A PROJECT PROPOSAL FOR THE DEPARTMENT OF TRANSPORT

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THE ROAD TO NET ZERO

CO-DESIGNING A ZERO EMISSIONS STRATEGY FOR THE WA TRANSPORT SECTOR

DESIGN THINKING & SERVICE INNOVATION

This project has applied the methodologies of Service Design and Service Innovation to the issues of decarbonisation and transportation, brought to the project team by the WA Department of Transport in early 2022. Service Design and Service Innovation are forms of human-centred design that focus on people's interactions with each other, organisations, and businesses. Using Design Thinking, these forms of design develop services, systems and organisations to identify and improve on platforms

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WHAT IS A PROJECT PROPOSAL?

This project proposal is a collation of project data, visualised project information and proposed service outcomes developed for the Department of Transport's complex project of lowering emissions within Perth's transport sector. Utilising terminology and methods of design thinking and service innovation, this proposal is a documentation and visual communication of our design process.

Within this proposal, The Department of Transport can expect an exploration both in depth and breadth of our understanding of the project, clarity on the stakeholders we are designing with, redefining the project problems, demonstrating potential project outcomes and what our aims are for moving forward.

Although the proposal is designed to communicate the value in our discoveries and demonstrate the opportunity to generate sustainable behaviour change within Perth's public mobility, it is important to address the contents of the proposal are not fixed or final. As we continue co-design with the Department of Transport, we aim to build on these concepts.

KEY TAKEAWAYS

- In 2019, the WA Government established the target of reaching net zero emissions by 2050 (Department of Water and Environmental Regulation 2020, 5)
- Working with the WA Department of Transport, this project aims to co-design a strategy for lowering emissions specifically in Perth's public transport sector
- As a team of multidisciplinary design students with diverse backgrounds, skills and resources, we are positioned to achieve this goal
- Using design thinking and service innovation tools, our team endeavours to develop an information system that can assist the public in lowering their emissions

WHO ARE WE?

Our core team is a multidisciplinary and multicultural group of six students from Murdoch University, currently undertaking a Graduate Diploma in Design Thinking and Service Innovation. Led by our tutors Erica Ormsby and Eko Pam, we are taking on this project as part of our course. Coming from backgrounds in graphic design, games art and design, fine art, education, accounting and marketing, politics, and community and sustainable development, we bring a range of perspectives, skills, and resources to this project that can help the Department of Transport tackle this problem.

The project also encompasses the ideas and perspectives of a larger cohort of students through the Design Thinking Tools unit. Students in this unit represent a pool of people with even more diverse disciplines, cultural backgrounds, and life experiences, who have also contributed to the project.

"We bring a range of perspectives, skills, and resources to this project, and believe that we can help the Department of Transport tackle this problem."

(Bailey et al. 2022)

MATTHEW BAILEY

Discipline
Graphic Design and Games Art & Design

Quote
"Design is about so much more than solving a problem. It's about shaping people's experiences – it's about shaping the future."

Interest in the project
I truly believe that design has the power to change the world – and that's why I'm interested in this project: at its core, it's about creating a better future. Transport is such a fundamental part of the way we live, and so changing it in a way that is both effective and empathetic will be a challenge – but it's one I'm ready to take on!

CHANTAL BENSON

Discipline
Graphic Design and Games Art & Design

Quote
"Design is rethinking the ordinary, to use our imagination and creative exploration to work outside our comfort zones – it is about creating services and experiences that are authentic to humans."

Interest in the project
I believe design is game-changing, a powerful vehicle for constructing world shifting innovations. Design is human-centred and to me, bringing people together through co-designing is vital in educating and, creating conditions in which innovation is possible. This project is a hands-on, shared collective investment for our future, and I am excited to work with the DoT to create appropriate design solutions to problems that are inherently human.

LIZETH CASTELLANOS

Discipline
Politics, Community and Sustainable Development

Quote
"It is our moral responsibility to challenge the status quo and co-design innovative ways to become worthy ancestors."

Interest in the project
We can no longer talk about environmental and social issues separated from democracy, growth and ecology as they are interdependent. This is a new paradigm in which through innovation and shift of consciousness in humanity, we will be able collectively participate in significant changes in identity safe operating space for humanity. This is why I am interested in co-designing collectively as a community a strategy to lower emissions in the WA transport sector because is our moral responsibility to challenge the status quo and prototype together sustainable operating systems for the next generations.

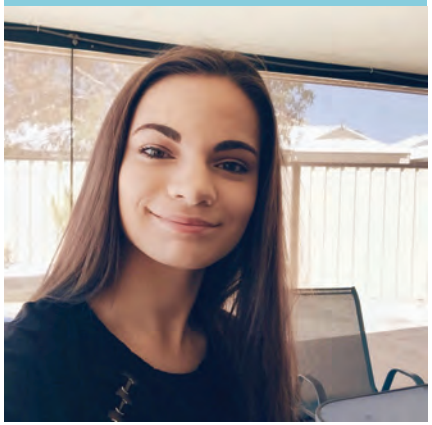
SAM CAVALLARO

Discipline
Education – Secondary Teaching in Visual Arts, Design, and Media

Quote
"We can no longer continue doing things the way that we have. Look at where it has gotten us..."

Interest in the project
I became a teacher because I wanted to make a positive impact. Transportation is one of the many problems our society must face as we move towards a carbon neutral world. I look forward to contributing to a shift in our mindsets, so that we can meet this challenge.

GABI SCARDIGNO

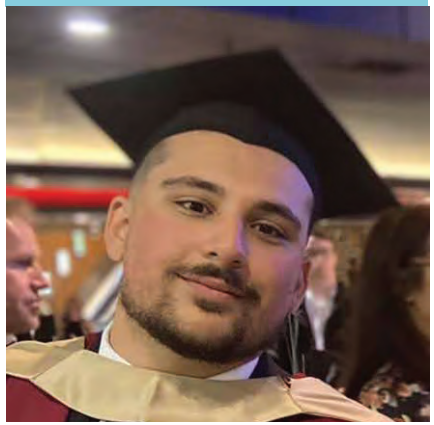


Discipline
Graphic Design and Games Art & Design

Quote
"Every great design begins with an even better story"

Interest in the project
Design is often overlooked by those who don't know how powerful it is in changing the world around us. This project is a way to continue to fuel this change and make a positive impact on the emissions and issues with current mobility present in Western Australia, whilst educating on how design can play a pivotal role in societal issues, not just making things look more aesthetic.

MOJIB TEMURI



Discipline
Accounting and Marketing

Occupation
Marketing Co-Ordinator at Access Without Barriers (AWB co)

Interest in the project
Coming from a marketing background understanding and applying user experience has been a massive interest of mine along with being an automotive enthusiast, this project specifically catches my interest as long term I aim at working my way into the automotive industry with my skill set and this project has the potential to fuel the direction of my career.

WHO IS THE CLIENT?

The agencies in the Transport Portfolio work together through integrated and intelligent transport systems and services to ensue well-designed transport infrastructure that supports vibrant, healthy and sustainable communities (Department of Transport 2022a; Department of Transport et al. 2020). Of these agencies, the Portfolio Strategic Projects Office (PSPO) provides oversight for the DoT's interaction with other agencies and will allow us considerable scope for innovative service design.

The DoT currently uses its website, transport.wa.gov.au, as a major form of interaction with the public. Its use is multi-functional: as a communication tool to the public, a repository for resources relating to transport in Western Australia, and an access site for DoT services. The DoT also uses the social media platforms Facebook, Instagram, Twitter, and YouTube as communication tools. These communication avenues are an area that has already been identified as needing investigation and improvement (Theobald and Thompson 2022b).

There is currently limited usage from the Department of Transport of printed collateral and resources for the purposes of advertising and communication with the public. Brochures and other informational printed resources can be found at DMVs around Perth that provide assistance and information on car registration processes. However, there is not much printed collateral produced and displayed to educate on lowering of emissions and sustainable mobility. Other bodies under the Transport Portfolio (such as the PTA that handle Transperth) seem to make more use of collateral in communications, including TV advertisements, bus advertisements and timetables.

While the Department of Transport directly has limited use of printed collateral, the Your Move team has implemented printed collateral in their communications strategy, including a welcome package that is sent out to members and wayfinding which people can use and interact with on their journey (Your Move 2022).

"Department of Transportation Client Presentation"

PROJECT OVERVIEW

Climate change poses an ever-growing and very real threat to humanity. The negative impacts of global warming can already be seen, and with our current way of life, this is only set to get worse (Mulvaney 2022). Climate change affects our entire planet, but there is no current 'instant-fix' to stop climate change, making its prevention not only an incredibly large-scale problem, but a very complex wicked problem (see PROJECT PROBLEM, pg. 019).

When assessing the uncertain future of Perth's natural and urban environment, Professor Richard Weller stated, "Western Australians, Saudi Arabians and Singaporeans share the increasingly dishonorable status of being the most unsustainable people on the planet" (Weller 2009); such a statement makes efforts to decarbonise this state particularly pressing and important.

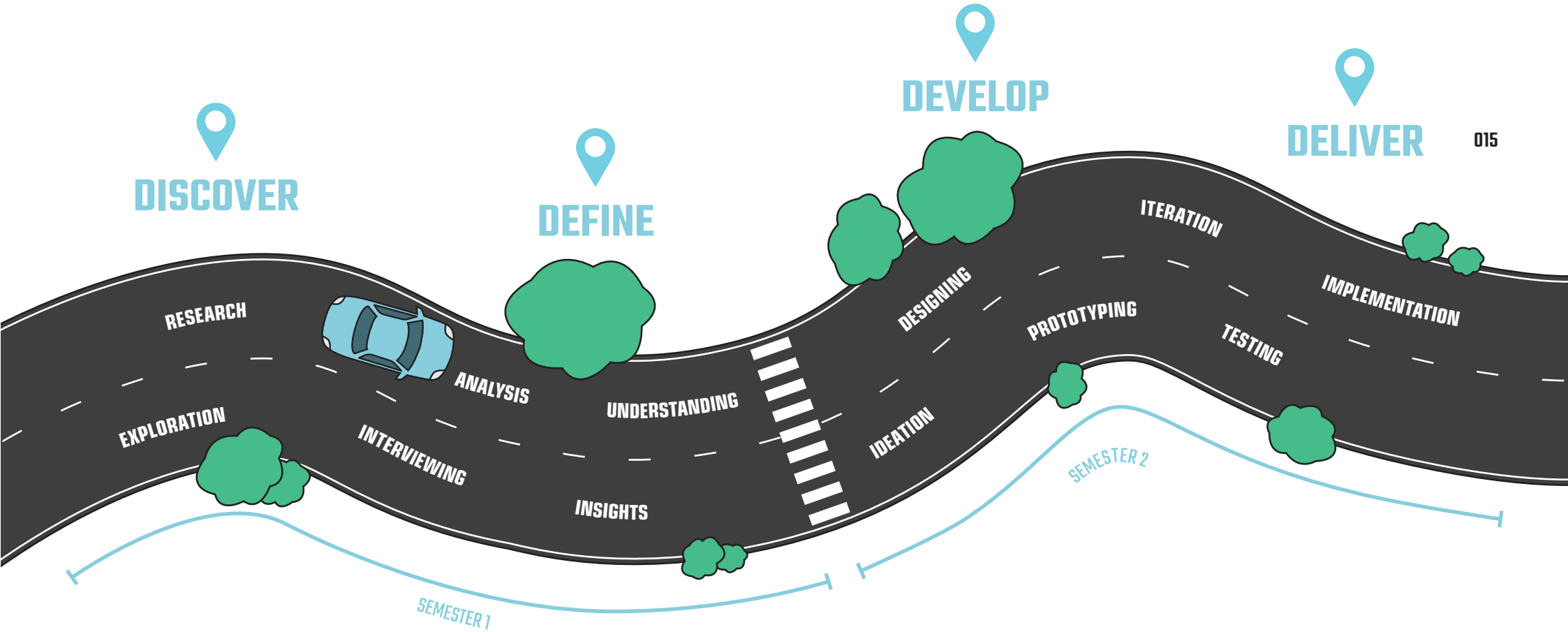
In 2019, the Western Australian Government announced the climate goal of achieving net zero emissions in WA by 2050 (Department of Water and Environmental Regulation 2020, 5). To achieve this goal, the Government plans to work with all sectors of the economy to reduce their emissions (Department of Water and Environmental Regulation 2020, 5). This project focuses on an emissions reduction strategy for the public transport sector.

Working with the WA Department of Transport, this project aims to co-design a strategy for lowering emissions in WA's public transport sector and working towards achieving the Western Australian Government's 2050 target of zero emissions.

This strategy will be in the form of an information system, which our team will create using design thinking, co-design strategies and service innovation tools. The purpose of this information system will be to educate individuals on how they can reduce their emissions and overall impact through making sustainable travel decisions. Over the course of this semester, we have conducted research and engaged in exploration in order to define and better understand this wicked problem. In semester 2, we will enter the implementation phase, engaging in ideation, prototyping and testing. We will use our discoveries and insights from this semester in order to deliver this information system.

“Can you **accelerate the uptake of low emission transport?**”

(Theobald and Thompson 2022a)



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Design Thinking requires designers to apply a critical lens to the problem presented to them, as the problem initially presented may not represent the true issue. For example, a problem recognised within an organisation may have been identified within the restricted scope of the industry. However, there are always larger issue(s) hiding beneath the surface or sitting in an organisational blind spot. Likewise, a problem may be a symptom of something systemic, with any proposal for change that does not address the root cause, providing only a band-aid solution.

We looked critically at the problem that the Department of Transport brought to the team. It was inspected so we could recognise broader issues that surrounded and intersected with it, and "redefined" the problem in response to our discoveries. We deconstructed the problem to recognise its core concerns and used these "problem challenges" as a basis to direct our research and design processes. Our research and processes then allowed us to develop "project objectives" that we used to clarify and direct our efforts towards achievable goals.

KEY TAKEAWAYS

This project can be classified as a wicked problem due it its complexity, resistance to change, and inability to be 'solved'. The nature of wicked problems also expects for shifts and changes over time.

Design thinking and service design are approaches that can be used to address such wicked problems; in this process, problems are deconstructed to understand them better, and then redefined.

Through research, investigation, and various design thinking methodologies, we have redefined this problem. This shifted from assisting the public with the uptake of low to zero emissions transport through a single information resource to one centred on educating the public through an interconnected information system that can empower them to make more sustainable travel choices.

Since our work on the project brief, we realised that there was a miscommunication about the perspective of the problem statements and objectives; as a result, we clarified the purpose and perspective of both of these and adapted the problem statements into new project challenges.

INITIAL PROJECT PROBLEM

In 2019, the Western Australian Government announced its intention to achieve net zero emissions by 2050 to mitigate the impacts of climate change (Department of Water and Environmental Regulation 2020, 5). In order to achieve this, the Department of Transport has been tasked with developing a transport sector emissions reduction strategy (TSERS). In this strategy, it was identified that one of the main issues with transport emissions is the limited uptake of low to zero emission vehicles due to a lack of accessible and concise public information.

This is an example of a **wicked problem**. Such problems are described as "wicked" because of their complex natures, their resistance to change, and the way that what can seemingly be offered as a solution may in actuality cause further problems in other areas.

Our process has seen us take this initial project problem and apply our methodologies to understanding the issue, redefine the problem through the human centred lens, and begin developing ideas about how to tackle such a big undertaking.

The initial project problem given to us by the Department of Transport resided in increasing the uptake of low to zero emission transport by developing an information resource using design thinking principles that could demystify and facilitate the uptake of such transport in Western Australia.

(Accelerating Lower Emissions 2022)

REDEFINED PROJECT PROBLEM

Design thinking and service design are human-centred approaches that revolve around understanding people and wicked problems. Through research conducted to learn about and understand the initial problem, design thinking often leads to new discoveries of the project and the problem – requiring the problem to be redefined.

Over the course of semester 1, through engaging in research, interviewing, and co-design workshops, we discovered that the initial problem – of developing an information resource that would promote low to zero emission transport in WA – needed to be reframed.

Our discoveries concluded that the problem is not only with assisting the public in the uptake of low to zero emission transport, but also with changing people's perceptions of the way they move around and educating and informing them about the sustainable mobility options available. Through our research, we discovered that not one static, PDF document or singular information resource would be enough to reach the wide variety of stakeholders we have identified. We realised that an entire information system - made up of a series of different, interconnected touchpoints (which are essentially contact moments that people interact with during a service experience) - would be immensely more effective.

Therefore, we have redefined the project problem as follows:

Reducing emissions in WA's transport sector is a very large-scale wicked problem. In order to assist the public with lowering their transport emissions, we need to look beyond simply electric vehicles, or public transport, and consider the wide variety of pathways available to lowering transport emissions.

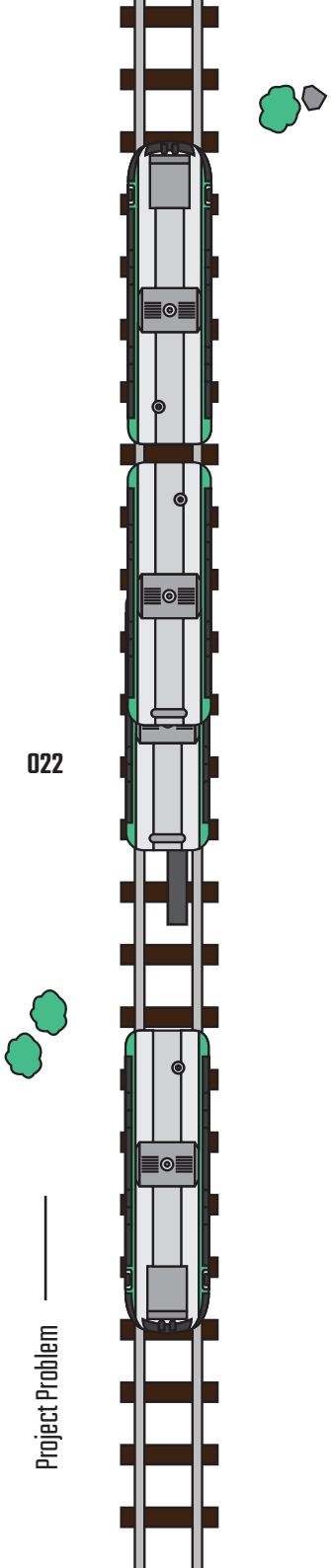
Therefore, we will need to co-design a comprehensive and interconnected information system for the general public that provides accessible, reliable and educational information about their alternative sustainable mobility options and empowers them to make informed, climate-conscious travel choices.

- **Evaluating and assisting the Department of Transport in how to effectively determine ways to lower emissions in the general public's mobility.**
- **Understanding how people wish to comprehensively receive information around mobility options in Perth.**
- **Determining the public's motivations for traveling and how we might educate and encourage the benefits of low emissions mobility in Perth.**
- **Discover what barriers are currently preventing the public from accessing the mobility options of their choice.**

PROJECT CHALLENGES

In the early stages of defining the project and increasing our understanding of this wicked problem, we initially created four problem statements to guide our research. However, through subsequent research, redefining the project problem, and feedback from the Department of Transport, we discovered that these problem statements needed revising to be clearer and more accurately reflect the redefined project problem we had determined.

Therefore, we have revised our previous problem statements into the following four project challenges. These challenges represent the challenges faced by the project, not challenges for the Department of Transport in this project.



PROJECT OBJECTIVES

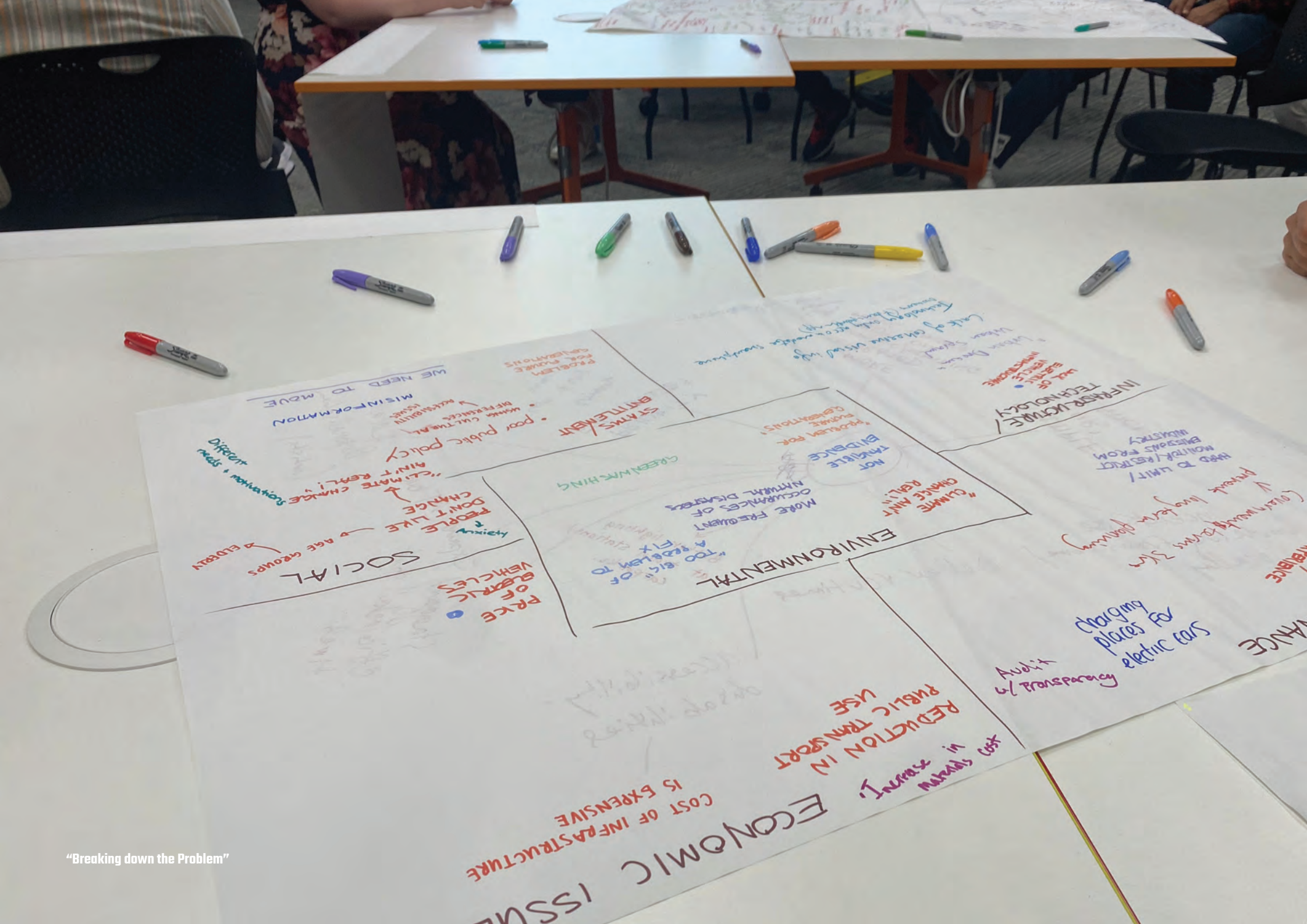
We have also identified the four following objectives for the project. Like the problem challenges, these objectives are from a holistic, project perspective; not from the perspective of the Department of Transport.

1. To bridge the gap in current public communication by developing an accessible, reliable and relevant information system that the public can easily utilise to find the information they seek about climate change and energy efficient modes of transport

2. To develop a strategy for effectively lowering scope 1, 2 and 3 emissions in Perth's transport sector

3. To construct an information system that will serve as an educational tool on the dangers of climate change and encourage the public of how they can alter their actions to assist in reducing their own scope 1 emissions

4. To collect data through research to understand the preferred mode of mobility of the public and the reasoning behind this to cater to all travel needs and improve public travel experience



"Breaking down the Problem"

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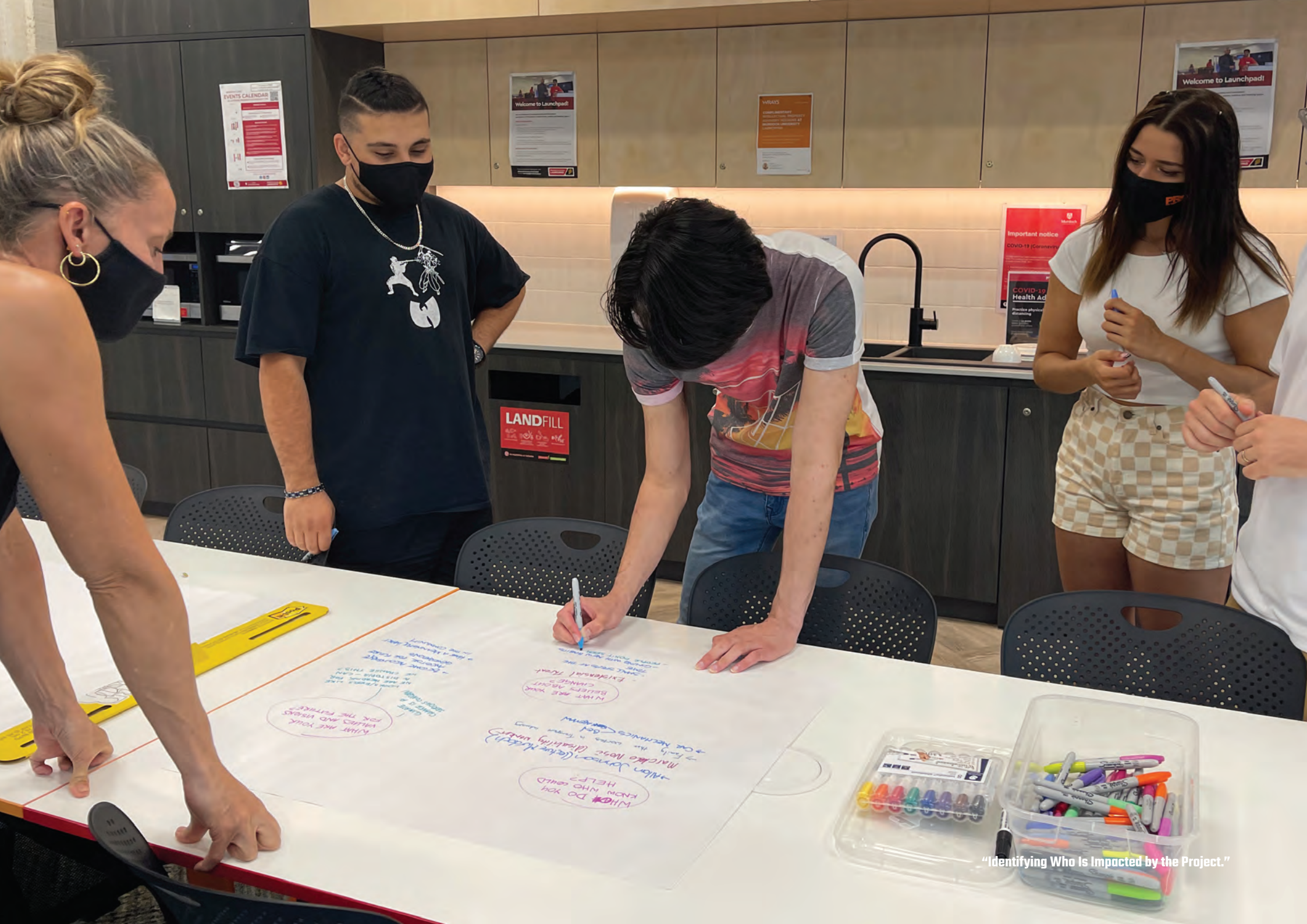


"Identifying Who Is Impacted by the Project."

INTRODUCTION

Service Design is a form of human-centered design that focuses the attention of its research on collecting data on the experiences, feelings, and opinions of people. This, qualitative data, is valued due to its ability to uncover the many interacting factors at play within a complex problem, to determine key areas of interest, and to give insights on how the experience of a service might be improved.

Our research methods have included forms of desk research, academic research and ethnographic, research. We have used this research to analyse issues, develop understanding of problems, and empathetically explore the experience of those affected by the project.

KEY TAKEAWAYS

- We have used a variety of different methods to research important topics relating to the project.
- Our research has focussed on the collection of qualitative data, and we have used methods to research the experience of people in relation to transport, mobility, and climate change.
- Our ethnographic research aimed to gain insights into the thoughts, feelings and opinions of the people we interviewed through conversations about transport, mobility and climate change.
- We have identified key stakeholders for the project: Citizens, Businesses, Tourism, Public Services, and Government Departments.
- We have identified core actors for the project: The Department of Transport, The Graduate Diploma Team, The GRD503 Class, and The General Public.

DESK RESEARCH

Precedence Studies

To have a better understanding of reducing Net Carbon Emissions it is essential to observe what those around have tried previously. We have explored initiatives from Australia and around the world to better understand what others have done.

Clean Cars 2030
United States 2022

A legislative bill passed where Electric Vehicles will be the only vehicles for sale in the United States Domestic Market with no gasoline or petrol vehicles for sale. In order to reduce emissions, one of the steps forward would be to eliminate the supply of vehicles that produce emissions and pollute the environment.

Zero-Emission Transition Plan for Transport Canberra
Australia 2020

Transport emissions in Canberra account for 60% of the total emissions in Canberra, with an identified need for increasing use of public transport, simplicity, efficiency, accessibility and reliability is the focus of the plan. While we can safely assume that Canberra and Perth are two different markets, we can monitor the transition plan from Canberra and adapt anything that may be of use to the Perth market.

Total Mobility Scheme/ Not Built For Me
New Zealand 2010

The current public transport methods available in New Zealand are not accessible or accommodating to those that need extra support; there are countless cases which explain the experiences from different walks of life - such as people with vision impairment, down syndrome, etc. This case raises the awareness that transport organisations/facilities need to do more so that they can better accommodate those with special needs.

This relates to the project as if better accommodation/services are provided publicly it will help reduce the need for private forms of transport which will help provide a better experience for users of the service and additionally reduce emissions.

Electric Vehicles Europe
Various Countries

Many countries with a leading charging strategy have national policies and goals in place to push for infrastructure development such as grants in countries like Germany, France, Netherlands, Sweden & Italy ("Policies to Promote Electric Vehicle Deployment – Global EV Outlook 2021 – Analysis - IEA" 2022)

"EV Charging Station in New Zealand"

Literature Reviews

The process of writing literature reviews was an investigation and evaluation of how design thinking and innovation had been explored over time through a variety of chosen topics. The identification of a diversity of literature sources allowed us to outline different perspectives on these topics and develop these perspectives by incorporating contributions from the source's authors research that reinforces the subjects and topics of the reviews.

This section contains six literature reviews that discuss six distinct aspects and topics of design thinking and innovation. These reviews are an analysis of our own and surrounding research practices regarding these topics that will assist in further understanding of the project through providing a global scope to a local problem. Each review contains 2,000 words to encompass the extensive research conducted and described, therefore a disclaimer is warranted that it is not necessary to read this section in order to understand our progress to date.

CHAPTER 1. How to Change Human Behaviour Using Design Thinking

Emerging more than a decade ago, design thinking has been widely adopted across industries beyond the traditional contexts of design. Design is utilised and experienced, arguably, in every aspect of life, unintentionally and deliberately shaping human beings. Discovering what comes naturally to humans is the core of design thinking, and this rethinking gives a new way of creating ideas that have not existed before, as stated by Kelley and Littman (2001, 24) why are designers and people fighting natural human instinct. This literature review examines the importance of utilising the instrument of design thinking to motivate change in human behaviour and demonstrates how effective behaviour change can lead to innovation.

Understanding and articulating design thinking, let alone the powerful implications in changing human behaviour, has been a point of ambiguity with numerous definitions grounding the concept in design; "Even on a cursory inspection, just what design thinking is supposed to be is not well understood, either by the public or those who claim to practice" (Kimbell 2011, 288). To contour a clear understanding within this literature review, key terms will be established for context. Dissociated from the discipline of art and any disciplinary focus, there is no perfect encompassment of design thinking, however, Tim Brown (cited in IDEO, 2022) defines design thinking as "a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people". It is important to note, design thinking is not only exclusive to wicked problems. Design thinking can applied to various contexts, ranging from services, products to complex societal problems that are posed as wicked problems. Wicked problems are challenging to define, however, there is agreement these problems are complex social, economic, and environmental issues, with Churchman (1987) stated wicked problems are "ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (B-141). Jordan, Kleinsasser and Roe (2014, 417) share further, "It is improbable, if not impossible, to solve a wicked problem for ever and all time." This poses wicked problems as inherently human and prone to endless change, a complex nature that cannot be truly solved, "only re-solved-over and over again" (Rittel & Webber 1973, 160).

The literature review comprises of three sections. The first section will investigate literature in design thinking as an active agent for change. Design thinking authors frequently deliberate design thinking as a force for change and innovation, extending beyond aesthetics. This section will examine the divisiveness around design thinking, and how might design thinking generate meaningful change. The second section will examine how design thinking can shift human behaviour, in particular, the exploration of facilitating meaningful design thinking to enhance human existence. However, despite the versatility shared around design thinking influencing human behaviour, there is a disjointed understanding of how to achieve an intentional shift in human behaviour. The final section will focus on investigating a shared collective future, where design thinking can be a potential catalyst to reinventing humans and innovating the world. Design thinking has been noted to hold responsibility in changing the way we approach inherently human problems, whilst considering the previous sections, design thinking changing human behaviour for a shared, sustainable future will be explored.

Investigating Change by Design Thinking

Change brings new alternatives and opportunities into the world, although achieving meaningful change in a world filled with inherently wicked problems is complex. Design thinking and non-designers who exercise the tool have adopted a perspective of challenging the world around them, uniting an instinctive relationship between design and change. Tschimmel (2012, 4) shares "We are witnessing a shift in attitude from designing 'for users' to the human centred approach of

designing 'with users'". Similarly, Tim Brown and Barry Katz, (2009,11) in their book Change by Design, poses that design thinking takes the next integrative and transformative step, "it is not only human-centered; it is deeply human in and of itself". The very holistic nature of design thinking has an embedded framework of empathetically understanding humans and paving the foundations for constant change. Dell'Era, Magistretti, Cautela, Verganti and Zurlo (2018, 324) noted that design thinking is a form of salvation, a comprehensive tool for its "adaptability in the face of indeterminacy". The concept of adaptability has seen the transformation of meaningful change happen in the world, even more so, when a non-designer becomes a design thinker. Liedtka, Hold and Eldrige (2021, 6) further shared that change comes from the innovator as a person, creating the experience to transition from "knower to learner". Design thinking is far from artefact creation, rather a foster of innovation and change where responsibility is placed upon the designer. Kimbell (2011, 289) stated a dualism "between 'thinking' and 'doing'". It is in this dualism that an opportunity for change is actioned, a change that might offer social and economic innovation. Brown (2009) goes on to say, "We are at a critical point where rapid change is forcing us to look not just to new ways of solving problems but to new problems to solve" (111).

This ever-shifting landscape of design thinking presents new kinds of social cultures, posing 'why' and 'what if' questions, and in the right collaborative environments can accomplish appropriate solutions, "high-order solutions that were better than anyone brought into the room in the first place, solutions that made a difference in their stakeholders' lives" (Liedtka, Salzman and Azer, 2017). Rachel Ivy (2020, 7) in Design Thinking shares that design thinking, "means having the perspective that no product or service is every completely finished: it can always be improved". An encompassment of design thinking's iterative, endless cycle.

Divisiveness in design thinking is apparent and Iskander (2018) shines a light into the reasons declaring, "Design thinking has allowed us to celebrate conventional solutions as breakthrough innovations and to continue with business as usual". Lucy Kimbell (2011, 294) goes further, "Design thinking fails to reference wider theories of the social and misses opportunities to illuminate the context into which the designer is intervening". An understanding of design thinking conducting change that disregards people's social contexts and intervenes with minimal reasoning behind the designer's intent is focal. Similarly, Erosy (2018) asserted design thinking might be doing more harm than innovating, with mediocre being the practice for change, "Design Thinking is a methodology that sells innovation and mind-blowing discoveries but the truth is that we are training designers and non-designers to be happy with half-ass work that uses a lot of time and money".

With the tensions of design thinking linking to both negative and positive connotations of its potential to create not only change but human-centered change, there is also a gap in literature concluding design thinking is actively tied to producing innovative change and synthesis of relevant long-term sustainable impact, "the change in future scenarios compared to 20 years ago is so dramatic that we cannot assume that Design Thinking will keep its central dominant role" (Verganti, Dell'Era and Swan 2021, 617). It is important to note design thinking needs to be adopted properly, without this responsibility, design thinking can cause damage, "long-term damage to our culture, our economy, and our environment" (Brown and Katz 2009, 138). This suggests that any uptake and practice of design thinking may require designers and non-designers to consider their responsibilities and critically think as they pioneer new opportunities to create new solutions to wicked problems.

Investigating Change by Design Thinking

Humans having been designing for centuries, every aspect of life is deeply human embedded, regardless of intention. Design thinking as shared amongst numerous authors (Brown and Wyatt 2010; Sanzo, Scribner and Wheeler 2021; Plattner, Meinel and Leifer 2015) is a human-centred approach grounded on the greater picture of emotionally and functionally innovating human experiences. Design thinking for behaviour change at present is not widely understood or implemented with Niedderer, Clune and Ludden (2018, 5) finding there is a perceived contentious of design achieving behaviour change. Tim Brown and Jocelyn Wyatt in Design Thinking for Social Innovation (2010, 29) write, design thinking is going beyond the assumptions of designing for people, instead "addresses the needs of the people who will consume a product or service and the infrastructure that enables". Co-collaboration with humans by humans is the core of design thinking, and this approach is what makes design thinking frame the wicked problem of shifting human behaviour and cultural environments. Clarke (2020, 5) further expresses "design thinking requires deep explorations into people's lives before beginning to generate solutions. Empathy- as opposed to knowledge alone – is key". Brown and Katz (2009, 157) poses further that education is important for long-term impact, and through educating we can unlock further human creative potential. This poses that design thinking coupled with empathy is a constant process of educating humans to shift their behaviour and incentive to enhance the future, giving people the tools to 'write their own stories' (100).

Gardiner and Niedderer (2018, 235) contend an important consideration, while design maybe created to address a certain issue, it can affect other aspects of life producing desirable and undesirable consequences. This suggests that design thinking and design has a plethora of versatility, yet the challenge remains in using design to form appropriate solutions to produce behaviour change, let alone ethical sustainable change. ¬Kristina Niedderer (2018) writes in Facilitating Behaviour Change through Mindful Design that design subtly influences our lives, therefore responsible designing by all involved is essential to motivate behaviour changes, "In order to encourage responsible decision-making, it is necessary to understand the complex interactions between people, objects and their environments as well as their

motivations" (105). Tromp, Hekkert and Verbeek (2011, 7), noted that changing human behaviour as collective enhancement for existence is challenging and cannot be automatically performed and assumed. There are behaviour conflicts as humans are individuals with their own concerns and motivations that pose a barrier to embracing change in their behaviour, concerns such as "desire of comfort and efficiency" (7). Tromp et al. (2011, 7), expanded sharing the power of design's potential can bridge these concerns, and through understanding individual concerns you can identify the type of influence that is effective for a collective behaviour change. Allan Chochinov's foreword in Design Revolution: 100 products that are changing peoples' lives (2009, 6) further shares "there now seems an urgent mandate to design for good-to understand the practice of design as an unequivocally interconnected, global, and consequence-creating endeavour".

For there be an honest, positive, and intentional shift in human behaviour, there needs to be consequence awareness and responsibility in integrating sustainable solutions. It is through the common theme of design thinking holding influence to change human behaviour, there is unanimous agreeance there is potentiality to improve society and existence. Tromp and Hekkert concluded (2018, 4) "we keep designing our society in ways that actually sustain these exact same social issues and thus confound their resolution". There is minimal doubt that design thinking is needed to change human behaviour to solve human problems. Although not related to mobility behaviour change, a relevant case study will be explored where design thinking has been used to shift human behaviour to enhance an experience. A Hospital Centered on the Patience Experience by IDEO (2012) shows the importance of using design thinking to give a unique perspective on the varying levels of patience experience that is most often overlooked. Brown (2009, 35) shared, "We need to learn to put people first". Dr Milov (cited in IDEO 2012) voices, "They captured insights otherwise unavailable to us". This co-collaboration and holistic approach morphed the negative experience to one that listened to people, giving the hospital the moment to connect with people as people, shifting the behavioural contexts of the hospital as an organisation and the patients as humans.

A Shared Collective Future of Design

There is an urgency for designers and non-designers to embrace design thinking to arrive and generate innovative solutions. Shana Agid (cited in Amatullo et al. 2021, 56) shared, "it requires a kind of thinking about things that are both future-oriented, but also deeply observant of daily practice". This thinking grounds a natural investment and responsibility for present and future innovation towards reinventing human existence and behaviour. Anne Chick in Design for Social Innovation: Emerging Principles and Approaches (2012, 54), noted "design can be critical in addressing the various sustainable development concepts because it can have significant (both positive and negative) economic, environmental, social and cultural ripple effects". Plattner, Meinel and Leifer (2015, 3) shared that ambiguity is needed to produce the next ground-breaking idea, although frustrating to be in a state of uneasy, this is where design possibilities happen for alternative futures, and as humans we want a future with ambiguity to preserve more revolutionary options. Pilloton goes further in discussing the importance of an innovative future to be successful, requires a collective empathetic investment to make a permanent impact, "but design interventions for social impact are most successful when we hold a personal stake in the community" (2010, 50).

Peters (2017, 386) discovered wicked problems have another perception, "wicked problems must be solved, and indeed can be solved through developing the appropriate polices," this implies wicked problems can be solved in the future. Interestingly, this perception is not shared by many, with prominent authors, Rittel and Webber (1973, 162) concluding, "Wicked problems have no stopping rule", rather a cycle of resolving.

Although we have no true perception of what the future holds, there is agreeance amongst authors that the future needs to be a sustainable innovation, one with a changed mindset that no problem or service has an end. Instead, it is shared humans need to be ready to shift their thinking to support the ongoing enhancement of problems, with Rittel and Webber (cited in Jordan et al. 2016, 419) noting the framing of wicked problems is of critical importance. Tromp and Hekkert (2018, 3) concluded the problems we face today, are undeniably the result of humans designing without holistic, human focused intent, "in designing our man-made world, we have designed our problems too". Design thinking is posed to hold this responsibility in changing human behaviour to be one of collective investment to enhance human existence, and Chick (2012, 53) stated it is important as humans practicing design thinking, especially design professionals, to reinvent and relearn holistic skills to develop a sustainable future. Subsequently, a case study will be explored where design thinking has been used to shift human behaviour to enhance existence.

Throwing Car Culture Under the Bus: Inspiring and empowering youth to choose public transit by Daniel Hendry (cited in Amatullo, Boyer, May and Shea 2021, 325-328) revealed the importance of a pivotal shift in human behaviour through education and establishing incentive in younger people to make sustainable choices. Hendry (cited in Amatullo et al. 2021, 325) noticed many students lacked knowledge about the public transit system and over-reliant on vehicle transport from family, noting the low-density population of Kingston, Ontario, accumulated "a larger carbon footprint" with one-third of emissions coming from transportation alone (Federation of Canadian Municipalities 2019). With these initial findings, Hendry a non-designer, utilised design thinking to co-design with the community of Kingston to navigate the social barriers that prevented students from taking public transport, finding insights from observing and immersing himself with the students. Design being a constant cycle of education and for an appropriate behaviour shift to happen within the

students, Hendry created an orientation program to build life experience and give students an open discussion for the social and environment benefits from using public transport. Looking at the problem through a holistic and human lens, Hendry was able to create a collective investment with the students, using design thinking to build the conditions under which change was possible. Encouraging the youth to be open to shifting their behaviour patterns has resulted in reducing emissions and social innovation that can be replicated in other areas of the world, Hendry (cited in Amatullo et al.) shared further "this replicable service provides a meaningful alternative mode of transportation for youth... They don't require more money or technology. Instead, they require strong partnership with school boards and students" (2010, 326).

Pilloton (2012, 51) shared, "We must be the curators of new community ecosystems". Niedder, Clune and Ludden (2021, 268) further note "we are all actors and that therefore all of us are responsible for how we have collectively shaped the world". Design thinking as a tool for changing human behaviour is endorsed as a responsible necessity to reinvent the future to a sustainable, innovative one. Prominent authors caution behaviour change needs to be human-centered and a collective investment, an intrinsic change that allows appropriate design solutions to form within.

Conclusion

This review of relevant literature has revealed design thinking achieves the capacity to change human behaviour and improve human existence in social and environmental dimensions. It is also demonstrated that a shared collective future is crucial in creating the conditions for design thinking to be effective and build long-term incentive to apply appropriate solutions. There is a necessity and invitation for designs and non-designers to reinvent themselves and use the toolkit of design thinking to responsibly change humans to build a sustainable future that innovatively tackles inherently wicked problems.

CHAPTER 2. Using Innovative Methods to Educate the Public

There is a large body of academic literature that relates to the topic of 'using innovative methods to educate the public' that comes from a range of fields. These fields include, design, education, public health, and medicine, amongst others. Analysing and comparing the writing on the topic requires a multifaceted approach as each discipline has its own working understanding of the key sections of the topic. This literature review aims to explore the differing meaning of "education" and "educating", and its relation to design thinking and service innovation. The review will also explore the application of design thinking and service innovation and its application to the aims of "educating the public". Through exploring these two facets of the topic, the literature review aims to draw from the many fields that have touched on the issue to deliver a more targeted and comprehensive examination into the topic of "using innovative methods to educate the public".

Two Different Standpoints for Viewing the Topic

The relationship between the fields of 'service Innovation' and 'design thinking', to the field of 'education' or 'educating', changes according to the standpoint from which it is discussed. From the standpoint of the design discipline, the literature discusses methods for applying design thinking to innovate educational institutions and educational systems. From the standpoint of the discipline of education, the literature discusses how 'design thinking' can be explicitly taught or incorporated into curriculums.

Service Innovation and Education from the Standpoint of the Design Discipline

The article Design, learning networks and service innovation "argues that education is a surprisingly neglected sector of activity in research on service design and innovation" (Carvalho and Goodyear 2018, 27). It argues that "greater attention to education" (Carvalho and Goodyear 2018, 27) is needed to "shed new light on theoretical and methodological issues in service design and innovation research" (Carvalho and Goodyear 2018, 27). And concludes that "education is a rich but neglected site for service design and innovation." (Carvalho and Goodyear 2018, 27).

The article Understanding Innovation in Education: A Service Co-Production Perspective describes innovation in education as "bridging two rather disconnected research areas: service innovation and education innovation". (Rubalcaba 2022,1) Its central argument is that "education is a service" and that "the problem comes when innovation in education neglects the service aspect and human and social interactions and only focuses on pedagogy, technology, or regulations" (Rubalcaba 2022, 2). In this sense the article explores methodologies in which education can be innovated within a service innovation mode. The major methodology described is the utilisation of a co-production process that can be integrated into existing constructivist pedagogical models. The article describes the necessity of co-production "No education is possible if one of the parties is not engaged in the co-production." (Rubalcaba 2022, 5)

Further to the article above, the article Assessment and Innovation in Education explores innovation specifically in terms of assessment in education. The article defines innovation in education as "innovations in processes (methods, practices, and organisation)" (Looney 2009, 5)
which generally include "new or significantly improved approaches to classroom-based teaching, learning and assessment, as well as changes in the organisation, or governance, of systems". (Looney 2009, 5)
It contrasts these innovations to what it defines as traditional education methods which it defines as relying on a "transmission" (Looney 2009, 5) education model. The article explores central questions about innovation and high-stakes testing. Namely it looks at whether high-stakes assessment undermines innovation and how the tension between high-stakes assessment and innovation can be reconciled. It concludes that these points of tension can be reconciled through service innovation

of assessment methods and measures, but this is only possible in an educational environment where "schools and teachers are empowered to take the risks entailed in innovation." (Looney 2009, 21)

The key points posited in the articles that look at the topic of service innovation and education from the standpoint of the design discipline, are: that education is a service that can have innovation methodologies applied to it (Carvalho and Goodyear 2018, 27); that a process of co-production that incorporates the views and desires of the student is necessary for effective innovation (Rubalcaba 2022, 1); and that an educational environment where risk is possible allows for innovation. (Looney 2009, 21)

Service Innovation and Education from the Standpoint of the Discipline of Education

The article Thinking about "design thinking": a study of teacher experiences (Retna 2016) is about research conducted to measure the effectiveness of 'design thinking' implemented as a pedagogical strategy in schools. The article recognises the multiple interpretations of 'design thinking' defined by theorists. It summarises the different interpretations into the following definition "[D]esign thinking requires a distinct way of approaching and solving problems that entails a systematic process in order to achieve the desired outcomes. Understanding and meeting the users' needs, a different way of thinking and innovation are the perceived outcomes of design thinking." (Retna 2016, 7) This definition aligns closely with definitions provided in the previous articles discussed in this review. The conclusion of the article is that integrating 'design thinking' into schools has "considerable benefits to an education system seeking to equip students with the skills they need now and into the future" (Retna 2016, 17) but that the "major shift in the modes of thinking and behaviour of teachers and students" (Retna 2016, 16) creates "resource implications which must be addressed". (Retna 2016, 17)

The article Design thinking and the practicing teacher: addressing problems of practice in teacher education (Henriksen et al. 2020) gave examples of ways in which 'design thinking' could be integrated into the education system. These examples include: 'Design-Based Research', a research methodology "based on principles drawn from design and engineering" (Henriksen et al. 2020, 212); 'Learning by Design', which is a pedagogical method of "engaging in design processes as an important way to construct learner understandings of a topic" (Henriksen et al. 2020, 212) whereby "students learn or construct knowledge through the active process of design" (Henriksen et al. 2020, 212); and, 'Teachers as Designers', which explores the design involved "in the work that teachers do" (Henriksen et al. 2020, 213) and ways to improve the way teachers approach it. Of these methods, 'Teachers as Designers' most closely related the ideas presented in the previous section, when viewing service innovation and education from the standpoint of the design discipline.

Bridging the Gap Between the Two Standpoints

By reading the two sets of articles, one from the standpoint of education, and the other from the standpoint of design, the difference of focus can be ascertained. From the standpoint of 'design', the service which is education is something that designers can recognise as needing change and implement innovation. From the standpoint of 'education', 'design thinking' shows promise as an effective pedagogical approach. However, within these articles there are spaces where the gap between the two perspectives close.

As previously stated, Design thinking and the practicing teacher: addressing problems of practice in teacher education (Henriksen et al. 2020) is an article that bridges the gap between the two standpoints. It comes from the standpoint of the discipline of education but provides methodologies of what teachers can use to implement service innovation in their professional practice. It puts forward the Stanford Design Model - Empathize, Define, Ideate, Prototype, and Test – as a methodology for teachers to follow. (Henriksen et al 2020, 214) In looking at teacher practice as a point of service innovation the article is like Assessment and Innovation in Education (Looney 2009, 21). However, these two articles differ slightly in message with the former, calling explicitly for teachers to be taught design methodologies and the latter calling for greater support for teachers to take risks in innovating.

Education and Information Campaigns

While exploring service innovation and education from their respective standpoints provides some insights into the topic of 'using innovative methods to educate the public' it somewhat misses the mark on the topic. 'Education' in both contexts is inexorably defined as formal education of children, in tertiary institutions, and professional capacities. However, while these forms of education are examples of methods to "educate the public" the spirit of the topic is more akin to that of education and information campaigns. In this respect, there is limited literature on the topic from the standpoint of the design the discipline, however rich research has been conducted from the disciplines of economics, public health, and medicine.

Information vs Education

Within the literature the terms 'information campaign' and 'education' campaign are often used interchangeably and there is no set definition that distinguishes between the two. However, there is criticism of information campaigns that suggests an alternative. The article Do people really want to be informed? Ex-ante evaluations of information-campaign effectiveness (Espinosa 2021), calls into question the effectiveness of information campaigns. On information campaigns it says that they are "one of the favourite tools of governments to bring about behavioural change in the population" (Espinosa 2021, 1151), however information campaigns "rely on the assumption that people are willing to become informed about topics in which the government is interested." (Espinosa 2021, 1151) The article

questions whether this assumption is correct through testing participants beliefs both before and after exposure to information campaigns on different topics. The study concludes that despite an information campaign "that some individuals might reject the information they receive when accepting it would force them to change their behaviours" (Espinosa 2021, 1151), referring to this as a form of "cognitive dissonance" and this phenomena "Information Resistance" (Espinosa 2021, 1151). Considering this criticism, an education campaign could be defined as having a greater capacity to create behavioural change in the subject.

Education Campaigns and Service Innovation

Much of the literature about educational campaigns comes from the disciplines of public health and medicine. Despite this, successful of educational campaigns, that cause behavioural change, often have links with design thinking methods.

The article Encouraging Healthier Choices in Supermarkets: A Co-Design Approach examines an educational campaign which aimed for consumers to make 'healthier choices' regarding food consumption. The campaign incorporated 'co-design' as a "specific instance of Design Thinking" (Bogomolova et al. 2021, 2) as a method to develop the campaign involving key stakeholders during its ideation, design, and implementation phases (Bogomolova et al. 2021, 2). The co-design workshops were 90-minute sessions with members of the public to generate ideas for encouraging healthier choices, and recorded them in the form of "mud maps" (Bogomolova et al. 2021, 6). These "mud maps" were then analysed with ideas categorised into various topic areas then presented to supermarket management to be evaluated and assessed feasibility. The ideas that were implemented were: advertisements showing the campaign's logo and a description of why this product is a healthier option; additional advertisement in local print and social media; and in-store cooking-demonstrations by a dietician (Bogomolova et al. 2021, 2). While the campaign did not show strong results in all the areas that it was aiming to measure, it did see positive results in some areas with a 3.9% increase to promoted products (Bogomolova et al. 2021, 16).

A similar co-design approaches to an education campaign are detailed in the article Engaging active citizen participation in the co-creation of an educational and information campaign to support older people to be empowered against abuse. This article described the use of a multi-media educational and information campaign about elder abuse, that was developed by older people to be used by older people (O'Donnell et al. 2016, 2). Unlike the article previously discussed, this article was not able to provide a quantitative evaluation of its effectiveness. However, the article did conclude by saying that "the methodological challenges of evaluating the efficacy of citizen/patient involvement and measuring the public and user experience of the campaign present exciting areas for further innovative exploration." (O'Donnell et al. 2016, 2).

The literature on education campaigns that incorporate participation from key stakeholders suggest that this method sets them apart as effective education campaigns. Utilising co-design strategies is a method for creating an effective participatory education campaign. While this literature review has tried to distinguish between 'formal education' and 'education campaigns', the application of 'design thinking' strategies appear similar in both contexts.

Conclusion

The topic of "using innovative methods to educate the public" is very broad in scope. Conducting a literature review on this topic has required considering research from multiple disciplines and viewing the topic from multiple standpoints. The first half of the literature review explored the interactions between design thinking and service innovation, and the broad topic of education. This outlined methods for innovating "education" in its traditional sense of schools and learning institutions. The second half looked at "educating the public" in a broader sense and explored the differences between an information campaign and an education campaign to create lasting behavioural change.

Through examining the topic "using innovative methods to educate the public" from these two angles, the literature review has been able to find multiple underlying links between discipline areas. These links can be summarised as: education, in its various forms, can be viewed as a service and can therefore have the methodologies of service design applied to it; and the active participation of the people being educated in the formulation of their learning is the most effective method for education. Combined, these two conclusions, uncover an underlying thread throughout all the literature on the topic: the public must be involved in designing their education services for the aims of these services to be effective.

CHAPTER 3. Service Innovation in Mobility

Humans are designed to move. Through the course of human history, we have developed a plethora of new ways of getting from here to there – ways that have allowed us to travel faster, further, more efficiently, more conveniently, and with more comfort. We have gone from riding horses between towns to piloting space shuttles to the moon. And this has come through humanity's capacity for innovation. However, despite all our innovations in transportation, we are now facing a host of new mobility problems like congestion, pollution, climate change (due in part to carbon emissions from transport), and urban sprawl. With such a range of complex problems embedded in some of the most critical ways we have moved around for decades, there is a dire need for service innovation in mobility. But how is service innovation in mobility achieved?

Service innovation is a design-based process through which a particular product or service is created or redesigned so as to better serve those who interact with it. It involves the transformation of a particular product or service offering so as to address issues, improve and enhance users' experiences, and add a new dimension of

value.

Mobility refers to the way we physically move around. It goes beyond merely the understanding of modes of transportation and encompasses moving around as a fundamental part of our lifestyles - as a process that can achieve more than just getting 'from here to there' (for example, running engaged in for exercise, or a scenic drive taken for recreation).

Service innovation in mobility is occurring around the world through mechanisms such as holistic perspectives; involvement of stakeholders; reframed learning. This literature review will explore how service innovation is achieved in the area of mobility in relation to these three mechanisms. This literature review will provide an analysis of service innovation theories and practices and a dissection of case studies from mobility innovations from Colombia, Finland and Australia. Through doing so, the processes, attributes, and methodologies for effective service innovation will be identified, and conclusions put forward accordingly for future innovation development in mobility.

The Need for a Broader, Systems Perspective in Mobility Innovation

When it comes to the future of mobility, Vergragt and Brown (2007, 1111) see it as "a mix of new technologies and changes in the present infrastructure, as well as new services and social arrangements". Goldman and Gorham (2006) also argue that it is not consideration of just one aspect, but a "systems perspective" (271) that is needed, noting the need for considering individuals, businesses, and the relationships between transportation and the various systems that interact with it (271). There seems to be some agreement that a broader view is the way forward; Goldman and Gorham (2006, 271) and Vergragt and Brown (2007, 1111) both claim that new perspectives and thinking around the transport system are needed, calling for "more comprehensive view[s]" (Goldman and Gorham 2006, 271) and "a fundamental rethinking" (Vergragt and Brown 2007, 1111) of the transport system.

The effectiveness of Colombia's innovative cable car system similarly supports these notions. Schechtner et al. (2019, 51) demonstrate that while traditionally cable cars have been thought of solely as a tourist attraction, this perspective was challenged when they were integrated with the existing public transport system in Colombia. Schechtner et al. (2019, 52) also note the potential of Colombia's cable car system for further innovation through "planning the network in partnership with all relevant actors, and most importantly, with local residents themselves".

While the literature seems overwhelmingly in favour of adopting a broader, holistic approach to service innovation in mobility, there is a serious lack in the theoretical research in terms of how a holistic, systems approach can be adopted. While Vergragt and Brown (2007) and Goldman and Gorham (2006) do mention the need for a broader perspective that considers the wider factors and even make specific note of the factors which should be considered, they do not delve into how such a systems approach is achieved (and additionally, these two sources are over 10 years old, and therefore may be outdated and less relevant). Schechtner et al. (2019), however, manage to identify a real-world situation where a new perspective allowed for innovation, highlighting the value of "looking at old practices in a new light" (Schechtner et al. 2019, 51). Furthermore, Schechtner et al. (2019) also identify multiple ways that a holistic approach can be achieved – specifically noting working with the "relevant actors" (52) and "local residents" (52) as being key. While the evidence does seem to suggest that a broader, systems perspective can lead to service innovation in mobility, the current research does not investigate deep enough the specific ways of implementing such an approach.

Stakeholder Engagement: a Central Part of Innovation in Mobility

According to multiple authors, involvement of public, private and community stakeholders from a variety of sectors is critical to innovation in mobility (Dodson, cited in RMIT University 2021; Dodson et al. 2021, 105; Lang et al. 2020). Dodson (cited in RMIT University 2021) specifically states that the nature of this involvement needs to be one that is formed around "'genuinely innovative collaborative practices for innovation'". Ross, Mitchell and May (2012, 469), however, provide an alternative perspective: while acknowledging the value of communities in contributing to innovation in mobility, they see great potential for sustainable transport innovation in users "innovat[ing] themselves" (Ross, Mitchell and May 2012, 469). In an almost contradictory way, Ross Mitchell and May (2012, 469) additionally note that the directly opposing, top-down approaches also contribute value to sustainable transport innovation.

In Finland, Lahti's CitiCAP project seems to follow the thinking of the former mentioned authors. In developing a sustainable urban mobility plan for the city of Lahti, CitiCAP "s[aw] collaboration as essential to [improving mobility]" (Urban Innovative Actions 2021) and, consequently, ensured citizens were involved throughout the project through "dedicated workshops" (Urban Innovative Actions 2021). Urban Innovative Actions (2021) notes how CitiCAP identified target groups and involved multiple key stakeholders, "co-designing with citizens and businesses" (Urban Innovative Actions 2021) to ensure that the project would meet their needs (Urban Innovative Actions 2021).

CitiCAP was a real-life exploration of the value of involving stakeholders in innovation development in mobility. The project seems to have proven to the city of Lahti the benefits of co-creation with stakeholders (Urban Innovative Actions 2021) and its success supports the ideas of Dodson (cited in RMIT University 2021), Dodson et al. (2021), and Lang et al. (2020). This subsequently backs up the idea that engaging

multiple stakeholders from different sectors can facilitate service innovation in mobility. What Urban Innovative Actions (2021) seems to explore further and more in-depth than the other authors, however, are the ways that stakeholders can be involved and how this can help.

In comparison, the research of Ross, Mitchell and May (2012) is limited in determining the value of involving stakeholders. While they do note that users have "direct experience of the 'problem space'" (Von Hippel 2005, cited in Ross, Mitchell and May 2012, 471) and are motivated to innovate because they will directly benefit (Leadbeater 2006, cited in Ross Mitchel and May 2012, 471), these attributes are used as a way of defining 'user innovators' rather than using them to demonstrate why user innovation is valuable. Additionally, as this research looks solely at users innovating on their own, the value of involving stakeholders from multiple sectors cannot be measured. And lastly, Ross, Mitchell and May (2012, 469) note both top-down innovation and bottom-up, user innovation as having value in sustainable transport innovation, but fail to compare the two to determine if one is more valuable or how these two opposing methodologies have distinct value.

While the literature does seem to point to engaging stakeholders from a variety of sectors as being key for service innovation in mobility, the research in this area is still limited, and largely theoretical, lacking in specific actions that can be taken to achieve service innovation in mobility. Further investigation using real-world case studies could be beneficial to confirm the value of involving stakeholders in the innovation process and determine exactly how this may be done in service innovation in mobility.

Why new approaches to learning are key to service innovation in mobility

Vergragt and Brown (2007) state that "higher order learning" (1104) - which they define as new approaches and ways of interpreting and addressing problems (1104) - is key "for achieving major innovations in the current individual mobility system" (Vergragt and Brown 2007, 1108). They argue that such learning occurs through various "group techniques" (Vergragt and Brown 2007, 1108) that generate feedback (Vergragt and Brown 2007, 1108). Vergragt and Brown (2007, 1104) advocate for four processes: visioning, scenario building, backcasting and small-scale experimentation. In Deloitte's project for the public transport system in Brisbane, Australia, Pybus (2019) similarly notes a range of group-based activities that were used to gain input from others and gain critical insight. These included stakeholder mapping, service ecosystem mapping, future state elaboration, journey mapping and service blueprinting (Pybus 2019) among others.

Vergragt and Brown (2007) state that "learning takes place when key actors representing a range of interpretive frames" (1108) work together on problems or ideas (1108). Findings from Deloitte's project seem to support this idea. In Deloitte's project, the project team conducted interviewing as a way of generating feedback and started doing so by interviewing people from their company (Pybus 2019). However, early in this process they realised that the feedback they were gaining was "too smart" (Pybus 2019) and did not represent the key actors they were actually designing for: users (Pybus 2019). Pybus (2019) notes that it was the input from users that allowed Deloitte to determine which proposed outcomes would actually work.

These sources both show how learning is achieved, and present specific examples of how the input necessary for learning can be acquired. The learning methods noted in both the research of Vergragt and Brown (2007) and the work of Deloitte (Pybus 2019) are either idea generation or concept generation processes. As the insight gained through Deloitte's implementation of these activities resulted in service innovation in mobility in Brisbane, it appears that Vergragt and Brown's (2007, 1113) postulation – that higher order learning is a key component of innovation in mobility – may in fact be true.

Furthermore, Deloitte's discovery of the need for outside feedback from key actors in interviewing supports Vergragt and Brown's (2007, 1108) notion of "a range of interpretive frames" being crucial for higher order learning and, subsequently, service innovation in mobility (Vergragt and Brown 2007, 1108). However, this also draws attention to a potential gap in Vergragt and Brown's (2007) research: it indicates interviewing (a process which may be considered research gathering more than idea or concept generation) as another useful higher order learning tool that was neglected by the group-based activities proposed by Vergragt and Brown (2007). Overall, the two sources provide considerably valuable information when it comes to the role of learning in achieving service innovation in mobility; while the literature could still benefit from further research, these serve as useful resources for those seeking to engage in innovation development in mobility.

Conclusion

This literature review has investigated how service innovation is achieved in mobility. Focussing on three mechanisms - a broader, systems perspective; engaging stakeholders; and new approaches to learning – this review has aimed to determine how these mechanisms can facilitate service innovation in mobility.

The research of Vergragt and Brown (2007) and Goldman and Gorham (2006) suggests the need for a change of perception through a broader, systems perspective of mobility and transportation. Schechtner et al.'s (2019) study of Colombia's cable car system demonstrates how such a change of perception – and consideration of broader factors including various people, systems and infrastructure – can lead to service innovation in urban mobility. Though the research does provide some general

ways of adopting such an approach, there is a clear lack in examples of specific ways that a change of perception or system perspective can be implemented in service innovation projects.

The literature also points to engaging stakeholders as being a critical aspect; Dodson (cited in RMIT University 2021), Dodson et al. (2021), and Lang et al. (2020) all agree on the need for involvement of stakeholders from a variety of sectors. While these sources are limited in identifying specific ways of involving such stakeholders, Urban Innovative Actions' (2021) case study of Lahti's CitiCAP project demonstrates not only the value of involving various stakeholder groups, but that co-design workshops can provide a space that facilitates this stakeholder involvement in service innovation projects. Ross, Mitchell and May (2012) promote a much narrower approach – involving users innovating themselves (488) – but fail to compare the value of doing so to the broader stakeholder involvement supported by the other authors.

The last mechanism that has been explored in this literature review is that of higher order learning. According to the research of Vergragt and Brown (2007) and Pybus' (2019) case study of Deloitte's public transport system project for Brisbane, adopting a reframed way of learning could be a valuable approach for facilitating service innovation in mobility. It seems that specific group-based, idea generating and concept generating activities that elicit input from key actors are effective means of achieving this learning. However, as identified by Pybus (2019), non-collaborative research activities like interviewing also hold potential for such learning.

While all this research - and in particular the techniques noted in the case studies of Schechtner et al. (2019), Urban Innovative Actions (2021) and Pybus (2019) – does hold valuable insight for those who are seeking to achieve service innovation in mobility, all this research is incomplete, and far from comprehensive.

So how is service innovation achieved? This literature review has explored how service innovation can be achieved in mobility through three specific mechanisms - but it has only done so in relation to these three mechanisms; there are many other aspects which can facilitate service innovation in mobility too that warrant further research. While there are a significant number of case studies on innovative mobility projects around the world, and significant theoretical research on service innovation, where these two fields overlap – that is, service innovation in mobility (and more importantly how that innovation is achieved) - appears to have been somewhat neglected. More up-to-date studies which delve into the current mobility issues we are facing and the role of new technologies are crucial, and could prove incredibly valuable for future service innovation in mobility.

CHAPTER 4. Innovation in the Public Services Sector

"Public officials tend to be seasoned practitioners of methodologies more commonly associated with optimising existing services" (IDEO, 2017). This particularly applies to the public services sector, which has used rigid methodologies for many years, leaving little opportunity for familiarisation with innovative approaches and tools. However, in recent years, innovation has become "high on the agenda of politicians, civil servants and societal organisations" (Bekkers and Tummers, 2018) as the need for innovation worldwide becomes more apparent in efforts to improve on service quality.

This literature review aims to examine the relationship between innovation and public services. This is achieved through the research of articles that provide an overview of innovative practices within the public sector and projects that have benefited from innovative methods.

The first section will observe the history of innovation and its significance for the public sector. Even with the recent shift in innovation from technological to human-centered, we are still seeing the public service sector struggle to shift its focus from how it affects the company to how it affects the public (Borins, 2006; Wipulanusat et al., 2017). As a result, there is a significant disconnect between the two that must be addressed through service innovation (IDEO, 2017).

The second section investigates how design thinking can be used to promote innovation by equipping those in public services with tools for developing human-centered solutions. Lockwood (2009) defines design thinking as a "human-centered innovation process that emphasises observation, collaboration, fast learning, visualisation of ideas and rapid concept prototyping" (Liedtka, 2013). Innovative ideas are best achieved by teams motivated by a sense of leadership as well as delivering value to their stakeholders (Wipulanusat et al., 2019). It has consistently been proven that design thinking has successfully met these goals by introducing companies to the design thinking toolkit.

The final section focuses on service innovation in the global transport sector that has been accomplished through several human-centered methodologies and practices. By highlighting innovative practices, this review examines how countries have been able to adjust and adapt to public transportation needs and motivations.

The History and Importance of Innovation in Public Services

Innovation is viewed as one of the most important sources of competitive advantage in today's business environment (OECD, 1997). Historically, there have been misinterpretations of what innovation is, what it means to be innovative, and what its purpose is. According to Hyard (2013), there are two types of innovation: technological and non-technological. Technological remains the most commonly understood meaning of innovation as a matter of keeping pace with technological advances, as opposed to a more humane perspective. In their study, Ongkittikul and Geerlings (2006) elaborate on this through an additional focus on competence development and service innovation through service design. The concept of service design is defined by Moritz (2005) as helping "to innovate or improve services to make them more useful, usable, desirable for clients and efficient as well as effective

for organisations. It is a new holistic, multi-disciplinary, integrative field."

Due to these contradictory views and confusion surrounding the concept, innovation has only been viewed as a cost-reduction strategy in public services and is heavily linked to operational effectiveness logic (Chen et al., 2013).

Mulgan (2014) observes that there is a preconceived notion that the public service sector lacks "a competitive spur that drives businesses to create new products" and that the rules within this industry inhibit innovation and creativity. Additionally, Cankar and Petrovšek (2013) emphasise that those working in the public industry have the "inability to 'unlearn' the old logic of how products and markets work". In the process of developing solutions to problems that their users are currently experiencing, there has been insufficient consideration for a user-centric approach. It should also be noted that there are also arguments against this position that point to advancements in the public sector, such as the development of the internet and the World Wide Web through public organizations such as DARPA and CERN (Mulgan, 2014).

The recent shift towards innovation has been evident in a number of design thinking and service innovation projects worldwide that demonstrate the effectiveness of human-centred design, particularly in the transportation sector. This is due to the growing awareness of the importance of innovation and the need for innovation in any industry if it is to "remain competitive as innovation is a crucial element of sustainable growth" (Cankar and Petrovšek, 2013). Fatur and Likar (2009) propose that there is an increasing necessity within public service organisations for "constant change in the progress of developing new products and services is the key guiding principle for all business". There has been a realisation that innovation is an important driver of economic success, progress and competitiveness (The Global Innovation Index, 2012; Thenint 2010) and that "staying the same is not an option" (IDEO, 2017). IDEO (2017) explains that societal problems are becoming more complex and has had an increasing effect on the public services sector, providing them the opportunity to become innovative and stay ahead of these problems and the impacts of them.

While public services rely heavily on policies to conduct their work, they are also an industry that extensively interacts with and develops for the public. Based on the results of the research, the introduction of innovation into public services will not only allow the public to have a better experience with the service, but also enable the company to remain competitive in their industry.

How Service Design Can Facilitate Innovation in Public Services

IDEO (2017) have proposed that service design is the most effective way to facilitate innovation in the public services sector through the introduction of design thinking to stimulate empathetic research and idea generation.

An issue that the public service sector is currently facing is an "incoherent service experience for citizens" due to separation between policymakers and those delivering these services (IDEO, 2017). They also face pressure on public expenditure, making use of allocated resources "in a progressively efficient manner" and increasing productivity (Karwan and Marklan, 2006; Lindgren and Jansson, 2013). As a result, the demand for service design has increased in the public services sector, as it allows for "competitive, fresh and desirable" outcomes for the customers and stakeholders (Sirendi and Taveter, 2016). Narasimhan et al. (2005) explain how effective service design includes consideration of different factors such as costs, service levels, efficiency, sales, profits and, most importantly, human aspects. Service design often uses the methodology and tools of the design thinking model. Design thinking follows a multidisciplinary team bringing a diverse range of skills and knowledge to projects where they work to "model stakeholders' goals" through research activities, such as "ethnography, personas, stakeholder maps" (Stickdorn and Schneider, 2011) and empathy maps to better understand the topic, issue and the audience.

Governments in particular have sought out service design in hopes of applying the principles and methodologies to policymaking and creating "a new era of experimental government" (McGann, Blomkamp and Lewis, 2018). This is especially significant in creating change in the reception of public services, as governments drive change and this enthusiasm to shift from "designing from the inside out" to "designing from the outside in" (IDEO, 2017) will assist in bridging this gap in services being designed for the public not the company.

By providing those within the public service sector education on service design and design thinking, it will equip them with the appropriate tools to allow them the opportunity to strengthen their relationship with the public through understanding of their needs. Design thinking is a non-linear, iterative process that will allow public service workers to revisit issues that they have developed innovative solutions for. Having these additional skills for innovation used previously, will also benefit them in keeping updated and in line with current user's needs, "as citizens' demands and needs change" constantly (Venkatesh et al., 2012).

The practices of service design and design thinking are rapidly gaining popularity across various industries. A successful implementation of this methodology will ultimately result in higher public satisfaction, a reconnection with the public, and increased likelihood of success (IDEO, 2017).

Innovation That Has Occurred Recently in the Transport Sector

Chen et al (2013) states that there has been a worldwide public transport demand due to increased urbanisation and growing demand for sustainable and low-cost transport systems. This has led to an increased interest from the public sector in developing "innovative and new public transport systems" (Kaltenbrunner et al. 2010) or "innovative transportation modes that compliment public transport" (Huwer, 2004). Providing

innovative and new services to the public transport sector is crucial to meeting the changing needs of current users as well as keeping up with trends to attract new customers (Nalmpantis et al., 2019).

IDEO (2017) and other organisations provide examples through their case studies on innovative projects that have used design thinking and service design tools and practices in the transport sector.

"Collective Innovation for Public Transport in European Cities", CIPTEC, worked on a project that ran from May 2015 to April 2018. The objective of this project was to use design thinking techniques to "combine ideas from marketing, consumer behaviour and innovation" to evaluate issues within the European public transport system and develop "smart, green and integrated transport" (CIPTEC 2015; Nalmpantis et al., 2019). CIPTEC ran eight collaborative co-design sessions in urban areas of Greece, Italy, the Netherlands and Germany. The purpose of these sessions was to generate innovative concepts for services and products that could be introduced in public transport to attract new customers. (Nalmpantis et al., 2019). This technique involved stakeholders in the process of designing a product or service and giving them direct influence in the final outcomes of the project (Lusch, Vargo and O'Brien, 2007). From this interaction with the public, the project was able to produce twenty innovative concepts that would benefit public transport users from an e-ticketing system to a public transport pre-selection seating app.

Singapore has also achieved great success with their implementation of innovation when developing new projects, using behavioural insights and design thinking tools to assist them in improving their public service sector (Ho 2021). The Land Transport Authority project of 2013 "envisioned developing a people-centred and community inclusive transport system" (Land Transport Authority 2018) that focused on the needs of commuters and shifting away from their previous design approach of solely developing based on technical restrictions, such as the consideration of land size (IDEO, 2017). The project focused on wayfinding and developing innovative ideas for upcoming stations where commuters would be able to navigate to, from and around the stations "without stress, anxiety or confusion" (Land Transport Authority, 2018). Through ethnographic research and communication with the public who used the system, insights were gathered about the issues they experienced and how these could translate to innovative improvements for the station. Land Transport Authority (2018) determined that the MRT would need to: deliver a wayfinding-oriented experience, reinforce Singaporean culture and become more than a mode of transport.

There have been several projects recently that have used service design and design thinking approaches to facilitate innovation and create key design archetypes and opportunities for the future of public services, particularly those related to transportation.

Conclusion

The literature review demonstrates that innovation in the public sector has been gaining in strength over the past decade, although there is still room for growth in this relationship. In analysing the literature surrounding the topic of innovation within the public sector, great emphasis has been placed on the fact that there is a significant and clear market for service design and design thinking in this sector. Although there is a need for innovation, it has not been easy for the public sector to break away from its past practices to adopt a more human-centric approach and to stop developing new solutions that support the internal operations of the organisation. It was emphasised in the articles that once those relationships had been established with innovative practices that the sector, particularly in the transportation industry, was able to achieve global success.

CHAPTER 5. Innovative Ways to Inform the Public

The literature review for this project will consist of several pieces of literature where the topics of mobility & transport, consumer behaviour, human behaviour & climate change will be discussed and how they impact methods of informing the public. The review topic in case is - Innovative ways of informing the public of transport and mobility options. The key aspect of the review topic is to ensure that the intention to inform & raise awareness opposed to selling an idea, an analysis of this piece of literature will explore innovative methodology of informing people and will tie in with transport & mobility; these sections help find the reason as to why there is so much disorder with providing information regarding mobility.

Human Behaviour and its Influence on Society

A study by (Moisidou et al. 2019) shows that despite challenges faced by consumers during recent times, if the consumer is aware of environmental issues they are more likely to make informed positive choices to help and protect the environment. The study suggests that human purchasing behaviour is influenced by communication medians such as social platforms and that having a communication/event/marketing strategy makes it easier to cater to different consumers and to creates an efficient tool for informing users of a product/brand/services. A study by (Zollo et al. 2021) explains that consumer purchasing intentions/consumer behaviour is driven now by Electronic Word Of Mouth (eWOM) such as online reviews now more than ever before. Social reassurance, information adoption & purchase intention is heavily linked to the reason as to why people make certain purchase choices, with adequate communication and sufficient eWOM consumers are more likely to make a positive informed decision with genuine purchasing intention. However (Sheeran 2002) states that intention and behaviour have a 'gap' but can still correlate and reflects an individual's commitment to addressing social and applied issues. Human behaviour plays a crucial role in motivating themselves and the people around them to make the environmentally conscious

decision, this is important as it helps push for the need of information that the general public will be able to access, understand and digest more conveniently as opposed to spending hours searching for information. The human behaviour regarding this topic exposes the lack of median between the public being informed of environmental issues vs the impact they are having to the situation. Human behaviour plays a crucial role in motivating themselves and the people around them to make the environmentally conscious decision, this is important as it helps push for the need of information that the general public will be able to access, understand and digest more conveniently as opposed to spending hours searching for information. The human behaviour regarding this topic exposes the lack of median between the public being informed of environmental issues vs the impact they are having to the situation.

Mobility & Transport Fueling the Move to Zero Emissions

There is more to mobility & transport than the roads and traffic systems- it is its own form of culture; cars have represented status, independence, freedom and convenience making them far more than a transport method and gives the opportunity for social and cultural configurations to drive the meaning of cars to that more of a functional transport purpose to certain individuals such as liberation of identity, sex appeal, gender & socio-economic background (Redshaw 2008). The decision consumers face to purchase Electric Vehicle (EV) are decided by several factors aside from price & convenience but (Ouyan et al. 2019) shows that consumers that were early adopters to EV were environmentally conscious, looking for updated vehicle features and status; alternatively, the research found that government incentives were a big driver to EV sales whilst individual demographic characteristics & subjective norms had little effect on the influence of purchase.

However, a study by (Adnan et al. 2017) shows that factors such as income, educational qualification, income, age & experience all play a role in to whether a person is able to inherently accept or deny EV's but as time goes on the number of EV's taken on increase and so does the information & awareness regarding sustainability and climate issues. Sustaining an economically viable Demand Responsive Transport is difficult to do despite its societal benefits as it relies so heavily on government incentives but setting up a Demand Responsive Transport system which meets people's needs, is environmentally friendly and can be economically sustained is possible through improving infrastructure and by targeting not only people that commute to employment shuttles such as airports, cities and stations but by ensuring that the cost of the service is less than the cost associated with driving to such places (Rylet et al. 2014).

Although the issues of some forms of transport is that it may not be sustained in an economy due to the governing bodies addressing the common issues of budget friendly transport, ensuring there are environmentally friendly vehicles available, social inclusion to minority groups, regional development, health & safety and economic competitiveness- then people will not see the return of investment or will not have a pleasant experience whilst using transport for their commutes (Stanley and Smith, 2013) and will eventually direct themselves to their own preferred methods of transport. This shows that topic shows that introducing another form of Demand Responsive Transport is only as effective as what is currently in place and effective due to the disarray of user understanding relating to methods of moving sustainably. For this to be effective there will need to be a median for people to attain information on the transport available and what suits their needs the best.

Climate Change Pushing for Change

The move to reduce carbon emissions for the sake of climate change is due to internal issues within governing bodies, for instance obstacles that people implementing change face are; a push to achieve economic goals, conflict of interest from member within governing bodies that may or may not be from the same political party, ties and contracts within the industry, biasness towards non-sustainable transport modes, periods of stalemate between policy approvals, lack of enforcement and policing around implementation of introduced ideas and an overabundance of trust on technology to reduce harmful waste emitted (Gössling, Cohen and Hares 2016). However more ambitious and eager leaders in social movements, governing and/or corporate entities can have the opposite effect and push for the change to occur (Gössling, Cohen and Hares 2016).

The transport sector is of but few global industries that continue to show an increasing rate of emissions being released, currently the sector accounts for 26% of CO2 emissions globally (Chapman 2007), shows that behavioural change to shift people from generational carbon emitting vehicles to alternate methods such as rail then a more efficient network for complicated journeys is required; behavioural changes, technological changes and policy enforcement are all required to help fight climate change whilst also enforcing sustainable development (Chapman 2007).

Despite all the governance enforced and changes made (Marsden & Rye, 2010) states that each member of authority needs to take their step of action at addressing the complex issues but aside from that who is held liable to make sure that efforts and contributions are made? local governments and cities were given the option to adopt their own carbon reduction emission target which led to neglect from local authorities (Marsden and Rye 2010). Governing bodies have considerable political opportunities for more ambitious to help fasten the processes of adopting to new and advanced technology (Hu, Javaid and Creutzig 2021).

The biggest benefit that Electric Vehicles can make to the environment is when the electricity that they are charged with are sourced from renewable energy sources as opposed to being sourced from fossil fuels; majority of greenhouse gases that were reduced in France derive from the fact that they switched to renewable energy sources for their electricity source (Sperling 2018), the same study also mentions that Electric Vehicles (not limited to cars) use less materials to make them which also gives

the vehicles greater reliability, precision in the aspect of performance and that certain parts can be recycled and reused in different industries (Sperling 2018) but even such great benefits people do not know where to find such information and are often influenced to believe what is shown on mainstream media and channels which could be a mix of influencers, family, articles, news outlets etc. so despite the gloominess revolving climate change it is crucial that the people of the general public are informed of the benefit that their vehicle can make and how it can push for a positive effect on climate change.

Consumer Behaviour and its Influence on Purchasing Intention

Marketing Eco-friendly products proves to be difficult according to (Yu & Han 2021) the current market practitioners are split between focusing on appealing to the psychological aspect of eco-friendly products contributing to the bigger picture and benefiting others or focusing on the appeal of self-benefit to ecofriendly products; however, marketers should focus on appealing to the psychological state of promoting the brand to be eco-friendly as opposed to the products (Yu & Han 2021).

Although this study by (Zhou et al. 2022) shows that consumers can be influenced from different things aside from price, it is shown that one of the biggest influences for selling luxury objects was that quality information and interactivity of knowledge platforms were available, different knowledge from what is available elsewhere & the information that is provided is provided in a professional manner. The reinforcement of this thinking into consumers is done through perception which can be triggered from; the number of positive ratings, the quality of knowledge shared- if its articulated professionally but easy to understand, if information shared is kept non-bias & maintaining quality control so there is consistency in regard to information shared (Zhou et al. 2022).

A study by (Amatulli, Guido & Nataraajan, 2015) shows that luxury consumers between the older demographic behave differently according to their purchase intention; it shows that older consumers feel younger than their chronological age, (Amatulli, Guido & Nataraajan, 2015) states that older generation consumers are influenced by not entirely the luxury product itself but the status, bandwagon effect & the psychological factor of feeling younger which imperatively leads to consumers purchasing luxury goods based off either the prominence of brands and/or the basis of product class which is shown in the example of a luxury car being purchased for its status or its features or both (Amatulli, Guido & Nataraajan, 2015) essentially stating that to promote luxury products it's to sell a brand and not a product.

Without being actively engaged in changing our environment to be more sustainable than making change will not be possible (Sommer & Klöckner, 2021), the study that was conducted shows that to raise awareness it doesn't have to stand out to be effective but rather trigger positive and negative emotions which can be done through artwork. (Sommer & Klöckner, 2021) state that artworks have the potential to awaken and encourage drive within society in acting towards climate change, where the stories of the climate are unable to be detached from the concept of societies and climate change as environmental issues are societal issues. However, a study by (Gordova et al. 2019) states that to make change reliable information on climate issues are required for the public and decision-makers which are required to be scientifically based information; but a study by (Plutzer & Hannah, 2018) Show that to raise effective awareness of climate change especially to the younger demographic then it would be to get science teachers in school to really push the risk of climate change and the adaption that humans need ot make to help change the effects of it on humanity.

Conclusion

The psychology behind human motives relating to climate change is rather fascinating as a single individual that makes the initiative for change has the potential to influence the society surrounding them, influence consumer trends & purchasing intention, switch their entire routine in terms of how they move and it all can happen with providing tailored information to the general public and by raising awareness in a innovative way which hasn't been introduced before and targeting specific niches and creating a safe space where people can encourage themselves to move in an environmentally friendly way that suits their needs and isn't an inconvenience to people.

CHAPTER 6. Social Innovation in Sustainable Development

Howaldt et al., (2014) observes that there is a key interrelation that exists between innovation and society, in how society co-produces innovation and innovation co-produces society. There is an increasing importance for societies and governments to understand the role that social innovation plays in cooperative economies, as social innovation and sustainable development are interrelated concepts. This requires an understanding that a bottom-up process that explores new perspectives is essential in tackling complex social issues and making a sustainable impact. This literature review examines the importance of the relationship between social innovation in sustainable development for tackling complex societal problems; and the discovery of potential opportunities and benefits to mitigate climate change. If citizen engagement and bottom-up innovation are included in this process of research, co-creation and the development of policies and practices, this will assist in addressing wicked environmental challenges and the co-design of sustainable urban development.

Progressive local authorities are exploring and co-creating innovative approaches to tackle urban challenges, according to Preston et al. (2020). By promoting community-based projects that encourages citizens' engagement with the project, there has been an increase in the potential to support long-term low-emission and sustainable urban development. Angelidou et al., (2020) states that acknowledging urban stakeholders' potential to exchange knowledge, skills, and talents collaboratively and co-design a product or service provides benefits

in developing more inclusive, resilient and democratic sustainable urban development. Ardill and Lemes de Oliveira's (2018) research on social innovation also argues that the collaboration of end-users in urban development is central to the process of sustainable urban spaces.

This literature review will include three sections. The first section will investigate the literature on social innovation within the government sector. Social innovation is frequently underestimated by authorities, due to the understanding of innovation being limited to only three aspects: technology, management and policy (Silvestre & Tirca, 2019). This section will analyse the key relationship between social innovation within the government sector and sustainable urban development for social change.

The second section will examine how co-creation is essential for tackling complex societal problems. Discussions within this section will include flexible and inclusive approaches that promote citizen and stakeholder engagement in the co-creation process of implementing innovative policies and practices to achieve sustainable development goals.

The final section will focus on investigating the social innovation framework that has been introduced to develop sustainable approaches to tackling urban mobility challenges.

Social Innovation Within the Government Sector

Diepenmaat et al.'s (2020) shared value model is an example of co-operative multi-actor networks for social innovations and recognises the reliance that actors have on each other. This is a systematic method that requires the collective participation of stakeholders to achieve sustainable development. Social innovation is transversal, thus, the importance of decompartmentalising the forms and stakeholders of innovation, and instead valuing the creation of resources to encourage connection and cooperation between players (Andre, 2021). Authorities that foster collective platforms for sustainable and social innovation project initiatives that address social and environmental issues, promote active participation of citizens by acknowledging their potential in sharing and testing information (Passani et al., 2016). Recognising the interlink of social innovation and sustainable development through a sustainable development goals framework promotes collaboration and empowerment of users by improving access to power and resources, as well as contributing to the development of policies and principles in the community at all levels (Millard, 2018). Carayannis (2012) pointed out that there is a need within the government sector to introduce creative design and to redesign concepts through knowledge production and innovation in their industry. This is fundamental for the co-creation of innovative developments that benefits mitigation of climate change. Additionally, Gamble (2021) emphasises the importance of top-down approaches to implement a bottom-up innovation strategy in the process of research, co-creation and development of practices for more inclusive sustainable cities.

Feola & Nunes (2014) in their study of grassroots innovations of the Transition Movement carried out in 23 countries discloses that transition initiatives are a combination of interdependent local and global learning processes. In assistance to this, there needs to be cooperation among bottom-up and top-down strategies in all levels of stakeholders in sharing and testing information in order to have success and replicate the model with global actions networks while maintaining a strong local sense.

However, within the government sector, there is a strong tendency to limit the views of innovation for addressing climate change, specifically in supporting more mechanisms for technological innovation research or economic innovation than in social innovation (Bergman et al., 2010). Silvestre & Tirca (2019) elaborates on this by claiming that economic aspects must become subservient to social and environmental dimensions as the primary focus of innovations for sustainable development.

Angelidou and Psaltoglou (2019), Periac et al. (2018) and Adam et al. (2016) share that there is a conceptual ambiguity in the meaning and practice of innovation within the government sector that allows for various creative thinking processes and practices concerning social innovation to occur.
Based on the results of the research, social innovation within the government sector will allow initiatives for environmental sustainability to improve and empower urban communities in their capacity to address sustainable development goals.

How Co-creation is Essential for Tackling Complex Societal Problems

Chirambo (2021) found that social innovation and entrepreneurship have the potential to improve resilience in regards to the effects of climate change. This is as a result of the possibility that new social practices might result in the development of institutional schemes and patterns of collaboration. In addition, he found that the participation of innovative entrepreneurs and stakeholders have an increased impact compared to technological innovation when addressing climate change challenges. Howaldt (2014) explains how social innovation guides socio-technological transitions and socio-economic transformations in contributing to more holistic practices in understanding the importance of the stakeholders' knowledge and co-creation in tackling environmental challenges.

Piccarozzi (2017) proposes that the development of social innovation is linked to social aspects of sustainability actions or initiatives and that achieving social aspects could contribute to the development of a sustainable economy. Ranabahu (2020) goes a step further and adds to the argument that responsible innovation framework in the co-creation process is a necessity to achieve sustainable development goals. This model recognises the managerial implications in the process of responsible innovation. Thus, social enterprises use several responsible innovations in co-creation practices to achieve sustainable development goals within the social entrepreneurship context. In other words, "wicked" solutions to "wicked" problems are best

for challenging existing structures.

Imaz and Eizagirre (2020) explains that responsible research and innovation approaches to science along with industrial leadership and social change is fundamental to addressing societal challenges. Therefore, a responsible innovation framework integrates a broader set of actors in the research and innovation process to alight better procedures and outcomes with values, needs and expectations. Additionally, responsible innovation is a tool to engage businesses in a social and solidarity economy to integrate organisations in the co-creation process of the implementation of sustainable development goals.

The practices of responsible innovation framework in the co-creation process are rapidly gaining popularity across various sectors. Successful implementation of this approach will ultimately result in reconnecting stakeholders with the government and increasing the likelihood of urban communities assisting in tackling complex societal challenges.

Social Innovation Framework in the Development of Sustainable Approaches to Tackle Urban Mobility Challenges

Blumfelde-Rutka (2021) discover further possibilities for the growth of sustainable entrepreneurship in Latvia and the effect on public practices and thinking. This research claims that in order to tackle urban mobility challenges that implementing sustainable entrepreneurship is necessary in making changes to transport infrastructure, energy efficiency and diversity in renewable energy.

Eichler and Schwarz (2019) states that using United Nations Sustainable Development Goals as a classification system to address social and environmental problems appears to be the correct framework to measure the success of social innovation initiatives for an inclusive mobility system. Fiand and Hauger (2020) share further UN goals, focusing on the United Nations Convention on the Rights of Persons with Disabilities. This is a more inclusive theoretical principal framework in the co-design processes of urban Design as it considers interdisciplinary involvement of spatial mobility system planning for people with disabilities. Moreover, they identified the importance of key stakeholders' participation in the following sectors: government, private sector (economy and industry), academia, civil society and advocacy groups.

Consequently, this multidisciplinary perspective considers and promotes innovative outlooks that constitutes a comprehensive mobility system. This is achieved by taking into account a more holistic approach in regards to technological and non-technological aspects for the formulation of a more inclusive and sustainable future plan of mobility systems. To achieve this, the following components need to be involved (Fiand and Hauger, 2020): cars, environment, rides, assistance, organisation, code, image and funding.

Thus, the potential to improve accessibility, equality and inclusion for marginalised groups in mobility requires the involvement of these components and the roles and responsibilities of the actors involved in co-creating a more inclusive mobility system.

Conclusion

Exploration and understanding of social innovation within government sectors could benefit them through development of more holistic, inclusive and flexible approaches for promoting citizen and stakeholder engagement. Co-creation and implementation of innovative policy and practices is essential to achieve sustainable development goals.

This literature review highlights how the conceptual relationship between social innovation and sustainable development interplays in the design of more sustainable and inclusive cities and demonstrates that there this field is growing exponentially. However, further research testing and exploration of responsible innovation frameworks combined with design thinking needs to be conducted to understand how social innovation impacts in sustainable development.

HUMAN RESEARCH

Introduction

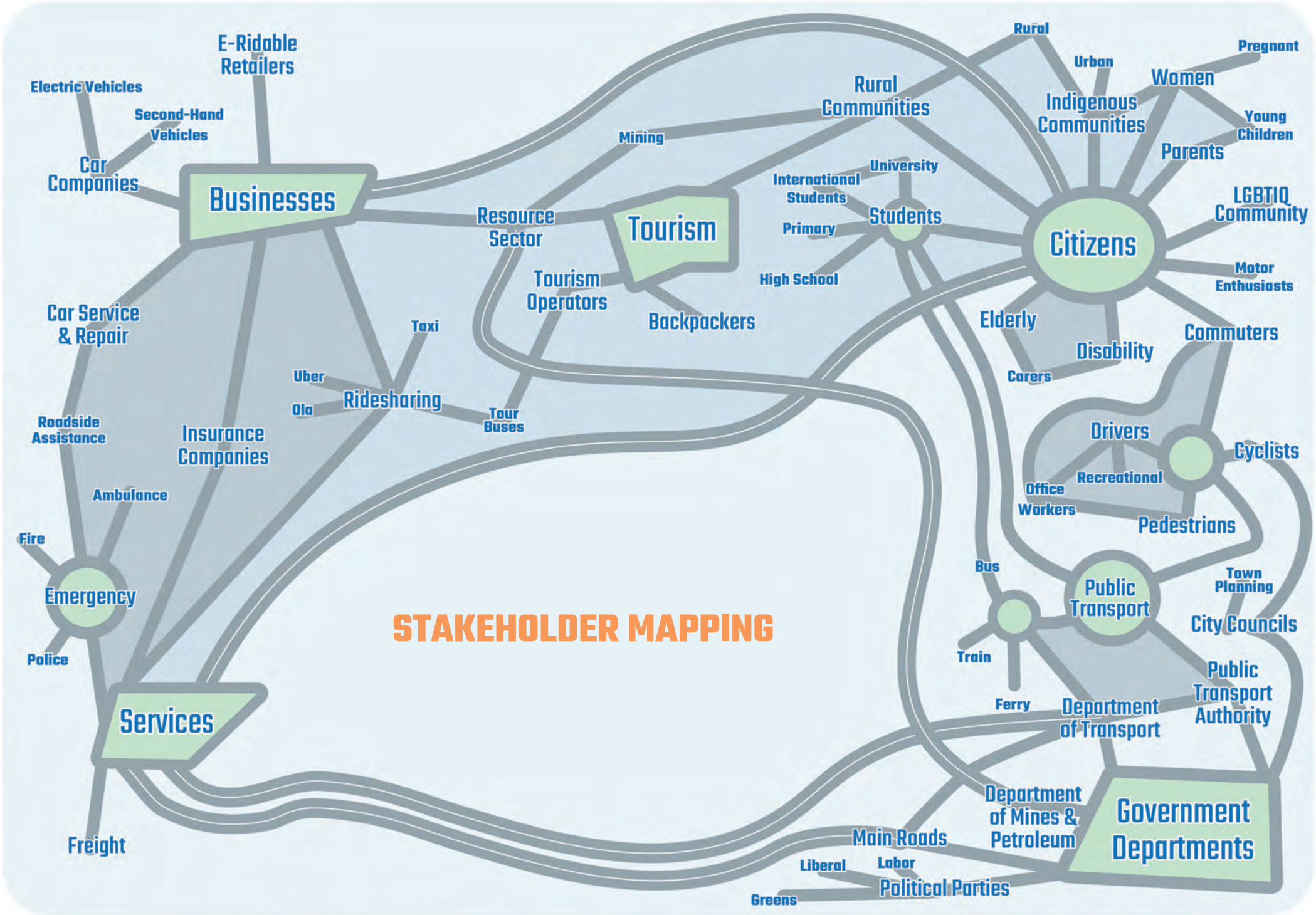
Service design, as mentioned, is human centered at its core, and to approach this complex problem we needed to establish an empathetic and hands on approach with the people directly affected by the project. Our first step in the design process was to uncover who the project impacted and understand what people truly needed; this was achieved through human research.

This stage can often be referred to as user research in other design thinking projects. However, we have made the decision to rename this section to 'human research' as this encapsulates the human-centred research we have conducted throught this phase more appropriately. "Human research is research conducted with or about people, or their data or issues, with the sole intention to do good" (Parija, Mandal, and Acharya 2011). Schneider and Schneider (2011) stresses, "everybody in the team must do user research. To fully understand the customer's needs and provide a suitable solution...". This process needed to be genuine, as we wanted people to naturally tell us their stories and experiences to allow appropriate solutions to form. Conducting research into people's mobility preferences and how they accessed information, helped empower our decision making throughout the project.

"We wanted people to naturally tell us their stories and experiences to help us construct an effective and comprehensive information system."

(Bailey et al. 2022)

"Stakeholder Mapping"


STAKEHOLDER MAPPING
Businesses
E-Ridable Retailers
Electric Vehicles
Second-Hand Vehicles
Car Companies
Car Service & Repair
Roadside Assistance
Insurance Companies
Ambulance
Fire
Emergency
Police
Services
Freight
Taxi
Uber
Ola
Ridesharing
Tour Buses
Resource Sector
Mining
Tourism
Tourism Operators
Backpackers
Rural Communities
Rural
Urban
Indigenous Communities
Women
Pregnant
Young Children
Parents
LGBTIQ Community
Motor Enthusiasts
Citizens
Elderly
Disability
Carers
Commuters
University
International Students
Primary
Students
High School
Drivers
Cyclists
Recreational
Office Workers
Pedestrians
Bus
Train
Ferry
Public Transport
Town Planning
City Councils
Public Transport Authority
Department of Transport
Department of Mines & Petroleum
Main Roads
Government Departments
Liberal
Labor
Greens
Political Parties

Stakeholder mapping is a tool used to research problems and determine the people and groups who are affected by them. The process of mapping stakeholders – and unravelling the network of interdependent sections – reveals the complex relationships of different groups of people to the problem. This occurs during the early stages of a project to determine who to consult, the key actors, and who has interests in the project's outcomes (Body 2019).

In the case of transportation and mobility, we quickly discovered that there are wide-ranging implications for a project of this nature and that everyone relies on transportation in one way or another. For example, on this map it can be seen transport is critical not only to getting around, but also for the proper functioning of businesses, services and organisations.

In reality, all Western Australians would be affected in some capacity by this project, and the impact of lowering emissions could have far-reaching effects well beyond our state's borders. With this in mind, we focused attention on the experience of specific interest groups and their network of interactions.

The 5 key groups we identified were:

- General Public
- Businesses
- Tourism
- Public Services (i.e. Hospitality, Emergency Services, Maintenance)
- Government Departments

A significant insight from this research came from identifying that each category or group in this stakeholder map is made up of individuals who have their own needs and experiences in relation to mobility and transportation. This relationship is multilayered, and therefore an individual may occupy a place in multiple sections at a time.

We have used the stakeholder map as a starting point to pinpoint key relationships and determine those that we wanted to explore further. This process became the basis for our ethnographic research.

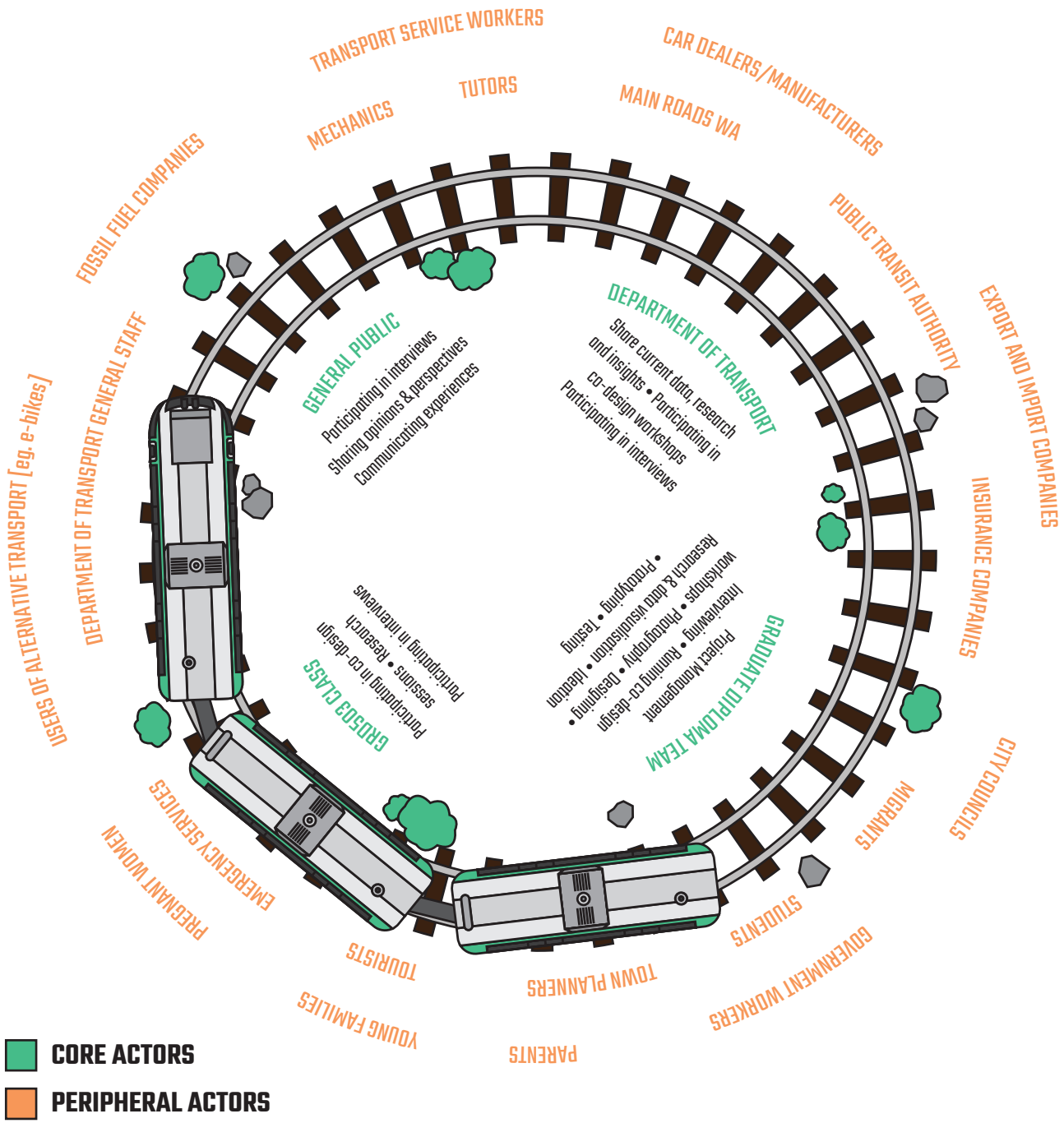
IDENTIFYING CORE ACTORS

After identifying the stakeholders, it is important to establish what their roles are in the project. As the next step in this project will require us to conduct ethnographic research through interviewing, defining the core actors is a critical step. This process allows us to do two important things: differentiate core actors from peripheral actors and determine sources of information as well as the roles needed within our team in order to gather this information.

Through brainstorming, our team worked together to categorise the actors and their roles for this project. Core actors are the actors critical to and directly involved with the project. We have identified the core actors as:

- The Department of Transport
- Murdoch University Design Students
- The general public

The peripheral actors represent stakeholders who are not directly involved in the project but will be directly or indirectly impacted by the project and/or serve as useful sources of information. We have identified a wide range of peripheral actors, which can be seen in the diagram on this page.


TRANSPORT SERVICE WORKERS
CAR DEALERS/MANUFACTURERS
TUTORS
MAIN ROADS WA
MECHANICS
PUBLIC TRANSIT AUTHORITY
FOSSIL FUEL COMPANIES
EXPORT AND IMPORT COMPANIES
USERS OF ALTERNATIVE TRANSPORT [eg. e-bikes]
INSURANCE COMPANIES
DEPARTMENT OF TRANSPORT GENERAL STAFF
CITY COUNCILS
MIGRANTS
PREGNANT WOMEN
EMERGENCY SERVICES
STUDENTS
GOVERNMENT WORKERS
TOURISTS
TOWN PLANNERS
YOUNG FAMILIES
PARENTS
GENERAL PUBLIC
Participating in interviews
Sharing opinions & perspectives
Communicating experiences
DEPARTMENT OF TRANSPORT
Share current data, research and insights • Participating in co-design workshops
Participating in interviews
GRADUATE DIPLOMA TEAM
Project Management
Interviewing • Running co-design workshops • Photography • Designing • Ideation
Research & data visualisation
• Prototyping • Testing
GRDSD3 CLASS
Participating in co-design sessions • Research
Participating in interviews
CORE ACTORS
PERIPHERAL ACTORS

PERSONAS

Personas are fictional characters that are generated from and shaped through research and investigations carried out over the project prior to starting the interviewing process. These personas assist us in identifying which groups of people would be the best focus for the project and are a starting point to deeper ethnographic research that will provide further understanding of the Perth public.

Acting as a human perspective network, personas depict a narrative of the behaviours, values and motivations of the different individuals that may be affected by our project. These personas help us wire our brain and design process to empathise with individuals rather than groups; no person is the same and this is crucial in grounding our intention in keeping the project humanised in our co-design strategies.

With our focus on mobility and how people access information around Perth, we used our initial insights to create unique personas around the five stakeholder groups: Business, General Public, Public Services, Tourism and Government Departments, identified in the core actors exercise. To ensure that these personas reflected a wide range of demographics, cultures and contexts, we generated a variety of personas that could fall into each of these stakeholder groups.

Although we cannot cover all individuals within our stakeholders, we found developing these personas gave us crucial considerations into how people will interact with the problem, and the contexts that shape their personal experiences.

KEY TAKEAWAYS

Identifying the fictional personas helped us embody the stakeholders' potential thoughts, motivations and experiences. These personas were used throughout the project and directed our planned ethnographic research.

The creation of these personas gave us an empathetic understanding and clarity into how the problem impacts and influences the public sector of Perth.

From these findings, the project expanded to consider other forms of lower emission mobility beyond electric vehicles.

Government Department

BIOGRAPHY

Piper Harding has been driven her entire life, working hard to achieve her goals and ambitions. Piper and her husband met at university and bonded over their love for the environment. They have two children, twins Charlie and Amie, who are starting high school this year. Recently, Piper and her husband have spent money on an Electric Vehicle and together they take their children to school depending on their schedules.

Piper is incredibly passionate about finding renewable energy alternatives for transport and, knows it is her responsibility to make these decisions while she is in her influential role.

Interests

- Passionate about finding renewable energy alternatives for transport
- Spending time with her kids and encouraging their learning
- Attending environmental protests and meetings with her husband
- Shopping weekends with her mother

Powers

- As the Minister of Transport, Piper has significant control over transport and services in WA. He also has a wide range of contacts in the transport industry, both locally and internationally
- Influence her children's decisions and future

Behaviours

- Winds down the end of her day with a glass of wine and chats with her husband outside on their patio
- Constantly busy replying to emails and thinking of solutions to problems
- Scrolls through social media to keep up-to-date with current issues and feelings

Needs

- Needs organisation and efficiency, time is precious and she wants to make the most impact in her role
- For her children to have viable and secure future, one where they can grow and foster their passions
- For people to listen and respect her opinions. Her role is demanding and has a lot of pressure, to have people who support and have her back is incredibly important

Values

- Piper is passionate about the enthronement and changing the future with the power she holds. She wants people to be inspired and ready for change to work together to change our emission rates and the way we travel
- As driven and hardworking as she is, Piper wants people to be dedicated to their work and respectful to one another. She values a positive work environment where everyone feels supported and heard.

Aspirations

- To leave the department of transport in a better place than she inherited
- To implement the EV policy in WA and a reduction in the traffic congestion on our roads
- Make sure her children understand their carbon emission and make sure they have a long-lasting, sustainable future

BIOGRAPHY

Mark grew up in QLD, Australia, where he lived with his parent and his dog, Baxter. After high school, Mark went to UNSW where he began studying a Bachelor of Arts. After studying this for 1 year and deciding it was not what he wanted to study, Mark took a year off and travelled to Europe.

Upon returning, Mark returned to UNSW to study a Bachelor of City Planning, which he quite liked. Following this, he completed A Master of City Planning and 8 years ago he moved to WA for a job in town planning.

Interests

- Avid AFL and cricket fan
- Enjoys catching up with friends at the bar
- Finding new places to hang out with mates

Powers

- Mark gets along well with everyone at work, and they know they can count on him to get the job done
- Mark's personality also makes him very good at convincing those who know him well (and sometimes even those who don't) to do things that are outside of their comfort zone, or that they may not be inclined to do

Behaviours

- Mark's weekends are his own time, and every Saturday night, Mark will meet up with his group of friends at their favourite bar for drinks
- Every year, without fail, Mark and his mates will watch the footy together at one of their houses

Needs

- Mark needs a workplace where colleagues can be relied on, and people can give their honest feedback
- While Mark enjoys his work, he likes to leave it at the office at the end of the day
- His weekends are his time, and he usually spends them catching up with mates

Values

- Mark values memorable and exciting experiences with his friends
- He stands by his friends no matter what (even if he doesn't always agree) and always has their backs
- While Mark doesn't mind a little mischief with mates, he a strong objection to people 'getting away' with doing the wrong things when it seriously impacts others. In Mark's ideal world, everyone would respect each other

Aspirations

- The most important thing in Mark's life is the experiences
- Mark's value of success is linked not only to his money, but also to how much he lives life. He is currently pretty content with where he is at and how he is living his life

BIOGRAPHY

Michael has been a bus driver since 2015, transporting people to their destination with a smile. Michael also has extensive experience in driving school buses for over five years, however, has stopped and focuses more on his normal bus route. Michael loves his job and takes great pride in greeting everyone that uses his bus, making sure his bus is clean and safe for every passenger.

As a driver for TransPerth, his roles are defined to follow prescribed routes in the given schedule. Besides driving the bus, he is required to assist passengers to get on or off the bus, with special attention to passengers with disabilities following and ensuring appropriate safety procedures. Michael regular talks to his friends in the bus and train community, and often feels frustrated to hear the lack of safety passengers feel traveling late at night or early in the morning. He wishes everyone would feel safe and protected when using public transport, especially when it is a necessity for people.

Interests

- Bird Watching
- Spending time with his wife
- Engaging and talking with people
- Traveling on different routes

Powers

- Connections with other bus and train drivers
- Knows everyone that frequents his route, he is personable and charismatic
- Voice in the bus driving community of TransPerth

Behaviours

- Spend 8 hours a day driving two bus routes
- Greets every person with a smile, chats to the person in the seat closest to him
- Wakes up early to watch birds on the weekend
- Goes out for lunch dates with his wife on his break
- Does not own a car, he frequently uses public transport to get around - he feels more comfortable

Needs

- Socialising with other people, to be apart and make peoples' days better
- Intellectual conversations
- Responsible passengers to make sure everyone is safe

Values

- Punctuality and time management
- Safety for passengers and high moral
- Safety for himself when working early morning
- Family-orientated and wants a bright future for his grandchildren

Aspirations

- To ensure zero causality in driving and ferrying passengers across Perth
- Financial and social security for his son's children
- Late Retirement, to enjoy the rest of his life with his wife
- To make sure everyone feels safe and comfortable not only on his route but on all public transport

BIOGRAPHY

Anthony is a big family man and wants to give his children a bright and secure future. His husband works as an Environmental Lawyer and Michael supports him by looking after their children during the day and after school, they then switch and Michael heads off to work.

Michael doesn't mind his job as a delivery driver, however, finds the role unsatisfying, leaving him wanting more and to provide better for his family. He struggles to make deliveries on time around 5pm which is rush time, he dislikes making people wait, but he has no other option. The roads have gotten worse, he finds people have no patience and hates sitting in traffic - this makes him want to find a new job.

Michael would love to study to open more opportunities for job prospects and help take the pressure of his husband.

Interests

- Social Media
- Spending time with his family
- Food culture and trying new restaurants
- Read nonfiction publications
- Being involved in his culture

Powers

- Deliver food on time to those who cannot travel (it helped especially those who are affected by COVID-19)
- Knows the Perth region extremely well
- Influence his children
- Organised and disciplined in his time management

Behaviours

- Takes his sons to soccer practice and attends their soccer matches on Sunday
- Spends 4 hours a day as a delivery driver which takes him across the Perth region
- Practices his cooking and cooks dinner for his family when he isn't working
- Face Times his parents to reconnect and check in

Needs

- Great car insurance that is reliable and there for him if he has an accident
- Safer roads and ways for traffic to be cleared quickly in peak hour
- More time to deliver food safely to people, and people to be more lenient if he is running behind

Values

- Patient people
- Educating and teaching his sons
- People who respect and listen to others
- Appreciation of other cultures
- Hard workers, people who are determined to achieve their goals

Aspirations

- To provide for his family and make sure they have a bright future
- To start studying to open the door to a secure high paying, permanent job
- To be able to deliver his orders quicker and to have safe roads, both in infrastructure and other drivers

General Public

BIOGRAPHY

Annie has been retired for a few years and decided to volunteer at Wellard Primary School to help the students with their reading skills. Annie has an approved assistance dog named Phoebe to help her navigate comfortably and safely around the world. Phoebe is approved for public transport, which is important as this is how Annie gets around.

Annie resides around Aubin Grove and uses a mixture of public transport (train and bus) to get to the school by 10:30am Tuesday and Wednesday. Annie finds travelling by public transport an alright experience for her and Phoebe, however, her bus stops don't have timetables, so when Annie is running behind, she can't see when the next bus is coming, she also doesn't have a mobile phone so she can't use the app to track her bus. This is an occasional occurrence, but Annie doesn't mind waiting with Phoebe, however, this is a safety issue if Phoebe and her are waiting near a busy road.

Annie knows among her community that people have a positive experience on public transport and find them not accommodating or safe. Annie wants to create awareness and understanding for the realities and difficulties in her community when public transport isn't accommodating.

Interests

>> Enjoys spending time with her grandchildren
>> Playing with her service dog Phoebe
>> Volunteering
>> Staying active by walking around her block
>> Cooking and watching cooking shows

Powers

>> Able to communicate and be a voice for the disability group in WA
>> Strong connections in the disability community
>> Inspire creativity and learning in students
>> Great at communication and can convey needs clearly- isn't afraid to share her opinion

Behaviours

>> Bingo with her friends on Thursday nights
>> Insists on taking out her grandchildren to the park for ice-cream every Saturday
>> Interacts with everyone
>> Supports local business on her journey and buys Phoebe treats

Needs

>> For public transport to be accessible
>> To feel safe and supported when traveling to new areas
>> Occupy her spare time with volunteering and interests
>> Public transport that is easier to read and understand as she doesn't have a mobile phone
>> Needs more frequent transport where she lives, if she misses her bus she has to wait a while and this impacts the train

Values

>> Family traditions and quality time with her grandchildren
>> Nurturing and helping children learn in her volunteer work
>> Safety for her and Phoebe
>> Frustrated when she misses her bus and the stop has no timetable

Aspirations

>> To have accessible public transport that is safe and not an inconvenience to figure out
>> Be more involved in her community and educate others
>> Be apart of her grandchildren's lives
>> Try and figure out a mobile phone

BIOGRAPHY

Andy is a stay-at-home father and freelances in Game Development on the side, his wife Mira teaches art Monday to Friday at Fremantle College, WA. They have two energetic children (5 years old and 12 months old) and reside in Myaree. The family can only afford one car which Mira uses to get to work, leaving Andy to use public transport to commute when taking the children on outings.

Andy recently had a negative experience taking his children to the RAC Arena to see the Wiggles. Mira dropped them off to the Fremantle Train Station on her way to work and they made their 40-minute journey by train to Perth and walked the last distance to the event. Unfortunately, Andy felt immensely overwhelmed with the packed train carriage with his pram, and the 40 minutes was too long for his oldest child to be entertained, making the event not worth the journey, especially as he had to commute the same way back.

With the young ages of his children and his experience, Andy dreads using public transport to get anywhere and prefers walking to help his 5-year-old burn off energy and be inquisitive with the world around him in a safe space, however, he is limited to walking distance locations.

Interests

>> Love spending time with the kids
>> Watching their kids learn and achieve milestones
>> Painting, arts and crafts (Mira)
>> Video games and Online gaming (Andy)
>> Spending time with each other on date nights

Powers

>> Influence over their children
>> Opportunity to shape their children's learning and identities
>> Inspire creativity and art in students
>> Like-able demeanors

Behaviours

>> Movie nights with the children every Friday
>> Leaving the children with the grandparents and having weekly date nights
>> Mira runs after school painting classes for her students
>> Andy occasionally plays video games with his friends after the children go to bed

Needs

>> Strong relationship with children
>> For their children to feel safe and supported
>> To foster creativity, inquiry and learning in their children
>> Transport that is easier to use as a young family to get to different places
>> Needs more single-modal commutes

Values

>> Family traditions and strong familial bonds
>> Nurturing their children in lifelong learning
>> Financial stability
>> Create a supportive and successful future

Aspirations

>> To move closer to public transport and Mira's work
>> Prepare their kids for a successful future
>> For Andy to secure a full time job when his youngest son starts school
>> Be apart of their children's lives and watch them grow and learn

BIOGRAPHY

Penny and Pia have been using the bus to get to school since year four, finding the independence exciting since their dad has to drop their younger sister to daycare in the morning. Penny and Pia catch the same bus everyday and more often than not, they are greeted by their favourite bus driver, Earl who makes sure they get off at the right stop. Although Penny and Pia are independent to an extent, they do get easily distracted playing games outside the windows of the bus.

The girls have experienced a negative moment when catching the bus, one school morning. Not having their usual bus driver taking their route, the girls were not aware they passed their stop and were stuck on the bus. Full of panic and confusion, the girls notified the bus driver, although annoyed, he took a detour and helped them get to school. This experience stayed with the girls and they are diligent now, especially after being lectured by their father.

Even though the girls were lucky to have a nice bus driver, they need a reminder or notification when they reach their stop in case they get distracted again.

Interests

>> Playing make believe together
>> Ballet (Penny)
>> Painting (Pia)
>> Running around with their dog
>> Putting makeup on their younger sister

Powers

>> Loves to learn and excited to have new topics taught at school
>> Both are creative and imaginative
>> Are not afraid to ask for help and vocal about topics they don't agree with

Behaviours

>> Goes to school everyday and at lunch time they run around with their friends
>> Will procrastinate on homework they find boring and instead play with their dog
>> Penny goes to ballet every Friday afternoon
>> Pia goes to her grandparents to paint in their studio

Needs

>> Guidance and support from their father and teachers
>> Needs help to be more aware of their surroundings and learn to be responsible
>> Encouragement and praise when they achieve goals or receive high marks on tests

Values

>> Learning
>> Having fun and being silly
>> Friends and family

Aspirations

>> Pia aspires to be a famous painter
>> Penny aspires to be a ballerina
>> Help their younger sister start writing

BIOGRAPHY

Kora is in her final year of high school and is excited to be independent and experience the world. She has not been able to get her driver's license as her focus was directly on studying and getting a great ATAR. Kora's parents driver her to school and pick her up everyday, as they do not want her catching public transport.

Using Spotify she accidentally clicks on a podcast about climate change and the need to change for a sustainable future with a guest influence. Kora listens to the podcast for a little bit and becomes intrigued about what they are discussing. After an hour the podcast finishes and Kora looks up the influence and notices their drive for a sustainable future. Empowered, she looks up aways she can reduce her impact.

Kora realised her biggest impact is taking the car everyday. Knowing it will be hard to convince her parents, Kora decides to research more to encourgae them to consider taking public transport some days.

Interests

>> Studying new topics
>> Social Media
>> Keeping up with the latest trends
>> Hanging out with her friends on the weekend

Powers

>> Motivated to achieve her high goals
>> Kora's friends listen and look up to her
>> She is interested in learning and becoming a smarter and sawy person

Behaviours

>> He catches the bus each day to work.
He has organised to have shifts that aren't too early or too late because he feels safer when there are more people on public transport.
He enjoys watching streaming services to pass the time on buses.
He usually brings a change of clothes for before and after rugby as he finds the uniform 'too revealing' for his comfort levels on public transport

Needs

>> Friends and family
>> Independence
>> To be heard
>> To be talked to with respect
>> Achiever her high goals

Values

>> People who listen to her and appreciate what she is saying
>> Hard work
>> Determination
>> Wants to make a change in the world

Aspirations

>> To recieve a high ATAR
>> Go to Univerisyt of Western Australia
>> Get her license
>> Move out from her parent's house

BIOGRAPHY

Timothy grew up in Goldfields town, Mukinbudin and assigned female at birth and started his gender transition at age 15. He recently moved to Perth with his mother to finish high school and currently lives with her in North Perth.

Timothy is passionate about rugby and feels immense pride acting as the team's treasurer. Being apart of an inclusive community is important to Timothy and he finds educating people on social justice issues imperative - he is seen as an expert on transgender issues among his friends and community.

Timothy wishes the world was kinder and more accepting of difference, especially as he uses public transport to get to TAFE, work and rugby training/games. He often feels unsafe catching public transport too early or too late, and usually has to bring a change of clothes for rugby, as he finds he uniform to revealing for his comfort levels.

Interests

>> Studies Sign Language at TAFE because he has deaf and hard of hearing friends
>> Plays rugby in an LGBTIQ inclusive sports team
>> Enjoys the Marvel Universe watching Disney Plus

Needs

>> Is bolstered by the sense of community that comes from the sports team and his close circle of friends
>> Needs to use public transport to get to TAFE, work, and rugby training
>> Is saving money for gender affirmative surgeries to feel more comfortable in how he presents.

Powers

>> Holds a prominent position as treasurer of the rugby team
>> His mother relies on him for many household duties including cooking and shopping
>> He has educated his friends and community about social justice issues, and he is seen as an expert on transgender issues in those groups

Values

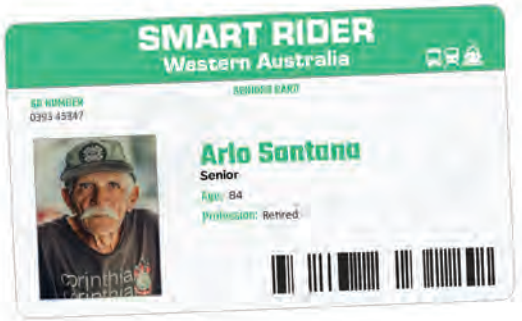
>> Values his communities, loyalty, and comradery
>> Sympathises with issues of social injustice
>> Identifies with the plight of farmers
>> Wants to world to be kinder and more accepting of difference

Behaviours

>> He catches the bus each day to work.
He has organised to have shifts that aren't too early or too late because he feels safer when there are more people on public transport.
He enjoys watching streaming services to pass the time on buses.
He usually brings a change of clothes for before and after rugby as he finds the uniform 'too revealing' for his comfort levels on public transport

Aspirations

>> His current priority is to get the money together for his gender affirming surgeries
>> He wants to get better at playing rugby and contribute to the team on the field as much as off the field.
>> He looks up to transgender athletes like Lia Thomas but is disheartened by their treatment in the media.



BIOGRAPHY

Arlo has been retired for twenty years and is enjoying his quite, serene life with his dog Buster ever since. Arlo can no longer drive which has been a pain point, as he loves to go camping and fishing anytime he feels like it. He used to get lifts from his fishing friends, however, due to Covid and Arlo being far older than his friends, this is no longer safe for him. To resolve this, Arlo catches the local bus in town with his camping gear and dog. Although the solution helps him reach his goal, Arlo sits on the bus for an hour to get to the camping grounds.

As he gets frustrated easily, Arlo has little patience when the bus runs late and becomes grumpy on the journey. He enjoys keeping his mind and body fit and by using the bus, he pushes his brain to remember the time of arrival and walks to reach the stop. The bus is perfect for Arlo to talk to the bus driver and fellow passengers to increase his social interaction. However, Arlo feels grumpy most of the time and keeps to himself, wishing he could say a quick hello or strike up a conversation on topics he loves.

Interests

>> Going fishing on the weekend
>> Walking his dog, Buster
>> Playing poker
>> Camping
>> Napping

Needs

>> For public transport to be accessible
>> To easily get around when he wants to go to places
>> Companionship, relies on his dog for social interaction, however, he misses being close with friends due to Covid and being in the at risk bracket
>> To be active. Arlo is mentally and physically capable, he needs to be moving and doing activities

Powers

>> Able to travel on his own and orient himself quickly in new places
>> Strong connections in the fishing community
>> Knows how to adapt to new environments and loves being in nature
>> Comfortable in his own company, including his dog

Values

>> Working hard for your goals
>> Companionship
>> Nature
>> Being independent

Behaviours

>> Rearranging his house every Friday
>> Eats dinner at 5pm and goes to bed at 7pm, ready to start the day early at 5am.
>> Goes fishing every weekend
>> Gets frustrated easily when things do not work out for him

Aspirations

>> To go camping again with Buster, before his body can no longer keep up with his mind
>> To be able to fish with his friends again
>> Adopt another dog
>> Win a poker game

Business

BIOGRAPHY

Being a mechanic has run in Tony's family for years; his father and grandfather were both mechanics, passing the family business down. Tony loves teaching the new apprentices that come through his shop, sharing his passion and love onto others in the hopes they can work full time at his business.

The business hasn't changed for generations, however, from reading and talking at motor shows with his friends, Tony has realised Ev's and emissions are being discussed about more. Tony prides himself on being knowledgeable and researching into areas he doesn't know much about. He knows from his research that the current climate and state of mobility isn't working for the future, and this greatly impacts his clients and business as a mechanic.

Tony wants to adapt and make sure his business evolves, especially for his son to take over when he retires. He wants to get more involved in learning about the future of his business and help change the way they think about the industry; to consider understanding electric batteries and how different clients will have very different functioning cars.

- >> Car enthusiast - loves engines and fast cars
- >> Teaching apprentices
- >> Long rides on his motorcycle
- >> Chatting with people

- >> Influence over his business
- >> Strong ties to the car mechanic community
- >> Inspires and teaches colleagues and apprentices
- >> Incredibly friendly and charismatic

- >> Hanging out at his usual bar with friends and colleges
- >> Big influence in the decisions of his business
- >> Attends motor shows and vintage car markets
- >> Busy schedule during the week

- >> To be active and using his hands to solve things
- >> Educating others and making sure his shop has quality workers
- >> Constantly talking and engaging with people
- >> Information from the government and car manufactures about what the future for cars

- >> Teaching and encouraging people
- >> Wants to get involved with the future of cars and lead the way for mechanics adapting to electric batteries
- >> Social interactions with friends, clients and co-workers, inspiring and educating them
- >> Frustrated when he doesn't know much about an area

- >> To have a business that can adapt to the future and survive changes
- >> Wants to retire soon and take his motorcycle on a long trip around the state
- >> To leave his business in capable hands when he retires
- >> Wants to make an impact in the industry and help bring change to certain areas

BIOGRAPHY

Max from a young age often found himself in trouble, either rebelling against his parents or skipping school. One day his father took him to his landscaping business and that is when a lightbulb when off in Max's is head - he loved the excavating trucks and wanted to have a job involving powerful machines.

As soon as he finished school, he signed up to be a FIFO, over the years he was able to secure a position at Higginsville Gold Mine. Keeping in contact with his friends every time he flies back into Perth, Max has realised everyone has moved on and found their person, starting to build their families. Max wishes he could find someone but struggles with the commitment and strain of his job on the person he is dating. Max wants to be a father one day and be there like his father was for him.

- >> Driving large vehicles, loves the power and durability traveling across the rocky terrain
- >> Drinking with his friends and colleagues after a long day of work
- >> Loves traveling
- >> To find his person

- >> Building strong relationships and fostering trust has given Max respect in the mining community, his views and opinions hold weight
- >> A wide range of contacts in the mining industry

- >> Max is disciplined with his time when flies back into Perth. He makes sure he plans visits with people but more importantly, has time to himself
- >> Scrolling through dating apps and going on dates set up by his friends to try and find his person
- >> Spend every Friday with his dad either fishing or going on hikes

- >> In his personal life, Max is incredibly lonely and often finds himself wanting what his friends have - a wife and kids
- >> To be social, constantly thriving and engaging with people. Max is extroverted and needs to feel a community wherever he goes
- >> Organisation and relaxation when he flies back into Perth, his time is precious and wants to use it wisely

- >> People who act fast and seize opportunities
- >> Comradery and mateship. He needs to feel connected and strengthen bonds with everyone he interacts with
- >> Respect in listening to what people have to say
- >> Reliability - people who have his back when he has theirs

- >> Max seeks a relationship, he wants to create a family and be an amazing father, just like his dad
- >> To move on from working as a FIFO and find permanency in Perth

BIOGRAPHY

Cindy grew up in Perth, WA. She is from a family of 4 and has a younger sister. After finishing high school, Cindy began studying Event Planning at university and shortly after began working as a travel agent while she studied.

After a few years of studying on and off, Cindy decided to discontinue her studies at university, and has been employed as a travel agent full-time since.

Interests

>> Going out with friends
>> Listening to music
>> Going to parties and big events
>> Meeting new people and trying new things

Powers

>> Cindy's opinion is important to her friends, and what she says matters a great deal to them
>> Due to her work, Cindy is also very good at relating to people and sparking their interest in things she is also interested in/informed about

Behaviours

>> Cindy's routines are less structured – when it comes to travel, Cindy likes to plan, but when going out, she is much more spontaneous
>> Cindy likes wearing designer brands and purchasing the newest products – even if they are a little too expensive

Needs

>> Cindy needs strong support systems. In her personal life, Cindy needs support from her friends and family to feel good about herself and where she is in life
>> In her work, she also requires a supportive team, but more so a team who are sociable and can be friends as well as co-workers

Values

>> Cindy values connection with others. Staying connected with her friends Online and seeing them regularly in person is important to her
>> People who are unnecessarily rude to others make Cindy indignant. Cindy's moral compass is simple: people should be able to do whatever they want as long as it does not negatively impact others

Aspirations

>> Cindy is fairly happy with who she is as a person. However, she is not exactly where she wants to be in life; one of her big life goals is to find someone to spend her life with, who shares her love of travel, but at the moment she is still single
>> Cindy is currently renting a house, but is wanting to build her own house – but due to her current lifestyle and spend patterns, this is something she is still a ways off from doing

BIOGRAPHY

Felix is currently backpacking across Australia, and this is his first time leaving Norway, in hopes of learning about Australian culture and making memories in his older age. After saving for two years, Felix and his bowling friends booked a flight to Australia and headed straight to Bondi Beach. On the last leg of their journey, they made it to Western Australia, staying at the Backpackers Inn in Fremantle.

Felix and his friends do not have any connections with anyone in Western Australia, and they feel isolated trying to navigate their way around to popular tourist destinations. The pressure is on Felix to understand and read public transport for his Norwegian friends, however, Felix has become instantly overwhelmed and confused.

Interests

>> Studying English and advancing his literacy skills
>> Traveling to different countries to make memories
>> Hanging out with his friends
>> Meeting new people and trying new foods

Powers

>> He can speak and write in English to a certain level and can communicate to his friends what things mean
>> Due to travelling, Felix has become incredibly flexible and adaptable to areas- this has made him reliable and trustworthy among his friends

Behaviours

>> Using public transport for him and his friends to get around countries
>> Documenting his experiences and memories on social media
>> Going out at night and exploring the city he is in, trying different foods and finding new adventures

Needs

>> To feel connected and safe when he is traveling
>> To have convenient and clear information resources, he is the soul translator for his friends and feels immense pressure to make sure they are safe and having fun
>> Make friends and socialise with new people
>> Minimal obstacles and challenges when travelling

Values

>> Values making his friends feel safe whilst having fun
>> Making memories and living in the moment
>> Having everything accessible and at his fingertips, this allows him to enjoy his experiences and travel more

Aspirations

>> His current priority is to travel to America, but first he has to save enough money
>> To make a living out of his social media and become a travel influencer
>> To advance his English and literacy skills so he can travel with ease

Tourism

ETHNOGRAPHIC RESEARCH

Ethnographic research is an analytical method of study used to observe people in their environment, and understand how people behave. This research process is a tool that is used in various areas and industries to gain a deeper understanding of the communities and people involved in projects, through their experiences, perspectives, opinions and motivations. In the case of this project, we will be utilising the ethnographic research method of interviewing to understand the people that we will be designing with, through observations and insights obtained from talking with the Perth public.

Ethnographic research primarily provides qualitative data. It is not so much concerned with how many people hold similar opinions and perspectives on a topic or issue, but rather with how people feel towards these topics/issues and the reasoning of why they feel this way. This is what makes ethnographic research incredibly valuable, especially in a human-centred design process such as service design that thrives off of qualitative – and human-centred - data.

For this project, it was paramount to acquire insight into the perspectives, experiences and opinions of the public when it comes to transport and mobility. To gather this information, we conducted ethnographic research based on the five key stakeholder groups we had determined within Perth:

- General public
- Government
- Public Services (i.e. Hospitality, Emergency Services, Maintenance)
- Business
- Tourism

"Ethnographic research primarily provides qualitative data. This is what makes ethnographic research incredibly valuable, especially in a human-centred design process such as service design that thrives off of qualitative - and human-centred - data"

(Bailey et al. 2022)

Interview Methodology

We started by identifying various groups we could interview from the stakeholder mapping, and then identifying possible participants that we had access to, as well as contacts provided by the Department of Transport.

We ended up talking to a variety of people in Perth, including:

1. General Public

- Family and friends
- Colleagues
- Classmates
- School and university students
- People outside Perth Underground
- Passengers on trains
- Members of the Human Excellence Project (community group)

2. Government

- Department of Transport
- Public Transit Authority
- Synergy

3. Business

- MOJO Car Share
- RAC

4. Public Services

- Eire Total Access (Construction)

5. Tourism

- Backpackers in Northbridge

Our main goal was to gather data from different sources; as we were trying to get perspectives from a range of organisations and people who interacted with mobility in a variety of ways, different interviews required different approaches. We conducted online interviews (mostly for big stakeholders and interviews with the contacts provided by the DoT) and in-person interviews (for the interviews with the general public), recording the data in written and/or audio format.

To target specific information from stakeholders, we conducted in-depth interviews for the key stakeholders and DoT contacts, and shorter interviews with the general public.

While some of these interviews (mainly the ones with organisations and contacts from the Department of Transport) were scheduled, most of our interviews were conducted by approaching random people in a variety of settings (as indicated above).

Difficulties

Though we gained a lot of valuable data through interviewing, we also encountered a number of difficulties in this process. This included:

- People not wanting to talk to us
- People who were rude
- Determining who to try approaching for interviewing
- Having to 'jump through hoops' - or rather into cold water at 6am on a Saturday (as well as an ice bath) – just to get interviews with people (this was the case for interviews with the Human Excellence Project)
- Determining specific questions that should be asked to each stakeholder group (discussed in the next section)

These difficulties were overcome through persistence and kindness when approaching members of the public, even through rejection, and expanding our research to more locations in order to conduct as many interviews and gather as much data as possible.

For the interviewing, our focus was on gaining insight into two key areas, people's mobility and how people access information

(Bailey et al. 2022)

Interview Questions

We created 5 different question sets which we tailored to each stakeholder group based on the project objectives and problem statements (which have since been renamed to project challenges as noted in the PROJECT PROBLEM chapter, pg. 019). This proved to be a difficult task, as questions that were relevant to some stakeholder groups were not relevant to others, we needed to consider how different stakeholder groups would interact with mobility and transport and then customise the interview questions accordingly.

The following are the interview question sets we used for each stakeholder group (note: not all questions were asked of all stakeholders due to time constraints and the ways interviews progressed).

Questions for Business

Travel and mobility in their business

- How does your business currently travel and use transport?

- How crucial is the role that transportation plays within your business. Is the business able to run effectively with or without the role of mobility?

- What does your business consider to be the most important factors when it comes to transport options?

- Are there any alternative transport options that you believe could be appropriate for this kind of work?

- Do you believe transportation in your industry is sustainable? Why/why not?

How do they find information?

- What do you currently know or would like to know about electric/hybrid vehicles, e-ridables, low-emission vehicles, public transport and other mobility options?

- What do you know or would like to know about the ways that your business could transition to a zero-emissions transport system?

- How do you usually find information about the ways your business can reduce its transport emissions?

- What ways would you prefer to find out this information?

Limitations

- What limitations currently exist that are preventing your business from adapting to a low to zero emissions transport system?

- If your business had no limitations or issues when it comes to transportation, what types of transport would your business prefer to use and why?

Incentives/policies that inspire action

- What would help your business reduce their transport emissions?

- Has your organisation been provided with any incentives to assist in making the changes necessary to reduce transport emissions?

- What policies do you think can be put in place or action could be taken to assist businesses like yours with lowering their transport emissions?

If the business provides services related to travel to customers

- Does your business provide any incentives to encourage customers to choose more sustainable travel options that your business might offer?

- What information does your business currently provide to customers/the public about low emissions transport and alternative transport options?

- If the business has something to do with electric vehicles and e-rideables (if applicable)

- What are your opinions on the future of electric vehicles and e-rideables and why?

- What information does your business currently provide to customers/the public about electric vehicles and e-rideables?

- How does your business provide this information to customers/the public?

Questions for Government

How they envision the future of transportation

- How do you think the current transport system could be improved to become more sustainable?

What limitations they believe need addressing

- Where do you think the most hesitation comes from within the government to make more policies regarding climate change?

Project impacts on the department/organisation

- In what ways is transport and travel important to your organisation? (Note: this is referring to domestic land travel only)

- How would an upheaval of the current mobility system people travel impact your organisation? (eg. Would it only impact how they get to work?)

What their department/organisation can do

-Are you aware of anything that your organisation is currently doing to reduce transport emissions?

- Do you know of anything else that your organisation could do to reduce transport emissions?

- Are there any incentives currently in place from the government that encourage your organisation to make more sustainable mobility choices?

What their opinions are on how the public transport system is used

- Do you think that the government appropriately provides for citizens through the current transport systems available? Why/why not?

- Do you think citizens are appropriately provided for through the current transport infrastructure? Why/why not? (e.g., Enough stations, safe roads, buses/trains that come often enough)

Department actions questions (only applicable if the department is directly responsible for transport in some capacity)

- What communication channels are being used to inform the public when it comes to information regarding transport?

- What is the biggest difficulty when it comes to communicating information to the public?

- How do you believe the public should move around in order to reduce emissions?

- What do you believe will be the biggest challenge when it comes to a zero-emissions transport system?

- Are there areas of the transport industry that you believe would be limited in finding ways to adapt to a low to zero emissions economy?

- What limitations currently exist that are preventing people from making more climate-considered travel decisions?

- What are the most important factors that are considered by the government when it comes to transport options?

- What are the biggest concerns when it comes to implementing policies that reduce transport emissions

- As a government body, does your organisation plan to or currently provide any incentives to businesses or services to assist them in making the changes necessary to reduce their emissions?

- What policies do you think can be put in place or action can be taken to incentivise businesses' lowering their transport emissions?

- What policies do you think can be put in place or action can be taken to assist citizens with lowering their transport emissions (on an individual level)?

- As a government body, in what ways are you educating the public as to how they can take action and make informed decisions to lower their transport emissions?

- How does your organisation provide this information to the public?

Electric vehicles and e-rideables (if applicable)

- What are your opinions on the future of electric vehicles and why?

- As a government body, are you looking into providing or endorsing e-rideable options for the public in the future?

- What information does your organisation currently provide to the public about electric vehicles/e-rideables?

- How does your organisation provide this information to the public?

Questions for Services

Travel and mobility in their service

- How does your service currently travel and use transport?

- How crucial is the role that transportation plays within your service. Is the service able to run effectively with or without the role of mobility?

- What does your service consider to be the most important factors or concerns when it comes to transport and mobility options?

- Are there any alternative transport options that you believe could be appropriate for this kind of work?

- Do you believe transportation in your service sector is sustainable? Why/why not?

- Are you aware of any ways that transportation in your service could be improved to become more sustainable?

How they find information

- What do you currently know or would like to know about electric/hybrid vehicles, e-ridables, low-emission vehicles, public transport and other mobility options?

- What do you know or would like to know about the ways that your business could transition to a zero-emissions transport system?

- How do you usually find information about the ways your business can reduce its transport emissions?

- What ways would you prefer to find out this information?

Limitations

- What limitations currently exist that are preventing your business from adapting to a low to zero emissions transport system?

- If your business had no limitations or issues when it comes to transportation, what types of transport would your business prefer to use and why?

Incentives/policies that inspire action

- What would help your service reduce their transport emissions?

- Has your organisation been provided with any incentives to assist in making the changes necessary to reduce transport emissions?

- What policies do you think can be put in place or action can be taken to assist services like yours with lowering their transport emissions?

If they provide services related to travel to customers

- Does your service provide any incentives to encourage customers to choose more sustainable travel options that might be offered by your service?

- What information does your business currently provide to customers/the public about low emissions transport and alternative transport options?

- With the increasing push to remove WA of petrol and diesel vehicles, how would this kind of change impact your service?

If the service has something to do with electric vehicles and e-rideables

- What are your opinions on the future of electric vehicles and e-rideables and why?

- What information does your business currently provide to customers/the public about electric vehicles and e-rideables?

- How does your business provide this information to customers/the public?

If the service is related to ridesharing

- What are your opinions on carpooling and ridesharing? Is this an option that your service currently caters towards or would be open to including in your service?

- What do you think would make people more inclined to engage carpooling and ridesharing?

Questions for Tourism

Travel and mobility in their organisation/industry

- How crucial is the role that transportation plays in your organisation? Is your organisation able to run effectively with or without the role of mobility?

- How would an upheaval of the current ways people travel impact your organisation? (eg. Would it only impact how they get to work? Would it impact how people are able to interact with the services you provide?)

- What does your organisation consider to be the most important aspects in transportation when it comes to the tourism industry?

- Are there any low emission or alternative transport options that you believe could be appropriate for your organisation or industry?

- Do you believe transportation in your organisation or industry is sustainable? Why/why not?

- Do you believe transportation in the tourism industry sustainable? Why/why not?

- What assistance is needed to help the tourism industry reduce their emissions?

- Do you know of any data that details how tourists currently make travel decisions when it comes to mobility in WA?

- What forms of transport currently being offered in the tourism industry are your most sustainable modes? What would you like to see offered more of in the future of the tourism industry?

What limitations they believe need addressing

- What do you believe will be the biggest challenge for the tourism industry when it comes to transitioning to a zero-emissions transport system?

- Are there specific areas of your organisation or industry that you believe would be limited in finding ways to adapt to a low to zero emissions economy?

- What limitations currently exist that are preventing your organisation or industry from adopting a more climate-considered approach to travel and tourism?

- If your organisation had no limitations or issues when it comes to transportation, what types of transport would your organisation prefer to use or offer and why?

How they find information

- What information does your organisation currently investigate when it comes to electric/hybrid vehicles, e-ridables, low-emission vehicles, public transport and other mobility options?

- What do you know or would like to know about the ways that your organisation or industry could transition to a zero-emissions transport system?

If they provide transport related services to customers (eg. Car rental)

- Does your organisation provide any incentives to encourage customers to choose more sustainable travel options that might be offered by your organisation?

- What information does your organisation currently provide to customers/the public about low emissions transport and alternative transport options?

- With the increasing push to remove WA of petrol and diesel vehicles, how would this kind of change impact your service?

- Has your organisation been provided with any incentives to assist in making the changes necessary to reduce transport emissions?

- What would help your organisation reduce their transport emissions?

- What policies do you think can be put in place or action can be taken to assist services like yours with lowering their transport emissions?

Questions for General Public

How they currently move around/travel

- In terms of transportation, how do you currently move around and why?

- What is the main reason that you travel for?

What mode of transportation they would like to use if there were no limitations

- If you had no personal limitations or issues when it comes to transportation, what mode of transport would you prefer to use and why?

- [If they have a different preferred mode of transport] What is preventing you from using this mode instead of your current?

- [If they have the same preferred mode of transport] What is preventing or deterring you from using other modes of transport instead of your current?

What their opinions on the public transport system are

- What are your opinions on our public transport system? Do you use it regularly or tend to avoid it?

- What, if anything, do you like or dislike about using public transport?

- Have you had any positive or negative experiences that have influenced this opinion?

What their biggest travel concerns are?

- What do you consider to be the most important factors when it comes to travel?

- What are your biggest concerns when it comes to travel and different travel options?

How they envision the future of transportation

- How do you envision transportation in WA in the long term?

- What mode of transport would you like to see yourself using or would be your perfect form of transport if there were no limitations in the future?

What they know about the climate change situation

- What is your perspective on climate change? Do you feel concerned about the threat it poses?

- How informed would you say you are about the impacts of climate change and what you personally can do to make a difference? Does your knowledge of these things impact your decisions when it comes to transport and travel?

How and where do they find information

- When you are searching for information regarding a topic climate change, where do you usually go to find it?

- How do you usually find information on electric or low emission vehicles and alternative travel options?

- What ways would you prefer to find out your information?

What their opinions/experience with electric/low emission vehicles is

- What do you currently know or would like to know about electric or hybrid vehicles, e-ridables and low-emission vehicles?

- Do you currently own any such vehicle?

  [If no] If not, how likely would you be to purchase one (and which one ?

  [If yes] What influenced your decision to purchase one?

- What would make you more likely to consider buying an electric, hybrid, or low emission vehicle or e-ridable?

Co-Design Workshops

Additionally, we engaged with the Department of Transport for multiple co-design workshops that helped us to develop creative ideas and outcomes together. These workshops contributed to directing our approach to the information system we have developed.

We similarly engaged in numerous co-design sessions with the GRD503 class, during which we worked on a variety of research, ideation and concept development activities (see IDEATION & CONCEPT DEVELOPMENT pg. 108).

004


INTRODUCTION
PROJECT PROBLEM
RESEARCH METHODS
DISCOVERIES & INSIGHTS

DISCOVERIES & INSIGHTS




IDEA & CONCEPT DEVELOPMENT

PROPOSED OUTCOMES

NEXT STEPS

GLOSSARY & REFERENCES

INTRODUCTION

Ethnographic research can produce an immense pool of data. To determine the important information within this data it is necessary to perform a content analysis through organisation, categorisation, and visualisation of the data received from the interviewing process. We have used the tools of: empathy mapping, persona storyworlds, future outcomes network, and journey mapping, to recognise the patterns in the data and to extract our discoveries and insights that could be useful for the next stage of the project.

KEY TAKEAWAYS

- Our research provided us with a large data set of people's thoughts, feelings and opinions about transport, mobility, and climate change.
- We organised and categorised this data in the form of empathy maps to look for patterns and insights.
- We applied the insights to design thinking visualisation processes; persona storyworlds, future outcomes network, and journey mapping.
- These visualisation processes allow for better understanding of the experiences of key stakeholders.
- Understanding the experiences of stakeholders is key to the development of effective concepts for the project.

EMPATHY MAPS

In order to organise all the qualitative data we gathered through interviewing, we used empathy maps. Empathy maps are a visualisation tool used to understand patterns in people's behaviour.

We used the empathy maps to categorise the data from each of the organisations or groups that we interviewed into 6 categories:

1. Think & feel

2. Say & do

3. See

4. Hear

5. Pain points

6. Gain points

Through categorising the data like this in the empathy maps, we were able to get a much clearer idea of the views, opinions and experiences of the public when it comes to travel and mobility and, most importantly, see patterns in these views and opinions.

Some of the **insights** that we gained through this process included:

- People don't feel safe on public transport, especially at night

- People will ultimately use the mode of transport that is most convenient for them

- People are open to alternative mobility options such as e-ridables

- Barriers to using more active transport include weather, distance to destinations, and getting tired and sweaty – the last of which is offered a solution through e-ridables

- Many people believe emissions causing climate change is an issue, but do not believe there is anything they can do on an individual level to make a difference

- Some people drive because they like driving, others avoid it because they dislike it or are afraid of driving

- Many people think taking public transport means longer journeys

- People are simply not aware of their mobility options

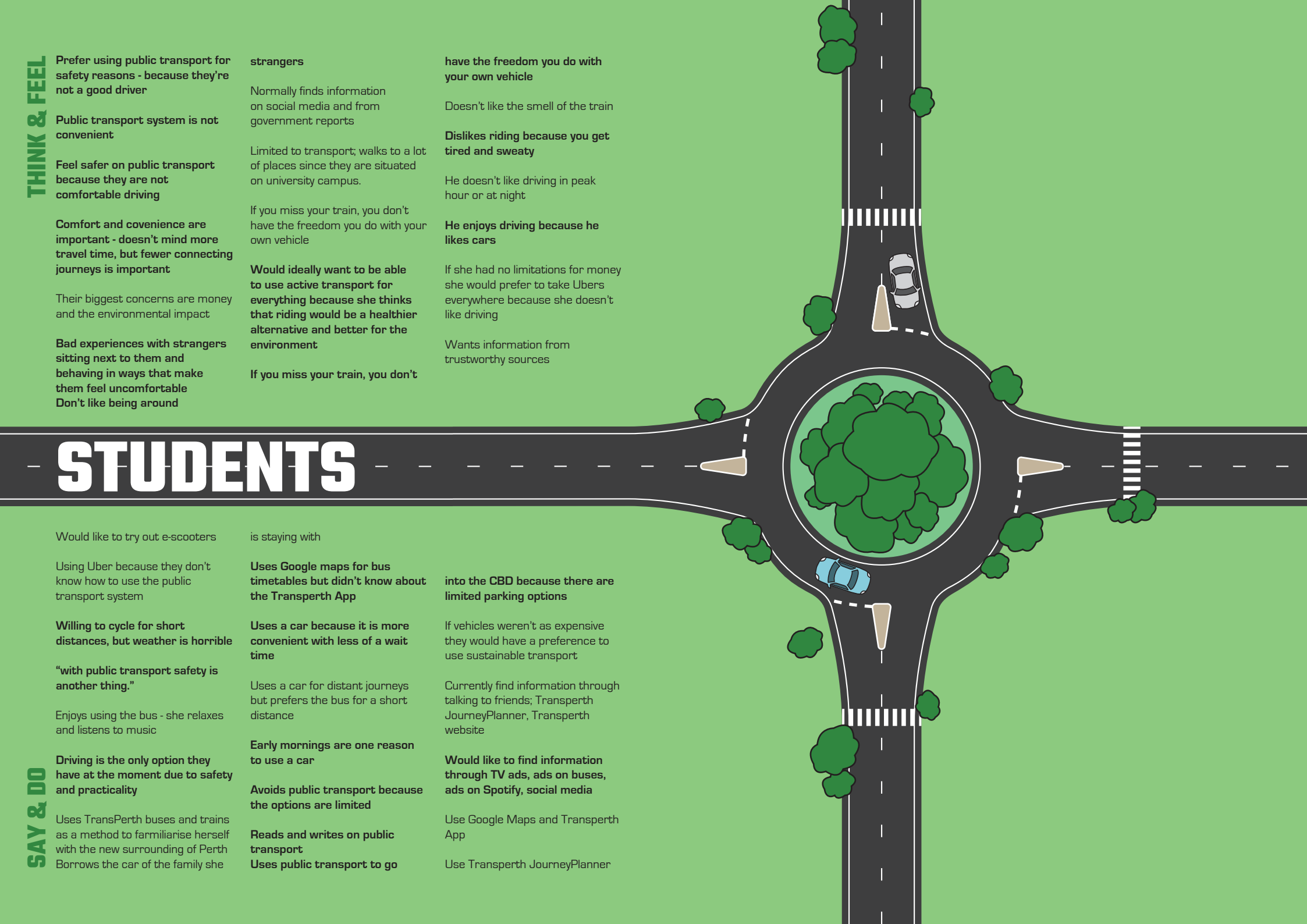
- A step change - such as Covid - is an effective means of changing habits or patterns in behaviour

- People are afraid of using bicycles due to the proximity to cars in bicycle lanes; in a similar way, pedestrians sharing a path with cyclists is also a danger; a separate network is something people would value

"Barriers to using more active transport include weather, distance to destinations, and getting tired and sweaty – the last of which is offered a solution through e-ridables"

(Bailey et al. 2022)

STUDENTS



THINK & FEEL

Prefer using public transport for safety reasons - because they're not a good driver

Public transport system is not convenient

Feel safer on public transport because they are not comfortable driving

Comfort and covenience are important - doesn't mind more travel time, but fewer connecting journeys is important

Their biggest concerns are money and the environmental impact

Bad experiences with strangers sitting next to them and behaving in ways that make them feel uncomfortable
Don't like being around strangers

Normally finds information on social media and from government reports

Limited to transport; walks to a lot of places since they are situated on university campus.

If you miss your train, you don't have the freedom you do with your own vehicle

Would ideally want to be able to use active transport for everything because she thinks that riding would be a healthier alternative and better for the environment

If you miss your train, you don't have the freedom you do with your own vehicle

Doesn't like the smell of the train

Dislikes riding because you get tired and sweaty

He doesn't like driving in peak hour or at night

He enjoys driving because he likes cars

If she had no limitations for money she would prefer to take Ubers everywhere because she doesn't like driving

Wants information from trustworthy sources

SAY & DO

Would like to try out e-scooters

Using Uber because they don't know how to use the public transport system

Willing to cycle for short distances, but weather is horrible

"with public transport safety is another thing."

Enjoys using the bus - she relaxes and listens to music

Driving is the only option they have at the moment due to safety and practicality

Uses TransPerth buses and trains as a method to farmiliarise herself with the new surrounding of Perth
Borrows the car of the family she is staying with

Uses Google maps for bus timetables but didn't know about the Transperth App

Uses a car because it is more convenient with less of a wait time

Uses a car for distant journeys but prefers the bus for a short distance

Early mornings are one reason to use a car

Avoids public transport because the options are limited

Reads and writes on public transport
Uses public transport to go into the CBD because there are limited parking options

If vehicles weren't as expensive they would have a preference to use sustainable transport

Currently find information through talking to friends; Transperth JourneyPlanner, Transperth website

Would like to find information through TV ads, ads on buses, ads on Spotify, social media

Use Google Maps and Transperth App

Use Transperth JourneyPlanner

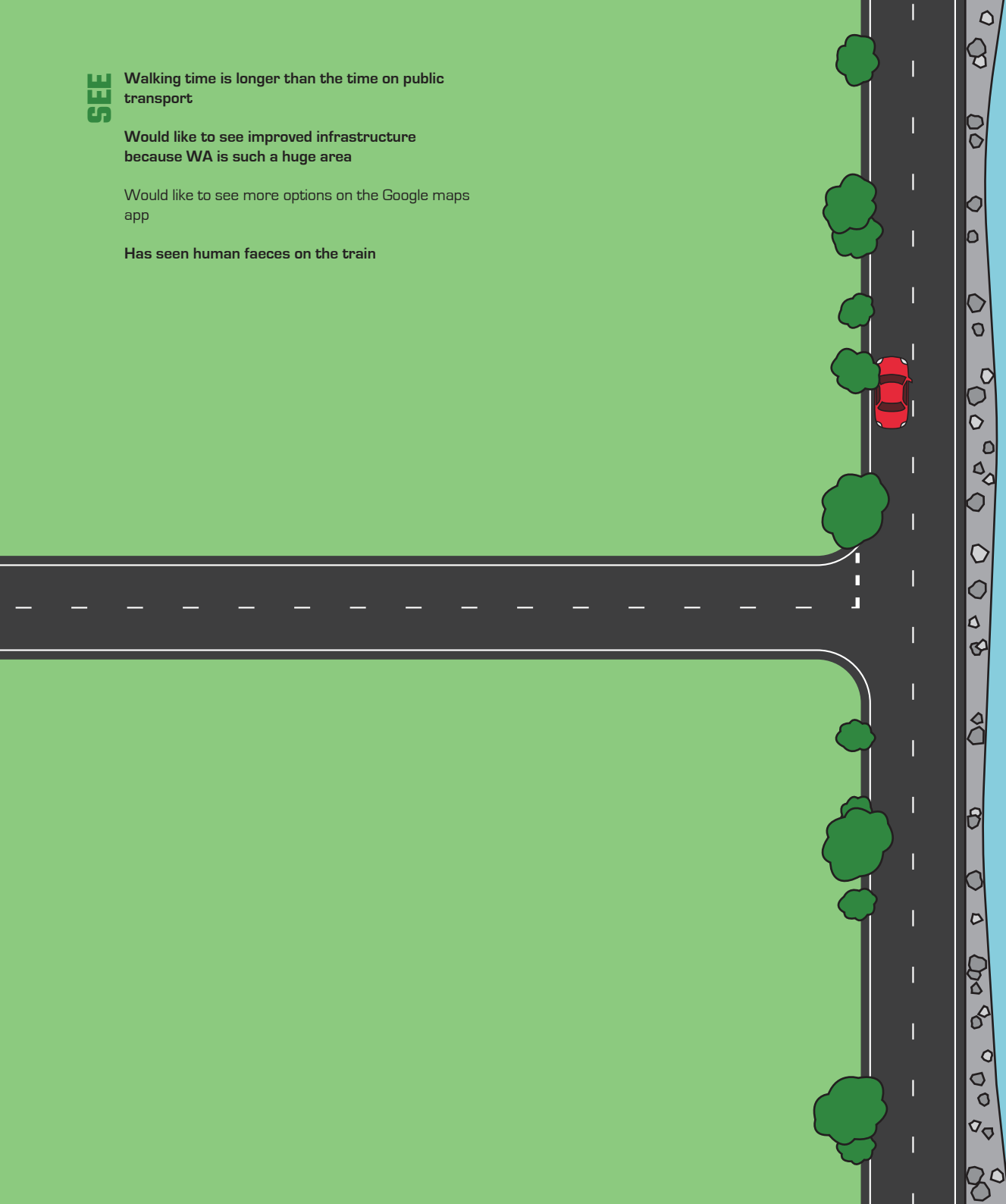
SEE

Walking time is longer than the time on public transport

Would like to see improved infrastructure because WA is such a huge area

Would like to see more options on the Google maps app

Has seen human faeces on the train



PAIN POINTS

Public transport is time consuming and a quicker method would be preferred

Traffic is a big problem for her to be able to squeeze in everything she needs to do - would love if teleportation was an option

Doesn't enjoy driving, especially in peak hour but thinks it is the most convenient

The Transperth App doesn't have up-to-date coverage of construction and the bus tracker isn't always accurate

Students appear to have safety concerns with public transport

There are serious concerns about the cleanliness of public transport

Multiple stops/connecting journeys is a downside

GAIN POINTS

The Transport app can be used to track her son while he is on the bus

Likes the 2 zone max tickets for public transport

Transperth buses and trains are more convenient options as an international student

Lots of students seem to use the Transperth JourneyPlanner or Transperth App

GENERAL PUBLIC

THINK & FEEL

"As a mother, it frightens me looking at people riding on the e-scooters, I am terrified at what could happen."

Somewhat care about climate change, but not really enough for it to affect their daily travel decisions

"I use to ride bikes to work with my little ones and those areas where you would be close to the road use to scare me – it is certainly a safety issue. I think if you could separate them more, for sure people would be more inclined to ride."

Would bike to work if it was a shorter distance

Expect transport in the future of WA to be lagging behind other states

Feel like they can't do a whole lot about climate change

At the moment there are too many limitations when it comes to EVs like the inconvenience of charging

Can't really do much about climate change

Dislike lack of hygiene and social nature of public transport

Transperth workers are not nice, and make the experience worse

Scared of driving, so uses public transport

Love trains due to convenience, but the worst thing is buses because the don't meet up with trains so you have to use your car to get to the station

Easy to get anywhere by bus, but not by train

Frequency of buses on weekends is an issue

Like the train system because it is direct and convenient
Buses can be annoying because you have to figure out routes.

Would be more likely to catch the train if they could park there

Safety is an issue when it comes to public transport (dimly lit, not a lot of parking options, can feel unsafe taking certain train lines in certain areas)

Public transport doesn't get them to the right spot they want to get

Would prefer to use public transport because it's nice not having to worry about traffic and people driving dangerously
Public transport is inconvenient; it's such a long trip and if there is a delay it uses up a lot of time

Public transport is not as good as a personal vehicle when it comes to comfort

HEAR

Hearing other people's (good) experiences about new forms of mobility would encourage them to explore it

Lots of mixed messaging around climate change and its impacts/seriousness

Friends can't be bothered using Transperth app and so they miss trains

SAY & DO

Wouldn't drive to work if they didn't have a parking spot

Don't like the congestion on public transport

Public transport is expensive

They don't try to find information on alternative mobility options

Taking your car gives you more independence - you choose when you leave and the route you take.

"Public transport is slower than any other mode of transport."

Public transport can be convenient if you are close to a bus stop

Will always use the train to get to the city

Travel time is a lot longer with public transport

Sometimes impossible to make it to your destination in one stop

Really expensive parking in the city has encouraged them to use public transport to the city

"I think there are so many other ways to enjoy travelling."

Lack of organisation (and missing the train) has pushed them towards using their car

"If I have to do multiple things in a day, why would I take public transport when I can drive?"

Will cycle or walk if within 40 minutes

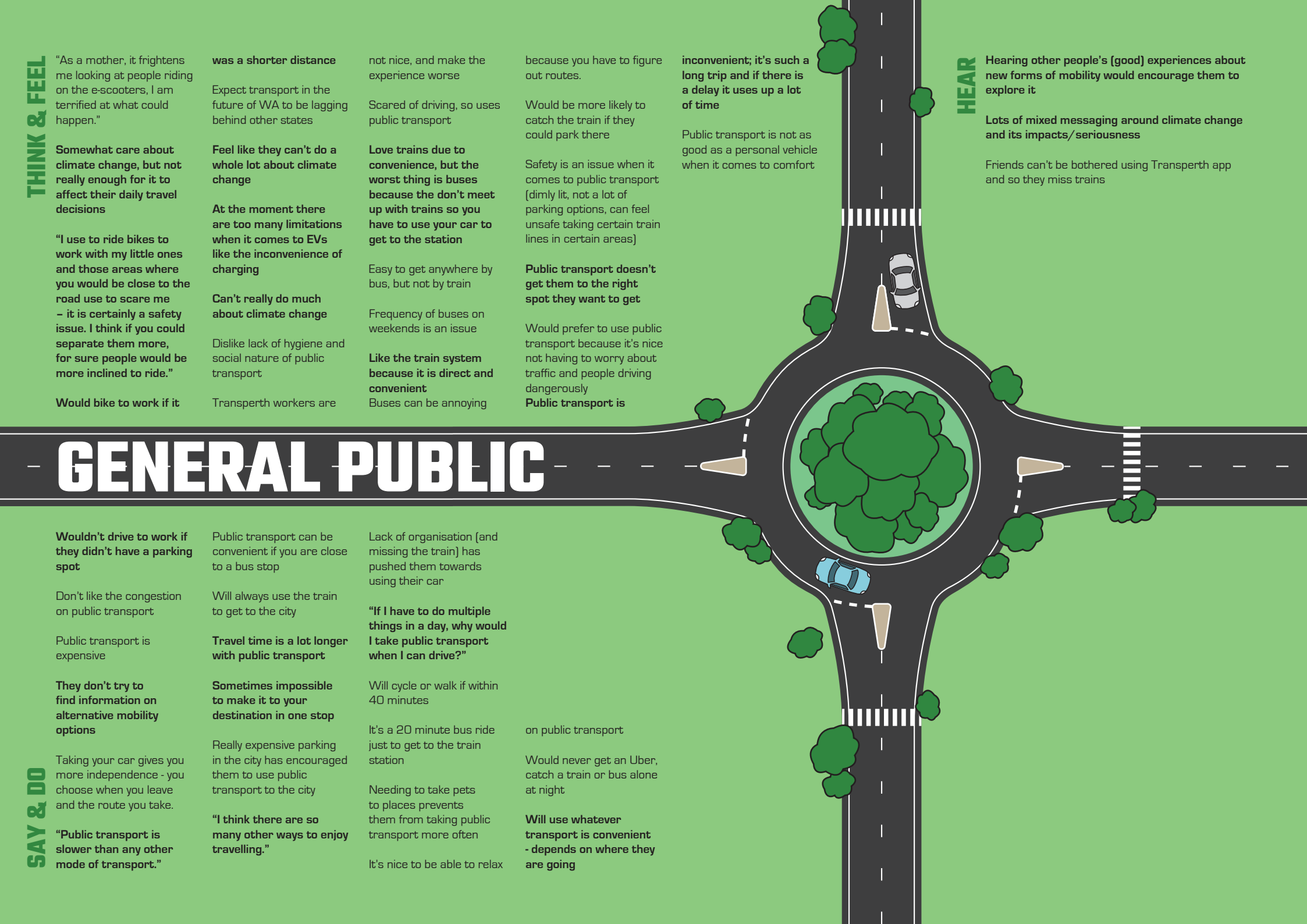
It's a 20 minute bus ride just to get to the train station

Needing to take pets to places prevents them from taking public transport more often

It's nice to be able to relax on public transport

Would never get an Uber, catch a train or bus alone at night

Will use whatever transport is convenient - depends on where they are going



SEE

Would like to see Sydney style buses (two storey with 'movable' seats allowing you to change the direction they are facing

Would like to see way cheaper parking or cheaper public transport

Would like to see implementation of light rail to connect certain areas

Would like to see more pushing for more eco-friendly transport - the technology exists and it is already happening in other places, so there is no excuse

Signage is not clear - 50% of the signs are difficult to understand

Negative experiences on public transport where people have been forced off the train due to bad behaviour

Would like to see a faster, more interconnected transport system

Would like to see more pet-friendly transport

OTHER INFORMATION

Most inportant travel/mobility factors
Time, speed, convenience, comfort, how easy it is to get there, cleanliness, how many stops, environmental impact, social aspect ("having an hour on the transport to just be no on is refreshing"), efficiency, accessibility, cost, climate change, time spent on the road, buses and trains being on time, having your own space, safety of travel at night and on public transport

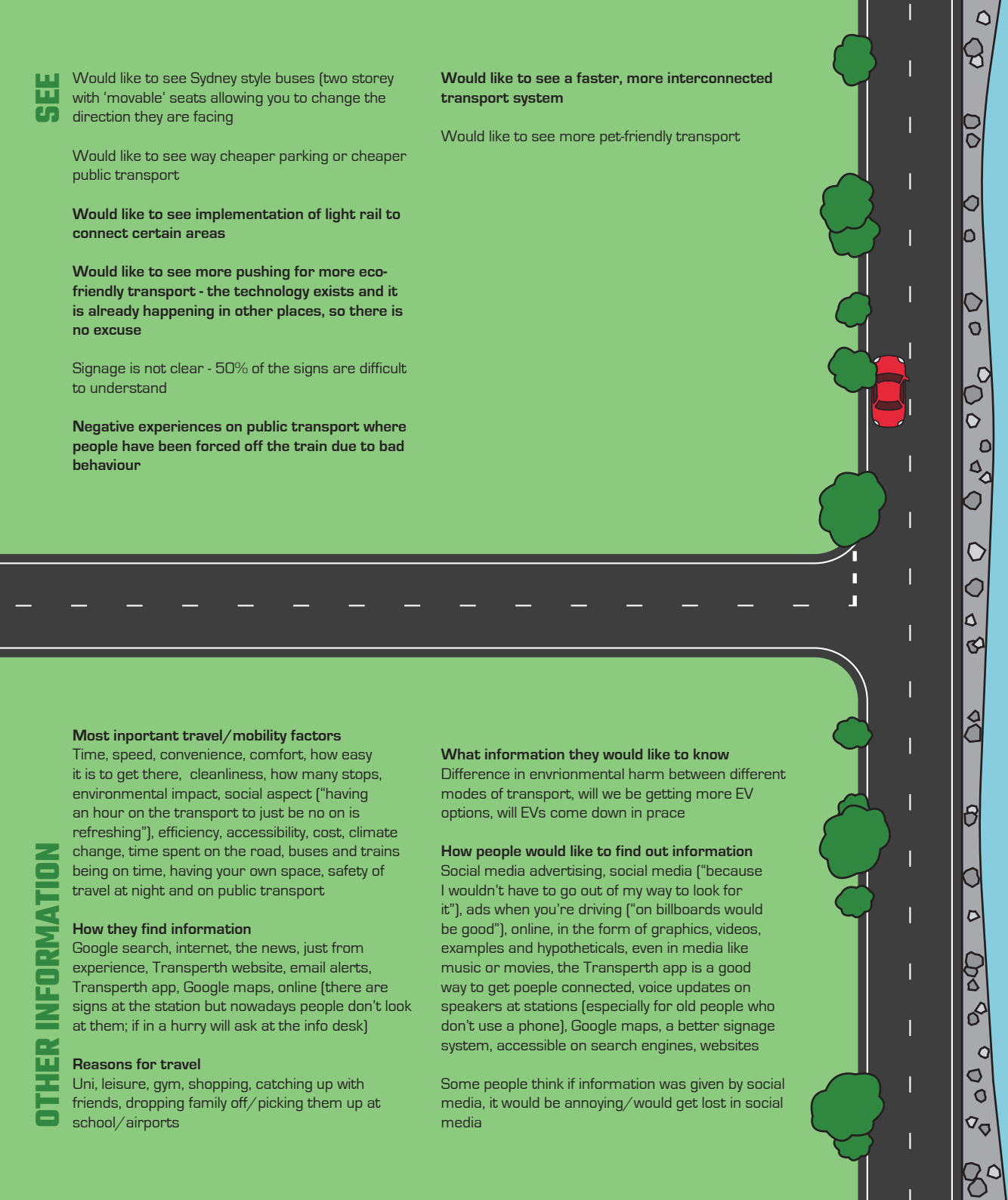
How they find information
Google search, internet, the news, just from experience, Transperth website, email alerts, Transperth app, Google maps, online (there are signs at the station but nowadays people don't look at them; if in a hurry will ask at the info desk)

Reasons for travel
Uni, leisure, gym, shopping, catching up with friends, dropping family off/picking them up at school/airports

What information they would like to know
Difference in envrionmental harm between different modes of transport, will we be getting more EV options, will EVs come down in prace

How people would like to find out information
Social media advertising, social media ("because I wouldn't have to go out of my way to look for it"), ads when you're driving ("on billboards would be good"), online, in the form of graphics, videos, examples and hypotheticals, even in media like music or movies, the Transperth app is a good way to get poeple connected, voice updates on speakers at stations (especially for old people who don't use a phone), Google maps, a better signage system, accessible on search engines, websites

Some people think if information was given by social media, it would be annoying/would get lost in social media



PAIN POINTS

A lot of people just don't have access to specific mobility options

A lot of people seem to think there is not anything they can do personally to make a difference when it comes to climate change

One of people's biggest concerns is the safety of public and shared transport, particularly at night

People seem to generally choose to use public transport to get to Perth CBD

Having multiple stops/connecting journeys to get somewhere is a barrier to using public transport for people

While a lot of people now climate change is an issue, it doesn't impact their travel decisions; convenience comes first and climate-friendly options are not convenient

A lot of people don't really know how they would like to receive this kind of information

GAIN POINTS

A lot of people know climate change is an issue

People are willing to use active transport, but long distances and weather create barriers

People will ultimately use whichever mode of transport is most convenient

WELL-BEING ORGANISATION

THINK & FEEL

Car is convenient and safer for a woman, don't like to feel tied to a schedule - she values her freedom

Weather is one of the biggest concerns

Traffic on the freeway takes too long

High rate of car accidents in Perth

Inspires family and friends with her example, and promotes the use of bikes and scooters

Car is the most convenient mobility option

Enjoys driving

Car is the only way to move around

Safety and anti social behaviour is a concern when using public transport

Would like to use more buses and trains but the frequency is not there and there are no other public transport options

Efficiency (in regards to time and affordability) is important

Parking prices are very expensive in the city

Think public transport is clean in comparison to Sydney and UK
In principle it is a good network but it is time consuming

Climate change is not as big as an issue as it is made out to be

Perth public transport is a good system that should be free for everyone to use; we are paying high taxes we should have more benefits

There are no direct options to move around

As a male, feels safe using public transport

Don't believe in climate change but considers environmental impact

The public transport system is too centralised - people need to go to the 'centre' just to go somewhere else

City distribution and design does not support walking, plus long hours at work makes it quite time consuming

Traffic seems to be concentrated because the public transport system is centralised around the city; everything is too centralised

SAY & DO

Uses car to move locally (groceries, leisure)

A life style of work and family commitments; needs to have access to travel options and move kids around quickly and directly

Travel to and from work on public transport to avoid traffic on the freeway

Car is the most efficient and convenient way of getting around

The car is a work tool that is used for courses, work and hobbies

Since last year has been making conscious changes in regards transport options to consider environmental impact

Bought a small car to go to medical appointments, shopping and socializing

Uses the car for work and also at his home

Uses car for taking his kids to school; when he is not with them, uses electric scooter to travel locally

Use Waze application because is in real time and have more options than Google Maps

Since using electric scooter and electric bike, doesn't use any other mode of transport to move locally

Would like to be able to go camping with an electric vehicle that is powered by the sun and self-sustaining

No access to public transport in rural areas and safety is much less than private cars

Kids are a source of information for parents

Values information via personal experiences and word of mouth

SEE

Electric small buses with no drivers and a capacity only for 20 people to go around locally 24/7

Having more access to public transport further into the suburbs

Would like to see more people who know the information and can inform them

Better design and planning in the freeway to solve traffic during peak hours

Like to see more bikes on the road like in Amsterdam and a system to hire bikes around and make it a cheap option for the public

Open forums with government organisations so people's opinions are valued

Allow bus tickets to be payed with bank cards

Like to see a system similar to Tokyo; railway that goes around in circle and provides a wider coverage; private cars have an elevated express lines built above one another, each one in only one direction

Honest and reliable information systems

Would like to see more electric buses like the one in South Perth

Would like to see an information system independent from the public transport website that provides information to the user of the overall calculations of emissions of each option to create personal awareness, control and accountability of life style

"Would like see an application that makes me more conscious of my options."

HEAR

Drunk people acting crazy

Kids share stories about funny individuals on the train ie. lady that always catches the train at the same time likes to sit in the same chair, and gets upset when some else sits in her chair

Likes to ring a landline and talk to people

Would like more audio facilities that provide information

PAIN POINTS

Privacy, autonomy and safety that private car provides; there is not enough security in public transport that looks after women specially

The distance that it takes to get to public transport further into the suburbs adds time to the journey

Public transport system is not that friendly because you need to change buses or trains because there are no direct routes

Considerable amount of people do not believe in climate change or do not believe it is an issue

Not aware of mobility options

GAIN POINTS

Generally open towards environmental causes

Want to be more aware of personal mobility options

Value information from peers, friends and relatives

MOBILITY ORGANISATION

THINK & FEEL

"it isn't necessarily the best model to just have a vehicle sitting there idle for days at a time"

"We couldn't really operate without mobility."

"we realise that mobility is kind of all interlinked, so it's not just the car."

[just converting to electric vehicles wouldn't work]: "if everyone was in their car...we'd have terrible congestion, so congestion is an ongoing issue, active transport is an ongoing issue"

"how do we keep our cities and our suburbs kind of all interconnected?"

"At the moment the technology is very, very limited."

Some transport technologies exist that would work for them, but those vehciles are not available in Australia

CO_2 light vehicle emission standard is needed to incentivise and penalise manufacturers to bring cleaner vehicles into Australia

Cleaner vehicles exist, but there is no incentive for manufacturers to bring them to Australia

Government has a long standing position of not doing anything too significant in Australia

"electric vehicles are still taking up the same road space, still causing the same car emissions from tyres and all the associated problems that go with cars"

"cities like Perth where we're so low density, so spread out, those e-ridables have a massive part to play because people might not want to ride 20km to their destination, but it becomes a lot easier when you've got an e-bike that can get your there with no sweat."

Cost is not really a huge part of the problem - but what's available technology-wise is

"people need to be able to choose how they want to get places."

If you do a direct comparison between a petrol vehicle and electric, electric comes out marginally clearner

"it's a transport and land use issue very much, that totally intertwines – so again, Perth with the urban sprawl: the further it spreads the further you've got to run your services and the less efficient everything is."

It is important to give people the option to not take their private vehicle

People who don't have the option to get an electric or hybrid vehicle should look at driving less (walking, riding and catching public transport when possible)

"there's 3 key factors when it comes to mode shift: cost, convenience and efficiency/speed."

"motoring is a massive enabler of quality of life and freedom for some many people and so many different contexts."

"But

THINK & FEEL (CONTINUED)

I also think we have such a massive potential to be world leaders here in sustainable mobility, we've got all these natural resources readily available to us."

"giving people the choices of how they can move around rather than telling them 'this is what you need to do'...choice is a huge one."

"...enabling that testing [of e-bikes]...lets people make that decision and see if it is going to work for their lifestyle - because people are quite scared to make that investment...before they actually test it because it is a sizeable chunk of money."

"step change, could be a social thing like Covid type of situation that you can't predict, or be as simple as a train station opening near someone's house. All of a sudden, there is a new option that wasn't there before and if they ignore it and keep sticking to their habits then it doesn't have any effect on them – but if people try it out, it can be a catalyst for change."

SAY & DO

"We do offset all of our vehicle emissions"

The technology for roadside assistance vehicles does not exist yet

"We are moving to a car-share model of electric vehicles for our pool cars"

"For our staff, we encourage obviously active transport."

"we have really good end-of-trip facilities and a really good, secure spot to store your bike or your scooter."

"We have a fleet of shared e-bikes for staff use as well."

Provide minimal parking options unless you are high-up in the company to encourage riding or public transport use.

2-month trials for e-bikes for staff

"we've got a team that actually dedicated to how we can decarbonise and electrify our raodside fleet."

"do you really need to jump in your car for the shop that's a block down the road?"

"linking up those [e-ridable] kind of trips to public transport whether that be through being able to bring them onto buses which a rack at the front of a bus for example at different times."
internally, most if not all vehicles are being converted to electric

Without limits on money, availability/access and technology, everything would be electrified

Would support subsidies and tax breaks for electric/hybrid vehicles

Get member (customer) online queries directed to them which they answer directly, with in-depth responses.

"EVs are still quite new to a lot of people, so we are having to educate people and answer very baseline questions on how they operate and what kind of emissions they produce, and why they should even consider one."

A growing number of the magazine issues they put out are related to emerging trends like sustainable transport.

SEE

"Can't imagine, a couple years ago we would see have imagined seeing this many e-rideables around on the paths."

"I would love to see us all walking and riding bikes, e-scooters, e-bikes and a lot less people driving in cities, personally."

"Would love to see electric and sustainability where we can with vehicles and public transport, a better-connected public transport system that fills in the some of the gaps."

"I'm not being stereotypical but seeing the older men on the e-scooters surprises me immensely, but I guess before that they didn't have a choice, so they would've gotten in their car. Now they have shifted their mode of transport."

"I think that's way you saw the carbon tax fall over because people could see immediate cost impact without any immediate environmental benefit."

"I think also to add to that, people tend to only make a big change in their transport habits, when there is a step change (eg. Covid) whenever there is a big event like that, that shakes things up, people might make a shift and then settle into a new habit – which is why...it is a little concerning to see increased private vehicles as a mode share, because there is a real potential that those habits will solidify, and people won't go back to catching a train to work."

HEAR

A better Principle Shared Path (PSP) network is needed for active travel. What's stopping more people from riding is being afraid of sharing space with cars - there needs to be a physically separate network, not just a painted bike lane. "All of a sudden you take away both of these things [limitations], you get so many people able to make the choice whereas currently, people might not feel like they can."

"68% of people say that the cost of EVs is just too high.10% say access to charging infrastructure is a concern, but when you talk to people, this isn't actually a real concern to them, because most people will charge at home, much like charging your phone."

"People don't want to be told 'you need to do x,y,z to get around'."

overwhelming majority of people think EVs are just another "gimmicky technology uptake".

One of the biggest demographics, is 35–45 year old females who work in office jobs in the city. There was a massive spike in e-bikes, because, apparently, it was a market that didn't really want to be riding. You don't have to get changed, you don't have to shower when you get to work. "It makes things easier and opens up that choice."

PAIN POINTS

Limited by technology

Limited by lack of availability of transport options in Australia (specifically new electric roadside vehicles)

Changes to government policy is a strong means of creating the necessary change

Urban sprawl and lack of density is a big contibutor to the issue, and a big barrier to overcome

Safety is an issue when it comes to e-bikes sharing the same raod space as cars; this presents a barrier

GAIN POINTS

Trying to do their best to implement climate-considered transport options

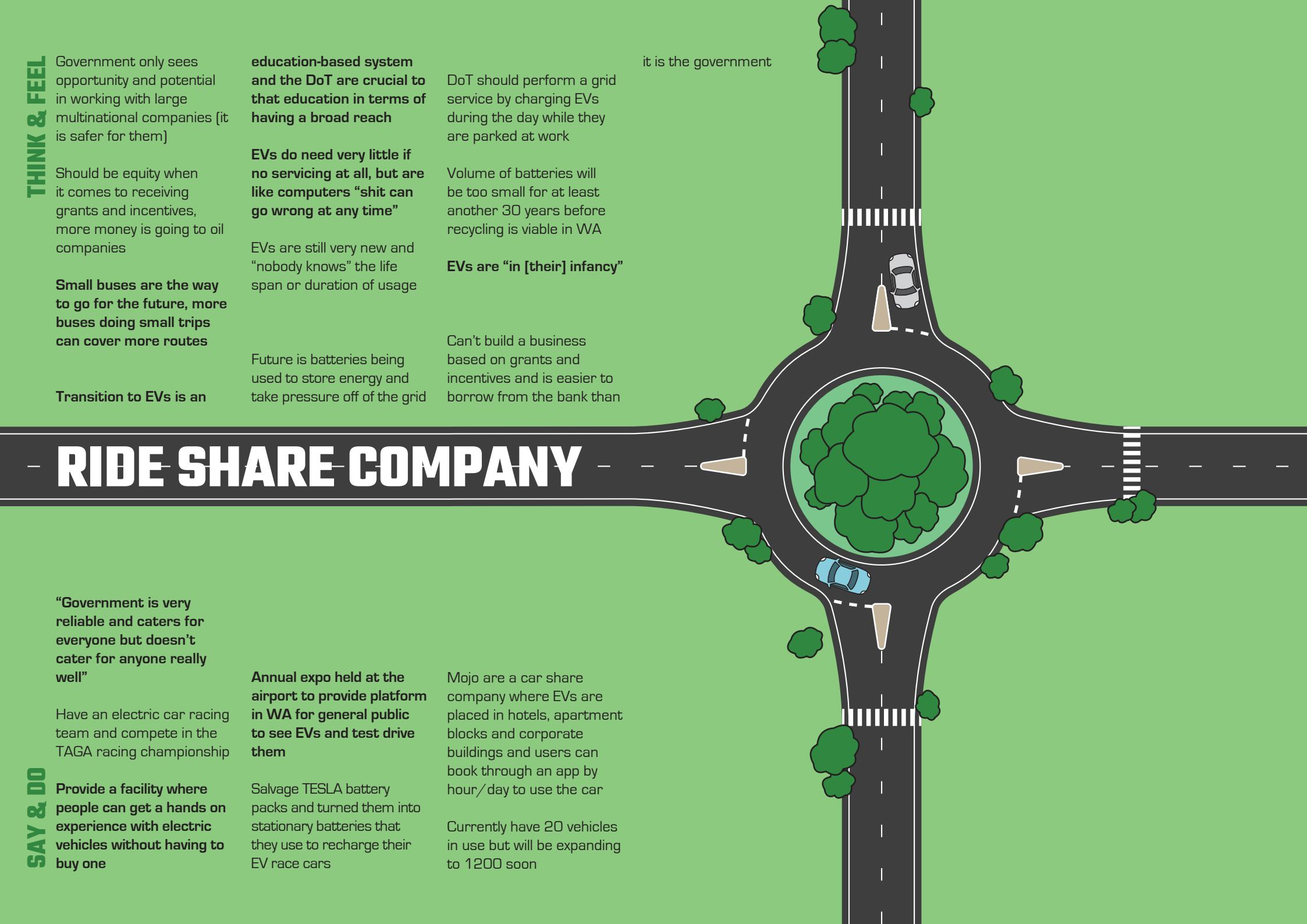
Finding information related to alternative transportation/mobility is a core part of what they do; they are essentially assisting with educating people about clearner mobility options

Where changes have been possible (eg. for converting to EVs) the changes have been made

E-ridables offer an alternative to non-electric bikes due to being able to travel far distances without having to worry about sweating or getting tired

People seem to be open to other options - but convenience is a crucial factor

RIDE SHARE COMPANY



THINK & FEEL

Government only sees opportunity and potential in working with large multinational companies (it is safer for them)

Should be equity when it comes to receiving grants and incentives, more money is going to oil companies

Small buses are the way to go for the future, more buses doing small trips can cover more routes

Transition to EVs is an education-based system and the DoT are crucial to that education in terms of having a broad reach

EVs do need very little if no servicing at all, but are like computers "shit can go wrong at any time"

EVs are still very new and "nobody knows" the life span or duration of usage

Future is batteries being used to store energy and take pressure off of the grid

DoT should perform a grid service by charging EVs during the day while they are parked at work

Volume of batteries will be too small for at least another 30 years before recycling is viable in WA

EVs are "in [their] infancy"

Can't build a business based on grants and incentives and is easier to borrow from the bank than it is the government

SAY & DO

"Government is very reliable and caters for everyone but doesn't cater for anyone really well"

Have an electric car racing team and compete in the TAGA racing championship

Provide a facility where people can get a hands on experience with electric vehicles without having to buy one

Annual expo held at the airport to provide platform in WA for general public to see EVs and test drive them

Salvage TESLA battery packs and turned them into stationary batteries that they use to recharge their EV race cars

Mojo are a car share company where EVs are placed in hotels, apartment blocks and corporate buildings and users can book through an app by hour/day to use the car

Currently have 20 vehicles in use but will be expanding to 1200 soon

SEE

Easier to convince Europeans because they have the education around electric vehicle benefits

Improvement in EV battery capacity; motorsport test shows racing EV vehicle needed its first service after only 3 years of top-level competitive motorsports

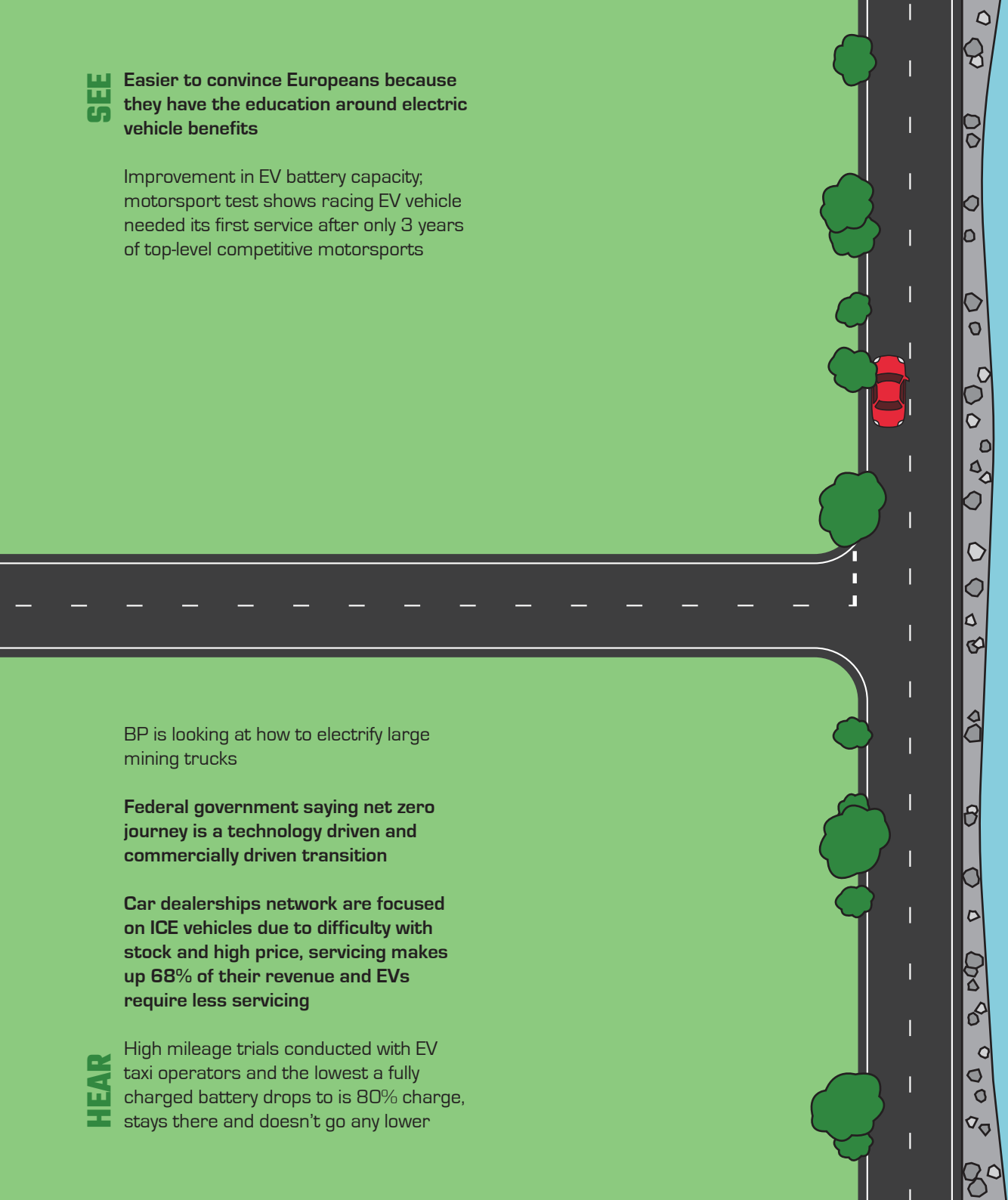
BP is looking at how to electrify large mining trucks

Federal government saying net zero journey is a technology driven and commercially driven transition

Car dealerships network are focused on ICE vehicles due to difficulty with stock and high price, servicing makes up 68% of their revenue and EVs require less servicing

HEAR

High mileage trials conducted with EV taxi operators and the lowest a fully charged battery drops to is 80% charge, stays there and doesn't go any lower



PAIN POINTS

No incentives from the government, put in grant with Synergy but didn't receive it

Transperth buses have a capacity of 60 people which means they can't make direct drop offs at locations

Ride sharing is a competitive indsutry with Uber, Ola, car rentals

Australia is still a long way behind in the uptake of electric vehicles

Are only just launching so are relying on referals and word of mouth

Is a company that has come out of Gemtek, they had the energy infrastructure but not enough electric cars to supply it

Haven't got a solution for end of trip side; suburban areas are a long way away and cars would need someone operating the vehicle to get them back to the site

GAIN POINTS

Car share is unique in WA with peer sharing

TESLA take a lot of data from Mojo due to their racing ventures being a world-first

Their service provides full perks of an EV vehicle without having to pay full costs that you would from owning a car (registration, insurance)

Ability to educate the general public through experiencing an EV vehicle for hire and through expo

CONSTRUCTION COMPANY

THINK & FEEL

Industry can be doing more in terms of reducing the environmental impact

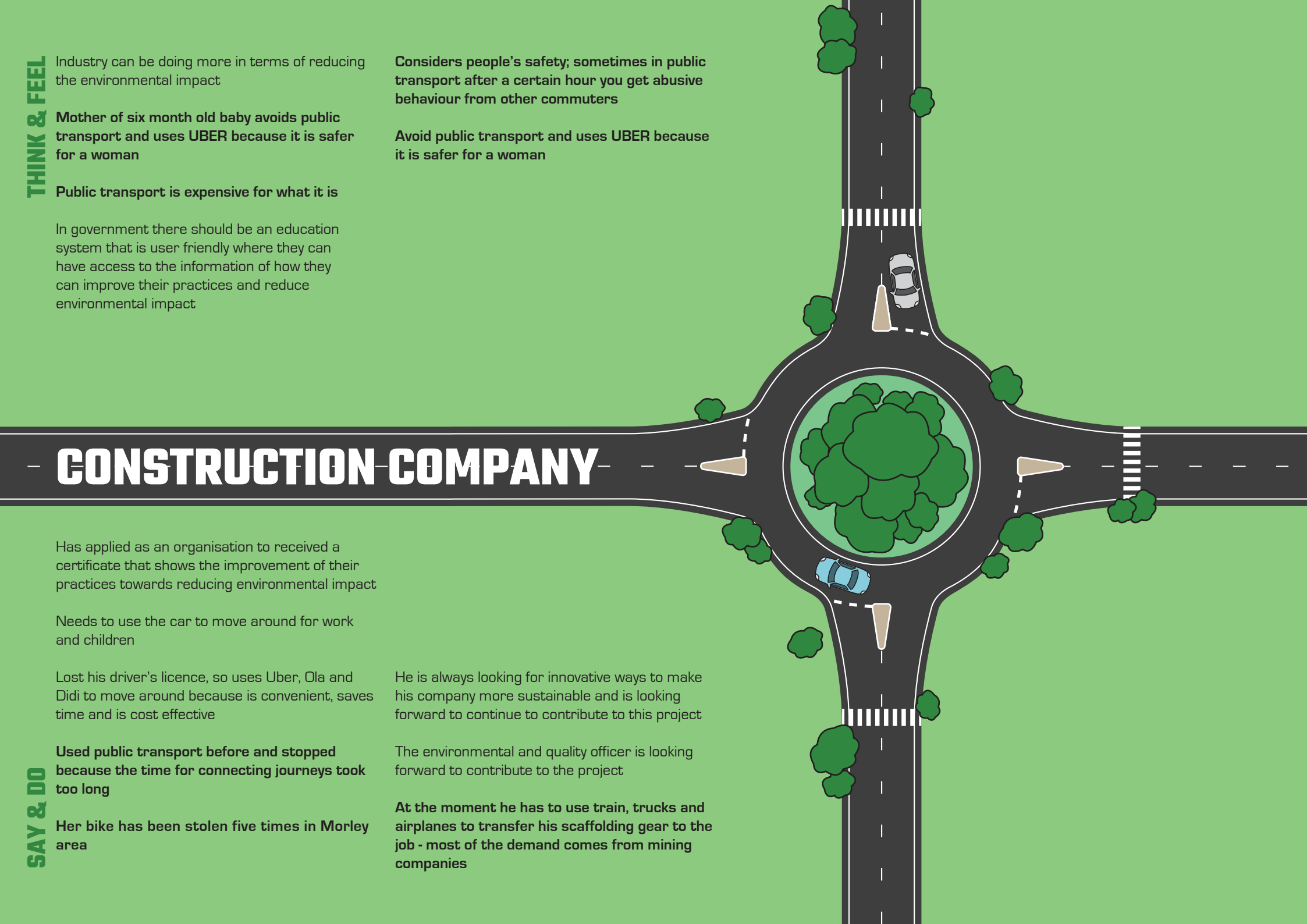
Mother of six month old baby avoids public transport and uses UBER because it is safer for a woman

Public transport is expensive for what it is

In government there should be an education system that is user friendly where they can have access to the information of how they can improve their practices and reduce environmental impact

Considers people's safety; sometimes in public transport after a certain hour you get abusive behaviour from other commuters

Avoid public transport and uses UBER because it is safer for a woman



SAY & DO

Has applied as an organisation to received a certificate that shows the improvement of their practices towards reducing environmental impact

Needs to use the car to move around for work and children

Lost his driver's licence, so uses Uber, Ola and Didi to move around because is convenient, saves time and is cost effective

Used public transport before and stopped because the time for connecting journeys took too long

Her bike has been stolen five times in Morley area

He is always looking for innovative ways to make his company more sustainable and is looking forward to continue to contribute to this project

The environmental and quality officer is looking forward to contribute to the project

At the moment he has to use train, trucks and airplanes to transfer his scaffolding gear to the job - most of the demand comes from mining companies

SEE

He sees people's needs first; decision making is human centred and he is always looking for ways to inspire positive change in the community

Would like to see a more connected transport system - for instance, train with Uber taxis at the stations

Would like to see staff members to be more friendly; bus drivers are rude and aggressive

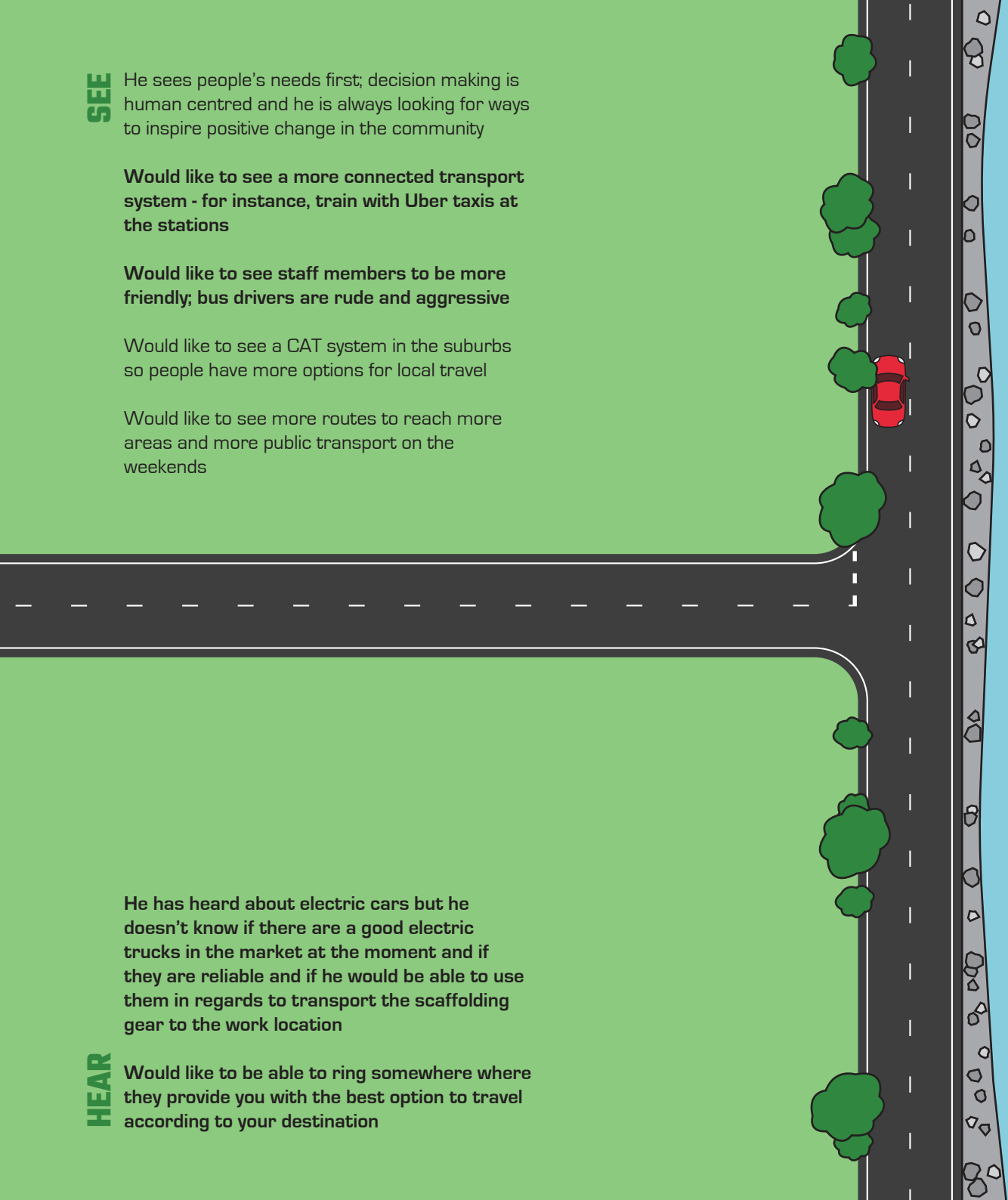
Would like to see a CAT system in the suburbs so people have more options for local travel

Would like to see more routes to reach more areas and more public transport on the weekends

HEAR

He has heard about electric cars but he doesn't know if there are a good electric trucks in the market at the moment and if they are reliable and if he would be able to use them in regards to transport the scaffolding gear to the work location

Would like to be able to ring somewhere where they provide you with the best option to travel according to your destination



PAIN POINTS

Restrictions and limitations due to transporting of gear and equipment

Lack of awareness around the available electric vehicles and their specifications

Safety concerns present a barrier to public transport

GAIN POINTS

Genuine interest in making a difference

Small changes (such as friendly transport workers) are important

DEPARTMENT OF TRANSPORT

THINK & FEEL

Information is "lost in the cracks"

Expecting to get a "tsunami" of questions around EVs really soon

"How do you change perceptions?" - It will be important to change people's perspectives

The biggest stakeholder "should be the minister"

"Get that experience to be general" for the public - experience is the key

Ultimate goal is behaviour change to lower emission transport

Educating the public is fundamental

When people understand the problem, they make long-lasting decisions that will reduce emissions

There is a missed opportunity to communicate with the public, stakeholders and staff

We need to remove distrust; existing resources are not informative; dispel misinformation

Educating on buzz words such as 'carbon footprint' is important - people need to understand

All stakeholders need to be in sync and collaborate

Communications is not a particularly sophisticated branch - "clunky system"

The website and current information accessibility is a "benefit and problem"

EVs are the solution - people to use more electric vehicles

HEAR

49% of people's biggest complaint is they "can't find what we are looking for" within the DoT website

Younger people have more positive view of affordability and range compared to other age groups

EVs are seen as too expensive and lacking a good range of options

People respond well to and value being given information and choice

Some awareness of our own vehicle emissions is present, however, this differs between people

"Too much information on the website" which was making it not user-friendly

The further people live away, the more time they spend travelling

Availability of charging stations positively impacts considerations to get an EV

SAY & DO

Stories are key for change and being the difference -"Select champions based on different spheres of life"; "finding those influences, relatable people, has so much power in storytelling"

Communications team is reactive rather than proactive and innovative; have a view that the media is the biggest stakeholder

Website is not user-friendly; only user-friendly for some people, "if you know where to look" but there is not very much information

"So much information in different places, no central space for the public to find out"

"Intensive, personalised and tailored" programs motivate change in people - Your Move

Your Move contract out companies to do their (formative) ethnographic research

The DoT focuses more on the licensing and registration of an EV vehicle, DWER have a more overall involvement with EVs

Market research that has been done

- Ownership of EVs is very low (1% of population)
- Intention to purchase an EV vehicle or interest (51%)
- **Half are concerned about the distance an EV can travel on a single charge**

Inform the Transport Minister on potential opportunities for the WA Transport industry

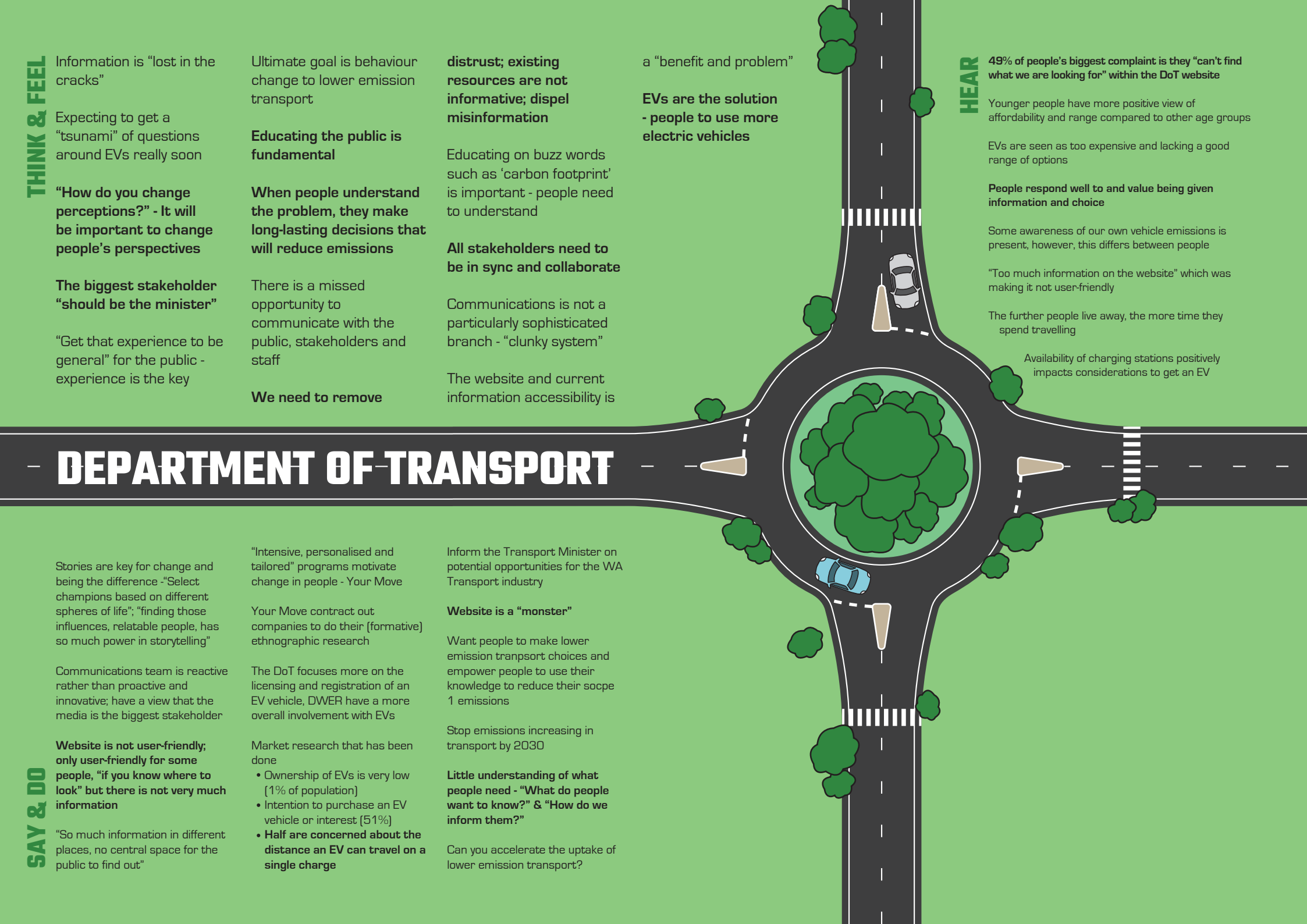
Website is a "monster"

Want people to make lower emission tranpsort choices and empower people to use their knowledge to reduce their socpe 1 emissions

Stop emissions increasing in transport by 2030

Little understanding of what people need - "What do people want to know?" & "How do we inform them?"

Can you accelerate the uptake of lower emission transport?



SEE

The siloed departments within the DoT- Departments need to work together and collaborate

Public mindset is that EVs are transport therefore belongs to the DoT

Climate change and energy change is a low priority for people - "very personal motivations, what is in it for me, time savings, cost low down"

People skeptical of climate change

There is a massive amount of misinformation out there

EVs sits with DWER - some information is confidential

People use transport networks based on where they live and how accessible those networks are

There is outdated information on their website

Public facing local champions can help share the resource - be the voice to change, knowledge dissemination

OTHER INFORMATION

Rewiring Australia – Electrify Everything **https://www.rewiringaustralia.org/about** Carole and Claire liked how they displayed this information through illustrations and videos that were simple to demonstrate and then click on each item to get more in-depth information

Good example of a champion is Gemma Green - involved with the city of Perth, the Power ledger

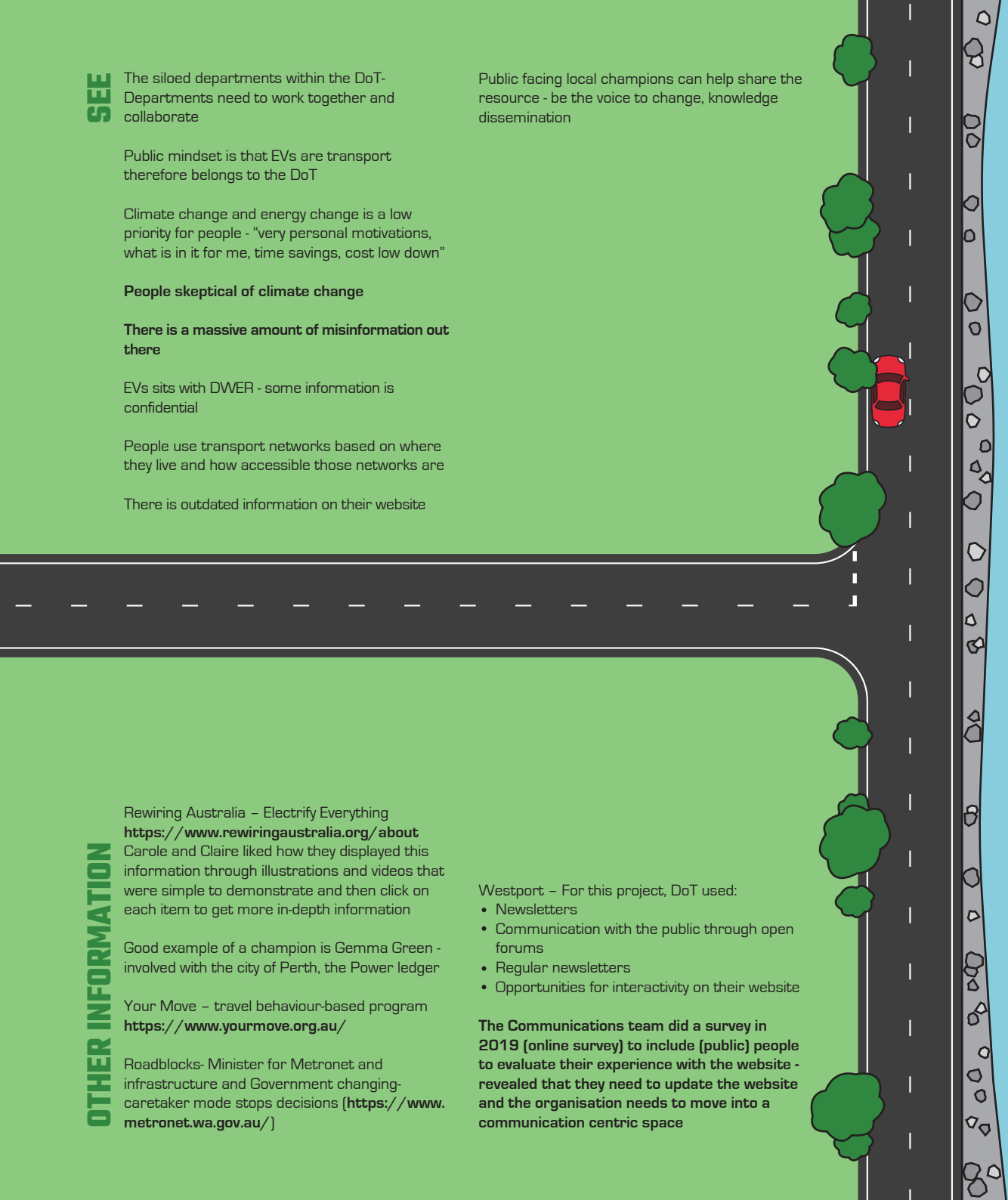
Your Move – travel behaviour-based program **https://www.yourmove.org.au/**

Roadblocks- Minister for Metronet and infrastructure and Government changing- caretaker mode stops decisions (**https://www.metronet.wa.gov.au/**)

Westport – For this project, DoT used:

- Newsletters
- Communication with the public through open forums
- Regular newsletters
- Opportunities for interactivity on their website

The Communications team did a survey in 2019 (online survey) to include (public) people to evaluate their experience with the website - revealed that they need to update the website and the organisation needs to move into a communication centric space



PAIN POINTS

DoT website is currently fairly transactional (oriented towards driver and vehicles services)

Public doesn't not understand/ confusion that EVs sit with the PTA

Project can have information placed in a public domain if needed but "we'd [DoT] have to have somewhere to put it for a start"

A confusion between climate health and personal health (need to communicate that reducing emissions will be beneficial for both simultaneously)

Long term impact is only 4 years

DoT is not allowed to link to any private sites

The price disparity between purchasing a petrol or diesel car (that have been around for longer and therefore cheaper) and an electric vehicle (relatively new to the scene)

Restrictions with what information can be displayed on the DoT website

Currently has minimal direct communication with public

Rent and the government regulations that come with renting - approve charging points at home

GAIN POINTS

Aware there is a disconnet between the DoT and the public

Creating advocacy challenges and influencers has proven to work in motivating people

The Your Move Program is the area of the DoT that communicates with the public the most and is effectively working

Wealth of knowledge on lowering emissions, in particular, Scope 1

PUBLIC TRANSIT AUTHORITY

THINK & FEEL

People are concerned about bicycle theft at PTA bike lockups

Time is worth more to people than money

Magic 60 minutes – people want to travel on public transport in under 60 minutes otherwise they will drive

Stakeholder involvement is seen as important

Smart freeway (Mainroads WA) - has had a better design over the last few years

SAY & DO

Capped fare structure aims to get people back after Covid

During the consultation for rebuilding Fremantle Traffic Bridge, there was community backlash against the proposal; different options were explored by the community, however in the end back to same decision.

The Director has begun to facilitate and create more discussion between the departments in the Transport Portfolio

Engage in regular meetings between agencies monthly

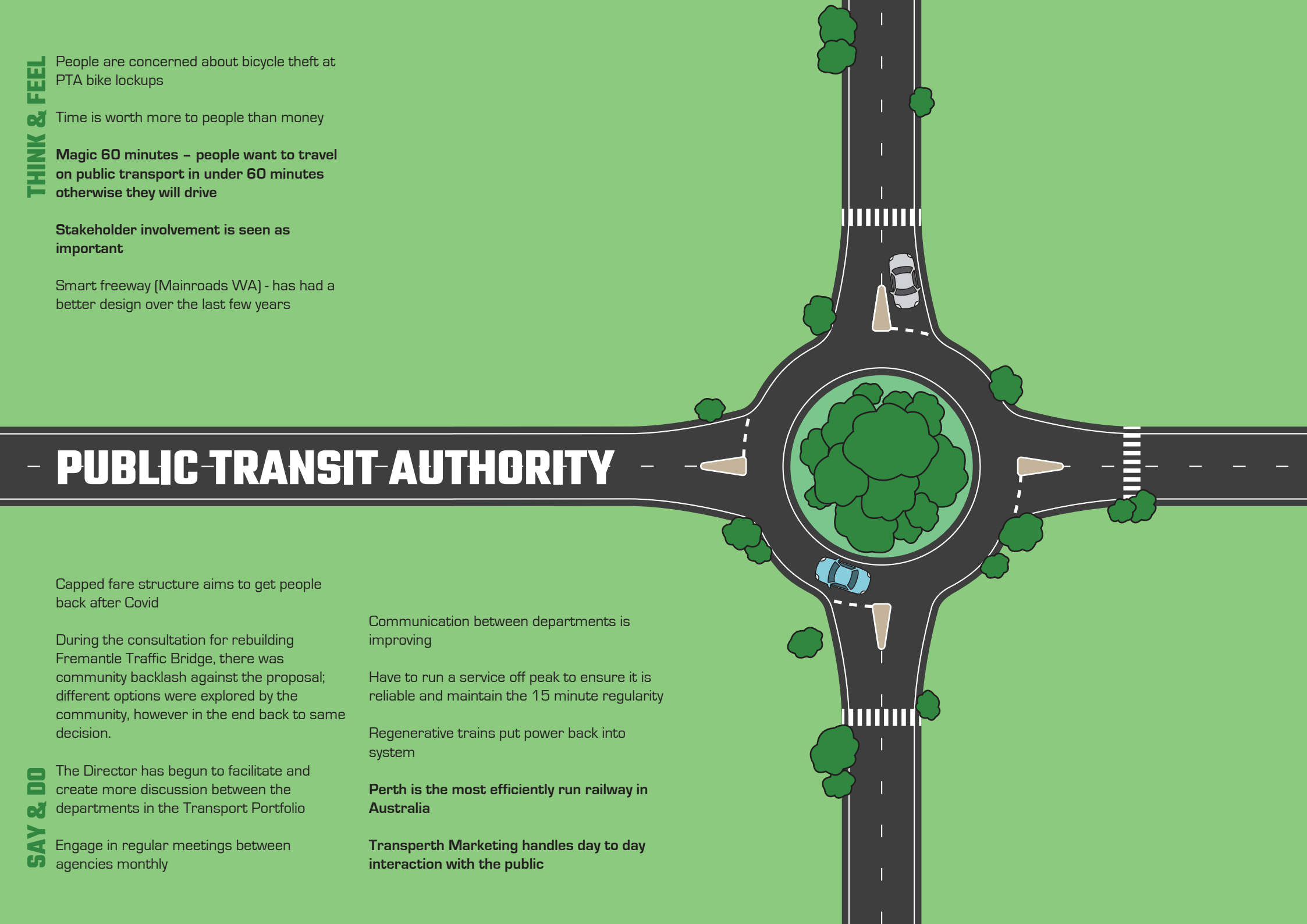
Communication between departments is improving

Have to run a service off peak to ensure it is reliable and maintain the 15 minute regularity

Regenerative trains put power back into system

Perth is the most efficiently run railway in Australia

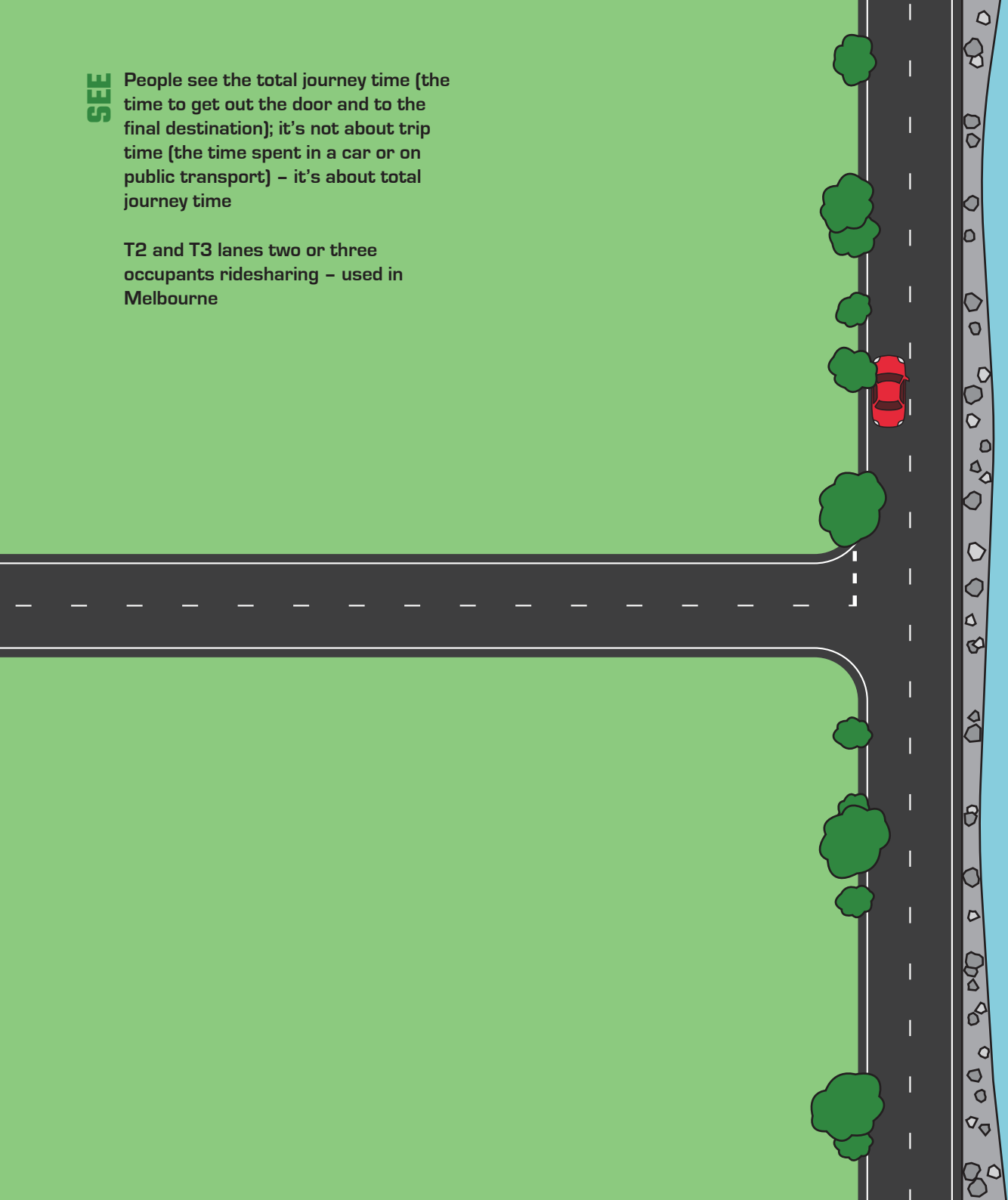
Transperth Marketing handles day to day interaction with the public



SEE

People see the total journey time (the time to get out the door and to the final destination); it's not about trip time (the time spent in a car or on public transport) – it's about total journey time

T2 and T3 lanes two or three occupants ridesharing – used in Melbourne



PAIN POINTS

Long term planning is difficult - government organisations have to be prepared to change every four years

Government of day has own ideas

Electric vehicles require a lot of new infrastructure: charging facilities, training, land, necessary, fast charge, maintenance

The longevity of electric vehicles is unknown

The Transperth App needs to be made easier and the Transperth website needs to be simplified

GAIN POINTS

Offer incentives like free public transport for PTA employees and discounts for spouses

The Public Transit Authority is planning ahead – there is an open transport corridor that runs down the freeway; this leaves the option open for an extended trainline in 30-40 years

THINK & FEEL

Judges his transportation options based on what it is more suitable and convenience depending his location

He thinks about his options of transportation according of what it is more convenient at the time

The cost of parking in the city is very expensive and there are not enough spaces available

Fights on the train

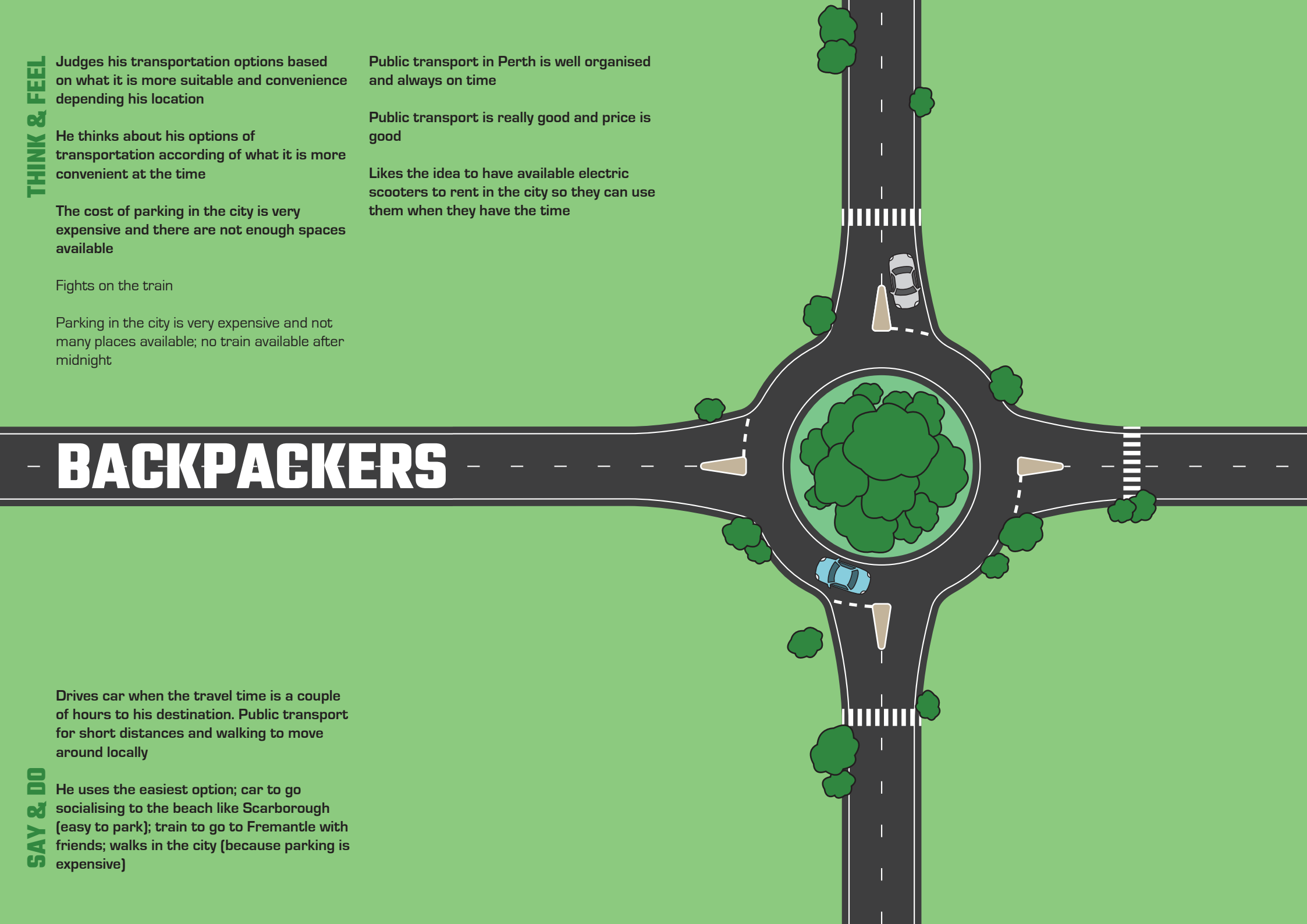
Parking in the city is very expensive and not many places available; no train available after midnight

Public transport in Perth is well organised and always on time

Public transport is really good and price is good

Likes the idea to have available electric scooters to rent in the city so they can use them when they have the time

BACKPACKERS



SAY & DO

Drives car when the travel time is a couple of hours to his destination. Public transport for short distances and walking to move around locally

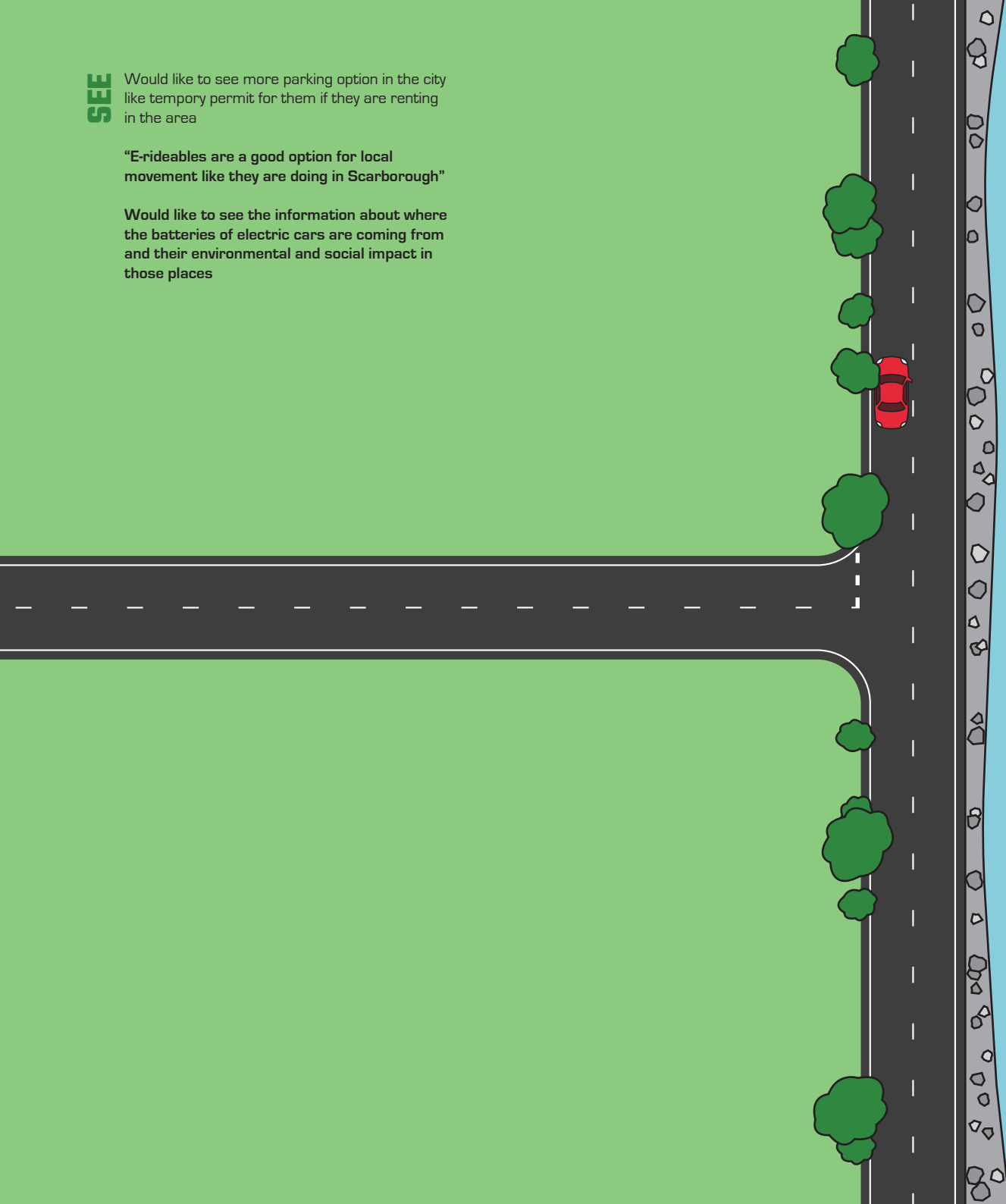
He uses the easiest option; car to go socialising to the beach like Scarborough (easy to park); train to go to Fremantle with friends; walks in the city (because parking is expensive)

SEE

Would like to see more parking option in the city like tempory permit for them if they are renting in the area

“E-rideables are a good option for local movement like they are doing in Scarborough”

Would like to see the information about where the batteries of electric cars are coming from and their environmental and social impact in those places



PAIN POINTS

Some bad experiences on public transport

Not enough trains running at night

Not enough parking space in the city (and parking is very expensive)

GAIN POINTS

Have a generally positive opinion of public transport

Think pricing of public transport is good

Open to alternative methods of transportation like e-ridables

GOVERNMENT ORGANISATION

THINK & FEEL

We need more electric buses, taking bicycles around Perth is quite risky and dangerous

We should have electric buses instead of gas buses, and more trains – in Western Australia it is quite limited

More regulations are required in Australia on how many petrol cars we let in. We don't even need to start big – we just need the basics (train, subway, bicycles).

Cars have such a big role in Australian culture – we take our car for everything – it's designed so that you need a car here, you can't be without one

It's more about creating policies around the dirty cars

Don't think we need to provide subsidy – more chargers are important – more organisations open to universal chargers

Because of the resources we have, we should produce batteries here rather than selling our resources overseas – this would reduce the costs as well

The more dirty your car is that you're willing to give up for an EV the larger subsidy you would get for purchasing an EV

Hopefully it will take 20 years or one generation – we only need one generation who is committed to being more sustainable

It is our duty to make a change – all of us doing a little bit on our own will make a difference

Hoping that the new generation will be more curious and will realise they actually need to take care of our world

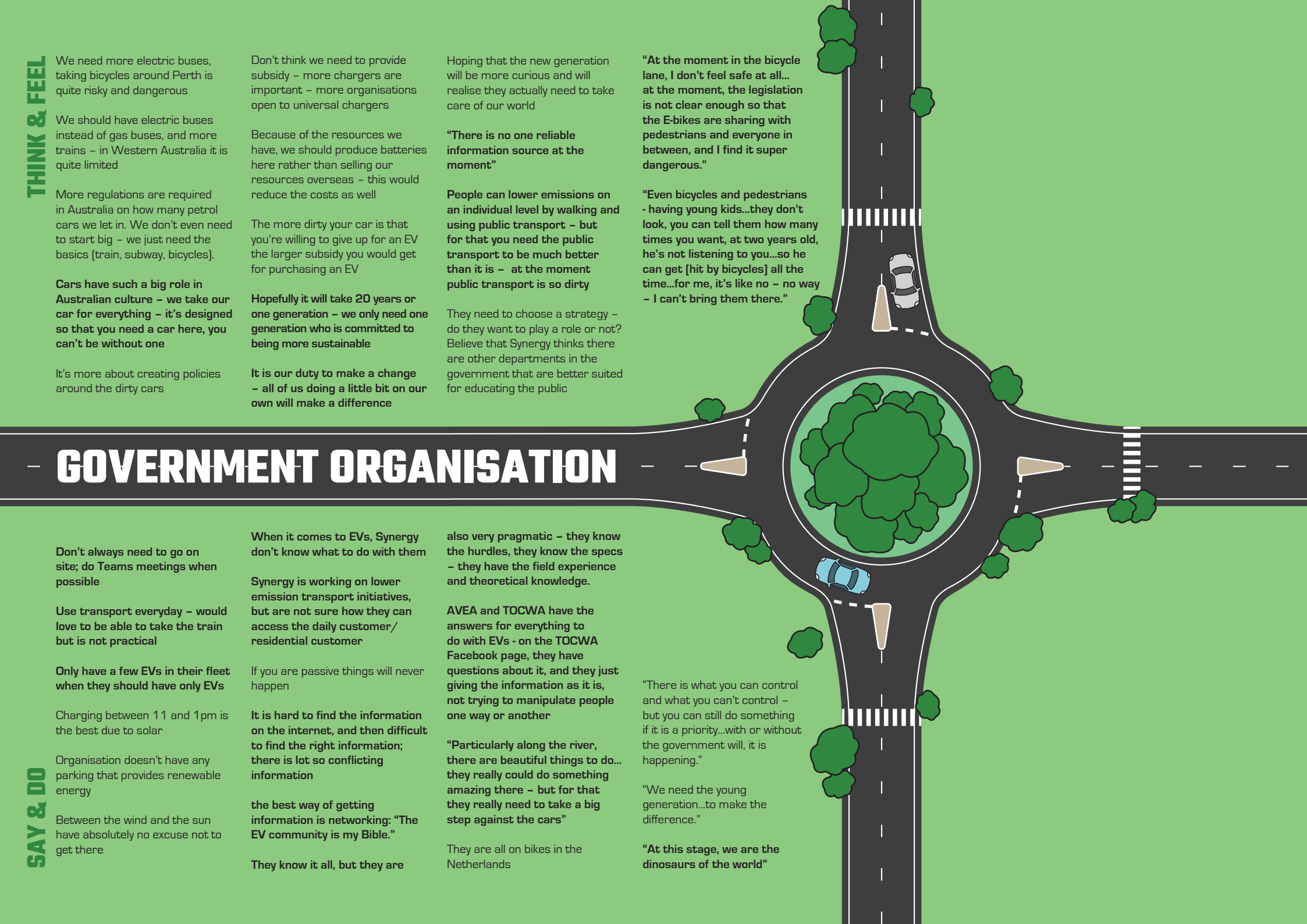
"There is no one reliable information source at the moment"

People can lower emissions on an individual level by walking and using public transport – but for that you need the public transport to be much better than it is – at the moment public transport is so dirty

They need to choose a strategy – do they want to play a role or not? Believe that Synergy thinks there are other departments in the government that are better suited for educating the public

"At the moment in the bicycle lane, I don't feel safe at all... at the moment, the legislation is not clear enough so that the E-bikes are sharing with pedestrians and everyone in between, and I find it super dangerous."

"Even bicycles and pedestrians - having young kids...they don't look, you can tell them how many times you want, at two years old, he's not listening to you...so he can get [hit by bicycles] all the time...for me, it's like no – no way – I can't bring them there."



SAY & DO

Don't always need to go on site; do Teams meetings when possible

Use transport everyday – would love to be able to take the train but is not practical

Only have a few EVs in their fleet when they should have only EVs

Charging between 11 and 1pm is the best due to solar

Organisation doesn't have any parking that provides renewable energy

Between the wind and the sun have absolutely no excuse not to get there

When it comes to EVs, Synergy don't know what to do with them

Synergy is working on lower emission transport initiatives, but are not sure how they can access the daily customer/ residential customer

If you are passive things will never happen

It is hard to find the information on the internet, and then difficult to find the right information; there is lot so conflicting information

the best way of getting information is networking: "The EV community is my Bible."

They know it all, but they are also very pragmatic – they know the hurdles, they know the specs – they have the field experience and theoretical knowledge.

AVEA and TOCWA have the answers for everything to do with EVs - on the TOCWA Facebook page, they have questions about it, and they just giving the information as it is, not trying to manipulate people one way or another

"Particularly along the river, there are beautiful things to do... they really could do something amazing there – but for that they really need to take a big step against the cars"

They are all on bikes in the Netherlands

"There is what you can control and what you can't control – but you can still do something if it is a priority...with or without the government will, it is happening."

"We need the young generation...to make the difference."

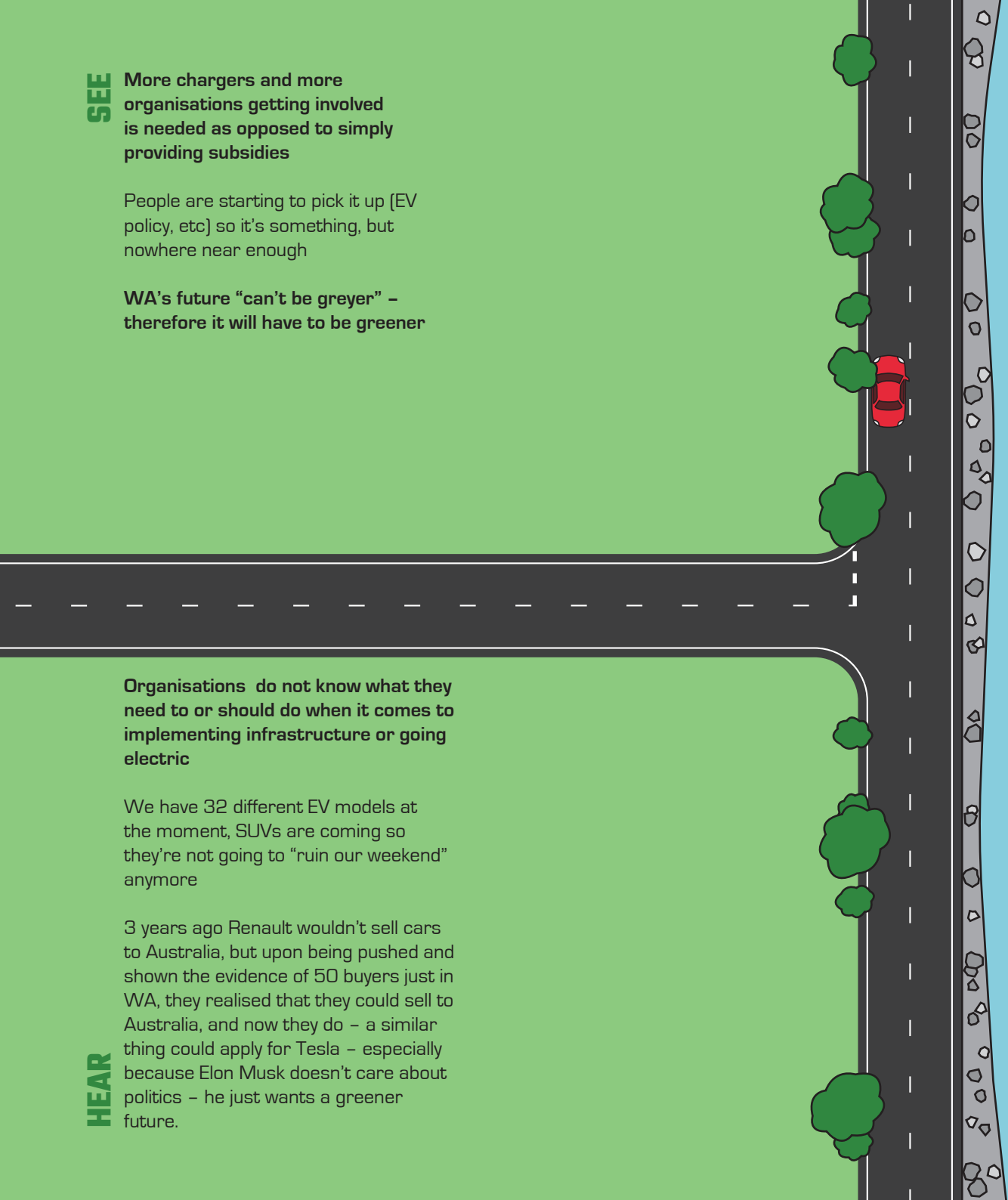
"At this stage, we are the dinosaurs of the world"

SEE

More chargers and more organisations getting involved is needed as opposed to simply providing subsidies

People are starting to pick it up (EV policy, etc) so it's something, but nowhere near enough

WA's future "can't be greyer" – therefore it will have to be greener



Organisations do not know what they need to or should do when it comes to implementing infrastructure or going electric

We have 32 different EV models at the moment, SUVs are coming so they're not going to "ruin our weekend" anymore

3 years ago Renault wouldn't sell cars to Australia, but upon being pushed and shown the evidence of 50 buyers just in WA, they realised that they could sell to Australia, and now they do – a similar thing could apply for Tesla – especially because Elon Musk doesn't care about politics – he just wants a greener future.

HEAR

PAIN POINTS

The resources we have available in the state should be used on producing batteries here rather than sell our resources overseas

Not enough is being done for the average citizen to be able to comfortably afford an EV

There are a lot of knock backs on projects that are 'for the better' due to conflicting policies. Anything you want to do has to go through the Minister, so requires a lot of work and processes to get things to go through. If they really don't want to do it, then it won't happen; it's not related to money; it's very much political.

Biggest challenge to achieving a zero emissions transport system is lobbying and the willingness of politicians; only thing that is blocking it is money (profits of big petrol companies)

"If I didn't have kids, I'd have an electric bike, that's for sure."

Synergy provides information to the public throgh the website mainly, but it is mainly about billing, and hasn't been updated in a while

GAIN POINTS

Are aware that something needs to be done

Actively working on lower emission transport initiatives, but do not know how to reach the everyday user

Do meetings online when possible so they do not have to go on site

PERSONA STORY WORLDS

Using the personas, developed earlier in the project, we developed persona story worlds based on the interviews we had conducted with the public, giving valuable insights based on real people rather than fictional characters. The story worlds delve deeper into individual travel journeys and experiences, thoughts and opinions, and insights we gathered from interviews.

JACKSON CONNORS

Backstory

Jackson has grown up in Perth, WA, where he lived with his parents and younger brother. He attended Willetton highschool, during his time there, realised he wanted to become a physics teacher.

After completing high school, Jackson took a gap year during which he worked and travelled around Europe with his friends. Upon returning, he went to the University of Notre Dame to study high school teaching. About a year ago, he moved out of home and now lives in a rental in Manning with 2 housemates.

Current Situation

Jackson is a full-time university student, in his final year; alongside his studies, he is a casual employee at Kmart.

Jackson's time is divided up between doing assignments, preparing for prac, working, going to the gym, and hanging out with friends.

The Purpose

The purpose of this activity was to produce persona profiles where the information was based off told insights directly from members of the public that we interviewed during our ethnographic research. This gives us a more accurate picture of the people we are designing for when attempting to put together concepts for our information system by avoiding stereotypes and assumptions of our stakeholders.

GOALS & VALUES

Complete undergraduate degree.

Become a high school physics teacher, and hopefully inspire the next generation through learning.

Jackson currently lives in a rental with 2 housemates, but is wanting to move into his own place in the next couple of years.

Jackson values a work-life balance; while he enjoys teaching, he also enjoys the flexibility provided by school holidays, and spends this time going out with his friends.

I THINK/FEEL/KNOW

"I think climate change is a serious issue, and we need to act now to prevent increasingly worse impacts - making sure people know the seriousness of this is key for that to happen."

"I believe that we need to become more sustainable in a lot of things we do - transport is just the tip of the iceberg - but we've got to start somewhere."

"I know I'm not the most sustainable traveller - and it's not that I don't want to be, it's just that for me, the most convenient ways of travelling at the moment are also some of the least sustainable."

ISSUES & CHALLENGES

When Jackson was living with his parents, he caught the bus to and from school due to the short distance only requiring a single bus trip. However, due to the distance he lives from the university now and the logistics of getting to schools for the practical component of his course, Jackson's main use of transportation is his car.

Jackson would ideally like to use more active transport, but due to the distance to the place she most frequently goes, he uses his car for most of his trips. Additionally, he values the flexibility that a car provides; he can leave directly from his home, and does not have to wait for a timetable.

WORKAROUNDS

For short trips within walking distance, Jackson always tries to walk if the weather is decent.

Once Jackson gets a job as a teacher, he intends to move into a house somewhere nearby. While this is more for convenience, this will reduce the emissions he causes through travel - and if he can find a place that is close enough, he would definitely consider riding to work.

BELIEFS ABOUT CHANGE

Jackson believes change is possible, and crucial in the times we are living in. However, he also believes that when it comes to creating positive change, there is not enough being done - especially when it comes to issues like climate change.

Jackson believes that research, technology and science are the fields that are key to creating positive change in our world. However, as a soon-to-be teacher, he also believes that education has a critical role to play in this too.

CAPACITIES & RESOURCES

Jackson is fairly good with technology; he knows how to use it and it comes fairly intuitively to him.

He is also quite good at research due to the work he has to do for his course.

Jackson has great communication skills, and understands people learn in different ways

Jackson considers teaching as not only a platform for educating young people, but also inspiring and encouraging them. He believes the role of teachers is incredibly important in raising the next generation to be even better than that last.

RELATIONSHIPS WITH ORGANISATIONS

Jackson's interaction with organisations related to transport and mobility is quite limited; the only real interaction would be with staff on buses and trains occasionally, and using the Transperth JourneyPlanner.

As a 4th year student at Notre Dame university, Jackson has frequent contact with other students and staff.

At his casual job at Kmart, Jackson has frequent interaction with other staff that he has worked with for 3 years.

DEVICES & TECHNOLOGIES

Jackson has an iPhone 11, which is the main technology that he uses when he is on the go. He uses this for social media, responding to emails, and listening to music.

For university, Jackson has a Macbook Air, which he uses for assignments, research and creating lesson plans and powerpoints for his prac classes at schools. He also uses this laptop for personal acitivites like social media, watching YouTube videos, and watching Netflix.

Jackson's work involves little use of tehcnologies aside from the cashier machine and a mobile device used for looking up products.

KEY INSIGHTS

- Some people are aware of the threat climate change poses, but are not doing very much when it comes to transport.
- While people may be willing and wanting to assist with reducing emissions, they will not make changes at the cost of convenience.
- Education is a powerful tool, and educating and inspiring the next generation is critical to solve issues like climate change which will be relevant for years to come.
- Education is critical to creating the positive change in our world.
- People learn in different ways, and to effectively educate them, those different ways need to be catered to.

Backstory

Julia was born in Perth, Australia, however, she lived in Norway from the ages of 12-18. It was here that she learnt about the importance of climate change through the progressive nature of the country and focus on sustainable transport.

After arriving back in Perth, she attended university to undertake a degree in Health Sciences. Although completing her degree she realised her passion was rather in photography.

Current Situation

Julia is currently working as a personal assistant to a high-end commercial photographer.

Although her job is time-consuming and exhausting, she still finds priority in socialising with her friends and family and keeping healthy through regular exercise.

GOALS & VALUES

To become more knowledgable in the practice of photography skills from watching and learning from her boss

Enroll in further photography course at TAFE to strengthen her skills

Start her own company as an event photographer for weddings, birthdays and other special occasions

To use her car less where she can for travelling

Has strong family values and wishes to support her parents in their retirement

I THINK/FEEL/KNOW

"I think there should be more planning into the construction of public transport for long distances rather than more roads for cars"

"I feel like I would be able to achieve my goal of using my car less if there were more shorter bus routes that could get me between destinations faster"

"I know that the road to education on climate change is long but I want to do what I can to play my part in a worthwhile cause to benefit our future generations"

ISSUES & CHALLENGES

As a personal assistant, Julia has to travel frequntly during the day to run errands for her boss. These locations could be within the CBD where her office resides, or they could be half an hour away.

Julia is aware of how much emissions is produced through travel but with errrands ofttен at long distances and a time span that she needs to complete them in, she still uses her own car to get around

She would like to use public transport more but it is too time consuming when she has busy days at work and lots to get done.

WORKAROUNDS

On quieter days at work, Julia will try to run her errands via public transport or use carpooling apps to share rides with others. When locations are within walking distance in the CBD she will prefer to get there through this form of transport instead.

She also attempts to use public transport on her days off to make up for her usage during the week. When going out to events or socialising with friends she tries to catch Ubers with friends to avoid dangers of travelling alone through public transport.

BELIEFS ABOUT CHANGE

Julia thinks that change is necessary to live in a world that is beneficial for us but but believes that due to skeptics of climate change and those with cognitive dissonance (discomfort when their morals don't match their actions) that change will be harder to achieve.

She believes that education is key to getting people to understand the importance of climate change and breaking down these barriers to reducing emissions that are as a result of lack of knowledge and sources for appropriate information.

Julia believes that further education of climate change will see an increase in healthy exercise and habits as a result of less driving.

CAPACITIES & RESOURCES

Has learnt how to use Adobe Lightroom and Photoshop to edit her photographs through adjusting lighting, colour correction, photo manipulation and removal of objects.

Julia has excellent communication skills as her job requires her to contact clients and pass on this information to her boss. With this also comes effective organisation and time management skills for planning and helping to set up photo shoots and run errangs for collection of props and equipment.

RELATIONSHIPS WITH ORGANISATIONS

Through her assistant job, Julia has been able to have the opportunity to interact with various commercial organisations to set up and plan for photo shoots. This has allowed her to network within these companies and build rapport with repeated clients.

Julia is loyal to use of certain transport and mobility organisations such as Uber, Didi, Ola and Transperth for use of public transport. However, she does not have any further interaction with the organisations themselves other than through use of their services.

DEVICES & TECHNOLOGIES

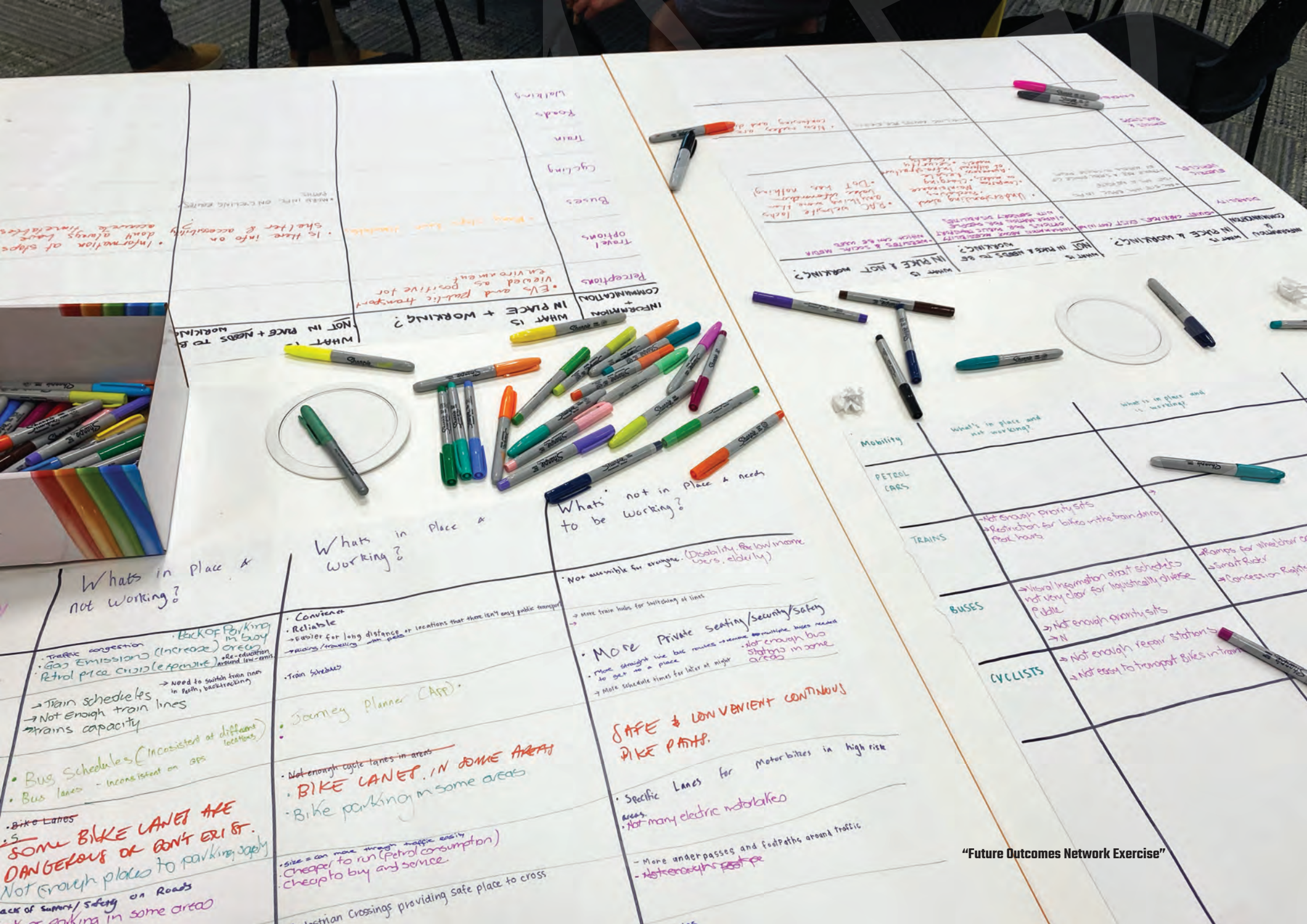
Working on her photography skills, Julia has bought her own set of photography equipment. This includes multiple camera bodies and lens, a tripod and a lightbox.

She also owns a Macbook Pro of which she uses for editing her photographs taken in in her free time and when freelancing to build her portfolio.

To communicate with her colleagues, friends and family she uses an iPhone 13 Pro Max, which was chosen due to it's reputation as one of the best smartphones for mobile photography.

KEY INSIGHTS

- Public transport is not suitable for all travel reasons and this makes it less accessible for everyone to switch to more sustainable forms than driving.
- Travel journeys that require long distance travel from the staring location and that have multiple stops in not easy to do using trains and buses, more convenience in driving your own vehicle.
- Education is required to convince those skeptical or lacking knowledge of climate change in order to encourage them to assist in reduction of emissions by making more sustainable travel choices.
- Those who have witnessed the actions by other countries making travel more sustainable for the community has passed on these habits to those who move countries. These people can influence those around them to make better travel choices and become more aware of the impacts of climate change.
- Health is a key factor in the drive for reducing travel emissions and acting as a motivation to get more people in the Perth public to start using travel that promotes exercise more to increase fitness.



"Future Outcomes Network Exercise"

FUTURE OUTCOMES NETWORK

Using this method, we defined and identified specific areas in mobility and information networks, focusing on dividing stakeholder groups into segments, stages, and outcomes that were more readily obtainable. We explored and investigated indicators and data-gathering by recognising: What is in place and working? What is not in place and needs to be working? What is in place and not working? We explored these segments through analysis of the information and communication channels currently available for mobility as well as the mobility services themselves.

Through this exercise, we reflected and discovered common themes emerging from different perspectives and knowledge that needed to be reviewed or resolved. This framework allowed the team to discuss how to gather evidence to help us to assess what is currently in place and to understand the core project problem challenge.

INFORMATION AND COMUNICATION	What is in place and not working?	What is in place and is working?	What is not in place and needs to be working?
Word of Mouth	• People's perceptions and opinions on mobility options, misinformation	• People taking on board reviews/ opinions/suggestions of peers	• A positive view on public transport that encourages usage by all
Internet	• DoT website does give information about mobility options but is confusing to find the information	• Basic EV information on RAC website • Transperth has a website • DoT has a website	• More train hubs for switching of lines • More user friendly website • Communication and participation of the Public needs and wants
Social Media	• Lack of awareness about DoT social pages	• Social media accounts exist	• EV advertising • Transport options
Transperth App	• Can be difficult to use • Not catered to use of all ages	• App is being used frequently • Bus tracker is good	• Education about use for those that find it hard to understand navigating the app (desktop & mobile)
Ridesharing App	• Some ridesharing services, although useful, are unethical	• Easy to use app • Safety Systems	• Not everyone has a smartphone • Not everyone knows how to use the app
Advertising	• Advertising on the side of buses about emissions but limited	• Large eye-catching billboards • Buses, trains and stations	• Transport options ads • EV info/ads
Buses	• Information at stops don't always have accurate timetables	• Many stops have timetables and advertising on shelters	• More catered information advertised on bus shelters and at stops about emission reduction strategies
Disability	• Sectioned seating for disability but not a lot reserved, still disruptive for sensory disabilities	• Websites and social media which can be used through accessibility options on smartphones i.e read aloud	• Information about accessibility options for public transport • Information for people with sensory disability
Electric Vehicles	• RAC website main resource of information • DoT has a website but currently contains no information about electric vehicle or other sustainable mobility choices, just the registration of vehicles	• RAC site has basic information • There are a small range of EV models to choose from • Car exhibitions are providing the public with opportunities to learn more about electric vehicles and test drive them	• One place where there is information about: - Purchasing - Maintenance - Environmental impact - Comparison on models - Awareness of different models - Resale - Infrastructure - Security - Safety

MOBILITY	What is in place and not working?	What is in place and is working?	What is not in place and needs to be working?
Petrol Cars	• Traffic, congestion • Increase in gas emissions • Petrol price crisis • Lack of parking in busy areas • Re-education around low emissions • Prices attributed to owning a vehicle (registration, insurance), costs can add up fast becoming expensive	• Convenience, reliable and safe. • Riding and travelling with pets • Easier for long distances locations where there is not easy access to public transport • Introduction of Smart Freeway, helping to merge traffic during peak hours and easing congestion • More side street and parallel parking	• Not accessible for everyone • Disability • Low-income users • Elderly • Express lines in the freeway like Melbourne
Trains	• Train schedules inconsistent in some areas • Not enough train lines • Train capacity during peak hours • Need to switch train lines in Perth, backtracking • Not enough priority seats • Escalator maintenance causes disruptions in stations • Only one lift per station platform, limits capacity for those with mobility issues or disabilities who can't use the stairs/escalators • Hard to purchase Smart Riders on the weekend from stations	• Train schedules in some areas are on time • Convenience for people travelling long distance • Fast, efficient way to skip traffic on roads during peak times • With Perth/the city being the main hub for all train lines, convenient for those working in the city • Journey Planner as website tool and mobile application, tracks where the train is	• More train hubs for switching of lines • More priority seating • Having more access points to station platforms that consider; speed, maintenance, accessibility • More kiosks and vending machines at train stations, cash and card acceptable • Machine that dispenses new Smart Rider cards (similar has been done in Victoria with Myki cards)
Cyclists	• Some bike lanes are dangerous or don't exist • Not enough safe places to bike parking • Restriction to take bikes on the train during peak hours • Expensive bike parking in the city	• Bike lanes in some areas • Bike parking in some areas	• Safe and convenient continuous bike paths • Buses and trains with bike racks • Better route for bikes around roundabouts • Incentives for people to ride bike to work (Free parking and shower stations)

MOBILITY	What is in place and not working?	What is in place and is working?	What is not in place and needs to be working?
Buses	• Bus schedules inconsistent in different locations • Bus lanes inconsistent on GPS • Visual information about schedules not very clear for linguistically diverse public • Not enough priority seats for those with disabilities and pregnant women/parents with prams	• Journey Planner as website tool and mobile application, tracks where the bus is • Ramps for wheelchair access and prams • Smart Rider • Concession and pensioner rates • Safety for drivers with caged areas and, at night, security vehicles following • Night Alight - Request for bus to make stop anywhere along route between stops after 7pm	• More private seating, security, safety • More straight-line bus routes. Remove multiple buses needed to get to a place • More scheduled times for later at night • Increase bus stations in some locations • More small local buses like CAT system in suburbs • QR codes of information posters that leads to translated pages (although presents challenge for those without smart phones • More priority seating • Using double buses during peak hours and have designated lines • More timed stops closer to high patron areas i.e shopping centres, hospitals
Motorbikes	• Lack of support/safety on roads • Lack of parking in some areas • Gender stigma and misinformation	• Size can move through traffic easily • Cheaper to run (petrol consumption) • Cheaper to buy and service	• Specific lanes for motorbikes in high-risk areas • Not enough electric motorbikes options
Walking	• Pedestrian traffic light crossings, not enough on main roads • Foot paths not consistent. Brakes in dangerous areas	• Pedestrian crossing providing safe places to cross	• More underpasses and footpaths around traffic
Carpooling	• Lack of information online • Inconsistent in meeting everyone's needs • Clash of interests • People don't like sharing with strangers • Fear of getting Covid	• Convenience in travelling • Reduces the number of cars travelling on the road • Saves money on petrol	• Incentives • Connected to the train and buses stations as other option for users

MOBILITY	What is in place and not working?	What is in place and is working?	What is not in place and needs to be working?
E-Rideables	• Paths not consistent in some areas	• Bike and path lanes in some areas	• Rechargeable stations • Information – clarity, accessibility, options • More E-Rideables to connected to the train and bus stations to allow more mobility options to users
Electric Vehicles	• Not enough charging stations • Expensive • Not many options in the market only TESLA • Status – Big Egos • Kms able to be travelled in one full charge not as many as ICE vehicle • Prices attributed to owning a vehicle (registration, insurance), costs can add up fast becoming expensive	• Environmentally safe • Status • DoT's drive and intention to incorporate more EVs and promote cleaner vehicle options; plans to expand charging infrastructure	• Reliable and informative sources (traditional and online) that covers all bases of EV questions for the public • More European EV's in the market
Uber	• Uber provides cheap rides, but it is not an ethical company • Safety support for drivers • Lots of drivers using service, but no option for customers to select preferred gender of driver (safety reassurance) • Accessibility limited to technological knowledge and smartphone devices; makes it harder for elderly to use	• More accessibility to people in different areas • Creates more jobs • Ability to share journey with friend/family member for safety reassurance • Incentives for Uber drivers to invest in an electric vehicle, reduced service fee • Drivers' use of GPS systems to navigate fastest route to destination • Can book in advance up 30 days • Vehicles that cater to different size groups	• Phone number in place for those without smart phone/ access to web or app to order an uber
Taxi	• Expensive • Unreliable – not easily accessible when needed • Lack of pricing benchmark (drivers taking routes) • Time Charge	• Lack of support and safety • Can book in advance • Vehicles that cater to different size groups	• Tracking the taxis safety

"Journey Mapping Exercise"

JOURNEY MAPS

Journey mapping is a common method used in many cooperate environments, particularly in service design and design thinking. Touchpoints, contact moments where people interact during a service experience, are used in this method to show connections in interactions taken by individuals on their journey. These maps are used to understand how different people move around within service journeys, and for our team, we wanted to know how people interacted and experienced touchpoints in mobility and accessing information, highlighting pivotal areas for impact.

The journey maps were visualised from our fictional personas, using their contextual experiences and preferences to map out potential journey experiences. These maps helped identify the touchpoints people can interact with, the actions they take to reach a touchpoint and more importantly, major junctions where multiple people interact at the same touchpoint.

"We wanted to know how people interacted and experienced touchpoints in mobility and accessing information, highlighting pivotal areas for impact"

(Bailey et al. 2022)

As the project is looking at the public sector, there is an enormous variation of experience pathways to map out. Visualising each individual preference and experience for the public sector would be complex and difficult to reflect. Instead, we created two journey maps for the General Public and Businesses, two of our five stakeholder groups.

Critical Touchpoints

Although the touchpoints are all interconnected and flow into one another, there are critical points where multiple individuals interact and action at. These touchpoints show us where key opportunities are for integrating the proposed information system to improve and change the experiences of the public sector.

General Public Journey Map

- Public transportation
- Wayfinding
- The road/bike lanes/foot paths
- Social Media

Businesses

- Signage & Advertising
- Customers
- Employees
- Product

How Journey Mapping Works

To explain how journey maps work, we will use the General Public journey map. (See next page)

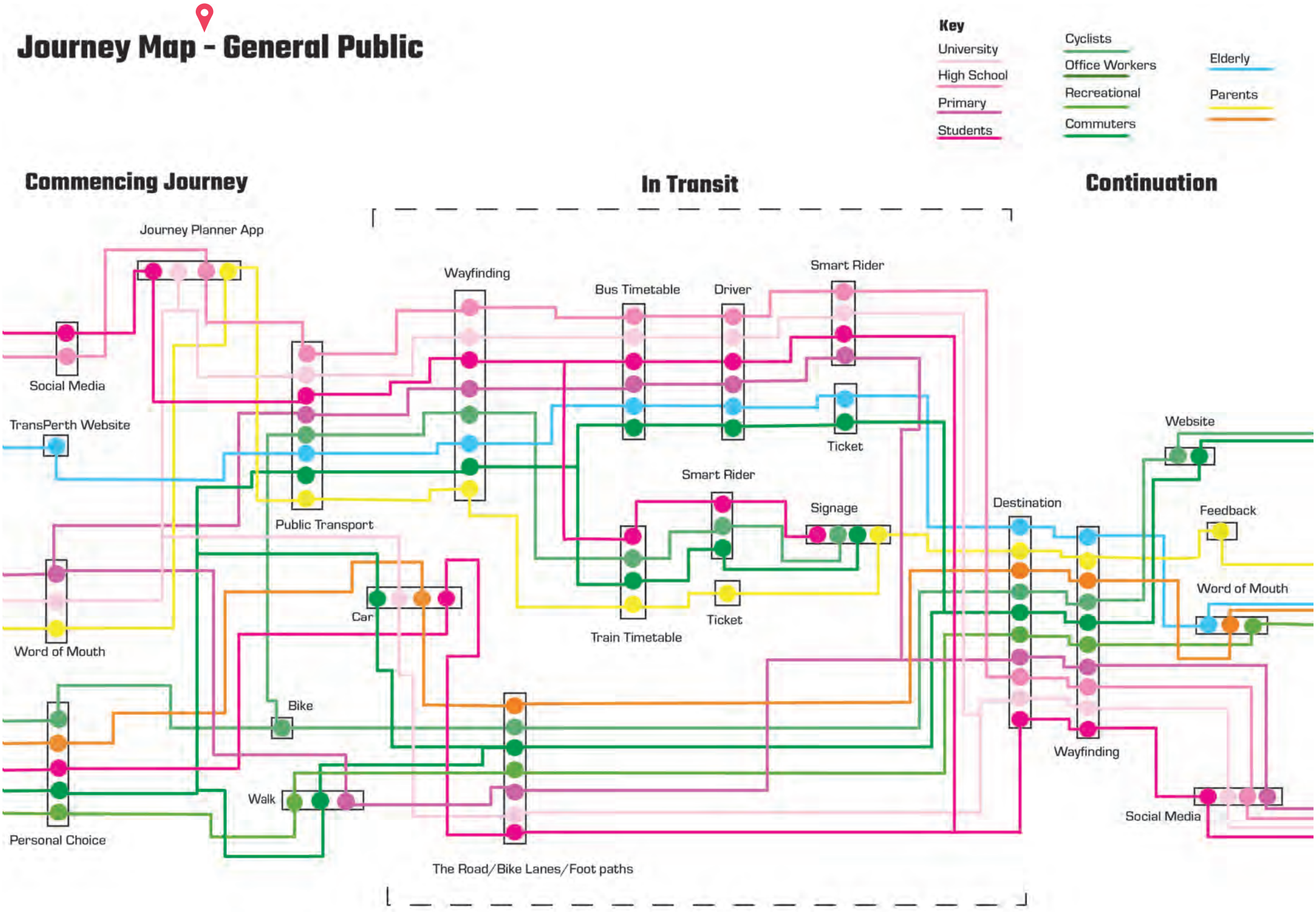
Looking at the **blue coloured journey**, we will be stepping into the possible perspective and context of an elderly member of the public. An elderly member could make the decision to use public transport as they can no longer drive, they start by looking for transport options using their device (for example a computer) from a simple google search they are taken to the TransPerth timetables website. Using the prompts on the website, they find the time their bus is leaving and make a short walk to their local bus stop, using wayfinding of a bus stand to orient themselves.

Double checking the time on the physical timetable at the stop, they patiently wait until their bus arrives. Stepping onto the bus, they are greeted by a friendly smile from the bus driver, purchasing a ticket before finding a seat and arrive at their destination. Once they arrive, they use wayfinding again to orient themselves and return the journey when they decide to head home. From this journey, they share their experience with their friends at their weekly catchup.

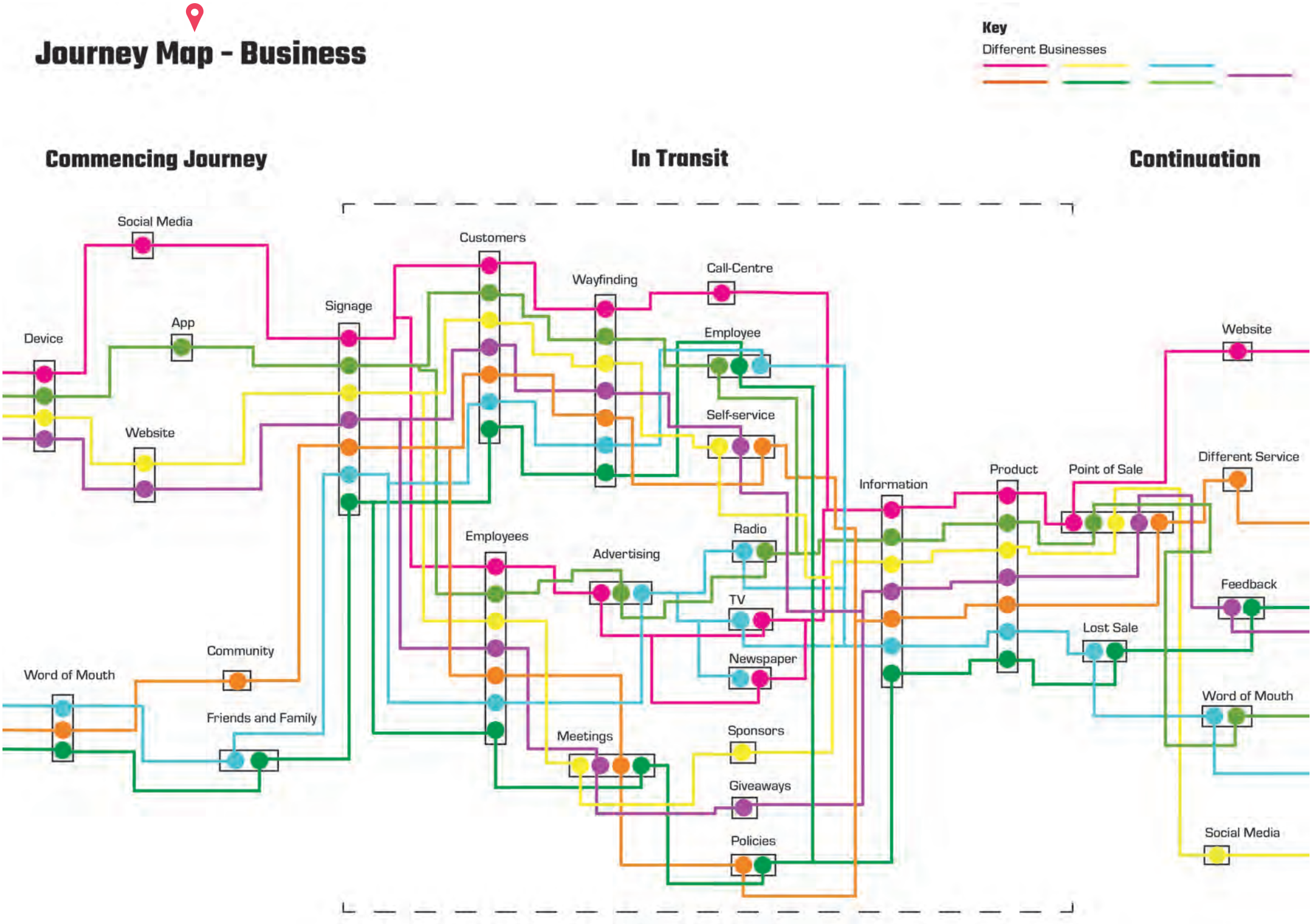
This is an example of a potential journey pathway of an individual within the public sector, highlighting the numerous and interacting touchpoints a persona utilises on a singular journey.

From our journey maps, we could see an information resource being a singular touchpoint, would not be relevant to everyone's needs, therefore not taking advantage of the connected nature seen in this system of touchpoints.

Journey Map - General Public



Journey Map - Business



005

INTRODUCTION

PROJECT PROBLEM

RESEARCH METHODS

DISCOVERIES & INSIGHTS

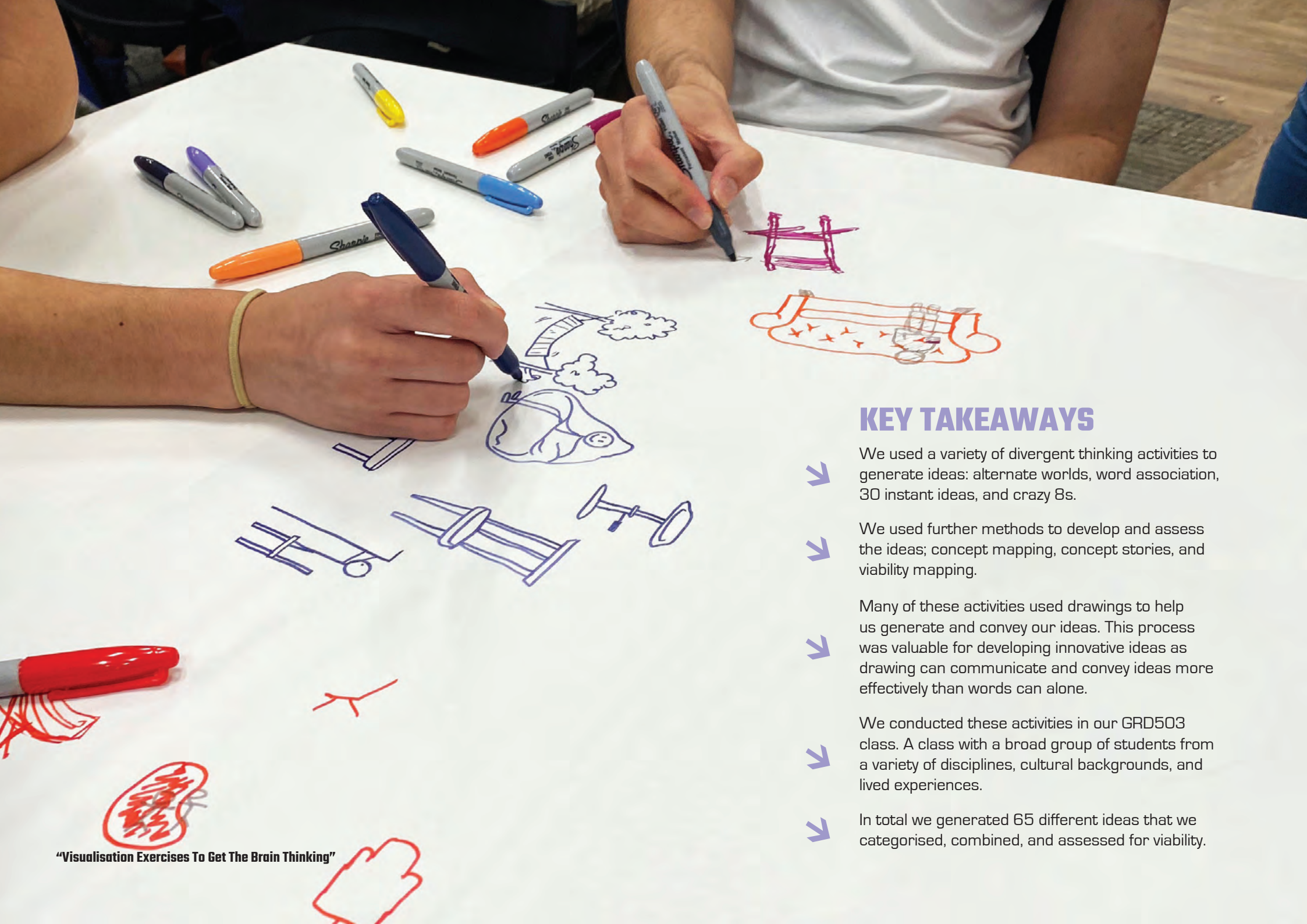
IDEATION & CONCEPT DEVELOPMENT

INTRODUCTION

To develop concepts for the project, we conducted several ideation activities in a large class group that aimed to make the participants engage in divergent thinking.

Divergent thinking is a process of expanding one's mind to surpass what would ordinarily be thought about. Ideation activities make the participant's mind open to ideas, perspectives, and methods that they would not usually be receptive to. Additionally, the class where these activities were conducted, is made up of people from a broad range of disciplines, nationalities, and cultures. The situation of divergent thinking activities in a diverse group of people provided fertile ground for the ideation of concepts.

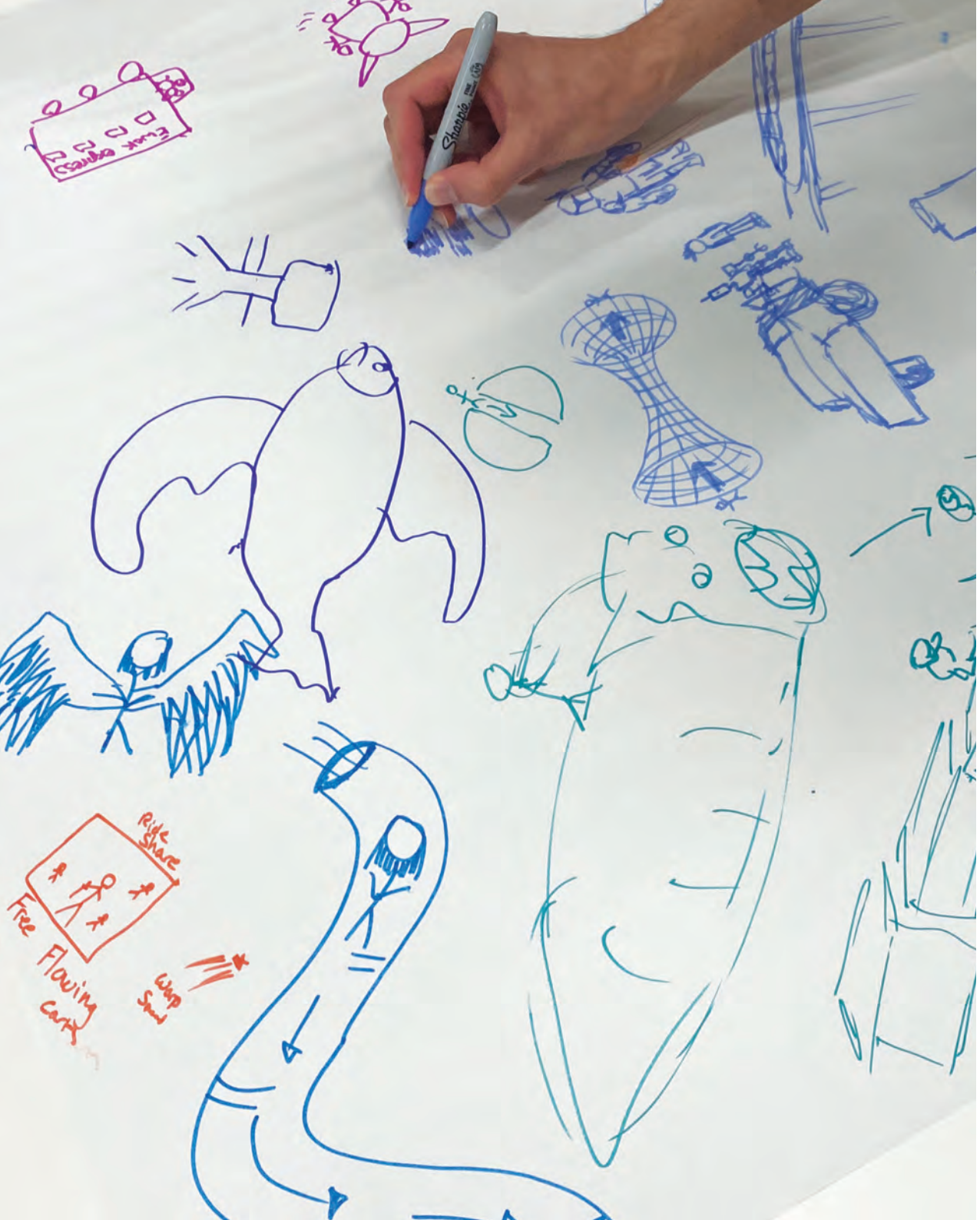
The broad set of ideas generated through these activities were then assessed, categorised, and developed into the concepts in this proposal.



"Visualisation Exercises To Get The Brain Thinking"

KEY TAKEAWAYS

- We used a variety of divergent thinking activities to generate ideas: alternate worlds, word association, 30 instant ideas, and crazy 8s.
- We used further methods to develop and assess the ideas; concept mapping, concept stories, and viability mapping.
- Many of these activities used drawings to help us generate and convey our ideas. This process was valuable for developing innovative ideas as drawing can communicate and convey ideas more effectively than words can alone.
- We conducted these activities in our GRD503 class. A class with a broad group of students from a variety of disciplines, cultural backgrounds, and lived experiences.
- In total we generated 65 different ideas that we categorised, combined, and assessed for viability.



ALTERNATE WORLDS

The purpose of the alternate worlds activity was to shift our thinking and idea generation processes to view the project from the perspective of a fictional world through a timed drawing exercise that explored mobility options through an unrestricted lens that we could then determine realistic concepts from.

Separated into two groups, we were each given a specific movie or tv universe that we could then apply to the activity, with these being the worlds of Harry Potter and Star Wars. Using these fictional universes, we were asked to sketch out as many alternative forms of transportation that were from these universes, or that could be possible within the realms of them. For the next part of this exercise, we were encouraged to select a universe of our choice and work on it at home to generate even more ideas.

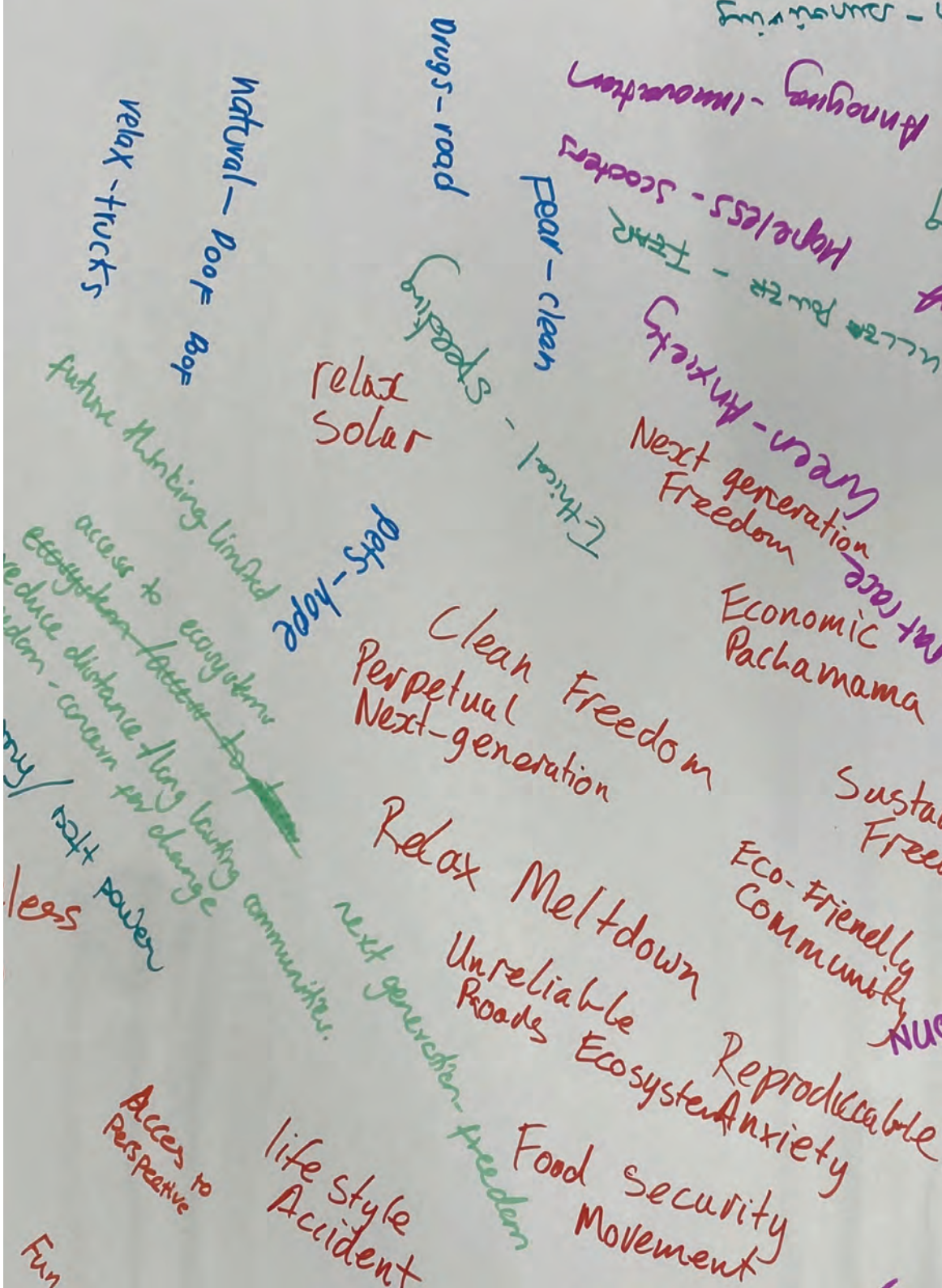
This activity assisted us in generating concepts that were 'out of the box' by providing us with an avenue for exploring radical ideas that could contribute to the development of innovative project concepts. Without the limitations of the real world restricting our thinking, we naturally developed a lot of concepts that were unrealistic and simply not able to be translated into our world for our project. However, we did gain some perspective on the concepts behind certain transport that could be applied in this project.

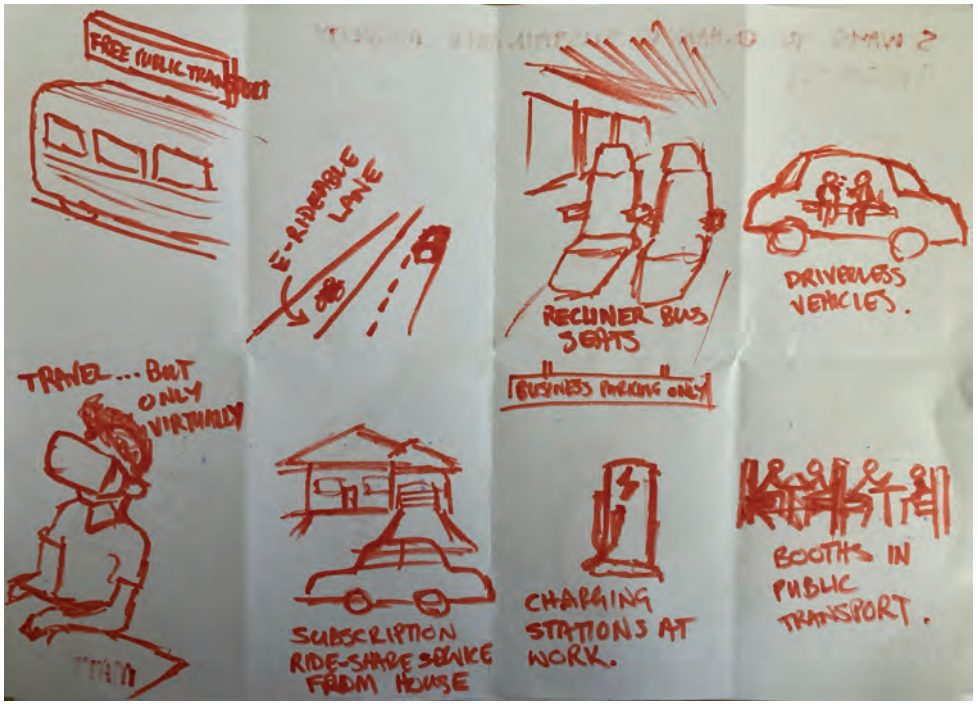
One example of this is teleportation. While teleportation is obviously not possible, the idea did lead to the concept of 'digital teleportation' - which involves the 'teleporting' of an individual via technology such as video meetings. As virtual reality headsets and virtual spaces continue to evolve, this 'digital teleportation' concept could play a significant role in reducing travel - and subsequently, emissions.

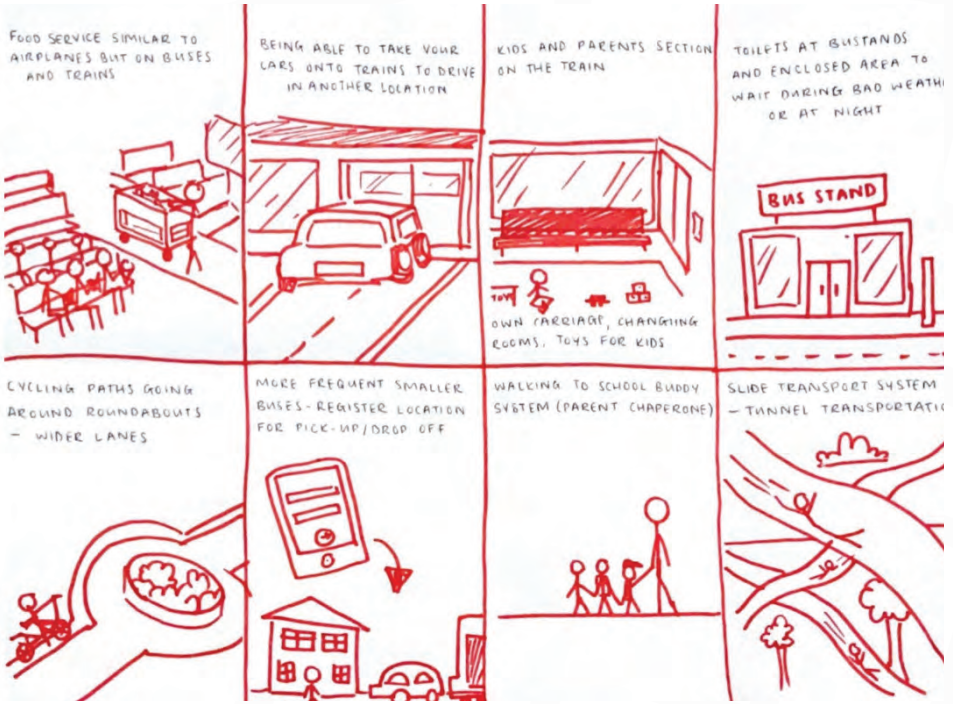
WORD ASSOCIATION

Using the terms “sustainable” and “mobility”, we worked collaboratively to brainstorm every possible key word associated with these two terms and the emotional connotations behind them. The purpose of this was to assist us in idea generation based on the perceived meanings and associations to the two terms that have the most importance in the context of this project.

However, the real value of this activity resided in the next part of the process: using the key words we had generated to create new concepts. Choosing a word stemming from the “sustainable” brainstorm and one from the “mobility” brainstorm, we combined words to create new terms. Through doing so, we were able to create a number of new concepts that were applicable to the project, but we were not aware of previously.







CRAZY 8S

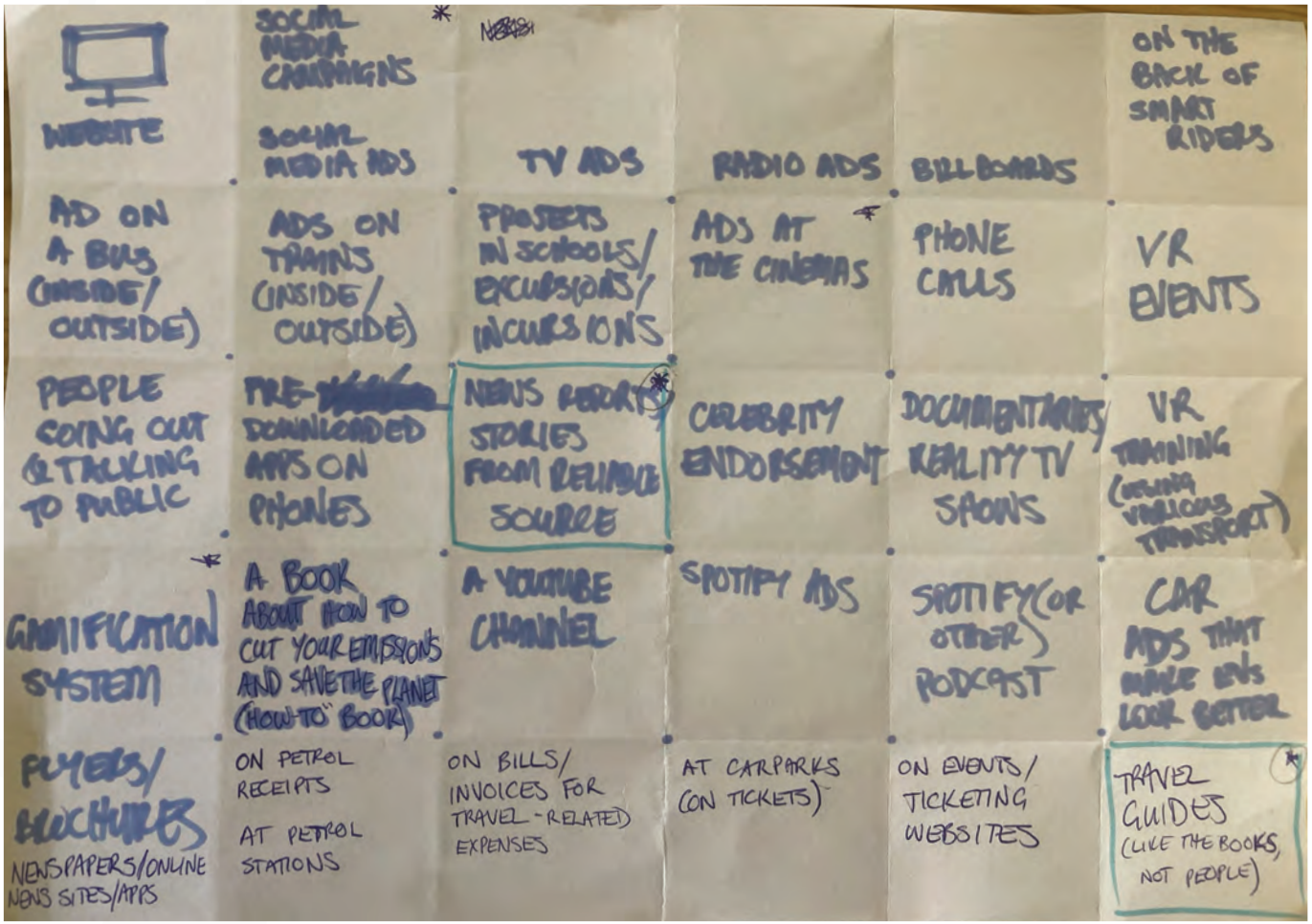
Crazy 8s revolved around the idea of quickly generating eight ways to use an everyday object. For this activity, we worked individually to each come up with eight different uses for a paperclip, and subsequently, eight different ways to use a t-shirt. We quickly discovered that coming up with more than three or four uses was quite a challenge, and in order to come up with a full eight, we had to start thinking outside the ordinary – as such was the purpose of this activity.

Following this, we then used the Crazy 8s format to each quickly generate eight ways to enhance sustainable mobility. This was incredibly challenging (especially in such a short period of time) but this outside-the-box thinking allowed us to come up with some innovative ideas, such as more frequent and smaller bus routes for personalised pick up and drop offs, sitting booths with dining options on public transport and a separate network for e-ridables.

30 INSTANT IDEAS

Having worked on multiple idea generation exercises, we were tasked with the activity of coming up with 30 individual ideas of how information on climate-conscious information could be shared with and within the public of Perth. The purpose of this activity was to be able to rapidly develop ideas and collaboratively generate as many concepts for the project as possible within a short time frame.

These ideas were generated in response to our experiences and ideas generated during the activities and what we had learned about current formats of sharing and communicating information through our previous project research. While we were given a short time frame, we were able to develop many ideas off the top of our heads. However, we still required additional time to generate more ideas and further develop them into more defined concepts.



CONCEPT MAPPING

After engaging in the previous divergent thinking exercises, we conceptualised as many possible concepts as we could for the mobility information system we would be developing, based on the 30 Instant Ideas and Crazy 8s activities we completed earlier.

We developed a total of 65 concepts, which are presented in this concept map. The purpose of the concept mapping was to identify links between the various concepts so that we could develop a system of different touchpoints that would work well together.

The proposed concepts – which are discussed in further detail in the PROPOSED OUTCOMES (pg. 128) section – have been colour coded to indicate the various touchpoints that are in each concept.

Early Concept Descriptions

The following is a list of all 65 concepts we conceptualised with a brief description of what we intended the concept to be in the first stages of our concept development.

Performance Artists

Performance artist catching people's attention about issues related to transport and mobility or climate change. Performance artists may make train stations feel vibrant. This could also encompass things such as street shows, flash mobs or performances.

Carnival

Community carnival with the theme of mobility alternatives. It will be fun and engaging for people of all ages.

Mascot

A bicycle riding emu (or sugar glider, or penguin) that promotes public transport and alternative mobility options.

Animated Movie

An animated kids movie with interesting characters for teaching children about climate change.

Pictorial Information

Information designed in a visual way that people can understand regardless of language or cultural differences.

Website with Mobility Options

Brand new website dedicated to transport and mobility options with digestible and reliable information that people can understand, presented in a variety of formats (videos, pictures, infographics) and other education information on sustainable travel.

Community Discussion Board

Online discussion spaces where people can offer insights, opinions and experiences related to low emission transport and mobility options.

Displays at Bus Stops
Imagery and information about low emission transport and alternative mobility options displayed on bus stops, encouraging people to use public transport and thanking them for using public transport and informing them of the good that using public transport is doing

Documentary / Reality TV Show
Documentary or reality TV show showcasing the innovation occurring in the transport sector that will allow emissions to be lowered, and the people helping it to be a reality.

YouTubers
Get informative YouTube channels who give information related to bettering the world (eg. Kurzgesagt) to release a low-emissions transport video series informing viewers of the ways they can lower their transport emissions.

Events / Ticketing Websites
Suggestions or incentives are provided to customers for ticketed events i.e. free public transport to encourage sustainable travel options to and from the event

TV Ads
Advertisements on TV that inform people about how we're heading to a zero-emissions future and how they can get on board in terms of travel.

Travel Guide
A travel guide book which showcases a variety of places to visit, activities to do and things to see in Western Australia. It gives people an easy way of finding things to do in WA in a single guidebook that is small enough to take with you when travelling.

Radio Ads
Ads played over the radio that inform people about how we're heading to a zero-emissions future and how they can get on board in terms of travel. This can be particularly impactful because it can be heard by people who are in their cars when they hear the ad.

Radio Shows
Radio segments where the hosts talk about the need to reduce emissions, informing people about how we're heading to a zero-emissions future and how they can get on board in terms of travel. This can be particularly impactful because it can be heard by people who are in their cars when they hear the ad. This could also include interviews and discussions with experts and allow listeners to ring in with any questions they may have.

Plane Video Instructional
Instructional video played upon landing in WA. Video details various transport options available to passengers once they get off the plane as well as transport options for getting around Perth.

Push Notifications / SMS Communication
Opt-in text messages that inform users about upcoming traffic jams, accidents, construction at nearby locations and frequently visited locations.

Ads at Cinemas
Advertisements at the cinemas that inform people about how we're heading to a zero-emissions future and how they can get on board in terms of travel. This is particularly good because people are not able to 'skip' or just not watch the ads like they might if there are ads on TV or YouTube, and also because in order to get to the cinemas, they would have had to take some kind of transport.

Ads at Petrol Stations
These ads would be listing the benefits of switching to more sustainable transport, influencing people as they fill up their non-environmentally friendly vehicle.

Podcasts
A podcast series where the host(s) invite celebrities, influencers and notable people to discuss and educate the audience on the importance of climate change, redirecting to a zero-emissions future and how they can assist this through their travel behaviours. Each episode in the series would focus on a different way people can reduce their transport emissions. This can target those who are currently travelling and prompt them to think about their travel options.

Car Ads that Make Electric Vehicles Look Better
Unlike traditional car ads, these ads would have a secondary purpose other than selling the vehicle – informing people of the bonus positive impacts of purchasing an electric vehicle over a conventional vehicle. Simultaneously, these ads would also increase awareness and make electric vehicles appear more mainstream.

Spotify Ads
Ads played on Spotify that inform people about how we're heading to a zero-emissions future and how they can get on board in terms of travel. This can be particularly impactful because it can be heard by people who are in their cars when they hear the ad.

News Broadcasts / News Stories
News stories reported as part of the nightly news across multiple channels. This news story would be highlighting the very real threat of climate change and how we can all make a different, noting some of the ways people can help reduce their transport emissions without excessive costs or disrupting their lifestyles. This could take place on news channels, or on shows like Q+A - both have the potential to create further discussion on the topic on social media.

At Traffic Lights
A display system at traffic lights that provides information on the available options for commuting and with a parking facility to park the car and travel by public transport.

Integrating with Google Maps
As most people rely on google maps to find a location or catch a bus, integrating information system on the Maps will help finding a suitable options of mobility.

Children's Book
A book that teaching young children about the value of using alternative mobility options.

School Curriculum
Integrating education about alternative mobility options into the school curriculum.

Transperth App
Use the TransPerth app as a method of communicating with people about different mobility options.

A Youtube Channel
A multiple YouTube channel – showing a travel guide, Humorous informational videos of mobility options and "How to get around" such as ticketing, using smart rider, etc

Supergraphics on Road
Paintings on road that make roads a space that is more inviting for pedestrians and cyclists and slow down drivers. These can also have information about sustainability.

Community / Industry Co-design
Working with communities, organisations, and industries on co-design which aims to increase mobility through sustainable means.

Information on Invoices / Bills
Use the bills sent by the DoT to provide alternative mobility information to customers.

Information Mural / Art
Murals and art that is used to beautify the urban landscape. Information on alternative mobility options and also be included in the artworks.

Interactive Game
A game (possibly via a mobile app) where players can gain points by using low emission transport or alternative mobility options. Points could also be redeemable for rewards at certain milestones (eg. Every 1000 points, players get a free trip/ticket on public transport).

Public Transport Etiquette / Manners Training
Advertising that provides information on how to politely use public transportation.

Sporting / Music Event Incentive
Free public transport that is included in the price of tickets for large events and information about how to get to the event.

Friendly Transit Officers
Transit officers are given training that teaches them how to interact with the public in a friendly way that makes them approachable for information on mobility.

Short Film Competition / School Project
A short film on the topic of sustainable mobility that will create exposure to sustainable mobility and teach people about sustainable mobility (either through research in order to create the short film, or through watching it.

Sponsored Product
Promotion through products or brands such as on juice or cereal boxes which have 'fun facts' about low emission mobility on the packaging. This is particularly effective because people would not be aware they are going to engage with this content.

Caller Ringtone / Automated Waiting Message
When making a call to specific places (such as environmentally conscious organisations/transport organisations/government departments) callers would receive information related to low emissions transport. This short message would be played to all callers before being put through

Social Media Influencers
Through sponsored advertising, influencer could create content related to sustainable mobility, which has the potential to go viral.

Song
Parody of a popular song or short musical rhyme/phrase on the topic of sustainable mobility, which could be used in advertising on radio, tv and social media eg. Snoop Dog and Menu Log; "Winner Winner Chicken Dinner"; "Should've gone to Specsavers."

Personalised Mobility App
People will feed information into the app about their travel patterns and transport needs. This will allow the app to generate sustainability options specific to the individual. Additionally, the app will provide information on how to both access and use the options it suggests for users.

Emissions Tracker App
An app which tracks the emissions you personally produce via your travel. This could also show the emissions you have saved by taking low emission transport.

Social Media Advertising
Ads across various social media platforms informing people of the need to shift to low emission transport and how they can alter their travel patterns acordingly. Additionally, clicking on these ads should take the user to a dedicated website where they can find further information.

Written Articles
Journal article, news articles, blogs, magazines, etc. that provide information on the topic sustainable mobility and potential low emission mobility optionsfor various trips and lifestyles.

Billboards
Advertising on standard and electronic billboards (such as the Canning Station electronic highway billboard) that displays information about alternative low emission transport options. This could be particularly effective as many such billboards are present on highways and places where they can be easily seen by people who are driving.

Digital Noticeboard
Digital noticeboards (essentially screens) that can inform individuals on low emission transport options and how to use/ incorporate them in their travel routines. These can be put in the workplace, at train stations, bus stops, shopping malls etc.

Ted Talk / Seminar / Lecture
It is an information session open to the public or talk on the topic of sustainable mobility designed to be informative and allow audience members to ask questions with an expert in the field. This could be expanded to industry-specific talks which inform businesses how they can incorporate more sustainable mobility into their organisations.

Lunch & Learn with Mobility Experts
An information session done via a lunch with particular organisations on the topic of sustainable mobility and how they can incorporate more sustainable mobility into their organisations. This would be designed to be informative and allow audience members to ask questions with an expert in the field.

Sport Teams / Matches
Sponsorship or partnership with athletes or sports teams (could be a small local team rather than professional leagues) where sustainable transport can be endorsed and/or advertised through team uniforms, merchandise, and content presented to fans.

Merchandise / Clothing
Things such as clothing, hats or mugs which promote sustainable mobility. This could be tied into other areas of the information system (eg. The mascot). Merchandise has the potential to indirectly spread awareness on the topic of sustainable mobility, as anyone seen wearing or using these products could inspire curiosity in others. This is especially the case if the merchandise or clothing has a visually appealing design that others might be interested in finding out more simply because they like the design/graphics.

Virtual Reality Experiences
This will enable people to experience sustainable mobility in a virtual world as if experiencing in real life. This can allow people to make more informed decisions about their transport options by getting a chance to 'experience' low emission transport options in a virtual world.

Interactive E-books / Displays
Interactive displays similar to ones found in museums or interactive books which allow you to explore in depth and in 3D the need for low emission mobility systems and how people can lower their own transport emissions.

School Incursions
Incursions presented by the Department of Transport, where a speaker would go to schools to give a presentation on the need to reduce emissions, and how people can make the necessary changes in their lifestyles to reduce their own transport emissions. This presentation would educate students and give students the opportunity to ask questions as well as provide students with novelty merchandise that promotes low emission transport.

Curriculum Mapping
Ensuring that any incursions done at schools are designed in ways that fit the curriculum. This is something that would make incursions more attractive to teachers and more useful for students. It would take place at the very beginning before interacting with students.

Flyers / Brochures
Flyers and brochures that could be handed out or displayed at various locations (such as parking ticket machines) which inform people about the benefits of reducing transport emissions and how they can do so. These flyers could also feature a QR code linking to a website with further information.

On the Back of Smartrider Cards
A simple "thank you for using public transport" or a statistical fact about how using public transport helps the environment.

Politicians at Public Meetings

Public meetings where politicians are in attendance and can inform the public of the need to reduce emissions. This kind of event would allow the public to gain information about what they can do to reduce their emissions as well as what the government is doing to assist the public in doing so.

Incentives

Incentives that companies, organisations or other bodies provide to employees or customers that encourages low emission transport use. This information could be a component of a larger information system (eg. Included in an emissions tracker app)

Special Events Public Transport

A requirement for large scale public events to consider transport as part of their event application. Public transport to and from the event would be included in the cost of the initial tickets. This would be something that the event organiser pays for in lieu of providing parking for the event.

Announcements on Speakers / Pa System in Public Places

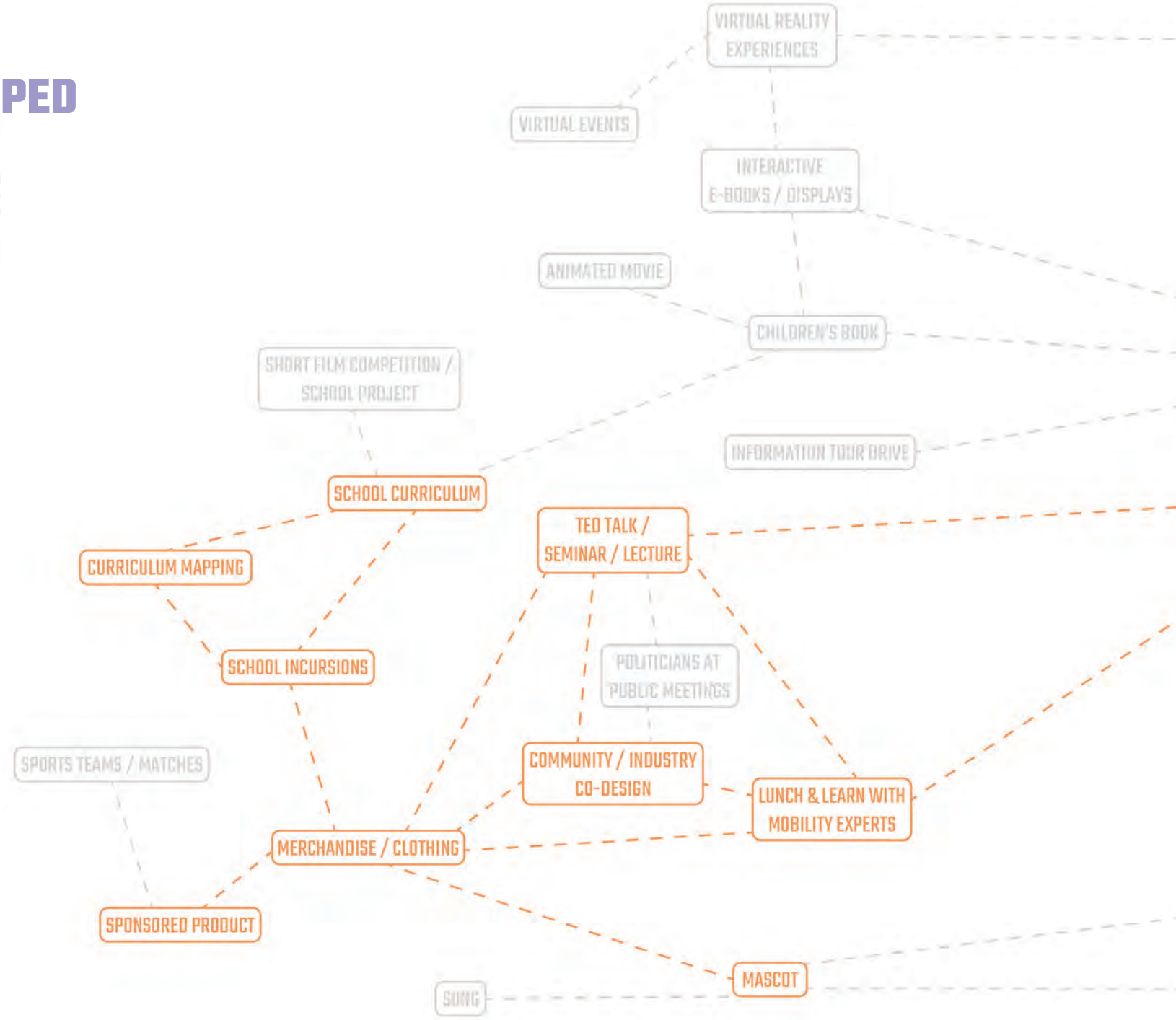
Announcements played over the PA system/s in public places (like train stations, car parks, and bus stations). These announcements would inform people of the good they are doing by using public transport; how they can reduce their emissions by switching from a conventional vehicle to an electric vehicle or to public or active transport; and the other low emission mobility options for getting to the particular place they are at.

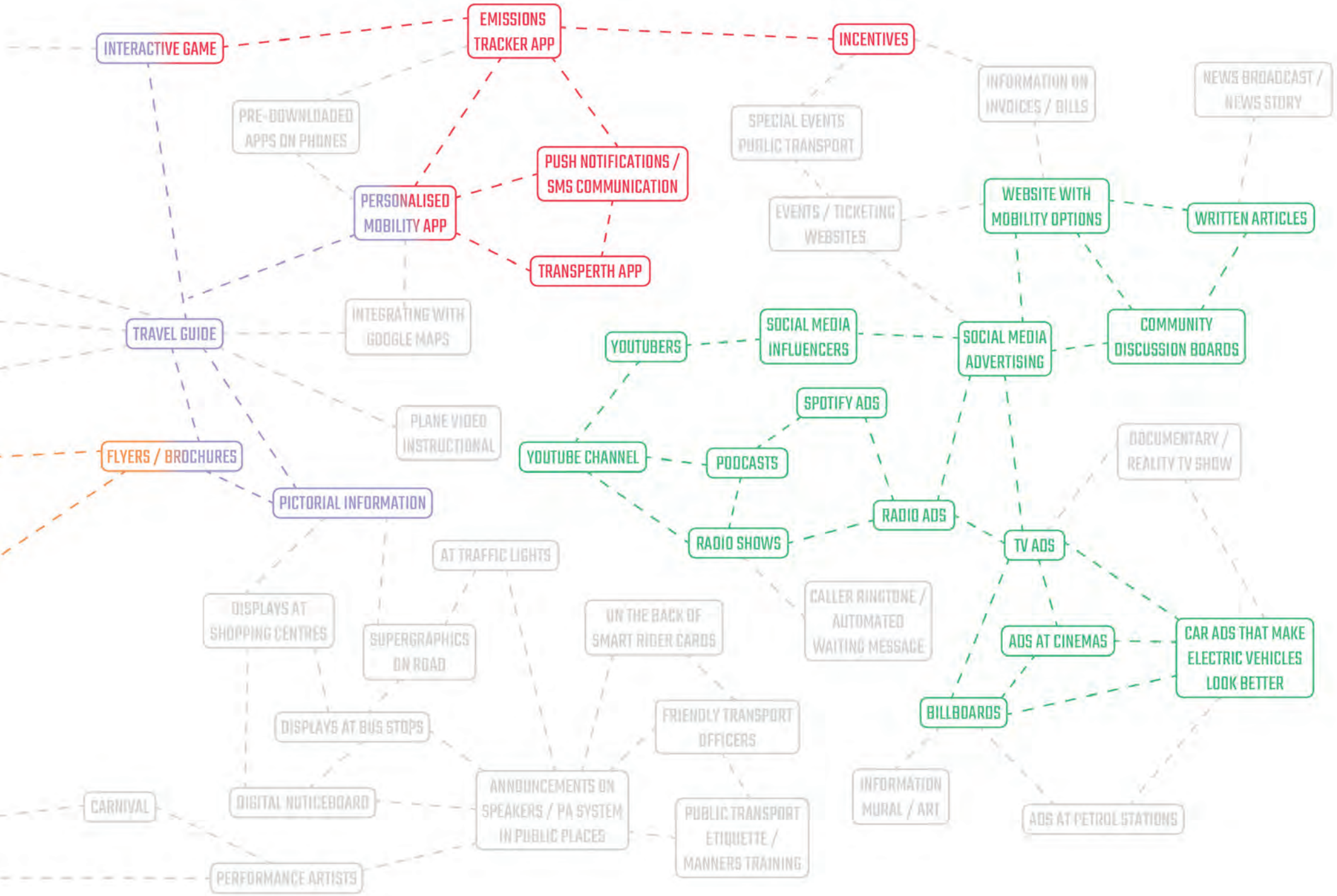
Personalised Mobility App

Electronic displays at shopping centres which can advertise information about low emission transport options. This information could specifically be tailored to the specific area, advertising low emission transport options to and from that shopping centre.

CONCEPTS MAPPED

- INFORMATIONAL MOBILITY ADVERTISING CAMPAIGN
- PERSONAL MOBILITY AND EMISSIONS TRACKER APP
- EDUCATIONAL MOBILITY SEMINARS
- SUSTAINABLE MOBILITY TRAVEL GUIDE
- UNUSED CONCEPTS (NOT BEING PROPOSED)




EMISSIONS TRACKER APP
INTERACTIVE GAME
INCENTIVES
PRE-DOWNLOADED APPS ON PHONES
SPECIAL EVENTS PUBLIC TRANSPORT
INFORMATION ON INVOICES / BILLS
NEWS BROADCAST / NEWS STORY
PUSH NOTIFICATIONS / SMS COMMUNICATION
PERSONALISED MOBILITY APP
EVENTS / TICKETING WEBSITES
WEBSITE WITH MOBILITY OPTIONS
WRITTEN ARTICLES
TRANSPERTH APP
INTEGRATING WITH GOOGLE MAPS
TRAVEL GUIDE
YOUTUBERS
SOCIAL MEDIA INFLUENCERS
SOCIAL MEDIA ADVERTISING
COMMUNITY DISCUSSION BOARDS
SPOTIFY ADS
PLANE VIDEO INSTRUCTIONAL
FLYERS / BROCHURES
YOUTUBE CHANNEL
PODCASTS
DOCUMENTARY / REALITY TV SHOW
PICTORIAL INFORMATION
RADIO ADS
RADIO SHOWS
TV ADS
AT TRAFFIC LIGHTS
DISPLAYS AT SHOPPING CENTRES
CALLER RINGTONE / AUTOMATED WAITING MESSAGE
SUPERGRAPHICS ON ROAD
ON THE BACK OF SMART RIDER CARDS
ADS AT CINEMAS
CAR ADS THAT MAKE ELECTRIC VEHICLES LOOK BETTER
BILLBOARDS
DISPLAYS AT BUS STOPS
FRIENDLY TRANSPORT OFFICERS
CARNIVAL
DIGITAL NOTICEBOARD
ANNOUNCEMENTS ON SPEAKERS / PA SYSTEM IN PUBLIC PLACES
INFORMATION MURAL / ART
ADS AT PETROL STATIONS
PUBLIC TRANSPORT ETIQUETTE / MANNERS TRAINING
PERFORMANCE ARTISTS

CONCEPT STORIES

As a way of better understanding the concepts that each of us had developed, we created concept stories for a few key concepts that we each thought might prove to be strong contenders for the final project concepts.

These concept stories would allow us to expand on the one-liners that we provided as part of the 30 Instant Ideas activity and delve more in-depth into what the concept was, how it would work, its audience and the benefits of the concept to the project and potential users. The purpose of creating concept stories was to give us more background information on the concepts to clearly define them and the strengths and weaknesses they had in terms of viability and the ability to make change if they were chosen as a final concept.

WHAT IS THIS?

A news story reported as part of the nightly news across multiple news channels. This news story would be highlighting the very real threat of climate change and how we can all make a difference, noting some of the ways people can help reduce their transport emissions without excessive costs or disrupting their lifestyles.

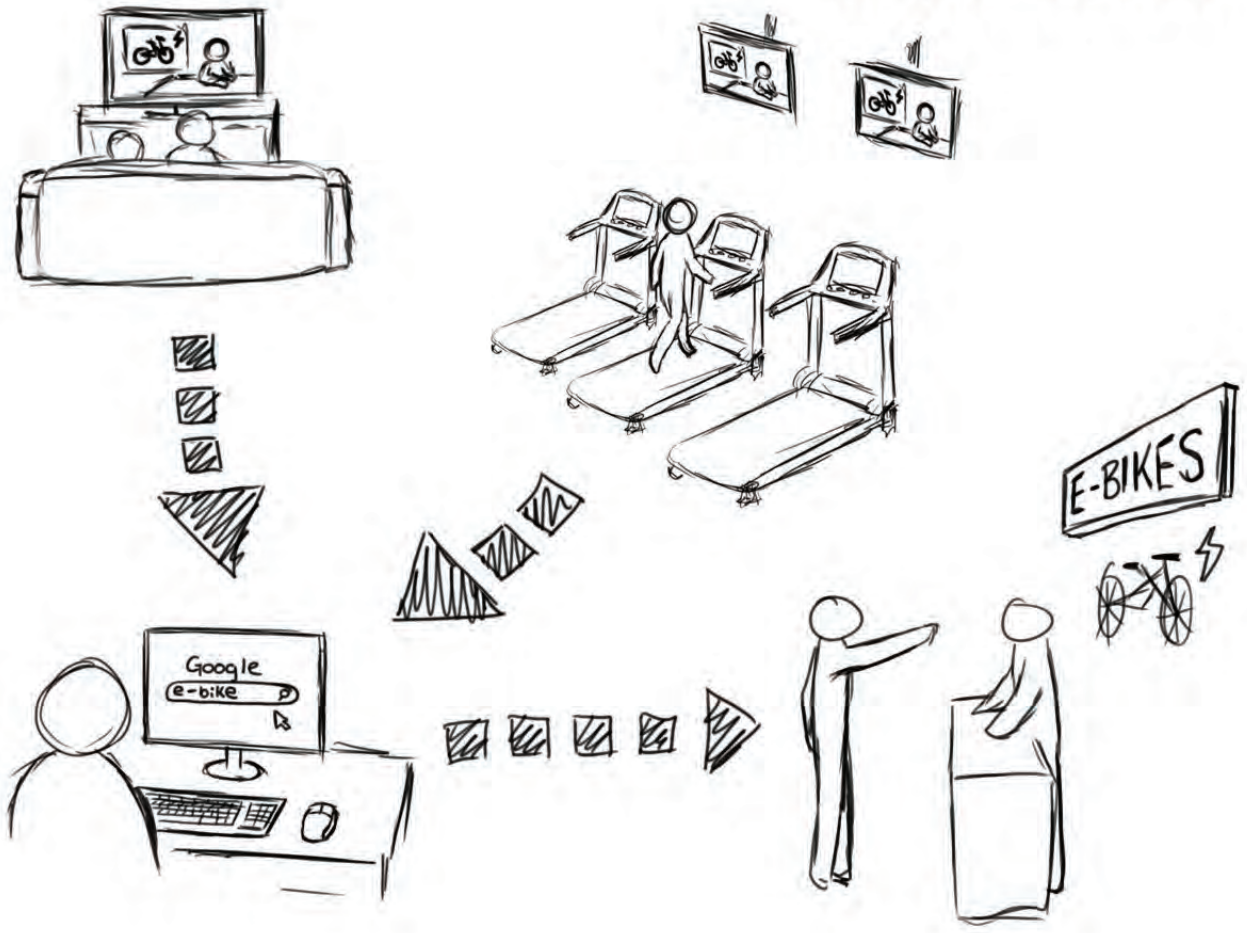
WHO WOULD USE OR ENGAGE WITH IT?

This would be used by the general public, and through word of mouth or simply seeing the story could also have influence in businesses, tourism, and various services.

WHAT IS DISTINCTIVE OR SPECIAL ABOUT IT?

As nightly news is considered a reliable source, information delivered through this medium would be more likely to be taken seriously, and additionally, with the high number of viewers and easily accessible nature of TV news, it is more likely to create change.

NEWS STORY

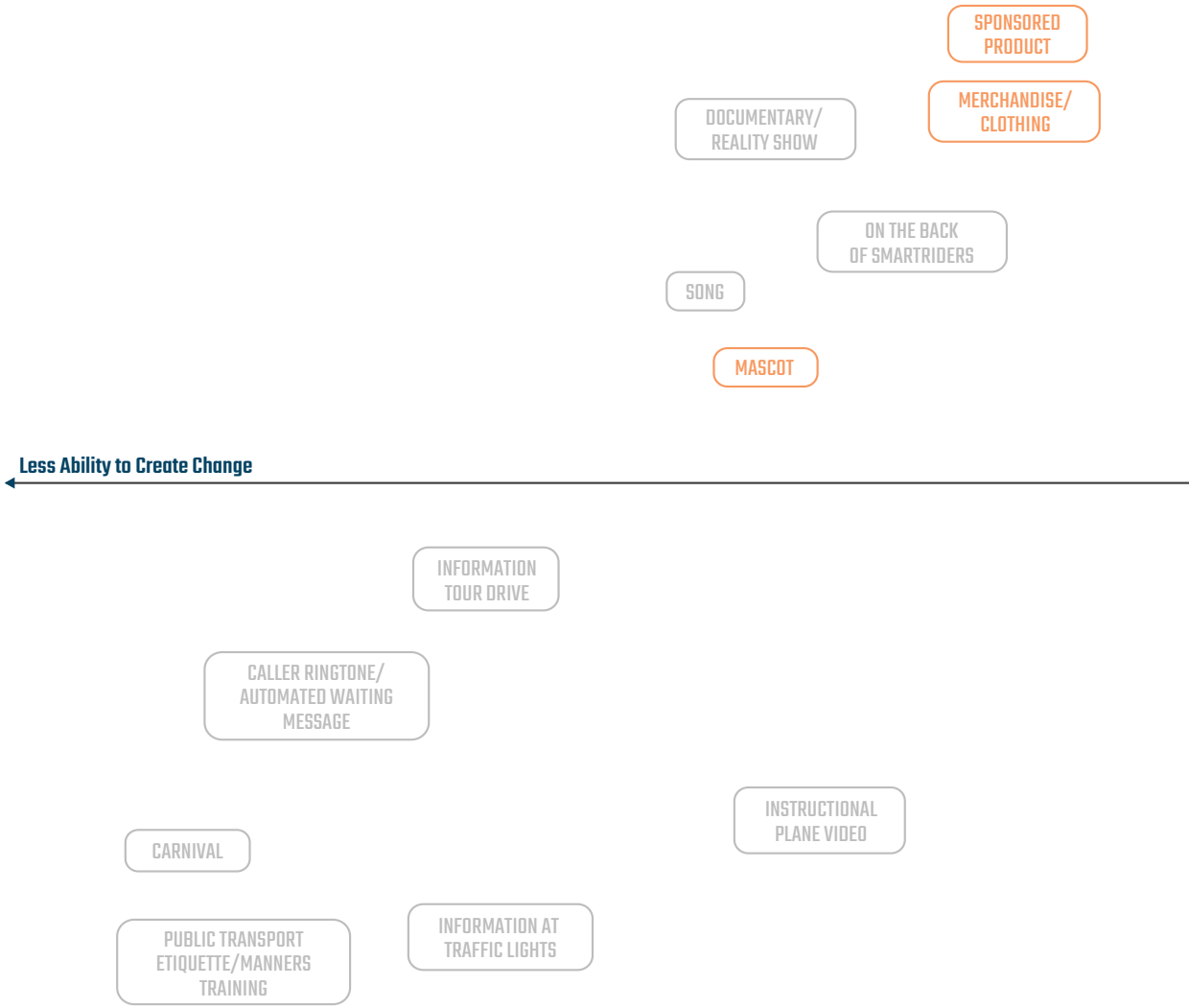


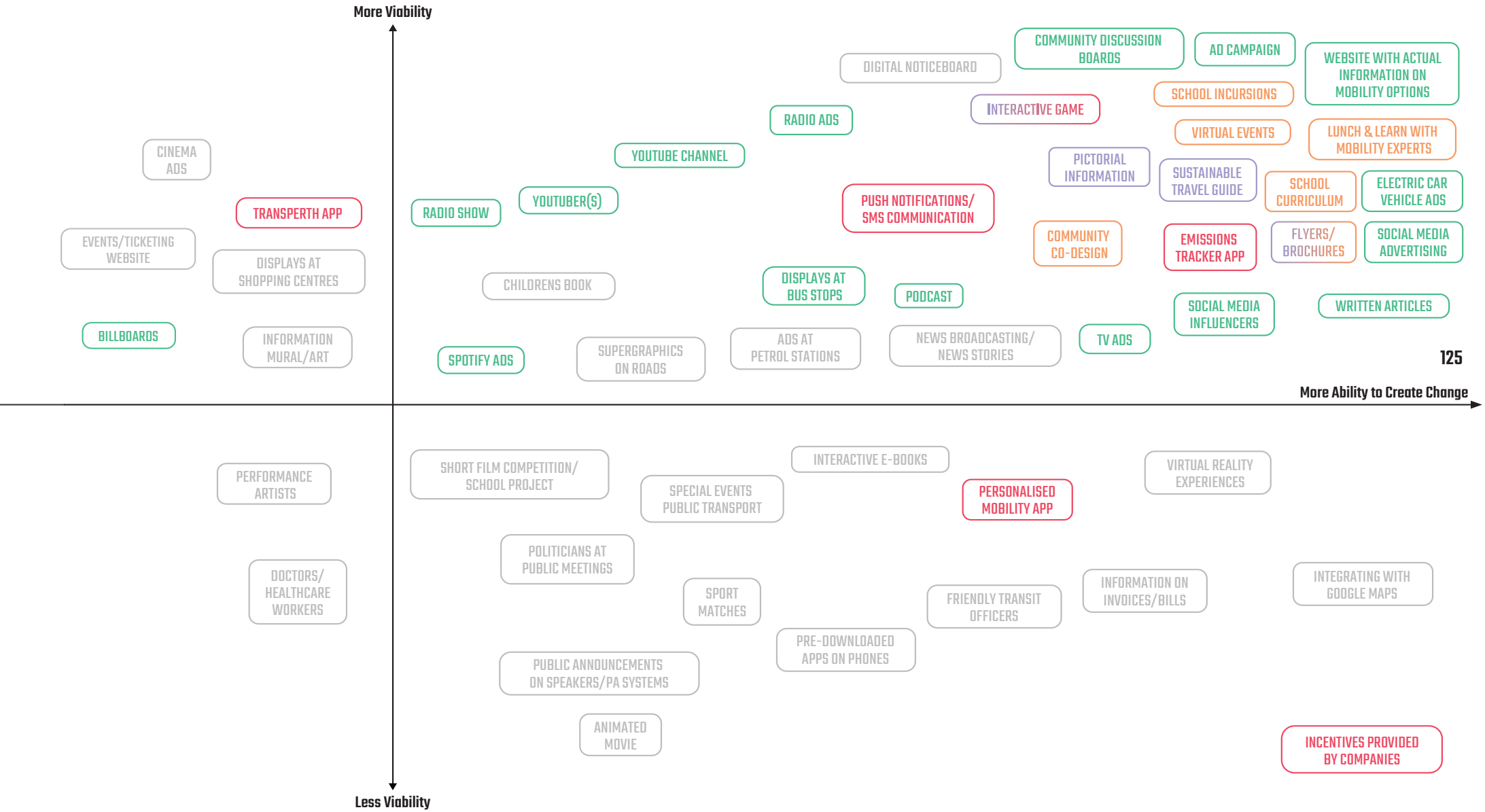
VIABILITY MAPPING

A viability map is a visualised representation of the strength of our concepts in terms of viability and ability to make a change. The purpose of this exercise was to direct the team and prompt progress towards finalising the proposed project concepts that would then be presented to the Department of Transport using the best candidates identified from the map.

Based on the multitude of ideas that were generated as a result of the 30 Instant Ideas activity, we used this exercise to plot these ideas on a map with two axes measuring these terms of viability and ability to make change. Being able to arrange these ideas collaboratively gave us the opportunity to discuss these ideas in further detail and explain to each other the concepts we had come up with whilst we debated their appropriate placement on the scale. After any further rearrangements of the ideas, we were able to see clear patterns that allowed us to assess any concerns that we had about these ideas from previous discussions, tweak them and then evaluate the strongest ideas put forward by the group.

While we began this exercise with hundreds of ideas between us, engaging in this exercise allowed us to focus our thoughts by reducing the number of concepts generated through the previous activities. It also significantly diminished the overwhelming feeling we had for developing solid concepts by collaboratively working to sort through the concepts and select the strongest ones.




More Viability
Less Viability
More Ability to Create Change
125
CINEMA ADS
TRANSPERTH APP
EVENTS/TICKETING WEBSITE
DISPLAYS AT SHOPPING CENTRES
BILLBOARDS
INFORMATION MURAL/ART
RADIO SHOW
YOUTUBER(S)
YOUTUBE CHANNEL
RADIO ADS
DIGITAL NOTICEBOARD
CHILDRENS BOOK
SPOTIFY ADS
SUPERGRAPHICS ON ROADS
DISPLAYS AT BUS STOPS
ADS AT PETROL STATIONS
PODCAST
NEWS BROADCASTING/ NEWS STORIES
PUSH NOTIFICATIONS/ SMS COMMUNICATION
COMMUNITY DISCUSSION BOARDS
AD CAMPAIGN
WEBSITE WITH ACTUAL INFORMATION ON MOBILITY OPTIONS
SCHOOL INCURSIONS
INTERACTIVE GAME
VIRTUAL EVENTS
LUNCH & LEARN WITH MOBILITY EXPERTS
PICTORIAL INFORMATION
SUSTAINABLE TRAVEL GUIDE
SCHOOL CURRICULUM
ELECTRIC CAR VEHICLE ADS
COMMUNITY CO-DESIGN
EMISSIONS TRACKER APP
FLYERS/ BROCHURES
SOCIAL MEDIA ADVERTISING
SOCIAL MEDIA INFLUENCERS
WRITTEN ARTICLES
TV ADS
PERFORMANCE ARTISTS
DOCTORS/ HEALTHCARE WORKERS
SHORT FILM COMPETITION/ SCHOOL PROJECT
SPECIAL EVENTS PUBLIC TRANSPORT
POLITICIANS AT PUBLIC MEETINGS
SPORT MATCHES
PUBLIC ANNOUNCEMENTS ON SPEAKERS/PA SYSTEMS
ANIMATED MOVIE
INTERACTIVE E-BOOKS
PERSONALISED MOBILITY APP
PRE-DOWNLOADED APPS ON PHONES
FRIENDLY TRANSIT OFFICERS
VIRTUAL REALITY EXPERIENCES
INFORMATION ON INVOICES/BILLS
INTEGRATING WITH GOOGLE MAPS
INCENTIVES PROVIDED BY COMPANIES

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INTRODUCTION

PROJECT PROBLEM

RESEARCH METHODS

DISCOVERIES & INSIGHTS

PROPOSED OUTCOMES

CONCEPT 1.

INFORMATIONAL MOBILITY ADVERTISING CAMPAIGN

Overview

The Informational Mobility Advertising Campaign aims at conveying reliable information to the public across a wide range of mediums in order to reach as diverse a demographic as possible. The campaign will utilise both digital and traditional media channels, providing the opportunity for inclusion through various formats that speak to different demographics and permit flexible and effective advertising.

The overall objective of the campaign is to educate the public regarding emissions produced by modes of transportation and to encourage them to adopt sustainable travel modes by providing relevant and unbiased information through these channels.

Audience

By operating a cohesive campaign across a variety of platforms (which has its own unique advantages) the campaign demonstrates the ease and benefit of communicating with a broad range of demographics through various channels of advertising. For example, the campaign would be conducted on digital platforms such as YouTube, Snapchat, TikTok, and other social media platforms that best target the specific demographic of pre-teens, teenagers and young adults familiar with these channels. However, older demographics, who are not as comfortable with social media, may be more inclined to interact and engage with more traditional media and forms of advertising, such as bus advertisements, posters and flyers, or TV commercials.

Through integration of all available channels into the campaign and tailoring the content to the demographics, the campaign can be flexible and inclusive to the public, ensuring that everyone has equal access to information about sustainable mobility options.

Relation to Project Objectives

This concept contributes to the fulfillment of the project's main objectives by providing the public with information that is dependable, accessible, accurate, and easy to comprehend. The information presented across the campaign will assist the Department of Transport in demystifying climate change perceptions and reducing transport emissions through education on the topic.

This information will be made available to all audiences through a variety of channels and digestible formats that can appeal to their preferences. This will make it easier for us to achieve our objective of notifying the public about available sustainable mobility options and raising awareness about climate change.

KEY FEATURES

Factual Information That Will Challenge Perspectives

A key feature of this concept is its ability to increase the awareness of and challenge perspectives on climate change and sustainable mobility options. In making educational or interesting information available for sharing via these channels, the campaign gives those who can act a chance to motivate others to reduce travel emissions. Habits of sustainable behaviour have been negatively impacted by generational and societal stereotypes regarding low-emission modes of transportation, such as public transport, due to class and status prejudice.

Also hindering the public from making climate-conscious travel decisions have been ineffective communication, false information dissemination, biased data, and unreliable sources of available information. Through information channels that eliminate these hindering factors, a campaign like this one will actively encourage the public to learn more about this issue and what they can do to help. The use of keywords and Search Engine Optimisation (SEO) throughout channels within this campaign will assist in allowing the public to find accurate and reliable sources of information about what they are seeking.

Taking Advantage of Context

A major advantage of this concept is its dynamism. Due to the range of platforms and mediums this campaign can be advertised on, it means that people can be exposed to this advertising in a variety of contexts. This provides an excellent opportunity to reach people in situations where the advertisement is relevant to their current circumstances. For example, radio ads or radio shows about climate change and the need to use cleaner vehicles could be heard by commuters when they are driving their cars; similarly, a well-placed billboard on the freeway could pose to commuters while they are driving whether or not they know their vehicle's impact on the planet. The campaigns can lead to a website or information hub where people can gain a more in depth understanding of the subject matter with options, alternatives of what they could be doing different today.

Multi-Campaigns to Increase Reach

Multiple campaigns can be run simultaneously or at different times, with customised materials and content for each channel, allowing for increased flexibility. By integrating different channels within a campaign, information can be conveyed to a wider audience and achieve a broader impact by taking advantage of all the available options for reaching specific demographics. The marketing of LinkedIn to a middle–aged demographic with professional occupations, for example, would not be a reliable sole method of reaching all middle-aged professionals. It would be naïve to assume that all members of this demographic would use the same social media platform or that this is the ideal method of communicating with them. It is possible, however, to run two campaigns together, such as sharing the same information presented on LinkedIn via a digital billboard located on major roads. During peak hours, this information could be displayed major roads so that many professionals travelling to and from work could see it. This will assist in broadening the campaign while narrowing in on specific demographics through a variety of channels to ensure the message cannot be ignored.

Adaptable Content to Maintain Relevance

It is not feasible to re-use the same campaign from ten years ago as people and times are constantly changing, especially their needs, wants, and desires. Considering that climate change is a wicked problem that is also ever-changing, it becomes imperative to be able to update the campaign according to the current circumstances by adjusting and adapting the information. A significant number of channels proposed for the campaign are digital components that can be easily altered to remove irrelevant information or add new insights that can benefit the public in their understanding of sustainable mobility.

Social Media Champions

The use of social media is a significant asset when conducting advertising campaigns in the present age of technology since there are social media platforms for people of all ages and preferences. It is through these platforms that social media champions can emerge and be of use to the campaign, as social influence is one of the most effective means of educating and promoting the interest in a particular service. By using collaboration and sponsorship with a well-known champion such as a celebrity, this will assist in the campaign reaching a wider audience and gaining attention through the reputation and following of the champion and their popularity on social platforms. Certain audiences, however, appreciate the appeal of being able to relate to their champions, and in this instance, champions can be created by promoting everyday individuals or employees whom the audience can get to know and establish a connection with, fostering trust in the information presented and being able to inspire change.

Connecting to All Other Concepts

As an advertising campaign, this concept has great capacity for spreading awareness, not only of the need for more sustainable transport and how people can contribute, but also for the other proposed concepts in the information system. The various platforms in the advertising campaign can be leveraged to advertise the Sustainable Travel Guide, Educational Mobility Seminars, and Personal Mobility and Emissions Tracker App to push people to these other concepts, providing them with more resources that can assist them in becoming more sustainable travellers.

Storyboard

A commuter travels to work in their personal vehicle.

During the journey, the commuter is stuck in traffic, and notices an advertisement on one of the digital billboards on the highway.

The billboard advertises a variety of other more sustainable ways to travel, directing viewers to a website for further information.

Being stuck in traffic, the commuter takes particular notice of this advertisement and remembers the website name.

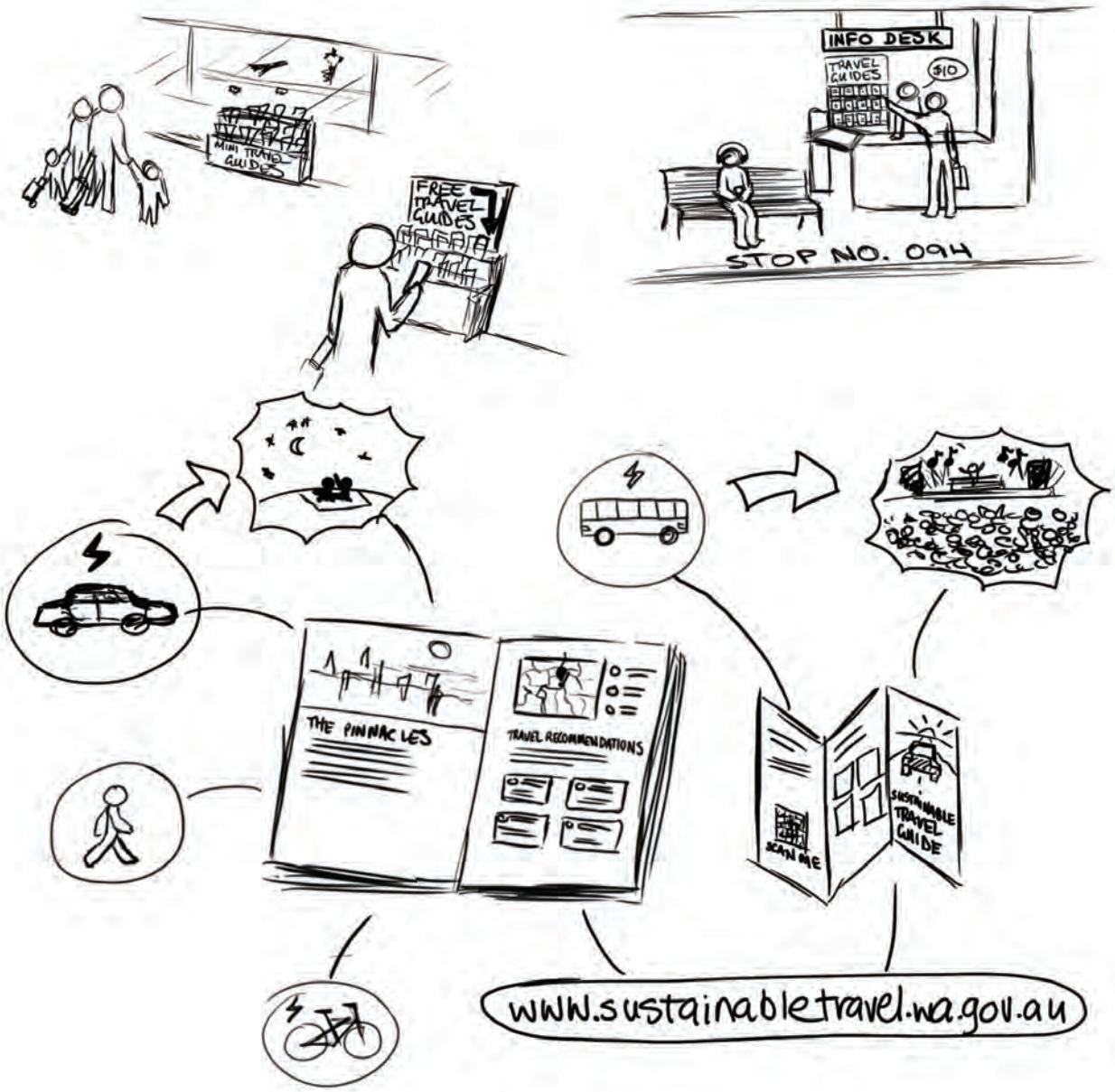
As it reaches the end of the work day, the commuter thinks about the traffic they are going to face on the way home, and remembers the website they saw advertised earlier.

The commuter looks up the website and has a read through the information on other mobility options.

In reading through this information, the commuter learns about the dangers of climate change, and the need to reduce transport emissions.

The commuter transitions to working from home for 2 days per week, and starts cycling for short distance trips, spending less time stuck in traffic and becoming a more sustainable traveller.

CONCEPT 2.



SUSTAINABLE TRAVEL GUIDE

Overview

People are constantly looking for things to do, whether that be events to attend, new things to experience, or attractions to see and visit. This Sustainable Travel Guide would serve as a way of connecting people with these experiences through sustainable mobility and transport.

The Sustainable Travel Guide concept is essentially a sizeable booklet with a comprehensive list of places to visit and events to attend in WA. This could range from particular landmarks like the Pinnacles to music festivals. But what makes this booklet unique is the sustainable mobility options included for getting to and from each experience.

Audience

This Sustainable Travel Guide would be valuable for tourists and visitors who want to experience WA and all it has to offer. However, it holds just as much value for Perth residents, offering a range of experiences they may not have known were available, with sustainable ways to get there.

To cater to the wide range of stakeholders we have identified and provide access to this sustainable travel guide in ways that suit the public, the guide concept includes the full guidebook, condensed flyer/brochure versions, as well as a digital version, which could be offered via an app or the sustainable travel website (noted in CONCEPT 1: INFORMATION MOBILITY ADVERTISING CAMPAIGN). Having 3 different formats for the travel guide would allow people to access it in the way that suits them best – and including a digital version would naturally improve accessibility, allowing people to access the guide wherever they are, and without the hassle of carrying a physical book.

The physical versions of the travel guide could be available at locations related to travel (like train stations, bus stops and airports) as well as places like newsagents and shopping centres, and even at the Educational Mobility Seminars as part of the complementary merchandise (see CONCEPT 3: EDUCATIONAL MOBILITY SEMINARS).

Relation to Project Objectives

The Sustainable Travel Guide would assist in informing people of their available mobility options when planning trips outside their day-to-day schedule. Further to this, the guide not only informs people about their options, but gives them specific ways to engage in sustainable travel for particular trips.

Additionally, this concept also addresses the accessibility side of the information system we are creating. The guide would be funded through sponsorship and advertising contained in the guide itself, meaning the guide could be offered free of charge, improving engagement with the guide for those who may be unwilling to pay for such a product. The guidebook, flyer/brochure, and digital versions of the guide also improve the guide's accessibility by providing sustainable travel information in multiple formats so that people can access it in a way that suits them.

KEY FEATURES

Incentives

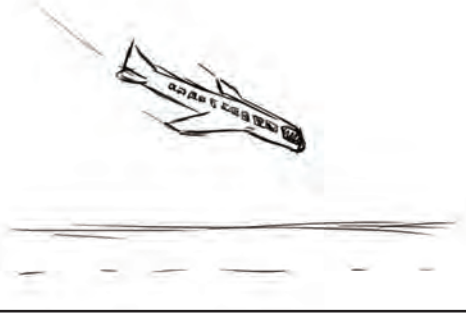
To incentivise using the guide, each year's guide would also contain a scavenger hunt that directs people to various locations using sustainable travel, with a prize that further encourages sustainable travel (such as a limited-time pass for free public transport, or even something like a new e-bike). This scavenger hunt could also include an online element (such as a social media hashtag) that further spreads awareness and connects with the Informational Advertising Campaign concept.

100% Sustainable

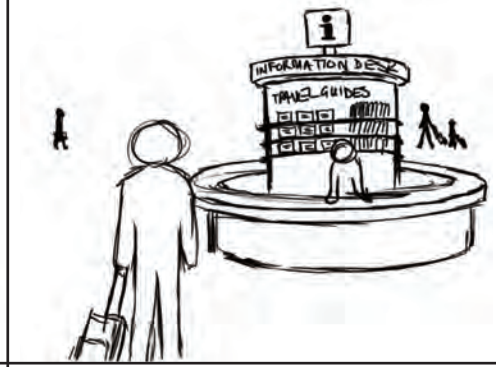
To stay up to date with current events and transport options, a new edition would need to be released every year. Therefore, the guide would be made from 100% compostable material – to ensure it is truly sustainable in every single way.

Multiple dimensions of value

While the primary goal of the guide is to improve sustainable travel, this guide has a second dimension of value for users. While some users may get and use the guide in order to travel more sustainable, others may be motivated to get the guide due to the information it has about the events, experiences and attractions available in WA. This means that while people may initially get the guide because they are wanting to know the events on offer in WA, there is the potential for them to end up becoming more sustainable travellers through using it.

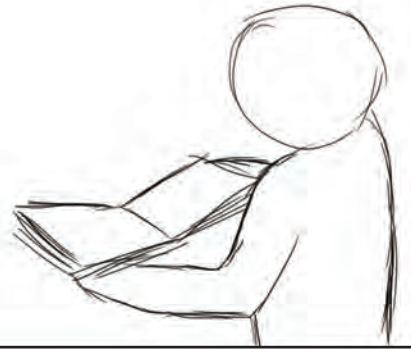


A traveller's flight arrives in Perth.



At the airport, the traveller walks past the information desk on their way out, and notices they have travel guides.

The traveller stops to ask the attendant about the book, who tells them it is a sustainable travel guide. The traveller decides to get one.

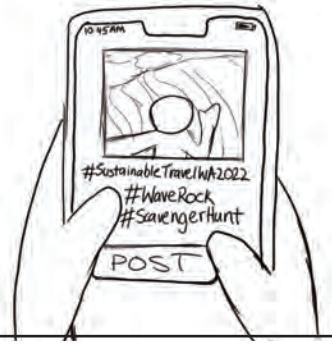


The traveller has a look through the book, learning of some of the great experiences on offer in WA, and sustainable ways to get there.

The traveller discovers a scavenger hunt game included in the guide, and decides to take part in it, seeing there is a new e-bike as a prize.

The traveller goes on the scavenger hunt, finding clues to get to the next destination.

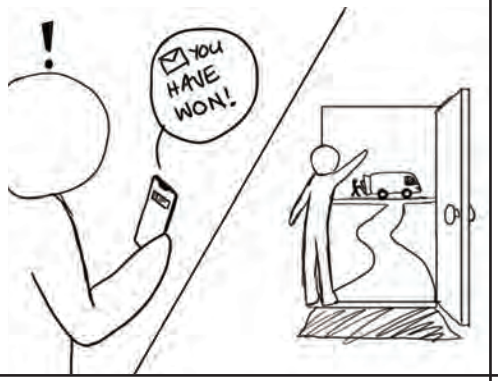
The traveller gets to the final destination, and takes a photo of themselves there.



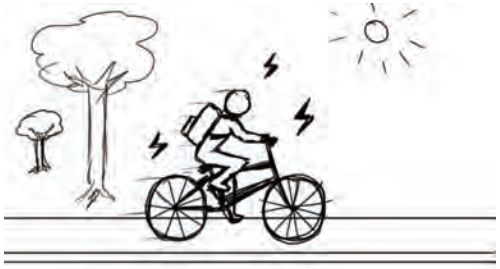
The traveller posts the photo online, sharing it with their friends, family and followers, and using the hashtag #SustainableTravelWA2022.

The traveller, having completed the scavenger hunt and completed all the experiences they wanted to from it, composts the travel guide.

Having gotten a lot of value from the guide the previous year, the traveller collects the 2023 edition when they see it on sale at the station.

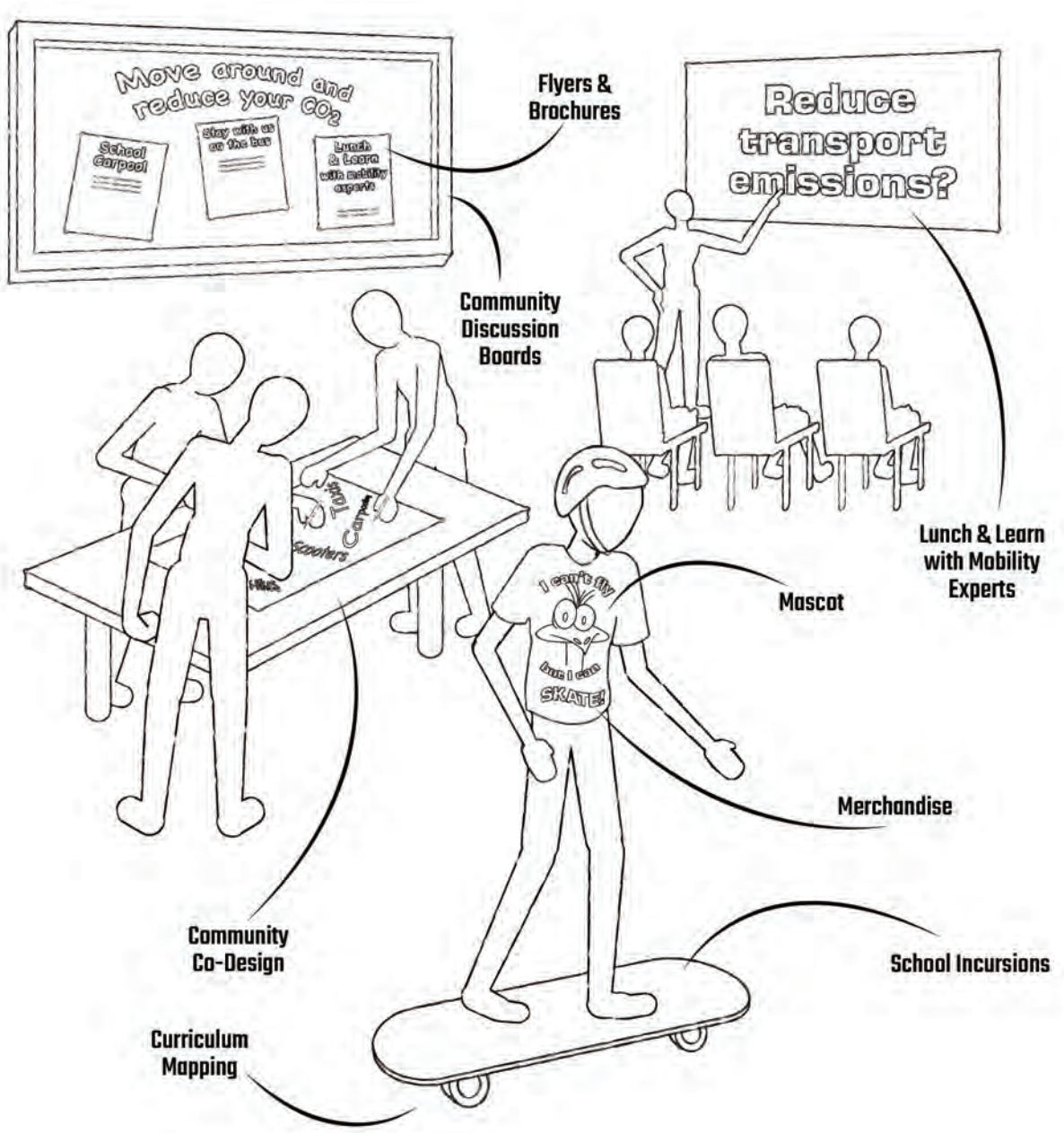


The traveller receives a notification informing them that they won the scavenger hunt, and they receive the prize of a new e-bike.



The traveller, now having an e-bike, uses it to get around and becomes a climate-conscious, sustainable traveller.

CONCEPT 3.



EDUCATIONAL MOBILITY SEMINARS

Overview

Through our research we have found that people want to do more about the environment, however, most people still decide to drive. Our proposed Educational Mobility Seminars, aim to face this contradiction by empowering young people and community members to take personal action on lowering emissions.

The Educational Mobility Seminars will educate participants about mobility options and co-design strategies within communities to increase the uptake of alternative mobility. Using a multi-modal approach, the seminars will aim to find communities and work with them to educate and develop mobility strategies.

Audience

The Educational Mobility Seminars aim to be relevant to a broad range of people, with a strong capacity to reach audiences of school age children, the elderly, and people in marginalised communities. This will be achieved by going to people in the places that they already congregate, such as schools, universities, workplaces, community centres, health centres, sporting clubs, and cultural hubs. The Educational mobility Seminars will work with communities and tailor their program to the people participating in it, to deliver useful information.

Relation to Project Objectives

The Educational Mobility Seminars aim to provide a robust program that achieves each of this project's objectives. As a participatory branch of the proposed information system, it is an educational tool on the dangers of climate change with the aims of creating behavioural change in the transport choices of the public (Objective 3). The seminars will be tailored to provide accessible, reliable and relevant information to the public about climate change and alternative energy efficient modes of transport (Objective 1). They also have the capacity to take the form of co-design workshops, which will be an avenue to collect rich data on the public's preferred mode of mobility (Objective 4), and for the development of further strategies to lower scope 1, 2 and 3 emissions in transportation (Objective 2).

KEY FEATURES

Tailored Seminars for Communities

The Educational Mobility Seminars can be tailored to meet the needs of community members who may miss or have trouble accessing other aspects of the information system. Some senior citizens may have trouble accessing information on websites and mobile phone apps and this may pose a barrier for them to use public transport outside of their known routes. Tailored information brochures and informational seminars would be hosted at libraries, senior centres and health centres.

Teaching how to plan journeys on public transport by using the TransPerth App or website, these seminars would aim to make seniors feel more comfortable using public transport and increase their general mobility. Likewise, a tailored approach towards people that speak languages other than English, with information presented at cultural and community centres, could increase low and zero emissions within their communities.

Co-designing strategies with the community

Educational mobility seminars would aim to educate, but also to create a dialogue where participants can communicate their ideas about how to make mobility options more accessible to their communities. Co-design might provide strategies that could be adopted by communities or ideas that are suggested to the Department of Transport for further development.

For example, the seminars could work with a women's interest group to develop collective strategies that could increase feelings of safety for women using public transport when travelling alone. Likewise, the Department of Transport could work with Aboriginal organisations and communities to foster increased cultural safety in aspects of transportation use. Co-designing would be an ongoing process for the Educational Mobility Seminars but would be a crucial component of developing relevant and effective information for communities.

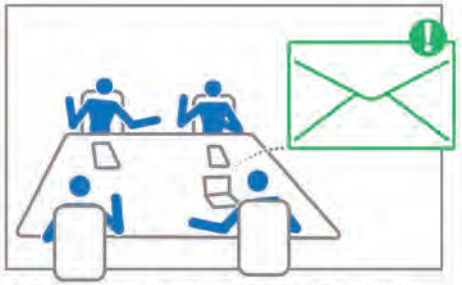
School Incursions

Schools can often play an important role as the centre of communities. Recognising this, school incursions will play an important role in developing and propagating the Educational Mobility Seminars. School incursions will teach children skills about how to use e-rideables and how to follow the laws of their use. It can also work within schools to increase feelings of security about using public transportation for both students and parents. Information about sustainability, climate change, and lowering emissions can also be mapped to the Western Australian curriculum and information can be disseminated to teachers or brought home to parents.

Co-design in schools may develop methods that could be used by the community to decrease emissions from transport related to the school while alleviating other problems. For example, carpooling could reduce emissions and additionally, reduce traffic congestion at schools, and morning stress for families. Participants in school incursions may also bring their learning into other communities and organise their own Educational Mobility Seminars within them.

Storyboard

This storyboard looks at how an Educational Mobility Seminar might run as an incursion at a school and create interest in further seminars.

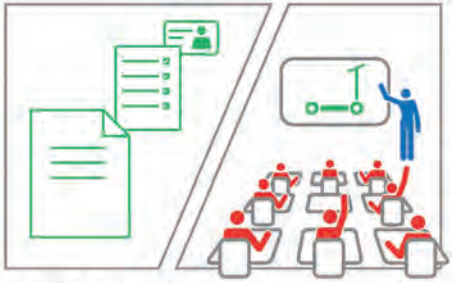


1. The DoT sends an email to schools advertising the Educational Mobility Seminars at the beginning or end of the school year.

2. A teacher reads the email, accesses the curriculum-aligned education resources, and books an incursion on the website.

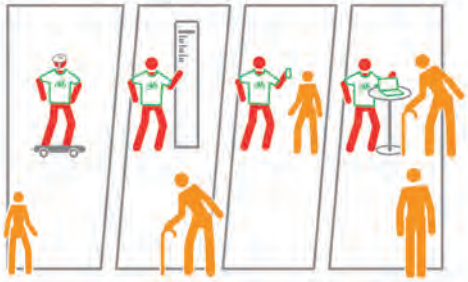
3. An organiser from the DoT calls the teacher to confirm details and ask about necessary documentation.

4. The teacher receives the necessary documentation from the DoT and sends the incursion pack for approval by the principal.



5. The DoT compiles the necessary documentation for the incursion, while the teacher uses educational resources from the DoT in their lessons.

7. The DoT comes to the school and facilitates learning and co-design activities and students take home merchandise , information and the downloaded app.



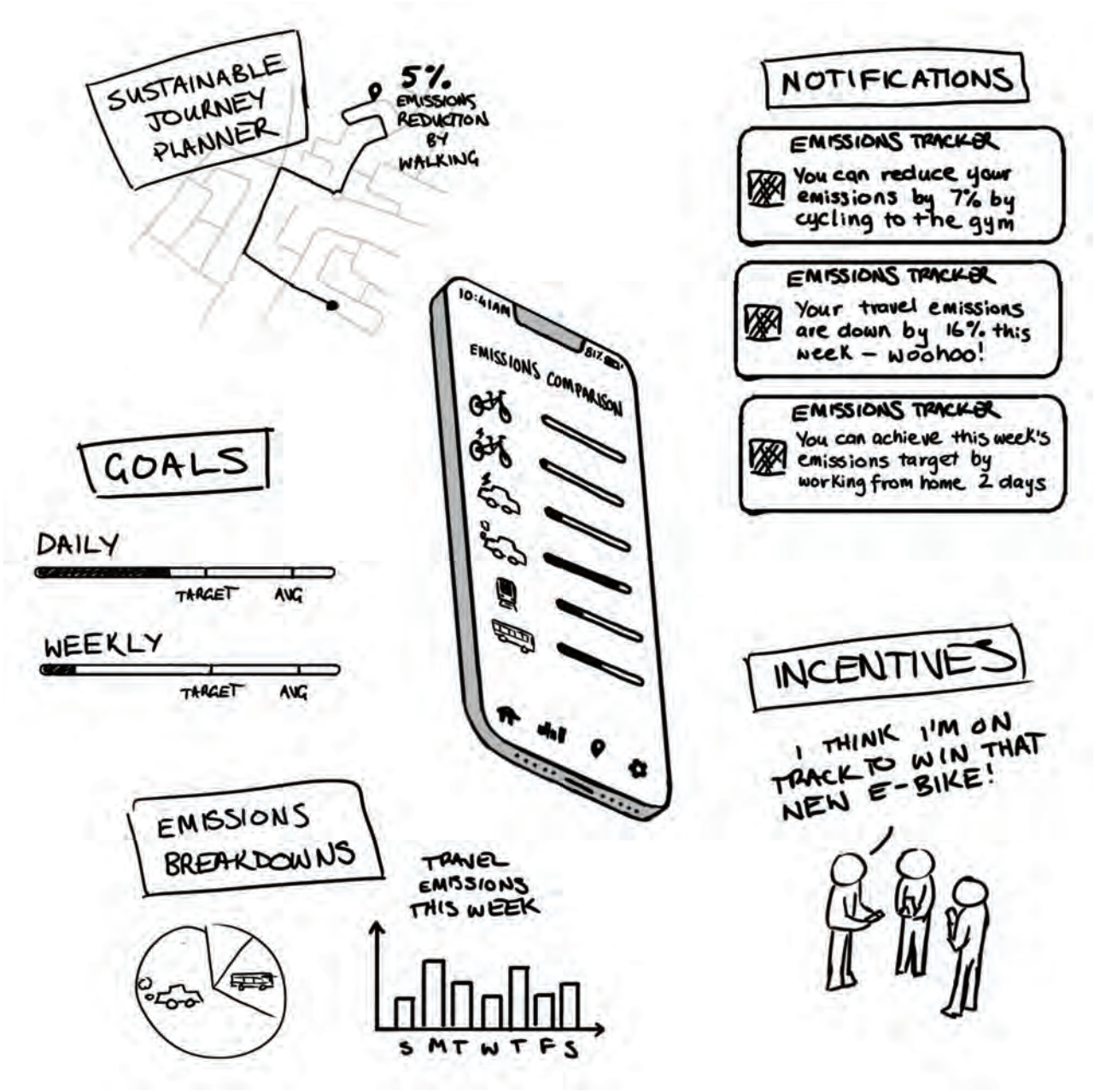
8. Students take their learning outside of the class, displaying the merchandise and sharing what they have learnt.

9. The parent is inspired by their child. They find the information brought home and use the website to search for how they can get involved. They book a community seminar.

10. The DoT facilitates a educational mobility seminar that caters for the needs of the community.

11. Community members and parents see the positive impact of the educational mobility seminars and suggest it to a local school.

CONCEPT 4.



PERSONAL MOBILITY AND EMISSIONS TRACKER APP

Overview

This app encourages users to reduce their individual travel emissions by inputting data about their daily travel usage, of which the app will calculate how much personal emissions were generated.

In a gamified attempt to educate the user about their own travel behaviours and motivate them to reduce their emissions, this app allows users to set daily or weekly goals for themselves to achieve and then they will receive suggestions based on their previous habits and push notifications reminding them of their goal with tips on how to reach them.

Audience

With the rise in technology and a majority portion of the population owning a smartphone, this application would be **available to anyone with access to this technology through Google Play or the App Store.** Although any with the ability to install the app will be able to do so, this app is mainly targeted towards those who travel individually, ranging from teenagers to elderly, and those who have an interest in reducing emissions for climate change purposes.

The development of mobile applications has proven to be advantageous to businesses due to the increasing audience size that can be reached through these channels. One of the most common misconceptions is that gamified mobile applications are only engaging a limited number of people and specific audience types. However, “mobile games are proving to be a lot more diverse than stereotypes imply” (Tapjoy 2021) which will enable us to build a stronger connection with a broader audience in terms of encouraging them to download and use our emissions tracking app through its gamified nature.

Relation to Project Objectives

Based on our project objectives, this app provides users with access to information and education related to reducing their emissions via one of the most readily available resources: technology. This is a resource that is understandable for them in comparison to the current information available and provides a level of interaction that entertains and encourages them whilst being educated.

One of our objectives was to provide the Department of Transport with informative data that could assist them with understanding the preferred modes of mobility in Perth. With the publics’ consent, the data collected through the app can then be relayed back to the DoT to assist with future mobility innovations.

KEY FEATURES

Engagement Through Competitions

Social motivation is a tactic that would be used to encourage more users to engage with this tracking app. Many companies have instituted competitive step goals as a workplace challenge. This same method can be applied to the app to encourage friendly competition with family, friends and colleagues, challenging each other to complete certain goals fastest or to receive a reward.

By participating in friendly competition, this will provide a motivation and encouragement for continuous use of the app that will aid the app in providing beneficial tips and information based on a larger range of data inputted by the user.

Incentives

Incentives are often the most effective form of motivation for the people that need the possibility of a reward or benefit to keep them engaged in using the application. As the app would particularly be a major benefit to stakeholders who travel significantly such as ride sharing services, freight drivers and frequent commuters, incentives would be the best way to engage with these groups and encourage consistent usage. Using this app these groups could track their usage and be given tips on how to reduce emissions through information based on their current travel patterns.

This could be in forms such as incentives to upgrade to an electric vehicle and the cost savings they would receive as a result or, if they already own an EV, the best times for charging. Having a reward given in exchange for taking more climate-conscious travel options and reducing their travel emissions, will encourage them to continue this behaviour and eventually form lasting habits that will result in the outcome of assisting in a lower emissions rate in Perth.

Education Through Entertainment

The topic of climate change can often be confusing for those when explained in scientific terms that not everyone understands and therefore loses the interest of many instead of educating them on the concerns of climate change and how they can adjust their habits to reduce emissions. Topp, Thai and Hryciw (2019) discusses the “blending of entertainment and education is often used as a mechanism for communicating science to the general public”. Mobile applications have been changing the future to combine education and entertainment into one source that is formatted to capture and hold the attention of the user through visuals and interaction elements.

As identified early in this project, Australia is behind in our education and actions on reducing climate change through emissions. Despite this, The Australia Institute’s poll showed “climate change and its impacts remain a prominent concern to Australians” (Colvin 2020). By utilising this concept and creating an application as one of our proposed outcomes, we will be able to make the information desired by the public to change and track their climate behaviours through a format that is recognisable and understandable for them as well as entertainingly educational.

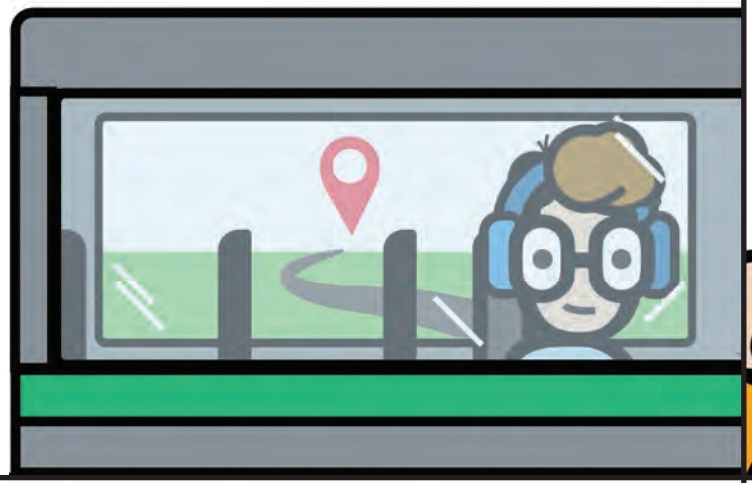
“blending of entertainment and education is often used as a mechanism for communicating science to the genreal public”

(Hryciw 2019)

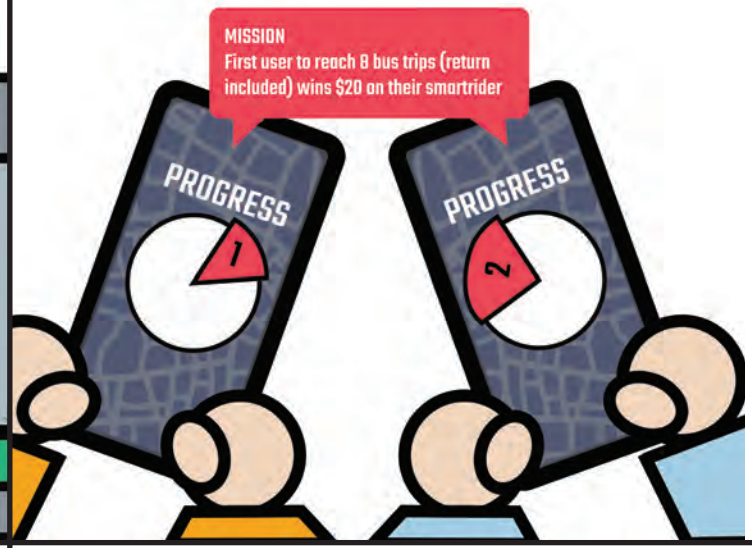
Hears colleagues at work talking about this new app that allows you to track your emissions. Out of curiosity the user downloads the app.

The user begins their first trip using the app, which provides them with the most sustainable mode of transport to get to their destination.

Everyday the user enters data on their travel journeys. After a week, the user is then given suggestions and tips on how to improve their travel behaviours to be more sustainable for the environment



The user starts taking more routes via bus, train and walking to their destinations that are within short distances



The app encourages the user to invite their friends to download the app to track their own travel emissions and compete in challenges together to motivate each other and win rewards/incentives for continued use

INFORMATION SYSTEM VS INFORMATION RESOURCE

The four previously mentioned concepts effectively illustrate the need for a system rather than an information resource. As explained in the REDEFINED PROJECT PROBLEM section, a single PDF or information resource is limited; it is static, and only really concerned with what information is being presented. An information system on the other hand, is dynamic, and not only concerned with what information is being presented, but also how that information is being presented.

This journey map depicts all the individual touchpoints from all four concepts that make up our proposed information system; through this journey map, the difference between an information resource and an information system can be demonstrated. On this journey map, a single information resource would be displayed on this map as just 1 touchpoint; from the number of different pathways presented on this map, it is clear to see that one, single touchpoint (due to its limited reach) would not be able to accommodate the diverse journeys of the wide range of stakeholders we have identified.

Due to the limited reach of one, single touchpoint, each of the concepts we have created also consists of its own sub-system of touchpoints.

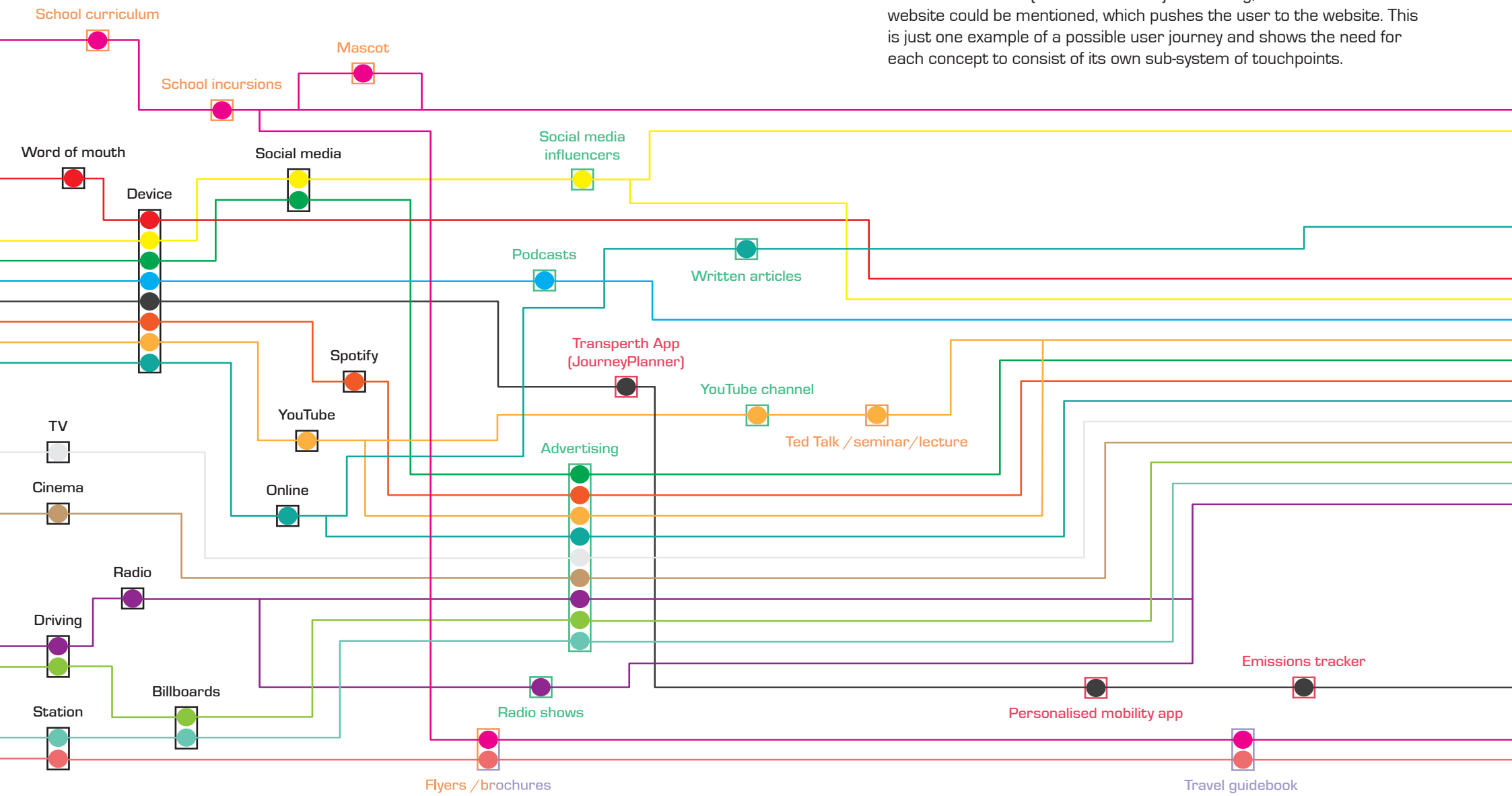
“a single PDF or information resource is limited; it is static, and only really concerned with what information is being presented. An information system on the other hand, is dynamic, and not only concerned with what information is being presented, but also how that information is being presented.”

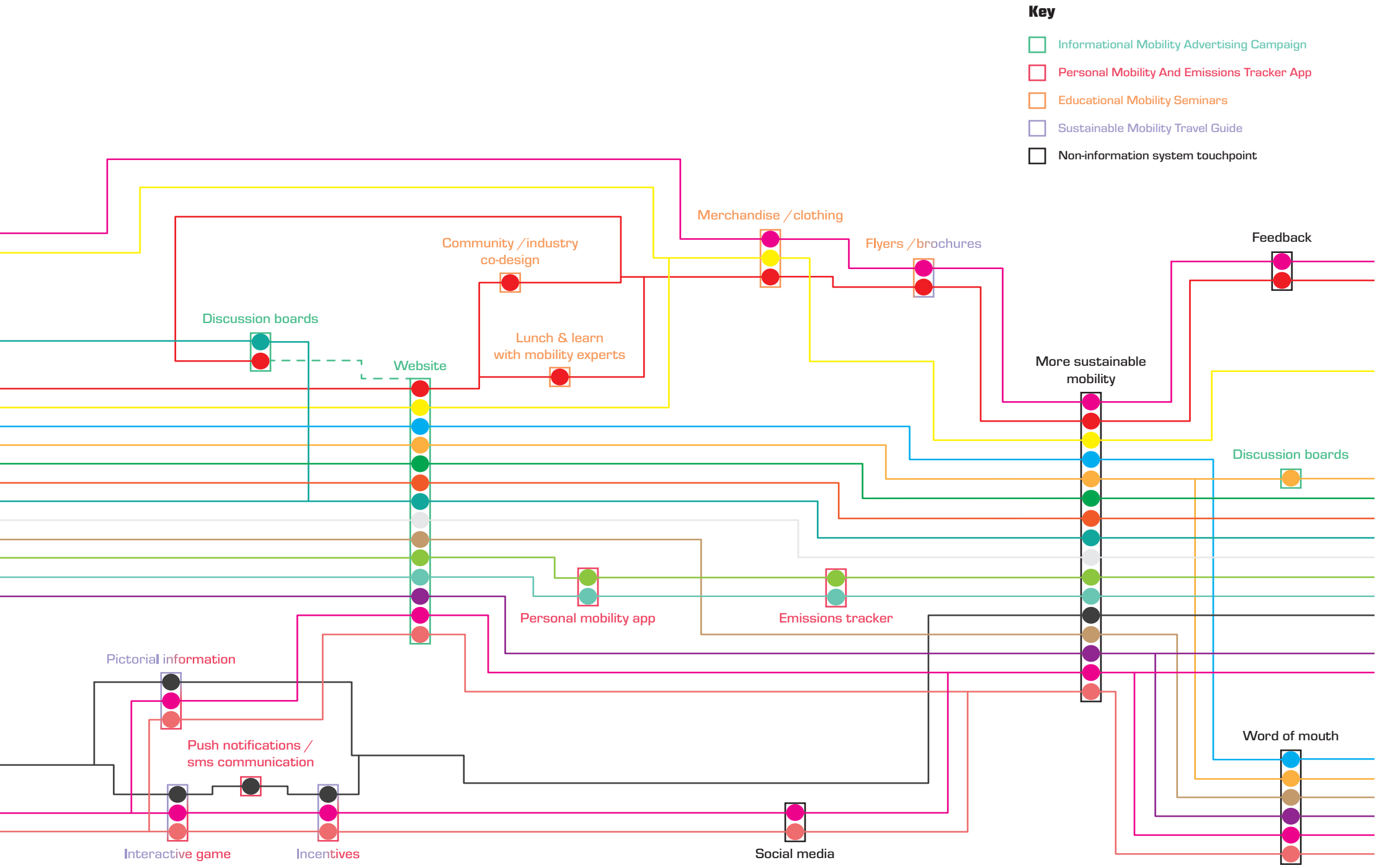
(Bailey et al. 2022)

Journey Map - Proposed Information System

This can be seen in the example of the Informational Mobility Advertising Campaign concept (the green touchpoints). If the advertising campaign concept only consisted of a website, how would people get to it?

Looking at the **teal-coloured journey**, users could start by using their device, going online and reading a written article (such as a blog). In the comments section (discussion board) of this blog, the sustainable travel website could be mentioned, which pushes the user to the website. This is just one example of a possible user journey and shows the need for each concept to consist of its own sub-system of touchpoints.




Key
Informational Mobility Advertising Campaign
Personal Mobility And Emissions Tracker App
Educational Mobility Seminars
Sustainable Mobility Travel Guide
Non-information system touchpoint
Merchandise /clothing
Flyers /brochures
Feedback
Community /industry co-design
Discussion boards
Lunch & learn with mobility experts
Website
More sustainable mobility
Discussion boards
Personal mobility app
Emissions tracker
Pictorial information
Push notifications / sms communication
Word of mouth
Interactive game
Incentives
Social media

Information System vs Information Resource Continued.

But the value of an information system goes beyond each of our four concepts individually. Together, our proposed information system spans across these concepts too. The following illustrates this.

Part of our Educational Mobility Seminars concept includes having complementary merchandise available for attendees at the conclusion. This merchandise could include the Sustainable Travel Guide.
As described in CONCEPT 2: SUSTAINABLE TRAVEL GUIDE, the scavenger hunt included in the guide could contain a social media hashtag component, which in turn, could complement the wider social media advertising campaign that is part of the Informational Mobility Advertising Campaign, and push users to the website. The billboard ads component of the Information Mobility Advertising Campaign could also prompt users to investigate their personal travel emissions by advertising the Personal Mobility and Emissions Tracker App.

"Service Blueprint Exercise"

SERVICE BLUEPRINTS

A service blueprint is a tool used to visualise the way a service functions and how it is experienced by those participating in it. It includes a step-by-step description of the service, from the different points of view of those involved and includes a behind-the-scenes look at the service delivery system.

While all four of our concepts are strong, we have chosen the following two service blueprints to demonstrate how these concepts would work and the necessary resources and components needed to deliver them.

How Service Blueprints Work

To explain how service blueprints work, we will use the Education Mobility Seminars service blueprint. The service blueprint for Educational Mobility Seminars shows the service system for the school incursions component of the Educational Mobility Seminars.

It shows some of the difficult behind-the-scenes work that comes with organising an incursion from the perspectives of the provider, teachers, students and parents. It also shows the potential of school incursions for becoming a beacon for broader community change. Children and young people are often the agents for change in society and empowering them can have ripple effects beyond the school gates.

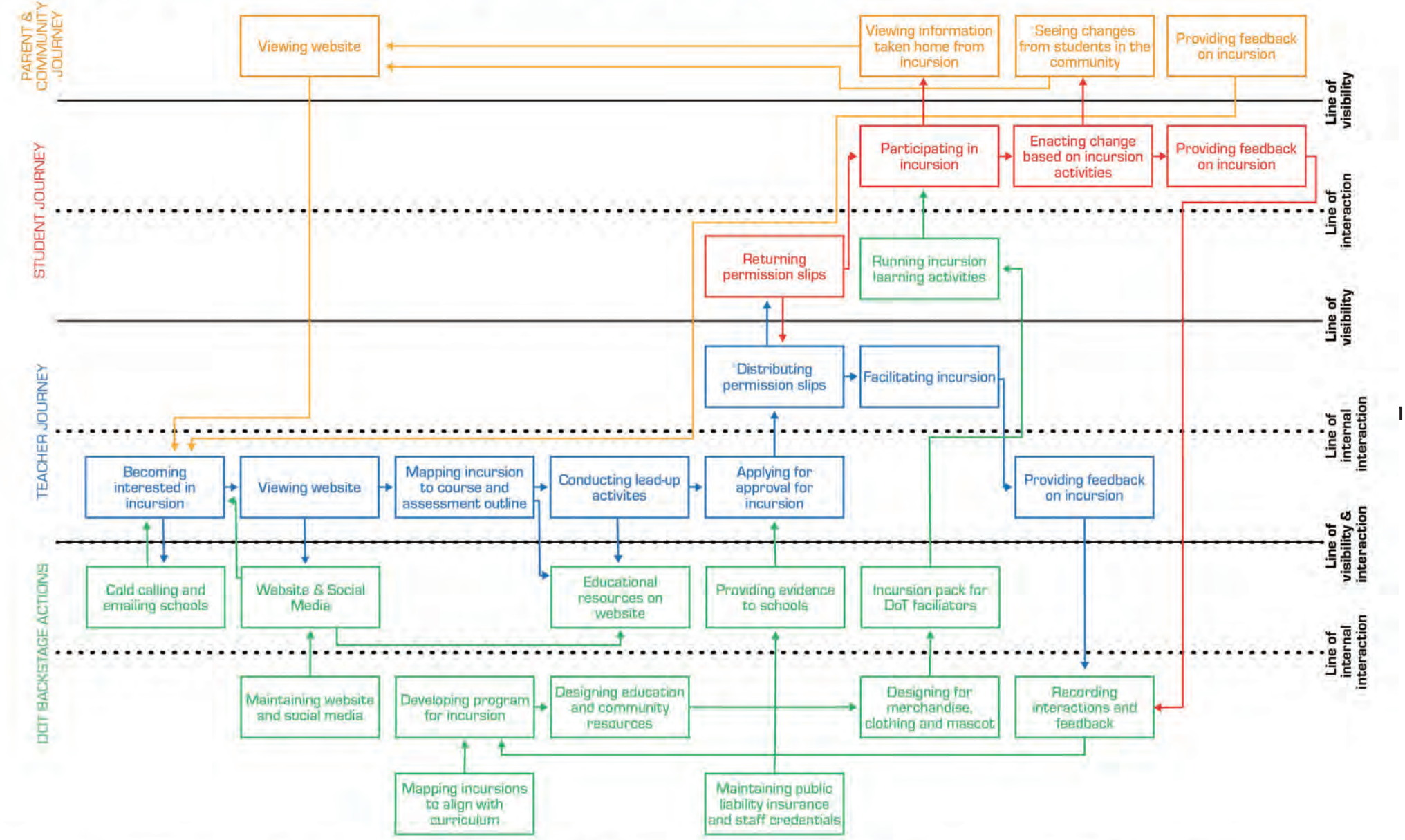
How Service Blueprints Work Continued.

Looking at the **green areas**, the behind-the-scenes preparation that would be required to organise something of this nature can be seen. In this example, it includes aligning it to the WA curriculum, developing resources for teachers to access and maintaining a website to post these resources.

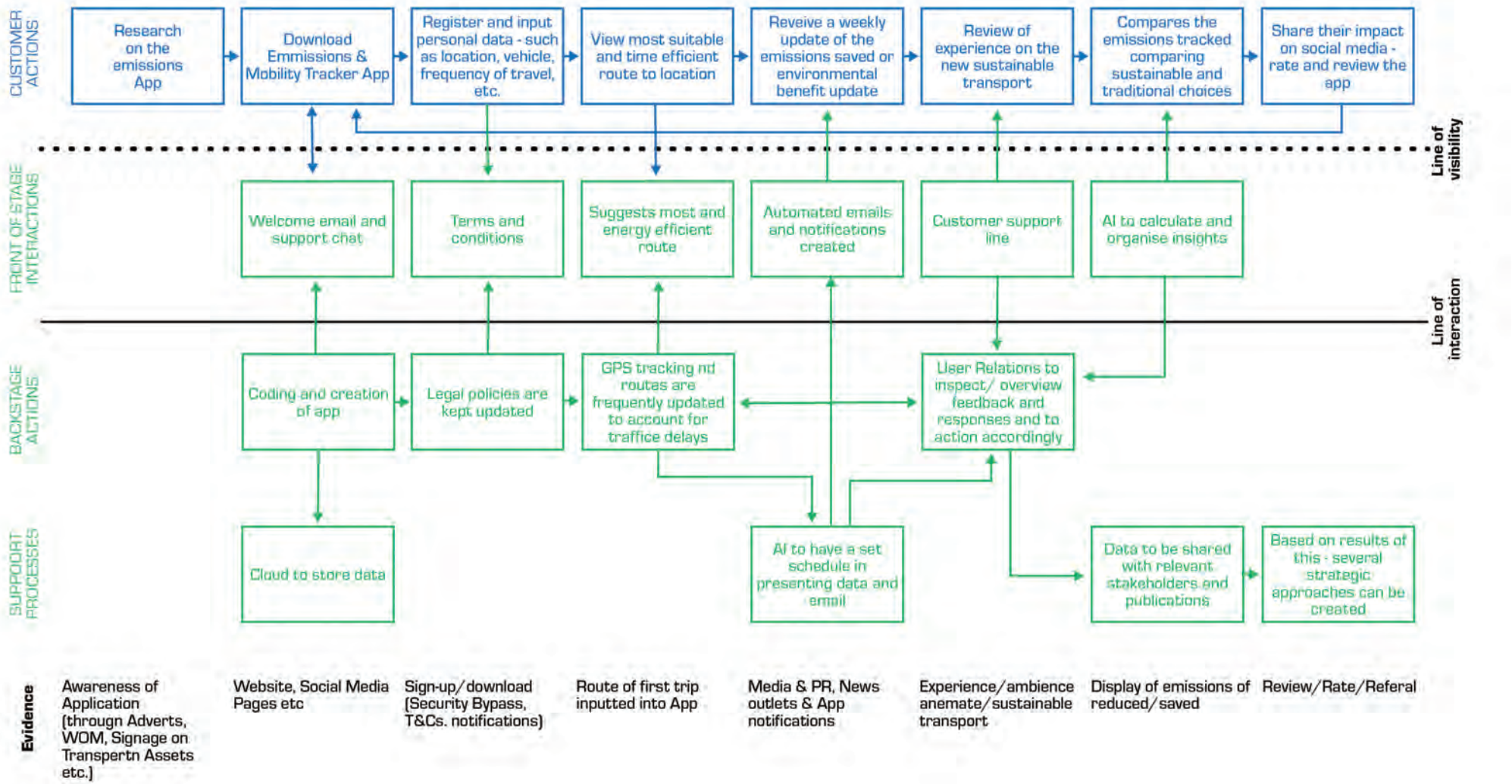
The **blue areas** display the initial access that teachers would have to the program and what touchpoints might make them interested in it – this includes seeing the website and feedback from parents and the community about past successes. This diagram also illustrates the process that a teacher typically undergoes to make a school incursion an integrated part of their teaching.

In **red** and **yellow**, the interaction of students and parents with the incursion can be seen. Importantly, this section shows the potential that a seminar of this nature has for creating further change as students take their learning home and engage in the strategies, learnt at school, in the broader community. This also becomes a point for the loop to be closed and for this the service to begin again, through community awareness and feedback to schools.

Service Blueprint: Educational Mobility Seminars (School Incursions)



Service Blueprint: Mobility & Emissions Tracker App



We have used service blueprinting in conjunction with our viability mapping to determine the feasibility of our ideas. For example, the blueprint for Educational Mobility Seminars highlights the behind-the-scenes work necessary to deliver just one aspect of the seminars (that being school incursions). As we move forward, we will be using tools like this to continue to refine our ideas.

VALUE

In this section of the proposal, we will define the degree of value that the proposed information system will provide for Perth in terms of assisting in reduction of travel emissions. As a result of our research and discussions with the public, we have identified three key areas in which our project will provide value to the Perth public, the WA Department of Transport and Australia.

Provide the Public with Accurate, Accessible Information

The Department of Transport recognises that in the absence of adequate communication with the public, education of public awareness regarding the importance of environmentally conscious transportation decisions has been limited. Currently available information resources on environmentally sustainable transport have proven to be difficult to access since they are dispersed across multiple agencies rather than consolidated into one central location.

The purpose of our project is to fill this information gap by proposing an integrated information system that combines four key concepts that will prove to be of immense significance and value to Perth's citizens. Using this information system, the public will be provided with educational information regarding the dangers of climate change and supply citizens with the assistance to adapt their mobility habits to incorporate more energy-efficient transportation methods based on the information provided.

Value for the Department of Transport

As demonstrated earlier in this proposal, the design thinking methodology involves empathy and gaining insight into the struggles and motivations of the public through interviewing of identified stakeholders. These interviews explore how the public are currently travelling around the metropolitan area and have assisted in identifying barriers and opportunities to transitioning to more environmentally sustainable modes of transport.
This process increases the value of this project through providing the DoT with valuable and useful data straight from the Perth public regarding their opinions on current transport options. Utilisation of this data will give the DoT direction on how to employ this data, especially in further development of climate change policies. This also means that the public will additionally find value and benefit from this project as it potentially opens opportunities for public opinion and feedback. Our research and data obtained could see a shift in everyday life of using the transport system available if the issues are brought to the DoT's attention and resolved.

There is additional value in this project for the Department of Transport as an organisation to use the information system to start initiating a better communication line with the Perth public. The concepts within our proposed information system offer the opportunity for the public and the DoT to communicate through multiple resources that allow for feedback about the information that has been provided and the ability to work directly and collaboratively with the public through mobility issues experienced.

The previously identified gap will also be bridged through providing the DoT with these appropriate communication channels to educate and inform the public and the tools necessary to use this as a basis for any other issues that need to be addressed in the future.

Assist the Reduction of Climate Change Impacts

Above all the issue of climate change is one that is going to affect everyone and will increasingly continue to do so if the level of carbon emissions does not reduce. Therefore, this project applies to and is worthy of the attention of the entire community of WA as everyone has a role to play in assisting to reduce greenhouse gas emissions.

The Department of Transport have been tasked with achieving net zero transport emissions by 2050. As a result of this, documents such as the WA Climate Policy and WA EV Strategy were produced to identify key steps needed to meet this goal. As WA starts to experience more extreme weather events, there is an urgency for further information resources that can educate the public about how they can contribute to this net zero emissions goal. By identifying, insights gained through research and interviewing, the information system created through this project has the potential to assist with this.

“the purpose of measuring the experience had by the public is to provide us with feedback that will indicate where iterations need to be made to improve the information system over time.”

(Bailey et al. 2022)

EXPERIENCE MEASURE

The experience measure of this project can be determined through the overall customer satisfaction and ongoing observation of public behaviours displayed through interaction and engagement with the information system. Customer satisfaction is an important aspect due to the human centred nature of design thinking and service design processes, which emphasises designing for the people who will be interacting with the service system. By ensuring the public are at the forefront of every decision made in this project, their satisfaction is a key indicator of success. The purpose of measuring the experience had by the public is to provide us with feedback that will indicate where iterations need to be made to improve the information system over time.

Multiple Channels for Feedback

Having multiple concepts that collaboratively build up this information system, it is important to establish appropriate tactics that will be used to approach each one individually to measure the success of that concept effectively. All concepts will have an element of feedback internally that will allow users to communicate their experience with that specific concept directly back to the Department of Transport. This feedback could take on the form of further interviewing, online surveys, social media polls and engagement, and feedback forums.

Measure of Educational Seminars

The educational seminars will particularly rely on this method of measuring experience due to feedback sessions being incorporated as part of the experience. This will provide us with an insight into how effectively the seminars run; if the information being presented is digestible and appropriate for the groups being presented to; how well attendees have been provided with the information needed to make changes to their travel options; and the overall satisfaction of the attendees. As we have learnt from ethnographic research, qualitative data is the most beneficial in understanding the reasoning, perspectives and opinions of people, and therefore, incorporating live feedback sessions with the public has been implemented into the educational seminars as the most appropriate form of measure for this concept.

Measure of Emission Tracker App

The emissions tracker app is our main form of data collection from this proposed information system and will provide the DoT with insights into the adjusted travel behaviours as a result of data collected by the app. The measure of user engagement can be determined through patterns in acquisition (new users) and retention (returning users) rates, and calculating how many climate-conscious travel recommendations from the app have been taken by the user. Through Google Play and Apple App Store, the app users can provide ratings of their experience with the app and feedback on how well the app works, and their opinion on how helpful the app has been in educating them on travel emissions and sustainable mobility options. z

Measure of Travel Guide

The sustainable travel guide encourages participants of the scavenger hunt to share their experiences through a social media hashtag, allowing for experience measure to be determined through public social media engagement. Through the social media hashtag, the public can share their experiences along the hunt and how this guide has assisted them in becoming more sustainable travellers. Customer satisfaction can then be determined from how many posts have been made under the hashtag, tags to the advertising campaign social media accounts and positive vs. negative feedback in these experiences that are posted.

Measure of Advertising Campaign

The advertising campaign is multi-faceted and therefore the customer satisfaction can be determined through the channels previously discussed in the other concepts, as well as additional channels. The website is another concept within the campaign that would draw in many users allowing for digital analytics to be employed to measure the success of the campaign through the website interactions. Digital analytics can determine: the retention of users on specific pages, frequency of customer visits, total time spent on the website, the number of clicks on certain elements and redirection to other links internally and externally of the site. Utilising online software such as Google Adwords and Google Trends will also allow indication of how often keywords associated with the advertising campaign are searched for and specifics about these searches by locations to determine the reach of the campaign.

OUTCOMES & IMPACT

At its core, this project may be about reducing emissions, but its outcomes – in the present and the future - are far broader than that. This section describes the future outcomes and impacts we anticipate for the public as a result of implementing our proposed information system.

An Effectively Informed Public

When it comes to issues like climate change, there is still considerable misinformation. Through providing relevant and reliable information in a variety of formats that can cater to how people want to receive that information, this information system can effectively inform the public and reduce such misinformation.

Increased Education

The information system created through this project aims to not only inform people but to educate them. Informing people as to what their mobility options are, the threat that climate change poses, and what they can do on an individual level to reduce transport emissions can lead to increased education around these issues.

A More Empowered Society

Through informing and educating the public, this information system can empower people to make climate-considered travel choices. In turn, there is potential for this project to cause a shift in thinking and behaviours and create a more sustainably minded society in which people are empowered to make sustainable choices in areas beyond just travel.

"There is potential for this project to cause a shift in thinking and behaviours and create a more sustainably minded society in which people are empowered to make sustainable choices in areas beyond just travel."

(Bailey et al. 2022)

Improved Mobility

This information system needs to reduce transport emissions to be successful – but more broadly, has the potential to inspire effective change in the way we move around. By rethinking how we travel to reduce emissions, we are indirectly ensuring the sustainability of our whole transportation system.

Over Covid, many people had to work from home, and this reduced emissions - with the additional bonus of our transport system being able to handle the demand of the population during peak times (Theobald and Thompson 2022b). Therefore, as the population continues to grow in the future, changes in thinking, our systems, and the way people travel could be the difference between a transport system that is crippled under the weight of population growth, and one that is able to adapt.

Therefore, while this project may be primarily concerned with emissions, it creates awareness around the need for fundamental changes in the way we move around. As a result, it has the potential to inspire change in other problematic areas of our mobility systems too.

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(Bailey et al. 2022)

Healthier Habits and Lifestyles

Allowing the public to have this information system to educate themselves on more efficient transport and mobility options will also supply them with options that will improve their overall fitness and health. Studies over the last decade have attributed good health and fitness to using public transportation services - in Canada, the Journal of Public Health Policy has stated that 'people who take public transit are three times more likely than those who don't to meet the Heart and Stroke Foundation of Canada's suggested daily minimum of physical activity' (University of British Columbia 2009). By providing information that will encourage more people to utilise the public transport system and other low emission transport such as walking and cycling, we will start to see a shift in the level of general fitness and health of the public.

"By providing information that will encourage more people to utilise the public transport system and other low emission transport such as walking and cycling, we will start to see a shift in the level of general fitness and health of the public. "

(Bailey et al. 2022)

A Brighter Future

This project's primary aim is to help avoid the negative impacts of climate change by reducing transport emissions - but the information system that is created through this project also stands to create a better future. By educating the public on the importance of being climate conscious in their decisions now, this project is protecting the future of our planet and alleviating the ever-heavier burden of reversing climate change for future generations.

Achieving the Goal of the Department of Transport

The central focus on this project is to assist the Department of Transport with achieving their goal of reducing transport emissions and working towards achieving the WA government's 2050 target for net zero emissions (Department of Water and Environmental Regulation 2020, 5). Therefore, achieving this is an important outcome of this project.

Potential to Change the World

If the information system created through this project effectively assists with the public reducing their transport emissions, this project would serve as an inspiring example not only to the rest of Australia, but the rest of the world. While the information system created through this project could not simply be implemented in other areas, its success could lead to it being adapted to the conditions and people, and even being adapted to wider emissions reduction strategies in sectors beyond transport. Further than that, this project's value could go beyond emissions issues entirely, and be used as a reference for improving sustainability in society generally.

"By educating the public on the importance of being climate conscious in their decisions now, this project is protecting the future of our planet and alleviating the ever-heavier burden of reversing climate change for future generations."

(Bailey et al. 2022)

SUSTAINABILITY

This section covers the sustainability of the information system created through this project. To ensure this project can continue beyond the completion of our course at the end of 2022, strategies will need to be implemented so that the ideas and concepts developed through this project can grow and evolve over time. As noted earlier, we would not expect all of our proposed concepts to be rolled out at once, but in stages, over a number of years; as for which concepts should be rolled out when, this is something that we will be able to determine once the direction of the project is clarified more next semester.

Over longer periods of time, changes in infrastructure, mobility, technology, climate conditions, and people's mobility patterns and travel needs will likely result in the original concepts becoming ineffective or redundant. Therefore, to avoid the project having a limited lifespan, this project will need to be revisited regularly; further ethnographic research and co-design will be critical to ensure that previous concepts can be adapted and/or new concepts can be created. Keeping lifespan of the information system in mind, we acknowledge that with the change of government every four years there is a possibility of needing to adapt the information within the system to ensure the information is current and updated with the policies being focused on within the current government.

Due to limitations of the university calendar and the resources of our team of six, this projects scope was narrowed to domestic land travel, and the Perth metro area. However, should this project be successful, we would see its expansion to encompass commercial travel, as well as regional areas of WA as a next key phase. To do so, further ethnographic research and co-design would be needed with stakeholders from these new areas to ensure that this project's information system can be adapted to their needs and wants.

Through adopting a mindset and processes of ever-evolving outputs rather than finite solutions, this project's value can extend beyond just the current Perth public to the future public of the whole of WA.

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INTRODUCTION

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NEXT STEPS

"Co-Designing through Stakeholder Mapping with Carole and Helen from YourMove"

SUMMARY

Introduction

This proposal reflects our work to address the problem brought to us by the Department of Transport. The initial problem asked us to develop an information resource that could increase the uptake of low and zero emissions vehicles in Western Australia. Using design thinking we have investigated this problem and have proposed that an integrated information system is necessary to address the issues core to the problem.

The core issues revolve around a lack of low emissions mobility options and uncertain and inaccessible information about reducing emission through using alternative mobility options. Our investigation, research, ideation, and idea development have produced concepts that interconnect in the aims of creating a robust and effective information system. We will continue to develop our concepts for this system through ongoing co-design with the Department of Transport.

THE NEXT PHASE

Review Period

Over the month break before the next phase of the project begins, the Department of Transport will have the opportunity to thoroughly review this proposal. Feedback, especially regarding the viability of our ideas, will allow us to determine the direction of the project and which proposed concepts we will continue to develop in semester 2 during the prototyping phase.

Next Semester

Over the course of the next phase, we will continue to work with and investigate YourMove to understand the methods behind their work and how this can be applied to our project. There will be more of an emphasis on co-design workshops with the Department of Transport and other stakeholders that we have identified through our research.

Our main objective, however, will be to develop and prototype the final concepts and do user-testing to see how they work in a real-world situation with those who will actually be interacting with the information system. From this we will be able to make iterations based on feedback, and hopefully create an information system that effectively achieves the goals of this project.

Feedback Session

A session will be organised for the first week back in semester 2 to go through this feedback with the Department of Transport so that we may answer any questions about this proposal, provide any clarification needed on the direction or proposed information system, and make adjustments needed to the project if necessary.

Into the Future

If this project is successful, we would like to see this project expanded further than Perth and adapted to regional areas and beyond.

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INTRODUCTION


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GLOSSARY & REFERENCES

DESIGN TH  NKING

Co-Design	The client, designers and stakeholders work collaboratively using design thinking-based activities to keep stakeholders informed and at the forefront of project decisions, giving them frequent opportunities for input and inclusion, to develop more effective human-centred solutions
Design Brief	A project management document that outlines the specifics of a design project at the beginning of the project timeline. This document will communicate the initial design problem, who it is for, the vision, and project goals and outcomes. It will also contain general specifications in terms of what is expected of the various parties involved. (Short 2020)
Design Challenge	Our starting point in Design Thinking, a question in which we frame our initial research and problem for the project. ("Design Thinking Glossary" 2022)
Design Research	Qualitative research is conducted in order to gather information on users' needs, pain points, conflicts and problems to use this as a basis and inspiration for generating ideas. ("Design Thinking Glossary" 2022)
Design Thinking	Both a mindset and a design process, design thinking takes a 'human-centred' approach to addressing the wicked problems of the world. Design thinking explores the vague nature of wicked problems in order to clarify them so that core issues can be identified, and solutions can be implemented

Empathy	Technique used in design thinking methodology to better understand a particular experience from a user's perspective
Ethnographic Research	A research method to study people in their environment, which involves participant observation to try to comprehend how people live their lives and how they attempt to overcome the challenges they face
Human-Centred Design	Design is typically approached from a business-centred perspective. Human-centred design re-frames the perspective, instead placing humans at the forefront and core of the design process to develop more holistic solutions, which better meet the needs of the people ("A Quick Guide To Design Thinking Terminology" 2022)
Ideate	The process in which the team collates data and research from previous stages of the project and use their findings on user needs and issues to generate helpful and innovative ideas ("Design Thinking Glossary" 2022)
Information Resource	An individual channel of materials and assets containing useful information that can be accessed by the user
Information System	A network of interrelated resources and touchpoints that connect together to provide users with multiple sources of relevant, related information that increases the effectiveness of the system on a long-term basis
Iteration	The act of returning to previous stages in the Design Thinking process to learn, revise, refine or experiment, to achieve a better result ("Design Thinking Glossary" 2022)
Multi-disciplinary Team	Team members within the Design Thinking team who have differing levels of expertise, careers, cultures, gender, age, education, etc. This forms a stronger team with more knowledge and skills that can provide valuable assets and opinions to the team

Proposal	A comprehensive document outlining the core details, deliverables and outputs of project as well as the proposed solution and how the team aims to complete and meet the client's expectations and project goals (Fleck 2021)
Prototype	Transferring ideas and assumptions into a tangible form that can be utilised to demonstrate how the team and the users can experience and react to a possible idea ("Design Thinking Glossary" 2022)
Service Design	A design process which considers the whole system associated with a problem or a product rather than just specific, isolated, individual problems or products, which allows designers to develop holistic, sustainable solutions that work for all stakeholders ("Service Design" n.d.)
Stakeholders	Stakeholders are all people who are involved in the project whether that be by directly working on the project with the core design team, being impacted by the project, or simply having a vested interest in the project
Testing	The crucial step in testing prototypes with users to gain valuable feedback regarding how they feel about the experience and interaction ("Design Thinking Glossary" 2022)
User-Centric	A process in which the user is part of the project in a collaborative and co-design role, contributing their needs, wishes and problems ("Design Thinking Glossary" 2022)
Wicked Problem	Wicked problems are complex social, economic and environmental issues which involve many factors. They are characterised as being vague or ambitious and prone to change and shifting, thus not able to be solved.

TRANSPORT & MOBILITY

AEVA	Australian Electric Vehicle Association
Battery Electric Vehicle (BEV)	A vehicle which is fully powered by a re-chargeable battery that runs on electricity (Department of Water and Environmental Regulation 2020)
Carbon Neutral	The carbon emitted from a product, service, company or designated entity is equal to or less than the carbon that is absorbed in that entity
Charging Infrastructure	Refers to the charging stations where electric vehicles can be plugged in to be charged, both in public areas and private (at home)
Electric motorcycles, e-bikes, e-scooters and e-skateboards	Refers to motorcycles, bicycles, scooters and skateboards that are powered by electricity
Electric Vehicle (EV)	A vehicle which is in part or fully powered by a re-chargeable battery that runs on electricity (Department of Water and Environmental Regulation 2020)
Fuel Cell Electric Vehicle (FCEV) / Hydrogen Fuel Cell Vehicles	Vehicle is powered by a hydrogen fuel cell which converts hydrogen into electricity (Department of Water and Environmental Regulation 2020)

Heavy Vehicle	Freight and delivery vehicles used for bulk or large-scale transportation of goods. (Oxford University Press 2021)
Hybrid Vehicle / Hybrid Electric Vehicle (HEV)	A vehicle which uses an internal combustion engine but also has an on-board non-rechargeable battery. This battery is recharged when the car is in use through the engine and/or regenerative braking. (Department of Water and Environmental Regulation 2020; RAC 2021)
Internal Combustion Engine (ICE)	A vehicle which runs on petrol or diesel fuel. (Department of Water and Environmental Regulation 2020)
Low and Zero Emission Vehicles (LZEV)	Vehicles that emit low levels of emissions (e.g. hybrid vehicles, PHEVs) or emit no emissions (e.g. electric vehicles, hydrogen fuel cell vehicles) (RAC n.d.)
METRONET	Public transport project in WA adding 72km of new rail for passenger trains as well as 22 new stations to provide more transport options and opportunities for housing and employment. (Government of Western Australia 2022)
OECD	Organisation for Economic Co-operation and development (OECD) is an international organisation whose goal is to provide standard and solutions for social, economic and environmental challenges. Australia is a member of the OECD. (Organisation for Economic Co-operation and Development n.d.)
Paris Agreement	An international treaty designed to reduce emissions in various countries around the world in order to limit global warming and avoid the negative repercussions of climate change. The Paris Agreement aims to keep the overall rise in global temperature within 2°C. (United Nations Climate Change 2022)

Plug-In Hybrid Electric Vehicle	Vehicle powered by both an internal combustion engine and an on-board rechargeable battery that runs on electricity. (Department of Water and Environmental Regulation 2020; RAC 2021)
Renewable Hydrogen	A form of renewable energy, where power is stored as hydrogen gas. (Renewable Hydrogen 2017)
Scope 1 Emissions	Emissions released as the direct result of an activity; emissions that individuals have direct control over (e.g. emissions from fuel in conventional vehicles, gas heating) (Clean Energy Regulator n.d.)
Scope 2 Emissions	Emissions released through indirect consumption; emission from another party on an individual's behalf (e.g. electricity in housing for heating and lighting) (Clean Energy Regulator n.d.)
Scope 3 Emissions	Emissions that are induced from another activity (e.g. emissions from the transportation of goods, emissions embedded in manufactured materials [like a plastic chair] (Clean Energy Regulator n.d.)
TOCWA	Tesla Owners Club WA
Transport Sector Emissions Reduction Strategy (TSERS)	A strategy for reducing emissions in the transport sector so as to achieve the Western Australian government target of net zero emissions by 2050. (Department of Water and Environmental Regulation 2021)

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