Tees Valley Combined Authority Digital Transport Delivery Plan
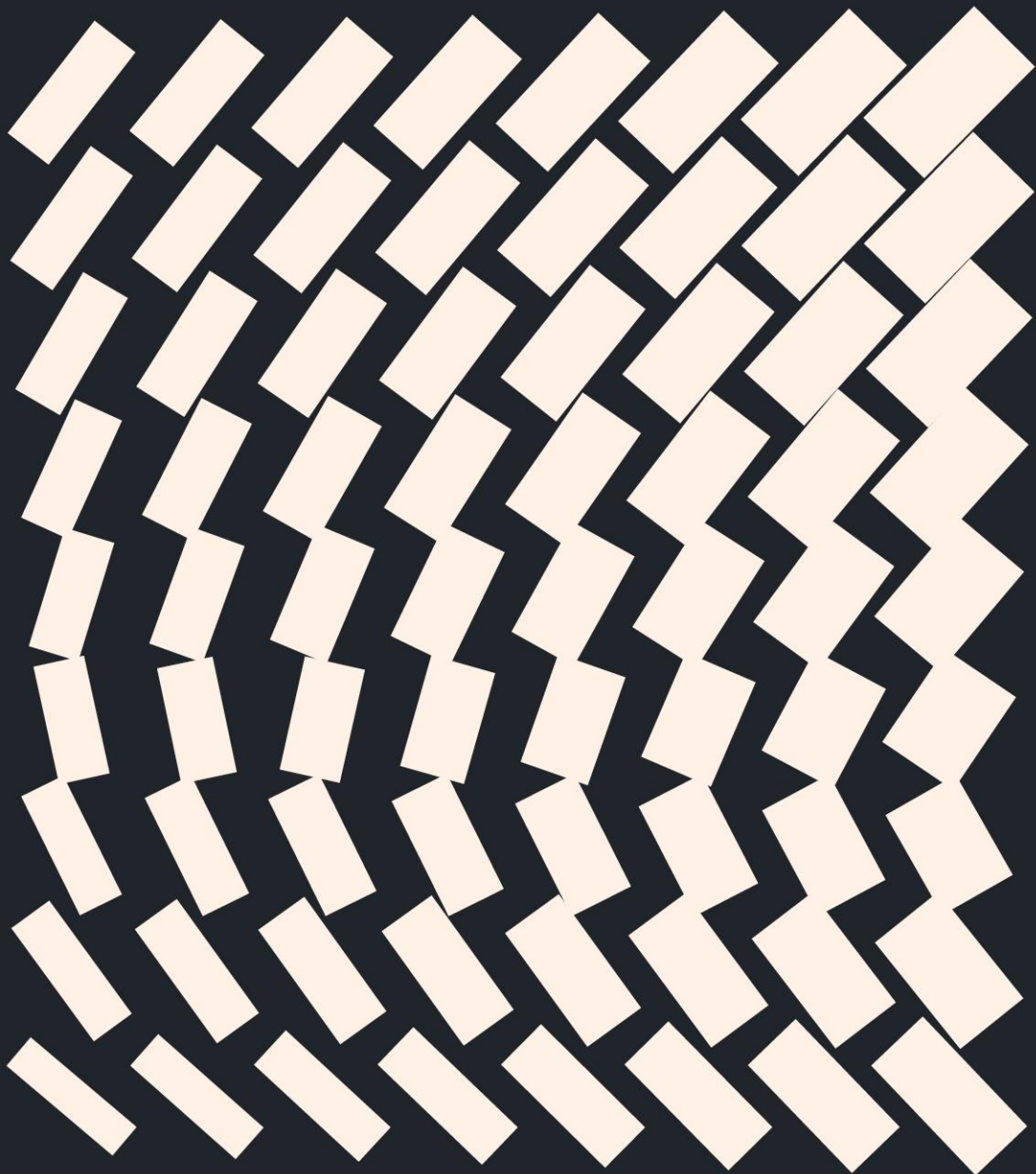
TVCA

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Future Mobility

WSP

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Executive Summary

Executive Summary

Tees Valley Digital Transport Delivery Plan

Tees Valley Combined Authority (TVCA) commissioned WSP to investigate opportunities for investments in digital to support the delivery of the Tees Valley Strategic Transport Plan and the wider strategic ambition of the TVCA to become a highly digital and technologically innovative region.

This strategy supports the wider Tees Valley Digital Strategy, which sets an ambitious target of becoming the UK's first truly Smart Region by 2032, covering the three foundations of digital infrastructure, digital innovation and digital inclusions and skills.

The digital transport delivery plan identifies a number of digital and transport needs of the residents, businesses and key stakeholders of the region. This user-centric approach ensures that digital solutions will be developed that meet these needs and solve real issues and challenges.

TVCA already has a collection of digital capabilities that will act as a foundation for this strategy, most notably its Connect Tees Valley journey planner and the Urban Traffic Management and Control (UTMC) system. However, many of these digital activities are disparate and there is a lack of coordination between digital assets.

Based on a review of TVCA's existing digital capabilities, the interventions proposed for the digital transport delivery plan have been identified as:

1. Regional data platform – a data platform will allow for data analytics capabilities to fully analyse data and gain insights. The regional data platform will form the foundational digital infrastructure for Tees Valley and could eventually be expanded for use beyond transportation services.

2. Digital services – these digital services will be the customer facing functions that are developed to meet specific user transport and digital needs, building upon the digital services that already exist.

3. Digital Twin – a virtual software simulation of the transport network, allowing greater understanding of asset and network performance. The digital twin will build upon the existing UTMC system.

Investments will also be needed in internal resourcing within TVCA to ensure there are the skills and capabilities to roll out this digital technology across the region.

The benefits of these digital investments and how they meet the objectives of the Tees Valley Strategic Transport Plan are set out in Figure 1.

The roadmap to delivery has been prepared to develop the proposed digital interventions over the next five years from 2022-2026. The roadmap follows five key stages: putting the foundations in place; exploring digital services; deploying the digital technology; scaling up; and looking forward. The roadmap will be refined in the foundation stage as the platform and services delivered will be driven by the strategy and research undertaken during this stage.

Our Vision

"Our digital transport delivery plan will support the development of a Tees Valley Smart Region, in which our citizens and organisations can access and benefit equitably from employment, education and training opportunities created in the region through innovation-led growth of our industry and commerce"
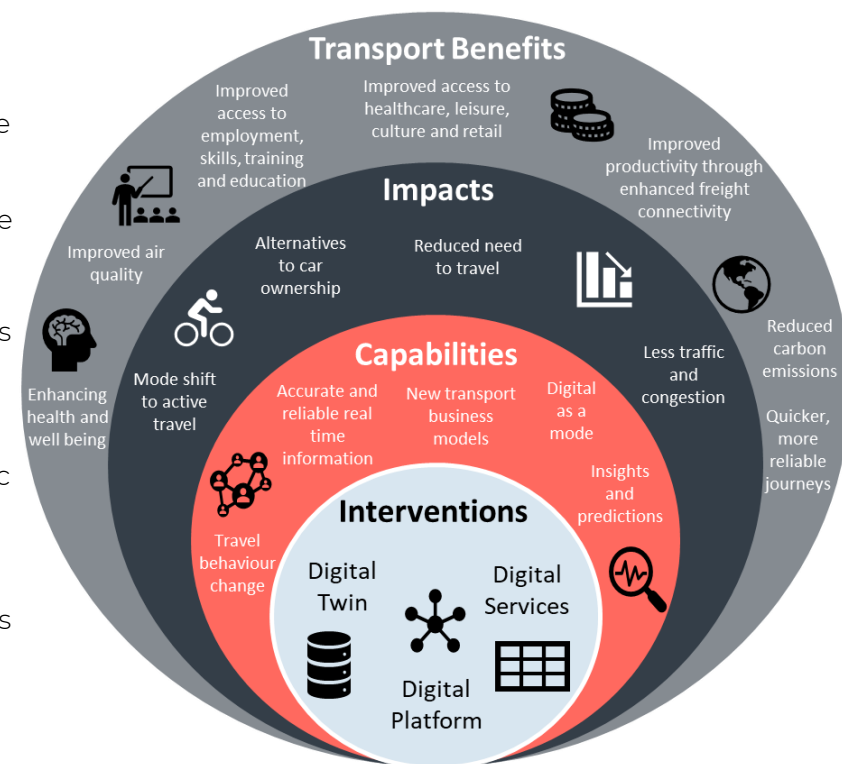

Figure 1. Digital Transport Delivery Plan Benefits Diagram

1. Introduction

Introduction

Introduction to the study

As part of developing proposals to the Government's City Region Sustainable Transport Settlements (CRSTS) fund, Tees Valley Combined Authority (TVCA) is investigating potential opportunities for investments in digital to support the delivery of its Tees Valley Strategic Transport Plan.

TVCA appointed WSP to develop a digital transport delivery plan and ideate and propose a set of prioritised digital interventions along with high level feasibility and costings to be included in TVCA's CRSTS funding programme to be delivered by March 2026.

The study takes a user-centric, design-led approach by seeking to understand customer travel and digital challenges from different resident, stakeholder and business users. The study reviews the current digital landscape in the Tees Valley to propose digital interventions that build upon existing digital capabilities.

The study is the first phase of a five-year programme to deliver digital investments in the Tees Valley area and support the wider digital strategic ambition of the Tees Valley becoming a Tees Valley Smart Region by 2032, building on key digital infrastructure innovation and inclusion and skills. .

Approach

The study takes a five-stage process:

1. Understand the policy context and opportunities to inform a vision and objectives.

2. Define key customers, their mobility and digital needs and pain points.

3. Undertake a baseline review of current digital capabilities in Tees Valley.

4. Propose digital and technology interventions.

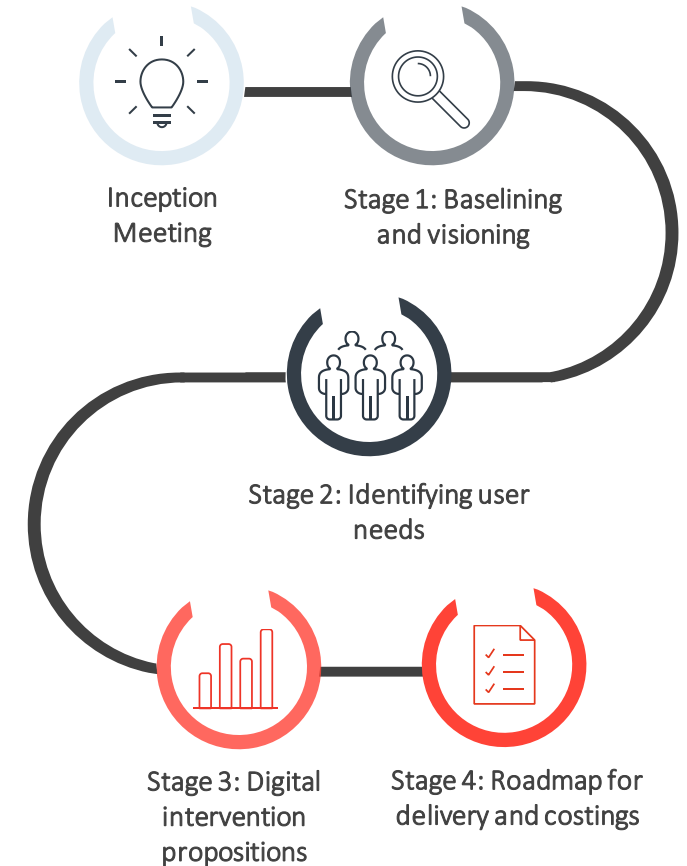5. Set out a roadmap for delivery and costings.

Figure 2. Digital Transport Delivery Plan Approach

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2. Policy Context

Policy Context (Tees Valley)

Introduction

The Tees Valley region has a number of key strategy and policy documents detailing the combined authority's plan to unlock economic potential, deliver improved social outcomes and to decarbonise across all sectors, including transportation. The documents also outline how transport and digital can contribute to these ambitions.

This section provides an overview of the policy context for the region and provides an evidential basis for the digital transport delivery plan's vision and objectives presented later.

Tees Valley Combined Authority Strategic Economic Plan (2016)

The Strategic Economic Plan (SEP) outlines the region's ambitions and priorities up to 2026 and it aims to improve, diversify and accelerate growth to equip businesses in the region to compete in the national and international economy. The SEP highlights some key digital challenges in the region, particularly in relation to improving productivity and ensuring that growth sectors can upskill and capitalise on new technological developments. The plan also highlights the present strengths and digital assets which can be exploited to boost strength sectors such as advanced manufacturing, and carve out a role for the region in international markets.

Education

An ageing workforce in the region is creating a need for 11,000 replacement jobs, particularly in key strength sectors. Furthermore, youth unemployment is high and educational attainment is lower than the national average. The plan outlines a subsequent need to forge stronger links between education and industry to signpost skills to education and training providers, to ensure that future workers can meet the changing demands of employers. The region's strength sectors can provide excellent career opportunities to people growing up and moving into the region. However, awareness of these opportunities needs to be better communicated.

Technology

Digital technology can help to remove some of the barriers presented by the region's geographical location by opening up opportunities to compete successfully in national markets for business and technical support services.

Rollout out of high speed broadband is also a priority for the region and it will enable a greater variety of activities to be undertaken more effectively from home, further negating the effects.

Tees Valley Digital Sector Action Plan (2018)

The digital sector is growing rapidly in the Tees Valley region and is becoming increasingly pervasive. However, there are a number of challenges faced by small businesses in particular, which are making it difficult for them to enter into large supply chains and access international markets.

The rate of growth in the industry also presents its own challenges, particularly in relation to developing the necessary skills pipeline to be able to capitalise on opportunities in emergent digital sectors. The immediate priorities identified by the strategy to address these issues are:

Growth of the sector:

- Growing companies of scale through the provision of specialist in-company support (particularly developing leadership and preparing teams for growth).
- Support for new digital start-ups and spinouts from traditional sectors providing new technology based services.

Collaboration:

- Encouraging greater collaboration between companies, so they can invest in innovation and gain access to more sophisticated supply chains, particularly within the Tees Valley based chemicals and advanced manufacturing sectors.

Infrastructure:

- Provision of 'fit for purpose managed accommodation' which is flexible and affordable, but above all facilitates networking and collaborative working.

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Policy Context (Tees Valley)

Recognition

- Raise the profile and understanding of the tech sector in Tees Valley to support growth of businesses and attraction of talent and new opportunities.

- To become a leading pilot area for the application of digital technology.

Tees Valley Local Industrial Strategy (2019)

The Tees Valley Local Industrial Strategy aims to increase economic output in the region by building on the distinctiveness and niche offerings of the regional economy to set out priority sectors for growth. The strategy has a particular focus on the clean growth agenda, including projects relating to clean energy, decarbonisation and hydrogen.

The region's notable strengths in advanced manufacturing present an opportunity to become a leader in industrial digitisation, including proposals for a 5G testbed with a focus on technology testing for Tees Valley's priority sectors.

Digital connectivity

Whilst the region has some of the highest rates of broadband connectivity in the country, small pockets of poor digital connectivity still persist. In these regions, it is difficult for residents and businesses to thrive and they are at risk of being left behind in an increasingly digitised economy.

Logistics

The industry is anticipating a shift to automation in the coming years and it is expected that this will lead to increased productivity in the logistics sector. For this to happen, the necessary skills and infrastructure need to be in place locally to capitalise on the opportunities that this presents.

Industrial digitisation

Some industrial sectors already make good use of digital technologies and depend upon high levels of automation. Increasingly, there are opportunities to exploit visualisation technologies in support of training staff, as well as operating and maintaining plants.

Artificial intelligence will be a key technology in the coming years, particularly in data analytics for the chemical and bio-manufacturing sectors to increase productivity and mitigate supply chain risks. Furthermore, integrating environmental data with operational data will support active environmental management and promote more localised and circular supply chains.

Tees Valley Strategic Transport Plan (2020)

The Tees Valley Strategy Transport Plan covers all aspects of travel and aims to facilitate the creation of jobs, drive economic growth and to provide residents of the region with high-quality, fast, reliable and well-connected transport options.

The plan also focuses on reducing carbon emissions through the provision of increased choice, by offering effective low-carbon alternatives to the private car.

Better information

The strategy recognises the role of digital technology to simplify travelling, particularly in presenting users with high quality information to support more sustainable choices.

Journey planning applications such as Connect Tees Valley are already helping people make more sustainable choices, and open data and smartphone app integration are helping to make travel data more accessible to users.

Smarter payments

Integrated digital payment platforms are also alluded to and some progress has been made in support of these ambitions through the North East Smart Ticketing Initiative, which will enable travel on multiple forms of public transport using a single smart card.

Wider proposals

Other opportunities for digital are likely to arise through the upcoming Transforming Cities Fund proposals, which include use of intelligent transport systems (ITS) to make improvements such as enhanced bus priority at junctions and real time information at bus stops.

Many of these proposals have flowed through to the recently completed Tees Valley Bus service Improvement Plan, recently submitted to Government.

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Policy Context (National)

Transport Decarbonisation Plan – DfT (2021)

Overview

The Transport Decarbonisation Plan (TDP) highlights the key role that data has to play in supporting ambitions to decarbonise the transport sector, particularly in relation to the provision of better information to commuters to enable more sustainable travel choices during regular journeys. To help consumers choose lower carbon journeys, new mobility-as-a-service (MaaS) Code of Practice guidance will look to encourage inclusion of carbon data for each route offered.
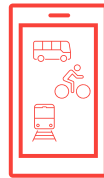
Investment is also needed in infrastructure to make it smarter, such as the £15 million in investment in 2021/22 for signals and data systems that will enable a digital and connected road network. This will include opening up charge point data to improve the reliability of the network, streamline the payment methods offered to drivers, and increase pricing transparency.

The plan also notes that freight transportation must be considered, with digital solutions needed to enable new business models and practices which can optimise freight efficiency through increased sharing, aggregation, and fleet optimisation to support commercially viable sustainable last mile deliveries. It suggests that this, along with better and more transparent data on carbon emissions, will remove key barriers to organisations who wish to reduce their carbon emissions.

Data

Data is most valuable when it is shared, so the government has been developing a transport data strategy alongside the TDP to remove the barriers to data sharing and use, improving the discoverability, accessibility and quality of data.

A new annual statistical release has also been announced which reveals transport's impact on the environment and provides guidance to third parties on how the data can be used to inform their own actions. By investing in and growing the UK data industry, it is hoped that innovation projects can be deployed and implemented more effectively.

Digital Skills for the UK Economy – DCMS (2016)

Key risks outlined in the strategy

- A shortage in suitable digital skills for digital jobs persists in the UK labour market. This is particularly prevalent in emergent fields such as automation, data and AI and is a major risk to business growth, innovation and broader societal development.

- Investment in digital skills is slipping compared to other developed economies.

- Digital skills need to improve continuously across the whole UK population so that all sectors and organisations can maximise their competitive potential offered by the rapidly developing applications of digital technologies..

- There is a need for action to be taken to re-skill the workforce continuously to ensure that new market segments that require digital skills can be exploited.

- As demand for digital skills outstrips supply, employers across a wider range of sectors are experiencing digital skill gaps within their workforce, and encountering difficulties in filling advertised vacancies (particularly in high level roles such as developers).

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Policy Context (National)

Future of Mobility: Urban Strategy – DfT (2019)

Overview

The Future of Mobility: Urban Strategy presents the strategy for facilitating innovation in urban mobility for freight, passengers and services and it is guided by 9 key principles. Those relevant to this digital transport delivery plan are presented below:

- New modes of transport and new mobility services must be safe and secure by design

- The benefits of innovation in mobility must be available to all parts of the UK and all segments of society.

- The marketplace for mobility must be open to stimulate innovation and give the best deal to consumers - need to ensure that the full range of mobility options are provided and not ending up with a fragmented market

- New mobility services must be designed to operate as part of an integrated transport system combining public, private and multiple modes for transport user.

- Data from new mobility services must be shared where appropriate to improve choice and the operation of the transport system.

Digitally enabled business models

Data and connectivity is being harnessed to enable new disruptive business models which are increasing the availability, efficiency and quality of transport modes and services available to users. Notable examples include the emergence of ride hailing services and increasingly sophisticated MaaS platforms that enable complex, multi-modal journeys to be completed much more easily by integrating multiple modes, journey planning, payments and ticketing together into one application.

Linked to this, shared mobility is becoming ever-more prevalent across the country with digitally enabled ways of sharing and using mobility assets giving rise to a sharing economy. Digital technology provides the platforms for these services and machine learning and intelligent optimisation algorithms identify patterns in data to optimise assets, connect users and make the business model commercially viable.

Social risks

As more services such as booking payment platforms and even social interactions are hosted online, there is a risk of social exclusion for those who are not digitally enfranchised. Only 44% of those aged 75 and over have used the Internet within the last three months, while 1.3 million UK adults have no bank account and are therefore excluded from apps that require bank account registration.

Security is an additional consideration which is fundamental to delivering a digital future. Fears over loss of privacy could cause users to give false details or withdraw consent for use, leading to missing, inaccurate and/or non-representative data.

Investing in a digitised economy

New developments in mobility such as automation, electrification and digitisation will all require a skills pipeline to support them. Developing the necessary talent and promoting the appropriate career pathways will require strong links between the industrial and education sectors and investment in digital training across all sectors.

Fundamentally, the industrial strategy will need to be underpinned by high quality, reliable fixed and wireless networks, including gigabit broadband for residents and businesses, and the ongoing rollout of 5G networks across the country. To achieve this, £740 million in funding has been reserved through the National Productivity Investment Fund.

Data availability

The publication of data standards and more open sharing of information will improve the quality and availability of mobility-related data. As part of the strategy, multiple projects have been commissioned, including a roads data catalogue to improve the awareness of existing and emerging data sources, and the Street Manager Project, a new digital service that will ensure timely publication of data about street works and road works to transform how they are planned, managed and communicated.

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Policy Context (National)

National Data Strategy – DCMS (2019)

A number of interconnected issues currently prevent the best use of data in the UK. These are reflected in the core pillars of this strategy

Pillars

- Data foundations

The true value of data can only be fully realised when it is fit for purpose, recorded in standardised formats on modern, future-proof systems and held in a condition that means it is findable, accessible, interoperable and reusable. By improving the quality of the data, we can use it more effectively, and drive better insights and outcomes from its use.

- Data skills

To make the best use of data, we must have a wealth of data skills to draw on. That means delivering the right skills through our education system, but also ensuring that people can continue to develop the data skills they need throughout their lives.

- Data availability

For data to have the most effective impact, it needs to be appropriately accessible, mobile and re-usable. That means encouraging better coordination, access to and sharing of data of appropriate quality between organisations in the public, private and third sectors, and ensuring

appropriate protections for the flow of data internationally.

- Responsible data

As we drive increased use of data, we must ensure that it is used responsibly, in a way that is lawful, secure, fair, ethical, sustainable and accountable, while also supporting innovation and research.

Missions

Building on the pillars identified in the strategy, a number of key actions have been identified:

- Unlocking the value of data across the economy

The full value of data is not being exploited, so a government framework is to be created to provide the correct conditions to make data useable, available and accessible.

- Securing a pro-growth and trusted data regime

This mission aims to maintain a data regime in the UK that helps innovators and entrepreneurs to use data responsibly and securely, without undue regulatory uncertainty or risk, to drive

growth across the economy

- Transforming government's use of data to drive efficiency and improve public services

The creation of an appropriately safeguarded, joined-up and interoperable data infrastructure to drive major improvements in the way information is efficiently managed, used and shared across government.

- Ensuring the security and resilience of the infrastructure on which data relies

The government has a responsibility to ensure that data and its supporting infrastructure is resilient in the face of established, new and emerging risks, protecting the economy as it grows

- Championing the international flow of data –

Promoting domestic best practice and work with international partners to ensure data is not inappropriately constrained by national borders and fragmented regulatory regimes so that it can be used to its full potential

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3. Our Approach

Purpose of our user-centric approach

User centric design

The digital transport delivery plan adopts WSP's user-centric approach to develop solutions that match with real life problems and needs. The user-centric approach identifies the users, or 'personas', of the region – from people and their predominant citizen demographics, to businesses to stakeholders – and explores what their digital and mobility needs are. The needs are developed and verified through detailed reviews of relevant policy and strategies, demographic segmentation and analysis of government data sources.

This approach then ensures that solutions are developed to solve real problems rather than what planners and technologists think are appropriate solutions, or applying solutions because they are new or novel emergent technologies. It also enables designs for a wide range of different users with unique intersections of needs, rather than developing broad brush solutions to benefit the average user based on superficial assumptions.

Design thinking

In practice, this means first looking widely to **discover** and understand the specific challenges faced in the region, and then clearly **defining** them using the insights gained.

Once the problem has been clearly identified, we will once again look more widely to **develop** solutions and give answers to the defined problem by drawing on a broad range of insights and experience.

Finally, we prioritise the best performing solutions that most effectively **deliver** address the needs of the citizens, businesses and key stakeholders in the region. This process is summarised using the Design Council's Double Diamond framework for innovation.

Next steps

This report takes the digital transport delivery plan through the process of discovering and defining the needs of the citizens, businesses and transport stakeholders in the region – which is the first diamond.

Further stages in the process of delivering this digital transport delivery plan will build on these needs to develop and deliver the digital solutions to complete the second diamond.
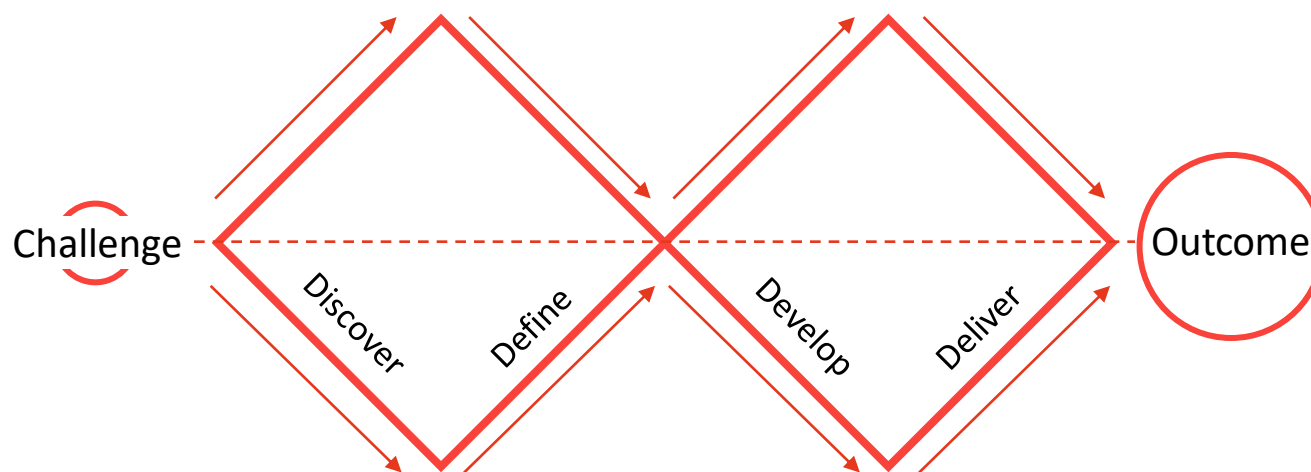

Figure 3. Design Council's Double Diamond

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Identifying the personas

Citizens

Demographic segmentation using Experian's Mosaic dataset has been used to identify the predominant groups living in the Tees Valley. The dataset includes a range of metrics such as income, age, home ownership, and rate of technological adoption, which are used to define consumers' proclivities towards different behaviours and helps to define the needs of each user group at a postcode level.

Having mapped the resident population, the results showed defined clusters of diverse demographics in urban areas, with significantly more dispersal but more homogeneity across more rural areas.

We developed detailed and bespoke personas designed to be representative of each demographic group, and by considering their unique intersection of characteristics, formed a picture of the daily challenges faced in their lives.
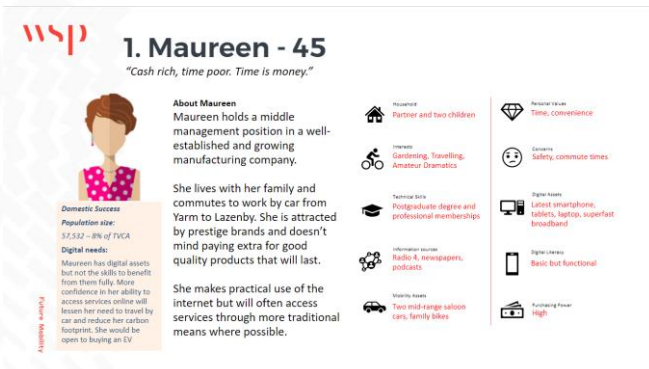
The personas consider attributes such as the demographic's typical occupation, family structure and digital and mobility assets, which in turn led us to identify their digital needs. For example, a wealthy pensioner may well have a smartphone and a car, but they may not know how to use the phone, or feel comfortable driving at night. Consequently, more user-friendly user interfaces for travel planning applications may be needed to make important public transport information more accessible.

Understanding the region's population is essential to ensure that digital interventions will be developed that suit local needs. For example, areas with a predominantly younger population would be much more receptive to interventions making use of digital payments to access mobility services than an area with a large number of retirees. Similarly, areas with high levels of unemployment may benefit most from interventions targeting the development skills for a digital economy, rather than reducing car use.

The full list of personas for the region have been included in Appendix A

Businesses

To identify the composition and distribution of different sizes and types of businesses across the region – or business personas – a data-led approach was adopted using statistics from the 2020 ONS release and findings validated using

TVCA economic studies.

The dataset disaggregates the 303,000 jobs across the 17,000 businesses in the region and produces estimates of how many people are employed in small, medium and large organisations in each industry.

The findings show that 90% of businesses have less than 10 employees, yet around 70% of people are employed by larger organisations with more than 100 employees. The findings also demonstrated the dominance of key sectors such as process and chemical engineering, as well as the presence of the transport and storage sector associated with the port.

The most notable business sizes in each industry were used to form the basis of a series of personas for which needs were developed based on their business activities.

For example, sectors with high potential for digitisation and automation would benefit greatly from a strong digital skills pipeline. However, the manufacturing industry would see limited benefit from infrastructure enabling more homeworking given that they are concerned with the production of physical products, unlike the service sector, in which homeworking could democratise opportunities by overcoming geographical barriers to work.

Figure 4. Citizen User Persona in the Tees Valley

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Identifying the personas

Stakeholders

Bringing about digital transformation in the Tees Valley region will require close collaboration between a wide range of stakeholders representing a variety of interests and institutions.

The stakeholder personas were developed by identifying the predominant stakeholder organisations and mapping their activities and interests across the various facets of digital technology within transport.

Such interests included data collection for monitoring and evaluation, and enhancing their understanding of how interventions are performing to make the case for future investments. It also includes opportunities to share more data and insights to facilitate enhanced integration between mobility operators and users of the network.

The list of key transport stakeholders identified in the region is as follows:

- Department for Transport
- Department of Culture Media and Sport
- Transport for the North
- Tees Valley Combined Authority
- Constituent Local Authorities
- National Highways

- Tees Valley Airport
- Network Rail
- Train operating companies/ Great British railways
- Bus and other mobility operators
- TeesPort/ other major employers
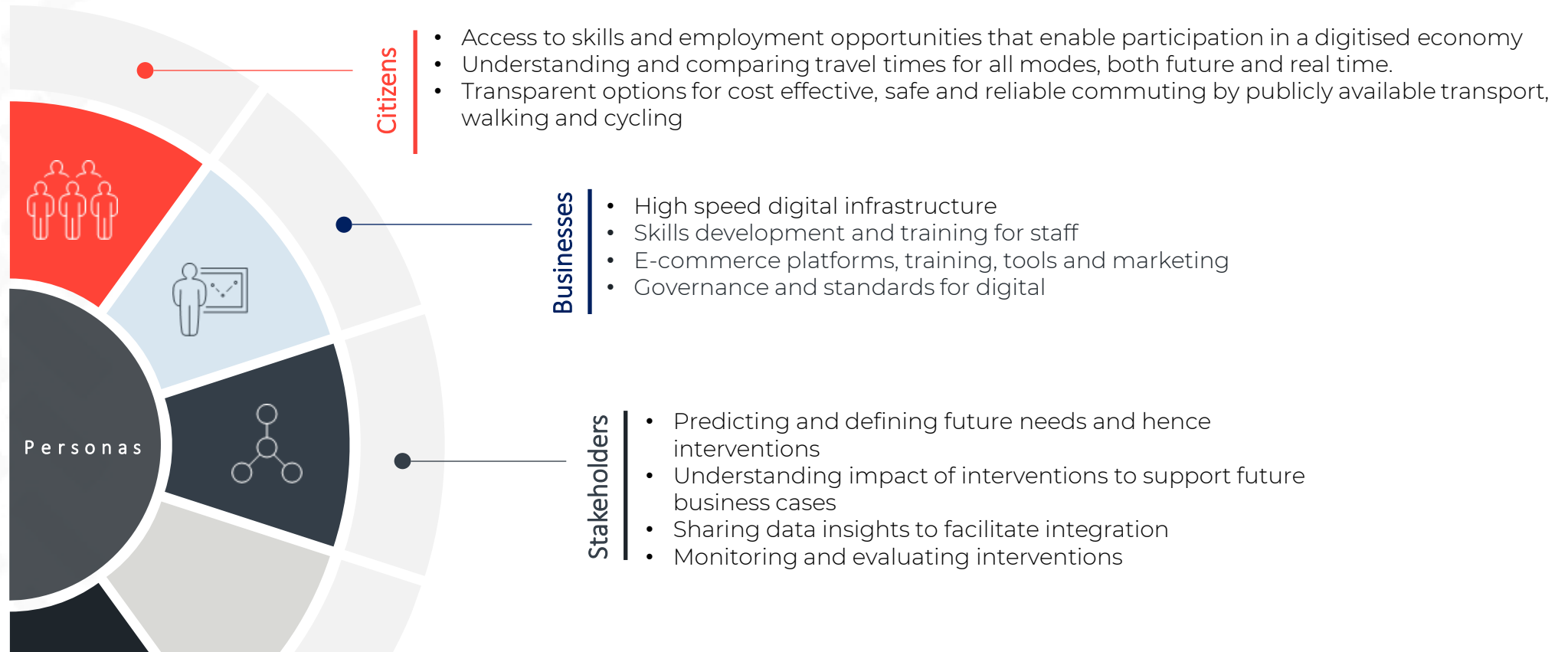- NHS Trusts
- Connect / Let's Go Tees Valley

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Digital needs

Introduction

Digital needs are defined as challenges faced by each of the persona types (Citizens, Businesses, Stakeholders) relating to all facets of digital technology. They are very varied in nature, spanning from the need to access high quality travel information and educational opportunities, to rolling out digital connectivity and facilitating data sharing between mobility operators. A long list of needs was developed from the persona work presented earlier in this report. These needs were mapped across each of the personas and those applying to the most in each of the three groups were shortlisted and prioritised for further development.

The list of needs identified from this process is presented below and a more detailed description of each is included in **Appendix A.**

Citizens
- Access to skills and employment opportunities that enable participation in a digitised economy
- Understanding and comparing travel times for all modes, both future and real time.
- Transparent options for cost effective, safe and reliable commuting by publicly available transport, walking and cycling

Businesses
- High speed digital infrastructure
- Skills development and training for staff
- E-commerce platforms, training, tools and marketing
- Governance and standards for digital

Stakeholders
- Predicting and defining future needs and hence interventions
- Understanding impact of interventions to support future business cases
- Sharing data insights to facilitate integration
- Monitoring and evaluating interventions

Personas

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4. Vision and Objectives

Vision and Objectives

Developing the vision and objectives

A review of regional and national policy has informed the development of the digital transport delivery plan's vision and objectives. These have been designed to reflect the digital needs of people, businesses and stakeholders in the region whilst recognising the opportunity that digital technology presents for the region.

Our Vision

"Our digital transport delivery plan will support the development of a Tees Valley Smart Region, in which our citizens and organisations can access and benefit equitably from employment, education and training opportunities created in the region through innovation-led growth of our industry and commerce"

Strategy Objectives

Digital Innovation

- Support the development of a Tees Valley Smart Region through the use of digital transport innovation across Tees Valley.

- Exploit the digital opportunity for the region's businesses and attract future inward investment and growth with a focus on smart logistics through our proactive approach to innovation to encourage regional retention of our workforce.

- Embrace digital and data to enable improved management and insights to deliver an optimised multi-modal network, our decarbonisation ambitions improve environmental conditions and health of our citizens.

- Create and support a secure, resilient and credible data economy to unlock value across the region to drive efficiency, insight and new business models.

Digital inclusion and skills

- Improve physical and digital access to, and visibility of, the skills and education needed to access the changing Tees Valley economy for our region's citizens .

- Evolve our digital infrastructure and services to allow equitable access to the services, goods and opportunities our region provides.

Infrastructure

- Allow citizens to confidently undertake complex, safe, reliable, cost effective and ideally zero-carbon journeys across the region to provide access to opportunities without the need to own a private car.

- Evolve the service offering of existing mobility operators and attract new partners to exploit the mobility needs of our region.

- Support and enable digital infrastructure investment in fibre and wireless connectivity by proactively engaging with infrastructure providers.

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Digital needs

Mapping the digital needs to the strategy objectives

This table demonstrates how the digital needs identified for the citizen, business and stakeholder personas map across the digital transport delivery plan objectives.

This ensures that the problems identified match with ambitions of the strategy and that the resultant interventions reflect the regional challenges highlighted in the policy review

Objectives

Objectives	Understanding and comparing travel times for all modes,	Transparent options for cost effective, safe and reliable commuting by publicly available transport, walking and cycling	Access to skills that enable participation in a digitised economy	Skills development and training fro staff	High speed digital infrastructure	E-commerce platforms, training, tools and marketing	Governance and standards for digital	Predicting and defining future interventions	Understanding impact of interventions to support future business cases	Sharing data insights to facilitate integration	Monitoring interventions and performance
Support the development of a Tees Valley Smart Region through the use of digital transport innovation across Tees Valley	x	x		x		x			x	x	x
Exploit the digital opportunity for the region's businesses and attract future inward investment and growth to encourage regional retention of our workforce			x	x	x	x	x	x	x	x	
Embrace digital and data to enable improved management and insights to deliver an optimised multi-modal network, our decarbonisation ambitions improve environmental conditions and health of our citizens	x	x		x						x	x
Create and support a secure, resilient and credible data economy to unlock value across the region to drive efficiency, insight and new business models			x	x			x	x	x	x	x
Improve physical and digital access to, and visibility of, the skills and education needed to access the changing Tees Valley economy for our region's citizens	x	x	x	x	x	x			x		
Evolve our digital infrastructure and services to allow equitable access to the services, goods and opportunities our region provides.	x	x		x	x	x	x			x	
Allow citizens to confidently undertake complex, and zero-carbon journeys across the region to provide access to opportunities without the need to own a private car	x	x		x	x	x					
Evolve the service offering of existing mobility operators and attract new partners to exploit the mobility needs of our region	x	x		x		x			x	x	x
Support and enable digital infrastructure investment in fibre and wireless connectivity by proactively engaging with infrastructure providers					x			x		x	

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5. Baselining – Review of Current Digital Capabilities

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Review of Current Digital Transport Capabilities

Introduction

Tees Valley Combined Authority already has a collection of digital transport assets, services and infrastructure which will act as a foundation for the strategy. This section of the report presents a digital transport baseline for the Tees Valley region by reviewing the existing digital transport capabilities in operation, as well as those planned for implementation in the near future.

The review identifies current constraints and outlines some of the steps needed to begin to progress the existing assets towards a more unified, integrated and coordinated digital transport delivery plan.

DIGITAL TRANSPORT ASSETS

Urban Traffic Management Control

The Tees Valley Urban Traffic Management and Control (UTMC) system is used to enable traffic management systems to communicate with one another to optimise the network and improve performance. The UTMC brings together a range of datasets including ANPR data, air quality monitoring, weather data and car parking occupancy. It can also communicate key information to road users through variable message signs to influence user behaviour.

It has been noted that further funding has been granted and is intended to be for the implementation of Microprocessor Optimised Vehicle Actuation (MOVA), or dynamic signalling, in support of the Bus Corridors work in the region, to provide enhanced bus priority at key junctions. To ensure maximum efficacy, the UTMC system should share its data on a data platform and make it available to organisations such as mobility service operators and other potential partners via accessible channels such as an API.

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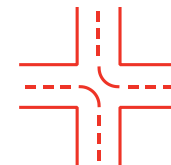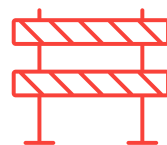
Cycling and Walking Sensors

As part of the Transforming Cities Fund, £200,000 has been allocated to TVCA across 4 years to support the delivery of sensors to collect data relating to walking, cycling and vehicle movements in the region. The data collected will be made available and will be accessed by a digital platform.

As the project evolves, the data insights produced have the potential to be integrated into a data platform, which can provide insights into levels of walking and cycling, delivering a more consolidated view of travel behaviours across the region.

Active Travel Incentivisation

TVCA have been awarded a Capability Fund, which includes a £200,000 provision for a scheme that employs a rewards-based system to promote active travel designed around a data platform. TVCA intend to deploy this at scale and closely monitor the evidence of impact.

This can be used to achieve wider behaviour change outcomes, informed by a data-driven approach. For example, understanding which micromobility solutions are being best adopted.

Next Steps

In conjunction with the UTMC, other data sources are able to provide insights into network performance and condition, such as real time updates on highway disruption. These data sources may be hosted on a data platform, which will provide convenient access for the council and third parties to collate and analyse this data, identifying trends in the network, and producing operational and capital efficiencies.

In order to efficiently collate and disseminate the data to ensure all parties are able to effectively utilise this data, there needs to be a standardised governance process in place. This will allow data collection and provision to be in a consistent format whilst ensuring an acceptable level of data quality. This will ultimately see a consistent approach to service integration and lead to increased service supply.

The TVCA plans to collect and share more active data, which will be key in the monitoring and evaluation of this active travel incentivisation initiative, one which should be offered and promoted using a single brand identity, making use of existing assets such as the Let's Go Tees Valley Initiative.

Future Mobility

Review of Current Digital Transport Capabilities

DIGITAL TRANSPORT SERVICES

Other Digital Transport Investments

Alongside the ambition to digitise transport infrastructure through this digital transport delivery plan, TVCA is also seeking investments in other supporting initiatives, notably for rail station and bus shelter enhancements.

Station Enhancement Package

This workstream will introduce measures to improve modal interchange at rail stations. This may include technology to improve access to key travel information such as real-time bus updates at the station and bus stops on services serving the station.

Bus shelters

Discussions are underway to determine the approach to improving access to live bus times. Realtime information at bus stops could accelerate the transition to digitised information, opening the doors to making this information available through journey planning and Mobility as a Service (MaaS) applications in future.

Behaviour Change Initiatives

TVCA uses a variety of social media channels to reach a wide audience across the region to encourage behaviour change. The channels currently in use are detailed below

Connect Tees Valley

Connect Tees Valley provides users with updates on the bus network with the aim of promoting modal shift and notifies of any issues relating to congestion in the region. It is a journey planning website (no app currently), and has been designed and implemented for residents to find out about routes, journey times and real time information.

Let's Go Tees Valley

Let's Go Tees Valley is a behavioural change initiative which campaigns to encourage active travel and smarter travel choices in the region. The initiative aims to encourage people to make more sustainable travel choices through schemes such as Let's Go to School - which helps children get back to school safely and sustainably in light of the pandemic, Bike Buddy - a one-to-one guided ride scheme, and periodical events such as the Greener Commuting Challenge - which encourages people to try travelling sustainably for at least one day per week.

The initiative is promoted through a number of social media channels including Facebook, Twitter and Instagram. Content is coordinated across channels by using Hootsuite, a platform which provides analytics and content management solutions across all major social network channels.

The webpage analytics show that the site receives some web traffic but not an amount to be significant in transforming travel behaviour in the region. Web traffic data is available up to June 2021 and recent data shows that from January 2019, the average number of monthly visits was 5,958, from an average of 4,180 unique users – resulting in a visitation rate of 1.43 visits per person. There is high variability in web traffic statistics, with some months recording almost 30,000 visits, and most months around the 4,000 mark. Since records began in 2016, traffic has steadily declined with peaks once reaching 32,000 visits shortly after launching the initiative.

Compared to the size of the region and the number of people travelling daily, these are relatively small proportions.

North East Smart Ticketing (NEST)

A new smart ticketing initiative 'Smartzone' has been introduced by TVCA which enables travel on multiple forms of public transport using a single smart card. Integrating ticketing in this way helps to simplify the travel experience and reduce dwell times on bus services. It also ensures that users are getting the best value when they travel and opens the door to offer schemes such as mobility credits to help those on low income access key services and opportunities. Crucially, however, this is an important step towards a MaaS application.

Review of Current Digital Transport Capabilities

Facebook groups

As well as hosting content promoting Let's Go Tees Valley, various mobility campaigns are also promoted through Facebook. One such example is Wheel Women which is a place where women can come together to discuss and support each other in cycling more, whether for commuting or more leisurely trips.

Website and branding

Many of the current brands and initiatives operated by TVCA currently exist as separate programmes. TVCA has allocated £100,000 towards consolidating the existing brands as well as delivering a website upgrade to improve functionality and information provision.

As part of a more coordinated online presence Connect Tees Valley could be amalgamated into Let's Go Tees Valley to provide a unified brand identity and single point of contact for all things mobility.

MARKETING ASSETS

TVCA has a range of marketing assets which assist in public engagement and information campaigns, including the following:

Constant Contact

This email marketing tool enables TVCA to create and manage email marketing campaigns. This includes the management of mailing lists and allows for integration with social media platforms.

Google My Business

Google My Business is a tool which helps organisations and businesses to manage their online presence. This includes facility to manage how they appear in online searches and on Google Maps.

SurveyMonkey

SurveyMonkey is an online planform which hosts secure forms and facilitates data collection such as contact information. Survey Monkey can also be used to provide user feedback and market research.

Next steps

These marketing assets will be key in promoting the digital interventions proposed as part of this strategy. To be successful, public engagement needs to be done in a way that is brand-consistent to ensure clear messaging to prospective users and beneficiaries of the interventions and the associated assets described in this section.

Furthermore, as the ways people access information and services become increasingly digitised, new and innovative methods of communication must be considered. This is likely to include exploiting the value of advertisement using social media platforms and more use of digital media.

Increased service functionality such as integrating payments and ticketing would encourage additional usage and move the application towards a more integrated transport service. A successful brand, will prompt consumers to this 'one-stop-shop' for all their travel needs and requirements. More sustainable behaviours can also be encouraged by providing high quality, accessible information around sustainable modes of transport, making adoption of these modes more seamless for consumers.

PHYSICAL ASSETS

Electric Vehicle Charging Point Network

Funding has been made available by TVCA for investment over 5 years in the delivery of an electric vehicle charging point network and supporting back office software. The project will enable data on charging point usage to be captured and shared.

The digital transport delivery plan will need to ensure that such datasets are made available to third parties who may then go on to develop new business models, such as those providing convenient means of locating charge points via an app or online platform.

Demand Responsive Transport (DDRT)

Stagecoach currently operates the TeesFlex service which enables users to book a DDRT service from an app on their smartphone or via a website.

Future Mobility

Review of Current Digital Transport Capabilities

The service can cater to multiple passengers making similar trips across three zones by using algorithms to optimise routing between 'virtual bus stops' located a short distance from their destination. The service is currently in operation across Redcar & Cleveland, Darlington & Stockton and in Hartlepool.

The service is especially valuable to people living in isolated communities where there is limited traditional public transport provision and it can help them to access essential services, jobs and training opportunities.

Next Steps

In future, there is an opportunity to aggregate DDRT services with other mobility services into an integrated transport service application, presenting the user with the most convenient, cost effective and low carbon travel options. For this to be successful, booking, ticketing and payments will need to be integrated and coordinated across a range of mobility service providers.

Data collected through charge point suppliers may also feed into the development of a digital twin to manage and optimise availability across the Tees Valley Region and reduce range anxiety.

OTHER INFRASTRUCTURE INVESTMENTS

Free Wi-Fi

Publicly accessible Wi-Fi across town centres helps to ensure that people can stay connected and access key information and services such as those proposed by this strategy, even if they don't have access to cellular network.

Expanding the coverage, speed and capacity of the network will enable the network to be used by more people and for more purposes, including for remote working, which can often require greater bandwidth.

CONCLUSION

The review of the region's digital transport capabilities shows that there is a strong foundation that can be built on to deliver the vision of the digital transport delivery plan.

The key theme emerging across the assets is the need for greater integration. Many projects promised for delivery have the potential to generate and benefit from large amounts of data. However, they currently exist as separate programmes and there are few plans to exploit the opportunities arising from better data collection and sharing.

For example, the electric vehicle charging point network, the walking and cycling sensors and the UTMC system could all feed into the creation of a digital twin by adding new data streams to inform dynamic modelling and real-time optimisation of the network. Where active travel is low, electric vehicle uptake is slow or congestion is damaging local communities, a data platform could provide the cross-cutting insight needed to allow measures to be targeted at the areas most in need of investment to encourage more sustainable travel choices.

By making data and digital platforms available and easily accessible, new opportunities could emerge to create new digitally-enabled business models. This has already been demonstrated with the introduction of the TeeFlex DDRT service, but there is room to go further and integrate a variety of different transport modes and services, including travel planning, ticketing and payments, contributing to the eventual creation of a MaaS platform.

Bringing together such a wide range of stakeholders working across traditionally separate organisations will require extensive and open communication between the public, private and third sectors. Achieving this is not simple, therefore a coordinated approach is needed with strong leadership from TVCA to put into place the necessary standards, and processes for a digitally-enabled future.

Future Mobility

6. Digital Interventions

1. Regional Data Platform

Regional Data Platform

It is important that TVCA grows its data analytics capabilities to gain value from data that exists currently and that which will be collected in the future. This will ultimately enable TVCA to scale its digital initiatives. As set out in Chapter 5, TVCA currently operates siloed digital systems. Given the breadth of digital services that already operate, and the aspirations to introduce new digital services, this single systems approach means that TVCA does not currently have the capabilities to fully analyse its data and gain insights to ensure all needs are met. A regional data platform will act as an enabler, and is required as the foundational digital infrastructure to allow TVCA to manage, analyse and store all data across its digital systems in one place.

### Requirements of the regional data platform

- The data platform will enable the delivery of digital services

- The platform will be developed in stages to deliver the functionality required to deliver the services; services will be iteratively developed from an MVP.

- Elements of the service will be common to enable data to be shared and governed effectively by TVCA.

- The platform will address the technology solution and the capabilities (within TVCA, UAs or supply chain) that will be required to operate it.

Scope and Approach

The specific services to be delivered will be defined during feasibility and implementation - the platform will be revised to accommodate these requirements.

Our approach:

1. Understanding regional objectives and customer needs, review potential services to assess fit and benefit/value delivered.

2. Define requirements for functionality, data integration and organisational changes

3. Identify platform components needed to deliver the requirements.
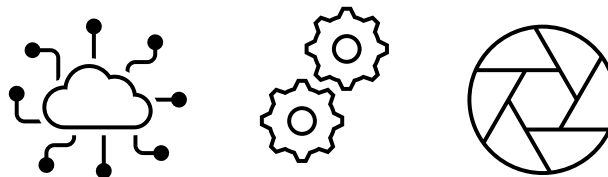
Functionality

Functional requirements will be defined during feasibility and implementation. The following key functionality has been identified through our initial survey:

- Ingestion and storage of data from batch and real time sources.
- Archiving/aggregation of historical data.
- Analysis and visualisation of data including GIS.
- Modelling, simulation and forecasting.
- External platform(s) to support:
  o Customer access to services and Open Data
  o Social integration
  o APIs
  o Optionally a data marketplace could be considered to enable a positive revenue stream

Case study: HADAMS, Kent Operational Analytics Platform

Kent County Council has developed an operational analytics platform to integrate all data and innovations within the service, pulling together information from a variety of sources including asset management systems, IoT sensors and external data services, such as traffic and weather. The platform will enable the integration and visualisation of these datasets. This will allow Kent County Council to trial key innovations that will enable staff to make intelligent operational decisions based on machine learning and data science analytics. Some of the trials identified include intelligent traffic modelling devices, computer vision for road surface degradation, and provide information that will assist staff when making decisions on when a new road scheme needs to be built.

Future Mobility

1. Regional Data Platform

Data Integration

Data requirements will be defined during feasibility and implementation. The following key classes of integration have been identified through our initial survey:

Batch Data	Real Time data
Asset data	UTMC integration
Historic usage patterns	Mobile derived data
Transport models	Social data
Mapping and topography	Environmental sensors
Environmental data	Mobility sensors
Socio economic data	
Planning data	

It has been assumed that digital services, such as MaaS, parking, charging and mobility credits, will be delivered using commercial off the shelf (COTS)/white labelled/SaaS solutions due to their complexity and existence of established markets. As such, the data platform will integrate with these solutions rather than directly with transport service providers and payment processors as follows:

- Service usage and service performance
- System performance
- (optionally real-time service information)
- (optionally static service information)

Platform Components

It is assumed that the platform will be deployed in the cloud as this costs less, provides greater resilience and scalability, and reduces the level of technical capability for TVCA to operate compared with on-premises deployment.

Data platforms can be assembled from COTS products and services, sometimes referred to as Software as a Service (SaaS), developed to meet your requirements on top of a framework of basic components, referred to as Platform and a Service (PaaS), developed from scratch, or a combination of the above.

Greater levels of development leads to longer delivery and increased risk due to unforeseen problems. Use of COTS products can reduce flexibility and may mean some requirements cannot be met. In general, PaaS-based solutions will require less technical capability to operate but will incur additional software licensing costs.

It is anticipated that TVCA will use a combination of SaaS and PaaS components to deliver the overall data platform with SaaS products preferred for complex components such as MaaS that would be expensive and time-consuming to develop and PaaS preferred for less complex components such as data ingestion and storage where TVCA will benefit from full ownership of the solution.

Case study: Transport for West Midlands Data Platform
Transport for West Midlands (TfWM) has developed a platform through four key stages – fixed asset operations, data and testing, development of granular personas and learning and feedback loops – which will help develop network resiliency using data collection and analysis. This data analysis, utilising multiple sources of data including a camera-based monitoring system, will lead to a deeper understanding of customers who use the road network. Through this platform, TfWM can monitor the network in real time, preventing emergencies and avoiding congestion, whilst also predicting trends in behaviour and movement, resultantly providing the awareness to adapt the network as required. With such an abundance of data, TfWM can accurately monitor how travel behaviour changes, increase capacity on the network, improve efficiency on roads, and make journeys more efficient through personalised travel planning.

Future Mobility

1. Regional Data Platform

Feasibility

Implementation of a regional data platform to support TVCA's objectives is feasible, however the scope of the platform will be limited by costs of implementation and operation. A more detailed feasibility assessment will need to be undertaken once this scope of services to be delivered has been defined. Various delivery options exist – and TVCA may elect to develop additional in-house capability to subcontract the work. This will have a cost implication as subcontracting will be more expensive but will enable more rapid delivery. A consequence of higher levels of subcontracting will be to impede TVCA's development of in-house capability, which may be undesirable as TVCA may wish to retain control of some areas such as data integration and governance. The organisational change required within TVCA also plays an instrumental factor in the feasibility, ensuring that the platform has the right capabilities and skills behind it. Finally, the level to which it is will be scaled also plays a role in the feasibility as this is constrained to budgetary requirements.

Similarly, the viability is dependent on factors such as the data volume and retention levels, as well as the demand for integrated real time data. Platforms with lower costs, such SaaS may be cheaper to operate but allow for minimal flexibility and modifications, whereas PaaS which is more expensive will have increased flexibility. Therefore, the feasibility of the platform is dependant upon the approach to operation and responsibility, as well as the cost structure and budget which TVCA are confined to.

Risks and challenges.

The main risks and challenges associated with implementation of a regional data platform are around timeline. In order to implement a suitable platform, one that utilises and collects data, and enables the variety of services outlined in the report, it must first be understood what is intended to be integrated and to what extent. Building a platform without a clearly defined scope will lead to much higher implementation and operational costs, and so it is essential that the timeline is realistic and that the discovery and exploration stages are robust. By completing these stages in a rigorous manner, the scope and approach of the data platform is much more clearly defined, and therefore so are all the requirements that sit around it.

Organisational Capabilities

TVCA will need organisational capabilities to make effective use of the data platform. At a minimum the following will be required and may need to be established/developed:

- Governance / data management
- Data modelling and analysis
- Cybersecurity management
- Legal and regulatory compliance
- User administration

A range of additional capabilities will be required to implement, operate and enhance the data hub. These could be developed in-house or procured through supply chain - driven by TVCA's regional existing capability and aspirations to develop that capability. Use of in-house capability may vary across the platform, with some components managed in-house and others subcontracted. Such capabilities will include:

- DevOps Manager
- Full-stack or Mobile Developers
- User experience / User interface / Customer experience Designer
- Dependent on delivery model
- Platform Manager
- Data Scientist(s)
- Data Engineer(s)
- Quality Assurance Manager

Future Mobility

1. Regional Data Platform

The concept of the regional data platform can be described through component parts, as shown in Figure 5. In this representation, components coloured pink show the Data Platform solution itself. Inputs are taken from numerous data sources (within and external to the Combined Authority), and output is provided to both internal and external end users. The overall solution, comprising component parts, data sources and data flows through to consumers, is supported and overseen by a monitoring, management and security centre. This provides management, governance and support to the entire technical solution and services provided. This also facilitates compliance with any regulatory requirements and alignment with parallel programmes.
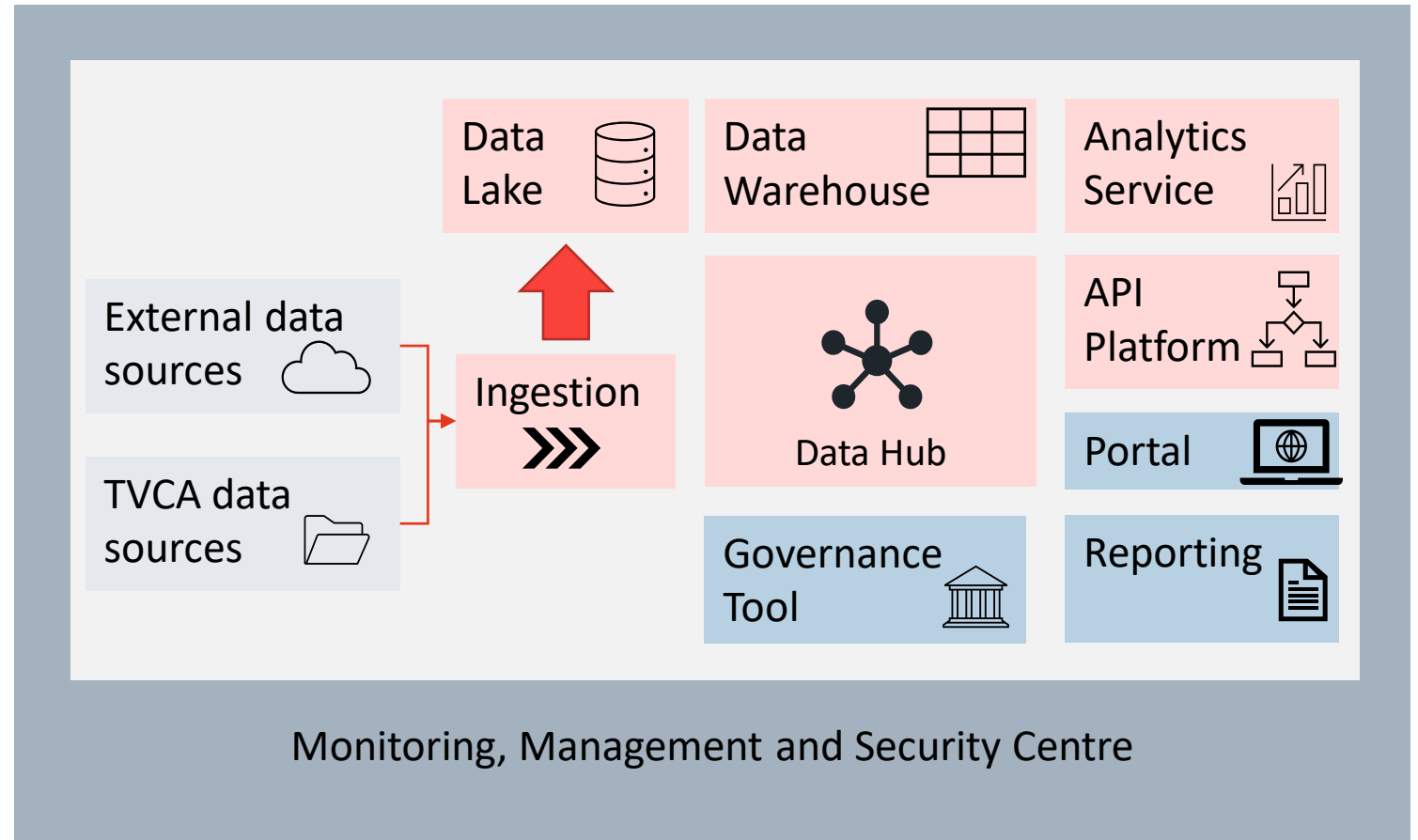

Figure 5. Components of the Regional Data Platform

2. Digital Services

What Are Digital Services

Digital services are the customer-facing offering that digitally communicates, engages and interacts with users. The services offering can vary greatly and is dependent on the strategic objectives and ambitions of TVCA, and more importantly, how it can improve quality of life for the regions' residents. What is proposed in this section covers services which provide capital and operational benefits, with the main two principal parties being TVCA and the residents.

Service Provision

As technology and data move towards the forefront of urban development, they have become cheaper, more usable and more accessible to the consumer and are able to provide clear, tangible benefits. Within transport, providing mobility information and positively influence travel behaviours has become a key goal for local authorities. They want residents to be more informed and connected with the transport network, making journeys as enjoyable and seamless as possible.

Similarly, for local authorities, they are trying to streamline their capital and operational expenditure, discovering efficiencies wherever possible. This ensures understanding pain points in the network, which will allow the local authorities to understand where they need investment to provide increased data levels and quality.

Digital service Forms

Digital services can take many forms, from web-based to mobile applications or voice activated services, and smart sensors. The key to ensuring that these digital services are utilised, irrespective of their use case, is their accessibility. Services are only beneficial if they can be adopted by everyone, easily, and in full.
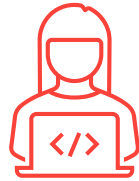
Current Digital Services

As set out in chapter 5, there are a number of digital transport services already on offer across the region. However, these digital services are currently unconnected and operating as disparate functions. These digital transport services will be reviewed, connected and consolidated using the regional data platform identified as intervention 1 that allows for centralised data analytic capabilities.

The ideation and development of new digital transport services will be explored, tested and developed to meet specific user digital and mobility needs. Digital transport services may take the form of specific apps developed by TVCA where the market has not/will not deliver; data supplied to existing digital services; and/or existing products 'white labelled' under a TVCA brand.

By creating a suite of integrated digital transport services, TVCA will be able to communicate real time mobility information, such as journey time, cost, carbon, accessibility etc., to positively influence travel behaviour change.

Digital Service Interventions

The following five interventions are examples of digital transport services that TVCA may want to consider. They include both customer facing and TVCA facing services, all of which aim to provide added benefits and efficiencies. A further stage of work in the digital transport delivery plan will be developing the exact digital transport services on offer in relation to the customer needs identified in chapter 3.

In this section, each potential transport service has been described, with further information on feasibility, case studies and use cases provide in Appendix B.

Mobility as a Service (MaaS) **1**

MaaS integrates various forms of transport services into a single mobility service accessible on demand. A MaaS operator facilitates a diverse menu of transport options to meet a customer's request, be they public transport, ride-, car- or bike-sharing, taxi or car rental/lease, or a combination thereof. MaaS can offer added value by using a single application to provide access to mobility with a single payment channel instead of multiple ticketing and payment operations. For its users, MaaS should help them meet their mobility needs and solve the inconvenient parts of individual journeys.

2. Digital Services

Data-Led approach to asset operations and management 2

Through dynamic and automated asset monitoring and tracking, organisations can get real-time data using smart sensors and devices, to gain real-time visibility into the operational status. This enables organisations to quickly respond to various situations, such as the beginning of silt build up in a gulley.

Sensors are also able to provide insights into active travel and pedestrian movements. This can inform planning to improve the road network and urban environment in order to help make the location smarter, safer and more sustainable. TVCA have already made their intention clear with their active travel incentivisation initiative that they need to gather more data on cyclists and pedestrians., an ambition which this digital service could build on.

Integrated Parking Services (including EV charging and park & ride) 3

Integrated parking services allows for individual management of parking facility meaning that assets can perform at their peak. The technology gives the ability to see real time individual spot availability and share the data

with wayfinding apps or integrate the solution with a custom mobile app to reduce parking stress, traffic congestion and air pollution.

For a local authority, such a service can optimise traffic, making the area a better place for citizens to live and move around. With further electric vehicle (EV) charge point integration, integrated parking services can promote EV uptake, and reduce range anxiety, one of the largest barriers to EV adoption.

Integrated Customer Services (all modes covering all needs and abilities) 4

Residents want to be able to access relevant services and information and to report issues as and when they occur, and that they want to do this quickly through a variety of different channels.

Service users have made it clear they want to be signposted to news and information that is relevant and local to them and to be able to access local services, events and community information.

Similarly, visitors need to see what's happening in the region, to be able to book tickets for events and to find out information about tourism spots and transport.

Mobility Credits 5

A mobility credits scheme would allow residents to access 'credits' over a set period to spend on appropriate shared transportation options, integrated into a MaaS platform. As an incentive to consumers, credits would automatically generate if they took more sustainable transport modes. Depending on the implementation plan, the credits offered would exceed the market value of regular transportation costs. Depending on the local area, the credits would be covered by the applicable MaaS modes.

Risks and Challenges

The overarching challenges to implementing digital services are as follows:

- Provision of suitable previous data to allow the data generated from the network to be analysed and then used by TVCA allowing benefits realisation;

- Potential incompatibilities between service and cloud solution where provided by different vendors.

- The ease with which service data feeds from users, sensors and infrastructure can be interfaced to existing Legacy systems;

- The correctly targeted and implemented marketing and branding of the service/s to ensure transparency and adoption

Future Mobility

3. Digital Twin

What is a Digital Twin?

A Digital Twin is a virtual digital replica of an asset that incorporates associated real-time data during the operation of that asset. It provides an immersive and integrated visualisation of previously siloed information. Digital Twins enable modern digital analysis techniques, such as condition-based monitoring and predictive analysis, to plan for the continued functioning of the infrastructure.

A Digital Twin provides well-informed decision-making throughout an asset's lifecycle. The ultimate vision for applying a digital twin is to create a system of interconnected digital twins for infrastructure within a city, region or nation, as envisioned by the United Kingdom, for example.

Digital Twins can enable the TVCA to better envision, design, build, operate, maintain and manage virtually everything in the built environment. With increasing intelligence, they offer increasing opportunities to expand how to contribute to a sustainable and resilient future for the built environments that are designed.

3. Digital Twin

Digital Twin benefits?

Digital Twins offer a real-time understanding gained through actional insight enabled by data analysis and simulation. Having an accurate and a completely detailed Digital Twin of a transport network, linked to MaaS, or community transport systems will enable the TVCA to study the entire transport network systems. Intelligent insight provided by the Digital Twin environment support when to prioritise planned upgrades, assess the best way to repair or improve the community logistics systems, and effectively respond to evolving situations.

Improved knowledge enables the TVCA to make smart decisions supported by historical, live and future data simulations. Digital Twins facilitate new testing measures and solutions in the virtual data model environment before committing them to reality. TVCA stakeholders can develop a high degree of confidence in the simulations and project outcomes from digital platform. Digital Twins can help optimise investments, resource utilisation and energy use related to transport or community logistics investment projects. In turn, these enhanced choices reduce costs as well as the TVCA carbon footprint.
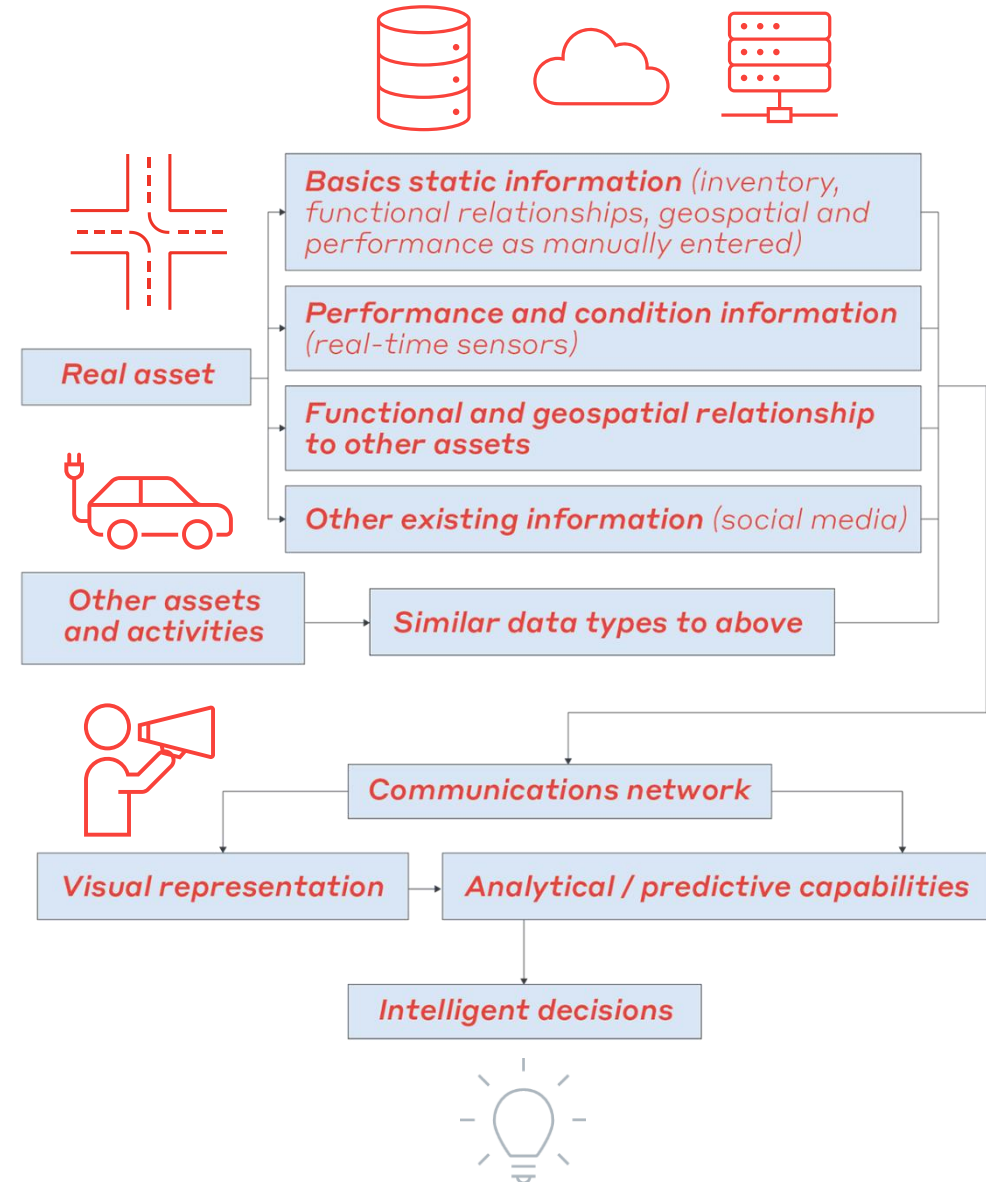
Future Mobility

Figure 6. Digital Twin Inputs and Benefits

3. *Digital Twin*

Transportation networks

Predict & improve flows of people and goods

- ❖ Gather data on transit, cyclists, pedestrians, environment, origins and destinations
- ❖ Predict future patterns and desires
- ❖ Identify smoother travel options
- ❖ Improve access of people and goods to desired connections

Land use planning twin

Predict & promote thriving neighbourhoods

- ❖ Gather neighbourhood, migration and work pattern data
- ❖ Predict neighbourhood impacts
- ❖ Propose new land use policy
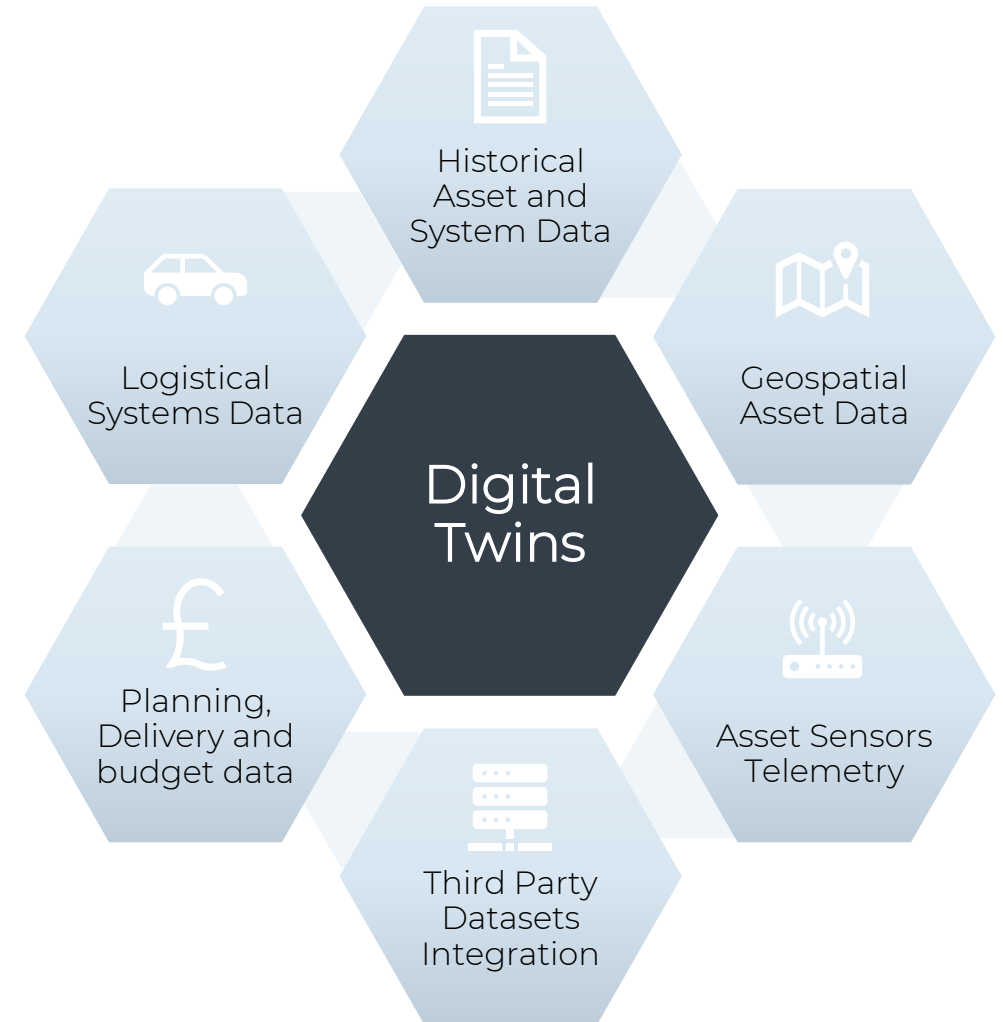- ❖ Promote thriving neighbourhoods

Future Mobility

Figure 7. Digital Twin Data Integrations

Proposed Interventions

3. Digital Twin

TVCA Digital Twins Feasibility

The TVCA can successfully realise the benefits of Digital Twins via an incremental phased approach. The proposed guidelines can enable Digital Twins maturity across three development horizons that categories Digital Twin investment by 'Level of Effort' and 'Implementation Time'. The outlined TVCA Digital Twins investment initiative program extends from one to three years.

There are two different investment and Digital Twin implementation paths available to the TVCA. The first path requires forming an in-house digital development and delivery team that follows a DevOps / ITOps approach. This in-house digital team would be responsible for leading and orchestrating the phased implementation of the Digital Twins development following the strategic objectives as set out by the TVCA.

The alternative path available to the TVCA is to appoint a Strategic Digital Partner that can administer and curate supplier networks to support the development and implementation of the TVCA's strategic objectives for the Digital Twins investment initiative.
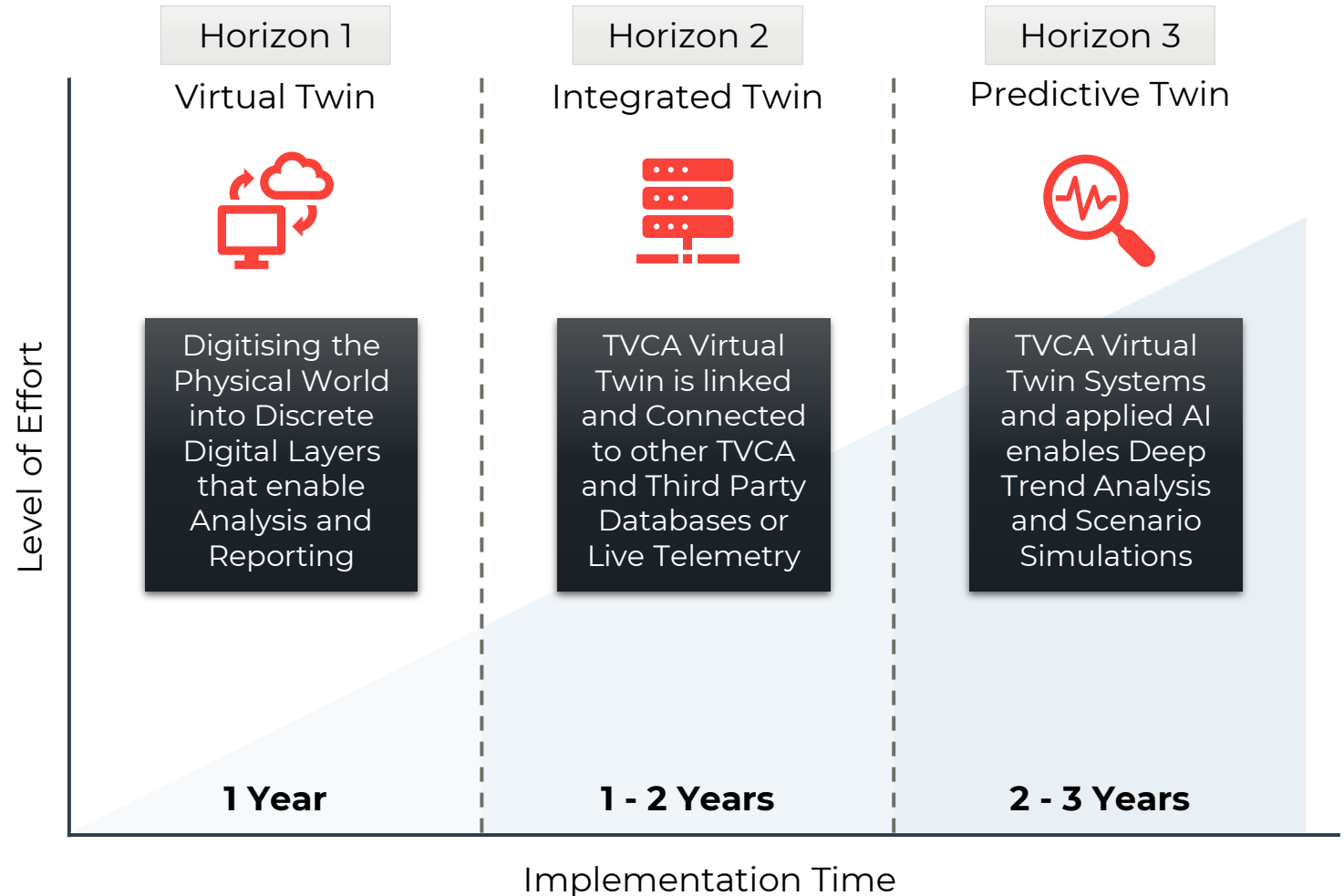
TVCA Digital Twins Maturity

Horizon 1	Horizon 2	Horizon 3
Virtual Twin	Integrated Twin	Predictive Twin
Digitising the Physical World into Discrete Digital Layers that enable Analysis and Reporting	TVCA Virtual Twin is linked and Connected to other TVCA and Third Party Databases or Live Telemetry	TVCA Virtual Twin Systems and applied AI enables Deep Trend Analysis and Scenario Simulations
1 Year	**1 - 2 Years**	**2 - 3 Years**

Level of Effort → Implementation Time

Figure 8. Digital Twin Phased Approach
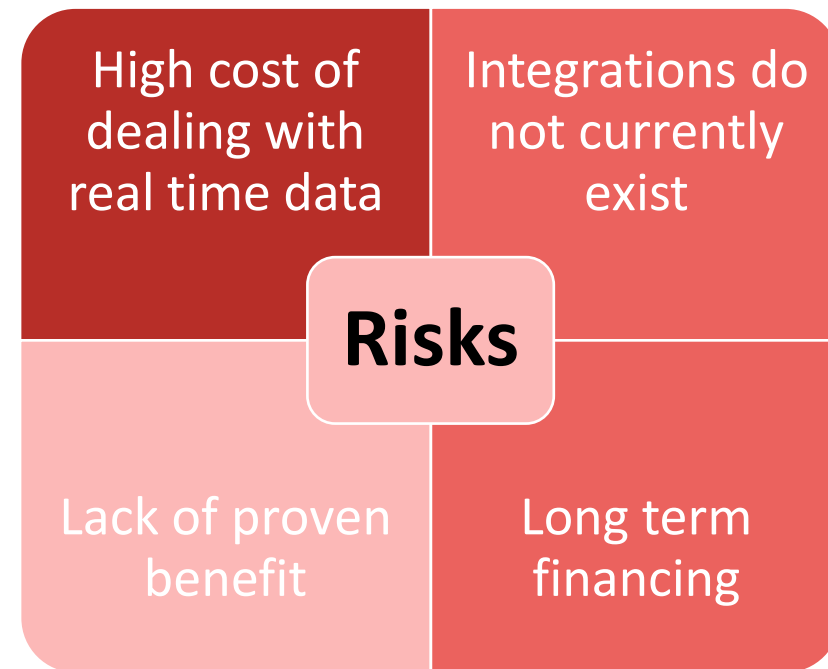
Future Mobility

3. Digital Twin

TVCA Digital Twins Risks

01. Real time data provides another level of insight for the digital twin, however, to implement and analyse such data, integration can be very costly. It costs more both to implement as well as to operate. It is therefore essential to define clear use cases for real time data, and understand if the cost is justified and deliverable within the existing scope

02. Currently, the integrations outlined in the digital twin scope do not exist, and therefore require supplier-side development. This bespoke integration takes a longer period of time to design and implement, and ultimately causes an increased cost to TVCA.

03. Due to the novel nature of digital twins, and their continuous technological development and iterations, there is yet to be a clearly defined use case for them, one which has been seen in multiple locations. It is therefore not guaranteed that a digital twin implementation will deliver enough benefits to align with its cost.

04. Similarly, without a defined use case, the forward planning of a digital twin is uncertain. Although it is currently proposed to be delivered within the existing budget, one must accept that it might not be commercially viable past the funding period without a clearly defined business case. Therefore, there is a probability that such an implementation could be significantly reduced or scraped if not deemed beneficial.

High cost of dealing with real time data	Integrations do not currently exist
Risks	
Lack of proven benefit	Long term financing

Future Mobility

3. Digital Twin – case studies

Leeds City Council 'Breathing City' digital twin

The Open Data Institute co-funded a digital twin for Leeds City Centre to specifically explore the challenges faced around air pollution in the city using published open data.

The development team underwent four phases of delivery in order to build the digital representation of Leeds. This included building the model on open geospatial data; integrating pollution and traffic data; integrating footfall data; and testing the model based on a set of what-if questions.

The model can be used to simulate different scenarios which recreate citizen interactions with heavily polluted areas. These 'what-if' scenarios can help city decision makers to determine the best course of action for preventing citizen exposure to air pollution, without actively affecting the safety of individuals.
An adapted version of the digital twin is now being built to aid the City's planners with personal mobility and the public realm in a COVID-19 world, illustrating how a digital twin can evolve and grow to support new objectives and outcomes.

Transport for the West Midlands – Midlands Future Mobility digital twin

University of Warwick and Transport for the West Midlands (TfWM) are supporting the regional automotive industry with a Connected & Autonomous Vehicle testbed across a mix of urban and rural routes in the West Midlands. To complement the physical testing environment, they have also developed a digital twin virtual environment of the same routes.
This include a full LIDAR (Light Detection and Ranging) and photographic scan of the entire route, which can be utilised to create detailed models of sections of the route for simulation purposes. Key sections of the route could therefore be 'driven' using a driving simulator to test different scenarios. This allows 'what if' questions to be tested in a safe, virtual environment before going on site, saving significant time, cost and resource as well as reducing risk.

The virtual model draws in live data analytics of the route and surrounding roads to undertake scenario testing, for example varying traffic conditions. A simulation capability is included with the ability to control parameters such as weather, lighting and leaf fall and understand how different users and modes of transport (such as pedestrians, bicycles, and cars) interact in shared environments.
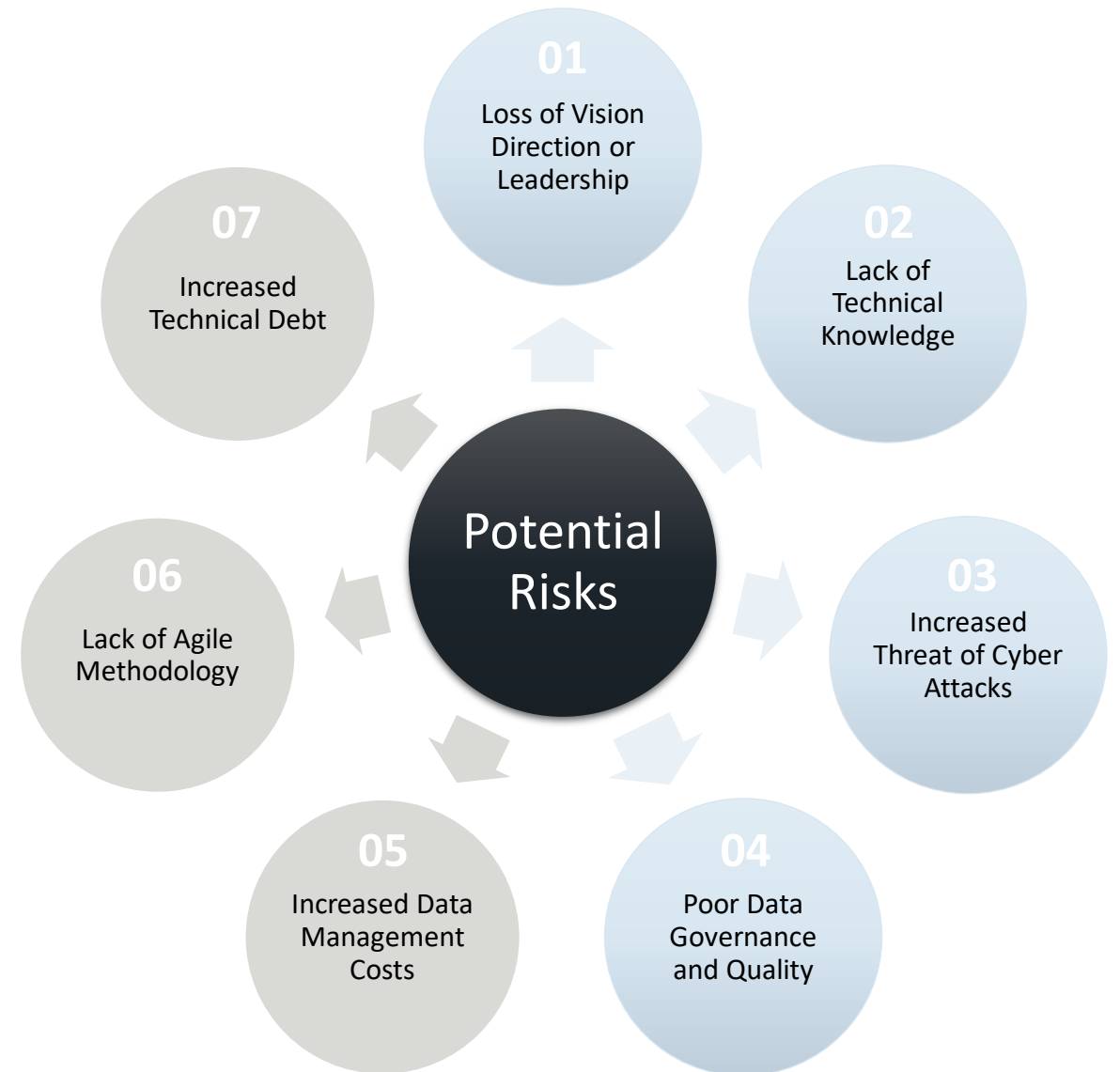
Future Mobility

3. Digital Twin

Risks Associated with the Outlined Interventions

01. There are very real risks linked to the proposed development approaches for implementing the TVCA's Digital Twin programme and successful outcomes. Embarking on a new digital initiative can be formidable and the original vision or ambition can be diluted and lost overtime.

02. Specific digital technical knowledge is required to successfully realise and implement a Digital Twin programme and platform. The right balance of technical knowledge and skills are required not only to deploy the initial Digital Platform but also to maintain the accuracy and health of the platform in order to provide a intuitive and efficient future proofed system.

03. We are all living in an age where there is an increased threat of Cyber Attacks. The proposed Digital Twin solution needs to be Secure by Design and managed to the highest evolving standards such as ISO 27001.

04. Poor data governance and management would result in a highly ineffective solution that would offer little value to the TVCA or Stakeholders. A lack of data quality would make it very difficult to develop meaningful data insights or future trend and investment scenario simulations.
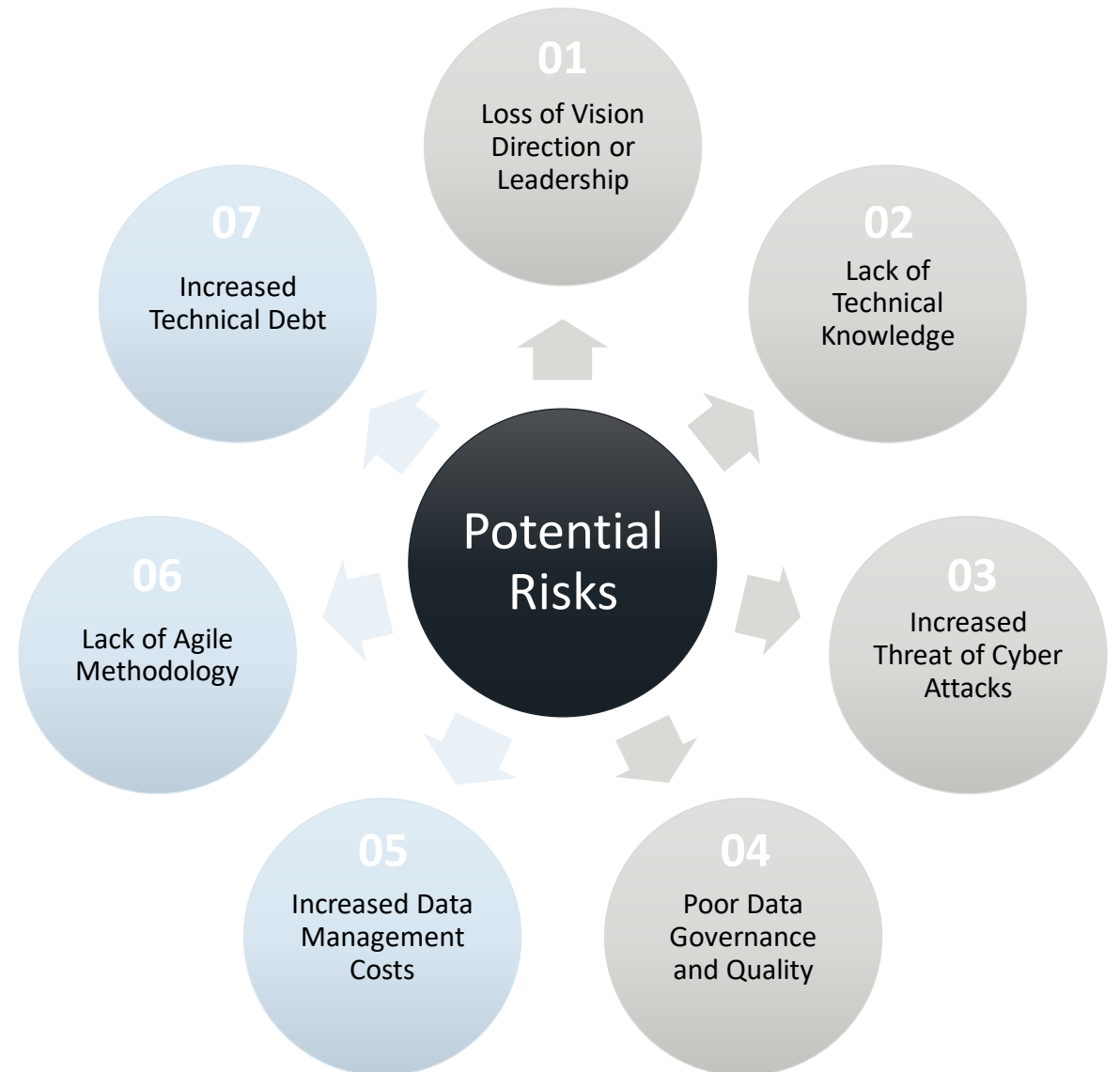
Future Mobility

Potential Risks

- **01** Loss of Vision Direction or Leadership
- **02** Lack of Technical Knowledge
- **03** Increased Threat of Cyber Attacks
- **04** Poor Data Governance and Quality
- **05** Increased Data Management Costs
- **06** Lack of Agile Methodology
- **07** Increased Technical Debt

Proposed Interventions

3. Digital Twin

TVCA Digital Twins Risks

05. The cost of managing large amounts of data is an evolving and challenging concern that TVCA will continue to encounter. Data management costs will continue to be incurred from storing, training and maintaining datasets quality, security and health. The type of data stored and managed also generates high costs. Some of these datasets or discrete data layers require annual licensing fees independent of the cost of providing an ecosystem and processes to manage the data securely.

06. One of the biggest challenges facing the TVCA when implementing a Digital Twins initiative is not having the correct Agile and LEAN processes to continue to realise the Digital Twin development on time and budget. Without the right progresses, the digital platform can quickly start to become stagnant and result in a loss of confidence

07. Technical Debt is an increasingly complex challenge facing new digital development initiatives. Technical Debt is a concept in software and digital development that reflects the implied cost of additional rework caused by choosing an easy (limited) solution instead of using a better approach that would take longer. Technical Debt can also arise when the volume of software fixes or user-driven feature requests overwhelms the speed and quality at which the digital development team can realise the requested improvements or enhancements.

Future Mobility

Potential Risks

- 01 Loss of Vision Direction or Leadership
- 02 Lack of Technical Knowledge
- 03 Increased Threat of Cyber Attacks
- 04 Poor Data Governance and Quality
- 05 Increased Data Management Costs
- 06 Lack of Agile Methodology
- 07 Increased Technical Debt

Proposed Interventions

Theory of Change

Digital interventions and the Tees Valley Strategic Transport Plan

Investment in digital infrastructure and the interventions presented are an important step in supporting TVCA meet its objectives outlined in the Tees Valley Strategic Transport Plan.

Figure 8 and Figure 9 set out the theory of change and the short term and long term benefits to be realised.
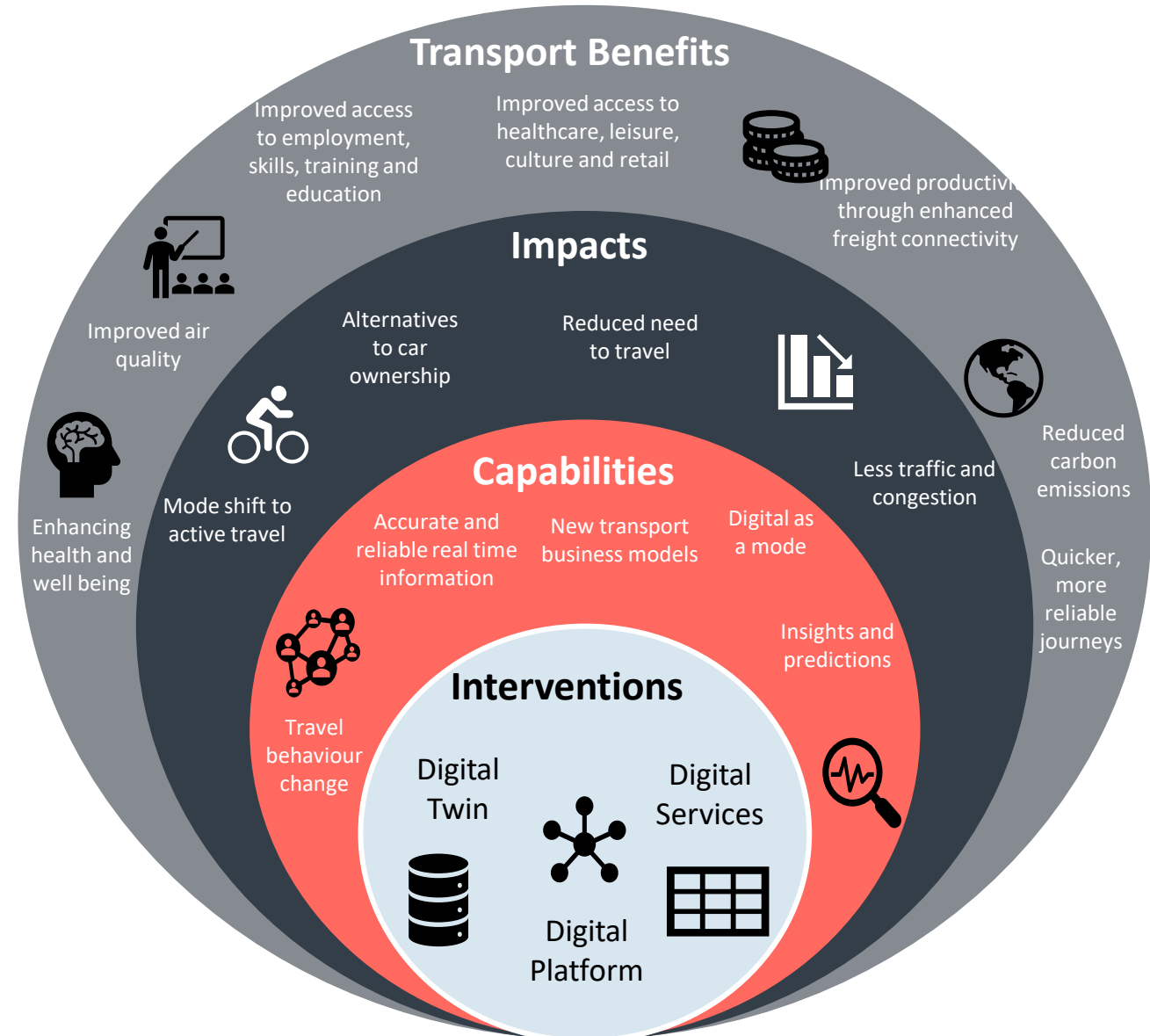

Transport Benefits

Improved access to employment, skills, training and education

Improved access to healthcare, leisure, culture and retail

Improved productivity through enhanced freight connectivity

Impacts

Improved air quality

Alternatives to car ownership

Reduced need to travel

Less traffic and congestion

Reduced carbon emissions

Quicker, more reliable journeys

Enhancing health and well being

Mode shift to active travel

Capabilities

Accurate and reliable real time information

New transport business models

Digital as a mode

Insights and predictions

Travel behaviour change

Interventions

Digital Twin

Digital Services

Digital Platform

Figure 9. Digital Transport Delivery Plan Benefits Diagram

Future Mobility

Proposed Interventions

Theory of Change

Context	Inputs & Activites	Outputs	Outcomes (Short-Medium Term)		Outcomes (Long Term)
Issues addressed and context in which it is taking place	*What is invested e.g. money, skills, people, activities*	*What has been produced*	*Short and medium term results*		*Long term outcomes*

Low car ownership - 31% of householders have no car, compared to 25% nationally

Yet high car dependency for work - car travel accounts for 72% of all journeys to work, compared to 62% nationally

Reduction in bus and rail patronage over the years, with bus punctuality causing dissatisfaction

High proportion of residents work within Tees Valley, with half of workers commuting less than 5km

Unemployment a persistent issue, particularly youth unemployment

Disperate and disconnected digital assets with little coopration between the Local Authorities

Lack of high quality data to provide transport insights

Insufficient skills pipeline to support advances in digital

Governance set up including data strategy and data sharing agreements

Understanding of user needs to develop effective digital services

Data mapping

Mobility branding and engagement with citizens

Rolling out the UTMC across the region

Monitoring and evaluation

Build in-house skills and capabilities

Rolling out sensor network/ IoT

Data platform

Digital services

Digital twin

New transport business models such as car sharing, Wheels 2 Work

Digital as a mode supporting working from home

Increased insights and predictions to proactivity and reactively manage the transport network

Travel behaviour change through social media, nudges and incentives

More accurate, accessible and reliable travel information

Alternatives to car ownership

Reduced need to travel for employment opportunities

Less traffic and congestion

Mode shift to active travel

Improved access to healthcare, leisure, culture and retail

Improved access to employment, skills, training and education

Quicker, more reliable journeys

Improved productivity through enhanced freight connectivity

Reduced carbon emissions

Improved air quality

Enhancing health and wellbeing

Sustainable Transport Plan Objectives:

- Social opportunity
- Economic growth
- Carbon reduction and environment

Figure 10. Digital Transport Delivery Plan - Theory of Change

7. Roadmap

Roadmap

Roadmap to delivery

The following roadmap has been prepared to develop the proposed digital interventions over the next five years from 2022-2026. The roadmap follows five key stages: putting the foundations in place; exploring digital services; deploying the digital infrastructure; scaling up; and looking forward. The roadmap will be refined in the Foundation stage as the platform and services delivered will be driven by the strategy and research in that stage. **- See Appendix C for additional steps in the roadmap**

2022 Foundation

Developing a clear understanding of how user needs are being met by existing digital services and identifying opportunities for improvement. We will conduct discovery activities to validate user needs with primary research and undertake collaborative ideation and co-designs to identify 'early win' digital solutions.

A digital transport services strategy will be developed, including a refined roadmap for service identification and delivery

A data strategy will be produced to set-out how TVCA will deliver the services, supporting platform and organisational transformation activities to make this programme a success. Put in place key data sharing agreements and governance processes

2023 Exploring

Focus on exploring, which includes exploring the data that is being processed within the data platform to support the development of 'early win' digital services and discovery of further monitoring sensors/ data services to support the digital twin roadmap

Data Platform:
Assessment of data needs for integrated services and delivery of a common data mode

Digital Services:
Developing Alpha digital service/s for high priority 'early win' transport digital information need/s.

Digital Twin:
Developing phase 1 of UTMC following feedback from local and regional partners

2024 Deploying

Focus on deployment, with the data platform in operation and used by all organisations, early win digital services gone live and the deployment of further monitory sensors to feed into the digital twin.

Data Platform:
Starting to deploy data platform service integrations such as MaaS, parking and EV charging

Digital Services:
Deploying Live digital service/s for high priority 'early win' transport digital information need/s, early MaaS solution.

Digital Twin:
Deploying Phase 2 of UTMC following feedback from local and regional partners

2025 Scaling

Focus on scaling up the interventions that have been deployed in year 3, with the data platform informing new business cases for digital services, a MaaS service being used across the region and further monitoring sensors deployed to feed into the digital twin.

Data Platform:
Data services from the data platform supporting service integrations such as MaaS, parking and EV charging

Digital Services:
TVCA MaaS service in use across the region, onboarding other digital services to this brand

Digital Twin:
Deploying further monitoring sensors to fill gaps and/or meet identified needs/Development of predictive asset and network management services

2026 Looking forward

Focus on reviewing the systems that have been set up and looking forward to where updates and changes could be made

Data Platform:
Refresh of Data Strategy // Understanding next iteration of Data Platform//Implementing a model to ensure the sustainability of the data platform

Digital Services:
Review of Strategy / Review of impact to support future funding.

Digital Twin:
Review of network and asset digital twin toolsets, impact and next steps.

Iterative Development

The integration of the three interventions outlined in this report require constant iteration. The digital services and digital twin are two aspects which will constantly change and adapt both as their own entity, but also in the way they feed back into the data platform. It is therefore important to understand the iterative, ongoing process produced by the digital transport delivery plan, one that is essential to reach the end vision.

Build and adapt solutions according to identified needs. Including modular add-ons.
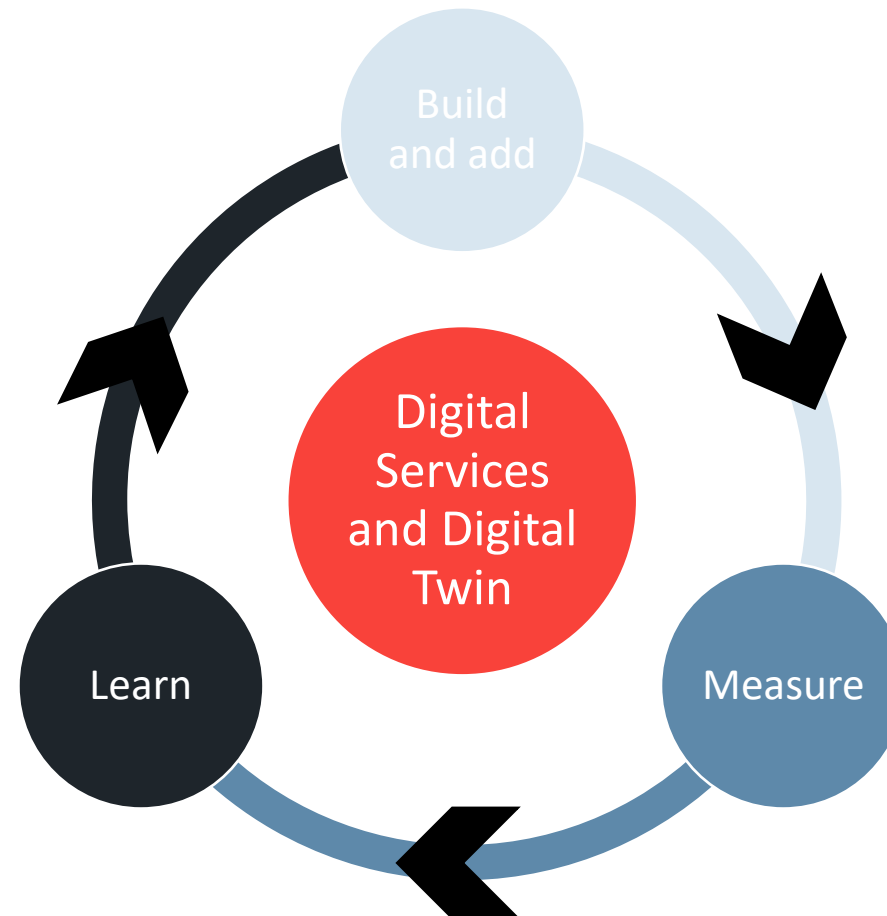
Monitoring and evaluation of data use cases and increased understanding of challenges/barriers for the interventions

Data is accessed, managed and provides insights.

Build and add

Digital Services and Digital Twin

Learn

Measure

8. Costings

NB: All costs are shown in £1000s

Data Platform

Components	2022	2023	2024	2025	2026	Total	Assumptions
Data strategy	75				50	125	
Procurement	50	10	10	10	50	130	
Supplier implementation	0	500	250	125	125	1000	
Analytics	120	180	180	180	180	840	
Operation	120	120	120	120	120	600	
Cloud services	60	120	120	180	180	660	
Governance	60	60	60	60	60	300	Data governance lead in-scope. Operation of governance processes absorbed.
Licenses	30	30	30	30	30	30	Extensive data licencing not required for use case
Data sharing agreements	50	50	25	10	10	145	
Total						3950	

KEY	
	Data Strategy
	Platform implementations
	Data Team
	Cloud Services

Future Mobility

Costings

NB: All costs are shown in £1000s

Digital Services

Components	2022	2023	2024	2025	2026	Total	*Assumptions*
Digital Service Strategy	125				50	175	
Quick wins	200					200	
MaaS	250	1000	500	500	500	2750	*Low-complexity, white-label*
Service 1		100	500	100		650	
Service 2			100	500	100	650	
Total						**4425**	

Digital Twin

Components	2022	2023	2024	2025	2026	*Total*
Digital twin blueprint	75				50	125
MVP virtual twin	250	250				500
Integrated twin (UTMC)			250	250		500
Predictive twin				250	250	500
Total						**1625**

NB: All costs are shown in £1000s

Costings Summary

Intervention	2022	2023	2024	2025	2026	TOTAL
Data Platform	565	1070	795	715	805	**3950**
Digital Services	575	1100	1100	1100	650	**4525**
Digital Twin	325	250	250	500	300	**1625**
TOTAL	**1465**	**2420**	**2145**	**2315**	**1755**	**10,100**

Summary

Overall, the high-level costings presented in this section have shown that to fully implement the digital transport delivery plan as set out in its current form, and do so within the existing TVCA budget, may prove to be challenging.

These costs will be further analysed and investigated during the next stage of development, the feasibility study, and are therefore subject to change. Currently the presented costings exceed the existing budget by £100,000, which demonstrates the challenge of achieving the scope in this report, and will only become harder if the budget is decreased, requiring significant changes to the scope delivery.

Furthermore, the costings presented here have not included consultancy leadership for the digital transport delivery plan as a whole, but rather for consultancy and consolidation assistance on individual tasks and implementations.

Let's change the way we think. *Let's create change.*

Appendix A – Citizen Personas

1. Maureen - 45

"Cash rich, time poor. Time is money."

Domestic Success

Population size:

57,532 – 8% of TVCA

Digital needs:

Maureen has digital assets but not the skills to benefit from them fully. More confidence in her ability to access services online will lessen her need to travel by car and reduce her carbon footprint. She would be open to buying an EV

About Maureen

Maureen holds a middle management position in a well-established and growing manufacturing company.

She lives with her family and commutes to work by car from Yarm to Lazenby. She is attracted by prestige brands and doesn't mind paying extra for good quality products that will last.

She makes practical use of the internet but will often access services through more traditional means where possible.

Household
Partner and two children

Interests
Gardening, Travelling, Amateur Dramatics

Technical Skills
Postgraduate degree and professional memberships

Information sources
Radio 4, newspapers, podcasts

Mobility Assets
Two mid-range saloon cars, family bikes

Personal Values
Time, convenience

Concerns
Safety, commute times

Digital Assets
Latest smartphone, tablets, laptop, superfast broadband

Digital Literacy
Basic but functional

Purchasing Power
High

wsp

Future Mobility

Legend:
- ⊕ Hospitals
- 🏭 Industrial Parks
- 🏗 Ports
- ✈ Airports
- 🏢 Business Parks
- 🎓 Higher Education Institution
- 🛍 Shopping Centre

Personas
- 🟨 Maureen
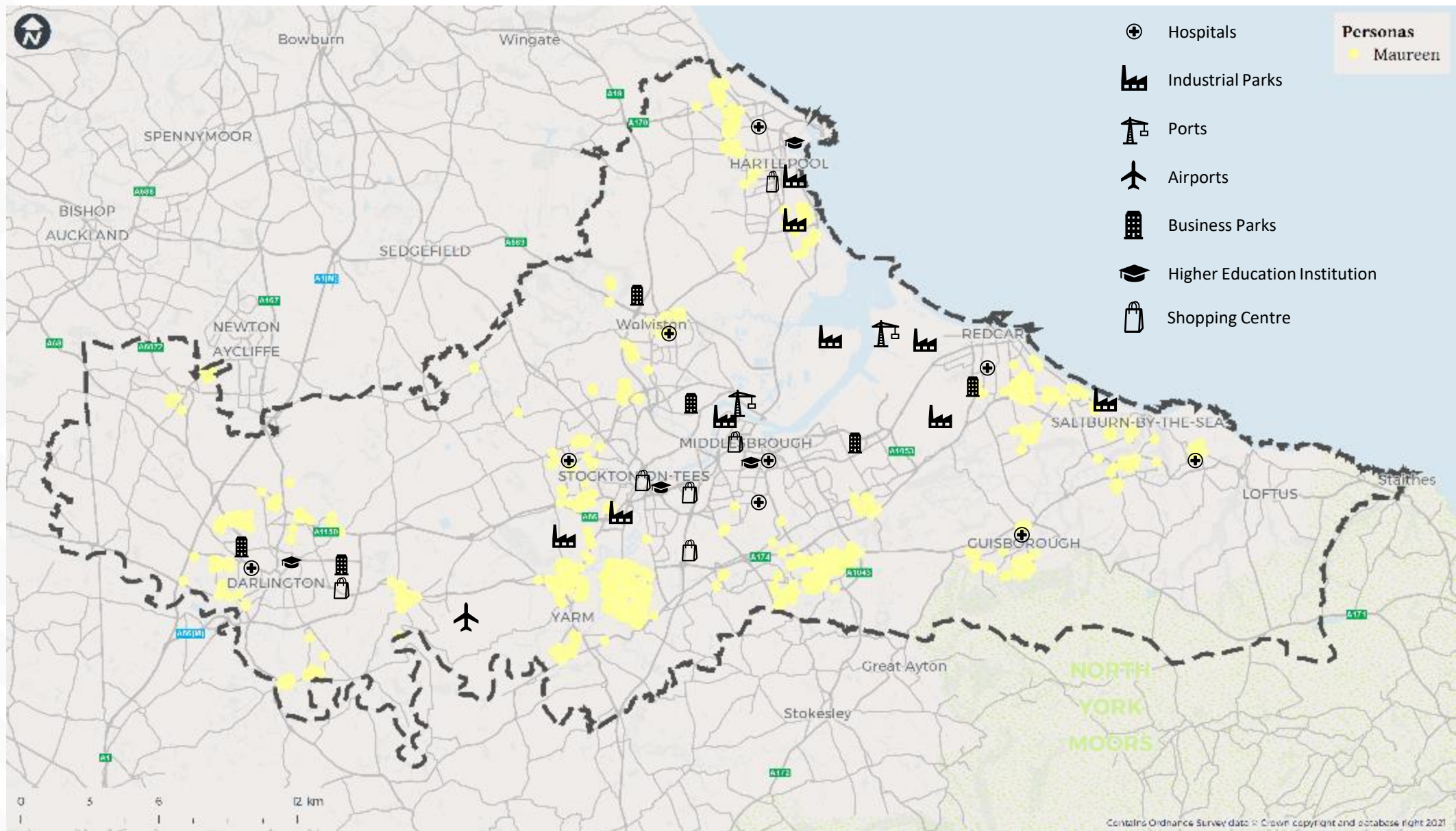
2. Kevin - 32

"Living an honest life to provide for my family."

Family Basics

Population size:

92,986 – 13% of TVCA

Digital needs:

Kevin needs better visibility of cost-effective travel alternatives to using his van. His digital literacy gives him a high propensity to adopt travel planning solutions which will help him to use more innovative transport solutions

About Kevin

Kevin works as a Labourer for a medium sized regional construction firm. He lives in council housing with his girlfriend and four school age children.

His girlfriend does not work and prioritises looking after the children as they cannot afford childcare.

Their household income is topped up with state support which helps to ensure that they can afford the daily essentials.

Household
Girlfriend and four children

Interests
Football, online gambling, pub

Technical Skills
Left school at 16 to work

Information sources
The Sun, Facebook

Mobility Assets
An ageing Transit van, used primarily for work

Personal Values
Thrifty and budget conscious

Concerns
Precarious financial position, wants to give best start to children

Digital Assets
Up-to date smartphone, not always latest model, basic broadband package, limited mobile data package

Digital Literacy
High smartphone usage

Purchasing Power
Very low

Legend:
- Hospitals
- Industrial Parks
- Ports
- Airports
- Business Parks
- Higher Education Institution
- Shopping Centre

Personas
- Kevin
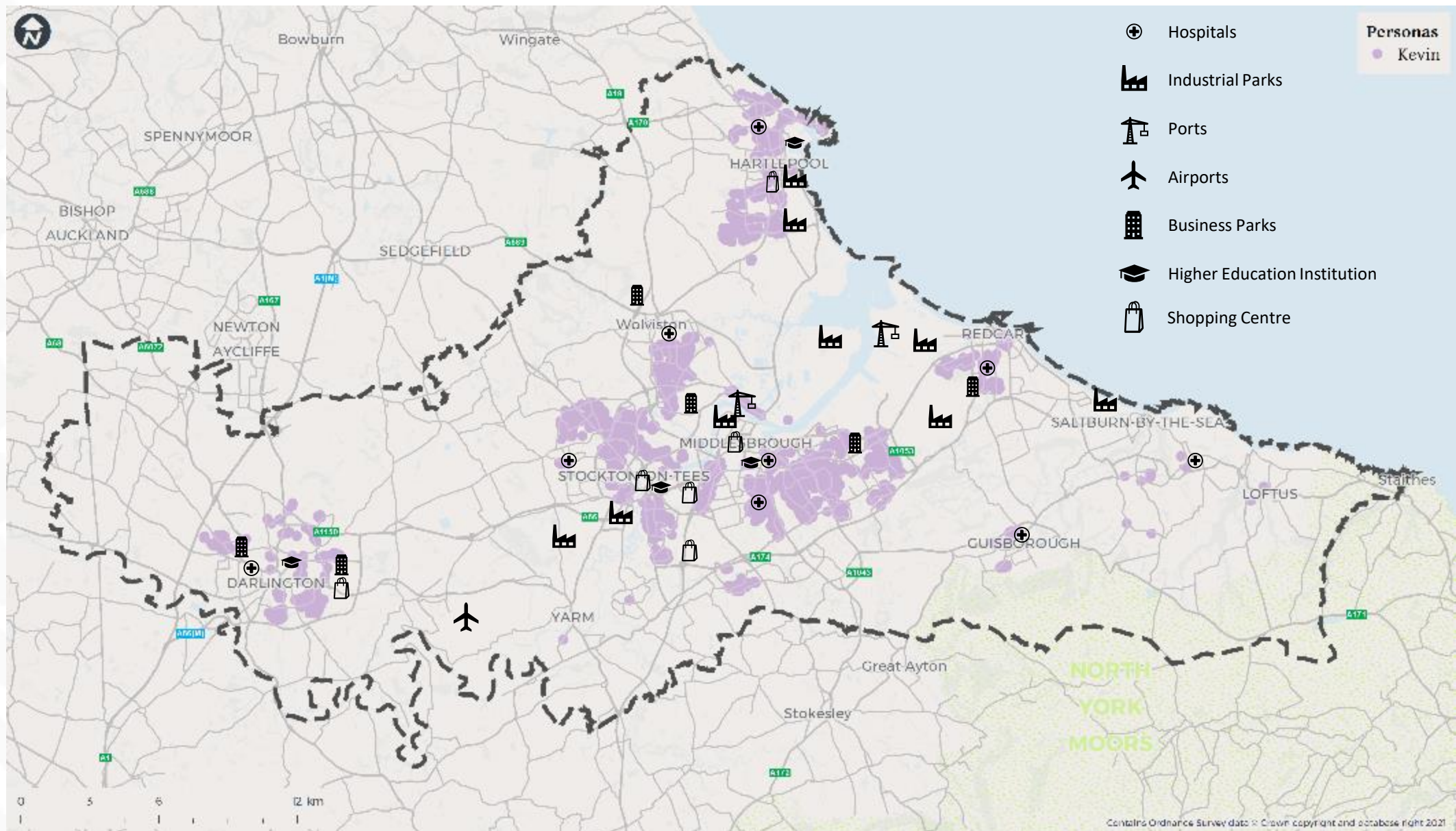
3. Tiana - 26

"Helping others is the most important thing you can do."

Transient Renters

Population size:

51,481 – 7% of TVCA

Digital needs:

Given her need to travel at all hours, Tiana needs transparent information on the public transport network to give her the confidence to access opportunities that may be further from home.

About Tiana

Tiana is a healthcare assistant at the hospital in Darlington and lives with some of her colleagues in a shared house.

Her hours are highly variable and she is heavily reliant on her smartphone to giver her up-to-date travel information to ensure she can get to work on time.

She is a frequent social networker and likes to follow a lot of influencers online.

Household
House share with 4 friends

Interests
Going out with friends, keeping fit, Netflix, Travel

Technical Skills
GCSEs, working towards a nursing qualification

Information sources
News channels on social media, influencers on Instagram

Mobility Assets
Lives on a bus corridor, but no access to a car

Personal Values
Social justice activism, loves helping others

Concerns
Walking home at night, money is tight

Digital Assets
Latest smartphone, tablets, laptop, superfast broadband

Digital Literacy
Lives online, has an app for everything

Purchasing Power
Very low

Legend:
- ⊕ Hospitals
- 🏭 Industrial Parks
- 🏗 Ports
- ✈ Airports
- 🏢 Business Parks
- 🎓 Higher Education Institution
- 🛍 Shopping Centre

Personas
- ● Tiana

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WSP

Future Mobility
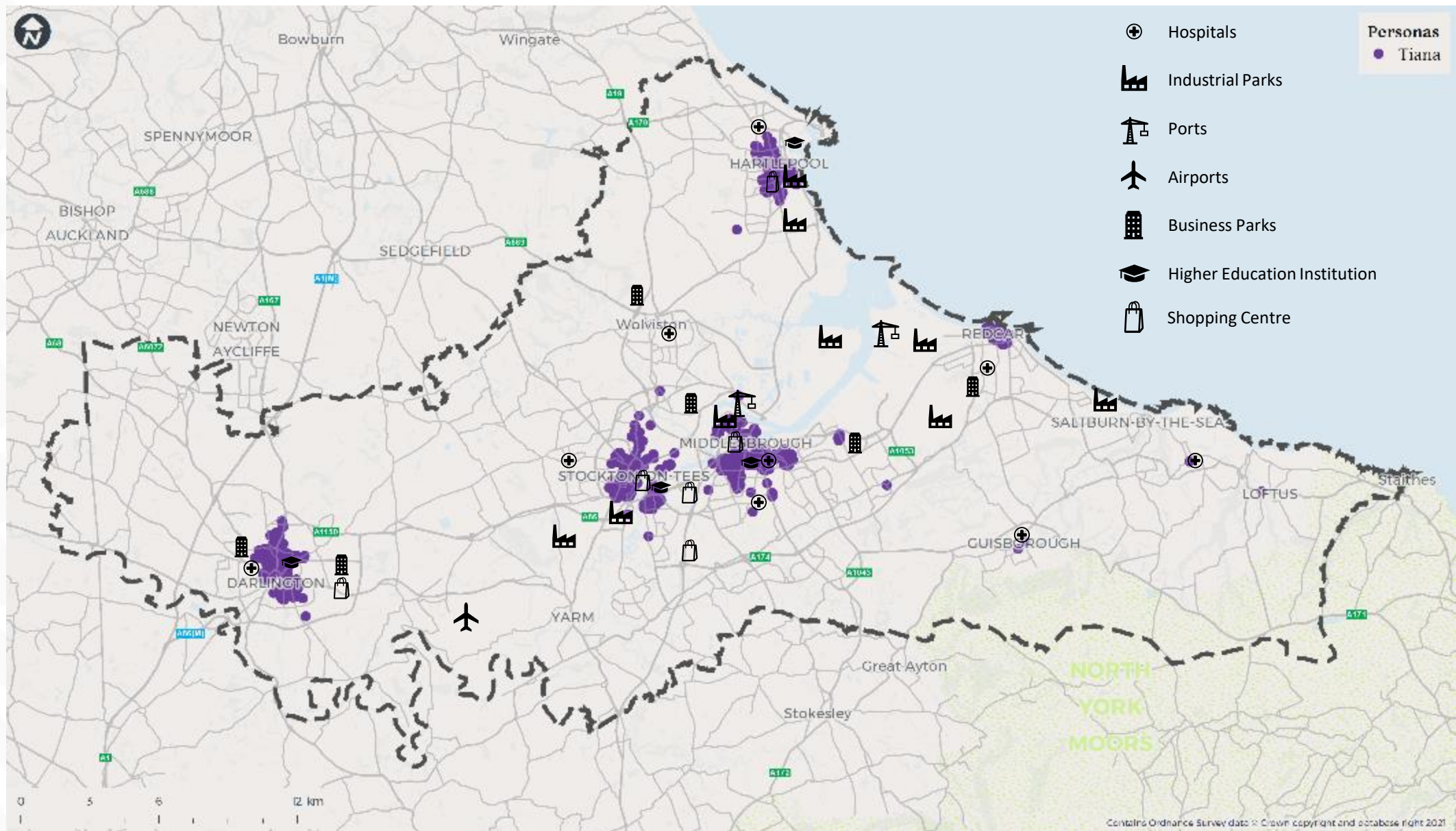
4. Keeley - 29

"Starting out in a new job with an exciting career ahead of me."

Aspiring Homemakers

Population size:

66,811 – 10% of TVCA

Digital needs:

Keeley is environmentally conscious, but doesn't always have the disposable income to act on her beliefs. Providing cost-effective digital alternatives to accessing amenities would provide her with the means to act.

About Keeley

Keeley is a newly qualified teacher at a primary school in Stockton. She lives in a semi-detached home in an accessible suburb in nearby Darlington.

She is aspirational and would like to get more qualified to access jobs which pay more so she can afford a mortgage. Affordability is one reason why she moved to the area.

Wherever she goes, she takes her Dachshund with her which impacts her mobility choices.

Household
Lives alone

Interests
Pottery, cooking, camping holidays

Technical Skills
Degree in primary education, studying for an online masters degree

Information sources
TV, BBC news app on her smartphone

Mobility Assets
Leases a small 3 door hatchback

Personal Values
Cares about the environment, trying to drive less but time conscious

Concerns
Getting on the housing ladder

Digital Assets
Smartphone and tablet

Digital Literacy
Functional use of smartphone, browses the web on a tablet

Purchasing Power
Modest

Legend:
- ⊕ Hospitals
- 🏭 Industrial Parks
- 🏗 Ports
- ✈ Airports
- 🏢 Business Parks
- 🎓 Higher Education Institution
- 🛍 Shopping Centre

Personas
- ● Keeley

WSP

Future Mobility
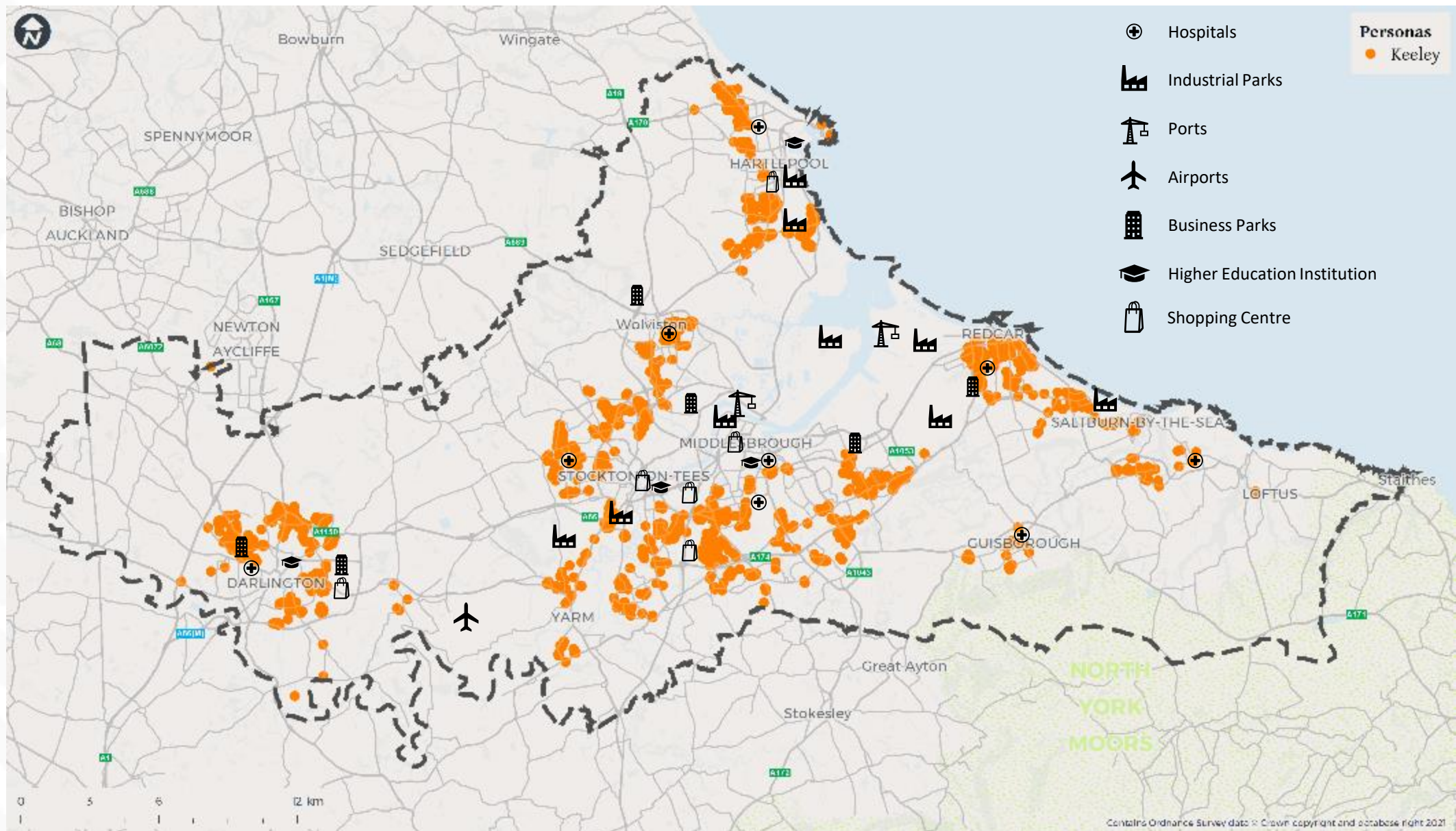
5. Tommy - 20

"I love my team, but I can't wait to get out of this town"

Municipal Challenge

Population size:

59,912 – 9% of TVCA

Digital needs:

Tommy doesn't have the skills required to participate in the industrial development of the region, however he is digitally literate. Access to STEM education opportunities will enable him to set his sights higher.

About Tommy

Tommy has been working in a Nando's restaurant since he was 16. He lives with his parents and catches the bus to work, but would like to transfer to a closer branch.

While he has no great ambitions for his career, he enjoys his work and would like to progress to a team leader position so he could leave the area.

Outside of his work, he follows his local football club around the country.

Household	Lives with parents
Interests	Mobile gaming, going to live sports
Technical Skills	Left school at 18. Workplace qualifications in food hygiene
Information sources	Social media, push notifications from news apps
Mobility Assets	Parents drive, but he has not learnt due to the cost

Personal Values	His football club
Concerns	Boredom
Digital Assets	Latest smartphone, unlimited data
Digital Literacy	High
Purchasing Power	Low

Legend:
- Hospitals
- Industrial Parks
- Ports
- Airports
- Business Parks
- Higher Education Institution
- Shopping Centre

Personas
- Tommy
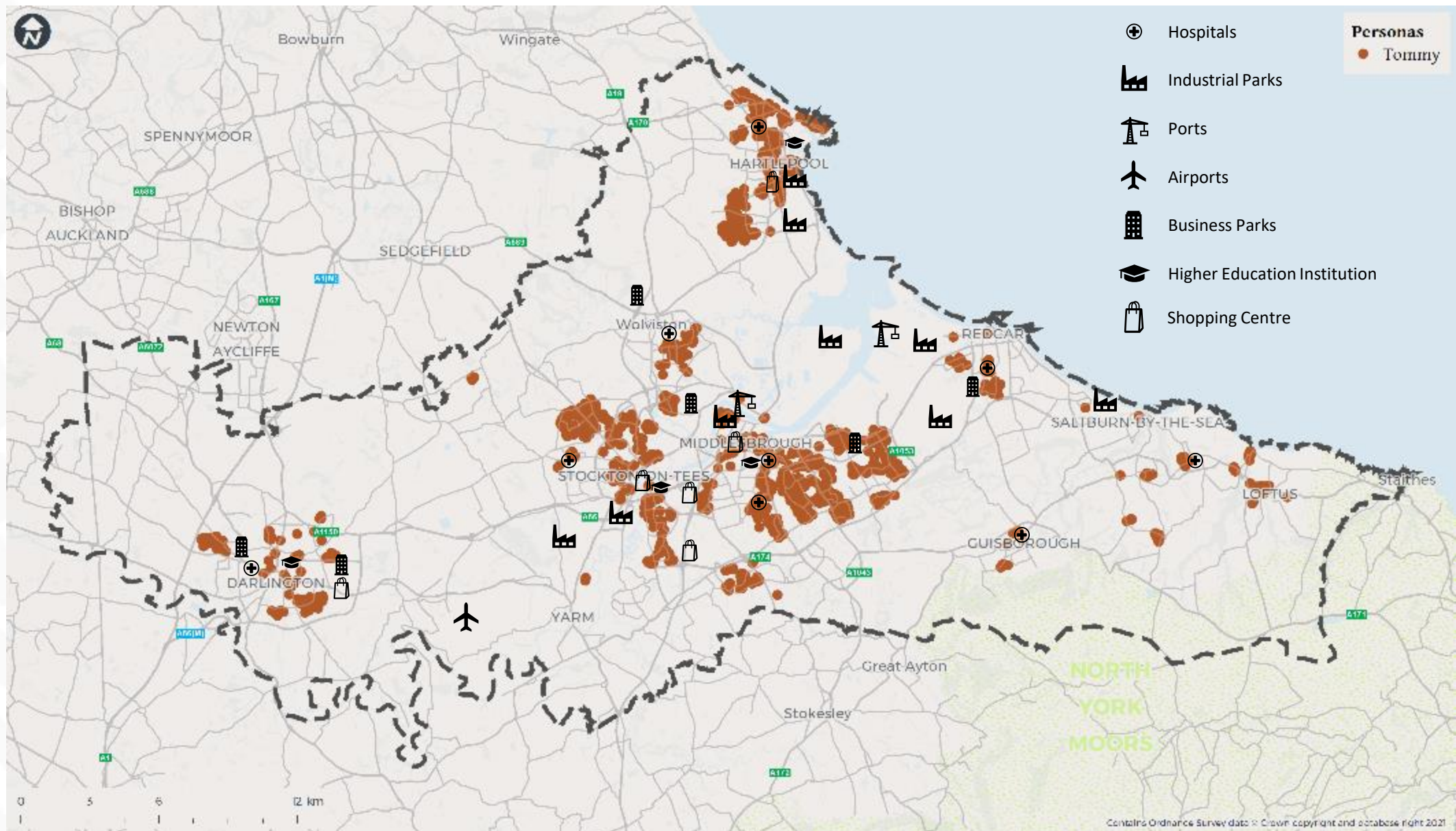
6. Christine - 47

"Money can be tight, but we make do with what we have."

Suburban Stability

Population size:

53,296 – 8% of TVCA

Digital needs:

Christine receives a lot of her information from online sources. The Digital Trasport Strategy will help to ensure that she is able to access reliable information quickly through the sources that she is familiar with.

About Christine

Christine is a part-time PA at a medium sized accountancy firm. She lives in a semi-detached house with her husband in an older suburb, with one of their two adult children still living at home.

Her and her husband's finances are often stretched due to having support their children through university and learning to drive.

Household
Partner and two children

Interests
Coffee with friends, going camping

Technical Skills
Went to secretarial college

Information sources
Mail Online, social media

Mobility Assets
An ageing estate car and a hatchback

Personal Values
Value for money, climate skeptic

Concerns
Journey time reliability, high monthly outgoings

Digital Assets
Up to date mid-range smartphone, family iPad

Digital Literacy
Does shopping and banking online, makes use of some smartphone apps

Purchasing Power
Modest with some difficulty when facing larger expenses

Future Mobility

Legend:

- ⊕ Hospitals
- Industrial Parks
- Ports
- ✈ Airports
- Business Parks
- Higher Education Institution
- Shopping Centre

Personas
- ● Christine
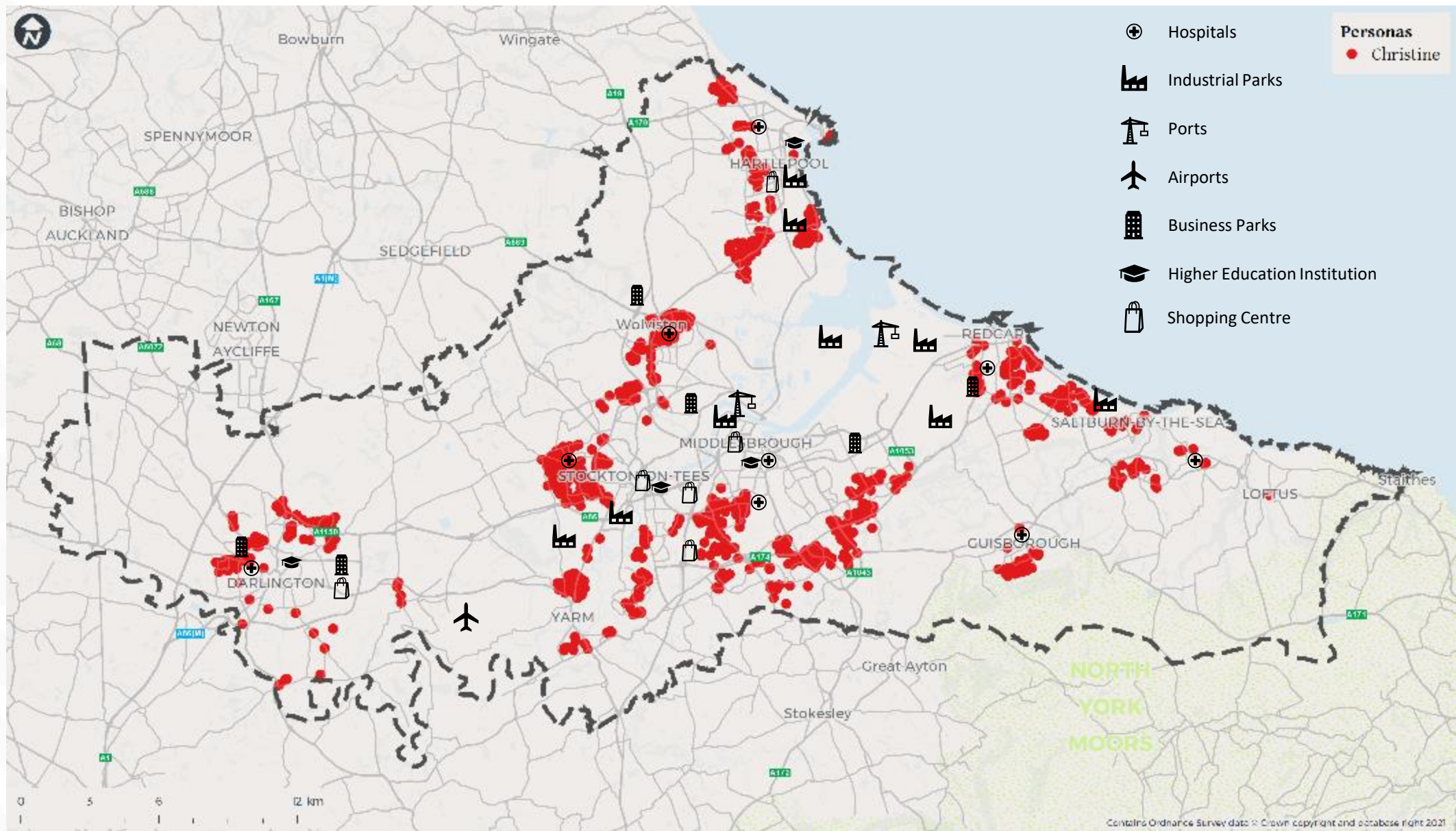
7. Terrance - 61

"Making the most of his final third of life

Modest Traditions

Population size:

43,320 – 6% of TVCA

Digital needs:

Technology can provide Terrance with the ability to do more of his work from home, helping him to achieve a better balance between his work commitments and spending time with his family.

About Terrance

Terrance is runs a small bookkeeping and accountancy firm for other local business owners. He focuses on sole traders and small limited companies.

He gave up working for a large firm a number of years ago to provide a better work/life balance.

He enjoys travelling to see his children and grandchildren.

Household
Lives with wife, has adult children and grandchildren

Interests
Theatre, Puzzles, travelling with his caravan.

Technical Skills
ACCA qualified

Information sources
Radio 3, Newspapers, BBC News

Mobility Assets
4x4, hatchback and a caravan

Personal Values
Comfort, open minded

Concerns
Increasingly concerned about the environment

Digital Assets
Older smartphone, starting to use a tablet his children bought him

Digital Literacy
Progressing

Purchasing Power
Medium
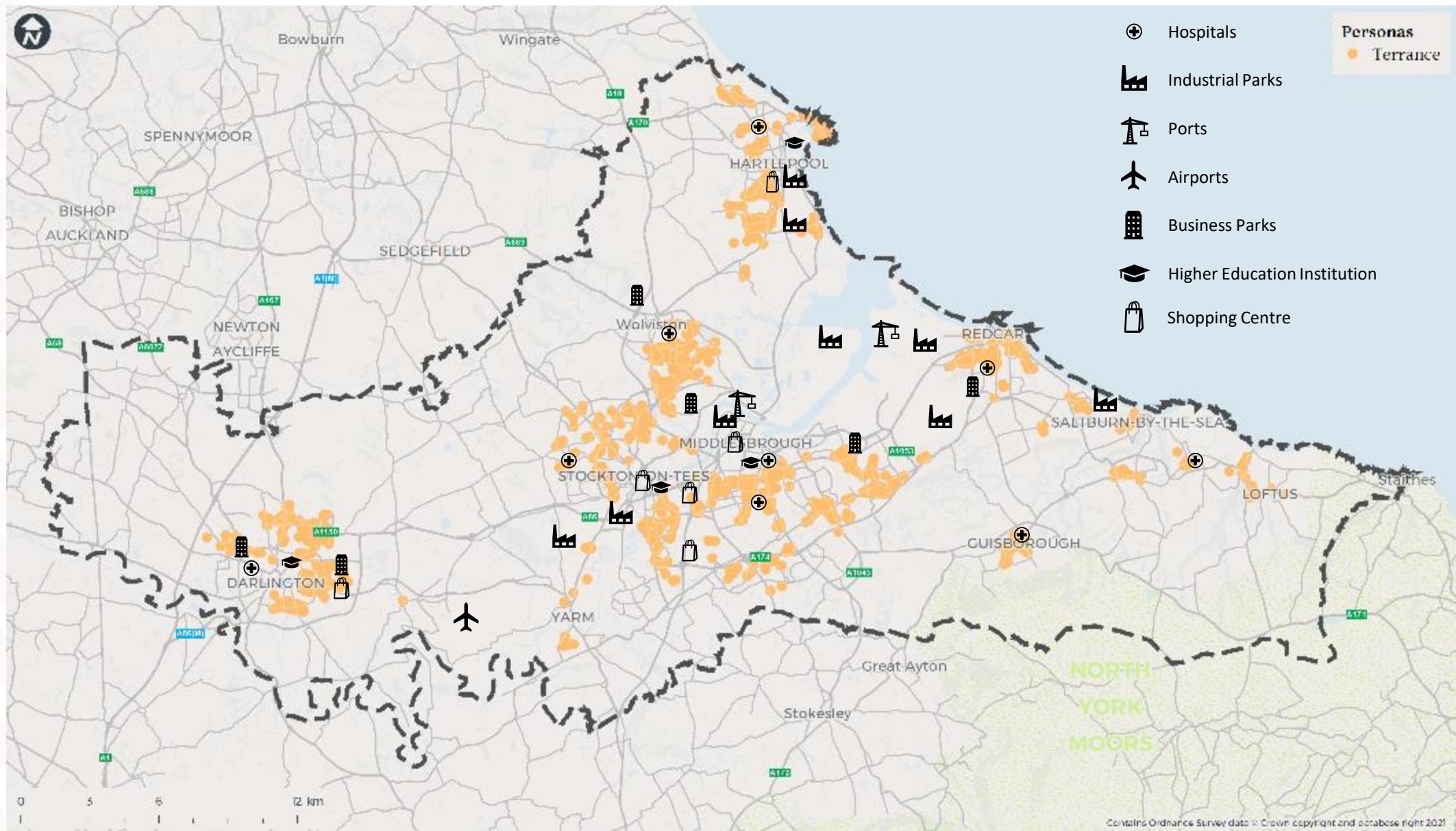
8. Julia - 53

"Nothing is more important than a good work/life balance."

Prestige Positions

Population size:

36,153 – 5% of TVCA

Digital needs:

Julia's proclivity towards active travel in her leisure time could be exploited to encourage her to choose to walk or cycle for other types of trips too. Easy-to-use cycle route planning tools could enable her to do so.

About Julia

Julia lives with her husband. Her children have all finished university and moved away. They live in a large detached house.

Julia works as an office manager in a large property company and her husband has a senior role in the local council.

The family are well off and enjoy staying active in their leisure time holidaying in the UK and abroad.

Household
Husband and three children who have all recently finished university

Interests
Shopping, home-making, hiking, holiday in Spain

Technical Skills
No professional qualifications but has been working since 18

Information sources
Radio 2, ITV news

Mobility Assets
Two premium saloon cars, small sports car, family bikes

Personal Values
Family time, enjoying the great outdoors

Concerns
Shifting job opportunities, did not enjoy working from home

Digital Assets
Latest smartphone, tablets, laptop, superfast broadband

Digital Literacy
Good, manages the household through apps

Purchasing Power
High
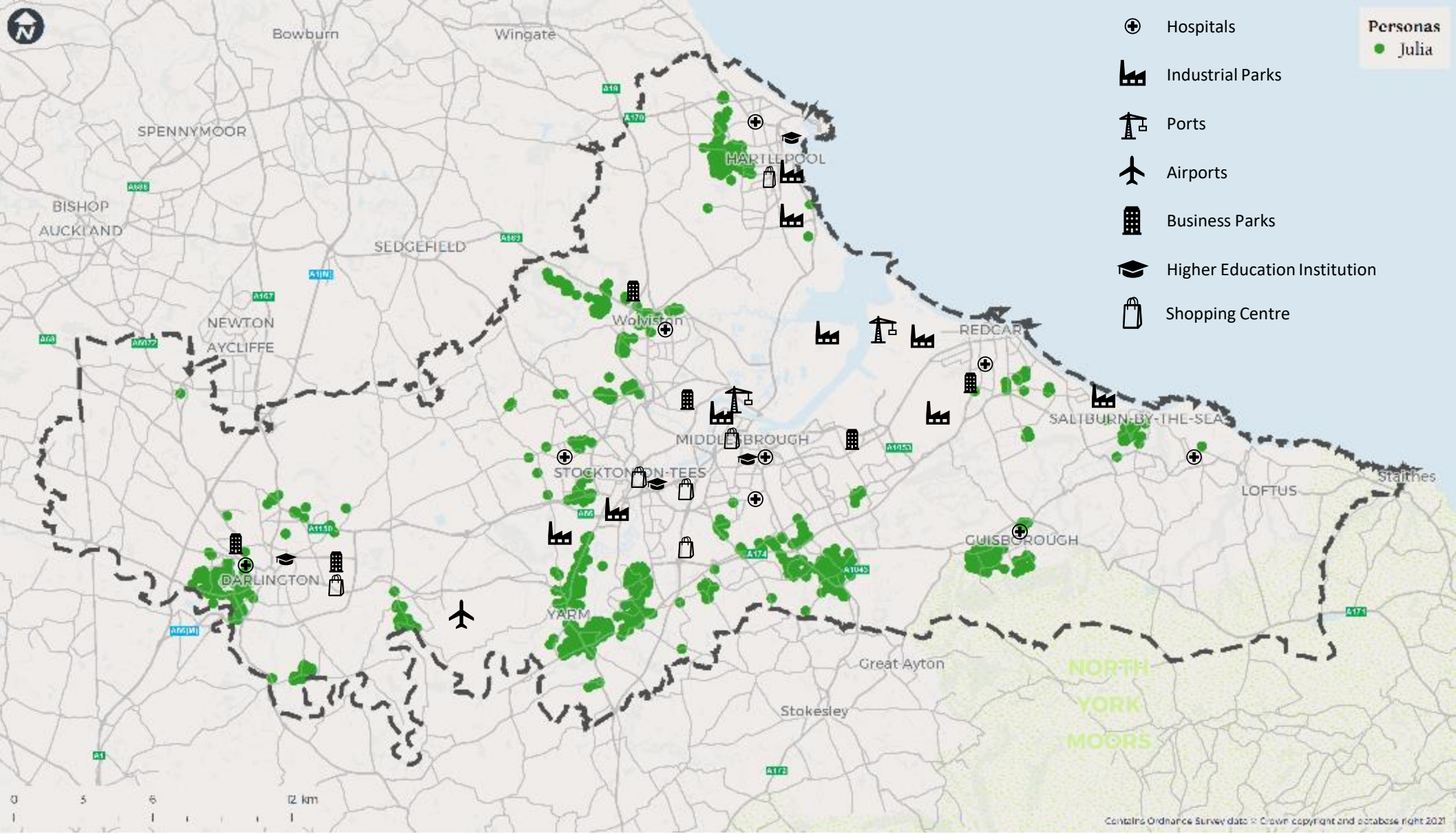
9. Brian - 69

"I know what I like, and I like what I know."

Senior Security

Population size:

66,493 – 10% of TVCA

Digital needs:

Brian often lacks the confidence to engage with digital services. However, tailored and user friendly interfaces will help him navigate the digital world and avoid being left behind by technology.

About Brian

Brian is several years into retirement having had a long career in a technical profession. He now enjoys a slower pace of life and likes to be involved with his young grandchildren.

Brian lives with his wife, who requires regular trips to the hospital due to a long term health condition. They enjoy regular trips away and making the most of their retirement, as well as socialising with other couples of a similar age.

Household
Lives with his wife

Interests
Gardening, spending time with grandchildren

Technical Skills
Technical diplomas earnt throughout career

Information sources
Radio 4, local newspapers, gossip in the pub

Mobility Assets
One aging car, bus pass

Personal Values
Time, convenience

Concerns
Safety, reliability, everything moving increasingly online, deteriorating health

Digital Assets
Basic smartphone, a few years old

Digital Literacy
Very basic

Purchasing Power
Modest, but enough to lead a comfortable life
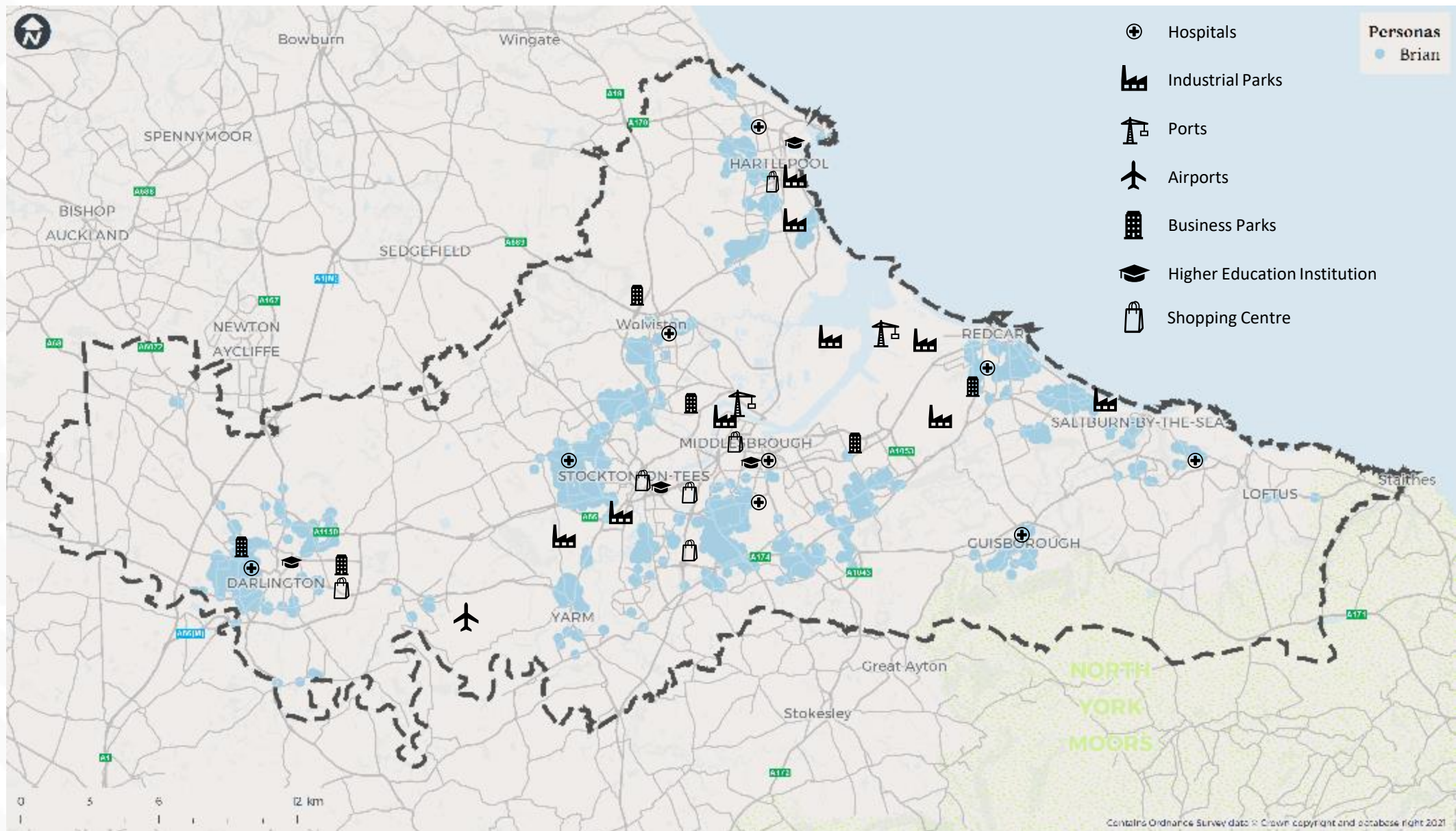
10. Sanjay - 44

Keeping active and exploring with a second youth

Transient Renters

Population size:

39,748 – 6% of TVCA

Digital needs:

Having moved to a new area, Sanjay is more reliant on social media than ever before to stay in touch with friends. He is a marketable employee, but he needs to be able to access opportunities by public transport too.

About Sanjay

Sanjay lives in a house share in Hartlepool. He moved to the area 18 months ago following a divorce and has not had a chance to work out where in the region he wants to settle due to Covid.

He is currently unemployed due to Covid and looking for work in his field, but until then, he will work part-time in retail.

He doesn't own a car but is considering investing in one as the bus service is patchy.

Household
House share with two others

Interests
Reading, running, exploring

Technical Skills
Degree and workplace-based training

Information sources
Radio 1, Twitter, online news sites

Mobility Assets
Buys a monthly bus pass after payday

Personal Values
New experiences

Concerns
Flexibility, poor services to distant places limiting opportunities

Digital Assets
Latest smartphone, tablets, laptop, relies on mobile data

Digital Literacy
Digital Native

Purchasing Power
Medium

Personas
- Sanjay

Legend:
- ⊕ Hospitals
- 🏭 Industrial Parks
- 🏗 Ports
- ✈ Airports
- 🏢 Business Parks
- 🎓 Higher Education Institution
- 🛍 Shopping Centre

Future Mobility

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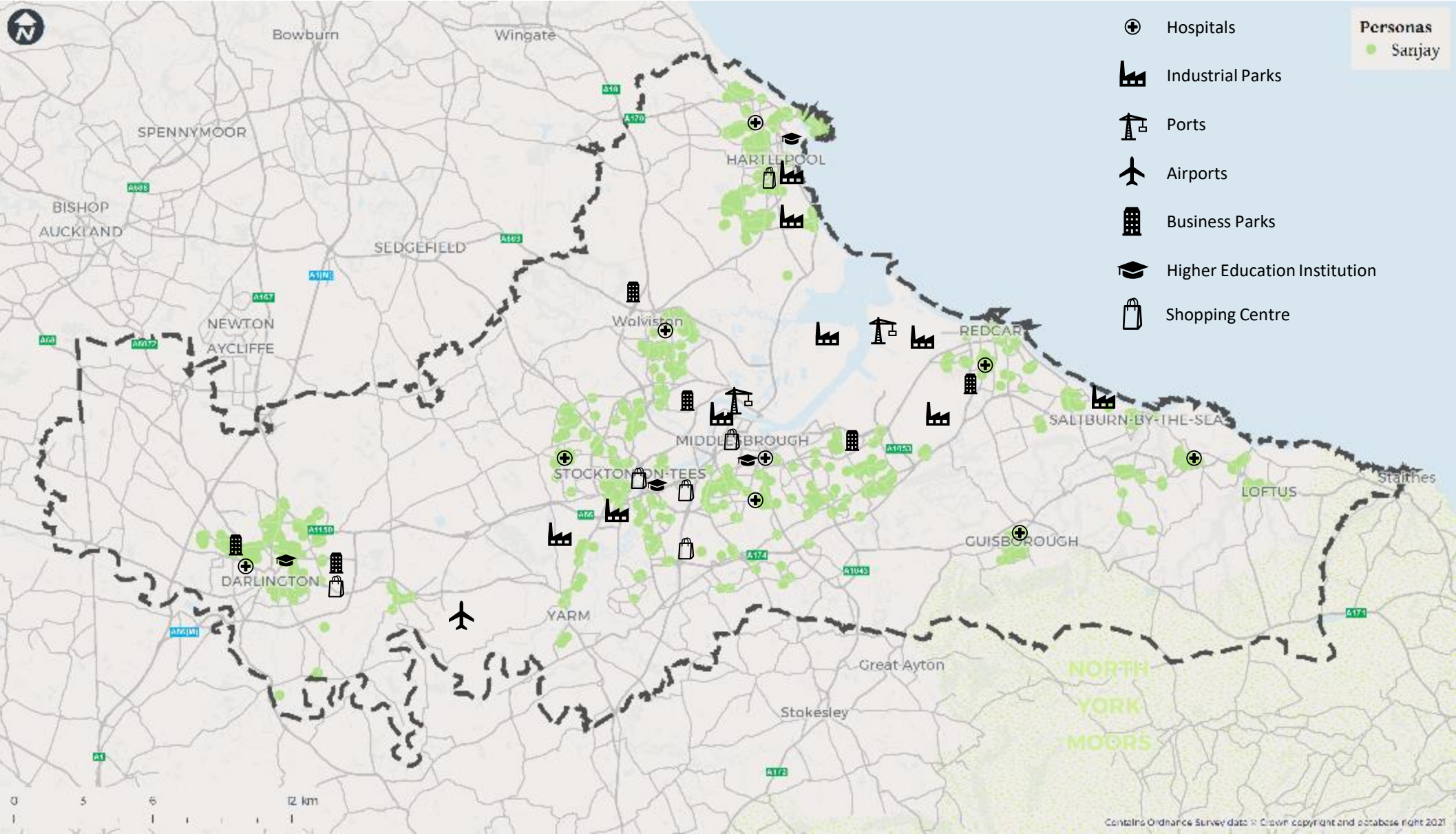
11. Raymond - 78

"The last of the 'job for life' generation"

About Raymond

Raymond is a retired widower. He lives on his own in Middlesbrough. He survives on his state pension which is enough to get by without any frivolous expenses.

Raymond does have a car but finds using it exhausting as he gets older. His car is his lifeline to see his friends and attend appointments.

He is anxious about what the future holds as his mobility is getting worse.

Vintage Value

Population size:

44,663 – 6% of TVCA

Digital needs:

Raymond is reliant on more traditional means of accessing services due to his low digital literacy. Alternatives such as call centres should be retained to ensure people like Raymond don't get left behind .

Future Mobility

Household
Lives alone

Interests
Gardening, the Royal British Legion

Technical Skills
N/A

Information sources
A local and national newspaper each day

Mobility Assets
One car, bus pass

Personal Values
Sociability,

Concerns
Losing his car and the unreliability of public transport, Social isolation

Digital Assets
TV, landline telephone, unused smart phone

Digital Literacy
Non-existent

Purchasing Power
Very low
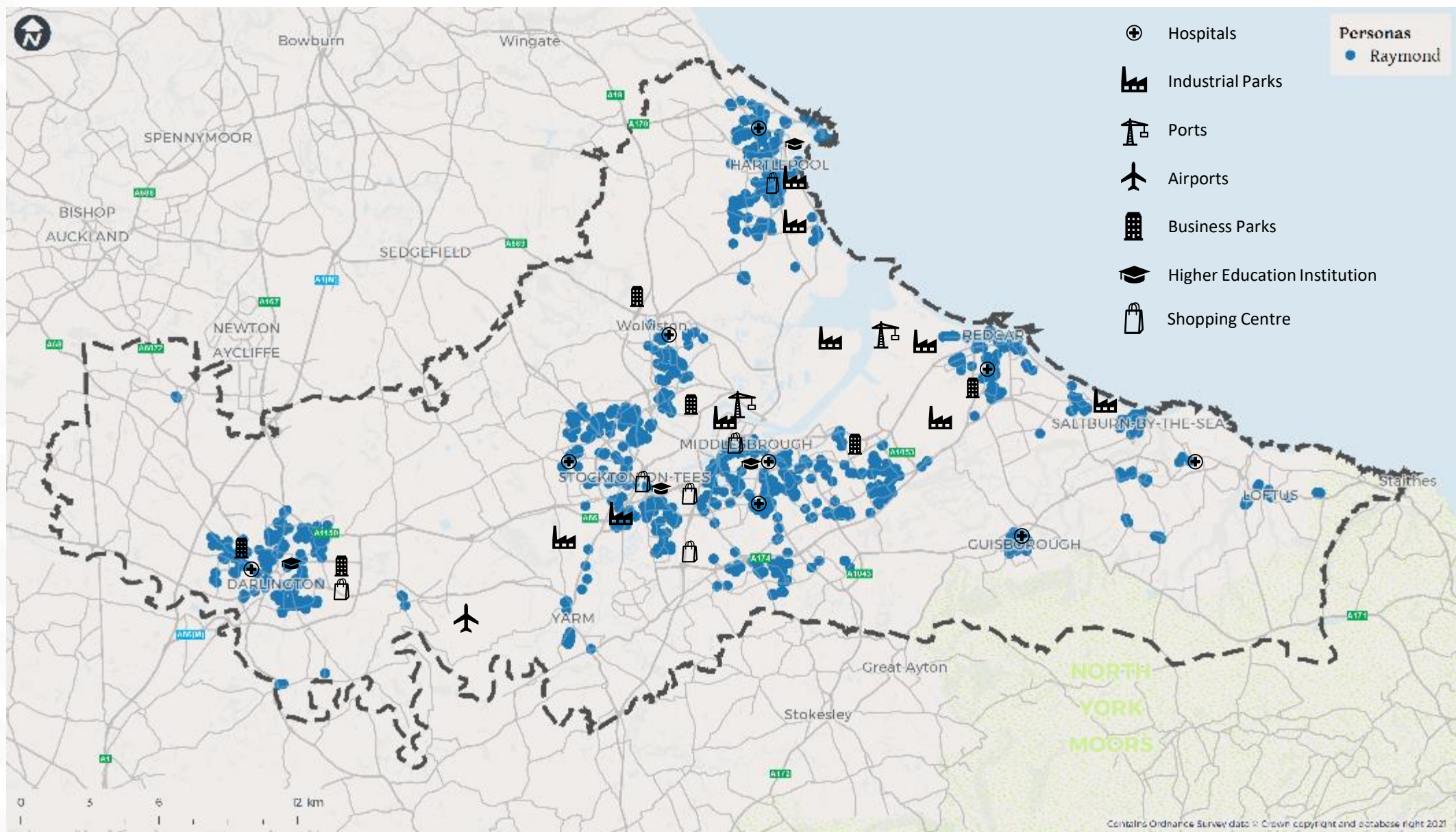
12. Mark - 50

"Living in the countryside is a way of life"

Country and Rural Dwellers

Population size:

26,677 – 4% of TVCA

Digital needs:

Living rurally, travel costs are much higher than Mark than they are for most, so providing access to services via digital means could help his finances stretch further. To do this, he will be reliant on the rollout of faster broadband infrastructure.

About Mark

Mark is married with children and lives between Stockton and Darlington. He works in and around the area as a contractor on different farms.

For Mark, ICE vehicles are a lifeline. He uses a van to get to different jobs and his wife uses the family car to go shopping and take the kids to school. There are no alternatives.

Mark works on vintage motorcycles in his spare time.

Household
Lives with his family

Interests
Motorcycles, walking, taking kids to extracurricular activities

Technical Skills
Experience in agriculture, practical around the house

Information sources
Has commercial radio on all day

Mobility Assets
A work van, a family car, multiple motorcycles

Personal Values
Traditional family life

Concerns
The costs of fuel

Digital Assets
Smartphone and computer, slow broadband

Digital Literacy
Good, has to be for work

Purchasing Power
Medium

Legend:
- ⊕ Hospitals
- Industrial Parks
- Ports
- ✈ Airports
- Business Parks
- Higher Education Institution
- Shopping Centre
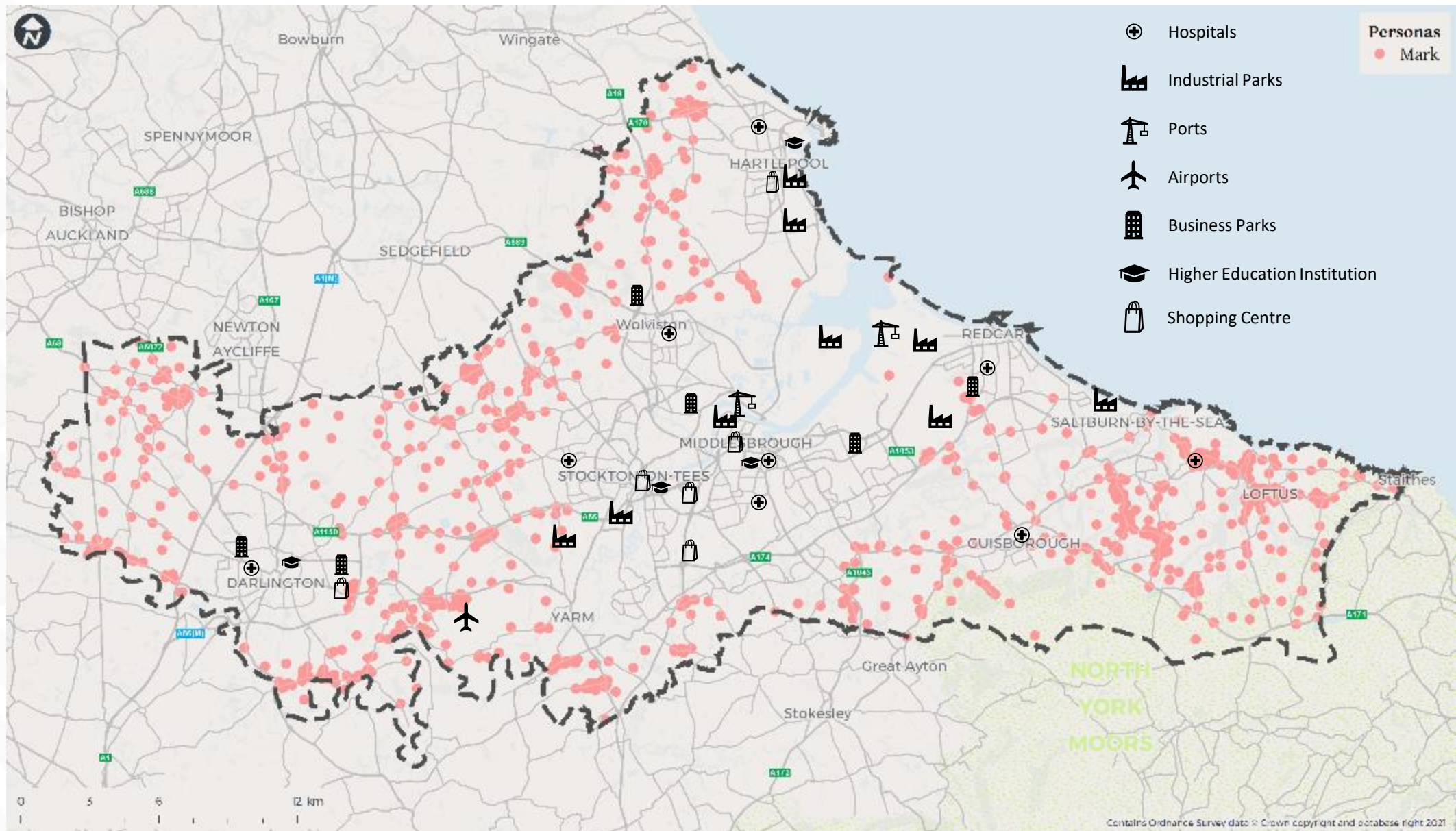
Personas
- Mark

Charlie- 16

"Can't wait to learn to drive so I can have my independence"
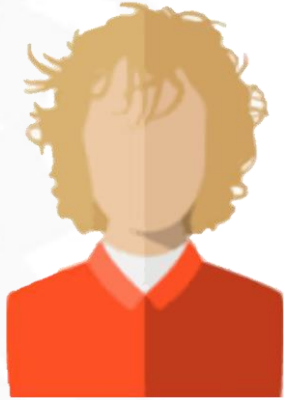
Young Persona (16 – 18)
Population: 28,790

(c. 20% of people are <18)

Digital needs:

Charlie's active social life and educational commitments mean that he has to make a wide variety of trips regularly. Technology can help to provide better visibility of cost-effective alternatives to lifts from his parents.

About Charlie

Charlie attends the local college which requires him to take the bus. The timings can be unpredictable due to traffic meaning that he has to be at the bus stop in plenty of time.

At the weekends he earns a small wage working in a pub and likes to meet his friends to play football or go into town. He often relies on lifts from his parents as its much quicker than using public transport. Opportunities in digital will be vital to ensuring his generation are retained.

Household
Lives with parents

Interests
Playing football, meeting friends, gaming

Technical Skills
Attending college

Information sources
Social media

Mobility Assets
BMX, lifts from parents

Personal Values
Independence, value for money,

Concerns
Reliance on parents,

Digital Assets
Smartphone, tablet, laptop, superfast broadband

Digital Literacy
Digital native

Purchasing Power
Very low

Appendix B – Digital Services

Mobility as a Service

Future Mobility

Digital Service 1: Mobility as a Service

Target Audience
- TVCA and partners
- Mobility Service Providers
- Individuals
- Businesses
- Institutions

Service Considerations

Cost — Low ●———●———●———🟠———● High

Time (months) — 0 ●———●———●———●———🔴 12+   (6)

Operational Change — Easy ●———🟢———●———●———● Hard

Emissions Reduction — High ●———🟢———●———●———● None

Use Case
- Integrated approach to journey planning, booking and payment across all modes focused on customer needs
- Connection of the current disparate transport systems
- Modal shift to more sustainable transport
- Reduction in single occupancy car journeys
- End-to-end ticket integration
- Improvement in emissions and air quality

Case Studies
- **WECA (Maas App as part of the FTZ): £4m** estimated value for Minimum Viable Product
- **HITRANS (GoHi app in Scottish Highlands): £2m** in total to commit to a Maas solution, no marketing in their initial investment round of £450,000. Plans to be included in second round (£410,000).

Barriers

Risks/challenges
- Integration of several systems
- Requirement of variety of stakeholders and partners
- Rapidly evolving market
- Commercial model is less clearly defined

Interdependencies/Key partners
- Variety of transport providers
- Dependent on a variety of Tees Valley mobility enhancements
- Governance and policy must also be set in a way to enhance the implementation of MaaS
- Financial integration of services and banks, collated into a single, central point requiring API's and app developers

Potential outcomes

Residents	Places	Emissions	Future Ready
• Increased accessibility for residents • More variety of transport options for different demographics	• Increased demand due to improved transport access • Potential to provide their own transport hubs to improve • Track which mode provides the highest demand	• Promotion of sustainable transport modes • Reduction in single occupancy car journeys	• Potential for the gradual addition of other transport modes as they become available • Predicting and adapting to trends in trasnport

Asset Operations and Management

Future Mobility

Digital Service 2: Data led approach to asset operations and management (sensors and real time/predictive data)	
Target Audience • TVCA and partners • Planning staff • Management staff • Operations staff • Asset managers	**Service Considerations** Cost — Low ● ● ● (yellow) ● ● High Time (months) — 0 ● ● ● ● (orange) ● 12+ 6 Operational Change — Easy ● ● (green) ● ● (yellow) ● ● Hard Emissions Reduction — High ● ● (green) ● ● ● None
Use Case • Integrated approach to harnessing value on existing and emerging data gathered through TVCA (and partners) existing data sources and sensors and third-party data sets including from mobility and other partners	**Case Study** • **Kent (ADEPT Live Labs) £1.975m**: Developing an operational analytics platform to integrate all data and innovations within the service, pulling together information from a variety of sources including asset management systems, IoT sensors and external data services such as traffic and weather. • Some of the trials identified include intelligent traffic modelling devices, computer vision for road surface degradation, and provide information that will assist staff when making decisions on when a new road scheme needs to be built
Barriers	
Risks/challenges • Understanding of the commercial model • Operating costs can be high depending on what data is included as well as the volume and velocity of the data • Operating cost of back-office collation and analysis • Cost of integrating and producing the data in a suitable manner (API development)	**Interdependencies/Key partners** • Variety of sensor providers • Integration with current asset data collection techniques and operations • Contractor input to ensure the correct data is being collected (and to a high enough standard) • Maintenance of these collection techniques (such as smart sensors and traffic recording)

Potential outcomes			
Residents	**Places**	**Emissions**	**Future Ready**
• Improved data for their journeys • Increased understanding of their road network	• Improved maintenance operations reducing the risk of emergency intervention • Understand how and which assets are deteriorating in real time • Understand which factors are the biggest barriers are to access these places	• Improved data accuracy on traffic patterns which can therefore be altered • More proactive maintenance leading to reduction in cyclical maintenance as well as more destructive maintenance issues	• Proactive maintenance ensuring that assets are dealt with in a timely manner • Increased use of smart technology, laying the groundwork for future implementations

Integrated Parking Services

Digital Service 3: Integrated parking services (including park & ride and EV charging)

Target Audience
- Asset managers
- Parking managers
- Individuals (private parking)
- Businesses (HGV and logistics)
- Institutions (healthcare, education etc.)
- EV partners
- Energy partners

Service Considerations

Consideration	Scale	
Cost	Low — ●	High
Time (months)	0 — ● (6)	12+
Operational Change	Easy — ●	Hard
Emissions Reduction	High — ●	None

Use Case
- Customer focused parking service
- Use of digital services to manage asset base and demand in an integrated way (across all modes) including EV charging
- Reduction in range anxiety through increased communication on charge points
- Business attraction due to improved parking logistics (such as freight drop off points)

Case Studies
- **Cardiff Council (£150 per sensors, £7pm/ps):** Invested in a smart city parking and guidance system to handle the 64,000 commuters that drive into the city centre each day. Cardiff Council wanted a solution that would provide data on the use of its parking resources and contribute to reducing the time commuters would spend on roads.
- **Coventry (~£10,000 p.a):** Working alongside a chargepoint operator to analyse issues with utilisation of electric vehicle bays. They can identify whether non-electric vehicles are parking in electric vehicle abys, and whether fully charged electric vehicles are occupying the space after they have been charged.

Barriers

Risks/challenges
- Application development, within the council or white label solution
- Competition with existing applications
- Difficulty with freight and predicting their journey times
- Provision and integration of live data on vehicles/freight to feed into logistics infrastructure
- Only suitable if adopted at a wide scale
- Suitable data hub to provide dashboard statistics and analysis

Interdependencies/Key partners
- Integration with a variety of EV and energy suppliers
- Financial integration of these suppliers into a consolidates system
- Governance and policy for parking and charge points need to be adhered to and potentially adapted
- Supply chain partners such as freight and delivery companies to adopt the solution

Potential outcomes

Residents	Places	Emissions	Future Ready
• Improved information on parking and EV provision • Clearer governance on parking areas into a consolidated system	• Improved customer satisfaction due to parking and EV provision in that location • Operation benefits as a result of improved freight logistics	• Improved uptake of EV journeys due to more comprehensive data on charge points and parking • Reduction in car travel time due to parking clarity and real time information	• Proactive parking logistics and service, laying the platform for continuous integration • Creation of adaptable and robust parking infrastructure which can feed into future transport plans

Future Mobility

Integrated Customer Services

Digital Service 4: Integrated Customer Services (all modes – covering all needs and abilities)	
Target Audience • Individuals • Businesses • TVCA and partner social media teams	**Service Considerations** Cost — Low ●——●——●——● High Time (months) — 0 ●——●——●——● 12+ (6) Operational Change — Easy ●——●——●——● Hard Emissions Reduction — High ●——●——●——● None
Use Case • Provisions of customer services (all modes) through an integrated portal with access via app, web, voice activated and other channels • Receiving resident and business input and insight into current services and ideas/innovation	**Case Studies** • **Available Solution:** MyLocalGov is a free mobile app that helps local authorities in the UK to improve their community engagement and information sharing. Councils can use the app with no ongoing cost. • **Self-Developed (Nottingham):** In phase one they designed the app for new and repeat customers to access transactional services and information via current web pages, online forms and systems. As they continue to develop service provision through the app in phase two, they will enable users to 'report it' 'pay for it' 'apply for it' and 'find it' on any smartphone and tablet.

Barriers

Risks/challenges	Interdependencies/Key partners
• Application/service development, ensuring an accessible portal to all on a variety of platforms • Producing a robust process to log, monitor and evaluate customer inputs using a transparent method • Operations and management structure in place to be able to collectively analyse the information received	• Existing social media teams that operate within TVCA • TVCA customer facing teams • Portal developers such as web designers, CRM, UX/UI

Potential outcomes

Residents	Places	Emissions	Future Ready
• Residents will have the ability to provide tangible feedback to the council • Source of advice and information for residents, improving customer satisfaction	• Through comprehensive input, certain places can be flagged for improvements to service or infrastructure • Increased information provision on these places which can increase demand	• More information on what the most suitable/sustainable forms of transport are and what the option are • Feedback into current services to allow for potential improvements to the network e.g. cycle lanes	• Customisable portal which will be able to incorporate latest technologies such as voice activation • Human centred service, to allow for amalgamation of information from a variety of demographics to prevent barriers to access (ageing population)

Future Mobility

Proposed Interventions

Mobility Credits

Future Mobility

Digital Service 5: Mobility Credits

Target Audience
- TVCA and partners
- Mobility Service Providers
- Individuals
- Businesses
- Institutions

Service Considerations

Cost	Low ———●———●———●———🟠———● High	
Time (months)	0 ———●———●———●———●———🔴 12+ (6)	
Operational Change	Easy ———●———●———🟡———●———● Hard	
Emissions Reduction	High 🟢———●———●———●———● None	

Use Case
- Focused credits to provide access to opportunities for people, including training, education and employment
- Nudge behaviours to achieve wider outcomes including initiatives such as workplace EV charging / air quality improvements
- Sustainable trasnport advocation and promotion e.g. making the most sustainable option the cheapest one

Case Studies

Coventry/WMCA (for improved travel and carbon emissions):
Coventry residents with an older (10 years or more), polluting car can exchange their car for £3000 of mobility credits. The credits can be spent on public transport, and other transport services such as car clubs, bikeshare, taxis and on-demand bus services. The credits are loaded in a pre-paid Debit card.

Barriers

Risks/challenges
- Financial integration with existing transport providers/services
- Financial governance of banks/service providers
- Gathering the data and insight to understand where to mobility credits need be most effectively applied
- Understanding wider issues connected to poor transportation and if mobility credits solve the problem

Interdependencies/Key partners
- Funding initiatives from government, local authority and charities
- Education, training and employment partners who seek to improve access
- Social housing partners who have access to housing funds
- Mobility swaps – e.g. car buyers and recycler

Potential outcomes

Residents	Places	Emissions	Future Ready
• Residents will have the opportunity to apply for or trade for mobility credits • Residents will be nudged to uptake other forms of trasnport which were bolstered because of the credits initiative	• Through the supply of mobility credits, places will become more accessible to people and will provide improved source of employment, education and training	• Mobility credits can be tailored to more sustainable solutions and therefore reduce emissions and improve air quality • Mobility credits can also help remove polluting trasnport off the road, for example, by trading old vehicles for a respective amount of mobility credits	• Prepares the area for a shift to a more agile transport network, setting the scene for a larger implementation of mobility credits • Nudge behaviour to help adopt increasing amounts of sustainable transport options, which encourages their demand and future supply

Appendix C – Roadmap

Roadmap

Roadmap to delivery

This appendix outlines other factors desired to be achieved in the respective time frame. This is complimentary to those factors outlined in the initial roadmap delivery in section 7. All elements of 2026 have been noted in the first instance are therefore not shown here.

2022 Foundation

Regional Data Platform
- Validate understand objectives for TVCA and key regional stakeholders
- Create a data strategy outlining direction, role, governance, sharing agreements, road map and management.
- Begin to embed data sharing agreements with key partners to provide data.
- Elicit requirements, develop and an architecture vision, and procure MVP for TVCA Data Platform.
- Take forward Mott MacDonald recommendations to surface data.

Digital services
- Undertake and implement a brand review, ensuring all external facing digital services have a clear and common brand used for all mobility facing services.
- Implement Mott MacDonald recommendations to review and consolidate existing digital services across TVCA.
- Validate initial WSP user needs assessment with representations of each cohort.
- Undertake Discovery activities using a co-design approach to identify and define high priority 'early win' transport digital information need following user needs validation.
- Undertake Discovery activities to explore travel information needs for older and digitally excluded cohorts, alongside funding opportunities from MHCLG Local Digital Unit.
- Undertake a cross sector to identify synergies between mobility and other services
- Develop a digital transport services strategy and present a refined roadmap for delivery

Digital twin:
- Implement Phase 1 of UTMC Business Case to ingest assets into the data platform.
- Identify opportunities to capture active travel and environmental monitoring data.

Future Mobility

Roadmap to delivery

This appendix outlines other factors desired to be achieved in the respective time frame. This is complimentary to those factors outlined in the initial roadmap delivery in section 7. All elements of 2026 have been noted in the first instance are therefore not shown here.

2023 Exploring

Regional Data Platform
- Assessment of data needs for integrated services and delivery of a common data model
- Data is accessed, managed and provides insights to support use cases been made available by TVCA Data Platform.
- Data to be used by third parties and partner organisations, skills support provided as required to enable adoption and maximise benefits
- Data platform is scaled and enhanced to deliver additional functionality, data integrations and performance to support new use cases
- Continuing to embed data sharing agreements with key partners

Digital services
- Clear TVCA mobility brand now deployed, moving and consolidating older sites into new brand.
- Developing Alpha digital service/s for high priority 'early win' transport digital information need/s.
- Undertaking discovery activities for lower priority digital information need/s

Digital twin:
- Developing Phase 2 of UTMC following feedback from local and regional partners
- Working with National Highways to explore management of SRN & MRN and predictive management of anticipated incidents.
- Identifying and developing business case for further monitoring sensors to fill gaps and or meet identified needs.

Roadmap to delivery

This appendix outlines other factors desired to be achieved in the respective time frame. This is complimentary to those factors outlined in the initial roadmap delivery in section 7. All elements of 2026 have been noted in the first instance are therefore not shown here.

2024 Deploying

Regional Data Platform
- Starting to deploy data platform service integrations such as MaaS, parking and EV charging
- Data is accessed, managed and provides insights to support use cases been made available by TVCA Data Platform.
- Data now routinely been used by third parties and partner organisations
- Data platform is scaled and enhanced to deliver additional functionality, data integrations and performance to support new use cases
- Continuing to embed data sharing agreements with key partners
- Investigating models to ensure the sustainability of the data platform, including expansion beyond transport

Digital services
- Deploying Live digital service/s for high priority 'early win' transport digital information need/s, early MaaS solution.
- Deploying additional services identified through discovery work in prior stages
- Developing further lower priority digital information need/s MVP's.

Digital twin:
- Deploying Phase 2 of UTMC following feedback from local and regional partners
- Working with all regional transport parties to understand and predict management of anticipated incidents and support smart 'logistics' region.
- Deploying further monitoring sensors to fill gaps and/or meet identified needs.

Future Mobility

Roadmap to delivery

This appendix outlines other factors desired to be achieved in the respective time frame. This is complimentary to those factors outlined in the initial roadmap delivery in section 7. All elements of 2026 have been noted in the first instance are therefore not shown here.

2025 Scaling

Regional Data Platform

- Data services from the data platform supporting service integrations such as MaaS, parking and EV charging
- Data is accessed, managed and provides insights to support use cases been made available by TVCA Data Platform.
- Data now routinely been used by third parties and partner organisations
- Data platform is scaled and enhanced to deliver additional functionality, data integrations and performance to support new use cases
- Continuing to embed data sharing agreements with key partners
- Defining a model to ensure the sustainability of the data platform

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