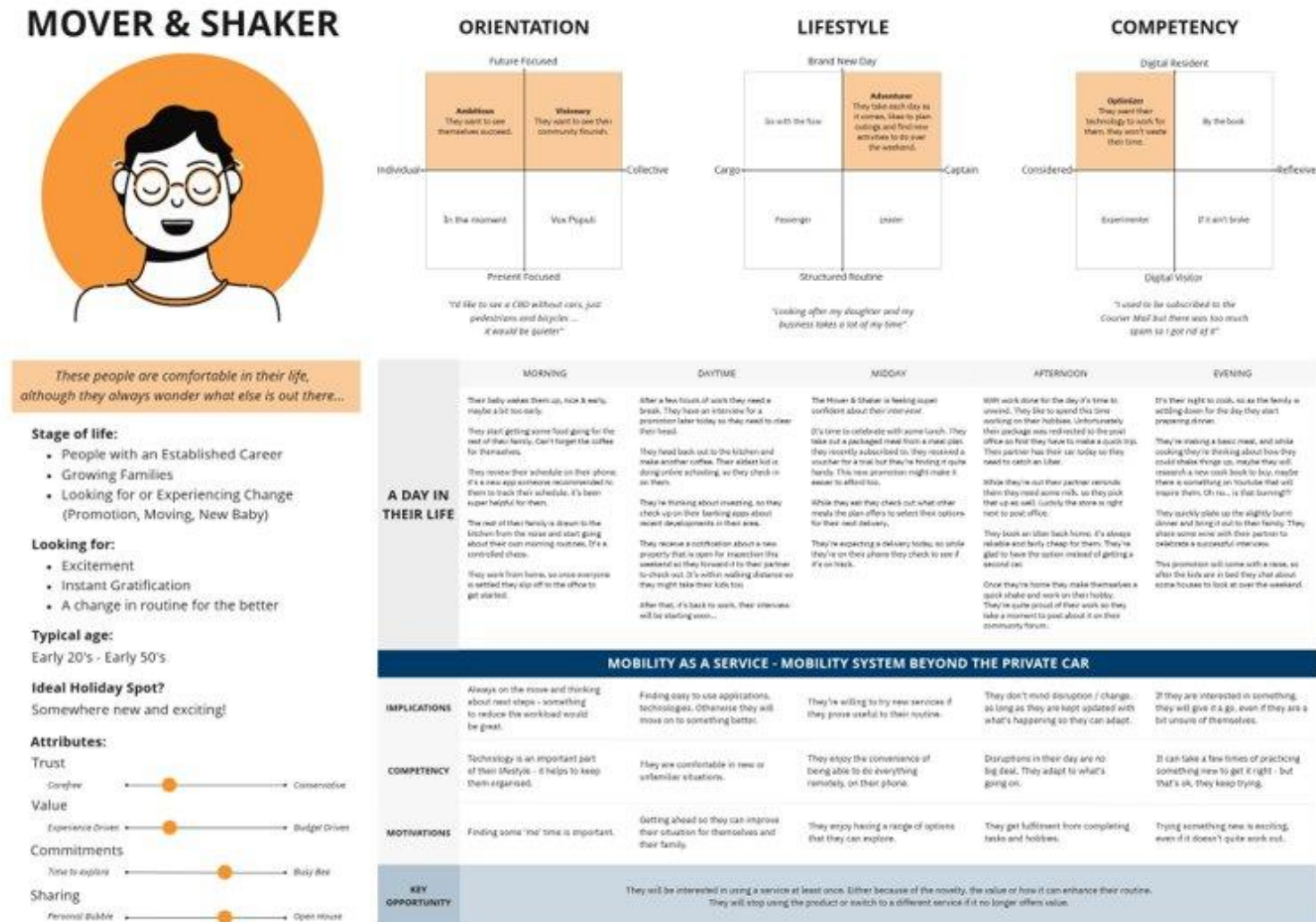
Figure 4 TMR Maas Customer Personas



The Mover and Shaker is shown in more detail below in Figure 5 and some key insights from this persona are noted:

- The Mover and Shaker's orientation, lifestyle approach and competency are expressed via three quadrants at the top of the persona diary entry. These top characteristics show how the personas live their lives. The four MaaS attributes of trust, value, commitments and sharing have been built into these.
- This person's orientation, or general outlook on life, is future focussed, meaning that they are always thinking ahead and about 'what else is out there'. This may be self-oriented (they are ambitious) or community oriented (they are visionary). The Mover and Shaker is shown as stretching across both of these sections, demonstrating their flexibility and how this persona may change by context.
- This persona's lifestyle explores their approach to planning and control. The Mover and Shaker is shown as approaching each day as an adventurer meaning that they tend to make decisions for themselves (and possibly others) but do this on a day-by-day basis.
- The Mover and Shaker is considered to be a digital optimiser. This means that they are comfortable in using technology (and solving any problems they experience using new technology) and carefully consider new technology.
- Together, these persona attributes mean the Mover and Shaker may be attracted to MaaS initially by the novelty or experience of it (drawn by their future focused orientation and adventurer lifestyle). However, they will easily stop using a MaaS product or switch to a different service if the Mover and Shaker perceives it to be no longer of value to enhancing their routine.

Figure 5 'Day in the life of' diary entry for the Mover and Shaker persona



8. A reflection on this approach and limitations of this research

To date this methodology appears to be proving successful in developing insights into potential MaaS customers and, critically, in conveying this information to people and industry interested in developing MaaS products. It does not provide an answer, but it does provide rich insights into users which can help inform how to develop and create a successful MaaS product which people may be encouraged to try and then adopt.

By considering people's lives in the round, and integrating the insights into their lives into planning and design, we are much more likely to be thinking about how we meet the needs of the customer. The more the needs of the customer are acknowledged, and the ease in which anything we are developing can support or enhance someone's daily activities, the greater engagement and trust will exist between the organisation and their customers.

From a design perspective, it helps to focus thoughts on developing the right solutions. If we know about people's choices, needs and motivations, it becomes much easier to evaluate potential solutions based on how they meet those needs. Incorporating these insights from the outset also helps to reduce iterations in the development process.

It should also be noted that the personas have proved a highly effective means of conveying complex information about people's lives and choice making.

There are some limitations from this research that are important to note for any further research into the customer and MaaS.

Firstly, there were 12 participants recruited to take part in three interviews each. However, only nine of the 12 participants completed all three interviews. The other three participants completed two interviews. The interviewers do not consider this to have compromised the quality of the research outputs as sufficient data had been collected from the first two interviews to understand how these participants make decisions. Nevertheless, as the third interview was focused on more on the role of attitudes in people's decision making, the additional interviews may have resulted in some tweaks or modifications to the final set of personas. It is unlikely that the three interviews would have resulted in additional or different personas having been identified though.

Secondly, one of the concepts identified from the literature review as being an important area to focus on was 'unmet need' and understanding how MaaS might be able to address customers' 'unmet need'. However, defining this concept to interview participants, in a way so not as to bias their answers, was difficult. It was also not apparent from discussions with any participant that they had an obvious 'unmet need'. Had a more direct approach to talking about transport and travel been used it may have been easier to distinguish whether people had an 'unmet need'.

Thirdly, it is important not to lose sight of what we already understand about the conditions that will support a successful MaaS environment – an underlying mobility system which offers attractive and competitive options to the private car. Building a deeper understanding of the user, the customer for MaaS, is vital but will only yield its full potential if the underlying mobility foundations are in place and if the system exists to support agile, responsive and tailored products.

9. Implications for policy makers and practitioners

Meeting future climate change and net zero targets is going to rely upon people doing things differently to what they do now. This is as true of transport policy makers and practitioners as it is of the population at large – the number of registered motor vehicles in Australia is higher now than it has ever been (ABS 2021 Motor Vehicle Census).

It is therefore imperative that as we seek to develop sustainable access solutions in the future, the customer experience is designed in from the very beginning. The double diamond approach is one which can really help to apply this design thinking into transport interventions. There are a number of practical steps that transport professionals can take to embed this approach:

- Thinking about your outcomes and purpose from the outset: Establishing the end goal(s) will ultimately set the direction of the process. Without clear intention, the ideas and concepts developed later on may not reflect what you wanted to achieve.
- Diversity of thought: the initial part of the process is about divergent thinking – firstly gathering insights to the problem in the discover step and generating a range of solutions that could be used to address the problem during the develop step. Bringing together a project team with a diverse skill set into both of these stages will do much to collect ideas from several perspectives.
- Framing questions in a human-centred way: In working through the problems at the discovery stage, it's important to consider the questions that arise – are they articulated in a way that helps you, or the customer?
- Understanding your customers: It is really important in this process to generate insights about who your users or customers actually are – so that when we are generating solutions, these always keep the user in mind. Consider the role of primary or secondary research as part of this process too.
- Bringing in customers to the design process: You can also go a stage further and consider how you can use co-creation with customers. What better way to understand their needs and what they might value as a new product, service or overall experience, than to have them involved in generating the concepts?
- Keeping an open mind: This process is about challenging the norm and adopting a different approach and mentality to what has gone before.

10. Conclusions and next steps

Ultimately, deepening our understanding of our customer's motivations, drivers and desires are vital elements of success in any transport project but all the more so for an evolving concept like Mobility as a Service, particularly in an increasing complex and uncertain world. This paper has outlined how application of the double diamond approach to design thinking is enabling transport authorities and consultants to really put the customer at the heart of decision making.

The project described in this paper has delivered a set of six unique customer personas and has highlighted the potential for deep insights into the choice making of customers to support TMR and businesses in planning for MaaS. This foundational piece of work has produced a rich resource of qualitative insights about factors which may impact people's decision making in relation to uptake and use of MaaS products.

This framework (and the double diamond approach which underpins it) is now being used to develop the next stage of the project. The objective of this next stage is to develop a scalable and repeatable model for building an understanding of the customer for MaaS across the whole of Queensland. This process, using a combination of qualitative and quantitative research is aiming to provide a set of resources that can then be used in future by potential MaaS operators in Queensland to better understand how to tailor their product to meet the needs of the customers in their target area, regardless of where in Queensland that happens to be.