



Freight as an Ecosystem

The Connected Road Ahead





Automated Freight

Multi Modal – 1.13M KM roads, 81 Airports, 42K KM Rail, 559 Marine Port Facilities





CRAWL.
WALK
RUN.





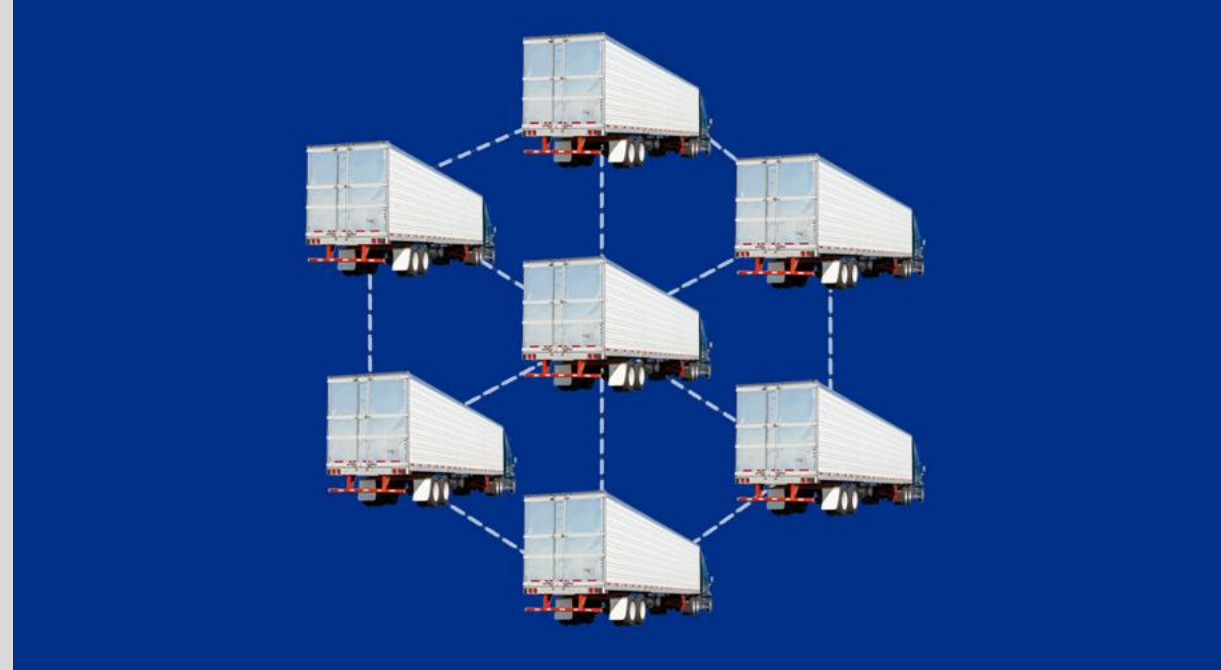
Crawl – the reality of today



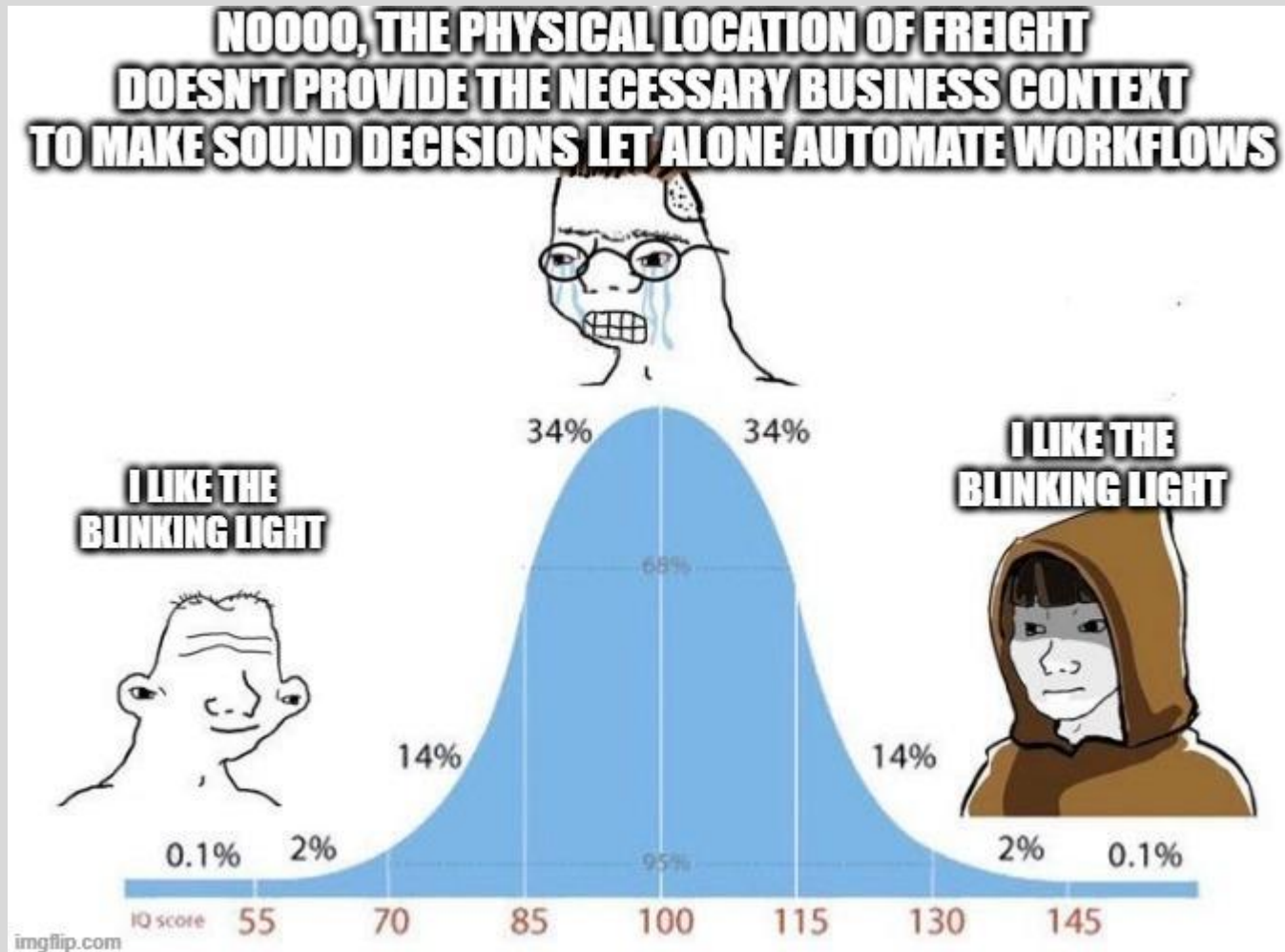
- 99% of Global Trade and shipping are still conducted using paper-based Bill of Lading
- Boston Consulting Group estimates that 1 trade finance transaction requires interaction between over 20 entities, 10 to 20 paper-based documents and 5,000 data field exchanges.

The Connected Road Ahead

- The global market size for digital transformation in transportation and logistics was valued at **\$54.92 Billion in 2018** and is expected to rise to **\$145.28 Billion by 2025**.
- IOT Track and Trace, autonomous vehicles and platooning are the key enabler of digital transformation
 - Supported by AI, Machine Learning and Web 3.0



“What’s the point of a blinking light on a map if you can’t do anything about it?”



- ✓ Route Optimization
- ✓ ESG
- ✓ Demurrage/Detention
- ✓ Maintenance & Repair
- ✓ Predictive ETA
- ✓ Just in time Manufacturing
- ✓ OTIF – on time and in full
- ✓ Accessorial Charges – Freight Invoicing
- ✓ Contract compliance
- ✓ Claims Management

IOT + Blockchain Network



By the editors of Today's Trucking
trucknews.com

Walmart Canada leverages blockchain to solve a billing nightmare



Bison Transport was the first to roll out Walmart Canada's blockchain solution, eliminating longstanding billing challenges. Now every third-party carrier uses it. (Photo: DLT Labs)

Forbes

Walmart Canada And DLT Labs Launch World's Largest Industrial Blockchain Application



Emerging Ecosystems





Technology Converges

- + Logistics
- + IOT
- + AI & Machine Learning
- + ITS – Intelligent Transportation
- + Autonomous Vehicles



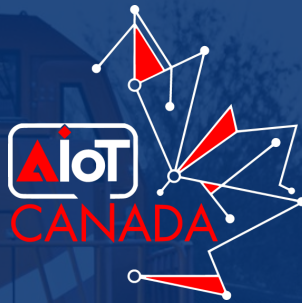
Automate Freight



AIoT Ecosystem Lays Foundation for Automated Freight

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aiotcanada.ca

Internet of Things (IoT) 101

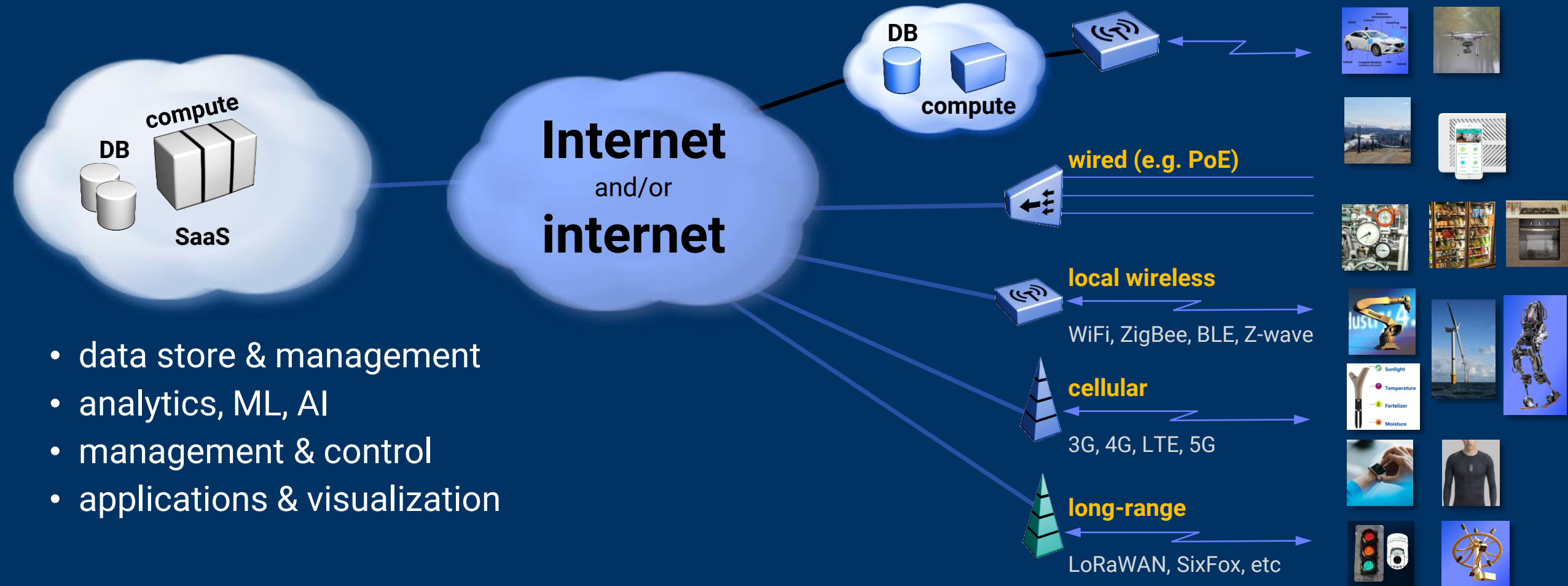
Cloud

Network

Edge

Devices THINGS

Edge/Fog computing



- data store & management
- analytics, ML, AI
- management & control
- applications & visualization

Internet of Things (IoT) 101

Cloud

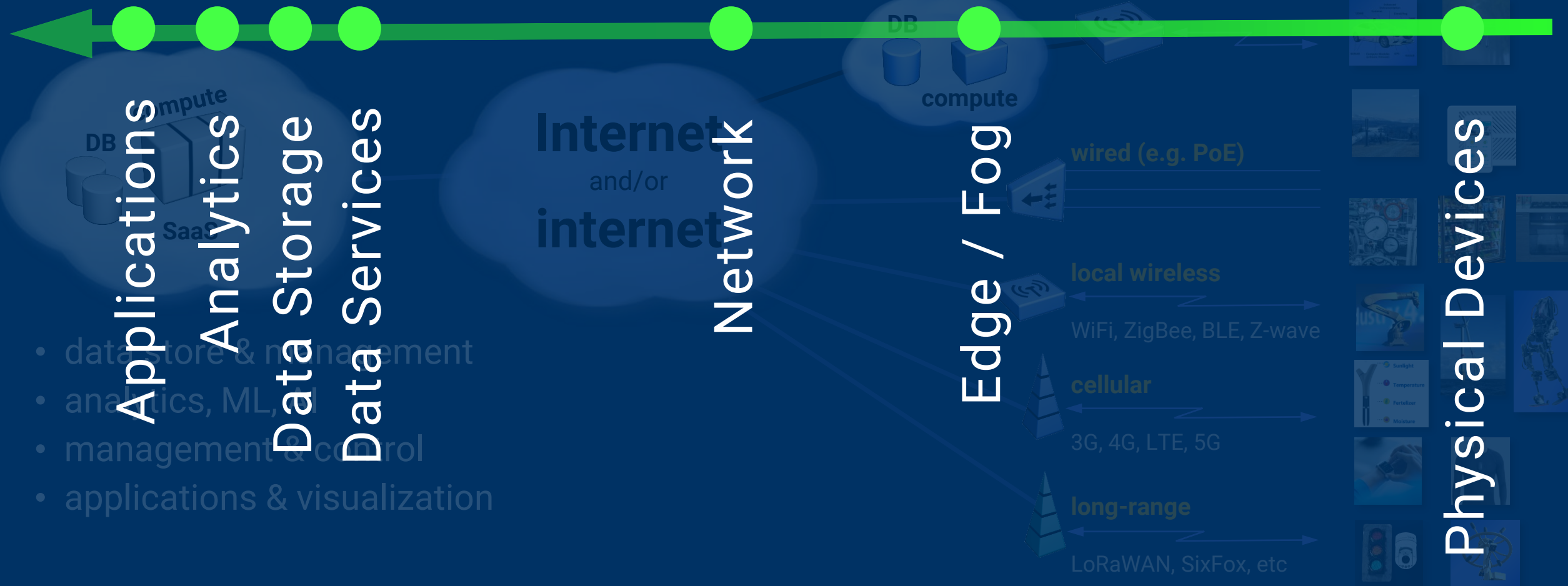
Network

Edge

Devices

THINGS

Edge/Fog computing



- data store & management
- analytics, ML, etc
- management & control
- applications & visualization

The structure and the bits and pieces

ARCHITECTURE



Applications

Analytics

Data Storage

Data Services

Network

Edge / Fog

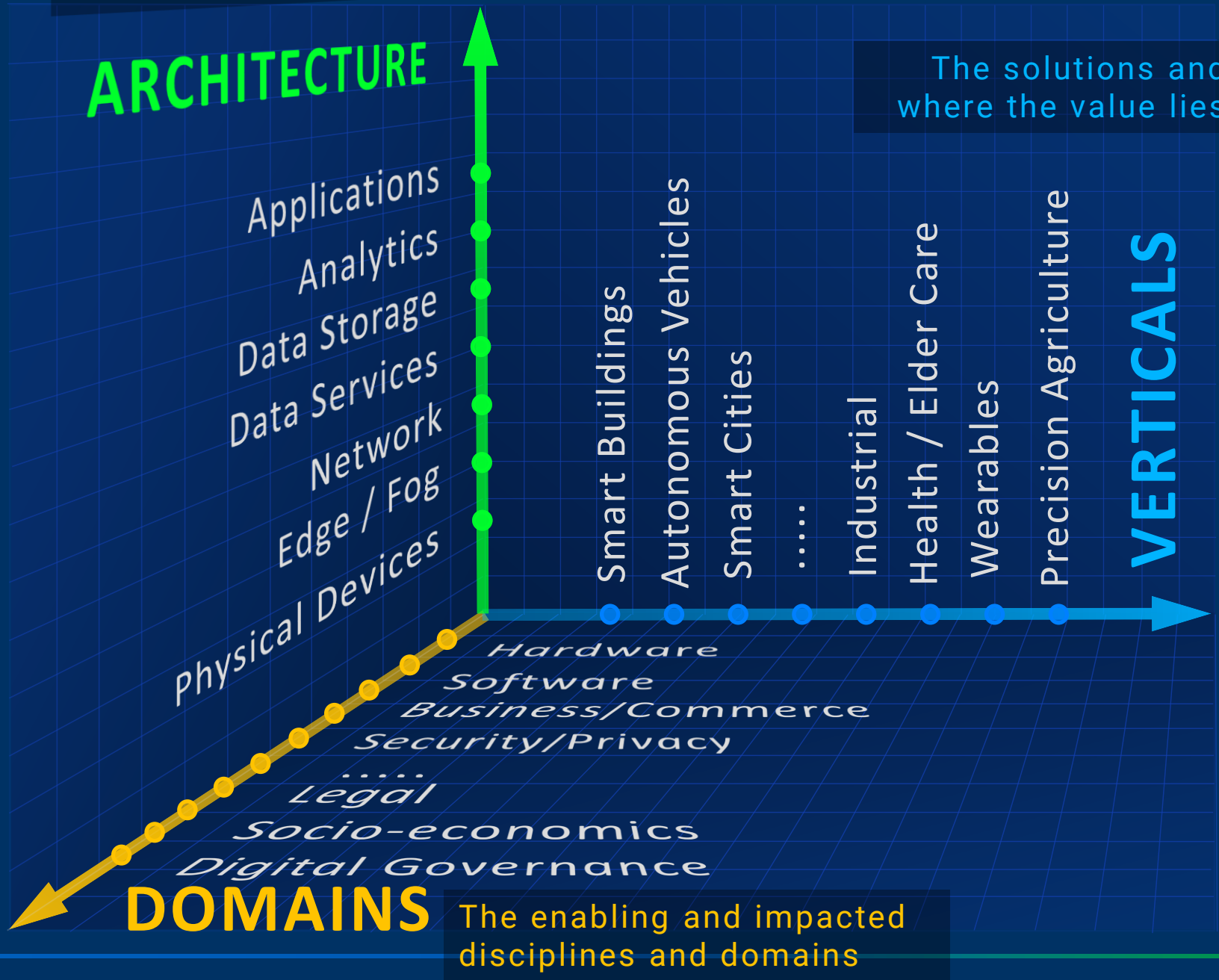
physical Devices

IoT Space

Think 3D

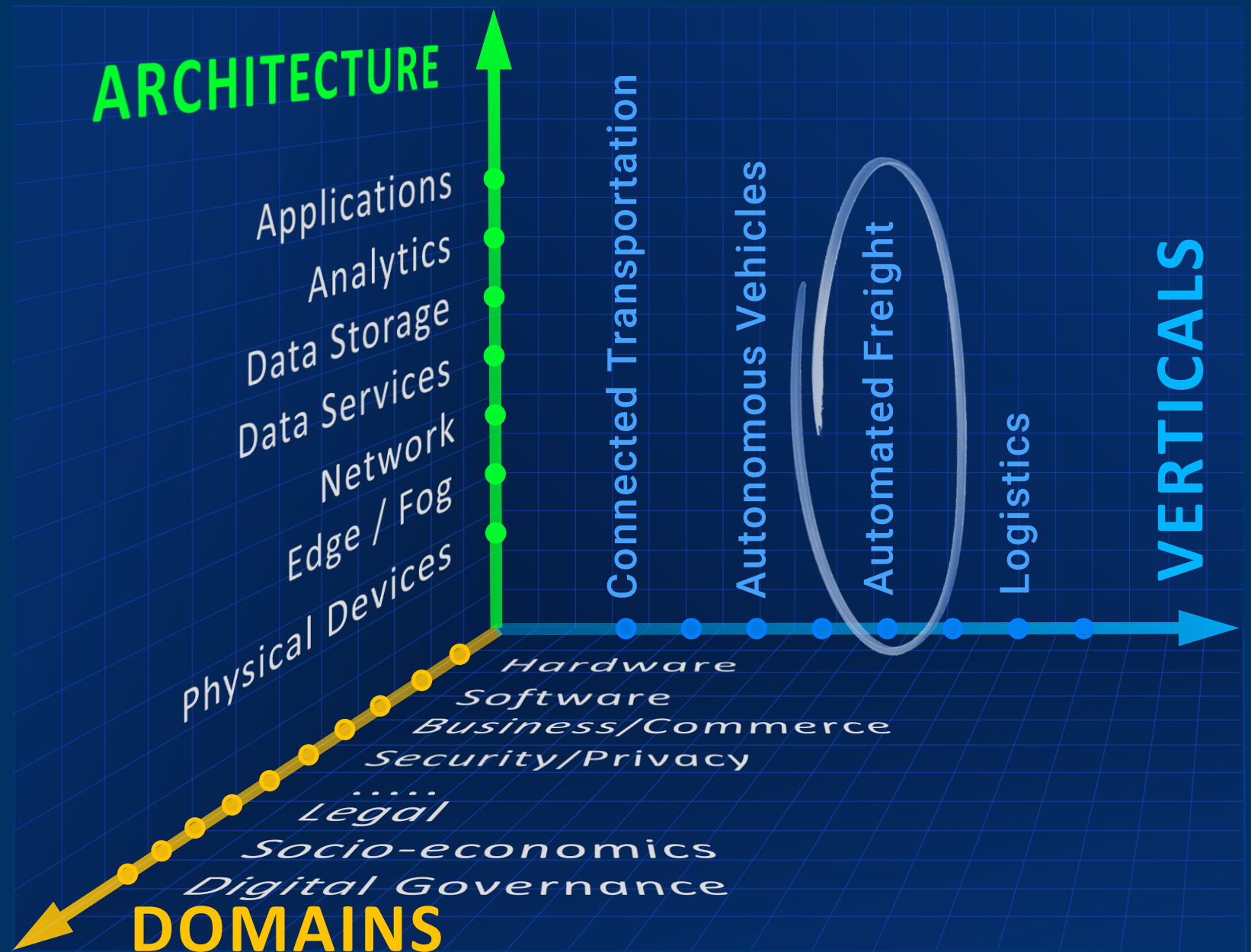
The structure and the bits and pieces

The solutions and where the value lies



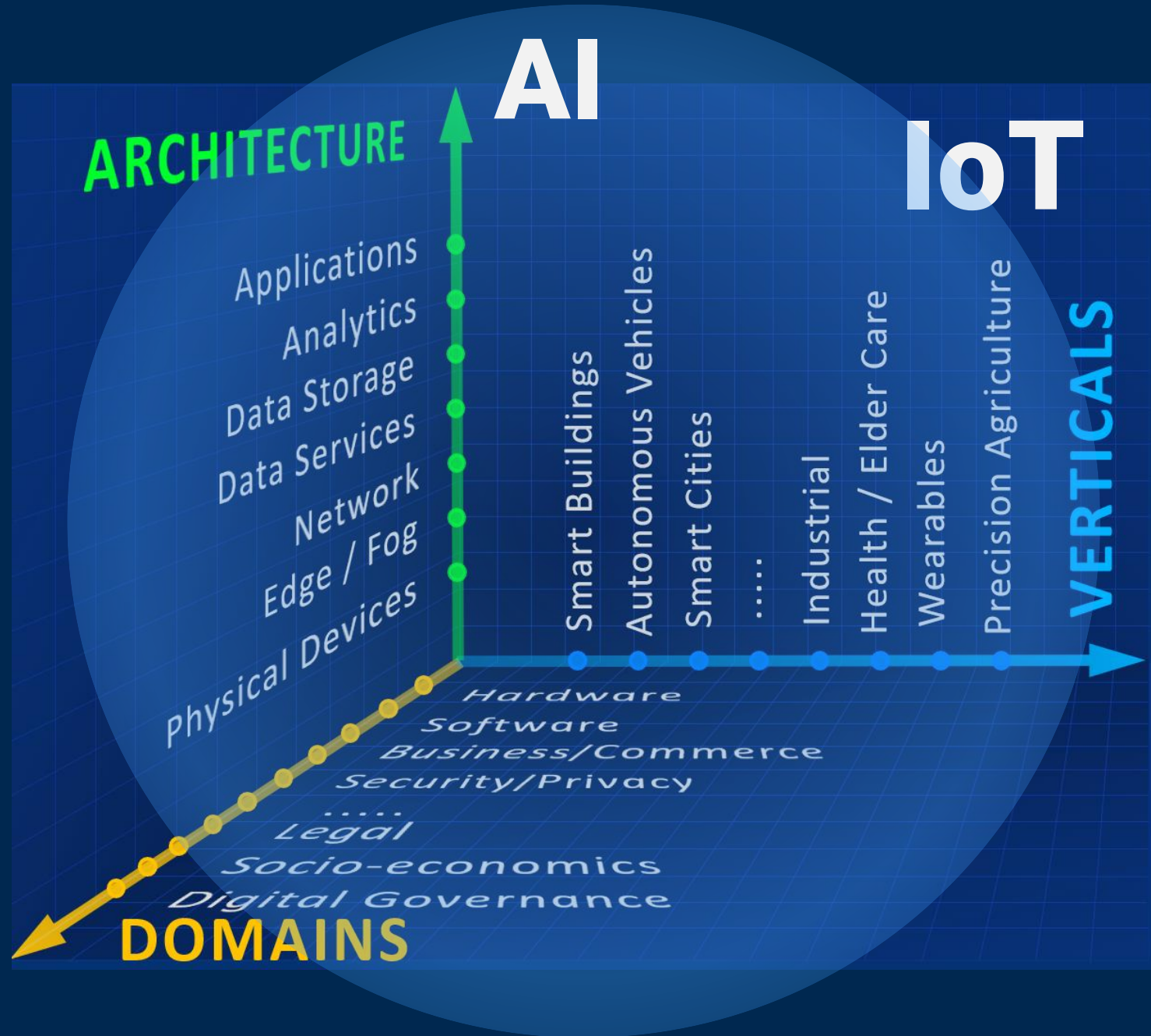
IoT Space

Think 3D



IoT
+
AI

AIoT



AIoT Application in Automated Freight

AIOT APPLICATION

- container geolocation
- freight sensing –
 - temperature, vibration, motion, moisture, ...
- automation –
 - loading, unloading, distribution, checkout
- physical access control and tampering detection
- driver/operator performance monitoring



R&R IMPLICATIONS

Risk Mitigation

- perishable spoilage
- damage or theft
- mislocation

Resilience Enhancement

- goods/payload recovery
- transportation rerouting
- preventive maintenance

R & R = Risk and Resilience

AIoT Application in Automated Freight

AIOT APPLICATION

- freight geolocation
- autonomous navigation
- freight sensing –
 - temperature, vibration, motion, moisture, ...
- human sensing and avoidance
 - under or near drone or sidewalk delivery robot
- infrastructure inspection (drones)



R&R IMPLICATIONS

Risk Mitigation

- geofencing
- damage or theft
- power management

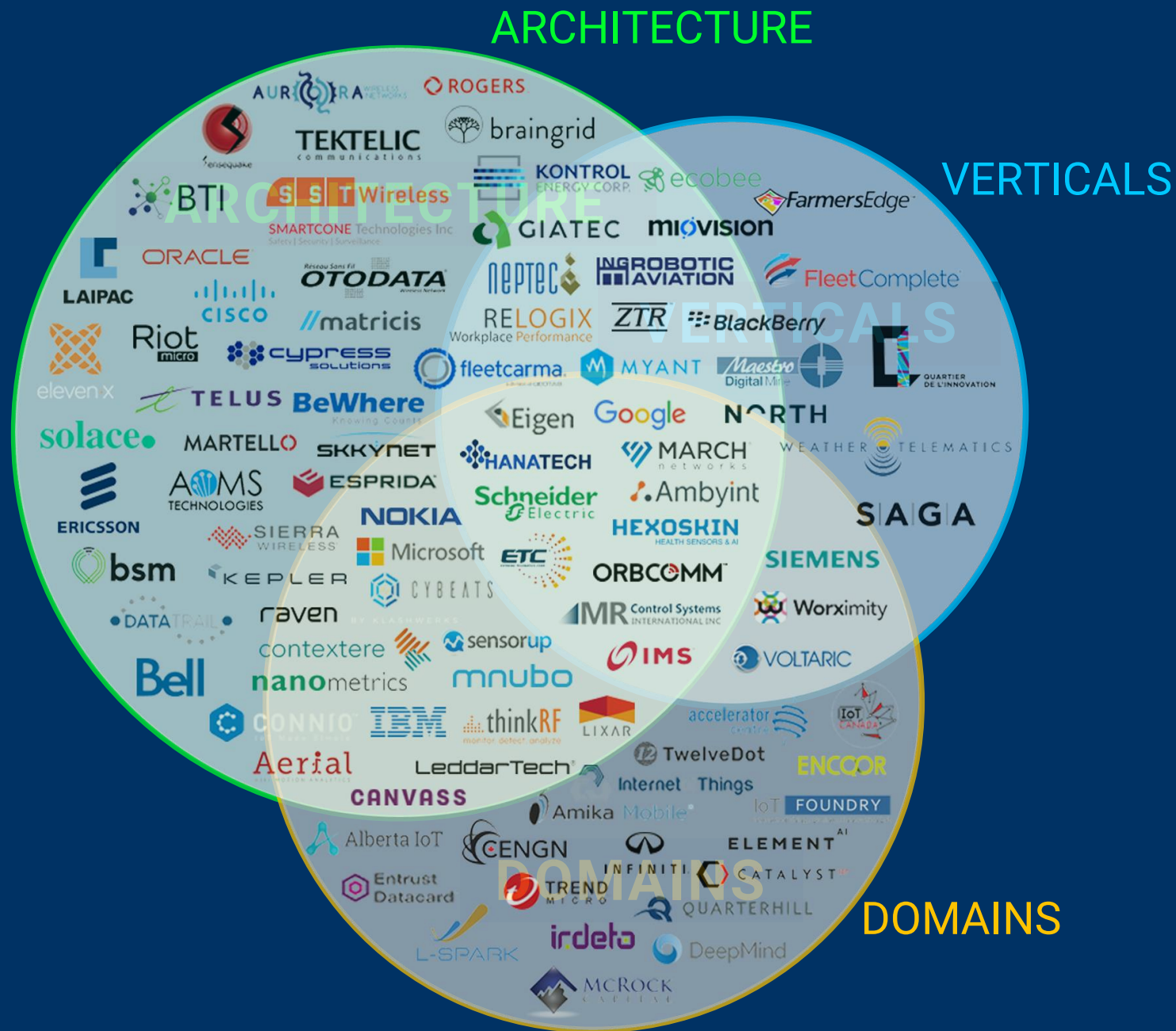
Resilience Enhancement

- goods/payload recovery
- preventive maintenance

R & R = Risk and Resilience

Canadian IoT Community

But –is it cohesive
and mutually
supportive?



AIoT Canada

Non-profit Organization

Fostering Canada's economic growth through innovation and accelerated adoption of the Internet of Things and Artificial Intelligence (AIoT) technologies and the advancement of Canada's global AIoT leadership.



Building AIoT ecosystem by

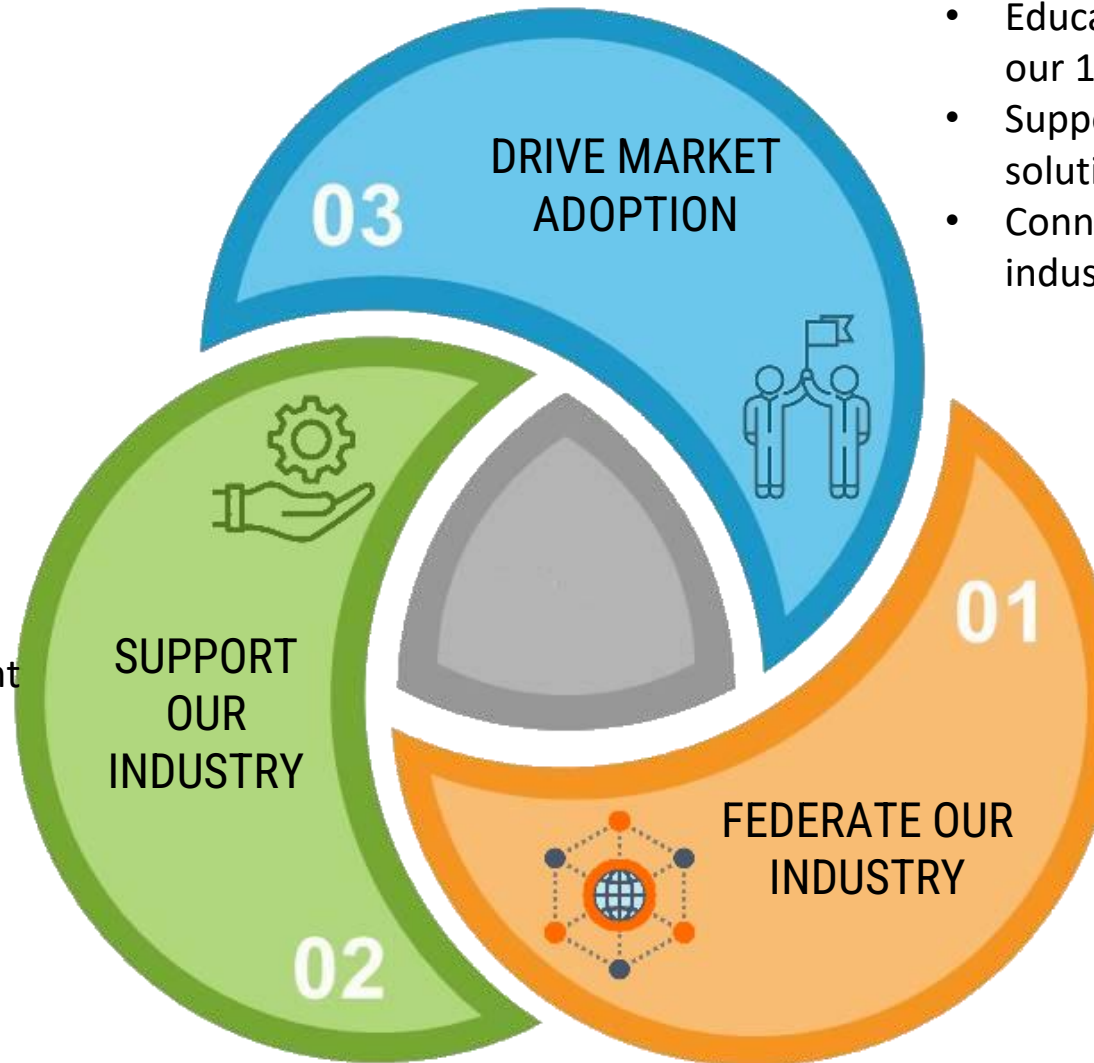
- connecting our members and the broader AIoT community
- learning events and member meetings
- Community Portal: [AIoT Canada « connect » B2B portal.](#)
- Bring industry, government, and academic stakeholders together to leverage and apply their common wisdom in establishing a national AIoT strategy and framework.

ACCELERATE THE ADOPTION OF AIOT

Join us: connect.aiotcanada.ca – Your portal



- Help the AIoT industry develop better products and solutions
- Help the AIoT industry develop its capabilities (partners, talents, \$\$)
- Help AIoT industry to implement shared AIoT resources and infrastructure



- Educate and promote the benefits of AIoT in our 12 markets
- Support the 12 markets to adopt AIoT solutions for their Digital Transformation
- Connecting the 12 markets to the AIoT industry for implementations and operation

- Become the voice of the AIoT industry (territorial focal points)
- Promote the Canadian AIoT industry
- Addressing global AIoT sustainability challenges
- Influencing AIoT policies and best practices

AIoT → Economic Value

How do we leverage AIoT
for national economic growth?



National AIoT Strategy





AIOT CANADA'S ROUNDTABLE ON AIOT STRATEGY (MAY 5TH) OBJECTIVES AND STRUCTURE

Six working groups with 5-6 participants each, from industry (mainly), academia, and government

Roundtable Mission

Leverage the combined wisdom and experience of industry, government, and academic leaders to identify the needs and actions to be addressed by a national Canadian AIoT strategy, aiming to elevate Canada's economic growth and competitiveness through AIoT.

Question 1

What are the **OPPORTUNITIES** in your vertical where AIoT product innovation or adoption can significantly contribute to the growth of the Canadian economy ?

Question 2

What are the **CHALLENGES** in addressing and realizing the opportunities ?

Question 3

What are the **SOLUTIONS** for the top opportunities/challenges in questions 1 and 2 - and how would these solutions address them ?



AIOT CANADA'S ROUNDTABLE ON AIOT STRATEGY (MAY 5TH) SUMMARY - KEY POINTS

Opportunities

Connected Transportation

- Energy management, Climate/pollution control, ...

Smart Buildings

- Energy management, Empathic buildings, Building lifecycle, Non-invasive healthcare etc.

Smart Agriculture

- Productivity and efficiency optimization through automation, Precision resource application (water, fertilizer, pest control, other)

Challenges

Heterogeneity:

- IoT as a multi-technology space
- Lack of standards
- Lack of regulation and governance
- Unarticulated national framework or strategy
- Seeming lack of urgency and leadership in Canada for all of the above
- Lack of (IoT+AI) community awareness among providers and adopters

Data Trust and Access

Talent and Skills

Proving a Business Case

Solutions

- Develop an ecosystem (19)
- Develop a shared vision, community framework, and plan (20)
- Develop a data trust (23)
- Support innovation programs (16)
- Stimulate adoption (18)
- Standards and governance (19)
- Skillset development (18)

The AIoT Ecosystem Imperative

- Clear consensus that we need a **national AIoT ecosystem**
- AIoT Canada embarked on developing a **National AIoT Strategy**
 - establishing a National Strategy Council (NSC) to guide strategy development
- A robust **AIoT ecosystem** is a prerequisite for Automated Freight advancement and adoption
 - *Lesson taken for Automated Freight → needs its own ecosystem*





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Automated Guided Vehicles (AGV)



Abraham Sir

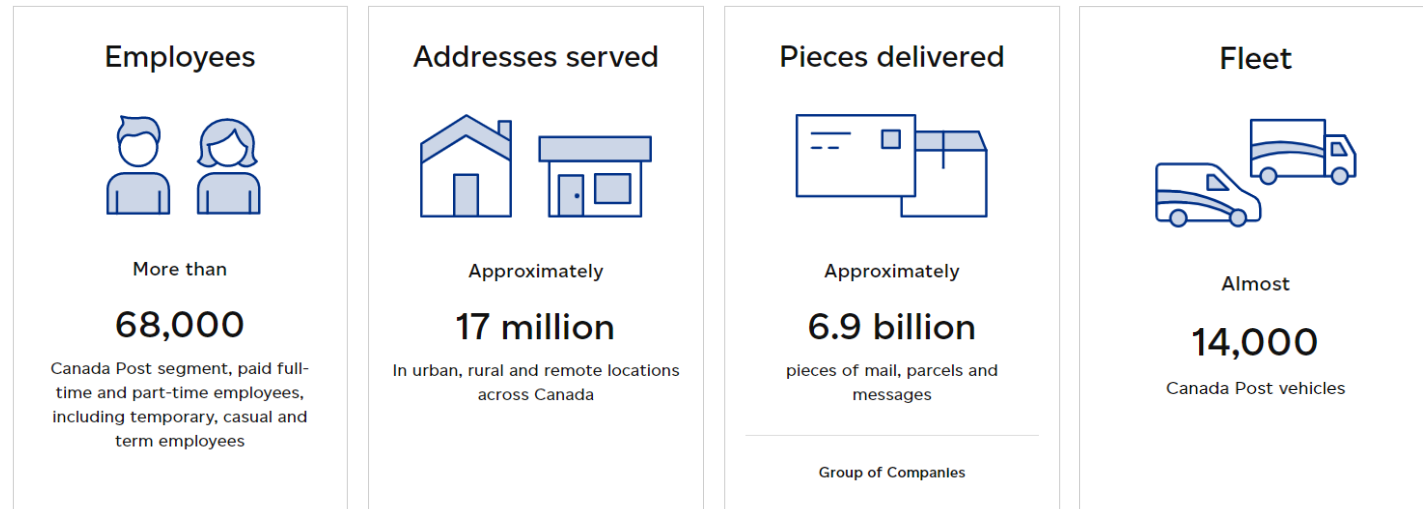
Manager, Automation
Process Engineering



New Albert Jackson Processing Centre



What's Happening at Canada Post?



5 Target areas



1. Expanding capacity
2. Improving service and tracking
3. Enhancing our retail services
4. Helping Canada stay connected and businesses succeed
5. Delivering a seamless and superior customer experience

What is an AGV?

- AGV: Automated Guided Vehicle
- In this case it refers to an automated pallet transporter



What is the objective of using AGVs?

AGVs are an additional tool to manage growth, by supporting Operations with repetitive material handling activities

What have we done so far?

- Pilot successfully completed in 2019 in Toronto
- RFP completed and vendor selected in 2021
- Deployment of 10 units in Montreal

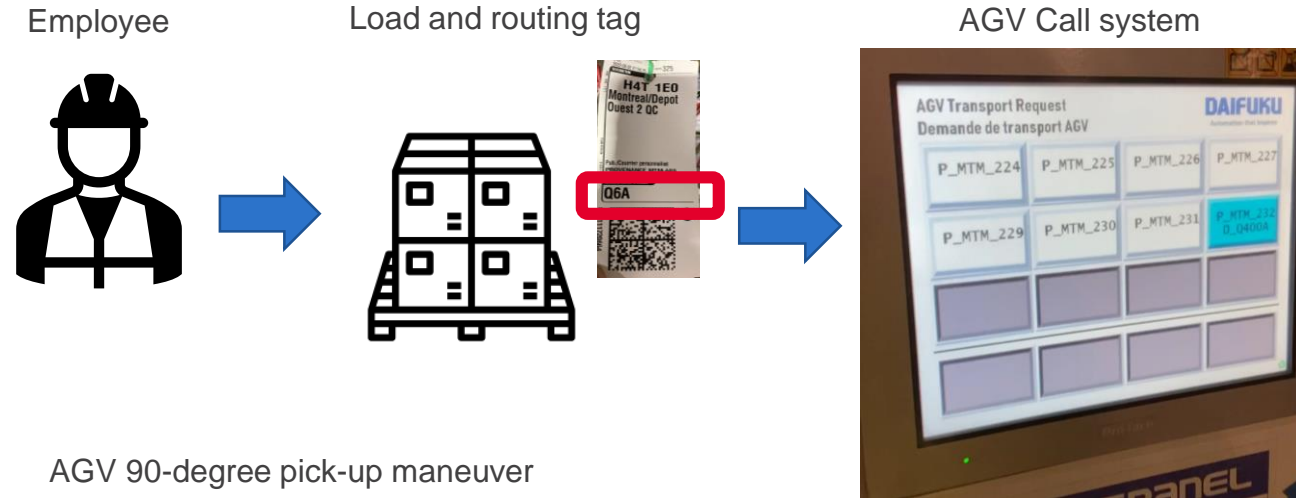
How are we using the AGVs?

- Transporting loads over long distances (A to B) from work centers to dock staging
- Employees call the AGVs using a touchscreen mounted near the pick-up location
- As jobs are created, the system builds a queue and assigns them to the vehicles as they become available
- When there's nothing in the queue, the AGVs will automatically self park and charge

What we're keeping our eye on:

- Adding more intelligence to AGV calls
- Integration to upper level systems
- Route and scheduling learning
- Next generation AGV

Step-by-step to call an AGV



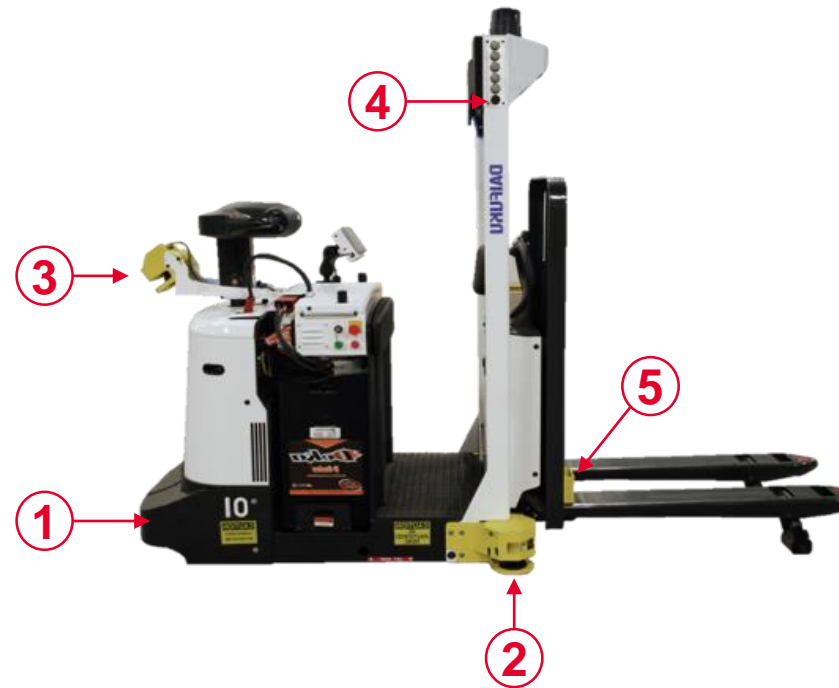
AGV 90-degree pick-up maneuver



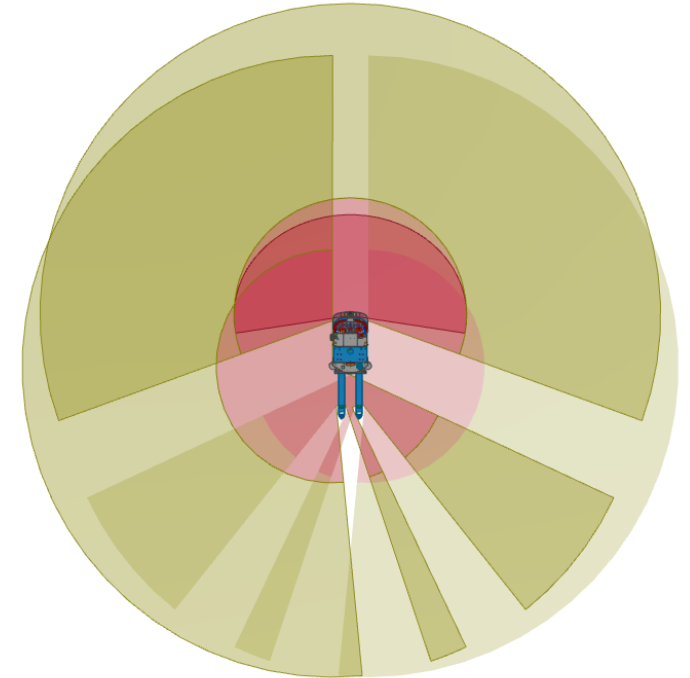
Safety Features

- Sensors
 1. Front (bottom)
 2. Sides and back (bottom)
 3. Front (top)
 4. Sides (top)
 5. Load presence
- Safety zones
 - Slow
 - Controlled stop
 - Emergency stop
- Safety mat
- Light indicators
- Sound indicators
- E-stops

Sensor locations

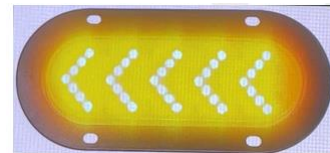
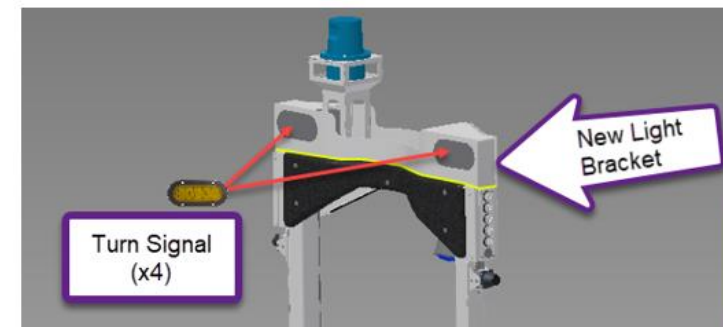


Top-down view of safety zones



Upcoming feature

- Redesign of light indicators: turn signals and reverse light
- Improve communication and predictability



Employee engagement and collaboration

Critical to the success of this project, the team made it a priority to communicate and collaborate as early as possible with committees both National and Local

Unions and joint health and safety committees both National and Regional

- Communication as early as possible
- Addressed concerns and find solutions to problems
- Technology demonstrations

Employee engagement

- Communication as early as possible
- Listened and implemented employee feedback





How the UK is Collaborating to Drive the Future of Freight

Mark Cracknell
5th October 2022





Champions of the UK Connected and Automated Mobility ecosystem

Bring together industry, government, and academia to enable to development and deployment of CAM in the UK.

Insights

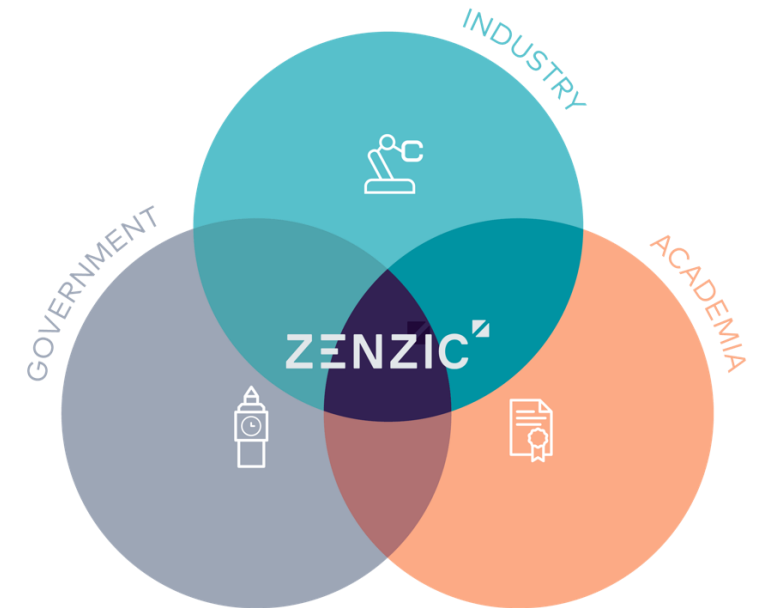
Hold the strategic vision and roadmap for the UK CAM ecosystem, providing informed guidance to government, industry and academia.

Innovation

Channel investment into targeted CR&D into late-stage tech and CAM Scale-Up programmes accelerating new technology the CAM market opportunity.

Collaboration

Provide the trusted brand and front door to a collaborative CAM supply chain, promoting and driving inwards investment.



Effective Innovation relies on both Insights and Collaboration.

UK National Policy

£200m public/private investment into testing infrastructure - The world's only coordinated ecosystem



£250m public/private funding for collaborative R&D
80+ projects to date



Open regulatory approach – you can test on UK roads now



ZENZIC



**Law
Commission**
Reforming the law



Centre for Connected
& Autonomous Vehicles

R&D: £250m across 90+ projects



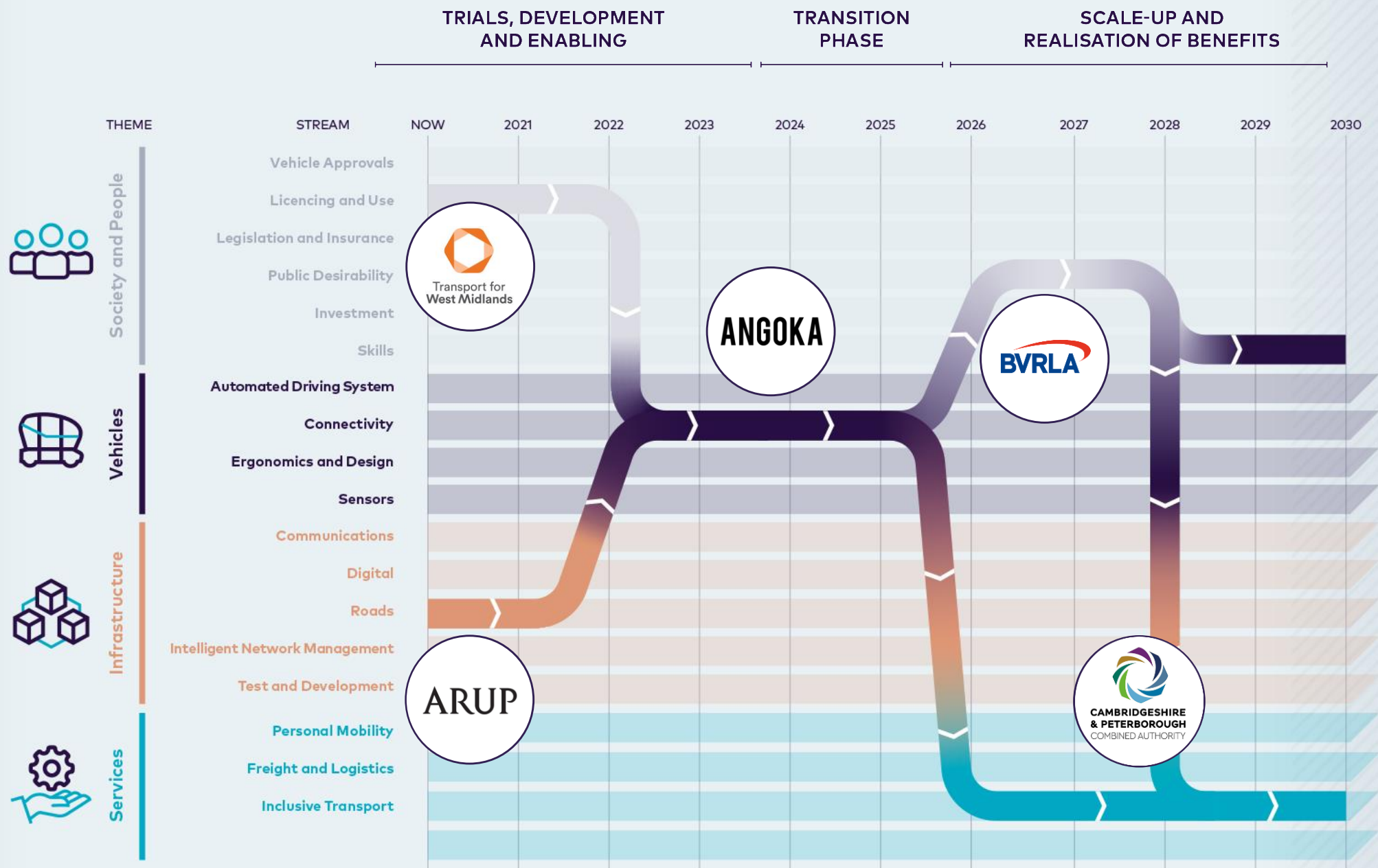


"By 2030, the UK is benefiting from proven connected and automated mobility, with an increasingly safe and secure road network, improved productivity and greater access to transport for all.

Next-generation services and technology and designed and developed in the UK, powered by high-value skills and a strong supply-chain, driven by public demand.

We are a world leader"

UK CAM Roadmap to 2030 – Vision Statement





UK CAM Supply Chain

Framework categories

Top-level CAM supply chain categories

RTO
(Research
and
Technology
Organisation)

OEM/
ASDE

Finance

Tools

Software

Hardware

Test
services

Engineering
Services

Communication
and Data
infrastructure

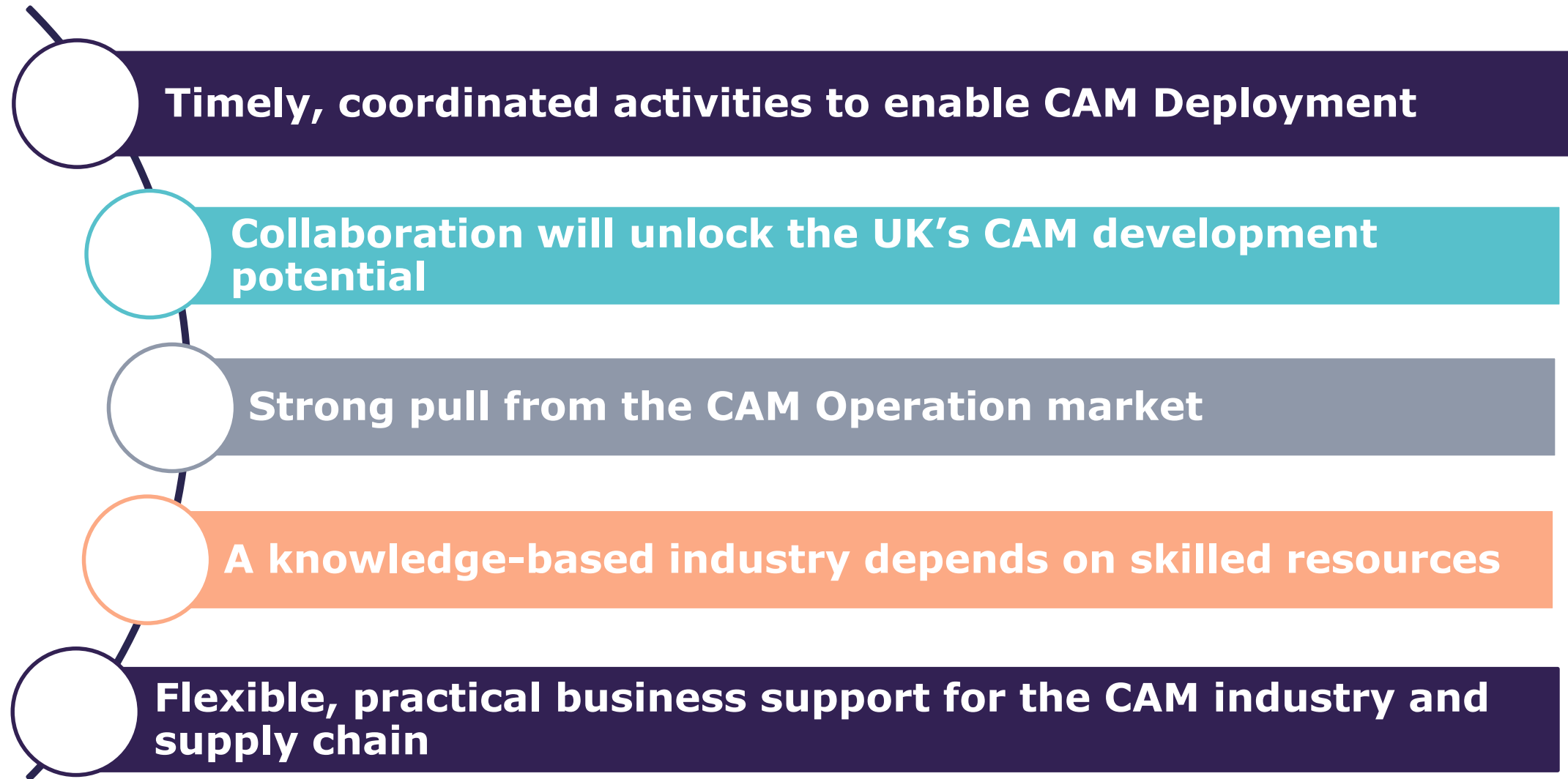
Operators

Insurance
and legal

Other

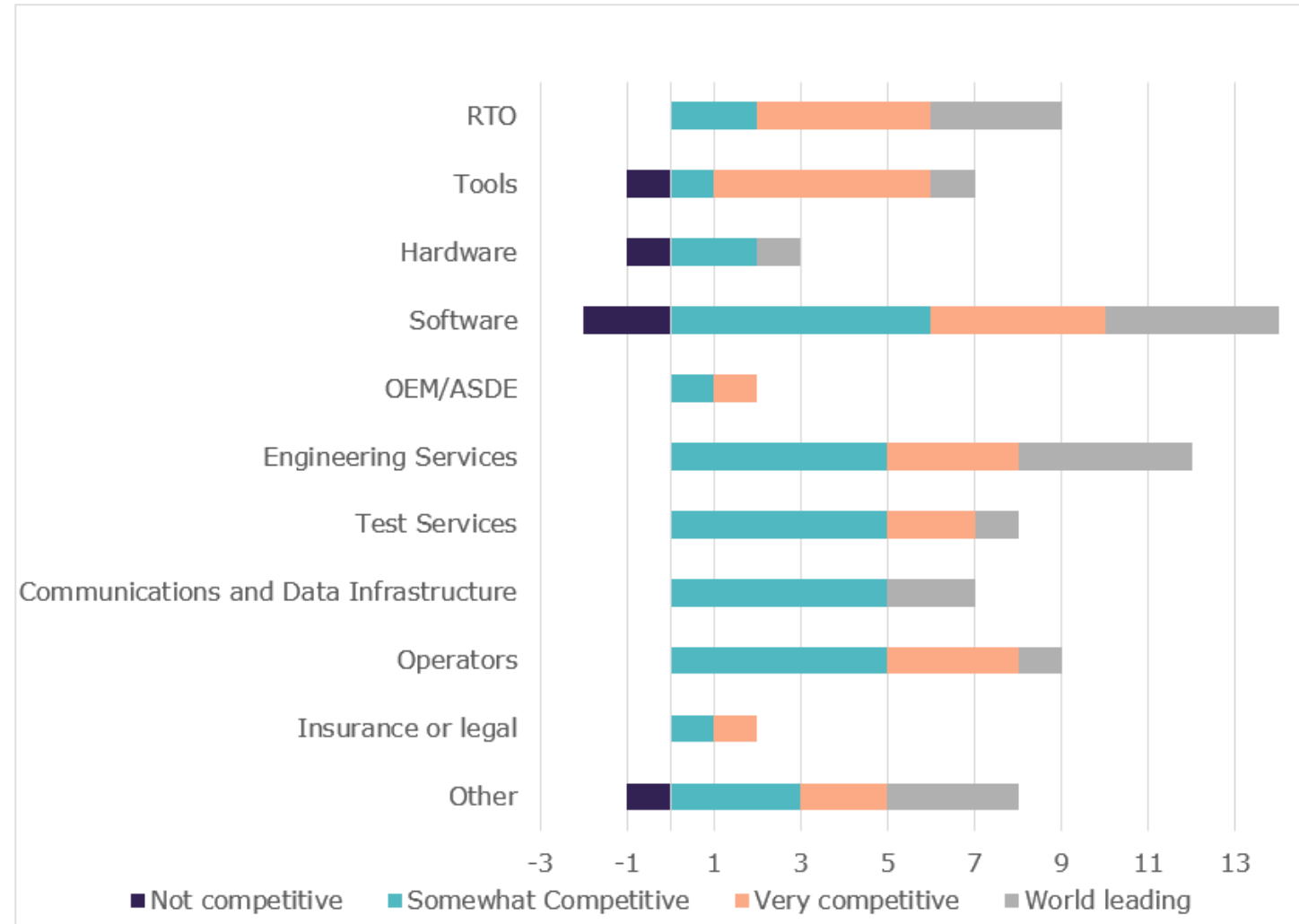


Core themes



View on UK competitiveness

Figure 3.4: View on UK competitiveness by primary category

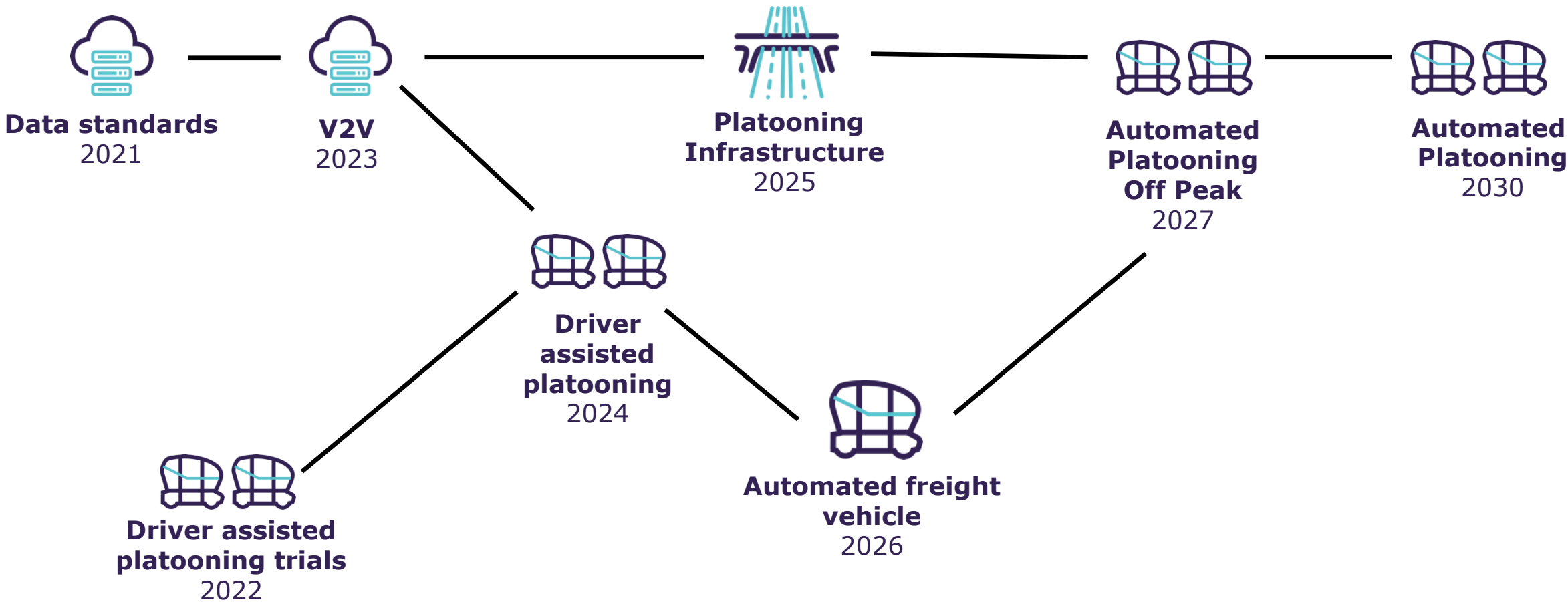


Source: Author generated.



Freight and Logistics

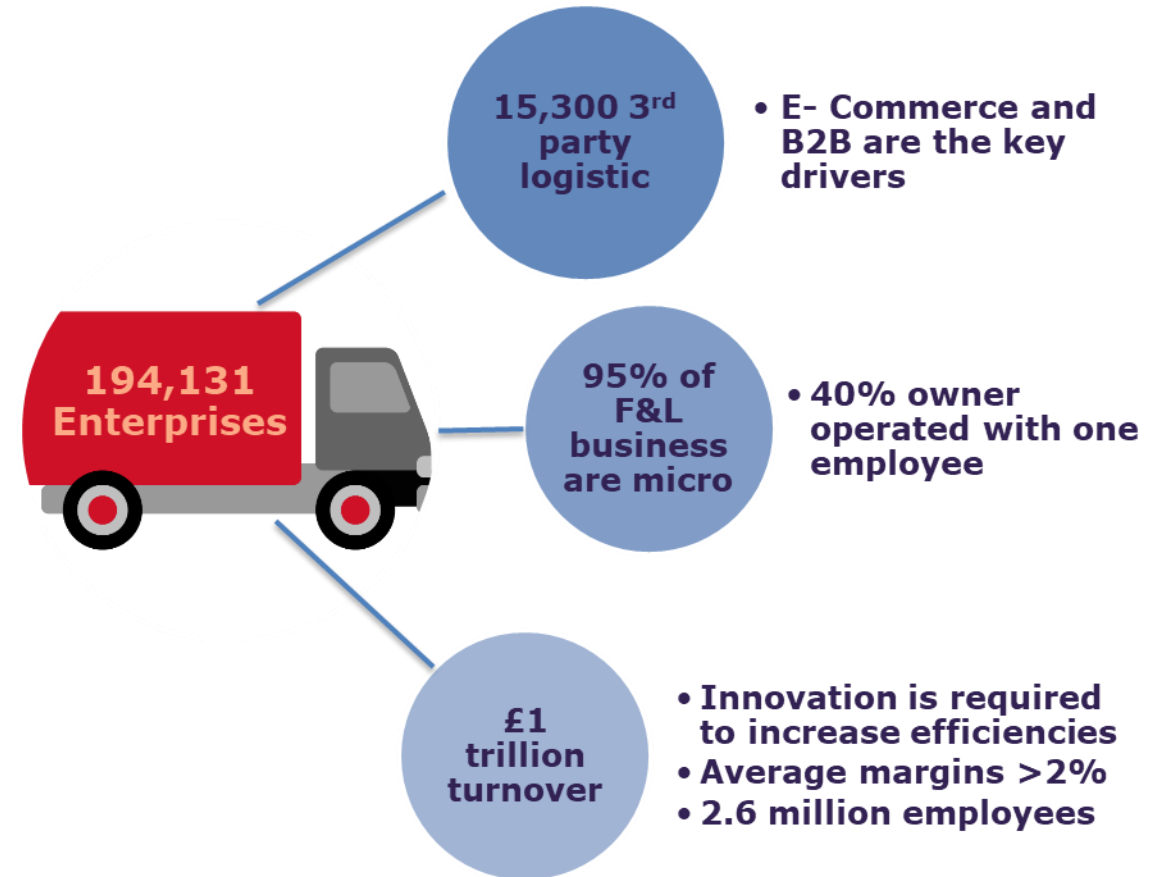
Automated heavy freight



State of play

The F&L sector is historically challenged by persistent issues:

- fragmentation (a few big players and many small operators),
- driver hours and driver shortages (an ageing, mostly male workforce with many from Europe),
- the rising cost of congestion, clean air zones, curbside parking fines, etc.
- increasing concern about air quality and noise pollution (night time deliveries),
- Small, ageing, and “grey” fleets.



Logistics Report 2020

Source: Mintel – Logistical Services – UK (December 2019)

2021 has seen a number of CAM partnerships in Freight and Logistics



Source: StreetDrone

Wilko's investment will accelerate the development and deployment of StreetDrone's Pix-E delivery vehicle



ocado
GROUP



ocado
GROUP
oxbotica

INVESTORS

Ocado partners with Oxbotica



**Aiming to integrate autonomous vehicles
into the Ocado Smart Platform**

PROSPECT

Asda partners with Wayve for autonomous van trial

22 September 2021

Asda is partnering with autonomous mobility start-up Wayve to trial self-driving delivery vans as part of its last mile fulfilment operation.

Asda is partnering with autonomous mobility start-up Wayve to trial self-driving delivery vans as part of its last mile fulfilment operation from early 2022.





Thank you

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zenzic.io

Driving Towards Autonomous Commercial Trucks

Dave Schaller
October 2022



North American Council for Freight Efficiency



- Unbiased, fuel agnostic, non-profit
- Mission to double freight efficiency
- All stakeholders
- Scale available technologies, ***guide future change*** and Run on Less demonstrations.

www.NACFE.org
www.RunOnLess.com



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Platinum



Gold



Silver



Bronze



Philanthropy

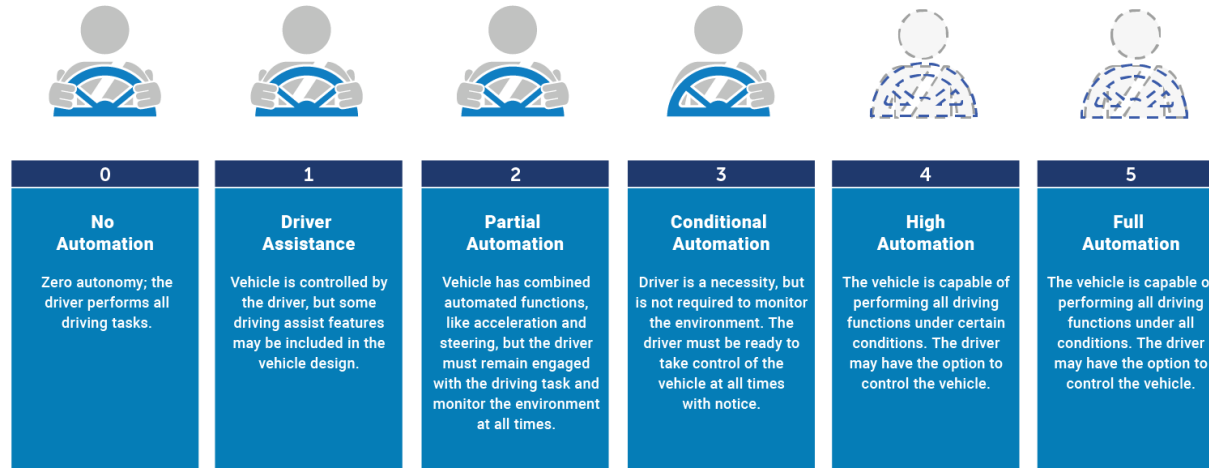


2022 Fiscal Supporters

Automated Trucks

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation



EVOLUTION TO AUTONOMOUS TRUCKING



Tech Growth For Automation

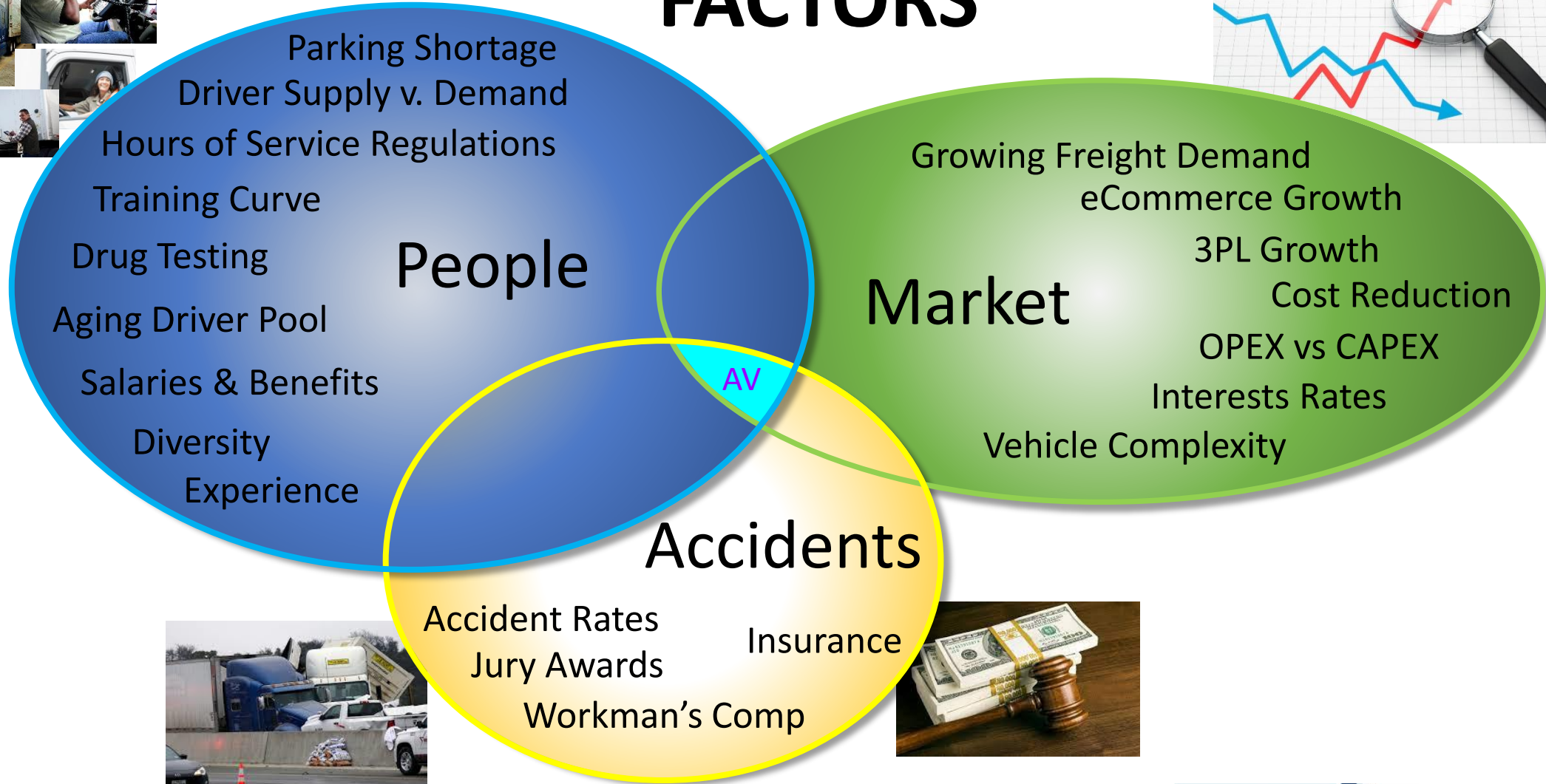
- Automated Transmission
- Collision Mitigation System
- Active Lane Keeping
- Camera System
- Telematics
- Tire Pressure Monitoring

www.nacfe.org/technology/two-truck-platooning/

Why AVs?



FACTORS

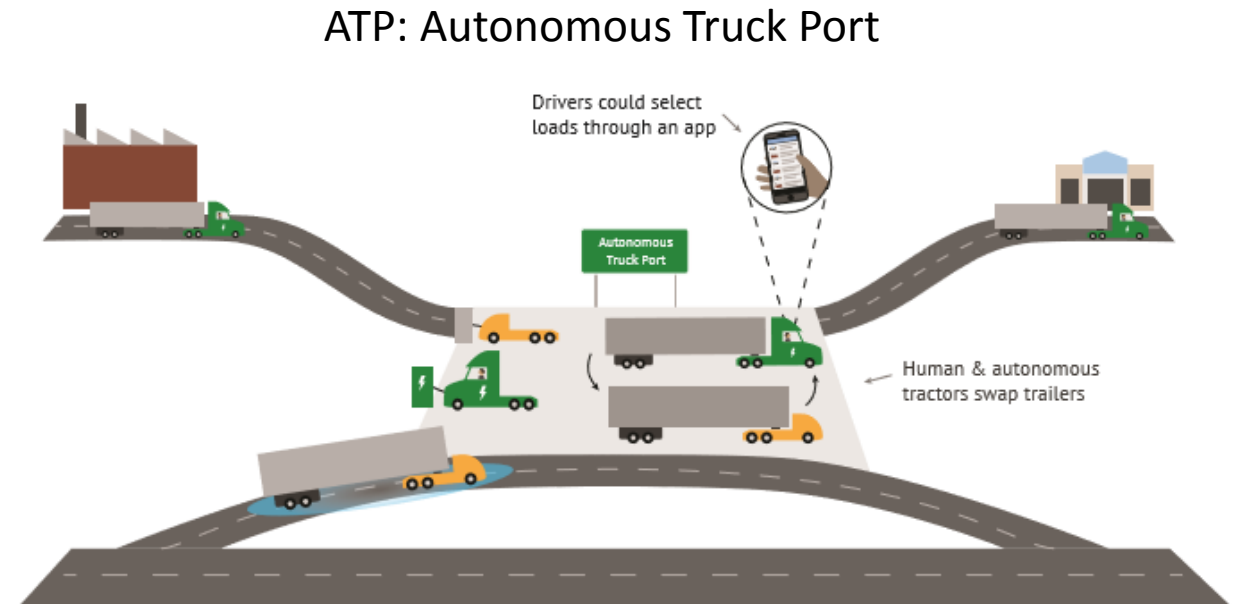


Different Scenarios for Autonomy

“Autonomous Trucks and the Future of the American Trucker”

By Steve Viscelli September 2018

1. Cooperative Adaptive Cruise-Control Platooning
2. Human–Drone Platooning
3. Exit-to-Exit Autonomous Trucks Plus Drone Operation
4. Driver-in-the-Sleeper Scenario (A.K.A. Autopilot)
5. Exit-to-Exit Autonomous Trucks
6. Facility-to-Facility Autonomous Trucking



<https://gspp.berkeley.edu/centers/cepp/news-and-publications>

New Companies in Truck Autonomy



tu simple

TORC
ROBOTICS



LOCOMOTION

Outrider



NURO

Gatik



Aurora



NACFE
NORTH AMERICAN COUNCIL FOR FREIGHT EFFICIENCY



WAYMO

SOLO AVT



einride



Thought Leadership Blogs



Autonomous Time

Autonomous vehicle technology could transform freight efficiency by an exponential factor.



NACFE's Three Laws of Autonomous Trucking

The autonomous trucks of the future likely will need some permutation of these laws to guide their decisions in complex daily life and to deal with "edge" scenarios.



Autonomous Trucks and Law Enforcement

Driverless trucks won't just stop for fuel and maintenance. There will be times they will need to respond to the directions of law enforcement officers and emergency response personnel. But how?



The Insurance Angle

A prime example of just how disruptive autonomous trucks will be to the logistics status quo can be seen by considering how this technology will affect the insurance industry.



Autonomous Partnership to Focus on Uptime

A new strategic partnership between Waymo and Ryder System will focus on an overlooked aspect of autonomous truck operations.



In the Beginning

Autonomous trucks won't just appear everywhere at once. Their deployment will be measured, studied and tempered by some very harsh operational realities.

39 Blogs by Jack Roberts & Mike Roeth dive into Autonomous Trucks



[Website Link: NACFE on Autonomy](#)

October 2021

Dangerous starts with a “D”

And so do these words about Drivers:

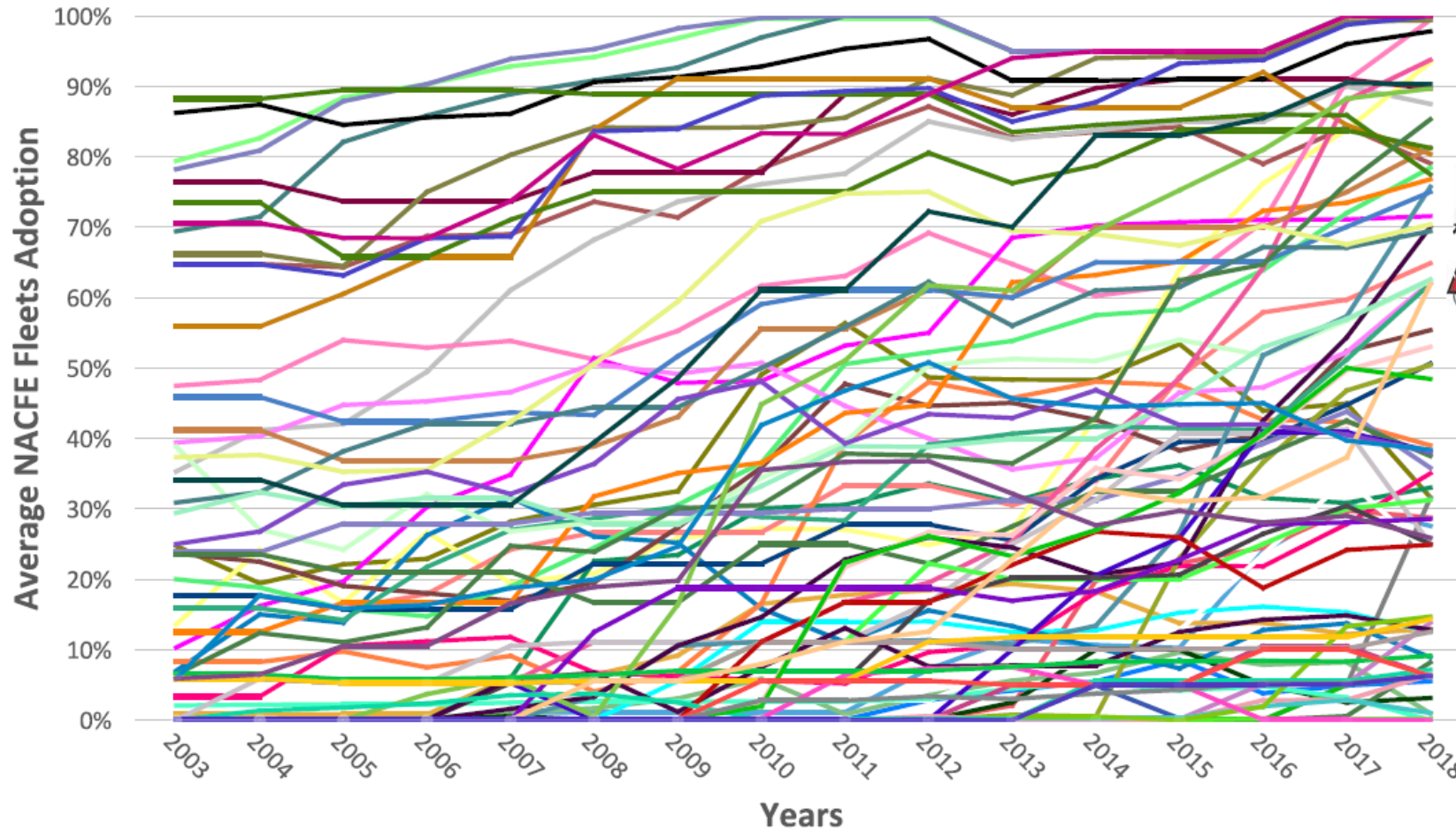
- Drunk
- Drugged
- Distracted
- Drowsy
- Disoriented (lost)
- Dining
- Decorating
- Disgruntled (road rage)
- Dogged
- Declining reflexes
- Dementia
- Dumb

Autonomous Vehicles don't have these issues !!

2019 Annual Fleet Fuel Study



All Technologies



<https://nacfe.org/annual-fleet-fuel-studies/>



CCS1



CCS2



CHAdeMO



J1772



MCS or CharIN



[NACFE.org](https://www.nacfe.org)

**Let's Stay Connected...
... And charged up!**



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