# How Intelligent Access can facilitate cross-border transports? – The Building Blocks of the ISAC Project

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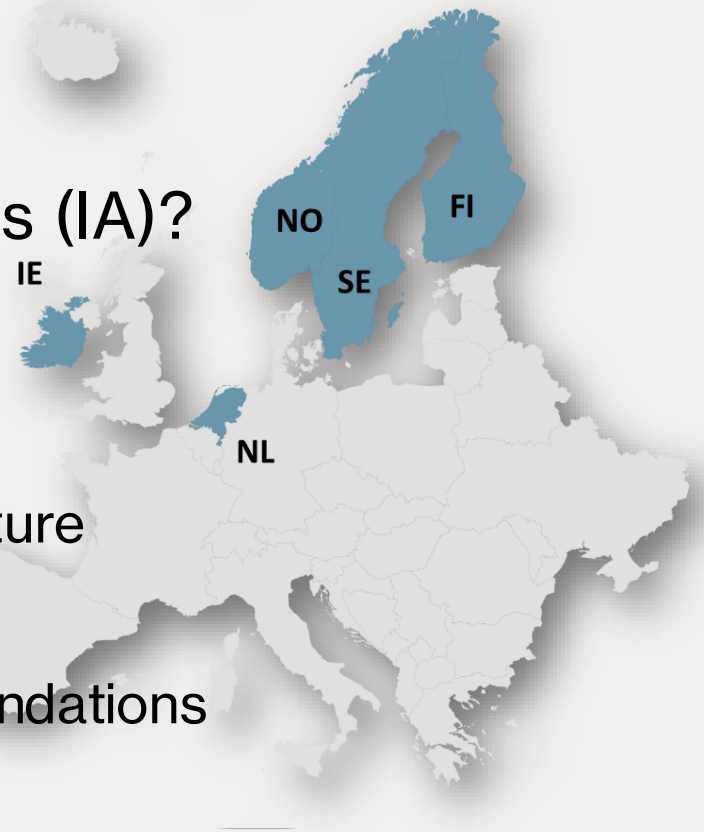
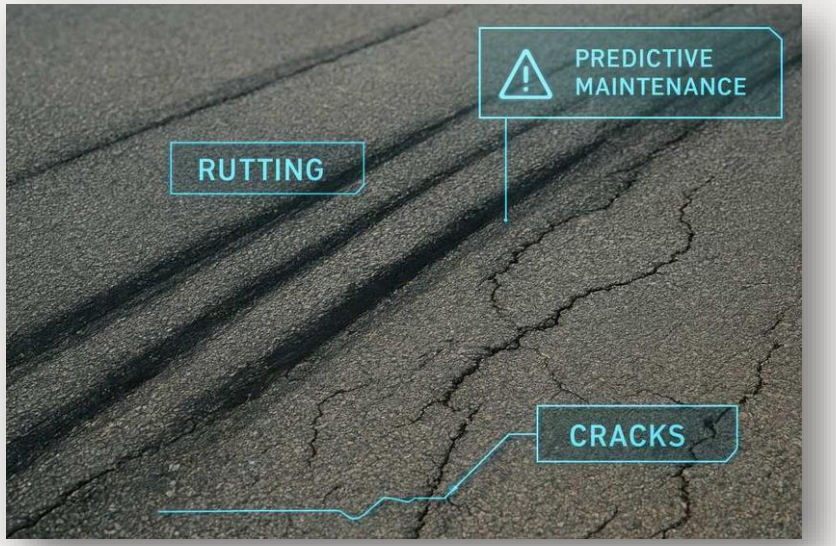
ISAC Intelligent Surface Access Community

# STRUCTURE

- Context and challenges
- What is Intelligent Access (IA)?
- ISAC Project
  - ➢ Methodology
  - ➢ ISAC IA functional architecture
  - ➢ Country readiness
  - ➢ Conclusions and Recommendations
- Key reflections

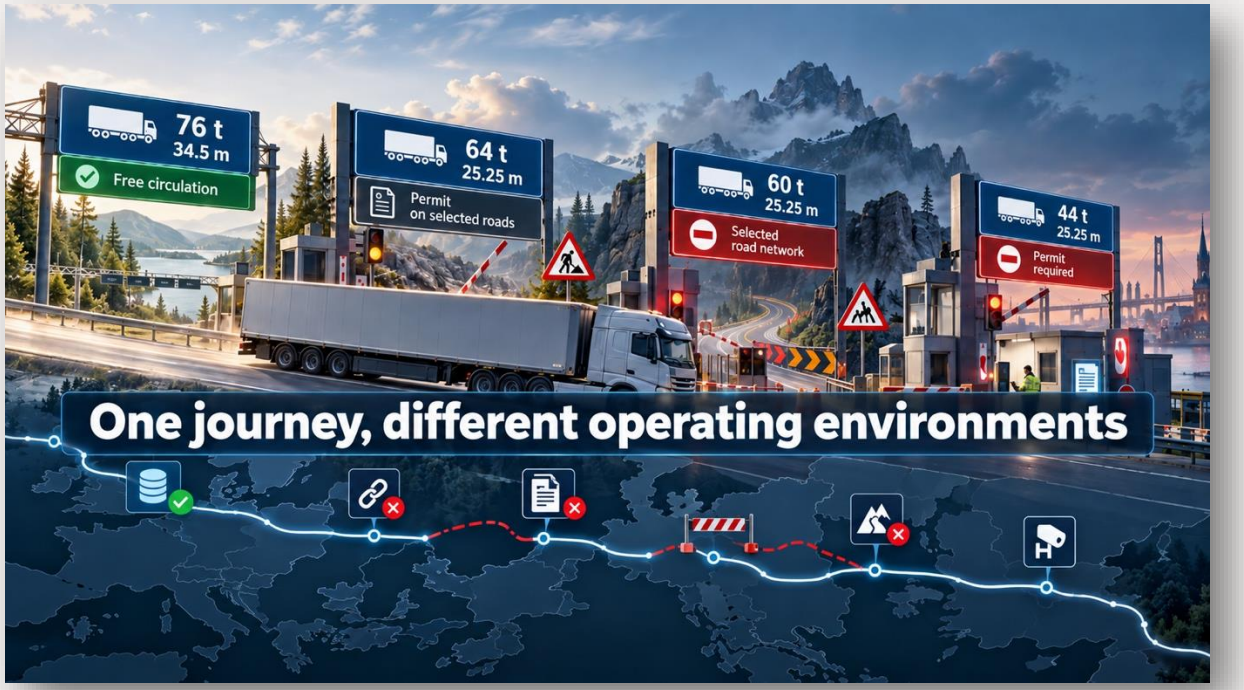


# Common challenges



- **Road authorities face growing pressure to use existing infrastructure more efficiently**. Scarce budgets make it harder to decide where to invest, restrict access or **protect vulnerable assets**
- **Freight operators rely on static maps or outsourced data** for trip planning and execution
- **Road authorities have limited visibility** of how heavy vehicles use the network
- **Heavy and non-compliant vehicles** can create disproportionate infrastructure and safety impacts
- **Fragmented permits, data systems and responsibilities** make cross-border freight inefficient
- **Reaching climate objectives** requires a framework that works for greener logistics and futuristic vehicles

# Cross-border challenges: one journey, multiple operating environments




⚠ Cross-border freight is continuous physically, but fragmented institutionally, digitally and regulatorily.

- **European freight is cross-border, but rules remain largely national**. Difference in W&D, access conditions, seasonal rules and local exceptions
- **Permit regimes and formats are fragmented and recognition is limited.** Permit requirements, issuing authorities, procedures and conditions differ across countries
- **Data ecosystems are not interoperable and differ in maturity.** Interactions with multiple national systems. Differences in NAP maturity, standards, availability, coverage undermine seamless operations
- Different countries have different priorities. Some want to focus on **enforcement while some want preventive compliance**
- Currently **limited collaboration among relevant stakeholders** (road authorities, industry partners, OEMs, service providers)

# What is Intelligent Access? (as “was” defined in the proposal of the WDD)

**Intelligent Access Policy (IAP)** is a **technical, regulatory and functional framework** to manage **heavy-duty vehicle access to the road network** through the use of **in-vehicle generated data** to **regulate, monitor and ease their access** to specific roads or areas and **to ensure compliance** with the applicable **rules on weights and dimensions** while **promoting efficiency and safety**.

The **principle** underpinning IAP is simple yet transformative:

**“the right vehicle on the right road with the right weight at the right time.”**

# Functions of Intelligent Access

- **Facilitating:** Assisting transport operators and relevant authorities in **accessing road infrastructure**, particularly through support with permitting and planning process.
- **Managing:** Enabling authorities and transport operators to align vehicle characteristics with infrastructure capabilities, thereby **supporting asset and traffic management** e.g., transit over bridges or through tunnels.
- **Monitoring:** Helping authorities **track and analyse the actual usage** of road infrastructure by heavy-duty vehicles.
- **Controlling:** Supporting transport operators and enforcement bodies in **ensuring operational compliance,** including adherence to regulations concerning vehicle dimensions, weight, and spatial or temporal constraints.

# Target vehicles

- Abnormal Indivisible Loads AIL
- European Modular Systems EMS
- Battery Electric BEV trucks.

# ISAC Methodology

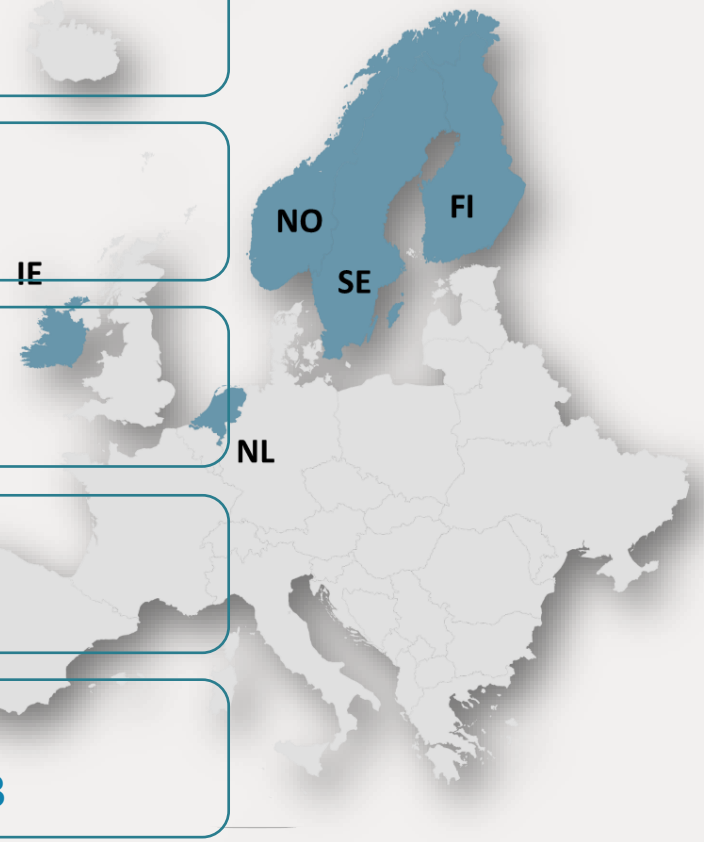
**Desk research**
Review of literature, policies, and existing IA initiatives

**Stakeholder engagement**
20+ bilateral interviews with national experts and authorities

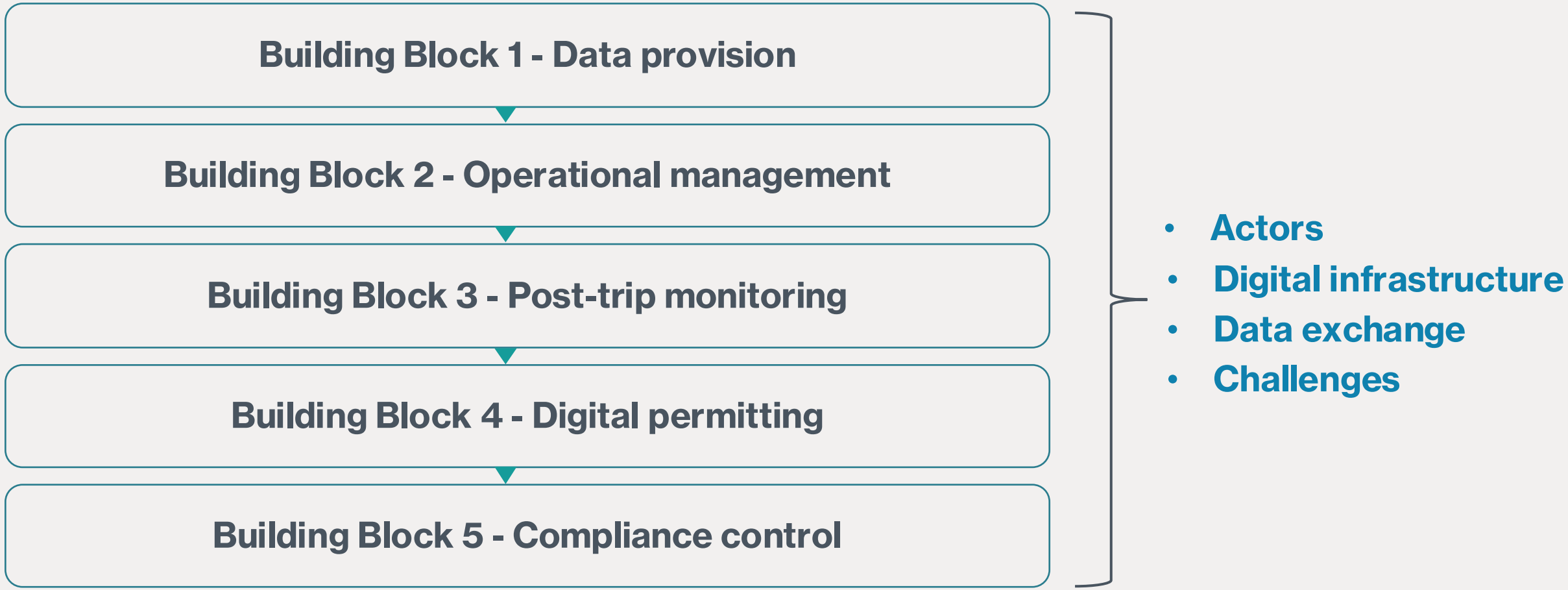
**Development of the Building blocks**
Functional architecture of the ISAC scheme

**Framework validation**
Iterative refinement with stakeholders and advisory board

**Comparative country analysis**
Assessment of 5 countries IE, NL, SE, FI, NO. Evaluation across five ISAC BB

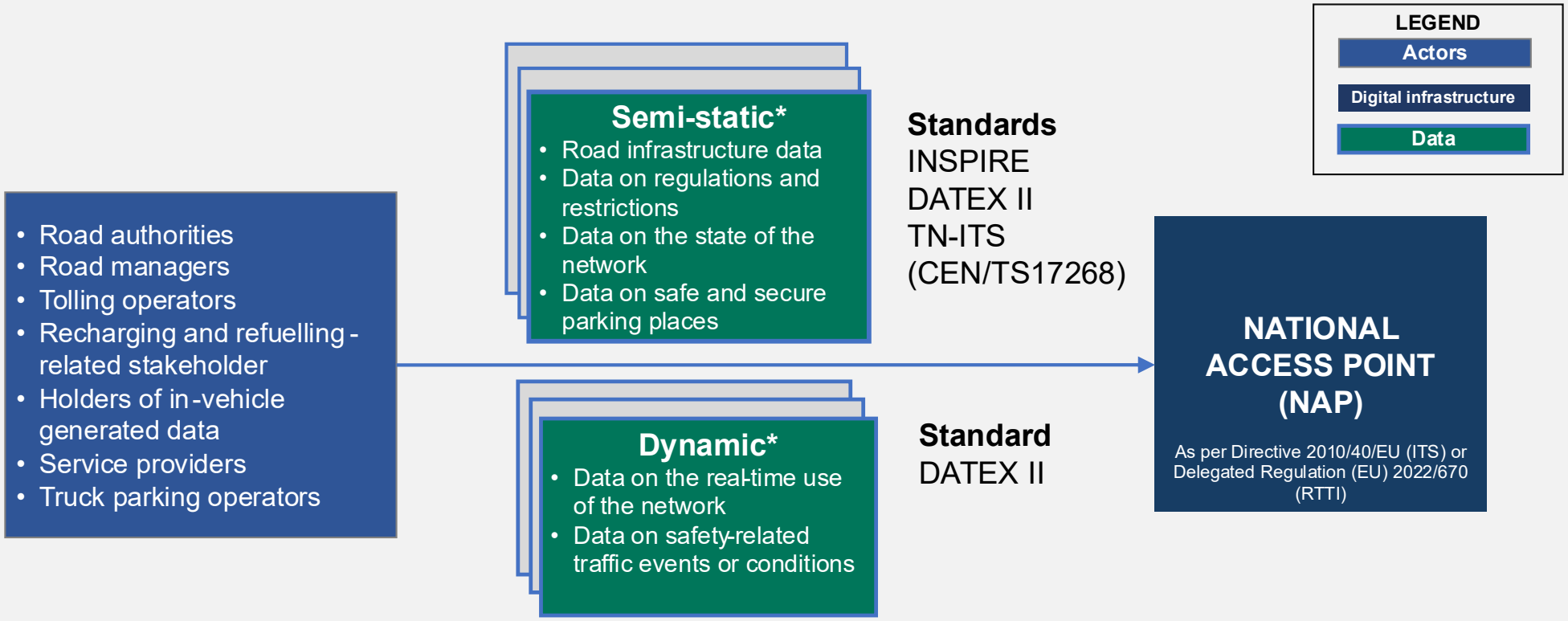


# System Architecture



# System Architecture

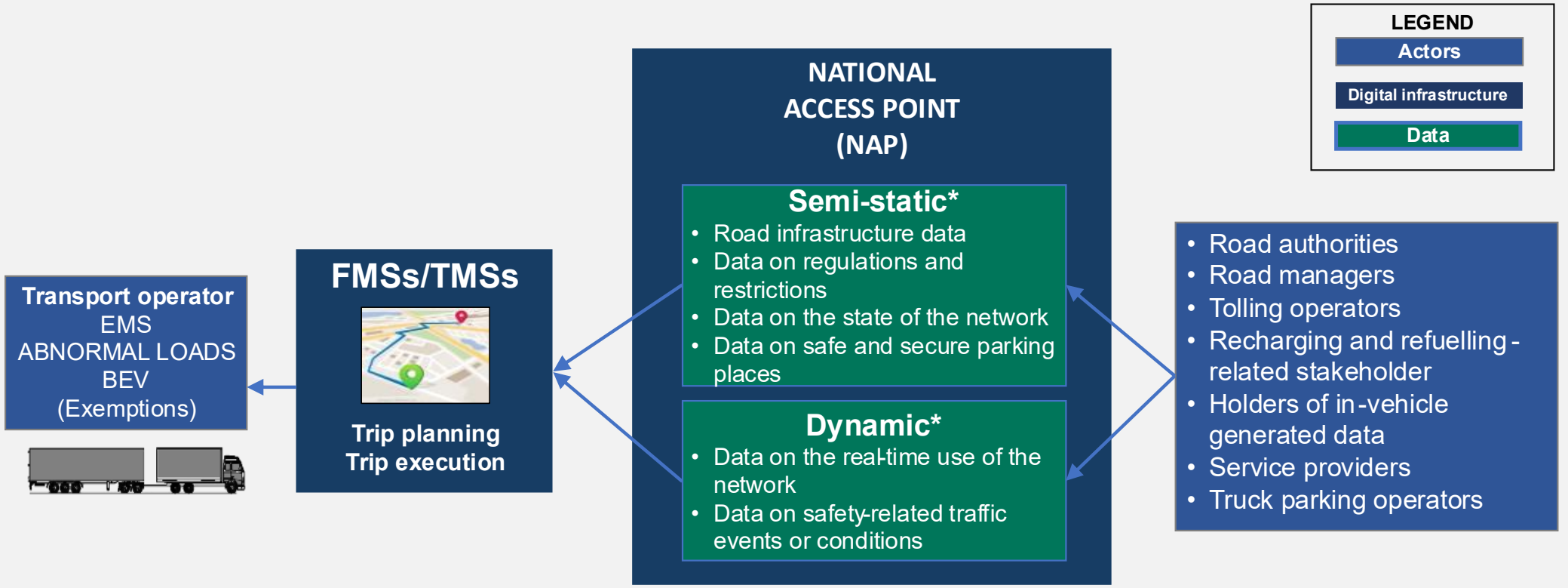
## Building Block – 1 Data provision




*As defined in Commission Delegated Regulation (EU) 2022/670 (RTTI); Commission Delegated Regulation (EU) No 886/2013 (SRTI); Commission Delegated Regulation (EU) No 885/2013

# System Architecture

## Building Block – 2 Operational management

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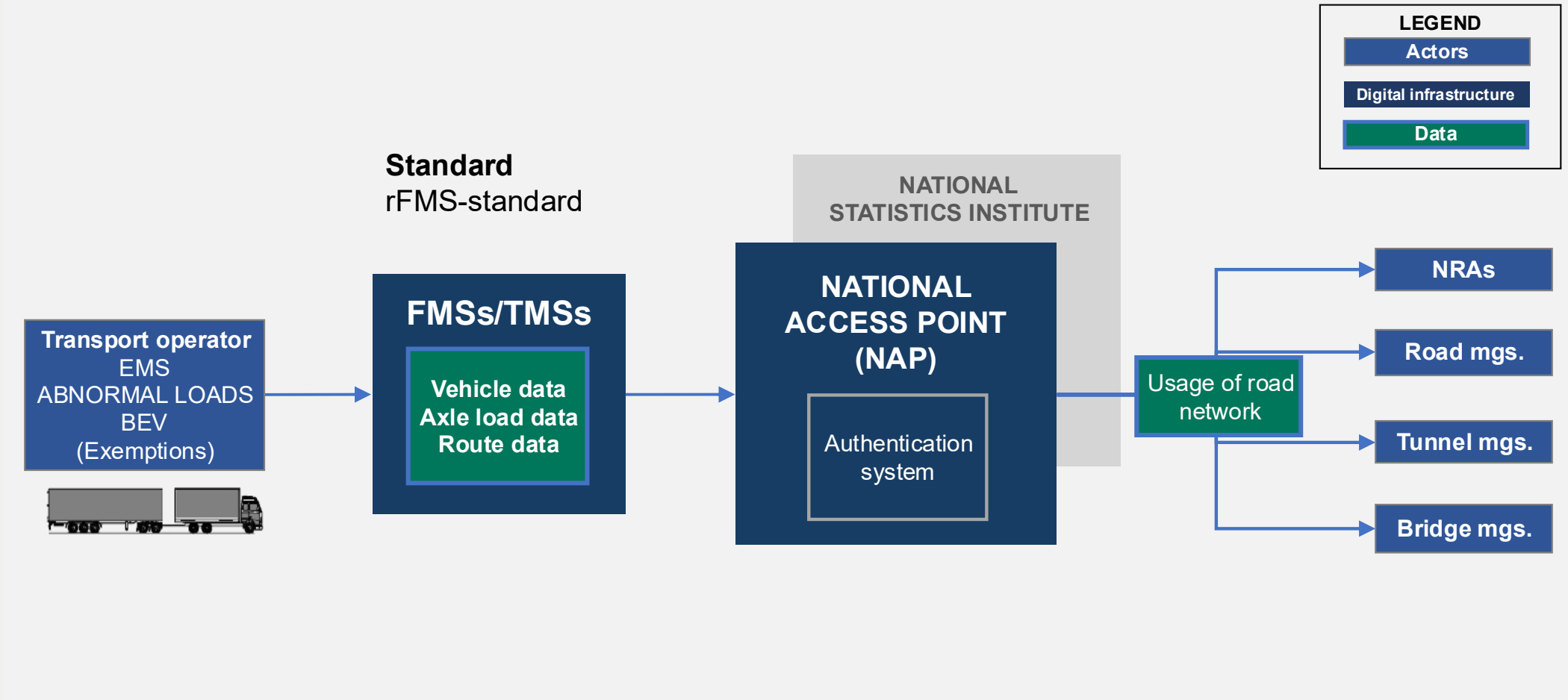
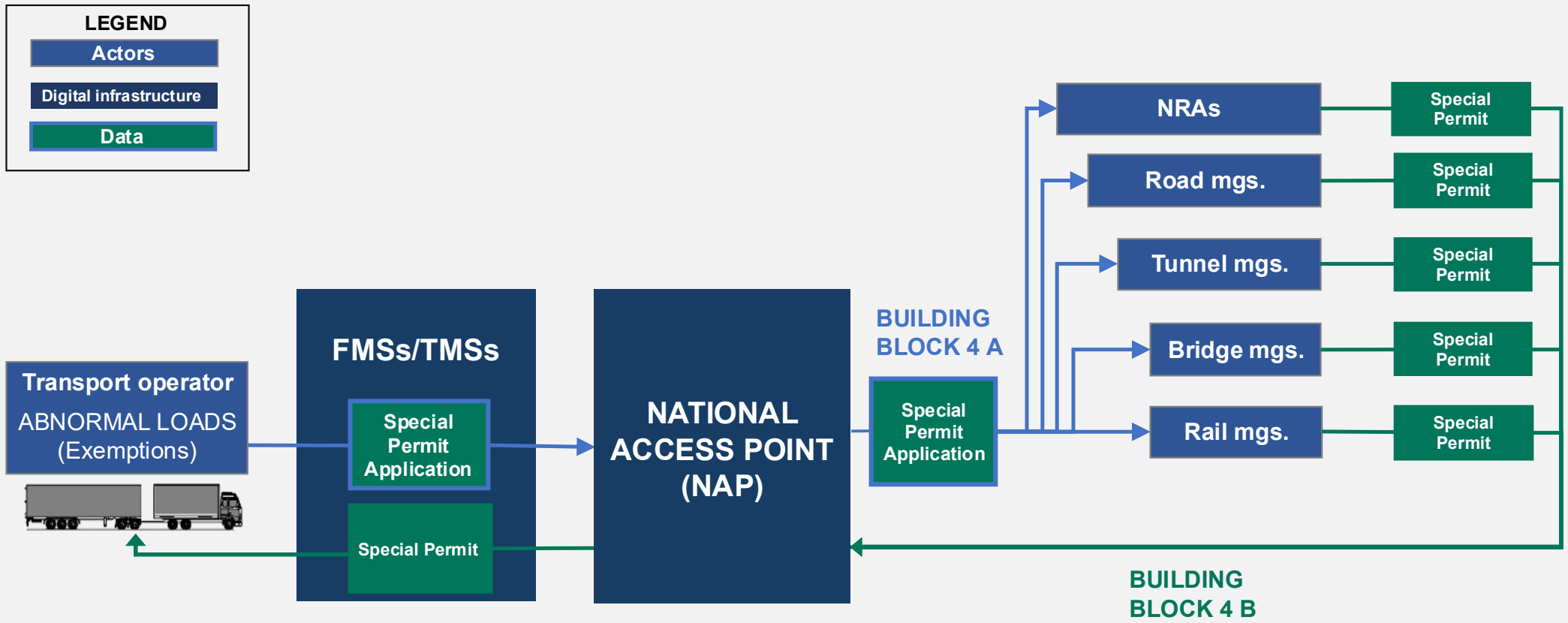
# System Architecture

## Building Block – 3 Post trip monitoring



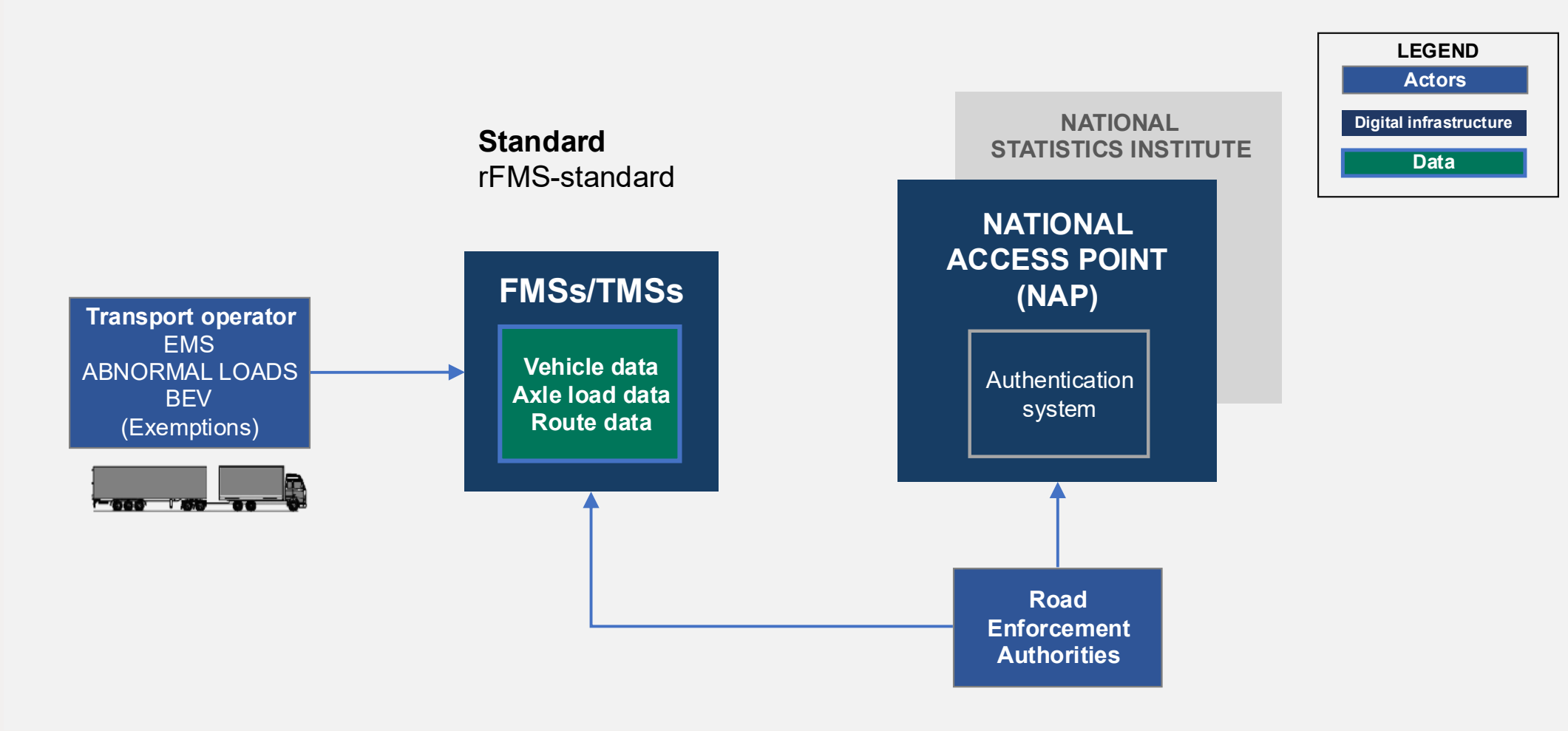
# System Architecture

## Building Block – 4 Digital permitting

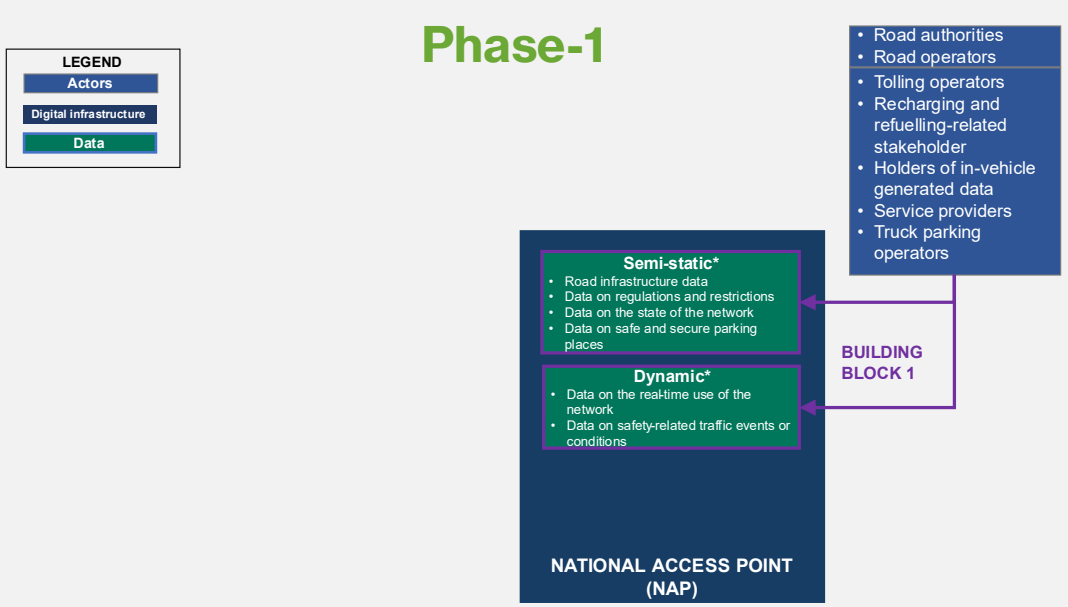


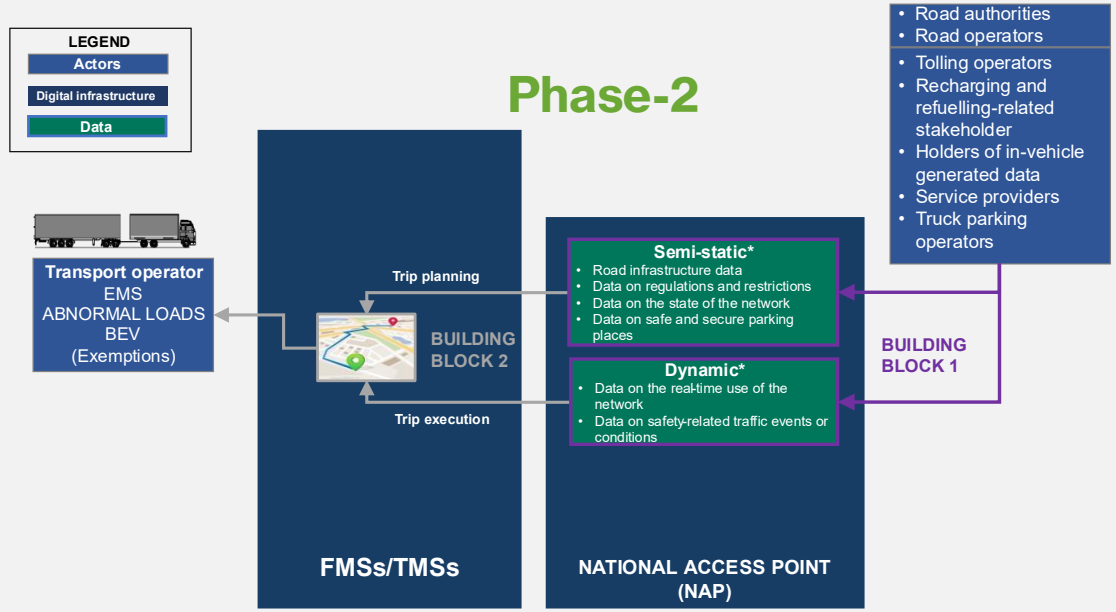
# System Architecture

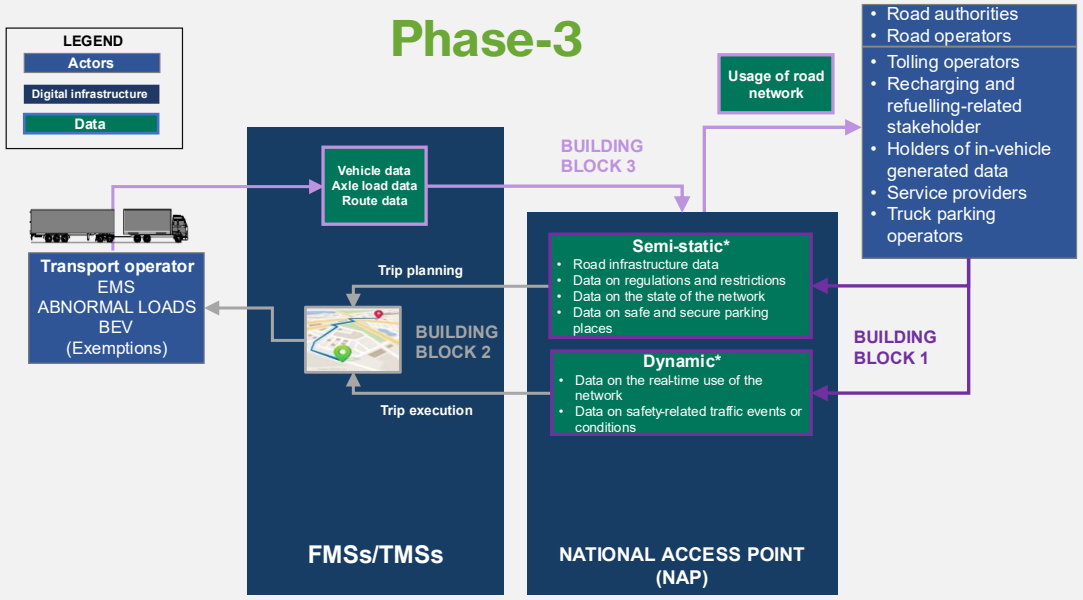
## Building Block – 5 Compliance control

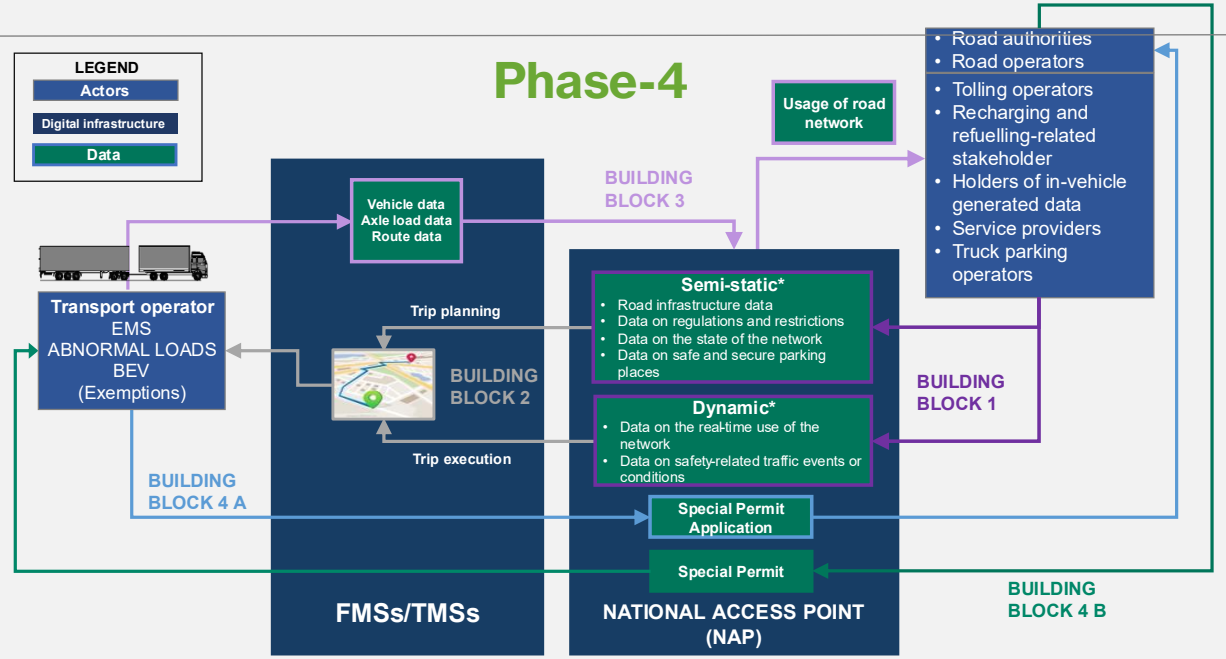


# Phased implementation

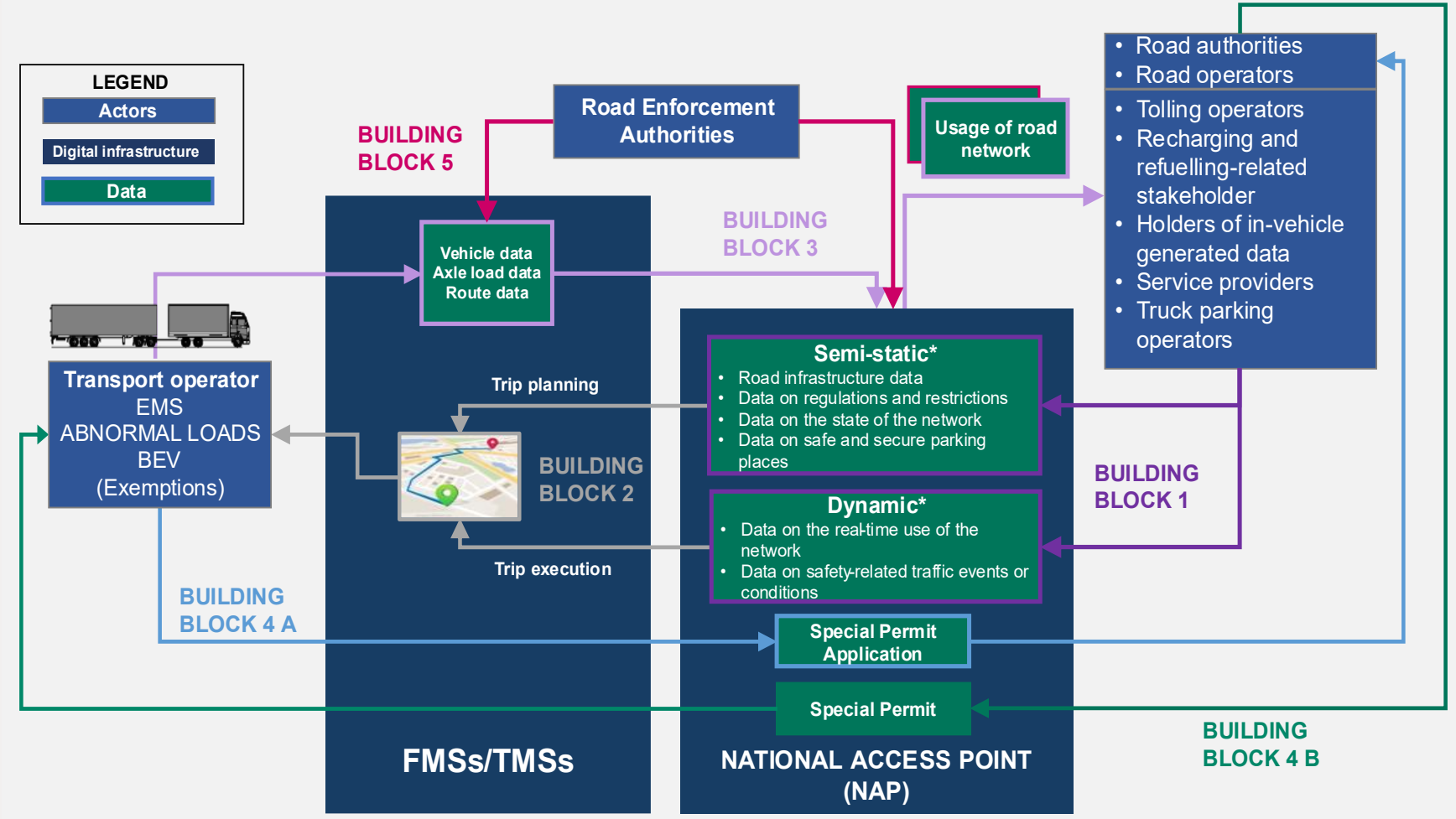


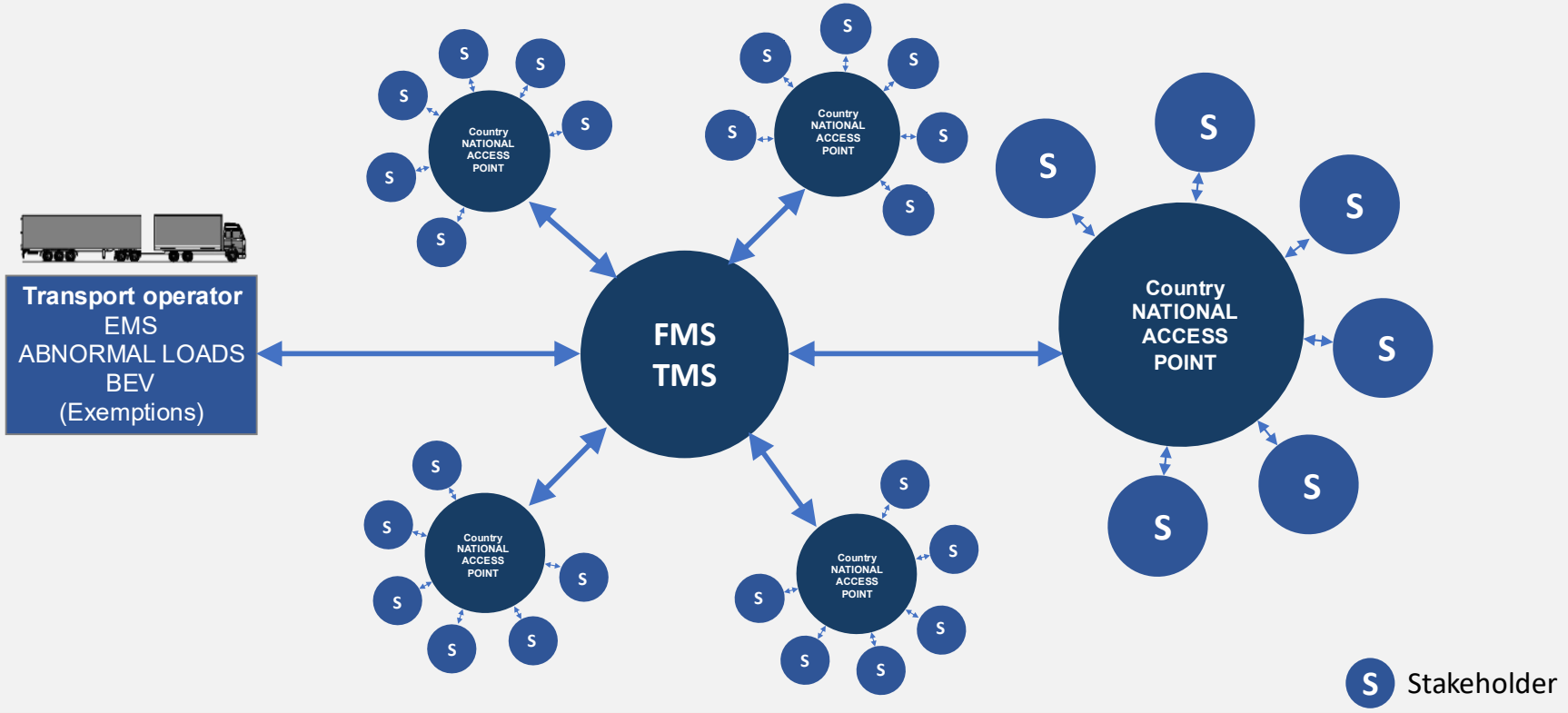



# Functional Architecture



# Cross-border architecture

- The proposed approach involves a wide array of **stakeholders (data holders and users) connected to the NAP** in each country.
- **Data exchange** between transport operators and relevant national stakeholders **occurs through the NAP via FMS/TMS systems**
- From a cross-border perspective, this entails for each **FMS/TMS to establish connections with all NAPs** of European countries



# Challenges across the Building Blocks

**Legal and regulatory constraints**
Certified planning tools, Data sharing, Cross-border permits

**Uneven digital maturity across countries**
NAP, standards, coverage, permits

**Data availability and quality**
Data gaps, Reliability, Up-to-date minimum viable datasets

**Governance and Trust**
Roles and responsibilities, GDPR, Institutional capacity

**Technical and integration**
Data exchange architecture, One stop shop functions, Axle weight calculation methods

# Country readiness

ISAC made an assessment **implementation potential of the five building blocks** in selected countries. Each country's readiness is evaluated based on:

- existing digital infrastructure
- regulatory frameworks
- data availability
- stakeholder engagement

| Country | BB1 | BB2 | BB3 | BB4 | BB5 |
|---|---|---|---|---|---|
| Ireland | Low 2028-2029 | Low 2029 | Low 2031+ | Low-Medium 2029-2030 | Low 2030+ |
| Netherlands | High 2027-2028 | Medium 2028-2029 | Medium-High 2028-2030 | Medium-High 2028-2029 | Low-Medium 2030-2031 |
| Sweden | Medium 2027-2028 | Medium 2029-2031 | Low-Medium 2031+ | Medium-High 2028-2029 | Low 2030+ |
| Finland | High 2026–2027 | Medium-High 2027–2028 | Low-Medium 2029–2030 | Low-Medium 2030+ | Low 2030+ |
| Norway | Medium 2028 | Low-Medium 2029-2030 | Low 2030+ | Medium 2028-2029 | Low 2030+ |

"Implementation needs to be **phased and adaptable**, building on existing strengths while addressing gaps over time"

# Conclusions & Recommendations

- **Create a European IA collaboration platform:** Establish an IA working group bringing together EU institutions, CEDR, NRAs, NAPs, enforcement bodies, operators, OEMs and service providers to align standards, pilots, governance and business cases and move from isolated national initiatives toward interoperable deployment.
- **Build IA on existing European programmes and initiatives:** IA should complement – not duplicate – existing work under NAPCORE, TISGRADE, eFTI, EETS, the Weights & Dimensions framework and related CEF programmes. Existing investments in NAPs, interoperability, data quality and digital freight should be used as the implementation backbone for IA.
- **Establishing common legal and regulatory foundations:** EU-wide regulation/Implementing acts for harmonized IA deployment ; Establish data sharing mechanisms, certified planning tools, and minimum data standards
- **Accelerating digital infrastructure development:** Improve National Access Points NAPs ; Harmonise data formats and APIs for cross-border interoperability
- **Start with TEN-T corridors and targeted cross-border pathfinders:** Use selected TEN-T corridors as an initial deployment environment rather than waiting for full EU-wide harmonisation. EMS corridor operations and abnormal-load movements are strong pathfinders for testing interoperable rules, qualified planning, digital permits and post-trip reporting. Use results to refine architecture and rollout.
- **Scale progressively and proportionately:** Start with authoritative data and qualified planning, then add post-trip monitoring, digital permitting and later proportionate compliance control.

***"With the right legal, technical, and institutional frameworks, IAP schemes can become a foundational element of Europe's future transport system"***

# Some important reflections + Potential IA UCs

- The transition to **Intelligent Access is not merely a technical upgrade**; it represents a **paradigm shift in how road freight is governed**.

- It requires a **cultural change in the relationship** between public authorities, transport operators, and technology providers, fostering collaboration and trust in **data-informed decision-making creating a win-win scenario**.

- The transition will require **coordinated action at both national and EU levels**, but the **benefits - in terms of efficiency, safety, and sustainability** - make it a worthwhile investment.

# Thank you for your attention...

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