

ID HONOURS PART 1: DESIGN RESEARCH & DEVELOPMENT

nomadA

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PROJECT:

WORK-FROM-ANYWHERE

MOBILE REMOTE WORKING ENVIRONMENT

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Declaration of Authority

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Abstract

PARAGRAPH

The COVID19 pandemic has brought massive change to the way we work and travel. A major shift in the way we work has been apparent the large shift to home workplaces and acceleration of growth in flexible working opportunities. This, along with emerging internet access technologies, has greatly expanded opportunities to work remotely. Restrictions to overseas travel has forced Australians to look locally, driving up demand for local, nature based tourism. With this current climate in mind, analysing the needs of this emerging demographic of the remote working professional has spawned creation of a new type of towable vehicle, to facilitate hybrid remote work/nature based travel experiences, greatly expanding the locations in which remote work can effectively occur.

A physical scale prototype model (1:10) – will be produced to demonstrate this project.

1 MINUTE TRANSCRIPT

The COVID19 pandemic has brought increased demand for nature-based travel and workplace flexibility. Along with emerging internet access technologies, this will greatly expand the locations and areas in which we can effectively work.

Considering the emerging hybrid work model, and how young professionals will adapt to possibilities of work and lifestyle flexibility, a clear need can be seen for a new type of towable vehicle that incorporates a rugged mobile work environment. This will effectively facilitate remote work alongside nature based travel experiences in a way that has not been done before.

SENTENCE

PAKA is a new type of towable vehicle that facilitates hybrid remote work/nature based travel experiences, providing a rugged mobile work environment that is accessible for young professionals.

Field of Practice

Tiny living & mobile homes

The tiny house movement has been continuing to gain popularity among increasing housing prices and interest lifestyle choice include decreased costs, a simplified lifestyle and increased freedom(Boeckermann, Kaczynski, & King, 2019). Tiny houses offer an alternative for sustainable living – requiring less energy to heat and cool, utilising fewer building materials to produce.

A tiny house usually refers to dwellings less than 40 sq m, which is just under a quarter of the average floor size of an Australian home at 186.3 sq m, these houses are often built on road registrable trailers which limits the width to 2.5m and height of 4.5m.

A tiny house generally aims to provide users with creative, well-planned rooms – often multifunctional, with smart

storage and easy access to the nature around them. The small space means that it is cheaper to heat or cool whilst using less building materials. By utilising an integrated/independent electrical power system and harvesting rainwater, these dwellings are able to function off the grid, giving more flexibility to where they can be placed.

Whilst online popularity of these houses is increasing, surveys of the tiny house community reveal that the proportion of tiny house residents have not grown in the last 7 years (ABC News, 2021).

Regulatory issues mean that tiny houses in Australia are essentially treated like Caravans, which restricts the length of time allowed to stay in one. In NSW, this is only

60 days a year, but there is further variation depending on different councils (Masige, 2020). The presence of restrictive planning policies, difficulty in accessing land and finance are other major regulatory hurdles faced by those wishing to live in a tiny house.

Professionally built tiny houses can cost 3x more per sq meter than standard houses, and off the grid features such as rainwater storage and solar panels and energy storage will add significant cost. Just a self-contained solar system costs at least \$15,000 currently (Solar Calculator, 2021).



Figure 1 Typical trailable tiny house (2019)
From "Living Big In A Tiny House" by Bryce Langston



Figure 2 upmarket tiny house(2021) by shacky.com

Caravans & recreational vehicles

There are over 120 caravan manufacturers in Australia. The majority of these are small companies, however the largest is Jayco which has a market share of 22.8% (IBIS world, 2020). In 2020, there were over 700,000 caravans registered in Australia and the amount purchased every year has been steadily increasing by ~4-5% in the last 5 years. Over 31,000 were sold in 2019 (Caravan Industry Association of Australia, 2020). This vastly different when comparing to the over 1 million car sales a year from only 56 brands.

Australia has one of the highest rates of new RV registrations on a per capita with 1 in 13 Australian households owning a caravan or camper (Fincham, 2019), and is ahead of all European countries, 2nd only to the US.

Lockdowns during the Covid 19 pandemic have resulted in many caravan owners using their caravan as an additional living/functional space, such as a home office

space. In a family with children, a space separate from the home offers a quiet place free of disturbance.

History of caravans

Among the earliest users of caravans were the nomadic European Romani people or Gypsies and travelling showmen and women who used them as mobile homes. Constructed from timber and horse drawn, these caravans offered much better protection to the weather than tents and could be outfitted with comforts such as a wood burning stove.

The first caravans that appeared around the world were horse drawn and homemade in the 1920s and presented as a cheaper option to staying in guest houses and more comfortable than tents. In these early days of caravanning, many of these were used by artists and the creative community to take them to remote places to inspire them as well as a cheaper way of going for a holiday.

The post-war economic boom in the 1950s gave way to more accessible cars and better roads, creating a boom in the caravan industry. This saw caravans being used as emergency accommodation, cheaper housing for itinerant & seasonal workers, retirement & weekend cottages, mobile offices, mobile laboratories as well as studios and homes for film production crews and circus crews. (Powerhouse Museum, 2008).

The 1970s saw the introduction of aluminium cladding fastened to the outside of a timber frame, which became an industry standard and is still in use today. This method of construction allowed for a relatively lightweight structure that is able to handle the multidirectional and repetitive forces encountered on a road journey. Over the years, other materials such as fiberglass and composite panelling have been used to make the caravans more lightweight and durable.



Figure 3 Australia's Oldest trailer caravan (1923) by Vintage Caravans
<https://vintagecaravans.proboards.com>



Figure 4 Composite panel off road caravan (2020) by Zone RV <https://www.zonerv.com.au/>

AUSTRALIAN CARAVAN INDUSTRY TRENDS

The current spread of groups taking Caravan/camping trips include 17% travelling alone, 27% Adult couples and 28% families or relatives (without children).

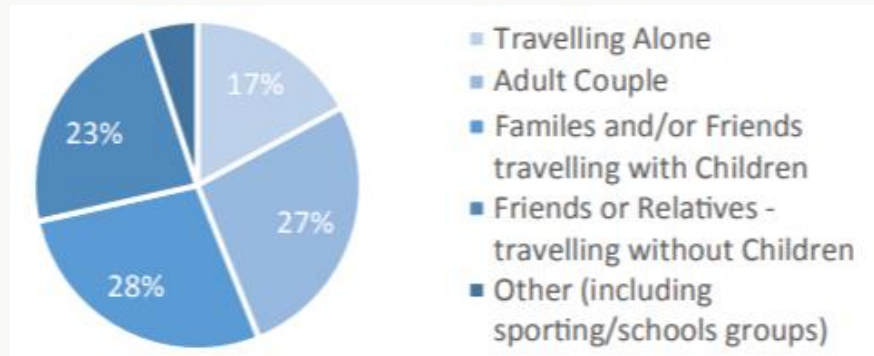


Figure 5: Domestic Caravan/camping trips by travel party (2019) by Caravan industry Association of Australia (<https://spark.adobe.com/page/ANW2ilUzglfN6/>)

On average, current RV owners use their vehicles 40.9 nights of the year, with a median value of 21 nights (CIAA, 2019). Major barriers to usage include time constraints such as work, school and family restrictions as well as cost of travel. With so many days unused, services such as Camplify allow caravan owners to rent them out, recovering the cost of an unused asset.

In general, prices for caravans are considerably more expensive in Australia compared to the US and UK and can be around double to price for a caravan of similar size and comparable features.

Factors that influence this include the high cost of labour in Australia and much smaller volumes (Caravan Camping Sales, 2019). Caravans imported from Europe or US also tend to be less robustly engineered than their Australian made competitors. Locally made caravans are designed for rougher road conditions. Imported caravans also

suffer from more difficulty in getting parts and repairs done, further reducing their appeal to Australian buyers.

Many Caravans made in the US are too wide for legal use on Australian roads, as Australian rules dictate a maximum of 2500mm width, while most US states allow for a 2590mm wide trailer (Scarpignato, 2020). 110V electronics are also not permitted in Australia. European caravans also require extensive modifications for compliance in Australia (such as electrical, plumbing, gas and appliances) and is another factor to the lack of popularity in the Australian market.

Despite the decreasing demand for vans in the US and UK, imported caravans from China has been steadily rising, with just over 10,000 units imported into Australia in 2018, the majority of these lighter camper trailers (Fincham, 2018). This still represents under half of the 22,381 camper trailers, caravans and motorhomes built in Australia in 2017.

RV rental

Statistics from the caravan industry of Australia show that a total of 47% of all non-RV owners indicated that they would consider hiring a recreational vehicle in Australia.

The age group that most strongly considers RV rental are those between 20 and 40, with 57-58% of those indicating a positive rental intention (see Figure 6) Peer to peer rental

Peer-to peer products such as Uber and Airbnb have become increasingly popular in recent times. Camplify, Australia's largest peer-to-peer lending network, reports over 50,000 holidaymakers in their community, with van owners earning up to \$10,000-20,000 a year.

Rental intention by age

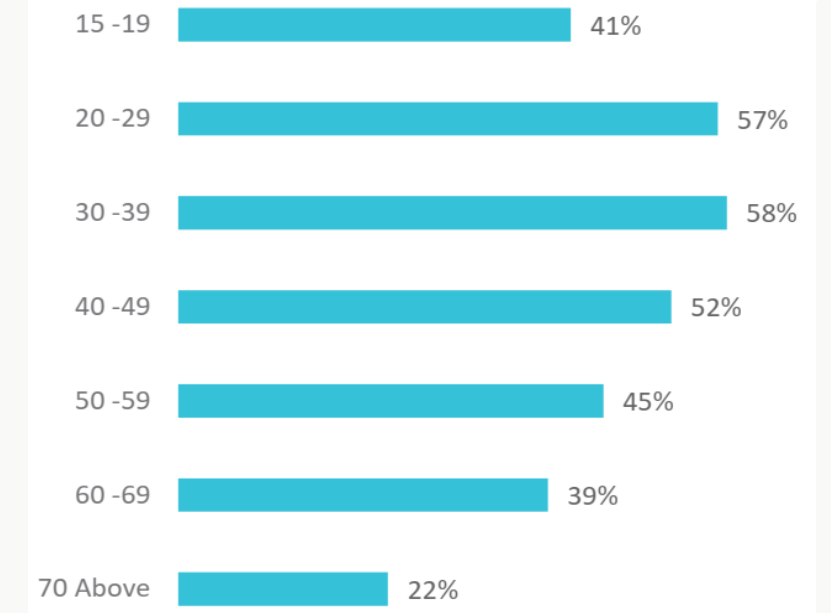


Figure 6: Non-RV owner rental intention by age (2018) by Caravan industry Association of Australia (<https://spark.adobe.com/page/ANW2ilUzglfN6/>)

Consideration for using the Peer-to-Peer network to hire an RV

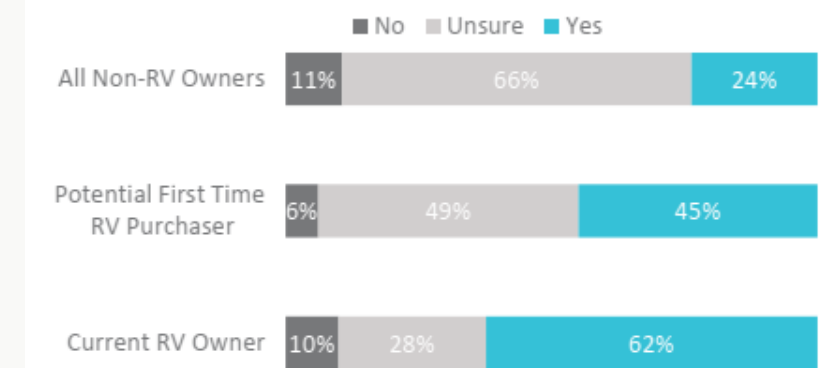


Figure 7: Consideration for using peer to peer network figure 44 (2018) by Caravan industry Association of Australia (<https://spark.adobe.com/page/ANW2ilUzglfN6/>)

Past reports (2018) indicate that 24-62% of people would consider using the peer-peer network to hire an RV, with those already owning an RV showing a greater interest.

TOWABLE CARAVAN TYPES

There were 1,630 motorised units (campervans & motorhomes) built in Australia in 2018. 65% of motorised RVs were between 6m and 9m in length, which has been consistent over the past decade. (Caravan industry Australia 2019)

1-in-5 towable units produced were pop-tops (4137 units) while camper trailers made up 14% (3095 units). There is a continued trend towards longer towable product with

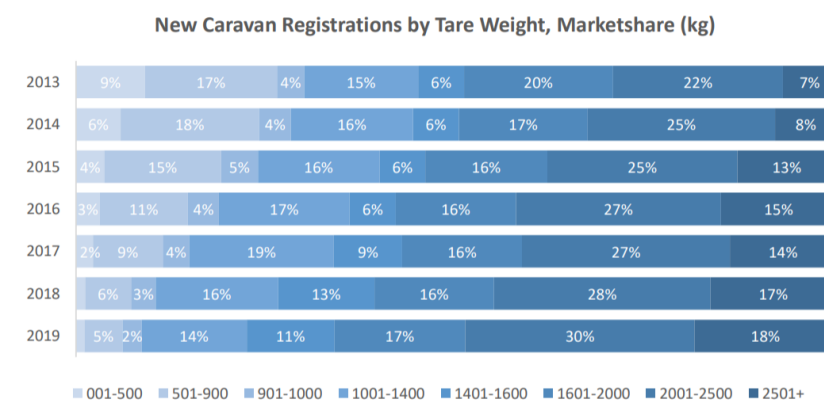


Figure 10 Market share of Caravans by Tare weight (2020) by CIAA
<https://caravanstats.com.au/wp-content/uploads/2020/12/State-of-Industry-2020.pdf>

61% being longer than 6 metres, increasing from 33% in 2011. New caravan registrations also show a trend towards being heavier, and therefore larger, shown in Figure 10. **Error! Reference source not found.**

Full/standard

These caravans do not feature any expanding components and the caravan body is generally from 14 - 25foot long (4.2 - 7.6m) These most commonly feature a toilet and shower, sleeping for 4-6 people and a kitchen and lounge area. This type is the most popular in Australia.



Figure 9 Full size caravan (2020) from CIAA
<https://www.caravanindustry.com.au/rvmap/types-of-rvs>

Pop top

Similar to a full/standard caravan and offering similar features, these feature a pop-up section that allows the interior height to expand, allowing for a lower profile for towing or storage.



Figure 11 Pop top caravan (2020) CIAA
<https://www.caravanindustry.com.au/rvmap/types-of-rvs>

Compact

Compact caravans feature a fully enclosed hard body like a full/standard but are smaller - typically less than 14ft long (4.2m). These typically feature sleeping for 2 adults and a basic kitchen in the rear. Their small size and often aerodynamic profile allow any vehicle to tow, even motorbikes for the lighter ones.



Figure 12 Compact teardrop trailer (2013) from Wikipedia
<https://en.wikipedia.org/wiki/File:Turtle1500TeardropTrailer.jpg>

Camper trailer

Comprises of a small box trailer with lift out expanding sections to create a sleeping and living space, light and small. Can be towed by smaller vehicles or made rugged for extreme off-road terrain.



Figure 13 Tent trailer (2020) CIAA
<https://www.caravanindustry.com.au/rvmap/types-of-rvs>

CO-WORKING SPACES

Co working spaces are designed to provide a productive and collaborative environment for its users, offering flexibility and scalability for its users. Innovative companies that have started out in co-working spaces include: Uber, Instagram and Indiegogo. These spaces target growing segment of freelancers, entrepreneurs and small businesses looking for spaces to work from and collaborate. Common facilities and amenities that co-working spaces offer include: internet access, a private desk free from distractions at home, toilets and shower, lockers, a kitchenette, lockable storage and regular cleaning. The cost of renting these spaces start from \$100 a week, depending on the size of space and facilities available, with larger spaces available to conduct collaborative projects and meetings.

Coworking spaces are becoming more common and have seen an annual growth rate of 24.2% (co-worker, 2018), with Coworking predicted to account for 30% of the office market by 2030 (Property Australia, 2020). Research also done by Property Australia reveals that 73% of companies have adopted some form of flexible working policy and 80% of people would prefer the option for flexible working arrangements. This shows a clear trend toward flexible working habits, a growth that has been accelerated by the COVID19 pandemic.



Context & Application

Project setting

The large amount of caravan manufacturers and relative low build volume mean that the manufacture of caravans is still mostly done manually and a high competition for sales encourages shortcuts in manufacturing. The use of outdated construction methods is still very prevalent among the industry today. Many caravans in Australia are built with walls that use the stick and tin method, which is timber frames with aluminium clad outer walls and plywood inner walls (see Figure 15).

This construction method has been used since the 1970s and has many disadvantages compared to more modern manufacturing methods. Due to the necessity of using skilled labour and common outsourcing of manufacturing, quality issues are rife amongst the industry, issues ranging from water damage, broken chassis, severely overweight vans and dangerous electrics (Choice, 2019).



Figure 15 Stick and tin wall construction (2020) by Caravan Fix Rockhampton <https://www.caravanfix.com.au/location/caravan-repairs->

Shifting attitudes towards working from home and more accessible & faster internet access has opened the door to more flexible working opportunities. Elon Musk, an entrepreneur and business magnate, known most notably as the CEO of SpaceX and Tesla is currently trailing his affordable satellite internet service which provides connection speeds equivalent to a very good internet plan (ABC news, 2020), as well as relative low latency, providing the opportunity for modern internet access in extremely remote locations. With solar energy now the cheapest form of energy (Evans, 2020), working from even the most remote of places will soon be accessible to many.

The rise in Ute and SUV sales in Australia has meant that more vehicles on the road today are suitable for towing, with SUV's and Utes accounting for 8 out of the 10 bestselling models of vehicles in May 2021, SUV's accounting for more than 53% of all sales (Hunter, 2021). Owning a caravan is now more accessible to more Australian households. Reduced international visitors and increased interest in local tourism has spawned a growing demographic of people who value nature-based travel and want to explore more of Australia.

Currently, caravans and recreational vehicles are difficult to work long hours in and are not considered as suitable workplaces by many, due to the lack of an ergonomic applied setup and are more centred around the recreational aspect.

CARAVAN OWNER TRENDS

In a post COVID19 world where international travel has become heavily restricted, the increased interest for

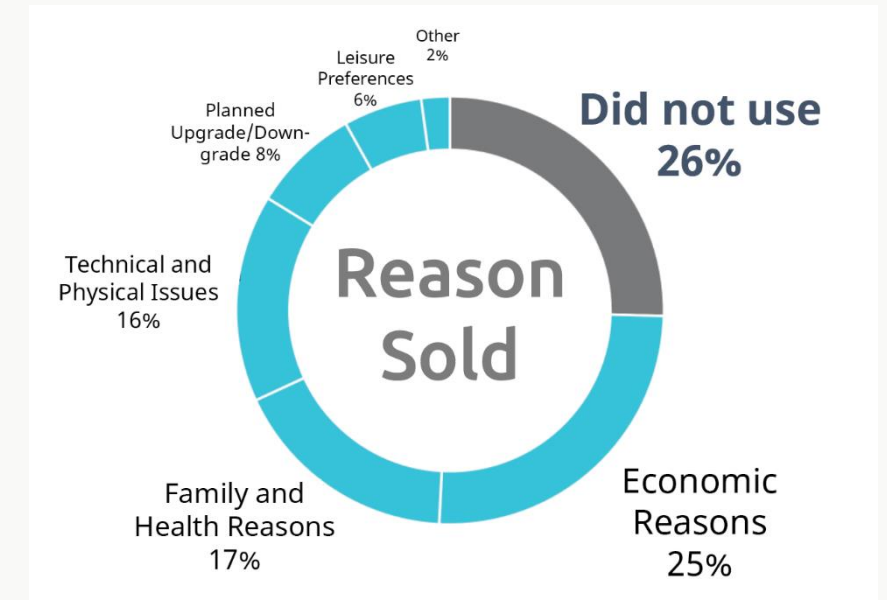


Figure 14 Reasons why Caravan owners sold their van (2018) by CIAA.

domestic travel has risen drastically. The customer base for caravans and recreational vehicles has also seen a shift to a younger demographic of people under 40 years old.

An increased focus on hygiene has also contributed to the appeal of owning rather than renting a caravan and a recent survey has revealed that 67% of Australians are more likely to consider buying a caravan (Caravan Camping Sales, 2020). This will result in increased caravan sales and increased production in the future. Those surveyed also ordered their most important considerations, which in order of priority were: price, quality and reliability, overall condition, comfort/liveability and weight.

The average length of RV ownership currently stands at 2.07 years, and the average age of the total campervan fleet has shown a decline from 18 years in 2010 to 17 years old in 2019 (CIAA, 2019).

CASE STUDY – CARAVAN INDUSTRY & JAYCO

The RV industry is largely self-regulated and self-accredited, which means that certification and testing is much less stringent than those required for automotive manufacturers, and it is very easy for anyone to start their own caravan manufacturing business (Lord P., 2017). This can often lead to often poor manufacturing processes, varying construction quality, resulting in unsafe vehicles. Consequently, a number of larger and smaller companies had to pay large fines after investigations into various complaints. Many of these issues stem from the difficulties in fixing electrical and plumbing problems due to poor accessibility and poor design/construction methods. For example, the extensive and inappropriate use of adhesives in production made disassembly an onerous and inefficient process.

Jayco is the largest manufacturer of recreational vehicles in Australia and has been founded in 1975 & make up about 22% of the caravan/RV market in Australia.

The timber construction of the caravans requires effective sealing to prevent moisture intrusion into cavities where it causes rotting (see figure 7). Many of the current issues owners have are sealing related and are often very difficult to fix. The Australian Competition and consumer commission (ACCC) has previously investigated Jayco due to quality issues and is the case with many companies in the caravan industry. Jayco was found to have “numerous defects” regarding sealing and other quality issues, resulting in water leaks and even roof collapses. (ACCC,2020). Despite this case being ultimately dismissed, the court still found that the caravans were not of acceptable quality and that Jayco was guilty on one count of misleading and deceptive conduct. Many other caravan companies are also culpable in producing defective caravans and carry similar issues.

The extent of these issues is clearly visible on the Facebook group dedicated to supporting owners of lemon caravans - “Lemon Caravans & RVs in Aus.”, a group consisting of over 56,000 members. A ‘buyer beware list’ issued by the administrator of this page has over 50 caravan manufacturers listed, after consideration of the severity of defects and consumer complaints.

Self-regulation

Vehicle Standards Bulletin VSB1 is the Australian regulation that covers the building of smaller trailers and caravans less than 4.5 tonnes. These standards outline requirements for electrical, lighting, braking, suspension, wheel guards, wheels and dimensions, and are based on the ADR regulations that motor vehicles must follow, but they are simpler so that they are suitable for individuals and small firms. While these design rules exist, they are not enforced in any way. Also, as VSB1 outlines standards for trailers, most of the design rules only cover external elements such as brakes and lights but miss out on standards for common elements inside a caravan, such as electrics, plumbing and cabinetry.

Another major difference between motor vehicle regulations is that trailers that meet VSB1 standards do not require certification from the government, nor any identification or import plate, and the responsibility of meeting the standards rests solely on the manufacturer. In the event of non-compliance, it is expected that the manufacturer must “take all steps possible to rectify the non-compliance” and only when the non-compliance is unable to be rectified, then the vehicle must be recalled. The responsibility for the recall also lies with the manufacturer or importer, meaning that even widespread issues are easily “covered up” by manufacturers if they choose to, as recalls are likely to tarnish brand image as well as representing high costs.

Examples of common quality issues



Figure 18 Water damage due to poor quality (2020) by P. Lord (<https://www.caravancampingsales.com.au/editorial/details/lemon-caravans-and-the-law-122225/>)



Figure 16 Poor insulation inside Caravan walls (2019) by T. Leigh - Lemon Caravans & RVs in Australia FB group

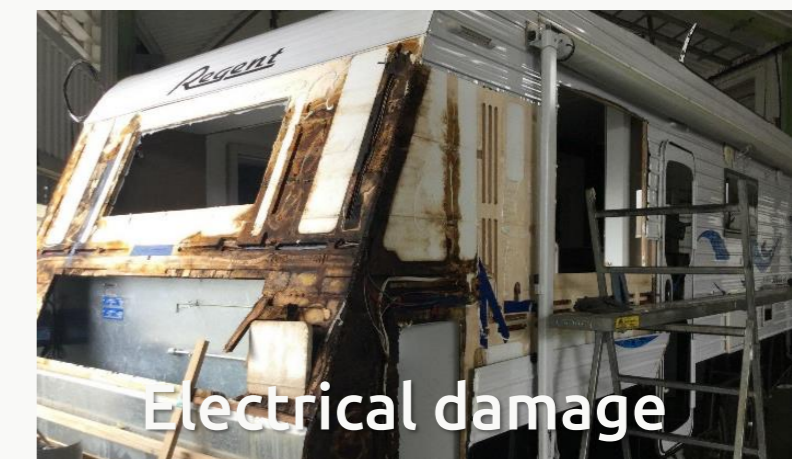


Figure 17 Electrical damage on a 7000km old Caravan (2020) by L. Lewis - Lemon Caravans & RVs in Australia FB group

TRADITIONAL CARAVAN MANUFACTURE

Many caravans produced today follow a similar construction to the method listed below:

1. Chassis is welded using mostly box section steel and galvanised for rust protection.
2. Axles and suspension are added to chassis.
3. A plywood floor is laid down and covered with a plastic sheet as a moisture barrier, Vinyl is added to the top.
4. Wiring, fibreglass insulation and propane tanks are arranged underneath the floor.
5. Sidewalls built using a timber frame stapled and glued an inner plywood wall, styrene foam insulation added in between, Ribbed aluminium cladding added on the outside. (stick and tin method)
6. Cabinetry and interior walls are added to the floor.
7. Aluminium sidings are attached to the exterior on the sidewalls.
8. Roof frame is made out of wood, wiring is run through, fibreglass insulation added, which is then topped with plywood.
9. A single sheet of rubber is added on top of the plywood, which is used to cover seams and for waterproofing.
10. Exterior aluminium roof cladding sheet is added to the top.
11. Exterior trim and final fit and finishing.



Figure 19 Typical caravan chassis (2021) by Callum Poon Deluxe caravans



Figure 20 Plywood floor added to chassis (2022) by Concept Caravans <http://y2u.be/mHluQGHCxp0>



Figure 22 Standard Timber wall construction by CaravansPlus (2020) <https://www.caravansplus.com.au/guides/self-build-guide-5-floor-wall-and-roof-construction-a-122.html>

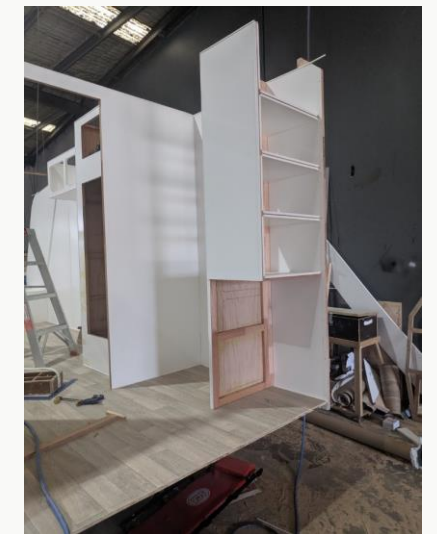


Figure 21 Cabinetry construction (2021) by Callum Poon Deluxe Caravans



Figure 24 Styrene insulation in walls and aluminium cladding added (2022) by Concept Caravans <http://y2u.be/mHluQGHCxp0>

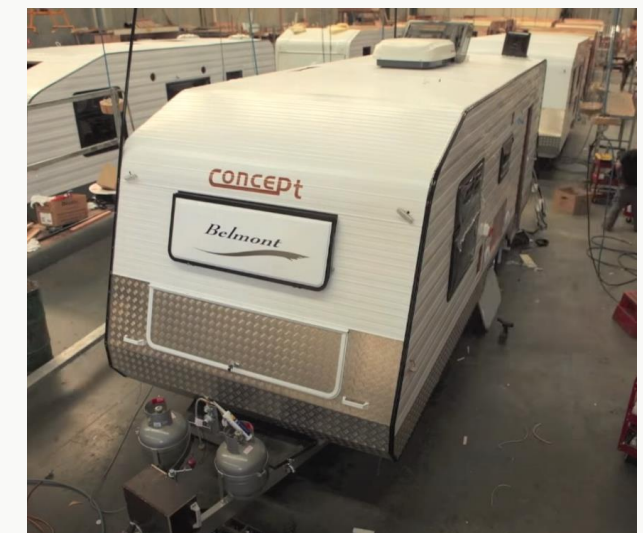


Figure 23 Finished caravan (2022) by Concept Caravans <http://y2u.be/mHluQGHCxp0>

CASE STUDY – EARTH TRAVELLER

The rise of electric vehicles has spawned the need for caravans that are lightweight and more aerodynamic, so that range can be maximised for longer trips. An American company Earth Traveller has been inspired to produce the t300, a compact, lightweight camper trailer that is made from fiberglass, wood, Kevlar, carbon fibre and traditional composite and corecell for structural components. Non-structural components use a resin reinforced chicken feather fabric.

The composite feather material is also quite economical to produce, whilst offering a strength similar to carbon

fibre as well as providing insulation and weather protection. (Marchese, 2019)

This trailer moves away from conventional materials and foregoes a traditional frame so that a lighter trailer can be made.

Sleeping 4 people and weighing only 135kg, this camper trailer design is inspired by principles of biomimicry and its shape is aerodynamic and weatherproof. The low weight, small footprint and aerodynamic features of the trailer means that it can be towed by nearly any vehicle

and will significantly reduce the extra fuel/energy that camper trailers traditionally use.

The trailer is semi-modular and can be used as a cargo-hauling utility trailer as well. The trailer features “gullwing panels” which allow the front and rear to expand, increasing interior headroom and space. These multifunctional features and use of space in the lightweight package mean that outdoor activities and travel can be more accessible in this camper trailer.



Figure 25 Earth T300 teardrop trailer by Earth Traveller (2020)
<https://www.earthtravelerteardroptrailers.com/standard>

CASE STUDY – NISSAN OFFICE POD VAN CONCEPT

Nissan has developed this concept vehicle in response to the COVID19 pandemic and shift towards remote working. The inside of this vehicle includes a slide out office pod, featuring a large monitor, desk, chair, coffee station, DC/AC inverter, anti-bacterial UV lamp and a power window shade for excess sun glare. The slide out nature of the pod also features a transparent panel on

the floor, allowing the user to be immersed in nature whilst sitting within the ergonomic work setup. The roof features a “balcony” for relaxing, which includes a lounge chair and umbrella. All terrain tyres are fitted along with an increased ride height to accommodate rugged terrain.

This concept is in response to the increased popularity towards nature-based travel and working flexibility, with a

strong focus on creating a healthy work environment. It is an example of how the changed working environment that the COVID19 pandemic has brought could change the way in which vehicles are designed and the features they could adopt.



Figure 26 Nissan NV350 office pod van concept by Nissan (2021) <https://www.cnet.com/roadshow/news/nissan-work-from-home-office-pod-concept/>

REMOTE WORK

History of remote work

The industrial revolution saw the migration of the labour force into a centralised working location and became the standard for work during most of the 20th century.

The term to mean working outside of an organization’s standard location, “telecommuting” was coined in 1973, with the internet born in 1983 (Toptal, 2020). However, it is now known more commonly as “remote work” and “working from home”, abbreviated as WFH. The popularity of remote work accelerated at the start of the 21st century as communications technology advanced to allow the possibility of more work to be done remotely and laws introduced globally to accommodate for remote working practices.

In more recent times, the covid19 pandemic has seen a large-scale shift to remote work, shifting cultural views forcing the global adoption of remote work.

Working from home – WFH & Remote working

The COVID19 pandemic has seen a mass restriction of people movement worldwide, shifting a large proportion of the global workforce to a home workplace and accelerating the trend for flexible workplace policies. Flexible working opportunities including working from home offer benefits such as a reduction of travel, better work-life balance, improved inclusivity, economic savings for both the employee and employer, environmental benefits, productivity improvements as well as reductions to overall stress (Courtney, 2021).

A report done by the NSW Innovation and Productivity Council found that in 2019, 18% of work done in NSW was done remotely. This is in contrast to during the pandemic, where 43% of the work done was remote. The council also estimates that a maximum of 44% of all work in NSW can be done remotely. Based on NSW workers current preferences, around 30% of work would be done remotely, which is 69% higher than pre-2020. Figure 27 shows the shifting working styles pre and post COVID19.

Pre pandemic, Finland was one of the world’s leaders for providing flexible working opportunities, with almost 1/3 regularly working from home. This can be attributed to fast internet services, digitalisation of the workplace, high proportion of knowledge workers, a culture of trust and a remote working law that allows employees to work out of the office for at least half of the week (Blomqvist, 2021).

Although flexible working arrangements were not uncommon pre-2020, the necessity of working from home during lockdowns has broken previous social stigma, and flexible working arrangements are now a necessary norm, with organisations more prepared for remote work and permission to work remotely is easier to obtain.

As attitudes shift towards remote and flexible working, companies are increasingly being pressured to accommodate these preferences and offering these opportunities will be seen as a competitive advantage in retaining talent and skills as well as supporting work-life balance and wellbeing. A survey conducted by Indeed revealed that 92% of the 200 employers surveyed are investing in technology such as video conferencing, laptops and smartphones to enable remote work. Remote work opportunities can increase the effectiveness of the overall workforce by allowing previously disadvantaged groups to be accommodated. These groups include people with disabilities, military spouses and people living in rural or economically disadvantaged areas.

Problems with remote working

Despite the overall trend towards remote workplaces, working in such settings can have its disadvantages. Challenges with remote work include communication, distractions and social connection.

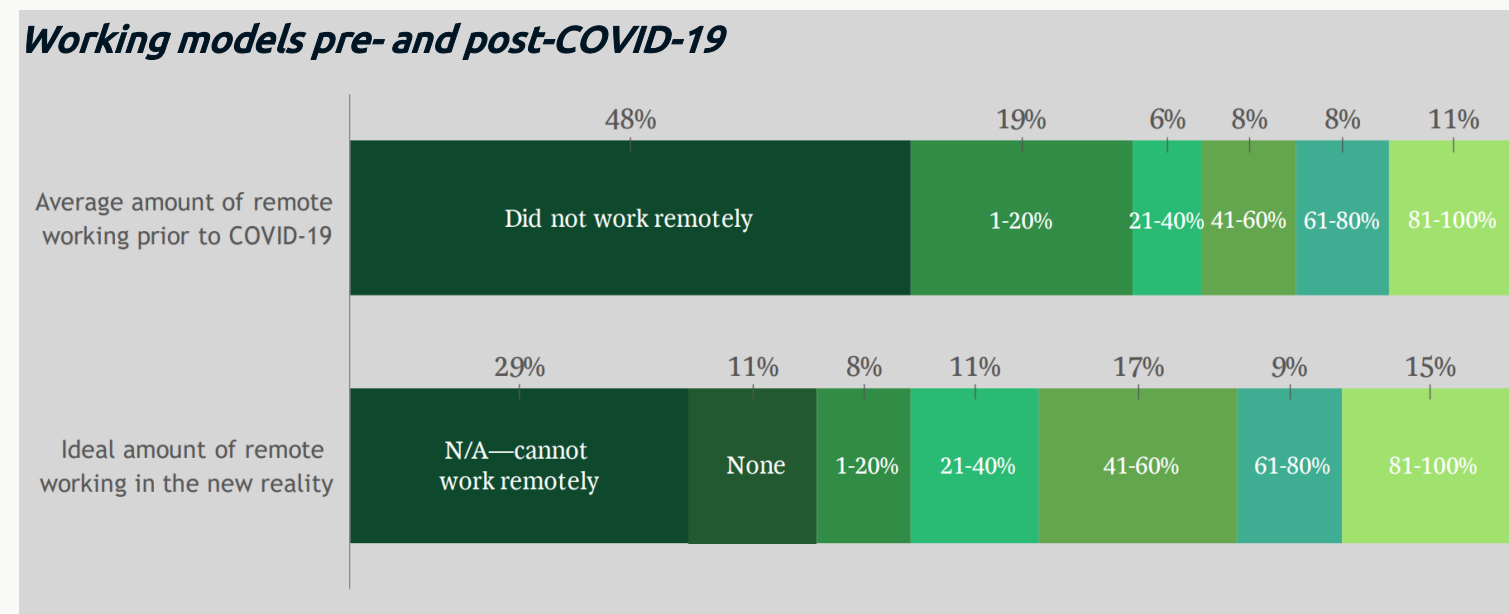


Figure 27 BCG Workforce Sentiment Survey (2020) by BCG
https://image-src.bcg.com/Images/ANZ-Personalisation-for-your-people_tcm9-251462.pdf

Communication & social connection

Despite the prevalence of video calling and social networking software, there are many elements to in-person communication that computers and the internet cannot replace. LinkedIn's global talent trends report found that the biggest challenges with remote work include: team bonding, collaboration and work oversight. The lack of face-to-face conversations causes some to feel disconnected from their workplace and extended periods or working from home have been shown to cause employees feeling socially and professionally isolated (Maruyama & Tietze, 2012), potentially staining working relationships and causing feelings of loneliness. Examples of the ways that companies are attempting to assist in this issue include: introducing informal check-ins, virtual coffee klatches as well as other well-being programs.

Distractions

Sources of distractions can be attributed to being one of the major reductions to productivity in a remote work environment. A report done by Building 20 (2020) analysing the attitudes towards remote work found that dedicated space for remote work resulted in respondents being 25% more likely to strongly agree/agree that they prefer remote working to working at the office and increases their perception of productivity. Having a dedicated space for remote work was found to have a large impact in productivity, with 51% out of those with dedicated spaces saying that they are more productive, compared to only 27% of those without dedicated spaces saying the same.

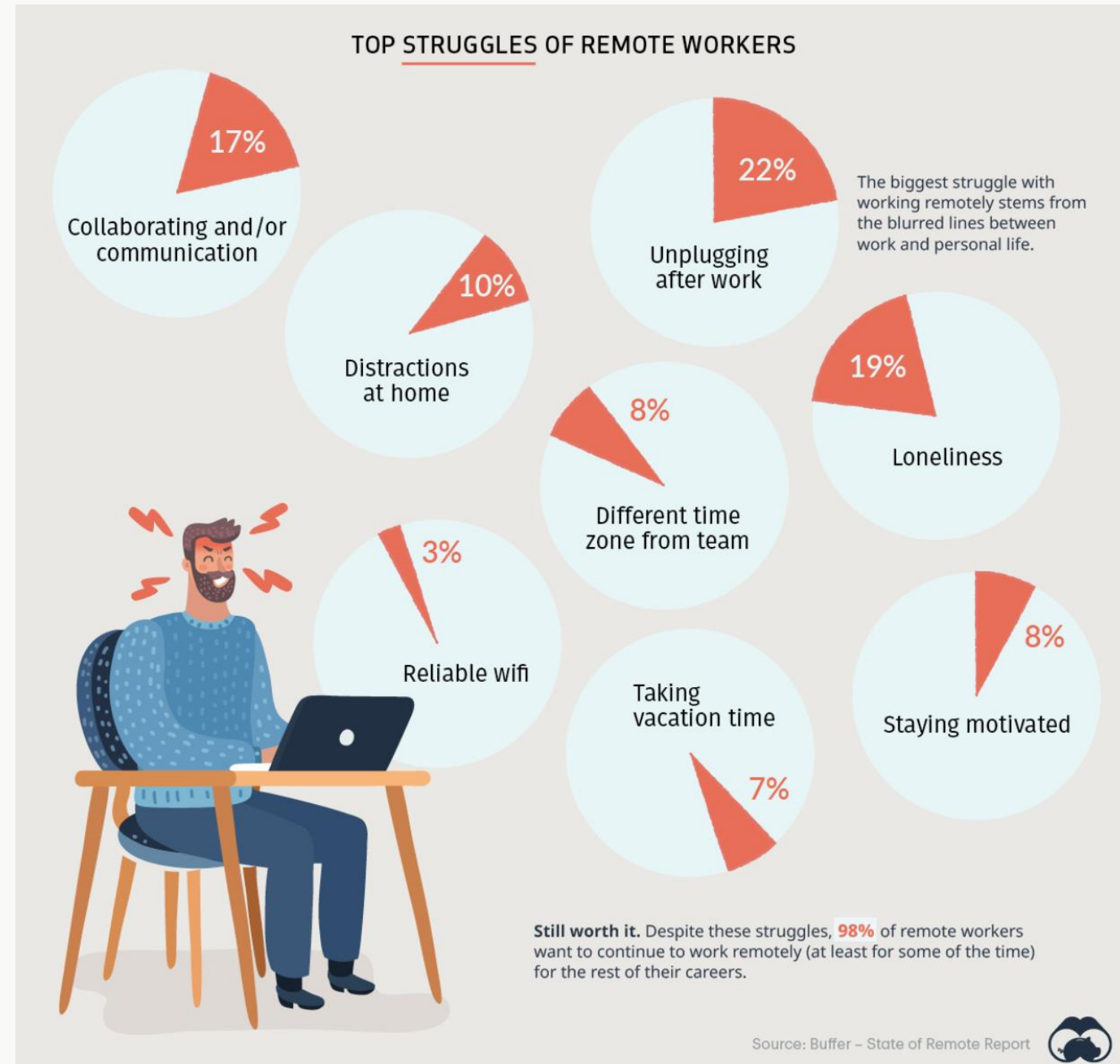


Figure 28 Top Struggles of remote workers (2020) by Visual Capitalist <https://www.visualcapitalist.com/top-struggles-of-remote-workers/>

Methods of Testing,

Evaluation & validation

INTRODUCTION

Research into current trends within the caravan and recreational vehicle market such as consumer and manufacturing. Within caravan manufacture, issues with a large proportion of current caravan construction have shown a trend of many failures related to inefficient manufacture, as well as outdated design and construction techniques. Factors that contribute to this include the

prevalence of small-scale manufacturing operations that rely on high skilled labour.

The COVID19 pandemic has brought massive change to the way we work and travel. A major shift in the way we work has been apparent the large shift to home workplaces and increase in flexible working opportunities. This, along with emerging internet access technologies,

has greatly expanded opportunities to work remotely. Restrictions to overseas travel has forced Australians to look locally, driving up demand for local based tourism. With Ute and SUV sales higher than ever and interest in nature-based caravan travel, a gap to create a product to meet the needs of this emerging demographic has been identified.

Gap/trend focus

Increasing demand for nature-based local travel & remote working spaces

Goals for this project include:

- Improving employee wellbeing in a remote work environment.
- Expanding the locations in which remote work can effectively occur.
- Provide an affordable and mobile work environment.

Design question

How might we....

**re-imagine a mobile environment
to improve the experience of remote working?**

Benchmarking

Analyse existing caravan layouts, focus on functionality & use of space

Compare other small spaces such as offices, tiny houses, capsule hotels

Determine size of caravan and features

Analyse existing caravan costs and features, pareto chart for cost spread?

Immersion – empathy modelling

Spend a week in a caravan to learn about the difficulties and problems associated with remote working in a caravan.

Goals while in caravan:

- Compare remote working experience with home experience
- Find pain and frustration points

Prototyping

Prototyping layouts by 3d printing a scale caravan space to shuffle features and items around a physical space.

This will be beneficial in fitting and arranging different features, to gain a perspective of how a space might be optimised for an imagined user. A scale person will also be used to simulate how a user will fit into the space.

Implementation

Finalisation of layout, CAD model & final scale model to represent project

Stop motion vid to demonstrate usage?

Defining the audience

3 User personas will be created to represent different target demographics, with a focus to create “real people” with authentic opinions. Underlying assumptions will be based off previous research and other sources of data such as consumer reports and casual conversations.

The careers of these personas are chosen are more suited to remote working, based on current jobs that commonly offer remote working opportunities.

SURVEY

Intention to survey employees that currently have the option for remote work and are interested in nature-based travel.

Find out priority features required, reasons for travel & desired trip length, desire for alternative remote working opportunities

Goals: gain info to the changing nature of work and its requirements

Growing/trending work opportunities

Target nature loving, people who value a sense of adventure

Survey design

Experiences: nature travel and remote working experiences

Attitudes: towards nature based travel,

Behaviours: prioritising nature based travel and work

The survey aims to minimise response bias by

Pilot testing to gain feedback on the effectiveness of the survey so it can be revised before sending out.

- Cognitive interview technique: ask question and find out how they arrived at their answer
- In your own words, what is this question asking? (has the volunteer interpreted the question in the way that was intended?)
- How did you arrive at your answer?
- How sure are you of your answer?
- Minimising socially desirable bias (people will change their answer to be more socially desirable)

PERSONA 1 – LILY & ROBIN (AGE 27-32)

Family status: Married, length of relationship: 4 years

Income:

\$160K/year

Career:

Graphic designer, Data analyst

Motivations/personality

Enjoys the outdoors – typical activities: going to the beach, bushwalks, picnics

Spending time together

Eating out

Core needs/ values

Wishes to work remotely

Access to a shower

Affordability

Pain points/frustrations

Lack of caravans on the market to suit working remotely

Presence of insects – especially mosquitos.

Notable quote

Lily : “ I just want to get out more, I feel a bit trapped in my home all of the time”

Goals

See more of Australia



PERSONA 2 - MAX & OKSANA (AGE 38-45)

Previously lived in a van, been living in it for 2 years.

Family status: Married, 2 children (age 8 and 11), length of relationship: 8 years

Established at current location, difficult to move

Income:

\$140k/year

Career:

Social media manager, Recruitment consultant

Motivations/Personality

Values and prioritises family time

Visiting friends and relatives,

Values physical skills and life skills

Tiny living

Core needs/ values

Flexible work hours and location, adequate home working setup

Passionate about the outdoors

More living space

Adequate weather and temperature protection

values the convenience of a toilet.

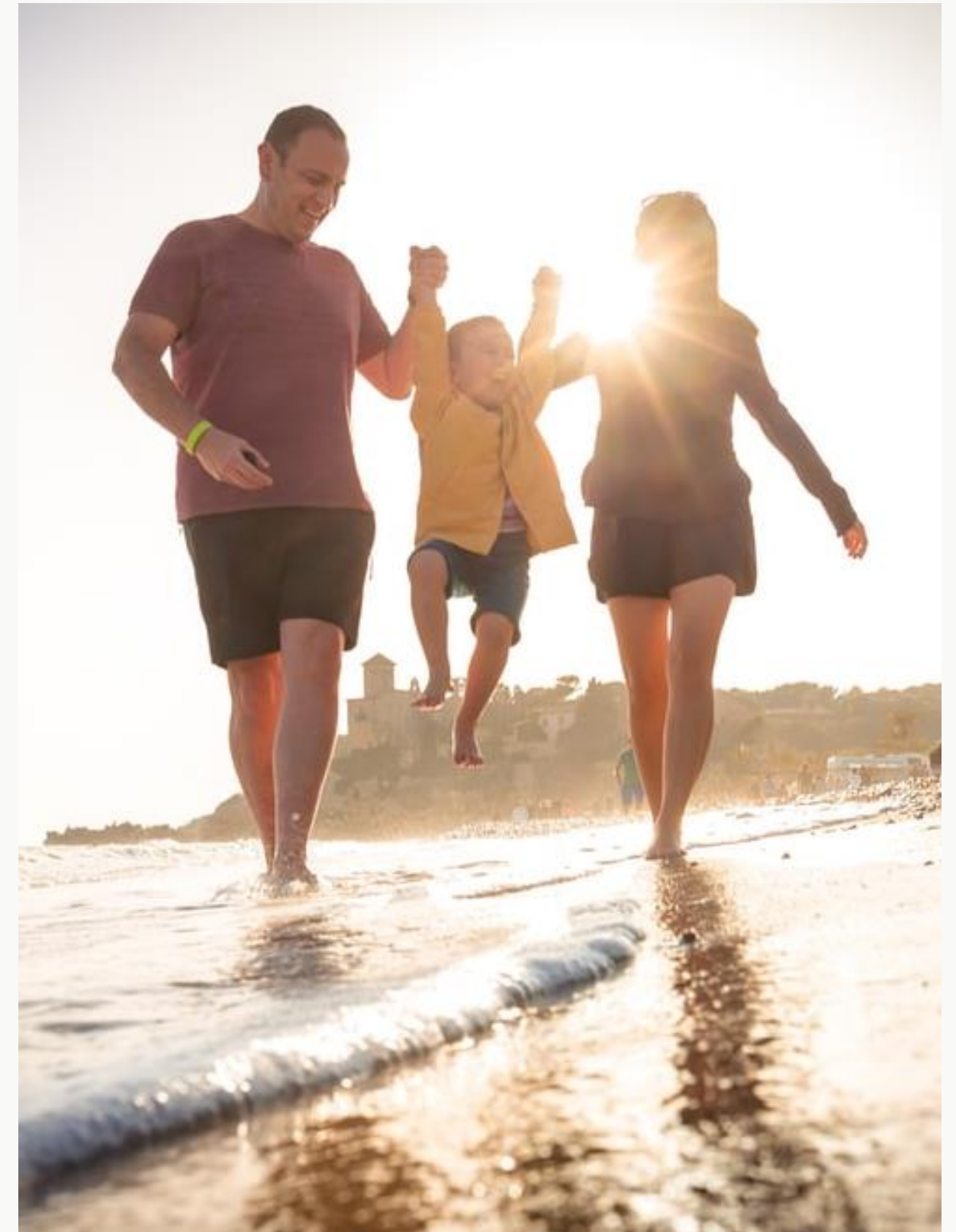
Pain points/frustrations

Lack of sitting space as bed occupies the same area as the living room, frustrating to setup bed every night.

Sick of using a porta-potty - needing to empty every few days, dumping stations not always easy to find,

Goals

Provide learning opportunities for life skills to their child



PERSONA 3 - TOM (AGE: 29)

Family status: Single

Lives in a share house

Income:

\$90k

Career:

Software engineer

Motivations/personality

Connecting with new people

Does not like to rely on work to cultivate social life

Likes to go Fishing

Core needs/values

Connecting with friends and family across Australia

Freedom and flexibility in lifestyle choices

Pain points/frustrations

Finding time away from work and other commitments to go on adventures

Sick of work from home environment - lonely & disconnected

Goals

Catch a very large fish, spend more time outdoors



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