Mapping the future of mobility

Bhavin Makwana

14 November 2019

Zenzic was created by government and industry to accelerate the self-driving revolution in the UK. Zenzic is channelling £200 million of investment to unite industry, government and academia in the move to a safer, more inclusive and productive mobile future.

Testbed UK

- **CAVWAY**
  Configurable junctions
  Flexible connectivity

- **HORIBA MIRA-Coventry University CAV Testbed**
  Urban parking
  Limit of controllability
  Connected & configurable

- **Midlands Future Mobility**
  Highly connected real-world and digital environments

- **Millbrook-Culham Urban Testbed**
  Secure site
  Controlled and semi-controlled

- **Smart Mobility Living Lab**
  Public and private London roads
  Digital and real-world testing

- **ConVEx Project**
  Data
  Virtual

BIRMINGHAM

ALL WITHIN
3HRS

LONDON

ZENZIC

Testing capabilities

Data   **Parking**   **Rural**   **Highways**   **Urban**   **Physical**   **Virtual**

ZENZIC
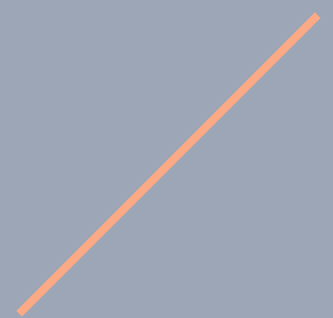
1904 Phoenix Quad Car, ca 1910

ZENZIC

Fatalities in reported road accidents: GB, 1979-2018

6,352

1,784

30%
since
2008
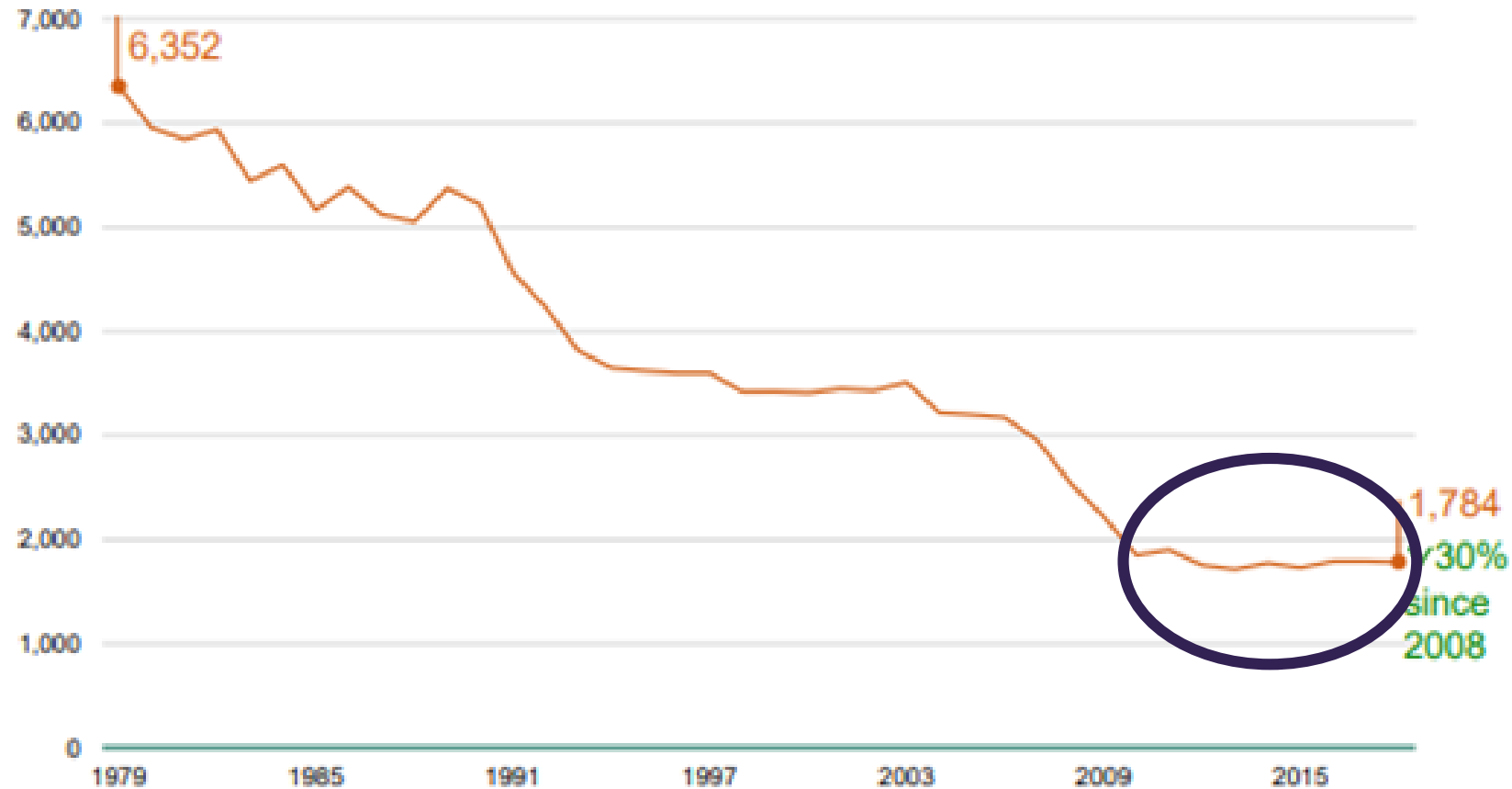
Yet, Human error in 86% of road injury collisions

DfT (RSGB), 2018

ZENZIC

Serious collisions prevented

+47,000
2030

SMMT 2019 report

Lives saved

+3,900

SMMT 2019 report

What are the benefits of connected and automated mobility (CAM)?

Productivity

225 hours driving per year

Access to transport

49% of disabled people in the UK report mobility as an issue

Efficiency

8.2% increase in traffic since 2010 (bn vehicles miles)

ZENZIC

Economic benefit by the deployment of CAVs to the UK per year

£52bn
2035

20,000
new automotive jobs

The UK Connected and Automated Roadmap to 2030

What is the roadmap?

The UK Connected and Automated Mobility Roadmap to 2030 is a tool for decision makers, investors and policy-makers for our mobile future.

ZENZIC

What does the roadmap provide?

Collaborative view

Reduction of risk

Insights

Shared vision

ZENZIC

Who is the roadmap for?

The roadmap offers different views for different users

Business

Consumer

Government

ZENZIC

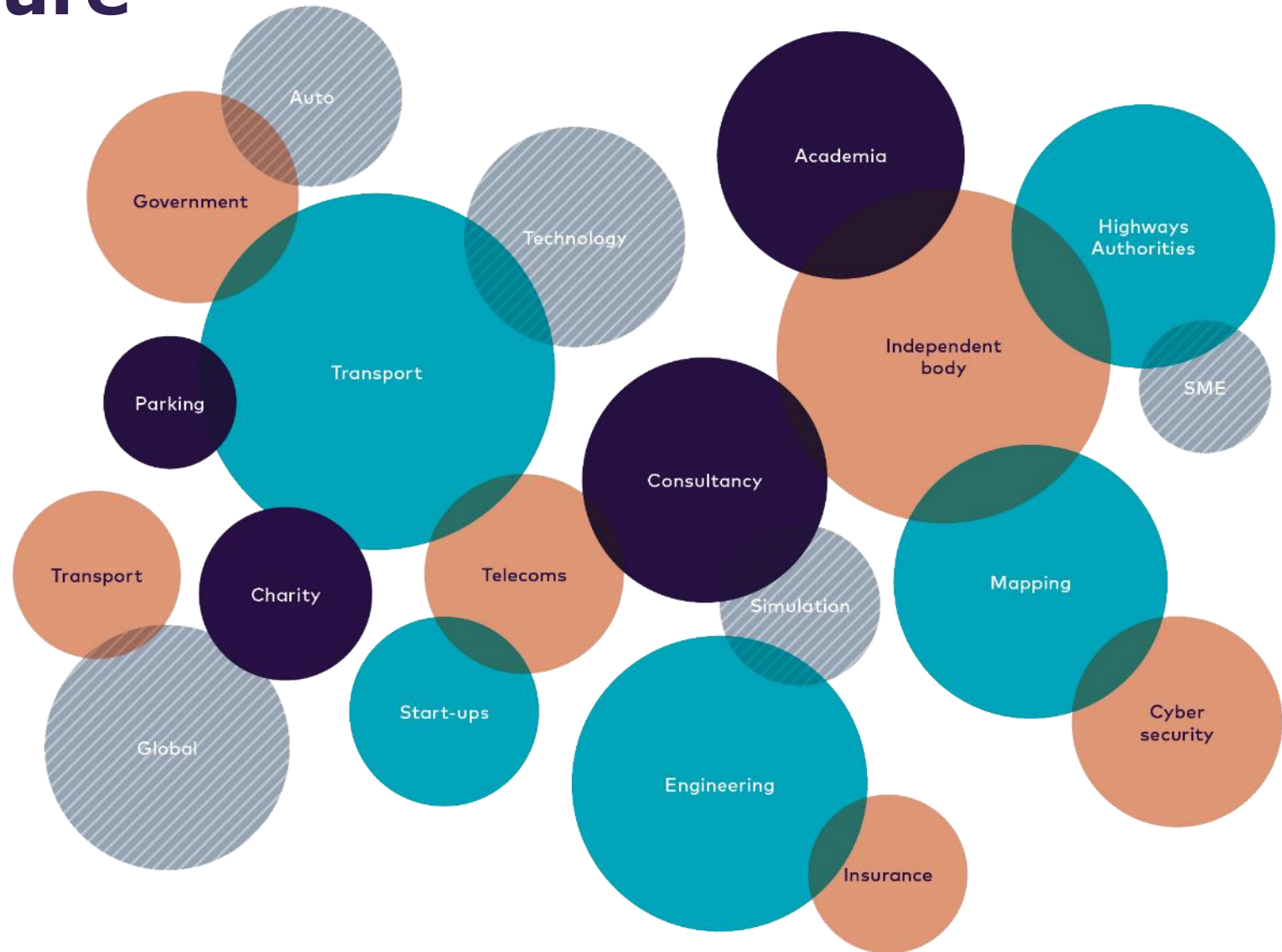# How was the roadmap created?

Collaboration is key

150+ organisations contributed to the roadmap

250+ individuals contributed to the roadmap

Milestones are connected through almost **600** unique relationships

ZENZIC

Cross-ecosystem contribution means an unbiased view of the future

ZENZIC

The roadmap aims to bring forward
connected and automated mobility*

from **2079**

*CAM

ZENZIC

The 2030 Vision was built upon government principles and priorities

FUTURE OF MOBILITY CORE PRINCIPLES

The future of mobility revolves around several fundamental principles. Ensuring safety, equality, accessibility and environmental conservation remain at the heart of CAM's future is paramount.

ROADMAP VISION STATEMENT

'By 2030, the UK is benefitting from proven connected and automated mobility, with an increasingly safe and secure road network, improved productivity and greater access to transport for all. Next-generation services and technology are designed and developed in the UK, powered by high value skills and a strong supply chain, and driven by public demand, we are a world leader.'

CCAV PRIORITIES

Safety and security
Productivity
Access to transport

TRIALS, DEVELOPMENT AND ENABLING — 2021 · 2022 · 2023 · 2024
TRANSITION PHASE — 2025 · 2026
SCALE-UP AND REALISATION OF BENEFITS — 2027 · 2028 · 2029 · 2030

THEME · STREAM · NOW · 2021 · 2022 · 2023 · 2024 · 2025 · 2026 · 2027 · 2028 · 2029 · 2030

Society and People

Stream	Timeline entries
Vehicle Approvals	Advanced trial approvals · National approval scheme · International approval harmonisation
Licencing and Use	Local codes of conduct for services · Alignment with the wider future of mobility · National licencing scheme for CAM services · Agile and adaptive development of CAM service regulation
Legislation and Insurance	Common risk and liability understanding · Data sharing · Changes in legislation · Insurance policy refinements and lower premiums
Public Desirability	Increasing dialogue with the public · Increasing public experience · Desirable mobility · Widespread acceptance and use of CAM
Investment	Establish investor forums · Structural changes to scale-up funding · Visible CAM benefits deliver on investor confidence · Grow FDI and export markets for CAM · CAM is a high value, low risk investment at scale
Skills	Establish skills centre of excellence and pipeline · Improvement of skills pipeline · Sustaining skills pipeline
Major Milestones	▶ 2020 – Advanced trials approval process in place · ▶ 2024 – Nationwide licencing approach for CAM services · ▶ 2025 – National vehicle approval scheme in place

Vehicles

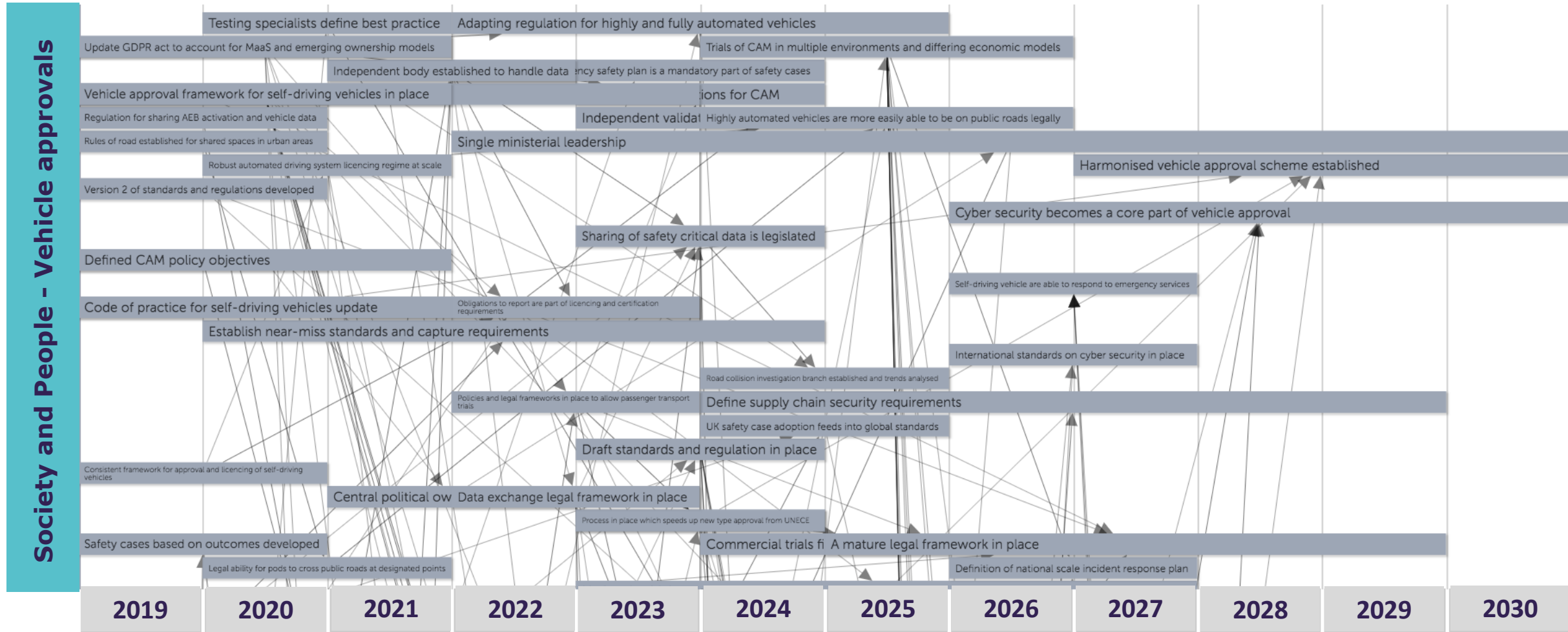| Stream	Timeline entries
Automated Driving System	Common standards · Low complexity design domain · Medium complexity design domain · High complexity design domain
Connectivity	Safety data standards · Cooperative data sharing · Legacy fleet connectivity · Ubiquitous cooperative communication
Ergonomics and Design	Human interaction research · Common HMI guidance · Intuitive HMI and CAM vehicle design · High utilisation vehicle design
Sensors	Low cost high precision sensor development · Deliver initial sensor validation methodology · Deliver full sensor validation methodology · Enhanced sensor development
Major Milestones	▶ 2021 – Data sharing agreements in place · ▶ 2027 – Safety vehicle connectivity

Infrastructure

Stream	Timeline entries
Communications	Agree communications approach at a national level · Plan coverage and rollout · Deploy CAM road safety infrastructure · High connectivity across the road network
Digital	Define data governance and ownership · Develop virtual road environments for CAM · Deploy virtual road environments for CAM · National operational data hub · Virtual road environments for operational management
Roads	New planning and investment guidance · Digitisation of signage assets · Digitisation of road rules · Repurpose infrastructure
Intelligent Network Management	Understand new travel demands through trials · Define new operational models · Deploy new operational models · Increase network efficiency
Test and Development	Cyber centre of excellence · Deploy virtual test environments · Develop automated validation · Refresh Testbed UK
Major Milestones	▶ 2020 – Testbed UK live · ▶ 2024 – UK-wide virtual environments for test and development · ▶ 2027 – Roadside signage no longer needed

Services

| Stream	Timeline entries
Personal Mobility	Demonstrator trials · Small scale passenger deployments · Deployments plugging mobility gaps · CAM preferred in public service contracts · CAM more attractive than traditional services
Freight and Logistics	Low complexity trials · New freight policy developments · Small scale deployments · Last mile CAM delivers productivity benefits · Integrated services
Inclusive Transport	Understand how CAM can improve access to transport · Trials and pilots · Commercially viable service deployment · Sustainable and inclusive CAM services
Major Milestones	▶ 2021 – First commercial pilot deployment of CAM · ▶ 2028 – CAM services are preferable in contracts

Simplifying the 600 relationships in the roadmap

Society and People – Vehicle approvals

Testing specialists define best practice

Adapting regulation for highly and fully automated vehicles

Update GDPR act to account for MaaS and emerging ownership models

Trials of CAM in multiple environments and differing economic models

Independent body established to handle data ency safety plan is a mandatory part of safety cases

Vehicle approval framework for self-driving vehicles in place

ions for CAM

Regulation for sharing AEB activation and vehicle data

Independent validat Highly automated vehicles are more easily able to be on public roads legally

Rules of road established for shared spaces in urban areas

Single ministerial leadership

Robust automated driving system licencing regime at scale

Harmonised vehicle approval scheme established

Version 2 of standards and regulations developed

Cyber security becomes a core part of vehicle approval

Sharing of safety critical data is legislated

Defined CAM policy objectives

Self-driving vehicle are able to respond to emergency services

Code of practice for self-driving vehicles update

Obligations to report are part of licencing and certification requirements

Establish near-miss standards and capture requirements

International standards on cyber security in place

Road collision investigation branch established and trends analysed

Policies and legal frameworks in place to allow passenger transport trials

Define supply chain security requirements

UK safety case adoption feeds into global standards

Draft standards and regulation in place

Consistent framework for approval and licencing of self-driving vehicles

Central political ow Data exchange legal framework in place

Process in place which speeds up new type approval from UNECE

Safety cases based on outcomes developed

Commercial trials fi A mature legal framework in place

Legal ability for pods to cross public roads at designated points

Definition of national scale incident response plan

2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

ZENZIC

Key enablers

The start of Strands that unlock many other milestones

KEY

ID	Milestone	Date
AF01	Develop methods for testing AI and ML systems	2023
AF03	Verification that AI and sensor fusion algorithms are able to self-determine exceedance of ODD	2030

Baseline policy and standards established (LR05)
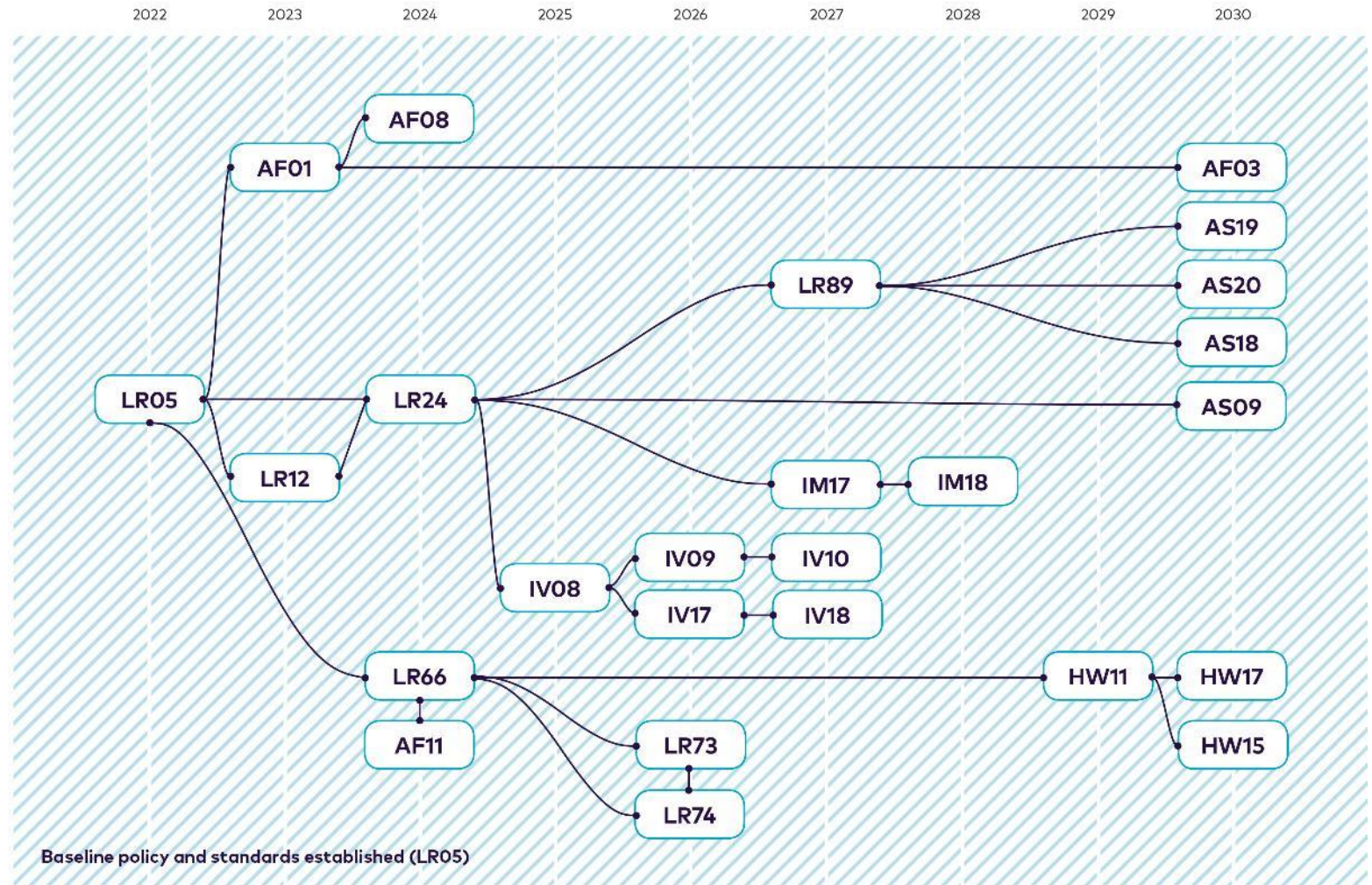
ZENZIC

Golden Threads – finding your way through the roadmap

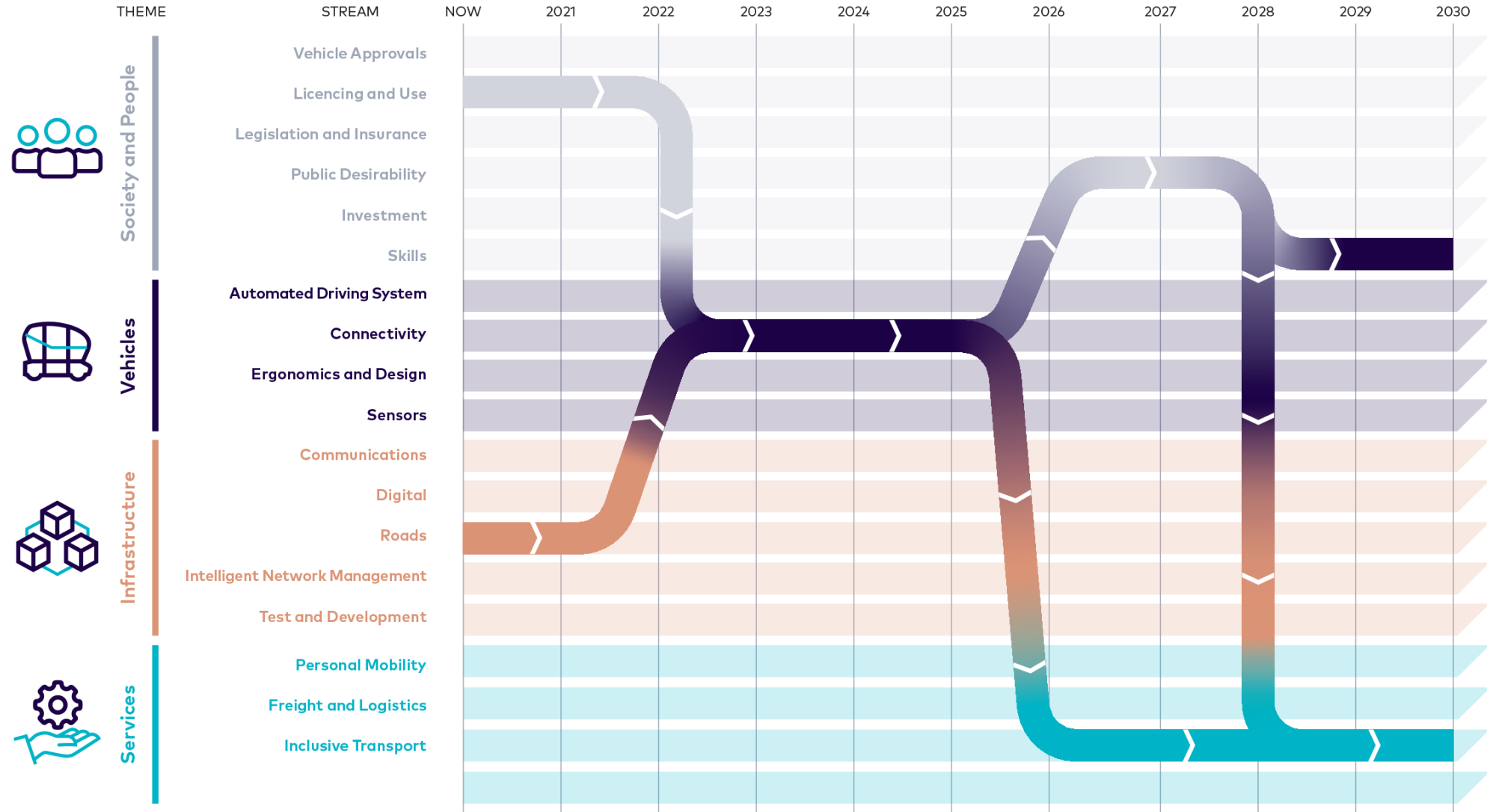# What is a Golden Thread?

Bespoke view

Meaningful path

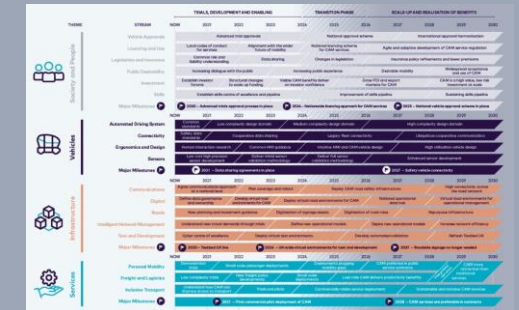**Interdependency driven**

ZENZIC

Visit zenzic.io/roadmap

Download your copy of the roadmap report

Access the online interactive roadmap

Get in touch to book a workshop with the team: info@zenzic.io

Report downloads: 1,500+
Roadmap tool views: 2,000 as at 31/10/2019

So...?

RCA, 2017

?

ZENZIC

@ZenzicUK

Zenzic

info@zenzic.io

zenzic.io

Thank you

Bhavin Makwana, Business Analyst
Bhavin.Makwana@zenzic.io