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Tomorrow's Mobility…Is Here Today!

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Leveraging on Toll Operators' Experiences as First-Generation Digital Mobility Providers

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What is Digital Mobility?

- We are now in the Digital Age where the 'Internet of Things' is rapidly evolving i.e.
    - Everything and Everybody is Connected
    - Connectivity leading to convergence of everything

- Huge socio-economic and user benefits but major challenges in transitioning and transforming existing business models

- Digital Transformation is enabled by increased harmonisation, standardisation and interoperability

- Evolution through 'Learning by Doing'

- Toll Operators were early adopters of this Digital Transformation
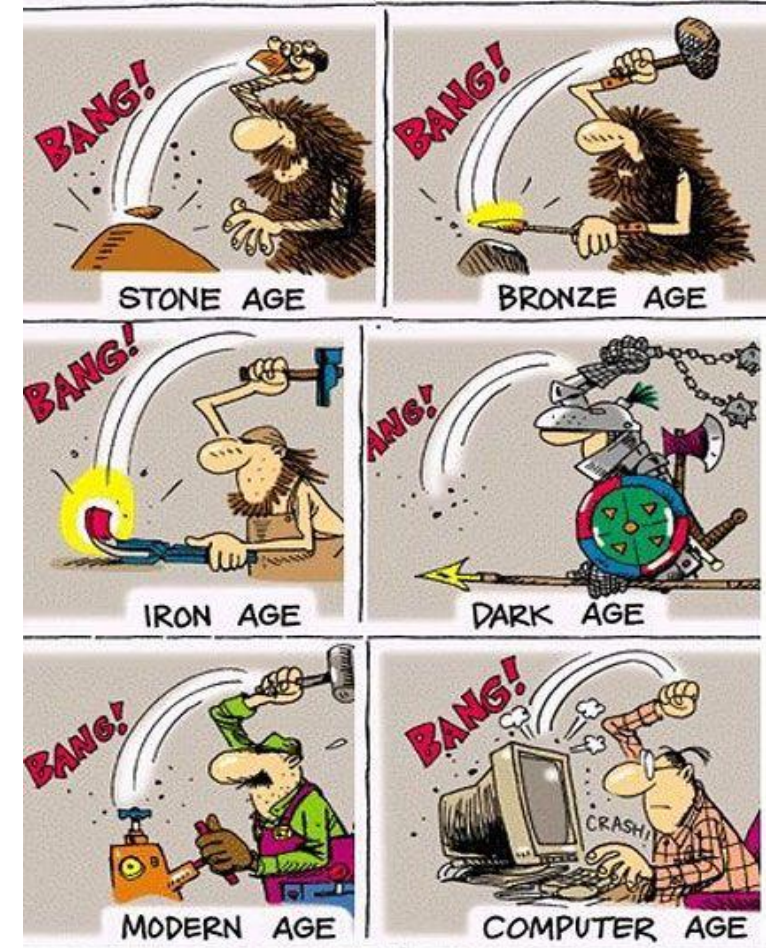
What is Digital Mobility?

- **Digitisation** is the process of converting information from a physical format into a digital one.

- **Digitalisation** is the process of leveraging digitisation to improve business processes.

  - In the context of Transport, **Digitalisation** is the increased use of digital (integrated advanced sensor, computer, electronic and communication) technologies and processes to promote safer, more efficient and sustainable systems for the movement of people and goods.

- **Digital Transformation** is the impact caused by the process of digitalisation.
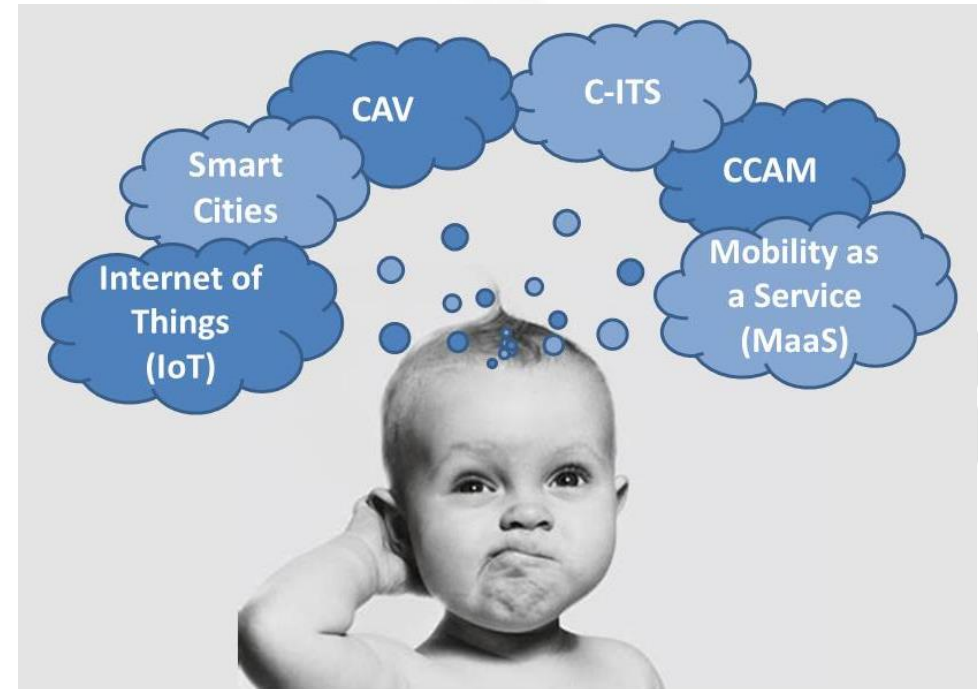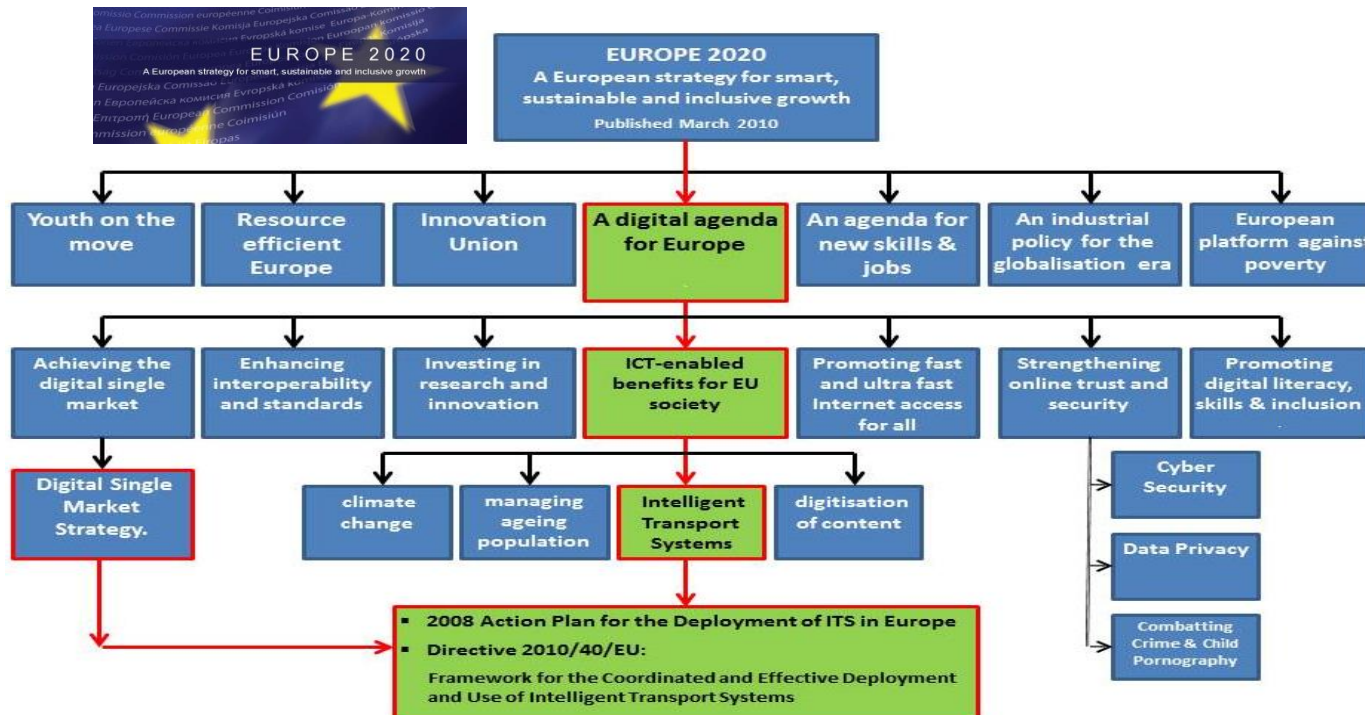
What is Digital Mobility?

- **Cooperative ITS (C-ITS)** refers to the harmonisation of standards and interoperability between technologies and processes related to vehicles and infrastructure capable of communicating with each other and with road users through V2V, V2I,or V2X technologies and the plethora of resultant applications and services.

- **Cooperative, Connected and Automated Mobility (CCAM)** refers to connectivity and interoperability between C-ITS and other harmonised digital systems, services and applications in a multi-modal transport environment.

- **A Digital Transport Network (DTN)** is the adoption of digitalisation as an integrated component of a well-interconnected, interoperable and efficiently managed transport system to improve the safety, security and environmental performance of the transport sector in Europe.

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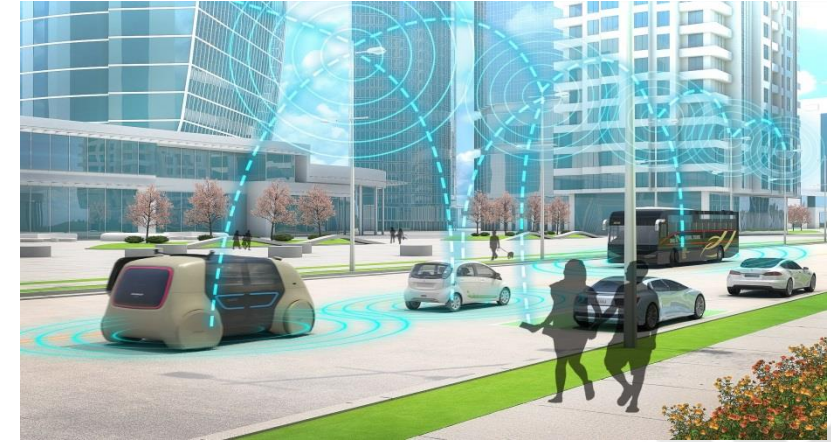
What is Digital Mobility?

- ITS is Digital by definition so is a good fit to EU 'Digital Agenda for Europe' flagship initiative

- EU Digitalisation strategy is to develop a seamless digital layer through the entire single European transport area which will form a critical part of multi-modal transport infrastructure required to "Connect Europe"
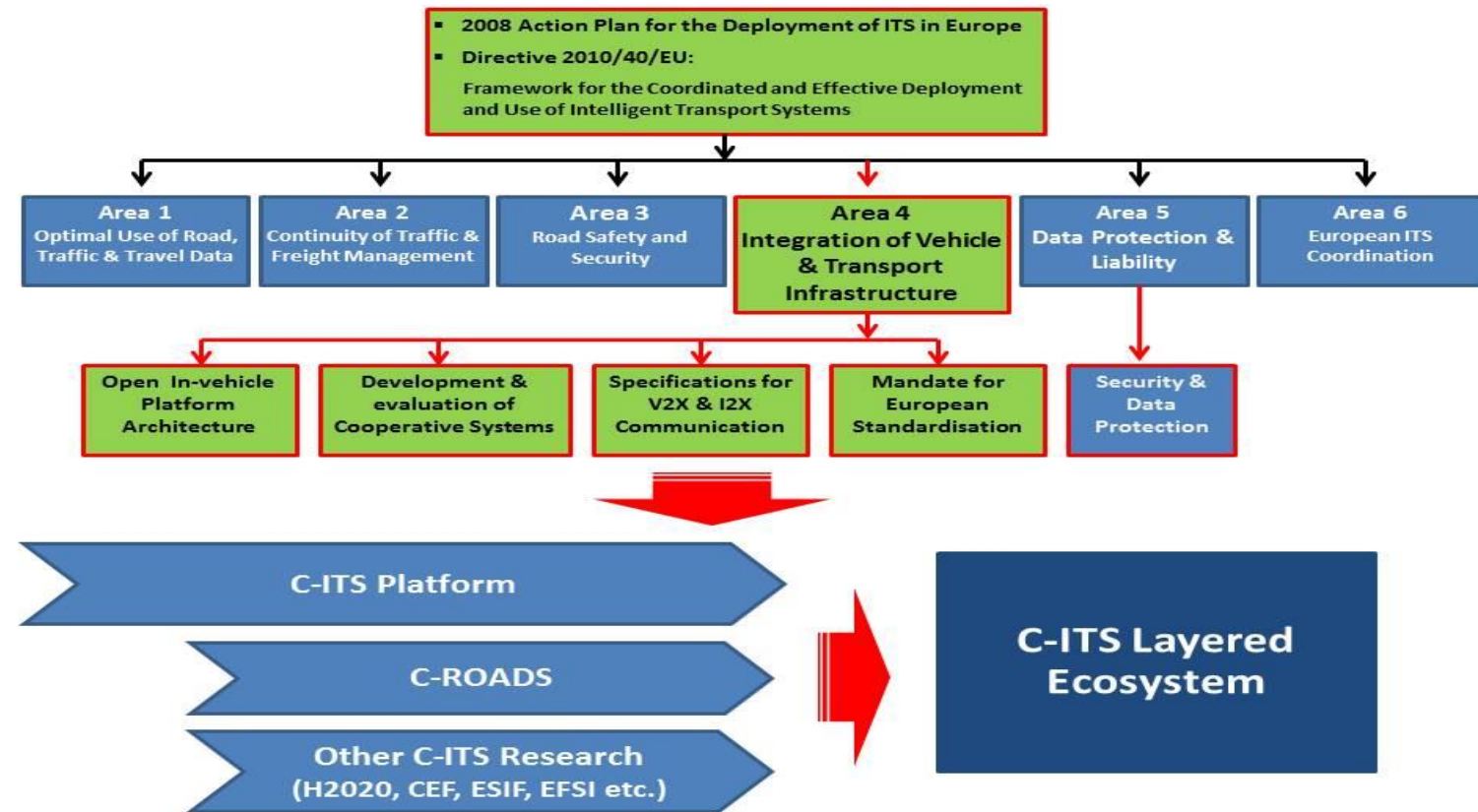
What is Digital Mobility?

- ITS Directive and Priority Action Plan set the ball rolling:

- 6 Priority Areas covering 24 Actions

- Common theme is harmonisation, standardisation and interoperability

- Progress in all 6 priority areas is aligned to the EU Digital Agenda

- All EU Directives are guided by this digitalisation network policy.
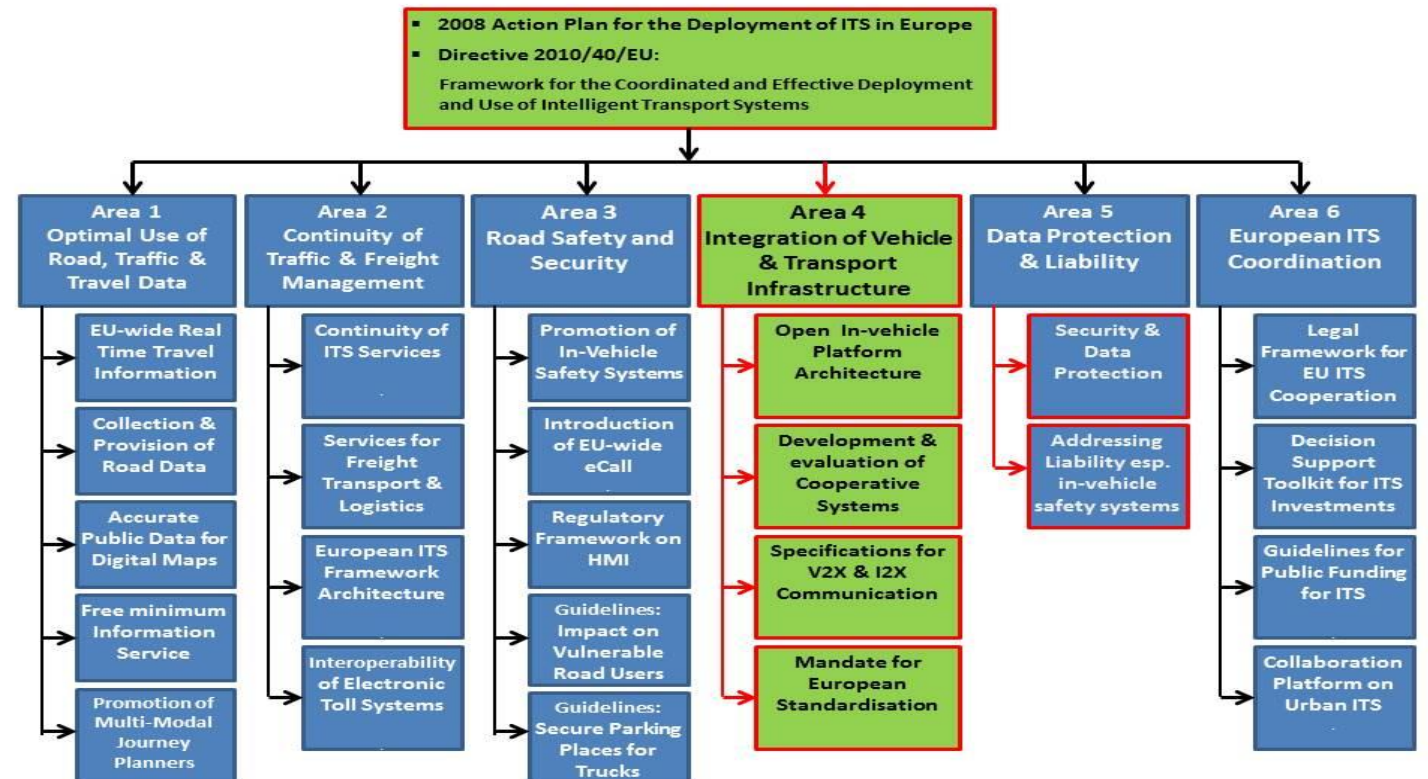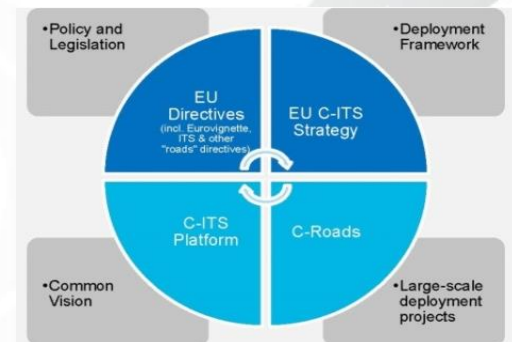
What is Digital Mobility?

- There has being a strong focus on Connected and Autonomous Vehicle related actions.

- Technology coming to market but very little understanding about how best to adapt that technology into the wider transport network

- The EC addressed this challenge through a series of parallel coordinated actions.

What is Digital Mobility?

- C-ITS deployment platform established in 2014 as a Cooperative Framework to develop a shared vision on interoperable C-ITS deployment.

- EC Strategy adopting a "learning by experience" approach.

- C-Roads Platform launched In 2016 to link C-ITS deployment activities, jointly develop and share technical specifications and to verify interoperability through cross-site testing.

- C-ITS Platform informed policy for development of an EU C-ITS strategy

- C-ROADS Platform informs standards for implementation in support of that policy and identification of potential solutions to some cross-cutting issues.
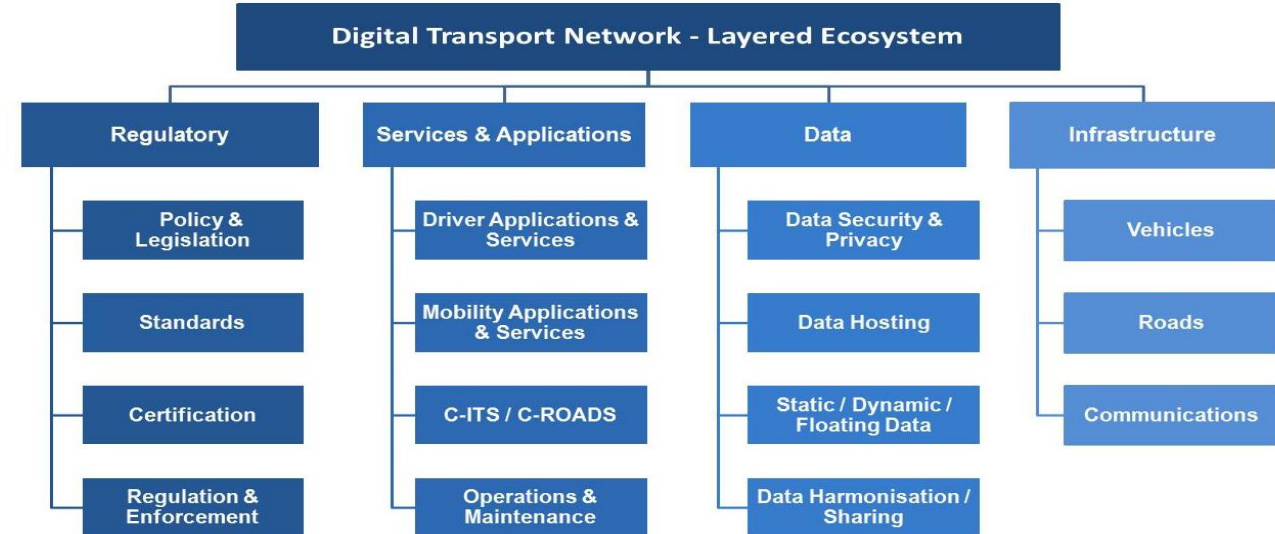
What is Digital Mobility?

- Adopted in Nov 2016, the C-ITS Strategy underlines the EC's view that:

"a digital transport system requires thinking in horizontal layers, cutting across different transport modes and industries, rather than in vertical silos (such as transport, energy or telecommunication).

Digital Transport Network - Layered Ecosystem

| Regulatory	Services & Applications	Data	Infrastructure
Policy & Legislation	Driver Applications & Services	Data Security & Privacy	Vehicles
Standards	Mobility Applications & Services	Data Hosting	Roads
Certification	C-ITS / C-ROADS	Static / Dynamic / Floating Data	Communications
Regulation & Enforcement	Operations & Maintenance	Data Harmonisation / Sharing	

The focus can no longer be on the infrastructure layer alone (for instance roads and vehicles). Digital technologies also build on a data layer which contains both static data such as digital maps or traffic regulations and dynamic data such as real-time traffic information.

These data are then used to develop a layer of innovative services and applications, which are made available over a layer of networks. To make best use of digital technologies, market access and fair competition in each of these layers needs to be ensured".

What is Digital Mobility?

- Layered Digital Transport Network Ecosystem can also be represented as shown here.

- EC applied a combined 'Top-Down' and 'Bottom Up' approach in developing and implementing C-ITS services into the "Digital Transport Network Layered Ecosystem".

- Multiple actors from Transport, Telecon & Automotive sectors involved in populating these layers

- EC adopted outputs / recommendations either into existing Directives and / or into updating the strategy and framework for C-ITS deployment.
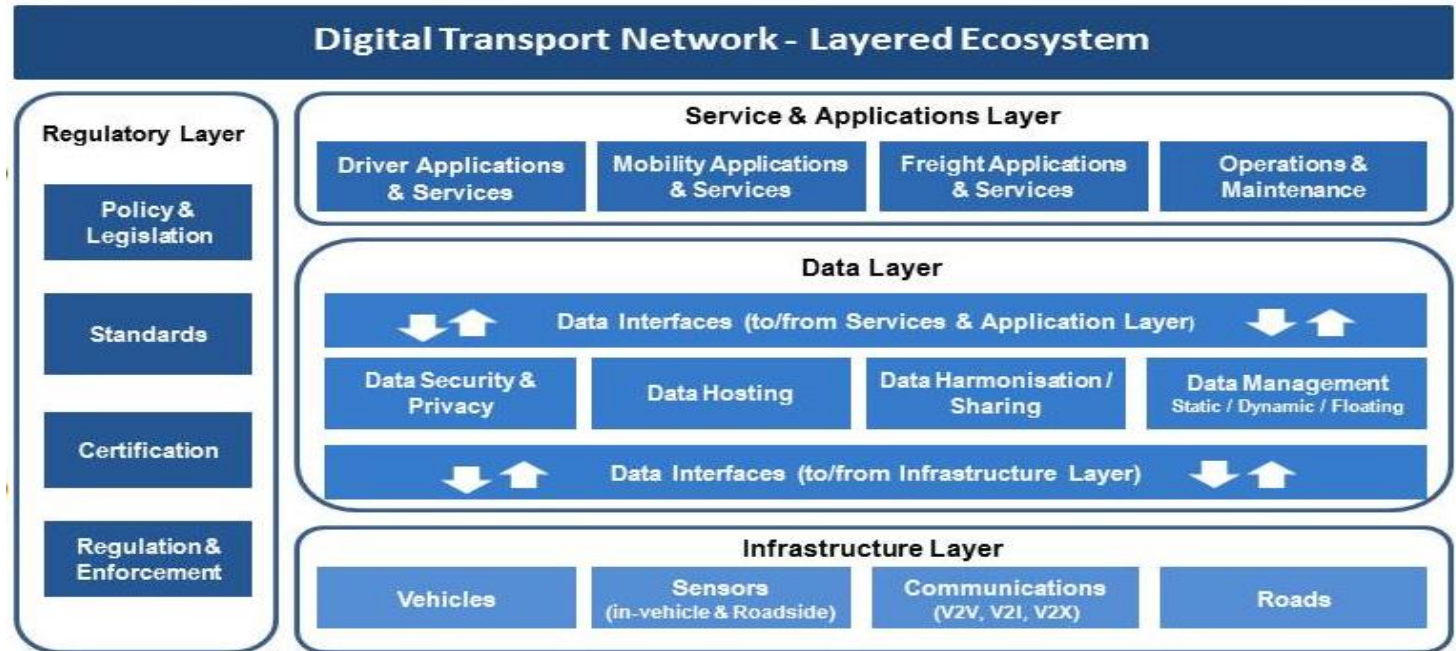
What is Digital Mobility?

- EU Digital Transport Network activities are replicated in other regions as all countries look to address the challenges arising from digitalisation.

- EU participate in a number of global working groups such as the UNECE Inland Transport Committee (ITC).

United Nations Economic Commission for Europe
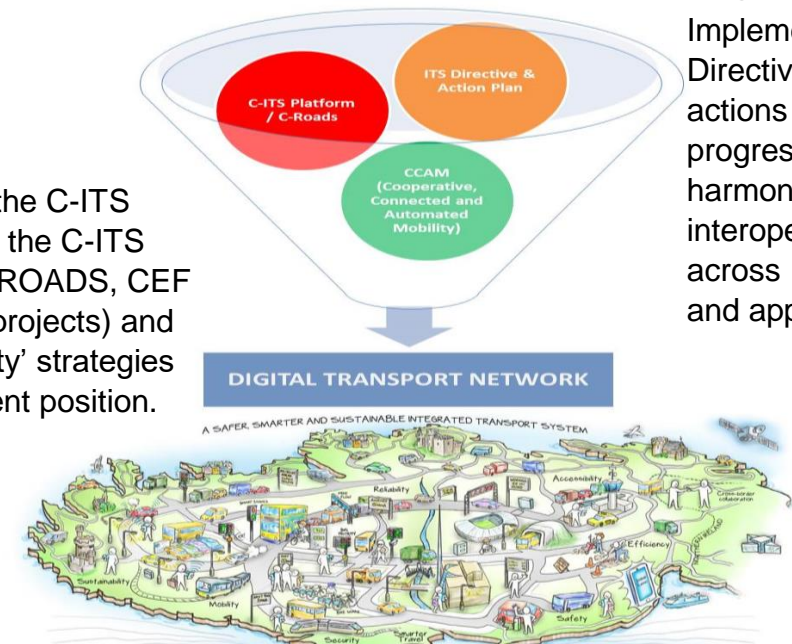Inland Transport Committee

UNECE includes 56 member states in Europe, North America and Asia whilst over 70 international professional organizations and other non-governmental organizations take part in UNECE activities

- The EU and its member States actively participate in all the transport inter-governmental forums of the United Nations serviced by UNECE.

- The UNECE ITC has set up a dedicated team to work on automated driving, following the recommendations of the EC High Level Group 'GEAR 2030' which called for coordination and harmonisation at an international level.

- It is important to note that standards developed at UNECE ITC 'World Forum' level are subsequently always adopted in EU Directives / Regulations and in ISO standards.

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What is Digital Mobility?

- CCAM is the final phase for developing a well-interconnected, interoperable and efficiently managed transport network and involves:

  - Continued development & deployment of 'Day 1' and 'Day 1.5' C-ITS services;

  - Development and deployment of a plethora of 'Day 2' C-ITS services (note that these services are not formally defined and most will be market-driven); and

  - Integrating C-ITS with other multi-modal mobility strands (e.g. other harmonised ITS services being tested / deployed via EU EIP projects) in an integrated manner. .

Leg 1:
Implementing ITS Directive priority actions that progressed harmonisation and interoperability across ITS systems and applications.

Leg 2:
Developing the C-ITS strategy (via the C-ITS Platform, C-ROADS, CEF and H2020 projects) and 'other mobility' strategies to their current position.

Leg 3:
Develop and implement a roadmap for combining the CCAM strands into an interconnected, interoperable and efficiently managed transport network.

What is Digital Mobility?

- Digitalisation in other sectors such as Freight & Logistics and Customs & Excise will feed into the CCAM platform in a phased building of the layered ecosystem

- Layered Ecosystem is the enabler for *"The Internet of Transport Things (IoTT)"*

- Tolling is a **'Transport Thing'** so feeds into this layered ecosystem
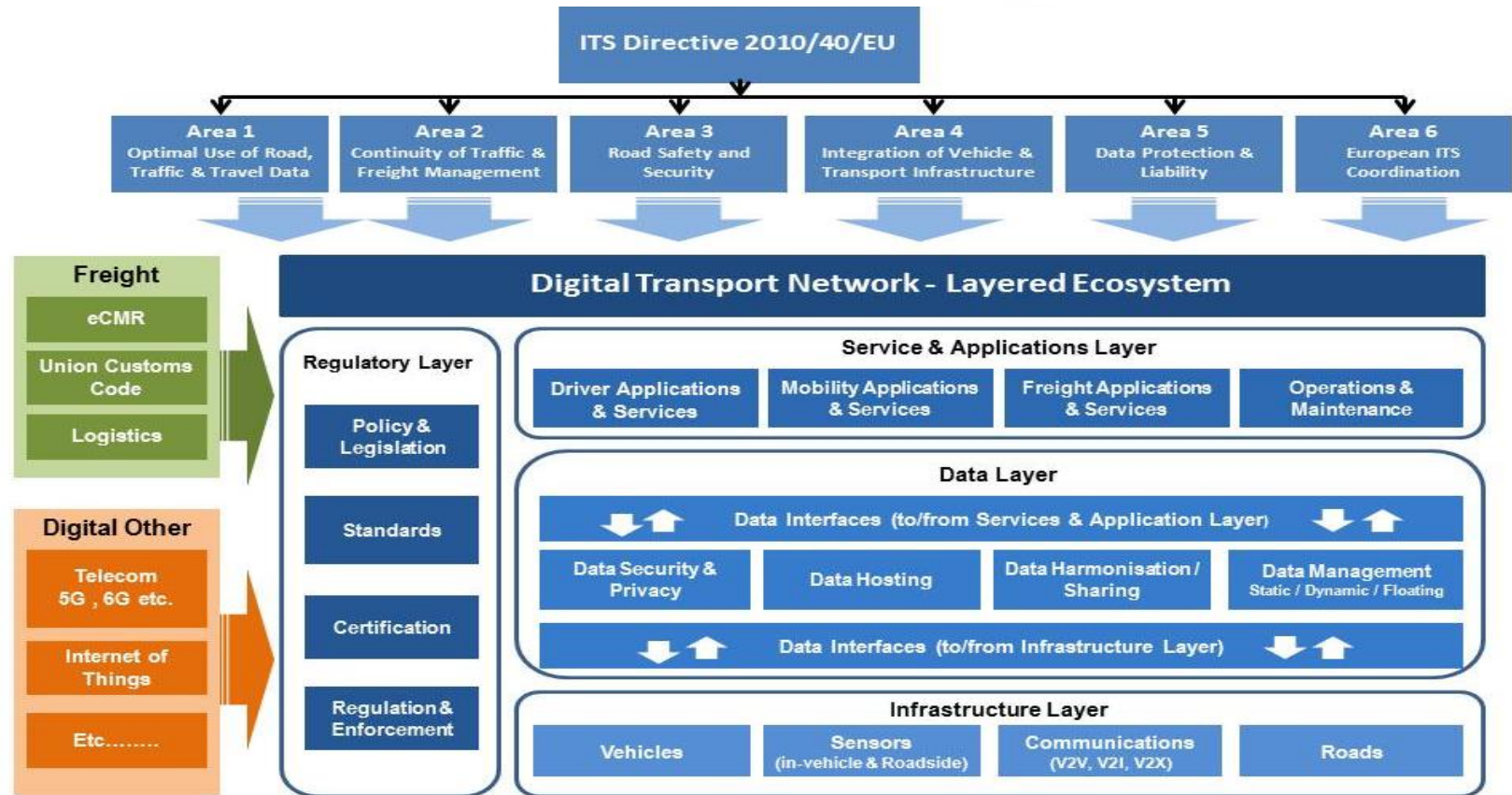
What is Digital Mobility?

- The journey over the past decade has not always being a smooth one but solid progress has being made through:

  - recognising the need for collaboration between diverse stakeholders.

  - Adopting a 'Learning through Discovery' outlook (and being quick to leverage on lessons learned).

  - Keeping a firm hand on the rudder with flexibility to change tack.

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The Tolling Sector was / is an Early Adopter of Digital Transformation
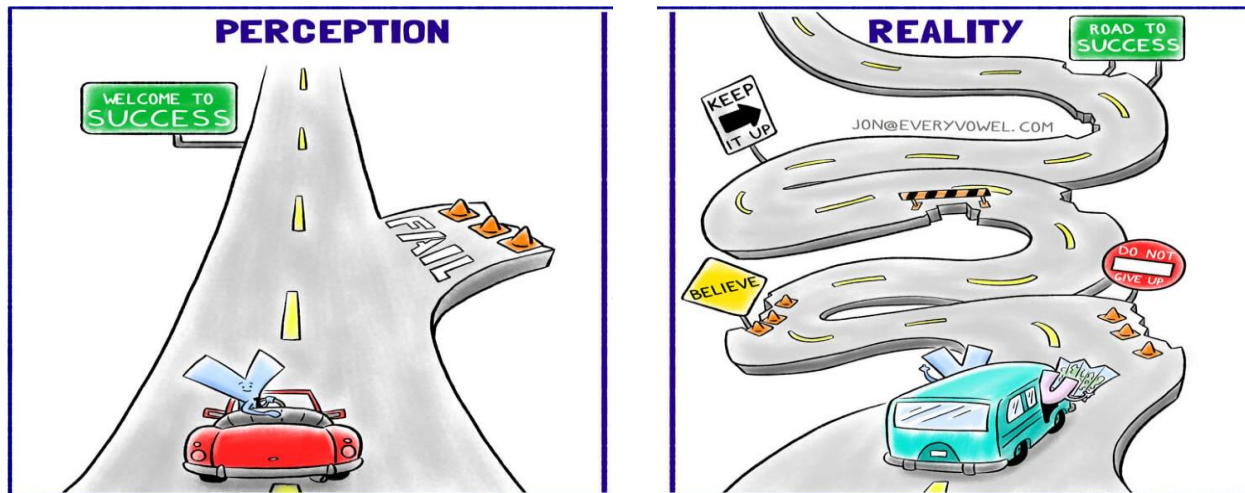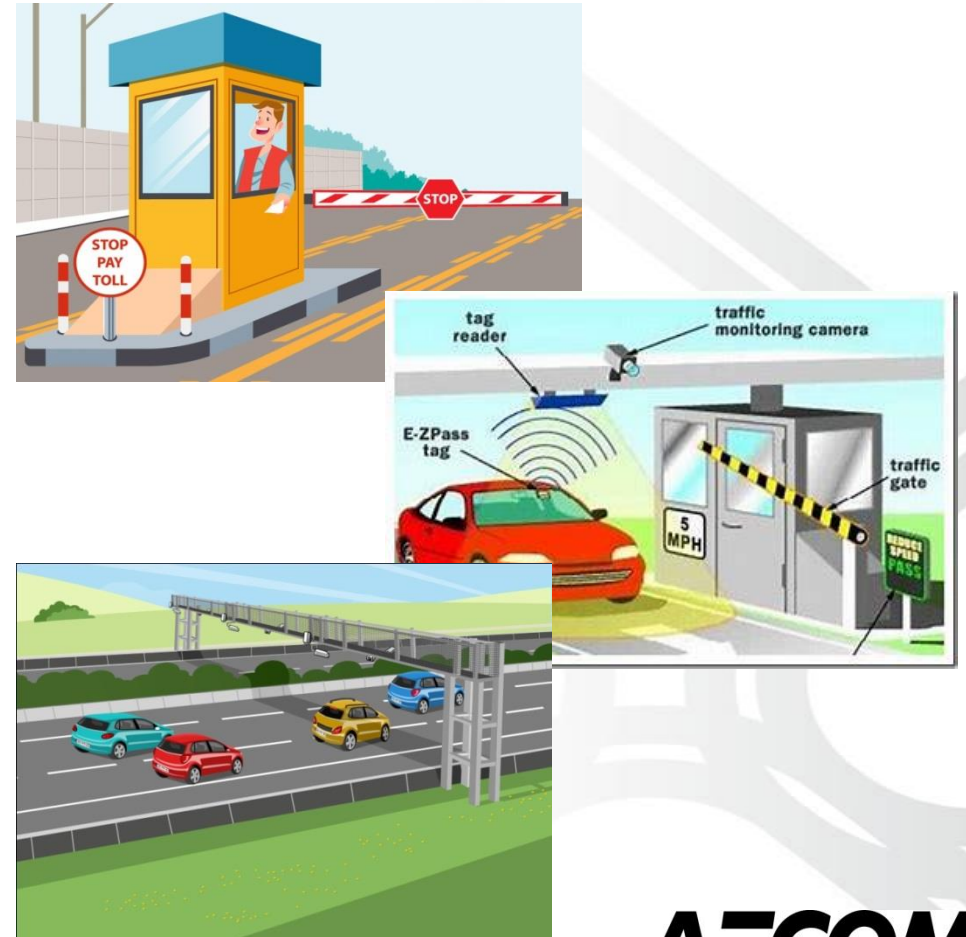
- **Digitisation:**
    - Phased conversion from manual cash collection to electronic toll collection to ORT

- **Digitalisation:**
    - Change of focus from Roadside to Back-Office Operations.
    - Phased introduction of National and Pan-EU Interoperability
    - Introduction of Independent Service Providers

- **Blended Environment:**
    - Different levels of Digitalisation

- Tolling sector has implemented "*The Internet of Tolling Things (IoTT)*"

The Tolling Sector was / is an Early Adopter of Digital Transformation

- Experienced in dealing with the impact caused by the process of digitalisation

  - Increased Focus on Customer Service ▪ Varied Digital Customer Communication Processes

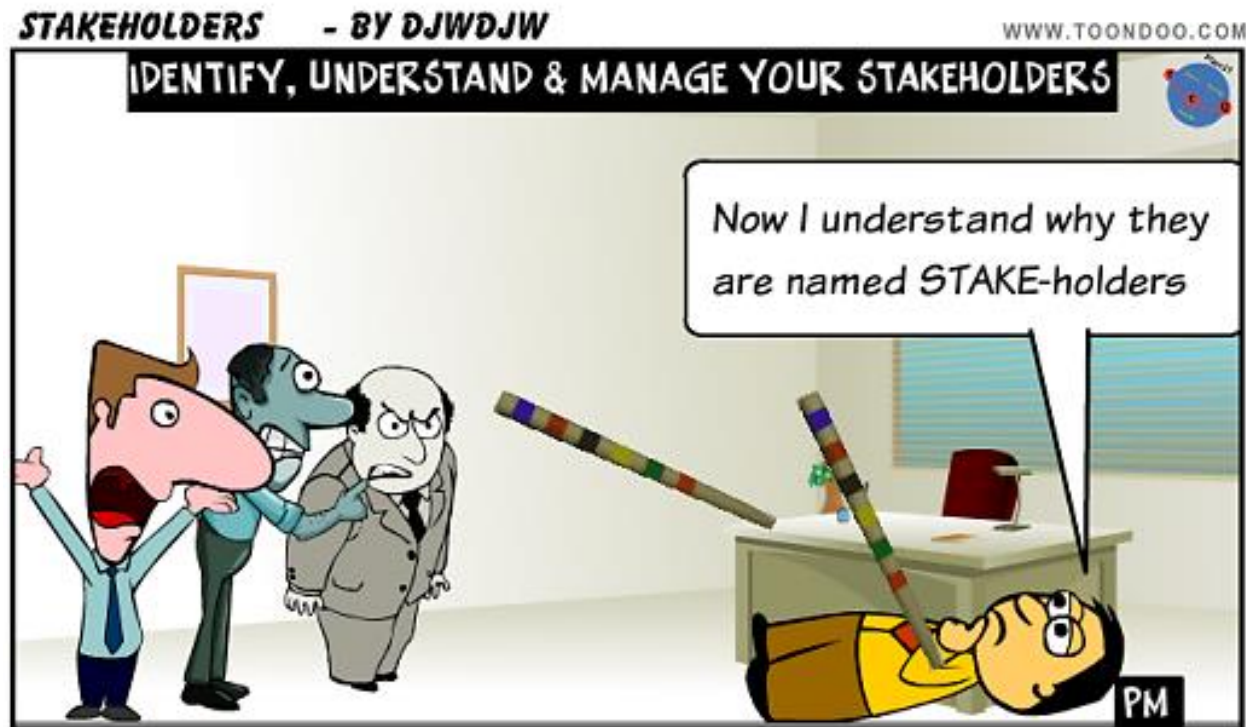# The Tolling Sector was / is an Early Adopter of Digital Transformation

- Experienced in dealing with the impact caused by the process of digitalisation

  - New Operational Processes for Dealing with Violators

The Tolling Sector was / is an Early Adopter of Digital Transformation

- Experienced in dealing with the impact caused by the process of digitalisation

    - Increased Stakeholder Management Overhead

The Tolling Sector was / is an Early Adopter of Digital Transformation

- The Irish Tolling Sector is a typical example

  - 11 toll road operations in Ireland,

  - 8 provide a tag offering

 - 2 independent toll service providers (TSPs).

Digital transformation in a blended tolling environment whilst maintaining "Business as Usual"

1984: Introduction of Tolling (Eastlink)

1990: 1st Irish Motorway Toll (Westlink)

2000: Introduction of ETC

2003 – 2010: New motorway network with PPP toll roads;

2005: Introduction of national ETC interoperability;

2008: Introduction of multi-lane free flow on M50

2008: Introduction of independent Tag Providers

2010: Preparation for EETS

2013: Procurement of Next Generation IMSP

2015- 2016: Redevelopment/ renegotiation of interoperability contract suite.

2016 - : Ongoing EETS preparation

2019 - : Commence 2nd-Generation M50 eFlow Operations contract

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# The Tolling Sector was / is an Early Adopter of Digital Transformation

- **Directive 2004/52/EC and related Decision 2009/750/EC enacted to introduce a European Electronic Toll Service (EETS)**

  - Directive 2004/52/EC sets up the EETS which covers all EU toll roads on which road-usage is declared electronically by means of on-board equipment

  - Decision 2009/750/EC sets out the framework for interoperability i.e. the procedural, contractual and legal aspects relating to EETS

  - Mandated EETS Timelines: 2012 for HGVs / 2014 for other vehicles

- **2012 Deadline was not met**

  - Technology not the Issue

'One contract with One service provider and One OBU'

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The Tolling Sector was / is an Early Adopter of Digital Transformation
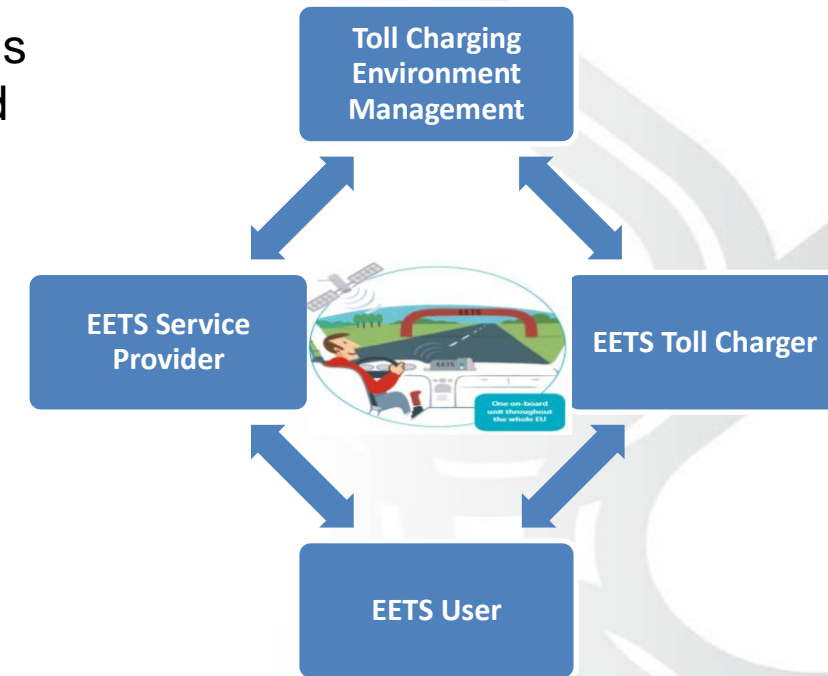
- **EC suggested "a stepwise approach" (COM [2012] 474)**
  - Regional approach to kick-start deployment of EETS (REETS)
  - REETS Project ran to 2015
  - Collaborative Discovery Project with Multiple Stakeholders

- The outputs from the REETS project informed revision of the EETS Directive (adopted in May 2017)
- Stakeholder Collaboration addressed challenges:
  - Business Case for Stakeholders
  - Perceived Onerous Conditions in Original Directive
  - Cross-border Enforcement   Etc….
- EETS is now being phased into live operation

The Tolling Sector was / is an Early Adopter of Digital Transformation
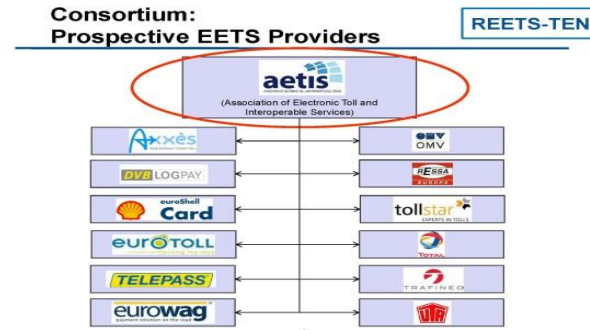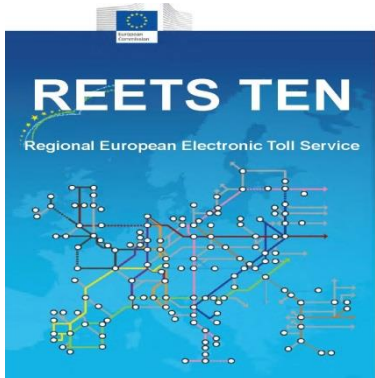
- The Hungarian HGV RUC scheme utilises the core RUC technologies and operations for additional applications.

- The Hungarian electronic distance-based HGV toll system commenced in 2013 and covers a total of 6,500 km of the national public road network.

- The system is based on GPS/GNSS (for registered users) and 'route ticketing' (for registered and unregistered users).

- A user can register through one of 22 certified toll declaration operators. These TDOs also offer other fleet telematics and traffic information services to users.

- RUC system is used to confirm compliance with an "Electronic Trade and Transport Control System" which monitors all freight transport to reduce VAT fraud.

- The system also integrates with the nationwide Weigh in Motion project (which consists of 89 control points and 274 controlled lanes).

- The system also provides an app that allows drivers to pay the HGV tolls and also to pay for parking.

- All transaction data is stored in a central database managed by a public sector IT agency.

The Tolling Sector was / is an Early Adopter of Digital Transformation

- **UK Clean Air Zones**

  - Areas where targeted action is taken to improve air quality and resources are prioritised and coordinated in order to shape the urban environment in a way that delivers improved health benefits and supports economic growth.

  - Range of measures tailored to the particular location to deliver immediate action to improve air quality and health with support for towns and cities to grow while delivering sustained reductions in pollution and a transition to a low emission economy.

    - Road pricing / Congestion Charging

    - Active / Smarter Travel (Work schemes, Public bike hire, Walking & Cycling corridors etc.)

    - ITS elements (Information Portals, Journey Planning, smart parking, bus priority)

    - Leases/grants to upgrade and/or retrofit vehicles / Freight Operator Recognition schemes

Lessons Learned

- **Need for Balance**
  - Big Bang is never feasible
  - Digital Transformation requires phased implementation
    - System Upgrades
    - Operational Procedures
    - User Acceptance
  - Digital Transformation is only relevant for some
    - Depends on business case
    - Be conscious of embedded investments
  - Against a Backdrop of Business Continuity

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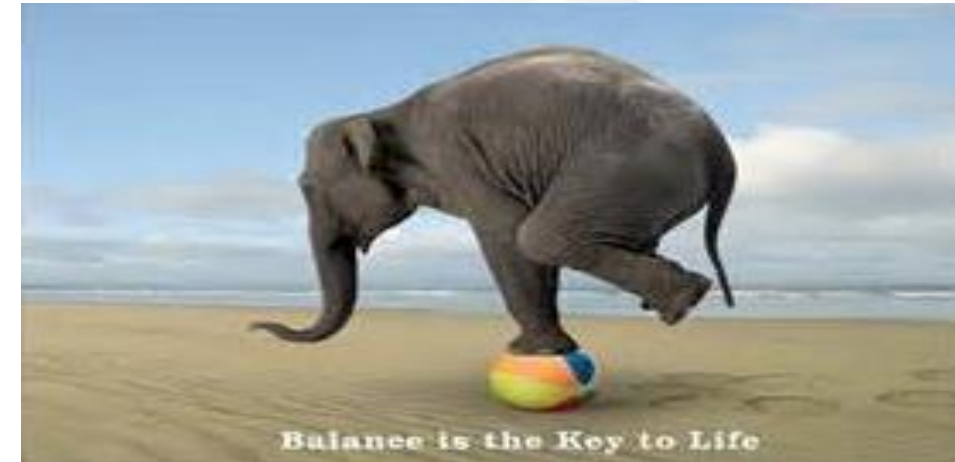
Lessons Learned

- **Collaboration requires Reciprocation**
  - Cooperation works but only if
    - Parties are aware of each other's priorities
    - Mutually beneficial landscape exists
    - Recognition of differences between public and private sector objectives
    - Parties built mutual trust and respect

The Road Ahead

- **The CCAM before the Digital Storm**

  - Increased pace of digital transformation across the transport network

  - Driven by industry and consumer demand

 - Constant new and revised standards and regulations

- **No Point Trying to Hold Back the Tide**

  - Acknowledge the Risks

  - Mitigate the Threats

  - Exploit the Opportunities

  - Opportunities outweigh the Risks

The Road Ahead

- **Learn to speak the Same Language**
  - Tolling Ecosystem can be mapped to the Digital Transport Ecosystem
  - Awareness of this mapping facilitates strategic planning
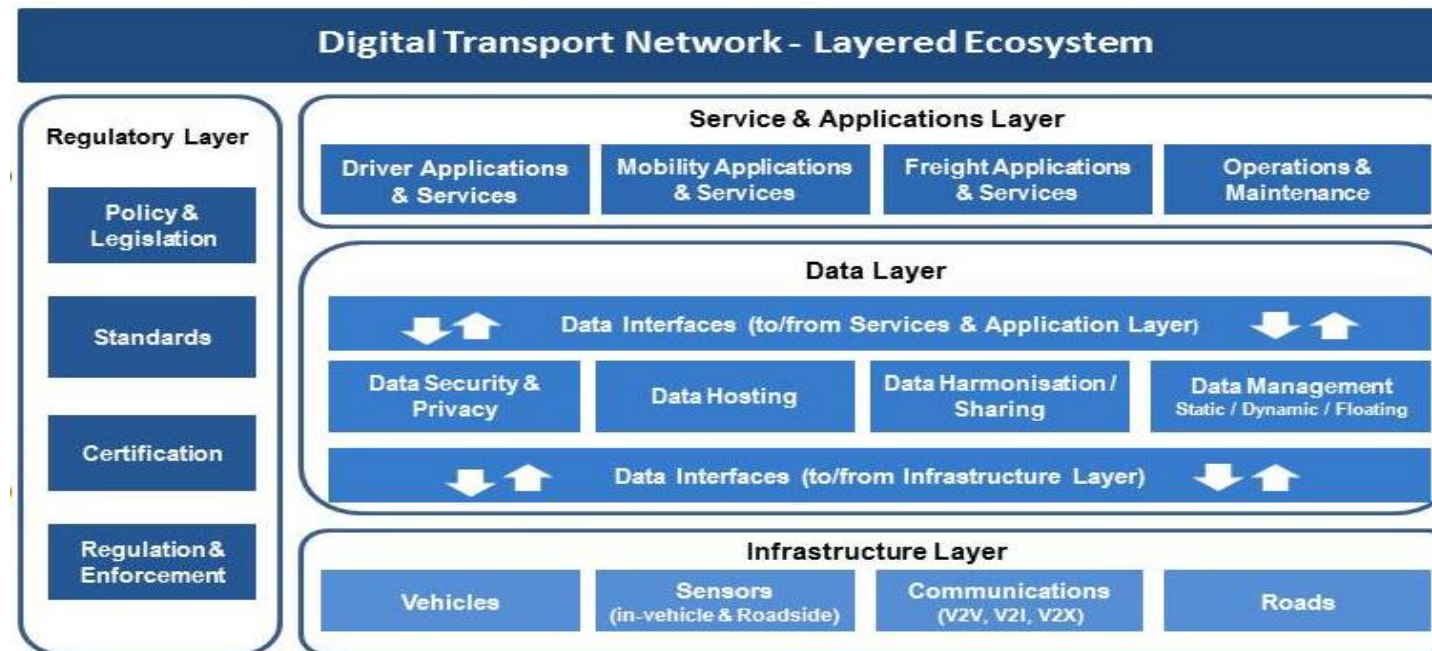
The Road Ahead

- **Stay Informed**
  - Determine where your organisation fits in the new Digital Transport Network environment.
  - Be prepared to
    - Understand that CCAM encapsulates ALL Tolling and ITS (and more besides)
    - Become familiar with what has already being done by others
    - Keep tracking developments in a rapidly changing environment
    - Engage with multiple cross-sector stakeholders
    - Be flexible to change operational roles and processes

The more I think,
the more confused I get.

For More Information

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