From Trust to Impact: How to Build Data Ecosystems that Work

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Chapter 1: Prologue – From Trust to Impact

Data is everywhere, yet real impact is still surprisingly rare.

Most organizations don't fail because they lack data, platforms, or talent. They fail because they can't collaborate at scale. Data remains trapped in silos, partnerships stay transactional, and promising pilots never become everyday practice. Everyone agrees that data should create value—safer roads, cleaner logistics, smarter public services, better customer experiences—yet the path from "we could" to "we did" is still unclear.

This book is about that path.

Over the past decade, one insight has become unavoidable: the most meaningful outcomes are no longer created by single organizations, end-to-end. They are created by ecosystems—networks of public and private actors that combine capabilities, share responsibilities, and build services that none of them could build alone. In these ecosystems, data is not merely an input. It is the connective tissue that enables joint situational awareness, coordinated decisions, and continuous innovation.

But ecosystems are not powered by APIs alone.

The invisible infrastructure is trust: confidence that rules are fair, that participation is safe, that value is shared, and that nobody will rewrite the terms when the stakes get higher. Without trust, data sharing becomes a negotiation. With trust, it becomes a habit. And when trust becomes a habit, collaboration becomes a capability—and capabilities create impact.

That is the core thesis of this book:

Impact is not the result of "more data." Impact is the result of trustworthy collaboration—designed, governed, and operationalized across an ecosystem.

Why this matters now

We are entering an era where regulation becomes architecture, interoperability becomes strategy, and compliance becomes a prerequisite for scaling digital services across borders. The rules of the European data economy are hardening: not just around privacy, but around access rights, data sharing obligations, transparency, AI governance, and accountability. At the same time, societal expectations are rising. People want digital services that are useful—and also fair, explainable, and resilient.

In this new environment, the winners will not be those with the most data. They will be those who can turn data into decisions, and decisions into outcomes—reliably, repeatedly, and responsibly.

That requires an ecosystem approach.

A practical case, not a theoretical one

To keep this book grounded, we will use a real-world backbone throughout: Finland's Traffic Data Ecosystem, coordinated in a public-interest domain where the stakes are tangible—safety, sustainability, and national competitiveness. Mobility is a perfect proving ground because it is inherently multi-actor: public authorities, infrastructure operators, cities, logistics companies, app developers, researchers, and citizens all depend on shared situational awareness.

The Finnish experience demonstrates something important: you can build an ecosystem that is open and innovative without becoming chaotic; governed without becoming bureaucratic; and scalable without losing neutrality. It shows that trust can be designed into structures—rulebooks, operating models, standards, incentives, and communication practices—so that collaboration does not depend on individual relationships alone.

This is not a story of perfection. It is a story of iteration: learning what works, adjusting what doesn't, and turning abstract principles into everyday routines.

What this book will give you

Think of this as a field guide for building data ecosystems that actually work.

You will find:

- **A clear language for ecosystems:** roles, operating models, and formation scenarios—so you can recognize what kind of ecosystem you're in and what "winning" looks like there.
- **A trust-first blueprint**: how transparency, reciprocity, and neutrality become practical instruments—not slogans.
- **Governance that enables, not constrains:** lightweight structures that create clarity, speed up decisions, and prevent fragmentation.
- **Legal and ethical foundations** that don't kill innovation—but make it scalable and credible.
- **Use-case selection methods** that avoid "pilot theatre" and produce measurable value.

- **A fair data economy perspective:** balancing openness with incentives so contributions remain sustainable.
- **Infrastructure and interoperability principles** that treat data platforms as the new public utility.
- **Communication and storytelling tools** to make ecosystem value visible to partners, funders, and society.
- **A scaling playbook**: how ecosystems move from experiments to institutions, and from national solutions to cross-border collaboration.

Most importantly, you will gain a way to think: not “How do we publish more data?” but “How do we create shared outcomes in a system where no one is in full control?”

Who this is for

This book is written for leaders and builders—across public sector, industry, and research—who are tasked with creating outcomes in complex environments:

- Executives and strategists who need ecosystems to deliver real impact, not just collaboration events.
- Product, data, and platform leaders who must turn interoperability and governance into working systems.
- Policymakers and regulators who want innovation and trust, speed and accountability.
- Entrepreneurs and innovators who rely on shared data and shared infrastructure to build new services.
- Ecosystem orchestrators—official or accidental—who must align incentives, manage tensions, and keep progress moving.

If you have ever felt that you are doing “all the right things” with data, yet outcomes remain stubbornly small, you are in the right place.

The promise

The promise of an ecosystem is not harmony. It is leverage.

When trust and rules are clear, collaboration becomes repeatable. When collaboration is repeatable, value creation accelerates. When value creation accelerates, ecosystems stop being projects and become platforms—capable of sustaining innovation, absorbing change, and delivering outcomes over time.

That is what it means to go from trust to impact.

Let’s begin.

Chapter 2: About Ecosystems

Ecosystems as “Platforms of Platforms”

In many industries, the most valuable services are no longer created by a single company end-to-end. They are created by ecosystems: networks of public and private actors that collaborate to produce complementary products and services—or to develop new capabilities, competencies, and production resources.

A useful way to think about ecosystems is as platforms built on top of platforms. An ecosystem typically leverages existing platforms (data platforms, payment platforms, identity platforms, marketplace platforms, infrastructure platforms), and then provides a shared foundation on which new value can be created. In other words, ecosystems don’t replace platforms—they extend them, connect them, and make them useful in new combinations.

This shift has changed how value is created:

- **Products** help customers meet needs in the simplest way.
- **Services** deliver an agreed outcome.
- **Solutions** combine products and services to solve a specific business problem.
- **Platforms** create additional value through data and network effects.
- **Ecosystems** leverage platforms to extend and innovate services offered by third parties—often producing a complex value network that no single organization could build alone.

In practice, moving toward an ecosystem model provides four major advantages:

1. **Access to a broader portfolio of capabilities** than any single company can offer.
2. **Faster scaling**, because value creation is distributed across multiple contributors.
3. **Flexibility and resilience**, since the ecosystem can adapt by recombining capabilities.
4. **Continuous innovation**, as new participants can add specialized components over time.

There is, however, no single “right path” to building an ecosystem. Successful ecosystem models are often created through iteration—launching something practical, learning quickly, and continuously incorporating feedback from other ecosystem members.

A successful ecosystem ultimately emerges when a shared vision is understood and executed: a vision that all members want to achieve, but none can achieve alone.

Ecosystem Operating Models Evolve—But the Roles Stay Familiar

Ecosystem operating models vary by industry, but the same roles appear again and again. As organizations evolve from hierarchical structures to more networked ways of working, the customer becomes the central reference point—and ecosystems become the most advanced form of this evolution.

Within ecosystem activity, three core archetypes are especially important:

Builder

A Builder actively creates new value for the customer—and for itself—by combining services and products into integrated offerings. Builders are pragmatic: they assemble, package, and operationalize what the ecosystem makes possible.

Typical strengths:

- Productization and solution design
- Integration capabilities (technical, commercial, operational)
- Speed: turning “components” into outcomes customers will pay for

Orchestrator

An Orchestrator connects and guides ecosystem participants to create additional value for the ecosystem as a whole. The orchestrator is responsible for the “rules of the game”: governance, standards, interfaces, onboarding, incentives, and shared direction.

Typical responsibilities:

- Defining the shared vision and value logic
- Setting common rules (governance, data sharing, standards, quality, compliance)
- Enabling participation (tools, APIs, contractual models, trust mechanisms)
- Balancing member interests so the ecosystem grows rather than fragments

Participant

A Participant produces products and services as part of the ecosystem, but does not actively contribute to expanding ecosystem-wide value. Participants can still be commercially successful, but their impact is typically narrower: they plug in, deliver their piece, and focus on their own offering.

Typical strengths:

- Specialist expertise
- High-quality components
- Efficient delivery inside defined boundaries

What Makes Ecosystems Work: Shared Value and Shared Rules

Ecosystems succeed when members do two things at the same time:

1. They understand the value created together (not just individual gains).
2. They commit to operating by common rules.

Those "common rules" can include governance structures, technical standards, data policies, compliance practices, commercial models, dispute mechanisms, and shared measurement. Without these, ecosystems drift toward fragmentation: duplicated efforts, mismatched incentives, and trust erosion.

For companies considering ecosystem participation, a key strategic decision is how to participate—because different participation models produce very different outcomes. The same ecosystem can reward a Builder, an Orchestrator, and a Participant in entirely different ways.

Three Formation Scenarios: How Ecosystems Typically Emerge

Although ecosystems are diverse, most real-world ecosystems tend to form in one of three scenarios. Each has a distinct power structure, governance dynamic, and "risk profile" for participants.

1) Orchestrator-Led Ecosystem

In an Orchestrator-led ecosystem, a neutral actor—neutral from the participants' perspective—coordinates the ecosystem with the goal of increasing value for customers and members.

In many industries, the orchestrator is often a public-sector actor, unless the orchestrator's own revenue model is directly tied to the ecosystem's success. When the orchestrator's incentives are aligned with ecosystem growth, private orchestrators can succeed as well.

Typical characteristics

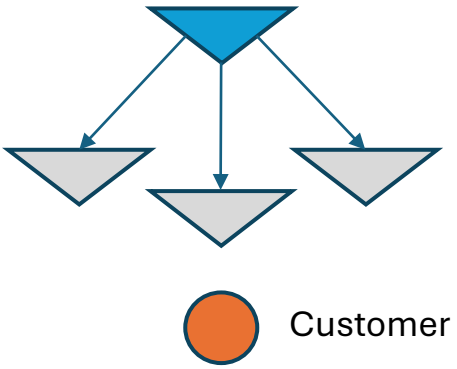
- Strong emphasis on shared governance and long-term trust
- Clear rules, standards, and onboarding practices
- Fairness is a strategic asset: neutrality helps attract diverse participants

Figure 1. Orchestrator led Ecosystem.

Key question for participants

Are the orchestrator's incentives truly aligned with ecosystem-wide success—or do they drift toward hidden self-interest over time?

(In public-interest domains, orchestrator-led ecosystems are often a natural fit—examples include national infrastructure and data ecosystems such as those led by Fintraffic.)



2) Oligopoly Ecosystem

In an Oligopoly ecosystem, the ecosystem is built around a few powerful actors who collectively control a significant share of revenue—or otherwise hold strong power positions relative to other members.

These ecosystems can be highly effective at scaling quickly, because the core players can align investment and execution. At the same time, oligopoly ecosystems often risk becoming gatekeepers, especially when strong contractual structures and information-sharing relationships form barriers to entry.

Typical characteristics:

- Fast execution when core players agree
- Strong commercial leverage and integrated go-to-market
- Risk of reduced openness and limited competition

Key question for participants

Is this ecosystem a growth engine—or also a market access barrier that will eventually constrain innovation and participation?

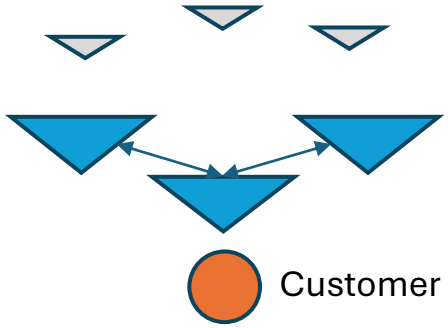


Figure 2. Oligopoly Ecosystem.

3) "Solar System" Ecosystem

In a Solar System ecosystem, the ecosystem revolves around a single dominant actor that controls either the customer interface or a significant data asset.

Classic examples include Google and Amazon. In such ecosystems, the central actor has substantial power to set operating rules, control information flows, and even influence pricing levels.

Typical characteristics:

- Extremely strong scalability driven by a dominant platform
- Clear rules—because one actor can define them
- High dependency risk for participants

Key question for participants

- What is your long-term leverage? If the "sun" changes the rules, can you adapt—or are you locked in?

Choosing Your Role—and Owning the Trade-Offs

Ecosystems are not automatically "better" than traditional models. They are more powerful—but also more complex. They demand governance, trust, and clear value logic.

The strategic choice for any organization is not just whether to join an ecosystem, but how:

- Become a **Builder** if you want to turn ecosystem capability into customer outcomes.
- Become an **Orchestrator** if you can credibly set rules, align incentives, and grow shared value.
- Remain a **Participant** if your advantage lies in a focused component—but be honest about dependency risks.

The best ecosystems are not built on optimism alone. They are built on a shared vision, concrete incentives, operational standards, and a willingness to learn—and refine the model—together.

Data Ecosystems as a Special Type of Ecosystem - What are Data Ecosystems?

A **data ecosystem** refers to a network or system of interconnected actors—such as individuals, organizations, platforms, and technologies—that collaborate to collect, process, share, and utilize data. These ecosystems enable data to flow between different entities, creating value through innovation, better decision-making, and improved services. Here's a breakdown of the components and how they work:

- **Data Sources:** These can be anything from IoT devices, mobile apps, sensors, or traditional databases. They provide raw data that fuels the ecosystem.
- **Data Platforms:** The infrastructure that hosts, processes, and manages the data. These platforms can include cloud storage, databases, and specialized tools for data analysis.
- **Data Consumers:** Individuals, organizations, or systems that use the data for various purposes, such as analytics, decision-making, or improving services.
- **Data Governance:** Rules, policies, and procedures that ensure data quality, privacy, security, and ethical use within the ecosystem.
- **Data Interoperability:** The ability of different systems and organizations to exchange and make use of data in a seamless way, using common standards.

Data ecosystems have several characteristics:

- **Collaboration:** Organizations and entities in a data ecosystem often collaborate, share, and leverage each other's data to create new insights or improve products and services.
- **Innovation:** A healthy data ecosystem enables innovation by allowing businesses and developers to build new services on top of shared data.
- **Scalability:** Data ecosystems often grow organically as more participants join and contribute data, leading to richer data sets and more opportunities.
- **Customer-centricity:** Many ecosystems are designed around delivering better services or experiences to end-users by leveraging data insights.

Building a successful data ecosystem requires careful planning, coordination, and the integration of technology, governance, and collaboration. Here are some of the key building blocks to consider when building such an ecosystem:

1. Clear Vision and Objectives

2. Clear Governance

3. Well defined Data models and standards.

4. Collaborative Partnerships

5. Technology Architecture and Infrastructure

6. User-Centric Design

7. Sustainability and Long-Term Planning

8. Performance Metrics and Monitoring

9. Engagement and Communication

10. Testbeds and Pilot Projects

Traffic Data Ecosystem as a case example

In this book, we will be using Fintraffic's Traffic Data Ecosystem as a case example. In a **traffic data ecosystem**, data from various sources such as vehicles, sensors on roads, weather stations, and public transport systems are collected. This data can be used by municipalities, transportation companies, urban planners, and service providers to:

- Optimize traffic flow
- Improve safety
- Reduce emissions
- Provide real-time travel information to users

This collaborative approach benefits the whole system, improving efficiency and safety for everyone.

Chapter 3: From Data Silos to Ecosystems – Case Traffic Management

The Evolution of Traffic Management in Finland

For decades, traffic management was built on centralized control and isolated data flows. Each mode of transport—road, rail, maritime, and air—developed its own systems, sensors, and reporting mechanisms. These systems were optimized for their specific operational needs but rarely designed for cross-sector collaboration. Data was treated as an operational by-product rather than as a strategic asset.

In the early 2000s, Finland began its digital transformation journey in traffic management. The first generation of digital systems focused on automation, efficiency, and safety. Traffic Management Centres were established to monitor road conditions, coordinate responses to incidents, and manage traffic flows using increasingly sophisticated sensor networks and digital communication tools.

The next wave came with the rise of Digitraffic.fi, a national open data platform that began publishing real-time road and weather data. It was a breakthrough moment: for the first time, data collected by public authorities became openly available to developers, researchers, and businesses. This marked a turning point in how Finland viewed the role of public traffic data — not as a closed asset but as an enabler of innovation.

By the late 2010s, the need for a more integrated, multimodal perspective had become clear. Travelers and logistics operators were no longer interested in fragmented information. They needed coherent, real-time data that would support door-to-door journeys and supply chains. The creation of Fintraffic in 2019 unified the previously separate traffic management functions across all modes. This institutional transformation was not merely administrative — it was conceptual. It recognized that efficient, safe, and sustainable mobility depends on the ability to connect data, systems, and people across boundaries.

This evolution — from separate systems to an orchestrated, data-driven ecosystem — became the foundation for Finland's internationally recognized leadership in traffic data innovation.

Why Data Collaboration Is Essential for Safety, Sustainability, and Efficiency

Traffic management is fundamentally about coordination — between vehicles, infrastructure, operators, and users. Without shared situational awareness, no amount of automation or regulation can deliver optimal outcomes. Data collaboration transforms the way this coordination happens.

Safety through shared situational awareness

When multiple actors — from road authorities to navigation apps and logistics companies — share data in real time, safety improves dramatically. Open interfaces and common standards enable alerts about accidents, obstacles, or weather hazards to propagate instantly across systems. Instead of each operator reacting separately, the ecosystem as a whole responds collectively and faster. In Finland, for example, integrating weather station data, vehicle telemetry, and road maintenance information has allowed for predictive safety models that anticipate slippery road conditions and enable proactive measures.

Sustainability through optimization

Transport accounts for roughly one-fifth of Finland's greenhouse gas emissions. Data collaboration is one of the most powerful tools to reduce these impacts. Shared data enables better traffic flow, optimized logistics routes, and integration of public transport and active mobility options. By connecting data from public and private actors, it becomes possible to identify inefficiencies — empty trucks, idle assets, or unnecessary detours — and to replace them with intelligent, low-emission alternatives. Data-driven coordination helps society move more with less.

Efficiency through interoperability and reuse

When data is openly available and interoperable, innovation multiplies. Instead of each organization building its own data pipelines, they can build on shared infrastructure and focus on value creation. Efficiency arises not only in operational terms but also in innovation speed. A single open dataset can support hundreds of use cases — from new navigation tools to predictive maintenance solutions. The ecosystem model encourages continuous experimentation and co-development, turning public data into a platform for economic growth.

In essence, data collaboration is the new infrastructure of mobility — as fundamental as roads, railways, and ports once were.

Overview of Fintraffic and the Finnish Ecosystem Model

Traffic Management Company Fintraffic Ltd serves as the national orchestrator of data-driven traffic management and ecosystem collaboration. Its mission extends far beyond operating control centres; it builds the foundations for digital collaboration across the entire mobility system.

Fintraffic operates across four domains — **road, rail, maritime, and air** — with a unified digital backbone that collects, harmonizes, and publishes data through the **Digitraffic platform**. The company also maintains the **National Access Point (NAP)**, fulfilling Finland's obligations under the EU ITS Directive. These infrastructures form the technical layer of the ecosystem.

Above this layer sits the **Traffic Data Ecosystem**, an open collaboration network bringing together public authorities, private companies, research institutions, and international partners. It is not a traditional project or consortium but an evolving community guided by shared rules and mutual trust.

The ecosystem operates on four core principles:

1. **Openness and Transparency**
   All participants have access to the same information about governance, goals, and datasets. Open communication and documentation ensure that decisions are visible and explainable.
2. **Fairness and Reciprocity**
   Value is shared fairly among participants. Public and private actors alike can contribute and benefit, with clear rules for data use, intellectual property, and revenue models.
3. **Shared Purpose and Trust**
   The ecosystem is built around a common societal mission: safer, smoother, and more sustainable mobility. Trust is maintained through consistent behaviour, clarity, and a neutral orchestrator role.
4. **Scalability and Reusability**
   Solutions developed within the ecosystem are designed for reuse across sectors and borders. The Finnish model has inspired international collaboration with Nordic and EU partners.

The governance of the Traffic Data Ecosystem is formalized through a **Rulebook**, which defines roles, rights, and responsibilities for participants (Please refer to appendix for more details). It ensures that collaboration remains transparent and predictable even as new partners and technologies enter the field. This combination of openness and structure is what makes the Finnish approach uniquely effective: it allows innovation to flourish within a framework of trust.

Conclusion: From Siloed Systems to Shared Value

The transition from data silos to ecosystems is more than a technical shift — it is a cultural transformation. It changes how organizations view data, how they define their roles, and how they measure success.

In traditional traffic management, the goal was to manage flows. In the ecosystem era, the goal is to **enable value creation** across a network of actors who share data responsibly and collaboratively.

Finland's experience shows that when trust, governance, and shared purpose align, the results reach far beyond mobility. They shape how societies organize innovation itself — not as competition over data, but as collaboration through it.

Chapter 4: The Vision and the Context

From National Ambition to European Leadership

Every transformation begins with a vision — a clear idea of the world we want to create.
For Finland, that vision was never limited to digitizing traffic management. It was to **build the world's most trusted and effective traffic data ecosystem**, one that empowers people and organizations to move safely, efficiently, and sustainably.

This vision emerged from a simple insight: mobility is no longer a collection of disconnected services, but a **living data network**. The vehicles, infrastructure, logistics chains, and passengers are all nodes in a continuously evolving system. Managing that system requires new principles — openness, interoperability, and trust.

As Fintraffic consolidated the national traffic management operations in 2019, it also inherited a strategic opportunity: to act as a **national orchestrator of digital mobility** and as a **European pioneer of ecosystem-based governance**. The Finnish government's strong digitalization agenda, its early embrace of open data, and its collaborative culture provided fertile ground for this vision to grow.

A European Framework for Data-Driven Mobility

Finland's approach to data ecosystems does not exist in isolation. It is part of a much larger European movement that aims to unlock the value of data for public good while ensuring fairness, privacy, and sovereignty.

The **European Commission's Data Strategy (2020)** introduced the idea of **Common European Data Spaces** — shared infrastructures where data can flow securely and fairly between sectors. The **Mobility Data Space** is one of the first and most mature of these initiatives. Its goal is to connect national and industry-specific data platforms to support safer, cleaner, and more efficient mobility across the continent.

Within this context, several legislative and programmatic pillars shape how Finland and Fintraffic operate:

1. **The Intelligent Transport Systems (ITS) Directive (2010/40/EU, revised 2023)**
   The ITS Directive and its Delegated Regulations require Member States to provide harmonized access to transport data through **National Access Points (NAPs)**. Finland's NAP, operated by Fintraffic, is recognized as one of the most advanced in Europe. It integrates multimodal datasets — from road conditions to public transport timetables — and ensures they are discoverable, standardized, and machine-readable.

2. **The Data Governance Act (DGA) and Data Act**
   These acts define the ground rules for data sharing across sectors. They promote trusted intermediaries, data altruism, and fair business models — principles deeply aligned with the Finnish ecosystem approach.
3. **The Green Deal and the CountEmissions EU Regulation**
   These initiatives emphasize sustainability and transparency. The CountEmissions EU framework introduces harmonized emission data calculation and sharing rules, where traffic data plays a key role in enabling evidence-based environmental decisions.
4. **The Digital Europe Programme and Horizon Europe**
   These EU funding instruments support the technical and organizational enablers of data spaces — from interoperability frameworks and reference architectures to cross-border pilots and digital twins. Finland actively contributes to these initiatives through Fintraffic's partnerships in EU projects and Nordic collaborations.

Together, these policies define the **operating environment for data ecosystems**. They provide both the mandate and the momentum for Finland's model to scale and inspire others.

Finland's Digital Vision for Mobility

Finland's digital strategy for transport rests on a conviction that **data is infrastructure** — a shared asset that, when managed responsibly, benefits society as much as roads or railways do.

This vision is articulated through several complementary goals:

1. **Seamless and Sustainable Mobility**
   All modes of transport — road, rail, air, and maritime — are connected through shared data flows, enabling a system that is predictable, safe, and resource-efficient.
   Whether it's a commuter planning a multimodal trip or a logistics company optimizing supply chains, real-time and high-quality data is the foundation.
2. **Open and Fair Data Economy**
   Openness drives innovation, but fairness ensures longevity. The Finnish approach balances these two forces through clear governance, transparent rulebooks, and shared value creation. Data is made available for innovation but protected against misuse.
3. **Collaboration over Competition**
   The most transformative mobility solutions — automated driving, AI-based logistics, emission monitoring — require data that no single organization can provide alone. Finland's ecosystem vision encourages **co-opetition**: public and private actors working together, even when they compete in the marketplace.
4. **Digital Twins and Predictive Capabilities**
   The future of traffic management lies in digital twins — virtual representations of the physical mobility system that enable simulation, prediction, and optimization. Fintraffic's Digital Twin Roadmap extends this vision toward 2035, connecting real-time sensor data, predictive analytics, and AI-assisted decision-making across all transport modes.

Fintraffic's Role in the Ecosystem Vision

Fintraffic's strategic position as both a **service operator** and a **neutral orchestrator** makes it uniquely capable of turning policy visions into practice. Its role bridges three domains:

1. **Operational excellence** – ensuring 24/7 safety, reliability, and coordination of traffic across modes.
2. **Data stewardship** – maintaining open and trusted data platforms such as Digitraffic and the NAP, ensuring interoperability, quality, and privacy compliance.
3. **Ecosystem facilitation** – convening public authorities, companies, researchers, and innovators to co-create solutions, define governance, and align investments.

This model exemplifies what the EU calls a **"trusted data intermediary"** — an entity that enables collaboration without monopolizing control. Fintraffic's strength lies not only in its technology, but in its credibility: it is widely trusted to act in the public interest while enabling private-sector innovation.

Nordic Collaboration and Cross-Border Innovation

Finland's ecosystem thinking has naturally extended beyond its borders. The **Nordic countries share a similar culture of openness, trust, and pragmatic innovation**, making them ideal partners in cross-border mobility data initiatives.

Joint projects such as the **ODIN cooperation** between Nordic countries and Estonia, the **European Mobility Data Space**, and participation in **C-Roads** and **ITS Nordic+** networks demonstrate how ecosystem thinking scales internationally.

These collaborations focus on **interoperability**, **real-time information exchange**, and **harmonization of data standards** — critical steps toward a truly European digital transport infrastructure.

By aligning national systems with EU data space principles, the Nordic region acts as a **living laboratory for the European Data Economy** — where public trust, technical excellence, and business innovation reinforce one another.

A Vision of Societal Impact

At its core, Finland's traffic data vision is not just about technology or governance. It is about **societal resilience** — how a connected and intelligent mobility system can make daily life safer, greener, and more predictable.

- When data enables precise and proactive winter maintenance, accidents are prevented.

- When freight routes are optimized through shared situational data, emissions and costs are reduced.
- When citizens can access reliable real-time information, public trust in digital services grows.

Each of these examples reflects a deeper outcome: **trust becomes impact**.
The more reliable and transparent the data ecosystem is, the more it amplifies the collective benefits — economic competitiveness, sustainability, and public welfare.

Conclusion: The Context Shapes the Vision

Finland's Traffic Data Ecosystem stands at the intersection of **national leadership and European collaboration**. It embodies a vision where open data, fair governance, and trusted partnerships redefine how a country manages its mobility system.

The context — legal, institutional, and cultural — provides both structure and direction. Yet the vision goes beyond compliance: it aims to **reimagine traffic management as a platform for shared value creation**, where every actor contributes to and benefits from a smarter, safer, and more sustainable future.

This is the environment from which the Traffic Data Ecosystem emerged — not as a project, but as a new paradigm for how societies can turn data into public good.

Chapter 5: Building Trust and Shared Purpose

Trust as the Foundation of Collaboration

Every successful ecosystem begins not with technology, but with trust. Without trust, data remains locked away, partnerships stay superficial, and collaboration never reaches scale. Trust is the invisible infrastructure that makes the visible data ecosystem work.

In traditional data-sharing models, the question has always been *"What can I get?"*
In ecosystem models, the question becomes *"What can we achieve together?"* — and that shift requires a foundation of credibility, transparency, and fairness.

Finland's Traffic Data Ecosystem has demonstrated that trust is not an abstract virtue; it is a **strategic capability** that can be deliberately built, maintained, and measured. The process requires time, consistent behavior, and structures that reinforce reliability.

The Trust Equation: Transparency + Reciprocity + Neutrality

Trust in data ecosystems is multi-dimensional. It is built on three interconnected elements:

1. **Transparency – Clarity Builds Confidence**
   Participants need to know *what* data is shared, *how* it is used, and *why* it matters.
   In the Finnish ecosystem, transparency is institutionalized through public rulebooks, open communication, and shared documentation. Stakeholders have equal access to information about decision-making, data governance, and technical standards.
   This openness creates psychological safety — participants understand the boundaries of cooperation and can focus on value creation instead of defending their interests.
2. **Reciprocity – Give and Gain**
   In any collaboration, perceived fairness determines engagement. A one-sided relationship erodes motivation quickly.
   Reciprocity does not always mean symmetrical data exchange. It can mean mutual benefit: a company providing data gains visibility, credibility, or new services in return. The key is to ensure that *everyone benefits from participating*, even if the forms of value differ.
   The Finnish ecosystem uses transparent benefit mapping and use case co-design to ensure that partners — whether public or private — understand and agree on the value they co-create.
3. **Neutrality – The Role of a Trusted Orchestrator**
   Data ecosystems need an entity that is trusted by all and owned by none.
   Fintraffic fulfills this role by acting as a **neutral orchestrator** — ensuring that no single participant dominates and that decisions are made in the collective interest.

Neutrality is reinforced through clear separation between operational services and ecosystem facilitation. Fintraffic operates open platforms like Digitraffic.fi and FiNAP.fi, but it does not compete in commercial service markets. This separation allows partners to collaborate with confidence, knowing the orchestrator's agenda is transparent and public-interest–driven.

The Journey from Skepticism to Collaboration

When Finland began developing its traffic data ecosystem, many potential partners were cautious. Private companies were hesitant to share data with public entities. Public authorities worried about commercial misuse. Startups feared being overshadowed by larger players.

Building trust required **deliberate design**:

- **Open dialogue** — workshops and roundtables where concerns could be voiced and expectations clarified.
- **Shared rulebooks** — written agreements that defined vision. roles, rights, and responsibilities without excessive bureaucracy.
- **Demonstrated success** — early pilots (e.g., real-time road weather and safety data sharing) showed tangible benefits for all sides.
- **Consistent communication** — Fintraffic continuously explained the rationale, shared results, and invited feedback, reinforcing predictability.

Over time, skepticism turned into collaboration. Trust was not demanded — it was *earned*, through behavior, openness, and results.

The Rulebook as a Trust Instrument

The **Traffic Data Ecosystem Rulebook** is one of Finland's most innovative governance tools. It functions as both a social contract and a practical manual.

It defines:

- The **principles of participation** — openness, transparency, fairness, and accountability.
- The **roles** — orchestrator, contributor, user, and observer.
- The **rules for data use** — licensing, attribution, and commercial models.
- The **processes for conflict resolution and onboarding**.

What makes the Rulebook powerful is its flexibility. It provides structure without rigidity — a framework that evolves as the ecosystem matures. This "soft governance" approach lowers the threshold for participation while maintaining clarity and consistency.

The Rulebook does not replace trust; it *enables* it. It ensures that collaboration remains fair even as new actors join, and it turns abstract principles into operational practices.

Building Shared Purpose

Trust creates the space for collaboration — but **shared purpose** gives it direction.
A clear and inspiring purpose helps participants see beyond their individual interests and align around a common mission.

In the Traffic Data Ecosystem, that shared purpose is simple and compelling:

"To make Finland's transport system safer, smoother, and more sustainable through data-driven collaboration."

This statement may sound straightforward, but it carries deep strategic weight. It frames data sharing as a **societal mission**, not a technical task. It connects engineers, policymakers, and entrepreneurs under a common narrative of public good and national competitiveness.

To operationalize shared purpose, the ecosystem uses three practical mechanisms:

1. **Co-creation of goals**
   Each phase of the ecosystem's development involves joint planning with participants. Priorities are not dictated from the top but agreed collectively. This process strengthens ownership and commitment.
2. **Use-case-driven collaboration**
   Shared purpose is made tangible through real-world projects: emissions data sharing, multimodal travel chains, winter road safety, and logistics optimization. Each use case demonstrates the societal impact of data collaboration, reinforcing the collective mission.
3. **Continuous storytelling**
   The ecosystem communicates its vision repeatedly — through newsletters, events, visuals, and public reporting. This storytelling keeps the purpose visible and alive. It transforms "trust" from an emotion into a shared identity.

The Role of Leadership in Sustaining Trust

Trust and purpose do not maintain themselves; they require leadership.
The role of the ecosystem orchestrator is not to control, but to *curate* — to keep the network coherent, motivated, and aligned.

Key leadership practices include:

- **Neutral facilitation:** ensuring all voices are heard, especially smaller actors.

- **Transparency of action:** documenting decisions and rationales publicly.
- **Empathy and predictability:** understanding the pressures of different stakeholders and responding consistently.
- **Recognition:** celebrating contributors and highlighting shared achievements.

Fintraffic's leadership model emphasizes "service orchestration" over "project management." Instead of enforcing compliance, it enables participation. The result is a self-reinforcing cycle: trust strengthens collaboration, collaboration delivers impact, and impact reinforces trust.

Trust as Measurable Capital

In a mature ecosystem, trust becomes **a measurable form of capital**. It manifests as reduced transaction costs, faster decision-making, and higher willingness to share data.

Fintraffic has developed informal indicators for monitoring this capital:

- Growth in the number and diversity of ecosystem participants
- Volume and richness of shared datasets
- Frequency of voluntary contributions and co-created initiatives
- Partner satisfaction and willingness to recommend participation

These indicators reflect something profound: trust, once intangible, becomes an operational resource — one that multiplies value across the ecosystem.

Conclusion: Trust Turns Data into Collaboration

Trust transforms data from a guarded asset into a shared capability. It allows organizations to move from coordination to **co-creation**, from compliance to **commitment**, and from isolated transactions to **continuous collaboration**.

In the Finnish Traffic Data Ecosystem, trust has become the competitive advantage. It allows public and private actors to innovate together in ways that would be impossible within traditional hierarchies or contracts.

When trust and shared purpose align, data ecosystems stop being management structures — they become *communities of impact*.

And in that transformation lies the true beginning of the data economy.

Chapter 6: Governance and Operating Models

From Collaboration to Coordination

Once trust and shared purpose are established, the next challenge is turning good intentions into effective structures.
Without governance, ecosystems risk drifting — enthusiasm alone cannot sustain alignment among dozens of organizations with different goals, cultures, and incentives.

Governance is not bureaucracy. In a well-designed data ecosystem, it is **the invisible scaffolding** that keeps collaboration balanced and productive. It defines *who decides what*, *how decisions are made*, and *how responsibilities are shared* — all while maintaining the openness that fuels innovation.

Finland's Traffic Data Ecosystem has approached governance not as a rigid hierarchy, but as a **living system**: adaptive, transparent, and proportionate to the ecosystem's maturity.

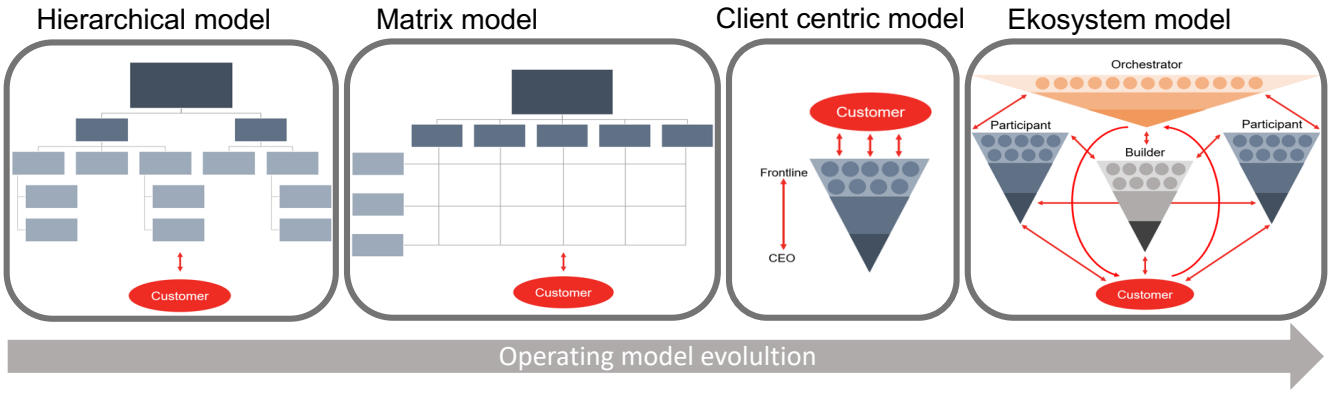


Figure 3. Operating model archetypes.

Ecosystem Governance Archetypes

Around the world, three main governance archetypes have emerged for digital ecosystems:

1. **Orchestrated ecosystems**
   A central entity — often public or semi-public — sets the overall framework, coordinates partners, and safeguards neutrality.
   → Example: Fintraffic, acting as a trusted national orchestrator.
2. **Federated ecosystems**
   Multiple organizations share governance power through joint committees or consortia. Decisions require consensus, and responsibilities are distributed.
   → Common in EU-funded data space pilots and industry associations.

3. **Decentralized ecosystems**
   No single orchestrator; rules are embedded in shared standards, technologies, or contracts. Participants self-govern using digital trust mechanisms (e.g., smart contracts or tokenized permissions).

The Finnish model blends **orchestrated** and **federated** characteristics. Fintraffic provides the backbone — the neutral orchestrator and facilitator — but the community participates actively in decision-making through working groups, advisory boards, and open consultations.
This hybrid model ensures both agility and legitimacy.

Principles of Good Governance

The ecosystem's governance framework is built on four guiding principles:

1. **Transparency** – All decisions, meeting notes, and rule changes are documented and accessible. Nothing important happens "behind closed doors."
2. **Inclusiveness** – Every stakeholder category (public, private, research, and civic) can contribute to shaping priorities.
3. **Accountability** – Roles and responsibilities are explicit; data ownership and obligations are clearly stated.
4. **Adaptability** – Governance evolves as the ecosystem grows. Complexity increases only when justified by scale.

These principles reflect Finland's cultural DNA — *trust through openness* — and are embedded in every operational process from onboarding to data publication.

Governance Structure of the Finnish Traffic Data Ecosystem

The governance of the Traffic Data Ecosystem operates on three layers:

1. Strategic Layer – Direction and Oversight

- **Ecosystem Steering Group**: Composed of senior representatives from ministries, Fintraffic, major partners, and research institutions.
- Sets strategic priorities, approves the Rulebook, and ensures alignment with national and EU policy.
- Meets quarterly to evaluate progress and endorse new initiatives.

2. Operational Layer – Execution and Coordination

- **Ecosystem Office (hosted by Fintraffic)**: Coordinates daily operations, manages communication, and ensures compliance with the Rulebook.
- **Thematic Working Groups**: Temporary task forces focusing on topics like data quality, business models, or digital twins.
- **Partner Network Meetings**: Regular open sessions where members showcase projects, share lessons, and align roadmaps.

3. Community Layer – Engagement and Innovation

- An open community of companies, startups, researchers, and authorities contributing ideas, pilots, and datasets.
- Operates under "opt-in" participation: anyone aligned with the principles can join, co-create, and benefit.
- Maintains lightweight participation agreements to lower barriers while ensuring responsible behavior.

This **three-layer structure** balances stability and flexibility — ensuring clear accountability at the top, while keeping innovation decentralized and inclusive at the base.

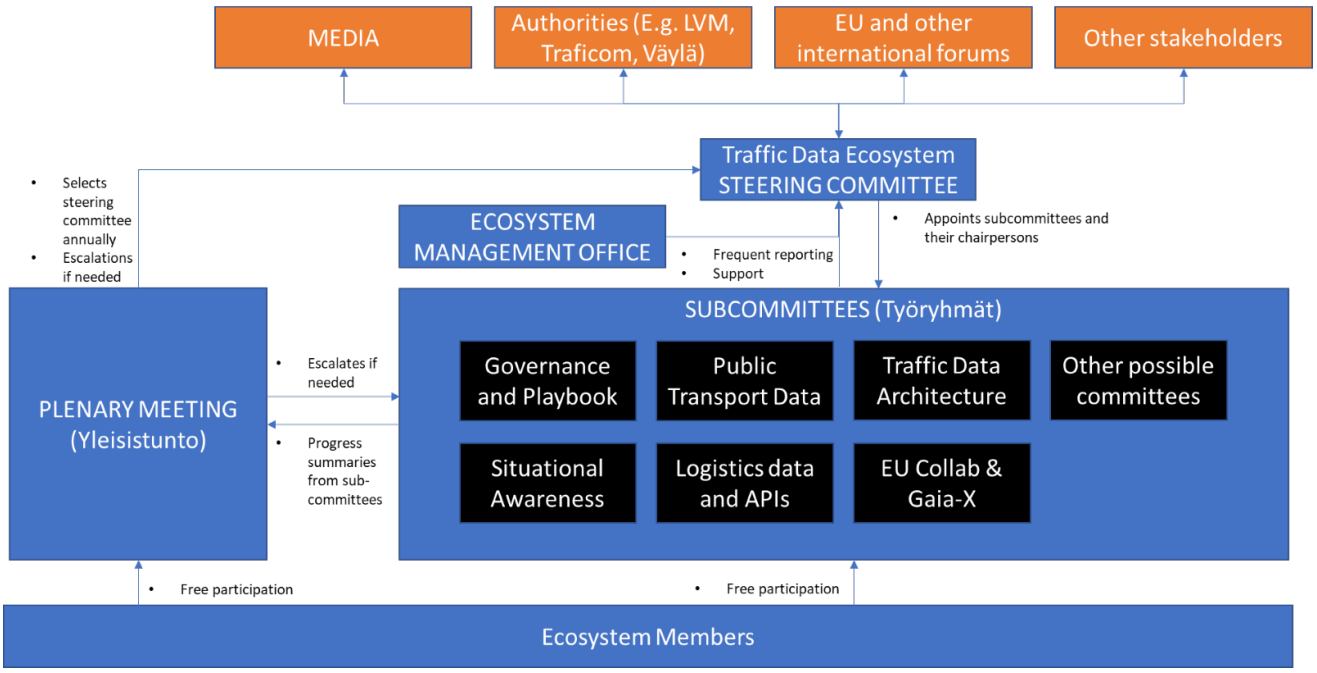


Figure 4. Traffic Data Ecosystem Governance Model.

Decision-Making: How Consensus Emerges

Unlike corporate hierarchies, ecosystems thrive on *distributed decision-making*.
The goal is not to enforce uniformity but to build **aligned diversity** — letting multiple actors innovate within shared boundaries.

Fintraffic's ecosystem uses three complementary mechanisms:

1. **Consultative Consensus**
   For most strategic decisions (e.g., new governance principles or major data releases), consensus is sought through open consultation. Every stakeholder can comment, and feedback is published transparently.
2. **Delegated Authority**
   Thematic working groups can make operational decisions within their mandate — for example, recommending a new data standard. This speeds up progress and empowers experts.
3. **Rulebook-based Resolution**
   When conflicts arise, the Rulebook provides predefined paths: mediation, escalation to the Steering Group, and, if necessary, neutral arbitration.
   In practice, most issues are resolved through dialogue — the presence of a trusted orchestrator reduces friction dramatically.

The Lifecycle of an Ecosystem Decision

To make governance concrete, consider how a new dataset (for example, *road surface temperature forecasts*) moves through the system:

1. **Idea phase** – A private company or authority proposes the dataset at a community meeting.
2. **Scoping** – A working group assesses relevance, privacy, and interoperability.
3. **Recommendation** – The group submits a proposal with technical and governance notes to the Steering Group.
4. **Approval** – The Steering Group validates alignment with ecosystem goals.
5. **Implementation** – Fintraffic's Ecosystem Office coordinates publication through Digitraffic or the NAP.
6. **Communication and feedback** – The dataset is announced, and users provide feedback through open channels.

This process is transparent, repeatable, and well understood — which builds confidence and accelerates collaboration.

Ecosystem Roles and Responsibilities

To avoid confusion and maintain clarity, the Finnish model defines four key roles:

Role	Main Responsibility	Examples
Orchestrator	Coordinates the ecosystem, safeguards neutrality, maintains infrastructure and Rulebook.	Fintraffic
Contributor	Provides data, expertise, or technology to shared initiatives.	Public authorities, companies, research projects
User / Innovator	Utilizes ecosystem data to create products, services, or research outcomes.	Startups, universities, app developers
Observer / Partner	Participates in dialogue, learning, and international alignment without active data exchange.	Ministries, NGOs, international bodies

This clear role division allows different types of engagement without forcing uniform commitment. It recognizes that not every participant must contribute equally to add value.

Maturity and Evolution: From Pilots to Platform

Ecosystems evolve in stages. Fintraffic's experience reflects a typical **four-phase maturity model**:

1. **Initiation (Trust-Building)**
   Focus on vision, stakeholder mapping, and early pilots. Success measured by engagement and visibility.
2. **Structuring (Governance Formation)**
   Creation of the Rulebook, working groups, and initial funding models. The ecosystem gains identity.
3. **Acceleration (Value Creation)**
   Use cases scale, data flows increase, and cross-sector collaboration deepens. Metrics include number of datasets, joint projects, and business adoption.
4. **Sustainability (Self-Governance)**
   Ecosystem functions independently; rules evolve collectively; the orchestrator shifts from control to facilitation. Revenue and cost-sharing models ensure longevity.

The Traffic Data Ecosystem is currently transitioning from *structuring* to *acceleration* — a phase where trust is established, governance is functioning, and impact becomes visible.

Governance Tools: Light but Effective

To support operations, the ecosystem employs a set of practical tools:

- **Document Repository** – a living digital document share accessible to all members, with version tracking. Participants can propose new datasets, submit feedback, or access standard templates (NDAs, data-sharing terms, etc.) and other documentation.
- **Data Catalogs** – to monitor data and interoperability.

These tools ensure accountability without bureaucracy — a "light governance" approach that maintains agility even as participation grows.

Funding and Incentives

No ecosystem can sustain itself on goodwill alone.
The Finnish model combines several funding mechanisms:

- **Public Base Funding** – provided through Fintraffic's mandate for national digital infrastructure and open data.
- **Co-funded Pilots** – joint initiatives with industry and EU programs (e.g., Horizon Europe, CEF Digital).
- **In-kind Contributions** – companies provide data, expertise, or tools in exchange for ecosystem access and visibility.
- **Export and Commercial Opportunities** – joint projects that generate value beyond Finland, strengthening the national innovation brand.

This hybrid model ensures that the ecosystem remains inclusive but financially grounded — capable of scaling without becoming dependent on single funding sources.

Challenges in Ecosystem Governance

Even with strong structures, governance remains a continuous balancing act.
Key challenges include:

- **Maintaining neutrality** while also being an active innovator.
- **Managing pace differences** — public sector cycles vs. startup agility.
- **Keeping engagement high** when immediate returns are not visible.

- **Evolving rules** fast enough to reflect new technologies (AI, digital twins, data spaces).

The Finnish approach accepts these as *natural tensions*, not failures. Governance is seen as a process of learning and adaptation — a living laboratory of collective intelligence.

Conclusion: Governance as Enabler, Not Constraint

Governance is often misunderstood as the "slow part" of collaboration.
In reality, **good governance accelerates innovation** — by providing clarity, predictability, and fairness.

In the Traffic Data Ecosystem, governance does not prescribe; it empowers.
It allows hundreds of actors to align without losing autonomy, to innovate within a shared framework, and to scale from national pilots to international data spaces.

Ultimately, governance turns *trust* into *structure* and *structure* into *impact*.
It is the bridge between the vision of shared data and the daily reality of collaboration — the unseen architecture of an ecosystem that works.

Chapter 7: Legal and Ethical Foundations

Why Legal and Ethical Foundations Matter

A data ecosystem without legal clarity is like a highway without signs — full of potential, but prone to collisions.
While trust and governance create the social fabric of collaboration, the **legal and ethical framework** defines its legitimacy. It ensures that innovation happens within boundaries that protect people's rights, preserve competition, and sustain public confidence.

Finland's Traffic Data Ecosystem operates at the intersection of **public responsibility and private innovation**. Its success depends on maintaining a delicate balance:

- Open enough to stimulate growth and innovation,
- Structured enough to protect privacy, fairness, and accountability.

This chapter describes how that balance is achieved — through clear legal frameworks, shared ethical principles, and a culture of responsible data use.

The European Legal Context

Finland's data governance does not exist in a vacuum. It is built within a strong European legal foundation designed to ensure **trustworthy data sharing** and **digital sovereignty**.
Several key frameworks define the boundaries of ecosystem collaboration:

1. **General Data Protection Regulation (GDPR)**
   The cornerstone of EU data protection law, the GDPR ensures that any processing of personal data respects individuals' rights.
   In the traffic domain, this often means distinguishing between personal and non-personal data — for example, anonymizing vehicle telemetry or trip data before sharing. GDPR is not a barrier to innovation; it is a quality standard that ensures data is used ethically and responsibly.
2. **Data Governance Act (DGA)**
   The DGA introduces the concept of *data intermediaries* — neutral entities that enable data sharing while maintaining trust and fairness. Fintraffic's orchestrator role aligns closely with this principle, providing a trusted bridge between public and private data holders.
3. **Data Act (2023)**
   This regulation defines how data generated by connected devices can be accessed and shared, ensuring fairness between manufacturers, service providers, and users.

For transport ecosystems, it clarifies rights around vehicle data, sensors, and platform-generated information — ensuring that value from data is distributed more equitably.

4. **ITS Directive (and Delegated Regulations)**
   Establishes the legal basis for National Access Points (NAPs) and mandates open, standardized data exchange to improve transport safety and efficiency.
   It ensures that ecosystem data is not only available but also interoperable and reliable.
5. **Public Sector Information (PSI) Directive / Open Data Directive**
   Encourages public authorities to make their data openly available, enabling reuse by businesses and citizens.
   This principle underpins Finland's open data policy, where platforms like Digitraffic offer free and machine-readable datasets for all.
6. **European competition law** places important boundaries on how collaboration can be organized within the Traffic Data Ecosystem and export cluster. While the EU encourages innovation, standardization, and cross-border cooperation, any activity must avoid restricting competition, sharing commercially sensitive information, or creating structures that could lead to price coordination, market allocation, or unfair competitive advantages. Therefore, ecosystem work must remain focused on open standards, interoperability, public-good data sharing, and non-discriminatory participation — without influencing commercial strategies, pricing models, or competitive behaviour among participating companies.

These legal frameworks form the **hard infrastructure** of the data ecosystem — defining rights, obligations, and compliance expectations for every participant.

Data Sharing Agreements and Licensing Models

In practice, not all ecosystem data can or should be fully open. Some datasets contain sensitive information, intellectual property, or competitive insights. For these, **data sharing agreements (DSAs)** and **licensing models** provide clarity on use, attribution, and redistribution.

The Finnish Traffic Data Ecosystem uses a tiered approach:

1. **Open Data (CC BY 4.0 or CC0 licenses)**
   The default option for non-sensitive data such as weather, road conditions, or transport timetables.
   Enables unrestricted reuse and supports innovation without friction.
2. **Shared Data (under Rulebook terms)**
   Data shared within the ecosystem under agreed principles — for example, traffic sensor data provided to ecosystem members for pilot use, with clear limits on commercial exploitation.
3. **Restricted Data (contract-based sharing)**
   For proprietary or sensitive datasets, bilateral or multilateral agreements define purpose, duration, and rights.
   These agreements often use standardized templates provided by the ecosystem, reducing legal overhead and ensuring fairness.

By combining openness with structured agreements, the ecosystem ensures both **accessibility** and **accountability**.

Intellectual Property and Value Distribution

Data itself may not be copyrightable, but the *products, algorithms, and insights* derived from it often are. The Finnish approach to IP in the ecosystem rests on three principles:

1. **Respect for Original Ownership**
   Data providers retain ownership and control over their data unless explicitly transferred.
   This clarity encourages organizations to contribute, knowing they will not lose their rights.
2. **Right to Use and Combine**
   Participants gain the right to use shared data for defined purposes (innovation, research, services) while respecting attribution and license terms.
   The focus is on *rights of use*, not *transfer of ownership*.
3. **Fair Value Sharing**
   When data-driven products or services create commercial value, benefit-sharing mechanisms ensure fairness.
   For example, companies using publicly shared traffic data are encouraged to provide feedback, data enrichments, or co-investment in new datasets.
   The emphasis is on reciprocity — not monetization per se, but on mutual reinforcement of value creation.

This pragmatic approach turns potential IP conflicts into collaborative opportunities.

Ethical Principles for Data Ecosystems

Beyond law and contracts lies something even more fundamental: **ethics**.
Legal compliance may prevent misuse, but ethics ensures *right use*.
The Finnish ecosystem integrates ethics as a living principle rather than an afterthought.

Its ethical foundation rests on five pillars:

1. **Human-Centric Design**
   Data serves people — not the other way around.
   Services built on ecosystem data must demonstrably improve safety, accessibility, or sustainability.
2. **Transparency and Explainability**
   Participants must be able to explain how data is used, by whom, and for what purpose.
   Black-box analytics or AI systems that obscure accountability are discouraged.
3. **Fairness and Non-Discrimination**
   Algorithms or datasets must not reinforce biases — for instance, penalizing certain regions,

user groups, or modes of transport.
Fairness audits and public feedback mechanisms help identify and mitigate unintended effects.

4. **Security and Privacy by Design**
   Protection of personal or sensitive data is embedded from the start — not added later.
   Privacy-preserving technologies (such as anonymization, aggregation, and differential privacy) are increasingly used.
5. **Societal and Environmental Responsibility**
   Data decisions must consider societal impact, not only efficiency or profit.
   The ecosystem encourages use cases that contribute to Vision Zero (no fatalities in traffic), emission reduction, and digital inclusion.

These principles transform ethical reflection into operational behavior — they guide design choices, project selection, and communication practices.

Operationalizing Legal and Ethical Compliance

Fintraffic and its partners have developed several **practical instruments** to turn legal and ethical principles into daily routines:

- **The Rulebook's Legal Appendix**
  Summarizes applicable laws, clarifies liability boundaries, and provides model clauses for data use and disclaimers.
- **Data Protection Impact Assessments (DPIA)**
  Conducted for any use case involving personal or location data.
  This ensures early identification of privacy risks and mitigation strategies.
- **Data Classification Framework**
  Categorizes data as *open, shared, restricted,* or *sensitive* based on content and risk.
  This determines which sharing mechanism and license apply.
- **Ethical Review Panels**
  Temporary expert groups assess new initiatives that raise ethical or societal questions (e.g., automated decision-making, use of AI in traffic enforcement).
- **Transparency Reports**
  Published annually to disclose what data is shared, how it is used, and what societal impact has been achieved.
  These reports build public confidence and demonstrate accountability.

Together, these mechanisms make compliance visible — and trust measurable.

Balancing Innovation and Regulation

A recurring tension in ecosystem governance is between **speed** and **safety**.
Private-sector innovators value agility; public-sector actors must ensure compliance.
The art of ecosystem leadership lies in managing this tension constructively.

Finland's approach emphasizes **"regulatory readiness"** — designing frameworks flexible enough to accommodate new technologies (e.g., connected vehicles, digital twins, AI-based routing) without rewriting the rulebook each time.
This is achieved through:

- **Principle-based regulation:** focusing on outcomes and accountability rather than prescriptive rules.
- **Regulatory sandboxes:** temporary, supervised environments for testing new data-driven solutions under real-world conditions.
- **Iterative policy feedback:** lessons from pilots inform updates to the Rulebook and, where applicable, national policy recommendations.

This adaptive balance allows innovation to flourish without eroding public trust.

Data Ethics as a Competitive Advantage

Ethical leadership in data ecosystems is no longer optional — it is strategic.
Global businesses, investors, and regulators increasingly reward organizations that demonstrate responsible data stewardship.

Finland's commitment to fairness, transparency, and privacy has become a **national brand**.
It signals reliability in an era of data misuse and algorithmic opacity.
For Fintraffic, ethical governance translates into a tangible advantage in international partnerships, EU projects, and export initiatives.
Partners know that Finnish data practices are not only compliant but credible.

By positioning ethics as a source of differentiation rather than constraint, the ecosystem has turned **responsibility into reputation** — and reputation into influence.

Conclusion: Guardrails for Trust and Innovation

Legal and ethical foundations are not obstacles to innovation — they are the **guardrails** that make innovation sustainable.
They ensure that data collaboration remains human-centered, transparent, and fair — not just efficient or profitable.

In Finland's Traffic Data Ecosystem, law and ethics work hand in hand with trust and governance. Together, they create a system where every participant knows the rules, feels safe to contribute, and shares responsibility for outcomes.

When combined, these foundations enable something powerful:
an ecosystem where **compliance is not the end goal — but the beginning of credible, scalable innovation**.

Chapter 8: Selecting and Shaping Use Cases

From Potential to Purpose

Every data ecosystem faces the same challenge: how to turn limitless data potential into tangible, measurable impact.
Data itself has no inherent value — value emerges only when data is used to solve real problems for real people.

Selecting and shaping the *right* use cases is therefore one of the most critical ecosystem capabilities. It determines credibility, attracts participants, and delivers proof that collaboration works. A strong use case is both a **technical demonstration** and a **trust-building exercise** — showing that joint effort leads to shared benefit.

In Finland's Traffic Data Ecosystem, use-case selection is guided not by technological curiosity but by **societal relevance and ecosystem maturity**. The goal is to show impact where it matters most: in safety, sustainability, and efficiency.

The Criteria for Selecting Use Cases

Through experience, Fintraffic and its partners have developed a pragmatic framework for identifying high-value use cases. The framework rests on five dimensions:

1. **Relevance**
    - Does the use case address a clear and important problem for the transport system or its users?
    - Is it aligned with the ecosystem's shared purpose — safer, smoother, and more sustainable mobility?
2. **Feasibility**
    - Are the necessary data, technologies, and partners available?
    - Is the scope manageable within existing resources and governance structures?
3. **Scalability**
    - Can the solution expand from a pilot to national or cross-border deployment?
    - Does it use interoperable standards and reusable data assets?
4. **Ecosystem Benefit**
    - Does it create value for multiple stakeholders, not just one?
    - Does it strengthen trust, data quality, or shared infrastructure?
5. **Demonstrability**
    - Can the outcomes be clearly measured and communicated — for example, in reduced emissions, improved safety, or better service reliability?

Each proposed use case is evaluated against these criteria in a transparent and participatory process, ensuring that limited resources are directed toward the most impactful opportunities.

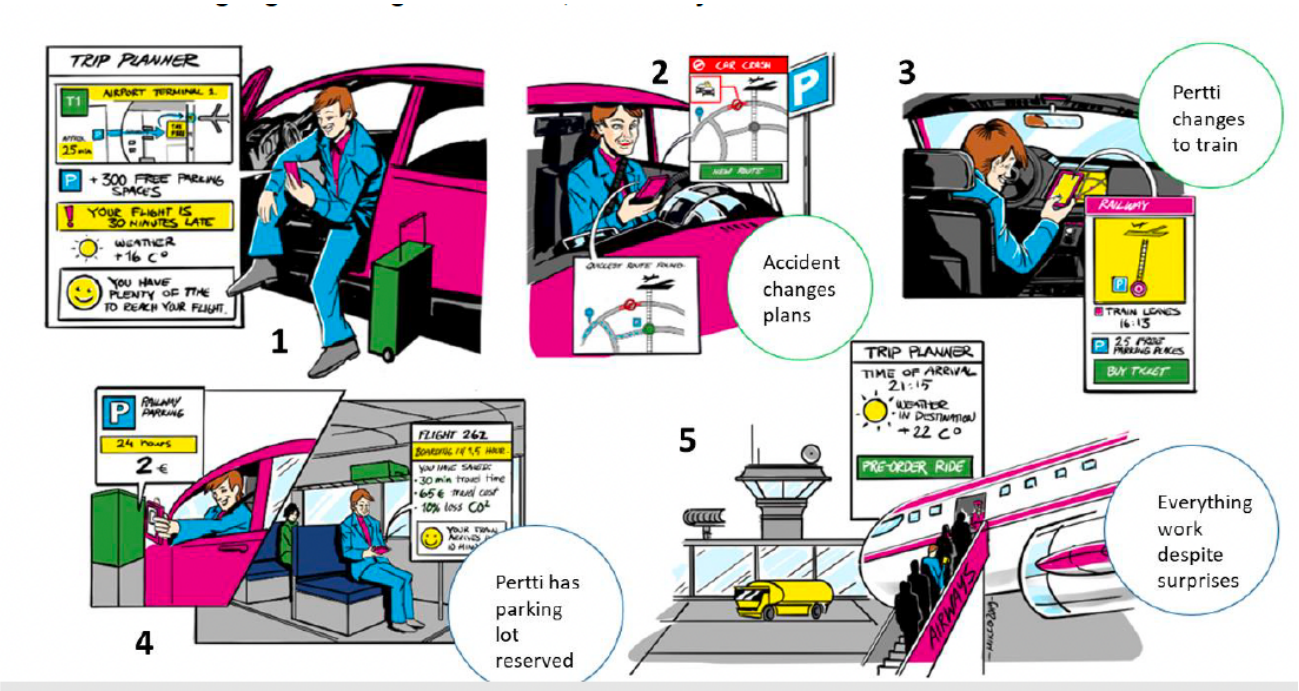


Figure 5. Sample ecosystem use case - Pertti on his way to an airport when accident happens.

The Co-Creation Process

In a data ecosystem, use cases are not "assigned" — they are **co-created**.
Fintraffic's facilitation model emphasizes inclusivity and speed: anyone in the ecosystem can propose a new idea, and the process moves through a lightweight but structured pipeline.

1. Ideation

Ideas often emerge during community workshops, hackathons, or partner meetings.
Participants are encouraged to articulate:

- The problem they aim to solve,
- The potential data sources, and
- The expected benefits.

Ideas are collected in a shared repository — open to comments and endorsements from other ecosystem members.

2. Evaluation and Scoping

The Ecosystem Office and relevant working groups assess feasibility and alignment with the criteria above. At this stage, data availability and quality are examined — for example, whether data exists in Digitraffic or if a new feed is needed.

3. Pilot Design

Selected ideas move to pilot definition. Partners agree on roles, data sharing terms, and success metrics. Fintraffic may provide technical support, governance oversight, and access to the NAP or Digitraffic infrastructure.

4. Implementation and Monitoring

Pilots are executed in short, iterative cycles — typically 3–6 months. Key performance indicators (KPIs) are defined in advance, ensuring that success can be objectively assessed.

5. Evaluation and Scale-Up

Successful pilots are documented and shared openly. Lessons learned feed into the Rulebook, data catalog improvements, or policy recommendations. The most promising pilots evolve into **ecosystem reference use cases** — serving as templates for replication or export.

This process ensures that innovation remains open but accountable — balancing agility with structure.

Examples of Ecosystem Use Cases

Finland's Traffic Data Ecosystem has nurtured dozens of pilots and partnerships. A few illustrate how shared data creates value across different dimensions.

1. Road Weather and Safety Warnings

- **Problem:** Slippery roads in winter cause hundreds of accidents each year.
- **Approach:** Combine meteorological data, road sensors, and vehicle telemetry to generate predictive safety warnings.
- **Outcome:** Improved driver awareness, better maintenance scheduling, and a measurable reduction in winter accidents.
- **Ecosystem benefit:** Strengthened data flows between weather, road maintenance, and navigation systems; new APIs published in Digitraffic.

2. Freight Emissions Data Exchange

- **Problem:** Logistics operators lack harmonized data on emissions per route and load.
- **Approach:** Aggregate route data, vehicle telemetry, and emission models to provide standardized CO_2 reporting.
- **Outcome:** Enables compliance with EU *CountEmissions EU* regulation and helps companies optimize routes for sustainability.
- **Ecosystem benefit:** Demonstrates how open data and commercial data can coexist under fair terms.

3. Multimodal Travel Chains

- **Problem:** Passengers often face fragmented information when combining transport modes (bus–train–ferry–bike).
- **Approach:** Integrate timetables, ticketing, and disruption data through the National Access Point, accessible to app developers.
- **Outcome:** Improved passenger experience and more efficient multimodal route planning.
- **Ecosystem benefit:** Strengthened interoperability and developer engagement through open APIs.

4. Cross-Border Traffic Information

- **Problem:** Drivers and logistics operators crossing borders face inconsistent data formats and languages.
- **Approach:** Finland and Estonia harmonized traffic data exchange through the ODIN project, using shared standards and APIs.
- **Outcome:** Seamless data flow between the two countries and a blueprint for wider Nordic integration.
- **Ecosystem benefit:** Showcases how trust and governance can scale internationally.

Each use case strengthens the ecosystem in a different way — technically, socially, or institutionally — and together they form a cumulative portfolio of trust and value.

Balancing Quick Wins and Strategic Impact

Not all use cases need to be large or complex. In fact, ecosystems thrive on a **portfolio approach**:

Type	Purpose	Example
Quick Wins	Build early momentum, demonstrate collaboration works	Open data visualization, real-time dashboards
Strategic Pilots	Test governance and legal frameworks	Shared emissions data under the Rulebook
Structural Projects	Build long-term infrastructure	NAP upgrades, interoperability standards
Flagship Use Cases	Symbolize the ecosystem's maturity and societal value	National digital twin of Finland's transport system

This balance prevents "pilot fatigue" while keeping ambition high. Quick wins build credibility; strategic projects secure continuity.

Co-Selection as a Trust Mechanism

How use cases are chosen is as important as *which* ones are chosen.
A transparent, participatory selection process reinforces trust — it shows that decisions are not political or proprietary but based on shared value.

The Finnish ecosystem's process ensures:

- Open calls for new ideas,
- Public documentation of evaluation criteria,
- Clear rationale for inclusion or postponement, and
- Feedback loops to those whose ideas were not selected.

This transparency builds legitimacy. Even when a proposal is not adopted, participants remain engaged because they trust the fairness of the process.

From Pilots to Policy Influence

Successful use cases rarely end as projects. They often **inform regulation, standards, or funding priorities**.
For instance:

- Insights from emissions data pilots contributed to Finland's national sustainability reporting framework.
- The multimodal data work supported the EU's ongoing revision of the ITS Directive.
- Cross-border pilots informed Nordic coordination under *Mobility Data Space* initiatives.

Thus, the ecosystem's use cases become **policy testbeds** — demonstrating what works and shaping the future regulatory landscape.

Measuring the Impact of Use Cases

Impact measurement is essential both for accountability and storytelling.
Fintraffic uses a combination of **quantitative** and **qualitative** indicators:

Category	Example Indicators
Safety	**Reduction in accidents, faster incident response**
Sustainability	**Emission savings, modal shift, reduced idling**
Efficiency	**Time saved, data reuse rate, API uptime**
Ecosystem Health	**Number of contributors, satisfaction, replication of pilots**
Public Value	**Media visibility, stakeholder trust index, policy influence**

By quantifying results, the ecosystem can communicate its value beyond the technical audience — to policymakers, funders, and the public.

Lessons Learned from Use-Case Development

Fintraffic's experience has revealed several recurring insights:

1. **Start from shared pain points, not technologies.**
   The best ideas come from solving real operational problems — not from showcasing a new data model or platform.
2. **Keep scope small but vision large.**
   Pilots that are too ambitious often stall. Begin with a narrow focus, but design for future scalability.
3. **Measure, communicate, repeat.**
   Success stories must be told frequently and vividly — they sustain engagement and attract new partners.
4. **Don't fear failure; fear opacity.**
   Not every pilot succeeds, but documenting lessons learned is more valuable than silence. Transparency about what didn't work builds long-term trust.

5. **Use cases are cultural artifacts.**
   They encode how collaboration feels — respectful, fair, innovative. Each project teaches participants how to work together better next time.

Conclusion: Turning Collaboration into Impact

The essence of an ecosystem is its capacity to **learn collectively** — to test, adapt, and scale solutions faster than any single organization could. Use cases are the ecosystem's learning loops — the practical expression of shared trust, governance, and ambition.

Finland's Traffic Data Ecosystem has shown that when use cases are chosen wisely and executed collaboratively, they do more than create new services: they strengthen institutions, inspire policy, and cultivate a culture of co-creation.

In other words:

Trust builds ecosystems. Use cases make them work.

Chapter 9: Building a Fair Data Economy

From Open Data to Shared Value

The first generation of data innovation was built on the principle of *openness* — make data available and innovation will follow.
That principle remains powerful, but experience has shown it is not enough. When only a few players have the capability to capitalize on open data, value creation becomes uneven and incentives erode.

A mature ecosystem therefore moves beyond "open for all" toward **"fair for all"** — a model where data sharing produces benefits for every contributor and where trust, not dominance, drives growth. Finland's Traffic Data Ecosystem embodies this shift: combining openness with fairness, public interest with commercial viability.

Defining the Fair Data Economy

A fair data economy is one where data is:

- **Accessible** to those who can create value responsibly,
- **Rewarding** to those who contribute,
- **Transparent** in how value and costs are distributed, and
- **Sustainable** over time — economically, socially, and environmentally.

In such an economy, the flow of data mirrors the flow of trust: reciprocal, accountable, and oriented toward shared outcomes.

Finland's national innovation fund, **Sitra**, was among the first institutions in Europe to articulate this concept. Its framework emphasizes human-centric principles — data rights, transparency, and equitable value distribution — all of which have influenced Fintraffic's approach to traffic data collaboration.

Why Fairness Matters

Fairness is not only a moral aspiration; it is a *pragmatic necessity*.
Without fair incentives, ecosystems stall.

- If public actors give data freely while private actors capture all economic value, political support disappears.

- If private companies see no return for sharing their proprietary data, cooperation evaporates.
- If citizens feel exploited or surveilled, trust collapses.

A fair data economy resolves these tensions by aligning interests. It ensures that:

- Public and private benefits grow together.
- Transparency replaces suspicion.
- Incentives reward contribution, not hoarding.

The Finnish Model: Combining Openness and Reciprocity

The Finnish Traffic Data Ecosystem operates under a **"default open, exceptions justified"** principle. Open data remains the foundation — ensuring accessibility, innovation, and equality of opportunity. But when openness alone cannot guarantee fairness or sustainability, **reciprocal sharing mechanisms** are introduced.

This hybrid model combines three tiers of data access:

Tier	Access Type	Purpose and Fairness Mechanism
Open Data	**Freely available to all (e.g., CC BY 4.0)**	**Maximizes innovation and transparency. Public funding covers costs.**
Shared Data	**Accessible to registered ecosystem members**	**Ensures that contributors benefit first. Reciprocity may be required (e.g., providing data back or sharing insights).**
Restricted Data	**Access by contract or license**	**Used when data has commercial or privacy value. Fair compensation or joint value creation agreements apply.**

This layered model allows flexibility without compromising principles. It recognizes that fairness is context-specific — what is fair for road-weather data may not be fair for vehicle telemetry or commercial logistics data.

Incentives for Participation

Fairness begins with **motivation**.
Different actors contribute for different reasons — and a well-designed ecosystem respects that diversity.

1. Public Sector Incentives

- **Policy impact:** Achieving national goals for safety, efficiency, and emission reduction.
- **Cost savings:** Shared infrastructure and data reduce duplication.
- **Transparency:** Open data strengthens accountability and public trust.

2. Private Sector Incentives

- **Market opportunities:** New services built on open APIs or co-developed datasets.
- **Operational efficiency:** Better situational awareness and predictive insights.
- **Reputation and trust:** Association with a credible, transparent ecosystem enhances brand value.

3. Research and Academia

- **Access to high-quality data:** Enabling scientific studies and innovation.
- **Co-publication and co-development:** Joint research with industry and public authorities.
- **Funding leverage:** EU projects often favor open and fair data sharing frameworks.

4. Citizens and Society

- **Improved services:** Safer roads, smoother travel, cleaner logistics.
- **Empowerment:** Transparency about how public data is used.
- **Privacy protection:** Assurance that data is handled ethically and lawfully.

Fintraffic's role is to **align these incentives** so that contribution and benefit stay in balance — preventing any one group from dominating the ecosystem's rewards.

Value Creation and Value Distribution

In a fair data economy, value is created at three levels:

1. **Operational Value** – efficiencies from shared data: reduced delays, better resource use.
2. **Innovation Value** – new products, services, and business models built on ecosystem data.
3. **Societal Value** – improved safety, lower emissions, enhanced resilience.

The challenge lies in distributing this value in a way that keeps the ecosystem healthy.
Fintraffic's approach relies on **transparency and reciprocity**, not direct revenue sharing.
For example:

- When a private company develops an app using public data, it is expected — though not mandated — to contribute feedback or complementary data.

- When public authorities access private data, they ensure that aggregated results benefit the wider ecosystem.

This circular flow of value ensures that everyone gains, even if not monetarily, from the collective effort.

Data Monetization Without Monopolization

Fair monetization is often misunderstood. It is not about putting a price tag on every dataset; it is about ensuring that **economic value is generated responsibly and distributed proportionally**.

The Finnish ecosystem distinguishes between three monetization logics:

1. **Public Good Logic** – Data generated by taxpayer funds (e.g., traffic sensors, weather) should be open and free.
2. **Partnership Logic** – Jointly created or maintained data can involve cost-sharing or reciprocal licensing.
3. **Market Logic** – Proprietary datasets with clear commercial value (e.g., fleet telemetry, predictive analytics) can be sold or licensed under fair, transparent conditions.

Fintraffic's Rulebook encourages these models to coexist, with openness as the default but without penalizing those who invest in valuable data assets.
The aim is a **level playing field**, not a single business model.

Public–Private Cost and Benefit Balance

The question "who pays for open data?" remains central in every ecosystem.
In Finland, the principle is straightforward:

"Public data should be funded publicly — but leveraged privately."

Fintraffic and its partners address cost–benefit balance through several mechanisms:

- **Baseline funding** for essential public datasets (roads, traffic, weather) is secured through government budgets.
- **Co-funding schemes** support pilots where both public and private partners benefit.
- **In-kind contributions** (expertise, infrastructure, data) are recognized as legitimate value, reducing the need for direct financial transfers.
- **Impact reporting** demonstrates return on public investment — not just in euros, but in emissions saved, safety improved, and jobs created.

This pragmatic model keeps the ecosystem financially sustainable without drifting toward data monopolies or paywalls.

Building Trust Through Transparency

Fairness requires visibility.
The Traffic Data Ecosystem therefore treats transparency as part of its economic model:

- **Open metadata:** All shared datasets, even restricted ones, have discoverable metadata describing purpose, owner, and access conditions.
- **Standardized licensing:** Users immediately understand the rights and obligations attached to data.
- **Impact dashboards:** Public metrics show who contributes data, how it is used, and what value is created.
- **Feedback loops:** Partners can suggest improvements or flag imbalances in perceived fairness.

By publishing both successes and challenges, Fintraffic keeps the conversation honest — which is essential for sustaining voluntary collaboration.

Case Example: Fair Value in the Emissions Data Ecosystem

In 2023–24, Fintraffic coordinated a pilot where logistics operators, energy companies, and public agencies exchanged **CO_2 emission data** using shared APIs.
Each participant contributed something different:

- Logistics firms provided vehicle telemetry,
- Energy providers supplied fuel emission factors,
- Fintraffic contributed route and traffic data, and
- Research partners developed harmonized calculation models.

No money changed hands — yet all parties benefited:

- Companies gained reliable tools for EU reporting and competitive advantage.
- Authorities received consistent emission data to support policy.
- The ecosystem advanced its sustainability mission.

This pilot became a benchmark for *non-monetary reciprocity*: fairness achieved through shared results rather than financial compensation.

Aligning the Fair Data Economy with EU Data Spaces

The emerging **European Data Space for Mobility (EDSM)** mirrors Finland's principles: interoperability, fairness, and trusted intermediaries.
Fintraffic's governance model and Rulebook already align with these EU frameworks, positioning Finland as both contributor and exemplar.

As the EU's Data Act and Common European Data Spaces mature, fair data economies will increasingly rely on:

- **Standardized contractual clauses** ensuring reciprocity and non-discrimination,
- **Federated access models** that allow data to stay where it is while being usable, and
- **Trust frameworks** that certify fair practices (e.g., IDSA or GAIA-X labels).

Finland's experience offers a ready-made playbook for operationalizing these principles in real markets.

Challenges and Future Directions

Despite its progress, the fair data economy faces ongoing challenges:

- **Quantifying fairness:** measuring non-monetary value such as trust, visibility, or shared infrastructure use.
- **Preventing free-riding:** ensuring contributors remain motivated when benefits are indirect.
- **Balancing regulation and agility:** maintaining compliance without stifling innovation.
- **Evolving incentive models:** adapting as data becomes richer and AI use cases multiply.

Future work will likely focus on **tokenized reciprocity systems**, **data trusts**, and **impact-based funding models** — tools that can make fairness measurable and automatable without losing its human dimension.

Conclusion: Fairness as the Currency of Trust

In a functioning data economy, fairness is not an optional value; it is the **currency that keeps the system running**.
Without it, data becomes guarded, partnerships fade, and innovation slows.
With it, collaboration flourishes, and data becomes a renewable resource for collective benefit.

The Finnish Traffic Data Ecosystem demonstrates that it is possible to combine open data, commercial innovation, and public good within one coherent model.
Its lesson is simple but profound:

Fairness is not the cost of openness — it is what makes openness sustainable.

Chapter 10: Technical Infrastructure and Interoperability

Data Infrastructure as the New Public Utility

In the 20th century, nations built roads, railways, and power grids to move people, goods, and energy.
In the 21st century, they must also build **data infrastructure** — the invisible grid that moves information safely and efficiently across systems, organizations, and borders.

Finland has treated data infrastructure not as a by-product of IT projects, but as a **strategic national asset**.
Fintraffic's digital platforms — including **Digitraffic** and the **National Access Point (NAP)** — form the backbone of this infrastructure, connecting sensors, vehicles, and services into a seamless flow of information.

This chapter explores how the Finnish ecosystem has turned infrastructure into interoperability — and interoperability into impact.

The Role of Technical Infrastructure in the Data Ecosystem

While governance defines *how* people collaborate, infrastructure defines *how* systems communicate.
Technical infrastructure ensures that:

- Data is available, accessible, and reliable;
- Systems use shared standards and semantics;
- Access is secure, traceable, and privacy-compliant;
- Innovation can happen without reinventing the basics.

In short, **trust in data depends on trust in infrastructure.**
When data pipelines are robust and transparent, stakeholders can focus on creating value rather than fixing connections.

The Building Blocks of Finland's Traffic Data Infrastructure

Finland's ecosystem rests on a layered architecture that ensures stability at the core and flexibility at the edges.

1. The Data Layer

The foundation where raw and processed data resides. It includes:

- **Sensors and IoT devices**: weather stations, cameras, vehicle probes, AIS for maritime, radar for airspace.
- **Operational data sources**: road maintenance, rail timetables, vessel movements, flight plans.
- **External data feeds**: meteorological, geospatial, and energy data.

All data is registered with clear metadata, quality indicators, and access conditions.

2. The Platform Layer

The national platforms that aggregate, harmonize, and publish data:

- **Digitraffic** – Fintraffic's open data platform, offering APIs for real-time road, rail, and maritime information.
- **National Access Point (NAP)** – mandated under the EU ITS Directive, it ensures discoverability, interoperability, and compliance for mobility data.
- **Traffic Management Systems** – 24/7 operational centers generating and consuming data in real time, feeding back insights into the ecosystem.

Together, these platforms create the **data commons** for Finland's mobility sector.

3. The Interoperability Layer

The "glue" that connects data across modes and partners:

- **Standardized APIs** (REST, GraphQL, OGC, DATEX II)
- **Shared taxonomies and ontologies** (e.g., traffic event classifications, location referencing)
- **Metadata catalogues** following DCAT-AP and INSPIRE standards
- **Data quality frameworks** defining accuracy, latency, and completeness levels.

By enforcing shared semantics and formats, interoperability transforms heterogeneous datasets into an integrated system.

4. The Access and Security Layer

Ensures that data flows remain safe and traceable:

- **Authentication and authorization** using EU eIDAS-compatible protocols.
- **Access control** via API keys, tokens, or federated identity systems.
- **Audit trails and logging** to ensure accountability.

- **Privacy-preserving methods** such as anonymization, aggregation, and geofencing for sensitive data.

5. The Innovation Layer

Where ecosystem partners create new value:

- **Developer portals** offering documentation, SDKs, and sandbox environments.
- **Digital twin environments** for simulation and testing.
- **Analytics and visualization tools** supporting predictive insights and public transparency dashboards.

This layered model ensures resilience, scalability, and inclusiveness — supporting both national operations and international data exchange.

The Principle of "Interoperability by Design"

Interoperability is not something added later; it must be embedded from the start.
Finland applies a "**once connected, everywhere reusable**" philosophy: when data is made interoperable in one context, it can immediately serve others.

This is achieved through:

- **Open standards:** DATEX II for road traffic, NeTEx and SIRI for public transport, IHO standards for maritime, AIXM for aviation.
- **Common identifiers:** consistent referencing of locations, vehicles, and events across datasets.
- **Semantic alignment:** ontologies that allow machines — not just humans — to understand data meaningfully.
- **APIs as default:** every dataset is accessible through machine-readable interfaces, reducing friction for developers.

This interoperability-by-design approach allows data to flow seamlessly across organizational and national boundaries, supporting the EU's broader vision of connected and automated mobility.

Digitraffic: Finland's Flagship Platform

Digitraffic is Fintraffic's open platform for traffic and weather data — one of Europe's most advanced examples of national data infrastructure.

It provides:

- **Over 100 APIs** delivering real-time data on traffic flow, road maintenance, and environmental conditions.
- **Unified access** to maritime and rail datasets.
- **High availability and reliability**, with uptime exceeding 99.9%.
- **Open licensing (CC BY 4.0)** that encourages commercial and research use.

Developers, logistics companies, and researchers use Digitraffic to build navigation apps, fleet optimization tools, and predictive maintenance solutions. Every API call represents a micro-interaction of trust — proof that openness, reliability, and standardization can coexist.

Digitraffic's architecture also supports **data versioning**, **quality scoring**, and **transparent change logs**, which have become benchmarks for other European platforms.

The National Access Point (NAP): Gateway to Europe

The **National Access Point** acts as the official gateway for discovering, accessing, and reusing transport-related data in compliance with EU ITS regulations. Fintraffic's NAP covers all modes — road, public transport, rail, maritime, and aviation — making it one of the most comprehensive in the EU.

Key features include:

- **Metadata catalogues** searchable through multilingual interfaces.
- **Dataset validation** to ensure compliance with EU delegated acts.
- **Cross-linking** with other NAPs in the EU, enabling cross-border information exchange.
- **Interoperability support** for EU mobility data space initiatives.

The NAP not only fulfills a legal requirement — it acts as a **strategic interoperability hub** that aligns national efforts with European data space objectives.

Digital Twins: The Next Layer of Integration

Data interoperability does not end with shared APIs — it evolves toward **shared understanding**. Digital twins represent the next frontier of technical integration: virtual replicas of physical traffic systems that simulate, predict, and optimize real-world operations.

Fintraffic's **Digital Twin Roadmap (2035)** envisions a layered, multimodal twin of Finland's transport system, integrating:

- Real-time data from Digitraffic, NAP, and partner systems.
- Predictive models for traffic flow, emissions, and safety.
- Simulation tools for planning, investment, and policy testing.

- Visualization dashboards for decision-makers and citizens.

Digital twins are where infrastructure meets intelligence — turning data into foresight, not just hindsight. They will be central to achieving Vision Zero, decarbonization, and resilience goals in the coming decades.

Cross-Border Interoperability: The Nordic Testbed

Interoperability gains full meaning only when it crosses borders. The Nordic countries have long collaborated to harmonize traffic data standards, forming one of the world's most integrated mobility regions.

Key initiatives include:

- **ODIN (Open Mobility Data in the Nordics)** – harmonizing APIs and datasets between Finland and Estonia.
- **C-ROADS Nordic+** – aligning connected vehicle communication protocols.
- **Nordic Mobility Data Space** – developing shared governance and technical frameworks aligned with EU Data Space principles.

These collaborations demonstrate that interoperability is as much about **shared language** as shared technology. By aligning semantics, licensing, and governance, the Nordics are building the foundations for a European mobility data ecosystem where services can scale across borders as easily as they do within them.

Cybersecurity and Resilience

As data flows grow, so do the risks.
Fintraffic's infrastructure is designed for **security by design** and **resilience by default**:

- **Redundant architectures** ensure continuity in case of system failure.
- **Regular penetration testing** and **vulnerability assessments** maintain technical robustness.
- **Role-based access control** protects sensitive operational data.
- **Incident response protocols** link technical systems with national cybersecurity authorities.

Cyber resilience is not seen as a constraint but as a **core element of public trust**. Without it, openness would become a vulnerability instead of a strength.

Interoperability as an Enabler of Innovation

Technical interoperability is not an end in itself; it is a platform for continuous innovation.
In the Finnish ecosystem, interoperability enables:

- **Startups** to build new applications without proprietary barriers.
- **Researchers** to combine datasets for machine learning and AI experiments.
- **Companies** to integrate public data into their own services.
- **Authorities** to share situational awareness across transport modes.

This reduces duplication, accelerates experimentation, and strengthens the ecosystem's international competitiveness.

"Interoperability is innovation infrastructure."

Challenges and Future Outlook

Despite its success, technical interoperability remains a moving target. Challenges include:

- Keeping standards up to date as technology evolves.
- Managing legacy systems still operating on proprietary protocols.
- Ensuring real-time synchronization across decentralized networks.
- Balancing openness with cybersecurity and privacy.

Looking ahead, interoperability will increasingly rely on:

- **Federated architectures** (where data stays with the owner but remains queryable).
- **AI-assisted data harmonization** that automates mapping between schemas.
- **Self-describing data models** that allow new systems to connect autonomously.
- **Interoperability certification** for both datasets and organizations.

Finland's proactive role in European data space standardization ensures it remains at the forefront of these developments.

Conclusion: The Backbone of Trust

Technology alone does not build trust — but without reliable technology, trust cannot scale.
The Finnish Traffic Data Ecosystem has proven that openness, fairness, and security can coexist on a shared technical foundation.

Digitraffic and the NAP are not just IT systems; they are **national trust infrastructures** — digital roads and rails for data. They enable public and private actors to collaborate with confidence, knowing that data flows are governed, secure, and interoperable.

In the digital mobility world, interoperability is the new infrastructure — and trust is its most important output.

Chapter 11: Effective Communication and Ecosystem Storytelling

Why Communication Matters in Ecosystems

In any ecosystem, communication is not a side activity — it is the **circulatory system** that keeps the network alive. No amount of technical excellence or governance can succeed if participants do not understand, trust, or feel part of the story being built together.

Communication in data ecosystems is challenging because it must bridge multiple languages — technical, policy, business, and human. Finland's Traffic Data Ecosystem has learned that **clarity, consistency, and authenticity** are the key ingredients of effective communication.

When done right, communication transforms collaboration from an administrative process into a shared mission.

From Information to Engagement

Traditional project communication focuses on **informing** — publishing updates, documents, and statistics. Ecosystem communication aims higher: it seeks to **engage**, **inspire**, and **align** diverse stakeholders around a common purpose.

The goal is not merely to tell people *what the ecosystem does* but to help them see *why it matters and how they belong*. This shift — from information to engagement — has been one of Fintraffic's most powerful success factors.

The Principles of Ecosystem Communication

Based on years of experience, the Finnish Traffic Data Ecosystem operates with six core communication principles:

1. **Transparency** – Share openly what is happening, what has been decided, and what is coming next. Uncertainty is reduced when information is accessible to all.
2. **Consistency** – Repeat key messages and visuals across channels and audiences. Repetition builds trust and recognition.
3. **Simplicity** – Translate complexity into clear, relatable narratives. Avoid jargon; use stories, metaphors, and visuals that everyone can grasp.

4. **Participation** – Communication is two-way. Encourage questions, feedback, and contributions. People support what they help create.
5. **Credibility** – Facts first. Avoid hype. Build authority through evidence, metrics, and examples.
6. **Inspiration** – Communicate a vision worth joining. Data alone doesn't move people — meaning does.

These principles turn communication from marketing into **ecosystem culture-building**.

Crafting the Narrative: From Trust to Impact

Every strong ecosystem has a strong story — one that explains *why* it exists and *what change* it aims to create.

Fintraffic's ecosystem narrative centers around three interconnected themes:

1. **Trust as the Enabler** – Data sharing works because Finland has built mutual confidence between public and private sectors.
2. **Collaboration as the Method** – Ecosystem thinking replaces silos with partnerships, aligning expertise and resources.
3. **Impact as the Goal** – Data collaboration delivers tangible benefits: safer roads, cleaner transport, better services.

Together, these create the narrative arc reflected in the book's title: **From Trust to Impact**.
It is not just a slogan — it is the story structure guiding all ecosystem communication.

Adapting Messages for Different Audiences

An ecosystem includes many audiences: policymakers, engineers, entrepreneurs, citizens, and international partners.
Each requires a tailored approach — but all should hear the same core melody.

Audience	Key Message	Preferred Style / Channel
Policy and Government	**The ecosystem supports national and EU strategic goals; it is a model for data-driven public value.**	**Policy briefs, impact summaries, high-level presentations**
Industry Partners	**Participation brings business benefits, visibility, and access to shared infrastructure.**	**Workshops, newsletters, LinkedIn, success stories**

Researchers and Academia	**The ecosystem is an open laboratory for applied innovation and collaboration.**	**Technical reports, conferences, white papers**
Citizens and Media	**Traffic data improves everyday life — safer, smoother, greener.**	**Visual dashboards, human-interest stories, social media**
International Community	**Finland provides a scalable blueprint for data ecosystems.**	**English-language case studies, EU events, partnerships**

By maintaining one narrative in multiple dialects, communication stays coherent and inclusive.

Visual Communication and Storytelling Tools

Data becomes powerful when it is seen. Fintraffic has invested heavily in **visual storytelling** — turning abstract concepts into clear, inspiring images.

Key tools include:

- **Infographics and data maps** showing how datasets connect and create value.
- **Visual "journeys"** illustrating how data travels from sensors to decisions.
- **Videos and animations** that explain concepts such as open APIs, data spaces, or digital twins in under two minutes.
- **Dashboards and impact meters** that make performance metrics visible in real time.
- **Graphic templates and consistent branding**, ensuring that every presentation or event reinforces the ecosystem identity.

This visual discipline makes complex systems understandable — and memorable.

Internal Communication: Keeping the Ecosystem Aligned

External visibility is important, but **internal communication** is what keeps the ecosystem coherent. Fintraffic coordinates a rhythm of engagement that maintains transparency and motivation:

- **Quarterly partner meetings** for strategic alignment.
- **Monthly working group calls** to track progress and share insights.
- **Biweekly newsletters** summarizing ongoing activities and upcoming opportunities.
- **Online collaboration platforms** (Teams, Slack, Confluence) for documentation and daily dialogue.
- **Ecosystem "pulse checks"** — short surveys to gauge engagement, trust, and satisfaction.

This regular cadence keeps participants informed, prevents silos, and sustains the sense of movement.

Communicating Results and Impact

Credibility grows through **evidence**. The ecosystem communicates results using a balanced mix of data and stories.

1. **Quantitative Metrics**
    - Number of datasets published, API calls made, or partners onboarded.
    - Reductions in accidents or emissions.
    - Cost savings or time saved through data reuse.
2. **Qualitative Narratives**
    - Case stories of collaboration success.
    - Testimonials from partners or users.
    - Examples of international recognition or policy influence.

The annual **Ecosystem Impact Report** combines both — acting as a mirror of progress and a motivator for further action.
This transparency also reinforces accountability to public funders and private contributors alike.

The Role of Leadership Voices

In an ecosystem, leadership is communicated as much through tone as through authority.
Leaders such as Fintraffic's Chief Ecosystem and Technology Officer act as **narrators-in-chief**, translating the ecosystem's complexity into relatable stories for various audiences.

Their communication style blends:

- **Visionary framing** ("Where are we heading?")
- **Pragmatic realism** ("What did we learn, even from failures?")
- **Inclusive language** ("Who can join us next?")

By combining vision with openness, leaders humanize the ecosystem and invite participation.

International Communication: Finland as a Lighthouse

Finland's story has resonated far beyond its borders because it balances humility with demonstrable achievement.

At EU and global levels, the Traffic Data Ecosystem is often cited as a **lighthouse example** — not for having the biggest budget, but for having the clearest purpose and structure.

International communication focuses on:

- Sharing replicable frameworks such as the **Rulebook** and **governance models**.
- Participating in EU and OECD working groups on data spaces and mobility.
- Publishing English-language case studies and thought leadership pieces.
- Engaging in international events like ITS Europe and the World Congress to inspire and learn.

By positioning itself as a *learning ecosystem*, Finland amplifies influence while staying authentic.

Storytelling Through People

While technology powers the ecosystem, **people bring it to life**. Highlighting the stories of engineers, researchers, policymakers, and entrepreneurs turns abstract collaboration into human narrative.

Profiles of contributors — for instance, a data scientist explaining how her API reduces road accidents, or a logistics CEO describing new business insights — create emotional connection. These personal stories demonstrate that the ecosystem is not a faceless system, but a community with shared values and ambition.

Communication as a Trust Multiplier

Trust grows when people understand what others are doing and why. By communicating openly, frequently, and honestly — even about uncertainties or setbacks — Fintraffic has cultivated deep credibility.

Key lessons learned:

- **Silence erodes trust faster than bad news.**
- **Repeated clarity is better than elegant obscurity.**
- **Data alone convinces minds; stories move hearts.**

When communication becomes a core process rather than an afterthought, it turns an ecosystem from a network of projects into a movement.

Conclusion: From Information to Inspiration

In a data ecosystem, communication is both a tool and a philosophy. It connects technical work with human purpose, and turns governance structures into shared identity.

The Finnish Traffic Data Ecosystem has shown that effective communication is not just about visibility — it is about **meaning-making**. It allows participants to see their role in a bigger story and gives the public a reason to care about data.

Ultimately, communication is what transforms **trust into community**, and **data into impact** — the two poles between which the ecosystem constantly moves.

Chapter 12: Building and Managing Public–Private Partnerships

Why Public–Private Collaboration Matters

No single actor can manage the complexity of today's mobility systems alone. Public authorities control infrastructure and policy. Private companies innovate, build, and scale. The true potential of data emerges **only when these capabilities converge** — when the public sector's legitimacy and the private sector's agility reinforce each other.

Public–private partnerships (PPPs) are therefore not optional add-ons; they are the **structural backbone** of modern data ecosystems. In the Finnish Traffic Data Ecosystem, PPPs have been instrumental in turning policy into practice, open data into business, and experimentation into long-term collaboration.

From Contractual Partnerships to Collaborative Ecosystems

Traditional PPPs were built around **contracts** — specific projects, deliverables, and timeframes. In the digital age, partnerships must evolve into **collaborative ecosystems**, where value is created continuously through shared data, shared learning, and shared innovation.

The difference can be summarized as follows:

Traditional PPP	Ecosystem Collaboration
Transaction-based	Relationship-based
Fixed scope and duration	Evolving, open-ended engagement
Focused on infrastructure or services	Focused on data, innovation, and impact
Defined by control	Defined by trust and governance
Success = project delivered	Success = ongoing shared value

Finland's approach embraces this evolution. Rather than managing one-off PPP projects, Fintraffic cultivates **long-term partnerships** based on openness, fairness, and mutual benefit.

The Foundations of Effective Public–Private Partnerships

Building strong partnerships in a data ecosystem requires aligning differences in culture, incentives, and risk tolerance. Fintraffic's experience suggests six core foundations:

1. **Shared Purpose**
   Both public and private actors must understand *why* collaboration exists beyond commercial interest or compliance.
   In Finland, the unifying purpose is clear: safer, smoother, and more sustainable mobility through data-driven collaboration.
2. **Neutral Orchestration**
   A trusted intermediary — Fintraffic in this case — ensures balance, transparency, and fairness.
   The orchestrator does not compete with private companies but provides a level playing field for all.
3. **Clear Governance and Roles**
   The Rulebook defines how decisions are made, data is shared, and conflicts are resolved.
   Everyone knows their role, obligations, and rights, reducing friction.
4. **Reciprocity and Fair Value Exchange**
   Public data fuels private innovation; private insights enrich public understanding.
   Both sides contribute and both benefit — economically, operationally, or reputationally.
5. **Open Communication and Visibility**
   Transparency builds trust. Regular updates, open meetings, and public documentation prevent misunderstandings.
6. **Long-Term Perspective**
   Partnerships are treated as *ongoing relationships*, not transactions.
   They evolve through feedback, not re-tendering.

These foundations create the cultural and operational conditions for collaboration to thrive.

Aligning Motivations

Public–private partnerships often face tension because motivations differ:

Public Sector Goals	Private Sector Goals
Safety, sustainability, transparency	Profitability, competitiveness, speed
Regulatory compliance	Market innovation
Public value creation	Customer value creation

The key is not to eliminate these differences, but to **align them through shared outcomes**.
For example:

- Reducing congestion (public goal) also reduces fuel costs (private benefit).
- Emission data transparency (public goal) enables green logistics marketing (private benefit).
- Open APIs (public service) lower integration costs (private efficiency).

When purpose alignment is explicit, cooperation turns from negotiation into co-creation.

The Partnership Lifecycle

Fintraffic structures partnerships as **living relationships** that progress through four stages:

1. **Initiation – Building Trust and Interest**
   Introductions through workshops, innovation events, or bilateral meetings.
   Shared vision and alignment with ecosystem principles are established before formal collaboration.
2. **Exploration – Co-Designing a Use Case**
   Partners jointly define the problem, data needs, and expected impact.
   Governance, licensing, and privacy are clarified early to avoid surprises.
3. **Collaboration – Executing and Learning Together**
   Co-funded or co-managed pilots run in iterative cycles.
   Open communication ensures learning is shared and success criteria remain aligned.
4. **Consolidation – Scaling and Institutionalizing**
   Successful pilots evolve into operational services, standards, or recurring collaborations.
   Lessons learned feed back into the Rulebook and policy recommendations.

This cycle replaces rigid contracts with **trust loops**, ensuring continuity and adaptability.

Case Example 1: Winter Road Safety Partnership

- **Context:** Winter weather poses significant safety challenges in Finland.
- **Partners:** Fintraffic, the Finnish Meteorological Institute, and several navigation and fleet companies.
- **Approach:** Combined public road weather data with private vehicle telemetry to improve warnings.
- **Result:** Predictive hazard alerts now reach drivers through commercial navigation apps.
- **Key Lesson:** Shared safety outcomes create strong alignment — competitors can collaborate when the benefit is universal.

Case Example 2: Emissions Data Collaboration

- **Context:** Companies need standardized, verified data to report and reduce transport emissions.
- **Partners:** Fintraffic, logistics companies, and fuel suppliers.
- **Approach:** Jointly developed harmonized emission calculation model.
- **Result:** Companies comply with *CountEmissions EU* standards, and policymakers gain better insight into national progress.
- **Key Lesson:** Regulatory change can be an opportunity for collaboration, not confrontation.

Managing Risks in Public–Private Partnerships

Every collaboration carries risk. Successful ecosystems don't eliminate risk — they **manage it transparently**.
Key categories include:

1. **Reputational Risk**
    - Mitigated by clear communication and shared responsibility.
    - Failures are framed as learning opportunities.
2. **Data Misuse or Leakage**
    - Prevented through robust legal agreements, role-based access, and anonymization.
3. **Imbalance of Power**
    - Addressed through neutral orchestration and transparent governance.
    - No single company or ministry dominates decision-making.
4. **Unequal Value Distribution**
    - Monitored through open feedback and benefit mapping.
    - Reciprocity mechanisms ensure fairness over time.
5. **Innovation Fatigue**
    - Prevented by alternating between quick wins and strategic initiatives to sustain engagement.

By treating risks as shared responsibilities, the ecosystem maintains momentum and credibility.

The Role of Co-Funding and EU Projects

Joint funding mechanisms have proven to be effective catalysts for PPPs. Fintraffic's ecosystem frequently participates in **EU Horizon and CEF projects**, where public and private partners co-develop solutions with partial EU support.

Benefits include:

- Risk-sharing for experimental projects.
- Access to European partners and standards.
- Strengthened alignment with EU mobility data space objectives.

Such projects serve as *laboratories for policy and technology*, where lessons from pilots can scale into permanent structures.

Cultural Differences and How to Bridge Them

Public and private organizations operate with distinct cultures:

Public Sector	Private Sector
Long planning cycles	Fast iteration
Focus on compliance	Focus on opportunity
Risk-averse	Risk-tolerant
Hierarchical decision-making	Agile teams

Bridging these cultures requires empathy and translation:

- **Joint language workshops** to clarify terminology and expectations.
- **Mixed teams** combining civil servants and company representatives.
- **Outcome-based metrics** that both sides can relate to (e.g., "reduction in delays" rather than "data API uptime").
- **Facilitation training** for public officials to lead cross-sector collaboration effectively.

Finland's culture of consensus and low hierarchy provides a natural advantage here — collaboration feels less transactional and more cooperative.

Governance Tools for Public–Private Partnerships

The Traffic Data Ecosystem uses practical governance tools to maintain clarity:

- **Memoranda of Understanding (MoUs)** outlining shared intent and principles before detailed contracts.
- **Data Sharing Agreements (DSAs)** defining access, use rights, and responsibilities.
- **Joint Steering Committees** for co-funded projects, ensuring transparency.
- **Partner Portals and dashboards** for reporting progress and sharing outcomes.
- **Public recognition programs** highlighting active and responsible partners.

These tools are lightweight but effective — designed to reduce legal overhead while maintaining accountability.

Exporting Collaboration: From National to Global Partnerships

Finland's success with public–private collaboration has drawn international attention.
Many countries face similar challenges — fragmented data, limited trust, and conflicting incentives — and look to the Finnish model as a **replicable governance pattern**.

Fintraffic's partnerships now extend to:

- Nordic collaboration (e.g., ODIN, C-Roads, Nordic Mobility Data Space).
- EU Data Space initiatives (as a founding contributor).
- Bilateral innovation dialogues with other national transport authorities.
- Industry partnerships with global technology providers.

These cross-border partnerships amplify Finland's influence and demonstrate that a *trust-based PPP model* can scale internationally without losing its fairness.

Lessons Learned

Fintraffic's experience offers several key insights for building lasting public–private partnerships:

1. **Start small, think big.**
   Pilot together before scaling — trust grows from experience.
2. **Neutrality is power.**
   The orchestrator's impartial role is the strongest guarantee of fairness.
3. **Document everything, but don't overcomplicate.**
   Clarity prevents conflict; bureaucracy kills enthusiasm.
4. **Celebrate collaboration, not competition.**
   Publicly recognizing shared success motivates continued participation.
5. **Evolve governance as relationships mature.**
   Early partnerships need structure; mature ones thrive on flexibility.

These lessons have allowed Finland to sustain dozens of partnerships over multiple years — a rare achievement in the rapidly changing digital mobility landscape.

Conclusion: Collaboration as a Strategic Asset

Public–private partnerships are not simply about cost-sharing or service delivery.
In the age of data, they are about **co-governing a shared resource** — the information that drives the mobility system.

The Finnish Traffic Data Ecosystem demonstrates that when trust, fairness, and shared purpose align, PPPs evolve from contracts into **communities of innovation**.
They turn policy goals into market opportunities and societal impact into competitive advantage.

Ultimately, the secret of Finland's success is simple yet profound:

Partnerships don't just manage data — they build the future together.

Chapter 13: People, Culture, and Skills

The Human Dimension of Ecosystem Success

Data, governance, and infrastructure may form the visible structure of an ecosystem — but people are its living core. Every dataset, standard, and API is ultimately the product of human curiosity, negotiation, and creativity.

Ecosystems thrive not because of perfect technology, but because people **trust, learn, and collaborate** across institutional boundaries. That is why the Finnish Traffic Data Ecosystem has invested as much in its culture as in its code.

"Culture eats data for breakfast."
— a phrase often repeated at Fintraffic, reminding everyone that collaboration is a human endeavor first.

From Hierarchies to Networks

Traditional organizations are built on hierarchy — clear roles, reporting lines, and authority. Ecosystems operate differently. They are **networks of peers**, connected by shared goals rather than shared employers.

This shift requires a new kind of leadership and mindset:

- Less control, more coordination.
- Less secrecy, more openness.
- Less ownership, more stewardship.
- Less "my project," more "our purpose."

In the Traffic Data Ecosystem, leadership is distributed — Fintraffic orchestrates, but partners co-create. Everyone leads something, whether it's a dataset, a pilot, or a working group.
This networked structure demands people who are comfortable with **collaborative ambiguity** — working together without all answers pre-defined.

The Cultural DNA of the Finnish Ecosystem

Culture cannot be mandated; it must be cultivated. Finland's national traits — trust, equality, pragmatism, and low hierarchy — provide fertile ground for collaboration.

The Traffic Data Ecosystem has built on these strengths by nurturing six cultural values:

1. **Openness** – Share information by default, not by exception.
2. **Respect** – Recognize that every actor, big or small, adds value.
3. **Fairness** – Reward contribution, not power or position.
4. **Learning** – Treat every pilot as an experiment, every mistake as data.
5. **Purposefulness** – Align daily actions with the shared mission.
6. **Humility** – Listen more than you speak; collaborate more than you compete.

These values are not written on posters; they are practiced in meetings, emails, and decisions. Culture becomes visible when difficult choices arise — when openness or fairness is inconvenient but maintained nonetheless.

Ecosystem Leadership: From Managers to Orchestrators

In hierarchical systems, leaders **direct**.
In ecosystems, leaders **orchestrate** — creating rhythm, balance, and flow among autonomous actors.

The orchestrator's role is to:

- **Connect** people and ideas that would otherwise remain separate.
- **Translate** between different professional languages (policy, business, technology).
- **Facilitate** dialogue and problem-solving rather than dictate solutions.
- **Empower** others to act by providing clarity and removing friction.
- **Model** the behavior the ecosystem needs — openness, transparency, patience.

This leadership model emphasizes **influence over authority**.
Orchestrators succeed not by being the smartest in the room, but by helping others succeed together.

The Key Skills for Ecosystem Practitioners

Working in an ecosystem requires a mix of soft and hard skills — a new professional profile often called the **ecosystem practitioner**. We have identified several essential capabilities:

1. Systems Thinking

The ability to see connections rather than parts. Ecosystem practitioners understand how data, governance, and human behavior interact — and how small changes ripple through the system.

2. Facilitation and Mediation

Conflicts and misunderstandings are inevitable. Facilitation skills help turn tension into progress. Good facilitators listen deeply, frame issues neutrally, and guide groups toward shared understanding.

3. Data Literacy

Participants don't need to be coders, but they must understand what data can and cannot do. Basic knowledge of data models, APIs, and quality metrics enables meaningful dialogue between business and technical teams.

4. Communication and Storytelling

Explaining complex topics in simple language is a superpower. Ecosystem practitioners are translators between technical precision and human meaning.

5. Co-Creation and Design Thinking

Collaborative innovation methods — from design sprints to user journey mapping — help align diverse stakeholders around real user needs.

6. Ethical and Legal Awareness

Understanding privacy, IP, and fairness principles helps ensure that creativity stays within legitimate boundaries.

7. Resilience and Patience

Building trust takes time. Practitioners must tolerate uncertainty, navigate slow progress, and maintain optimism through setbacks.

Each of these skills can be learned — but they require continuous practice and reflection.

How to Build Skills and Culture

There are ways to invest in your people and partners through structured and informal learning mechanisms:

1. **Ecosystem Training Programs**
    - Internal courses on ecosystem thinking, data governance, and facilitation.

    - Joint sessions with ministries, companies, and universities to build shared understanding.
2. **Communities of Practice**
    - Thematic groups (e.g., AI, data quality, ethics) where practitioners share experiences and tools.
    - Open Slack and Teams channels connecting hundreds of professionals.
3. **Mentorship and Peer Learning**
    - Experienced ecosystem facilitators coach new participants.
    - Peer reflections after pilots help capture lessons learned.
4. **Cross-Sector Mobility**
    - Temporary exchanges between public authorities and private firms.
    - Employees gain empathy for other sectors' realities.
5. **Recognition and Storytelling**
    - Highlighting individuals who embody ecosystem values.
    - Sharing personal stories in newsletters and events to humanize collaboration.

The goal is not only competence development but **identity formation** — building a community that sees itself as ecosystem builders, not just employees or suppliers.

Diversity and Inclusion in the Ecosystem Context

Innovation thrives on diversity — of expertise, perspective, and experience.
The Finnish Traffic Data Ecosystem actively seeks to include:

- Large and small companies,
- Research and education institutions,
- Startups and NGOs,
- Regional authorities,
- Young professionals and students.

Inclusion is both a principle and a practical tool: diverse perspectives challenge assumptions and expand creativity. Workshops are designed to give everyone a voice; facilitation techniques ensure equal airtime and respect.

Fintraffic's partnership with universities has also brought fresh energy: students working on real data challenges learn ecosystem values early — preparing the next generation of collaborators.

Psychological Safety and Openness

Innovation requires **psychological safety** — the confidence to speak up, share unfinished ideas, and admit uncertainty without fear. Fintraffic's teams promote this through:

- Open dialogue rules (“no wrong questions”) in workshops.
- Transparent documentation of decisions and feedback.
- Encouragement to publish learnings, even from failed experiments.

When people feel safe, they share ideas earlier and more freely — accelerating discovery and trust.

Balancing Expertise and Empathy

Technical expertise is essential, but in ecosystems, **empathy is equally strategic**.
Being able to understand another organization’s constraints, goals, and vocabulary makes collaboration smoother and more sustainable.

Fintraffic encourages its ecosystem leaders to:

- Spend time in partner organizations.
- Attend cross-sector events as listeners rather than presenters.
- Begin meetings by discussing shared goals before diving into data or technology.

This blend of expertise and empathy creates the emotional infrastructure for cooperation.

Leadership Development for the Ecosystem Era

As ecosystems mature, leadership development must evolve accordingly.
Fintraffic’s leadership model emphasizes four shifts:

From…	To…
Managing tasks	Enabling systems
Commanding expertise	Curating collaboration
Measuring outputs	Enabling outcomes
Protecting boundaries	Expanding networks

Training for ecosystem leaders includes facilitation coaching, stakeholder mapping, and narrative communication — but also reflection on mindset: *How do I lead when no one reports to me?*

This question lies at the heart of ecosystem leadership.

The Role of Education and Academia

Finland's universities play a crucial role in shaping the talent pipeline for data ecosystems. Collaborations with Aalto University, the University of Turku, and LUT have produced:

- Courses on **data economy and digital ecosystems**.
- Joint **master's theses** analyzing governance, fairness, and innovation models.
- **EIT Digital Summer Schools** where students apply ecosystem thinking to real challenges.

Through these collaborations, academic theory and real-world practice reinforce each other — ensuring that ecosystem competence becomes a mainstream skill in Finland's workforce.

Lessons Learned: The Human Side of Data Ecosystems

Over years of collaboration, Fintraffic and its partners have distilled several human lessons:

1. **Culture is built by repetition.**
   Consistent behavior, not one-off workshops, shapes trust.
2. **Transparency beats perfection.**
   People forgive mistakes, not opacity.
3. **Collaboration needs caretakers.**
   Relationships require time, facilitation, and follow-up.
4. **Curiosity is the ultimate soft skill.**
   People who ask questions build bridges faster than those who defend expertise.
5. **Joy matters.**
   Successful ecosystems celebrate progress, not just compliance. Shared laughter builds resilience.

Conclusion: Ecosystems Are Human Systems

Technology may enable data ecosystems, but people sustain them. Their values, curiosity, and relationships turn protocols into partnerships and governance into trust.

Finland's Traffic Data Ecosystem demonstrates that when culture and skills align with purpose, collaboration becomes not just possible, but natural. It shows that **data ecosystems are, at their heart, human ecosystems** — and their future depends as much on empathy and learning as on code and policy.

Or, as one ecosystem participant once said at a Fintraffic workshop:

"We came for the data — but we stayed for the people."

Chapter 14: Scaling Ecosystem Impact

From Pilots to Systemic Change

Every ecosystem begins with enthusiasm and experiments. But for true transformation, it must progress beyond isolated pilots and workshops — toward **systemic impact**. Scaling is not just about doing more; it is about **embedding collaboration into the fabric of how a system works**.

In Finland, the Traffic Data Ecosystem has evolved from early testbeds into a sustained, multi-sector movement shaping national policy, EU standards, and everyday mobility services. This chapter explores how that scaling happened — and how impact can be measured, managed, and multiplied.

The Three Dimensions of Scaling

Finland's experience shows that scaling happens along three interdependent dimensions:

1. **Scaling Up – Institutionalizing and Influencing Policy**
   Integrating ecosystem practices into formal policies, regulations, and funding frameworks.
   Example: Finland's National Access Point and ecosystem rulebook becoming part of national ITS policy and EU Data Space dialogue.
2. **Scaling Out – Expanding Across Sectors and Borders**
   Applying successful models in new domains (e.g., logistics, energy, health) or international collaborations.
   Example: The Nordic cooperation expanding data exchange beyond Finland's borders.
3. **Scaling Deep – Changing Mindsets and Behaviors**
   Embedding the principles of trust, fairness, and openness into organizational culture.
   Example: Public officials and private companies adopting ecosystem thinking in their daily work.

These three dimensions reinforce each other: deep cultural change makes up- and out-scaling sustainable.

The Maturity Model: From Experiment to Institution

Fintraffic uses a practical **ecosystem maturity model** to describe the stages of evolution:

Stage	Focus	Indicators of Progress
1. Initiation	Vision, trust, and early pilots	Stakeholder engagement, first data sharing, visible leadership

2. Structuring	Governance, rulebook, and processes	Roles clarified, transparency established, ecosystem identity
3. Acceleration	Use case scaling and value creation	Multiple active projects, increased participation, measurable impact
4. Institutionalization	Policy integration and sustainability	Ecosystem principles embedded in regulations, stable funding
5. Diffusion	Replication across domains or countries	New ecosystems adopting the model, international partnerships

The Traffic Data Ecosystem is currently between **Stage 3 and 4**, where operational maturity meets institutional recognition. The next step is ensuring that the model is self-sustaining — supported by stable governance, funding, and leadership renewal.

Enabling Conditions for Scaling

Scaling requires more than ambition. It depends on a set of enabling conditions that Finland has cultivated intentionally:

1. **Stable and Neutral Orchestrator**
   Fintraffic's credibility as a non-competitive, publicly accountable organization provides a safe foundation for growth.
2. **Clear Governance and Rulebook**
   Consistency in principles allows new partners to join easily without renegotiating everything from scratch.
3. **Open and Reliable Data Infrastructure**
   Platforms like Digitraffic and the NAP provide technical scalability — open APIs, standardization, and uptime create trust in the system.
4. **Visible Leadership and Narrative**
   A clear story ("From Trust to Impact") helps people see themselves as part of a growing movement.
5. **Multi-Level Funding**
   Combining national budgets, EU co-funding, and in-kind contributions creates a diversified financial base.
6. **Feedback and Learning Mechanisms**
   Impact reporting, retrospectives, and continuous communication ensure adaptation rather than stagnation.

Together, these conditions make the ecosystem resilient and scalable.

Scaling Through Use Cases

Impact scaling often happens **use case by use case**. When a successful pilot demonstrates value, it becomes a **template** others can replicate.

For example:

- **The Winter Road Safety Pilot** will evolve into a permanent data flow used by multiple companies.
- **Emission Data Collaboration** could became a model for EU-wide sustainability reporting.
- **Cross-border data exchange with Estonia** will lay the groundwork for Nordic Mobility Data Space alignment.

Each of these examples multiplied impact not through mandates, but through **demonstrated success**.

Scaling therefore follows a "fractal logic": the same collaborative principles that work at small scale also work at larger scales — as long as trust, governance, and fairness travel with them.

Metrics of Ecosystem Impact

To scale effectively, ecosystems need to **measure what matters** — not just activity, but outcomes. Fintraffic has developed a multi-layered impact framework:

1. Operational Metrics

- Number of datasets published and reused.
- API calls per day / per sector.
- Data quality indicators (accuracy, latency, completeness).

2. Collaboration Metrics

- Number and diversity of active partners.
- Participation in workshops, working groups, and co-funded projects.
- Partner satisfaction (measured through surveys and interviews).

3. Innovation Metrics

- Number of new services or applications developed using ecosystem data.
- Research publications and patents referencing open datasets.
- Cross-sector data linkages created.

4. Societal Metrics

- Reduction in accidents or emissions.
- Economic efficiency gains (cost/time savings).
- Public trust and transparency perceptions.

5. Policy and Global Influence Metrics

- Ecosystem principles referenced in national or EU strategies.
- International replication (Nordic, EU, OECD recognition).

Together, these indicators tell a comprehensive story: **data collaboration works** — not only in technology terms, but in real-world outcomes.

Institutionalization: When Ecosystem Thinking Becomes Policy

Scaling up requires embedding ecosystem logic into official structures.
In Finland, this has happened progressively:

- **Government Policy Alignment** – Ecosystem governance and open data principles are part of the national transport digitalization strategy.
- **Legal Integration** – Fintraffic's NAP and Rulebook align with EU ITS and Data Governance Acts.
- **Budget Integration** – Public funding recognizes open data infrastructure as essential public service, not optional innovation.
- **Procurement Reform** – Public tenders now increasingly include "data sharing" and "ecosystem cooperation" as criteria.

When ecosystem thinking becomes part of the machinery of governance, scaling becomes self-reinforcing.

Scaling Out: Beyond Transport

Finland's model is now influencing other sectors that face similar data-sharing challenges:

- **Energy** – Linking traffic and energy data to support smart charging and grid optimization.
- **Logistics and Ports** – Integrating maritime and rail data for end-to-end supply chain visibility.
- **Health and Wellbeing** – Applying ecosystem governance models to health data collaboration, inspired by traffic data successes.
- **Environment and Climate** – Using transport data to model emissions and inform national sustainability planning.

These cross-sectoral links mark the beginning of a **data ecosystem-of-ecosystems**, where shared governance principles accelerate digital transformation across society.

Scaling Out Internationally

Fintraffic's ecosystem model has become a **Nordic and European reference case**.
It is shared through:

- **Nordic collaborations** (ODIN, C-Roads, Nordic Mobility Data Space).
- **EU projects** under the Digital Europe Programme, Horizon, and CEF.
- **Advisory roles** in European data space governance forums.
- **Partnerships** with emerging ecosystems in other regions (Baltics, Central Europe, Asia).

Finland's role is not to dominate, but to **inspire and enable**.
By offering open documentation (Rulebook, governance models, process templates), it helps other countries accelerate their own journeys — spreading trust as a European export.

Scaling Deep: Changing How People Think

Perhaps the most profound form of scaling is **mental** — when ecosystem principles become part of everyday decision-making.
In Finland, ecosystem thinking is no longer confined to Fintraffic; it appears in ministries, municipalities, startups, and universities.

Indicators of deep scaling include:

- Officials asking, "Who should be at the table?" instead of "Who owns this?"
- Companies discussing *data partnerships* instead of *data sales*.
- Researchers framing projects as ecosystem experiments.
- Citizens expecting transparency in how mobility data is used.

This cultural diffusion ensures that even if organizations or technologies change, the underlying mindset endures.

Challenges in Scaling

Scaling impact is rewarding but not simple. Key challenges include:

- **Resource Dilution** – As ecosystems expand, maintaining quality and focus becomes harder.
- **Onboarding New Participants** – Latecomers must integrate quickly without slowing progress.

- **Governance Complexity** – The more participants, the greater the need for streamlined processes.
- **Sustaining Engagement** – Interest can fade once initial goals are met; continuous renewal is vital.
- **Measurement Fatigue** – Too many metrics can overwhelm rather than inform.

Fintraffic's approach to managing these challenges is iterative: simplify governance where possible, automate measurement, and renew energy through visible successes and learning.

The Role of Digital Twins and AI in Scaling

Technology is also a scaling lever. Digital twins, AI-based analytics, and data virtualization help ecosystems move from static sharing to **real-time collaboration**.

They enable:

- Scalable prediction models for traffic and emissions.
- Cross-sector data fusion without physical centralization.
- Machine-readable governance — automating licensing, access, and compliance.

As AI becomes integral to data ecosystems, Finland's emphasis on **human oversight and ethical principles** ensures that scale does not come at the expense of trust.

Sustainability and Renewal

Long-term impact depends on the ecosystem's ability to **renew itself**. Fintraffic plans this through:

- **Leadership succession** — ensuring new voices take ownership.
- **Periodic rulebook revisions** — keeping governance relevant.
- **Continuous onboarding** — new companies, regions, and technologies.
- **Ecosystem retrospectives** — annual reviews assessing what worked, what didn't, and what's next.

An ecosystem that can learn and adapt will never become obsolete.

Conclusion: Scaling Trust, Not Just Data

Scaling an ecosystem is not about growing databases — it is about **growing relationships and reputation**.

It is about expanding the circle of trust while preserving the principles that made collaboration possible in the first place.

Finland's Traffic Data Ecosystem shows that scale follows trust, not the other way around.
By aligning governance, infrastructure, and human culture, it has turned local pilots into a national and international movement.

The result is a model of **sustainable scaling** — one where openness creates momentum, fairness keeps it balanced, and trust ensures it endures.

When trust scales, impact becomes inevitable.

Chapter 15: Challenges and Lessons Learned

Why Reflection Matters

Every mature ecosystem carries scars — moments of tension, failed pilots, or misaligned expectations. These experiences are not signs of weakness but of **learning in motion**. Ecosystem building is a complex, adaptive process that unfolds in a landscape of competing interests, evolving technology, and shifting policy.

Finland's Traffic Data Ecosystem is often cited as a success story, but its real strength lies in its **capacity to learn from friction**.

This chapter distills the most important lessons from more than a decade of experimentation, collaboration, and reflection.

Challenge 1: Balancing Openness and Control

From the beginning, the ecosystem faced a fundamental tension: how to remain *open enough* to foster innovation, but *controlled enough* to ensure reliability and compliance.

What Happened

Early enthusiasm for open data sometimes led to unrealistic expectations — that all data could or should be open, instantly. However, certain datasets (e.g., vehicle telemetry, critical infrastructure information) required protection.

Lesson Learned

Openness works best when combined with **clear governance and transparency**. Instead of forcing all data into a single model, Finland adopted a **tiered openness approach** — open, shared, and restricted — balancing access with accountability. This flexibility built credibility and trust among both public and private partners.

Challenge 2: Aligning Public and Private Incentives

Public authorities pursue societal value; private companies pursue business value.
These goals overlap but rarely coincide perfectly.

What Happened

In early collaborations, private firms feared their contributions would primarily benefit competitors or public institutions. Meanwhile, public agencies worried about "privatizing" public data benefits.

Lesson Learned

Incentives must be **mutual and transparent**. Finland's Rulebook clarified rights and reciprocity: everyone who contributes should benefit — through visibility, influence, or shared results.
Once fairness was formalized, cooperation replaced suspicion.

Challenge 3: Turning Pilots into Practice

Finland, like many innovation-driven countries, once suffered from *"pilot fatigue."* Numerous successful pilots failed to transition into sustainable services.

What Happened

Projects often ended when funding stopped, even when the concept worked. Lack of ownership and unclear scaling pathways stalled progress.

Lesson Learned

Success requires **institutional anchors**. By integrating pilots into Fintraffic's operational platforms (like Digitraffic) and embedding results into policy, good ideas became lasting structures.
Every pilot now includes an *exit-to-scaling* plan from the outset.

Challenge 4: Managing Complexity Without Bureaucracy

As the ecosystem grew, governance risked becoming heavy. More partners meant more meetings, more processes, and slower decisions.

What Happened

Well-intentioned documentation sometimes overwhelmed participants. Small companies in particular struggled to keep up with administrative requirements.

Lesson Learned

Governance must remain **light, modular, and iterative**. Fintraffic simplified its Rulebook, standardized templates, and replaced long reports with living digital dashboards.
The principle became: *"Structure enough to ensure fairness, simplicity enough to ensure speed."*

Challenge 5: Measuring Impact Across Multiple Dimensions

Ecosystem impact is broad — safety, emissions, innovation, trust — but not all of it can be easily quantified.

What Happened

Early evaluations focused on visible metrics (API calls, datasets published), overlooking cultural and institutional change. This gave an incomplete picture of progress.

Lesson Learned

Impact measurement must combine **quantitative and qualitative evidence**. Fintraffic introduced a "trust and engagement index" alongside technical KPIs. Numbers tell the story of scale; narratives tell the story of meaning.

Challenge 6: Sustaining Engagement Over Time

Ecosystems depend on human energy. After initial enthusiasm, attention naturally drifts — especially when outcomes take years to materialize.

What Happened

Some working groups went dormant; partners shifted focus when funding ended.

Lesson Learned

Engagement needs **rhythm and renewal**. Regular communication, visible successes, and new entry points (e.g., onboarding sessions, hackathons) keep energy flowing. Fintraffic treats communication as part of ecosystem maintenance — not decoration.

Challenge 7: Integrating Legacy Systems and Mindsets

Technology evolves faster than institutions. Some public agencies and infrastructure owners still operated with outdated IT or siloed thinking.

What Happened

Efforts to harmonize data were slowed by incompatible formats, legacy systems, and organizational inertia.

Lesson Learned

Transformation is as much about **mindset migration** as system migration. By involving legacy operators in co-design rather than top-down mandates, Fintraffic built ownership and reduced resistance. Patience and empathy proved more effective than pressure.

Challenge 8: Protecting Neutrality in a Competitive Environment

As the ecosystem's influence grew, maintaining neutrality became harder. Private actors sometimes questioned whether the orchestrator favored certain partners or agendas.

What Happened

Requests for privileged access or co-branding created perceptions of imbalance.

Lesson Learned

Neutrality must be **visible and verifiable**. Fintraffic responded by documenting all decisions, publishing governance meeting notes, and rotating working-group chairs. Transparency became the ultimate safeguard of neutrality.

Challenge 9: Bridging Different Professional Languages

Engineers, lawyers, policymakers, and entrepreneurs often talk past one another. Misunderstandings about terms like "data ownership" or "interoperability" slowed progress.

What Happened

Technical and legal teams used incompatible vocabularies; decision-making stalled.

Lesson Learned

Ecosystems need **translation as a service**. Fintraffic invested in communication and facilitation training, and created cross-disciplinary working groups. By clarifying language, collaboration accelerated.

Challenge 10: Scaling Trust Beyond Borders

Building trust within Finland was one thing; extending it internationally was another.
Different regulatory cultures and maturity levels complicated Nordic and EU collaborations.

What Happened

Partners abroad were enthusiastic but lacked shared governance frameworks.
Negotiations often restarted from zero.

Lesson Learned

Trust must be **portable**. Finland began sharing its Rulebook, governance templates, and onboarding materials openly. By giving away its model, it built influence — and reduced friction in international cooperation.

What Finland Learned About Leadership

Across all these challenges, one insight stands out: **ecosystem leadership is stewardship, not ownership**. The orchestrator's job is not to control outcomes but to enable others to contribute. This requires humility, persistence, and a bias toward learning.

We have adopted a simple mantra:

"Lead by connecting. Govern by enabling. Inspire by example."

The Emotional Side of Ecosystem Work

Behind data strategies and governance diagrams are people — and people feel uncertainty, fatigue, and pride. Ecosystem work demands emotional intelligence: managing expectations, celebrating progress, and accepting imperfection.

Fintraffic learned that **emotional transparency** — admitting when something didn't work, thanking people publicly, and showing empathy — builds more credibility than any technical perfection.

From Lessons to Principles

Through its journey, the Finnish Traffic Data Ecosystem has distilled ten enduring principles:

1. **Trust First, Technology Second.**
   Collaboration collapses without relational capital.
2. **Start Small, Scale Smart.**
   Big visions grow from achievable pilots.
3. **Design for Fairness.**
   Equity is the fuel of participation.
4. **Govern Lightly, but Clearly.**
   Too much control kills innovation; too little kills coherence.
5. **Communicate Relentlessly.**
   Visibility is the immune system of trust.
6. **Make Learning Public.**
   Sharing mistakes accelerates collective maturity.
7. **Respect Different Speeds.**
   Public and private rhythms differ — synchronize, don't standardize.
8. **Measure What Matters.**
   Data is useful only when it tells a story of change.
9. **Stay Neutral, Stay Credible.**
   Neutrality is your license to operate.
10. **Celebrate Continuity.**
    Ecosystem success is not a sprint — it is a marathon of shared purpose.

Conclusion: Progress Through Imperfection

No ecosystem is ever finished. They evolve, stumble, and adapt — just like the societies they serve. Finland's Traffic Data Ecosystem is a story of continuous learning: how a small, trusted country built a model that others now emulate — not by avoiding mistakes, but by learning from them faster.

In complex systems, perfection is impossible — but **progress is inevitable when trust, humility, and persistence align**.

"We did not build a perfect ecosystem," one participant reflected. "We built a learning one — and that's what makes it work."

Chapter 16: The Future of Data Ecosystems

Looking Ahead: From Systems to Constellations

Over the 5 years, the Finnish Traffic Data Ecosystem has shown what collaboration, trust, and data can achieve at national scale. But the story is far from complete. We now stand at the threshold of a new era — one where **ecosystems connect with ecosystems**, forming constellations of data, algorithms, and human decision-making across sectors and borders.

The next phase will not be defined by new datasets alone, but by how **different data worlds interoperate responsibly**: mobility with energy, logistics with climate, health with urban planning. Finland's model is already a microcosm of this emerging future — transparent, trusted, and human-centric.

The 2030–2040 Horizon

By the 2030s, several transformative trends will redefine the ecosystem landscape:

1. **AI as a Core Partner, Not a Tool**
   Artificial intelligence will move from assisting to co-deciding. Ecosystems will need to ensure AI systems act transparently, explainably, and ethically within shared governance frameworks.
2. **Digital Twins of Everything**
   Real-time, data-driven models of transport, weather, energy, and environment will merge into a **national digital twin ecosystem** — enabling simulation of entire systems before decisions are made.
3. **Federated Data Spaces**
   The European Union's **Common European Data Spaces** will link national ecosystems through harmonized governance and technical standards — creating a single, trusted digital market for data-driven innovation.
4. **New Data Ownership and Rights Models**
   Individuals and companies will expect more control over how their data is used.
   Consent, usage tracking, and value sharing will be embedded in technology, not just contracts.
5. **Sustainability as Default**
   Carbon-neutrality and circular economy goals will shape data flows, making environmental impact a built-in KPI for all digital systems.
6. **Algorithmic Accountability and Ethical Certification**
   Governance will extend from datasets to algorithms — certifying fairness, bias mitigation, and sustainability compliance.

These shifts will not replace ecosystems; they will **mature them** — turning collaboration from a voluntary innovation model into a societal infrastructure.

Digital Twins: The Next Integration Layer

Fintraffic's long-term vision — the **Digital Twin of Finland's Transport System (2035)** — exemplifies how data ecosystems evolve into predictive, collaborative intelligence platforms.

What Digital Twins Will Enable

- **Predictive Safety:** Simulate accident risks before they occur.
- **Dynamic Traffic Management:** Real-time optimization of routes, modes, and maintenance.
- **Emission Forecasting:** Evaluate environmental impact of policy scenarios.
- **Resilience Planning:** Test system recovery from disruptions like storms or cyberattacks.

These capabilities depend on seamless interoperability — not just between datasets, but between models and algorithms. Digital twins are where **engineering meets ethics**: every prediction affects lives, so transparency and human oversight are essential.

The Rise of Data Spaces: From National Islands to European Networks

The **European Data Strategy** envisions sectoral data spaces — for mobility, health, energy, finance, and beyond — linked by shared standards and trust frameworks. Finland's ecosystem already operates as a **proto–data space**, aligned with EU principles of fairness, interoperability, and decentralization.

Key Features of Future Data Spaces

- **Federated Architecture:** Data stays with its owner but can be accessed through standardized interfaces.
- **Trust Frameworks:** Certification schemes for organizations that comply with data ethics, interoperability, and security standards.
- **Smart Contracts:** Automated enforcement of licenses and reciprocity rules.
- **Cross-Sector Connectors:** APIs and governance links between different data spaces — e.g., mobility + energy + climate.

These spaces will make data ecosystems **self-scaling** — connecting through shared rules rather than bilateral agreements.

Human-Centric AI and Ethical Automation

As automation expands, ecosystems must guard against "black-box governance." Finland's approach — combining AI innovation with ethical oversight — provides a template for **human-centered AI ecosystems**.

Key principles:

1. **Transparency:** Every automated decision must be explainable.
2. **Accountability:** Responsibility must remain with humans, not machines.
3. **Fairness:** Algorithms must not discriminate by geography, income, or demographic.
4. **Purpose Limitation:** AI should enhance safety, sustainability, and user experience — not surveillance or exclusion.

The future will require "algorithmic ecosystem governance" — ensuring AI systems follow the same trust and fairness principles as human collaborators.

The Next-Generation Ecosystem Skills

The human skills required for ecosystem work will also evolve.
Tomorrow's ecosystem professionals will need to combine **technical fluency, ethical judgment, and systems empathy**.

Skill Category	Future-Oriented Capabilities
Data Engineering & AI	Building interoperable models and responsible automation
Ecosystem Facilitation	Orchestrating cross-border collaboration at scale
Digital Ethics	Managing bias, transparency, and algorithmic accountability
Cybersecurity & Privacy Engineering	Protecting data in federated architectures
Impact Modeling	Linking digital performance to environmental and social outcomes
Storytelling & Public Diplomacy	Representing national ecosystems on global stages

Education systems will adapt accordingly — turning "ecosystem thinking" into a mainstream skill, not a niche specialization.

Ecosystem Diplomacy: A New Form of Soft Power

Just as 20th-century diplomacy managed trade and borders, 21st-century diplomacy will manage **data and trust**. Finland's reputation as a reliable and ethical data nation has already become a form of *soft power* — attracting partnerships, investments, and international influence.

Future orchestrators will need to act as **ecosystem diplomats**, representing not just organizations but shared values. They will negotiate *trust agreements* between countries and sectors, balancing sovereignty with collaboration.

In this sense, Finland's small size is an advantage — it can act as a **neutral broker**, building bridges where larger powers face political inertia.

Sustainability as the Next Frontier

By 2040, the success of data ecosystems will not be measured only by innovation or GDP impact, but by **sustainability metrics**:

- Reduced emissions through optimized traffic and logistics.
- Resource-efficient infrastructure maintenance.
- Increased modal shifts to public and shared transport.
- Lower congestion and improved quality of life.

Data ecosystems will become critical enablers of the **green transition** — not just monitoring change, but driving it through actionable insights. Fintraffic's integration of CO2, weather and traffic data already demonstrates this potential.

Governance Evolution: From Rulebooks to Self-Regulation

As ecosystems mature and connect, governance will need to evolve from *manual oversight* to *automated, embedded trust*. Future governance mechanisms may include:

- **Machine-readable Rulebooks** — enabling instant compliance checks.
- **Data Usage Ledgers** — transparent logs showing who used what, when, and why.
- **Digital Trust Certificates** — verifying compliance with ethics and interoperability standards.
- **AI-driven Auditing** — monitoring ecosystem behavior in real time to flag anomalies or bias.

These tools will make governance more scalable while preserving human accountability.
Finland's open and modular governance framework is already a prototype for this evolution.

Ecosystem of Ecosystems: The Global Context

By the 2040s, national ecosystems will interconnect into a **global web of trust** — linking transport, climate, trade, and public services through interoperable data spaces. This transformation will mirror how the Internet connected communication in the 1990s — but with stronger ethical and legal guardrails.

Finland and the Nordic countries are positioned as **early architects** of this world: small, cooperative, technologically advanced, and deeply trusted. Their contribution is not dominance, but design — creating models that others can adopt.

"We don't want to own the world's data — we want to make it work better for everyone."

That philosophy — openness with responsibility — may become the defining ethos of Europe's digital decade.

The Long View: 2040 and Beyond

In 2040, a mature data ecosystem may look like this:

- **Every transport decision** — from individual route choice to national infrastructure planning — is informed by real-time, interoperable data.
- **Public–private collaboration** is seamless and self-sustaining; funding models are stable, driven by impact-based returns.
- **Data is treated as a renewable public asset** — used responsibly, replenished continuously, and governed transparently.
- **AI and digital twins** provide foresight for planning, sustainability, and resilience.
- **Trust is embedded** — not negotiated case by case, but built into the architecture of data flows.

Finland's Traffic Data Ecosystem will have evolved into a **digital trust utility** — invisible yet indispensable, just like electricity or clean water today.

The Ethical Imperative for the Future

As technology becomes more powerful, so too must our ethics. The future of data ecosystems will not be determined by what is *technically possible*, but by what is *socially acceptable and morally sound*.

Human values — fairness, privacy, inclusion — must remain the compass. Finland's success offers hope that innovation and ethics can reinforce, not contradict, each other.

"The ultimate test of a data ecosystem is not how much data it shares, but how much good it does."

Conclusion: The Next Chapter of Trust

The journey from **Trust to Impact** is ongoing.Finland's ecosystem has shown how data can unite competitors, transform governance, and serve society. The next era will demand the same courage and curiosity that defined the first — but applied to even more complex and interconnected challenges.

The future of data ecosystems will not be written by technology alone. It will be written by people — policymakers, engineers, citizens, and dreamers — who believe that **trust is not a given, but a renewable resource**.

And when that trust is nurtured, data becomes not just information — but a force for shared progress.

The ecosystem era is just beginning.
The question for every country, company, and citizen is no longer *whether* to join it — but *how* to make it work for all.

Epilogue: From Trust to Impact — and Beyond

The story of Finland's Traffic Data Ecosystem began with a simple but radical idea: that openness and trust could achieve more than control and competition.

What started as an experiment in data sharing became a new way of thinking about how societies innovate — together. It was not only about traffic or technology, but about **how collaboration can become an engine of progress** when fairness, transparency, and curiosity guide the way.

A Journey Measured in Trust

Unlike most transformation stories, this one cannot be measured only in terabytes, APIs, or regulations. Its real success lies in something less visible but more enduring: **trust capital**.

Every shared dataset, every co-created pilot, every open conversation between public and private actors added another layer to that trust. It grew slowly, sometimes painfully, through misunderstandings and negotiations — yet it held firm. And because it held, new ideas could emerge faster, decisions could be made with confidence, and innovation could flow without fear.

The Finnish experience proves that in a complex, interconnected world, **trust is infrastructure**.
It is the foundation on which all else — governance, technology, economy — ultimately depends.

The Human Thread

Behind every platform and policy are people — professionals, researchers, entrepreneurs, and civil servants — who chose to act differently.
They shared before being asked.
They listened before arguing.
They built bridges between silos and disciplines that had never met before.

Their collective courage redefined what "public service" and "private innovation" can mean.
They discovered that the most powerful form of leadership is not command, but **connection**.

These people — the quiet practitioners of collaboration — are the true authors of this book's story.
They remind us that technology changes fast, but values must endure even faster.

Lessons for the Next Generation

The next generation of ecosystem builders will face new challenges: artificial intelligence that reasons on our behalf, data spaces that span continents, crises that demand instant coordination.
Their world will be faster, smarter, and more volatile.

Yet the lessons from Finland remain timeless:

- **Trust is built, not declared.**
- **Fairness is designed, not assumed.**
- **Collaboration is led, not left to chance.**

If future leaders remember these truths, they will not only manage data — they will shape societies capable of learning, adapting, and caring.

From a National Model to a Global Mandate

Finland's ecosystem is not an endpoint; it is a **prototype for global cooperation**. It demonstrates that small nations can lead big conversations — not through economic might, but through credibility and coherence. And it shows that when principles travel freely, impact multiplies without losing integrity.

The European data space movement, the Nordic collaboration, and countless new initiatives around the world now carry traces of the Finnish model. Each adds a new melody to the same symphony — proof that ecosystems can grow organically without losing harmony.

The Personal Reflection

If there is one personal insight from this journey, it is that **ecosystem building is both deeply strategic and deeply human**. It demands systems thinking, patience, and technical acumen — but also empathy, storytelling, and resilience. It is a profession of connectors, translators, and optimists.

Those who choose this path must learn to be comfortable with ambiguity, generous with credit, and tireless in nurturing relationships. Their reward is not fame, but the quiet satisfaction of seeing the world work a little better because people worked together.

The Ongoing Mission

The Traffic Data Ecosystem continues to evolve — from trust to impact, and from impact to **renewal**. New technologies, new partners, and new challenges will emerge, but the guiding compass remains constant: to make data collaboration **work for people, for business, and for the planet**.

Every new connection — whether a dataset, a handshake, or a shared insight — adds to a living system that no single organization owns but everyone benefits from. That is the true power of ecosystems: they outlive projects, plans, and even individuals.

Final Words

In the end, this is not a story about Finland alone. It is a story about what any society can achieve when it chooses collaboration over control, curiosity over fear, and fairness over dominance. It is a story about building **systems of trust in an age of uncertainty**.

And it carries a simple invitation to all who read it:

Don’t just study the ecosystem model.
Live it.
Share data.
Ask better questions.
Build bridges.
Measure impact not only in efficiency, but in understanding.
And keep proving that trust — when nurtured with integrity — can scale faster than technology itself.

Because the next chapter of this story will not be written in Finland alone.
It will be written wherever people believe, once again, that **data can unite us.**

Appendix: Traffic Data Ecosystem Rulebook

Traffic Data Ecosystem - Accession Agreement

Accession Agreement

ACCEDING PARTY

(1) [Acceding Party][1]

APPENDICES

Appendix	Description
1	Constitutive Agreement
1.1	Description of the Traffic Data Ecosystem
1.2	General Terms and Conditions
1.3	Code of Conduct

BACKGROUND

The Acceding Party has expressed its interest to accede to the Constitutive Agreement regarding Traffic Data Ecosystem that was signed on [●].[2]

DEFINITIONS

As used in this Agreement, including the preamble and the Appendices hereof, unless expressly otherwise stated or evident in the context, the following terms and expressions have the following meanings, the singular (where appropriate) includes the plural and vice versa, and references to Appendices and Sections mean the Appendices and Sections of this Agreement:

"Acceding Party"	means the entity defined under section Acceding Party.
"Accession Agreement"	means this Agreement.
"Constitutive Agreement"	means the Constitutive Agreement regarding Data Network on Traffic Data Ecosystem, dated [●].

[1] **Note:** Please insert the Acceding Party's details herein.

[2] **Note**: Please insert a reference to the Data Network herein.

ACCESSION TO THE CONSTITUTIVE AGREEMENT

The Acceding Party has expressed its interest in acceding to the Constitutive Agreement.

The Acceding Party accedes to the Constitutive Agreement and to the Data Network under this Agreement.

ENTRY INTO FORCE AND APPLICATION

This Agreement will enter into force as of its execution by the Acceding Party and after it has been duly approved by the Data Network's Steering Committee.

APPLICABLE LAWS AND DISPUTE RESOLUTION

This Agreement is governed by and construed in accordance with the laws of Finland, without regard to its principles of private international law and conflict of laws rules.

Any dispute, controversy or claim arising out of or in relation to the agreements based on the General Terms and Conditions, or the breach, termination or validity thereof, shall be finally settled by arbitration in accordance with the Arbitration Rules of the Finland Chamber of Commerce. The number of arbitrators shall be one, the seat of arbitration shall be Helsinki, Finland and the language of the arbitration shall be English.

COUNTERPARTS

This agreement has been executed in two identical counterparts, one for the Acceding Party and one for the Steering Committee.

In _____, on _____ 20

[Signatures on the next page]

	[PARTY 1]		**[PARTY 2]**
	_____		_____
Name:	**[Name]**	**Name:**	**[Name]**
Title:	**[Title]**	**Title:**	**[Title]**

	[PARTY 1]		**[PARTY 2]**
	_____		_____
Name:	**[Name]**	**Name:**	**[Name]**
Title:	**[Title]**	**Title:**	**[Title]**

Traffic Data Ecosystem: Vision, Goals and Governance Model

Traffic Data Ecosystem ("Liikenteen Dataekosysteemi") –Vision and Goals

Vision

Traffic operators and players in Finland will join forces to create innovative data-use solutions and a fair and open digital operating environment within an open data ecosystem. This cooperation seeks to provide competitive and scalable traffic and mobility services for both Finnish and international markets – solutions that will enable safe, low-emission and user-oriented travel and transport chains that combine different modes of transport.

Traffic Data Ecosystem is, as the name implies, an open ecosystem. Open ecosystem is an operating model in which companies jointly create, by sharing data and producing services for each other, a value proposition for the customers of the network, which none of them could create alone. All network members get their fair share of the added value created for the customer.

The ecosystem is open to everyone and their operations are market-based and guided by shared data. The boundaries entering the ecosystem are low – there are no entry fees or strict entry criteria.[3]

For more information about the Traffic Data Ecosystem, please refer to ecosystem web pages at: https://www.fintraffic.fi/en/trafficecosystem

Means – How we will achieve our vision

1. By inviting **all** operators to participate **equally** in the joint and **open** development of a Traffic data ecosystem.

2. By working towards **common objectives** and common action, by **sharing knowledge**, and by engaging in co-development to **increase the value** of the Finnish traffic market.

3. By **making more data available** – either with or without charge – in a mutually agreed format.

4. By making use of jointly developed **rules** and clear **working practices**.

5. By making it easier for different operators to work together with the aid of things such as common **data models**, jointly defined technical **interfaces**, and international **standards**.

6. By building **cooperation networks** that can market, sell and supply **interoperable** solutions to both **international** and **Finnish markets**.

[3] https://www.sitra.fi/en/articles/open-ecosystems-a-new-way-to-create-value-for-customers-companies-and-partners/

7. By respecting current **legislation** under all circumstances, and particularly with regard to **privacy protection**, **trade secrets**, **competition law**, **data protection** and **data security**.

8. By leveraging **Fintraffic's unifying role** between all modes of transport in the creation of the data ecosystem, particularly in the creation of **market references** and key market-based services that are difficult to launch, and primarily as an **enabler** rather than a creator of **services for end users**.

9. By **actively communicating** agreed measures, progress, and achievements; and by facilitating interaction between operators at all stages of the process

Desired Impact

Traffic Data Ecosystem will generate diverse and profound impact

1. For society, it will provide resource-wise transport system data that will enable us to reap the full benefits of data processing, and also act as a building block for a sustainable and competitive Finland. The ecosystem will also spawn new innovations, companies, and jobs.
For households, it will mean better-informed travellers and data-based services that provide genuine alternatives for safe, sustainable, affordable and smooth travel and logistics, in both rural and urban areas.
4. For organisations that use services, it will provide attractive and competitive service packages with lower emissions and lower costs.
5. For companies that provide services, easily accessible traffic data will accelerate the creation of new business, create new markets (including internationally), and facilitate cooperation and the formation of joint offerings in business networks.
6. For logistics operators, it will provide cost-effective and integrated logistics chains enabled by data sharing.
7. For the public sector, it will mean the opportunity to build higher quality and more efficient mobility and transport services that are more compatible with companies.
8. For R&D operators, widely available Traffic data will provide an internationally significant advantage in setting up research activities that accelerate service development and in implementing development environments that involve a number of actors.
9. For the international community, it will enable data-utilisation operating models and service packages tried and tested in Finland to be tailored to local needs or scaled up for a wider market.

Business approach for Traffic Data Ecosystem

Traffic Data ecosystem is an open ecosystem, which does not seek for profit. Individual players in the ecosystem can provide data and services in the ecosystem free of charge or for a fee, depending on their business needs. The detailed business rules for the data sets are described in respective data set descriptions and data sharing agreements.

Technical approach for Traffic Data Ecosystem

The technology architecture for Traffic Data Ecosystem is highly distributed. The required Application Programming Interfaces (APIs), authentication mechanisms

and other technical details are described in respective data set descriptions, service descriptions etc.

Governance Model[4]

GENERAL PROVISIONS

The Traffic Data Ecosystem (later "Data Network") is established by the Constitutive Agreement, which is signed by the Members of the Network. This Appendix includes a description of the Governance Model of the Data Network.

The purpose of the Governance Model is to define the procedures and mandates for managing the Data Network and any related changes during the lifecycle of the Data Network.

The Constitutive Agreement refers to a List of Members that also sets out the Parties to the Constitutive Agreement and the contact details of their representatives. The List of Members must be updated upon the accession of new Parties and the termination of incumbent Parties as well as when any contact details are changed.

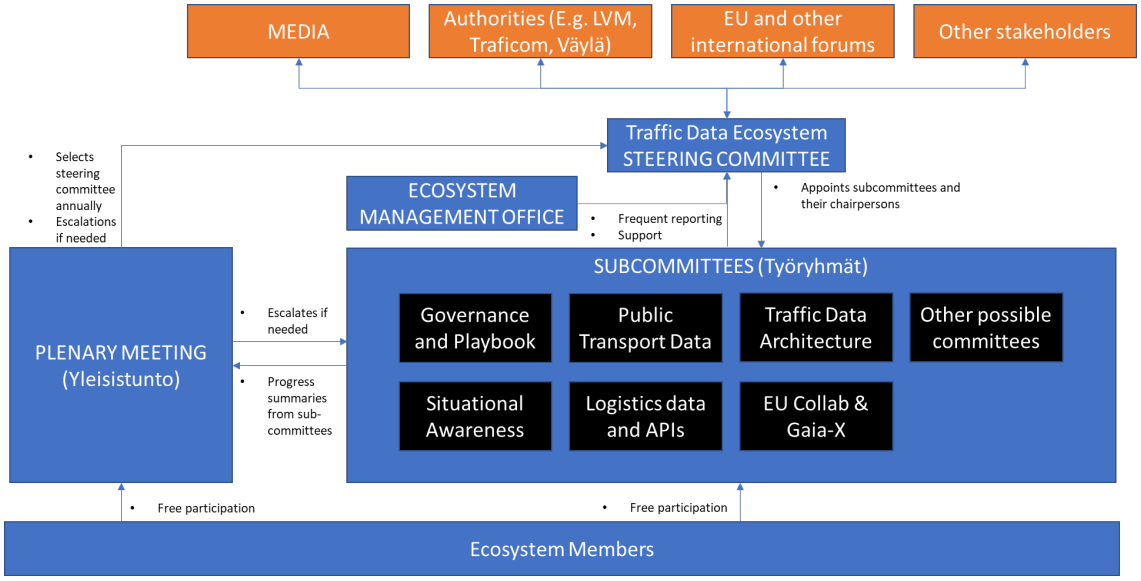


Figure 6. Traffic Data Ecosystem Governance Model.

STEERING GROUP ("OHJAUSRYHMÄ")

General

[4] **Note**: This template only serves as a general description of the governance rules that could apply to the relevant Network. The Members should consider, where applicable, whether it would be pertinent to define further provisions that would apply to the governance of the Network. This could include e.g. rules that apply to any changes in the Network's participants or in its contractual, technical or business framework. In addition, the Members should consider if a separate process should be defined for introducing new Datasets within the Network and for the approval of the Dataset Terms of Use.

The Steering Group is the ultimate decision-making body of the Data Network. The purpose of the Steering Group is to facilitate collaboration between the Parties and organise the administration of the Network appropriately on a strategic level. The Steering Group also decides on matters that may have a significant financial or risk impact on the Parties.

Primary Functions

The Steering Group is established to ensure the coordination of and any decision making related to the Data Network's business or to its legal, technical or ethical matters. The Steering Group is responsible for preparing any changes required to ensure that the Data Network continues to fulfil its purpose and meets the applicable requirements.

The Steering Group is authorised to make any changes to the Constitutive Agreement or any of its Appendices and to approve any new Members and terminate the participation of breaching Parties to the Data Network. The Steering Group is also authorised to validate new Datasets and/or Dataset Terms of Use.

Composition, Meetings and Organisation

The composition of the Steering Group is decided annually by the Annual Plenary Meeting. The Steering Group comprises of the chairmen of each working group + max 8 representatives of key participant organizations in the ecosystem (both public and private) (hereinafter referred to as the "Representatives")[Vanha: Finnish Traffic organizations (both public and private)].. The Steering Group will select a chairperson (hereinafter the "Chair") and a secretary (hereinafter the "Secretary"). The Secretary cannot simultaneously serve as a Representative. The Chair will lead the Steering Group meetings or appoint a Representative to lead the meeting in the Chair's stead.

Each Representative 1) should strive to be present or represented at all meetings; 2) may appoint a substitute or a proxy to attend and vote at any meeting; and 3) must participate in the meetings in the spirit of cooperation.

The Chair must convene an ordinary meeting of the Steering Group at least once every [three (3) months]. The Chair must convene an extraordinary meeting at any time upon the written request of the Chair or any Representative. Before scheduling an extraordinary meeting, the Chair or the Representative that has requested the extraordinary meeting must send an email summarising the issue at hand and whether it is time sensitive.

The meetings can be held or attended as video or teleconference calls when the Chair considers it necessary.

The Secretary coordinates matters related to the duties of the Steering Group. In particular, the Secretary is responsible for

- preparing Steering Group meetings, proposing agenda items, preparing the agenda of the Steering Group meetings, composing the minutes of the meetings and monitoring the implementation of the decisions made by the Steering Group;
- keeping the Constitutive Agreement and all of its Appendices updated and available;

- collecting, reviewing to verify consistency, and submitting any necessary documents[5] and specific requests made in relation to the Steering Group's duties;
- coordinating and administering the day-to-day matters of the Steering Group;
- promptly transmitting documents and notifications related to the Data Network to any Party concerned; and
- providing, upon request, the Parties with official copies or the originals of documents that are in the sole possession of the Secretary when such copies or originals are necessary for the Parties to present claims.

The Secretary is not entitled to act or make legally binding declarations on behalf of any of the Parties or the Data Network, unless explicitly stated otherwise in the Constitutive Agreement or duly authorised by all Parties. The Secretary must not seek to expand its role beyond the tasks specified in this Appendix.

Meeting Agenda

At each meeting, the topical issues affecting the Data Network will be reviewed using an agenda outline that is not limited to the following:

Introductory items such as:

- Introductions including any invited attendees
- Review agenda
- Minutes of the last meeting
- Review of any action points arising from previous meetings

Ongoing matters such as:

- Approval of changes to the Constitutive Agreement and its Appendices
- Approval of new Members to the Data Network
- Termination of the Constitutive Agreement [6]
- Validation of new Datasets and/or Dataset Terms of Use

[5] **Note**: At least where all Dataset Terms of Use are shared with all Members of the Data Network, it would be logical that the Secretary maintains an up-to-date library of the various applicable Dataset Terms of Use unless other some other centralised solution is established.

[6] **Note**: If the Constitutive Agreement allows new Members to join the Network.

- Operational and technical status of the Data Network
- Any change requests concerning the Data Network
- Acceptance of change request deliverables and monitoring their timelines
- Outstanding issues, open action points, conflicts
- Consideration of other relevant items
- Review and summary of actions from the meeting
- Next meeting
- Closing

Quorum and Decisions

A meeting constitutes a quorum when the Chair or his/her representative and at least 2/3 of the Representatives or their representatives are present. The Steering Group strives to work on the basis of achieving a consensus. The Steering Group will vote on decisions concerning the Network, if necessary.

In the event that the Group is not able to achieve a consensus, a proposal that is supported by at least a majority of 2/3 of the *Representatives present at the meeting* will be adopted as the Steering Group's decision.

Any amendments to the Constitutive Agreement, or to Appendix 2 – General Terms and Conditions or Appendix 4 Governance Model, as well as any changes to Appendix 1 – Description of the Data Network with material negative impact vis-à-vis any of the Members[7] must be agreed upon by a majority of 2/3 of *all Representatives*.

Invited Attendees

The Steering Group Representatives may invite necessary and appropriate persons to attend any Steering Group meeting, and such persons will be considered to have been 'in attendance'. The Chair is entitled to decide whether the attendance of the relevant invitee is necessary and appropriate. In the event that an invitee is not from a Network Member's organisation, such an invitee may be asked to sign a non-disclosure agreement, in case required by a Steering Group Representative.

Conflicts

[7] **Note**: Please consider if certain decisions should require even a unanimous decision of all Members' Representatives instead of a qualified majority of all Representatives. The Members should also consider whether criteria for decisions that involve for example a certain financial impact or risk impact should be defined herein in further details.

Any dispute, controversy or claim arising out of or relating to the Data Network, or the breach, termination or validity of the Constitutive Agreement must first be escalated to the Steering Group. The Parties must strive to resolve any such conflict in good faith at the Steering Group.

PLENARY ("TYÖRYHMIEN YHTEINEN KOKOUS")

General

The plenary gathers together participants from all the working groups to share information and progress. Plenary is also the vehicle for raising topics that are relevant to several working groups or ones that are failing between responsibilities of the groups.

Primary Functions

The plenary is used for communicating progress and sharing information between working groups. Plenary can also be used to escalate open topics either for working groups or steering group.

Once per year, the plenary holds the Annual Plenary Meeting that selects the participants in the steering group.

Composition, Meetings and Organisation

All ecosystem members can participate in the plenary meetings. Plenary meetings will be executed approximately once per 2 months.

The Annual Plenary Meeting shall consist of one representative of each Member (hereinafter "Annual Plenary Meeting Representative"). Each Annual Plenary Meeting Representative has one (1) vote. The Secretary shall convene Annual Plenary Meeting by giving a prior thirty (30) days notice to the Members and record the decisions taken by the Annual Plenary Meeting. An Annual Plenary Meeting constitutes a quorum when at least 2/3 of the Annual Plenary Meeting Representatives or their representatives are present. The Annual Plenary Meeting strives to work on the basis of achieving a consensus. In the event that the Annual Plenary Meeting is not able to achieve a consensus, a proposal that is supported by at least a majority of 2/3 of the *Annual Plenary Meeting Representatives present at the meeting* will be adopted as the Annual Plenary Meeting's decision. The meetings can be held or attended as video or teleconference calls.

SUBGROUPS / WORKING GROUPS ("TYÖRYHMÄT")

The Steering Group may authorise a subGroup/working group and/or the chair of the relevant subGroup to explore a specific issue. The plenary meeting will appoint the chairs of the subGroups/working groups in addition to defining their rules of procedure.

SubGroup chair(s) will attend Steering Group meetings. The chair of the relevant subGroup is responsible for disclosing all pertinent information the chair has learned at Steering Group meetings they have attended to the members of their subGroup.

All subGroups strive to operate under a full consensus. Where a consensus cannot be reached among the members of the subGroup, the subGroup can use voting among the Group attendees

to gain decisions. Each subGroup member shall have one (1) vote and decisions shall b
1/2 majority of the given votes. The chair will have the casting vote. .

Any member organization and/or person in the ecosystem can attend any working group sessions and participate in the work of any working group.

ECOSYSTEM MANAGEMENT OFFICE ("EKOSYSTEEMIN KOORDINAATIO")

Ecosystem Management Office is responsible of the practicalities related to the operations of the ecosystem sessions, including e.g. management of the schedules of the working group meetings, management of the document repository, newsletter and other communication internally to the ecosystem.

As of January 2022, this function is handled by Fintraffic. If needed, the responsibility of this function can be changed by the steering group.

1 APPLICABILITY, SCOPE AND GOVERNANCE

1.1 The Data Network (Traffic Data Ecosystem - Liikenteen Dataekosysteemi) is established by the Constitutive Agreement, which is signed by the Founding Members of the Network.

1.2 The provisions of these General Terms and Conditions will become applicable to and legally binding on the data sharing agreements of the Parties to the Data Network upon the execution of the Constitutive Agreement and any further Accession Agreements, as applicable.

1.3 In the event that a discrepancy arises between any of the terms and conditions established in the Constitutive Agreement, any Accession Agreements and these General Terms and Conditions, including any of their appendices or schedules, any such discrepancy will be resolved in accordance with the following order of priority:

(i) the clauses of the Constitutive Agreement;

(ii) the clauses of any Accession Agreement(s);

(iii) Dataset Terms of Use and related Schedules;

(iv) these General Terms and Conditions; and

(v) other Appendices to the Constitutive Agreement in numerical order.

1.4 Any amendments to or derogations from these General Terms and Conditions must be agreed upon in the Constitutive Agreement in order to be valid.

2 DEFINITIONS

2.1 In these General Terms and Conditions, the following capitalised terms and expressions have the following meanings, and the singular (where appropriate) includes the plural and vice versa:

"**Accession Agreement**" means the agreement that governs the admission of parties to the Constitutive Agreement and the Data Network after the execution of the Constitutive Agreement.

"**Affiliate**" means any individual, company, corporation, partnership or other entity that, directly or indirectly, controls, is controlled by, or is under shared control with Party.

"**Appendix**" means any appendix to the Constitutive Agreement.

"**Confidential Information**" refers to trade secrets as defined in the EU Directive 2016/943 of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure, point (1) of Article 2 provided it is: (a) if disclosed in writing or in other tangible form, clearly marked as confidential or proprietary by the disclosing Party at the time of disclosure, or (b) if disclosed in other than tangible form, identified as confidential at the time of disclosure and confirmed and designated in writing to the receiving Party within fourteen (14) calendar days from the disclosure as confidential information by the disclosing Party.

"**Constitutive Agreement**" means the agreement under which the Data Network is established and any of its appendices.

"**Data**" means any information that Data Providers have distributed, transmitted, shared or otherwise made available to the Data Network based on the Constitutive Agreement and during its period of validity as further defined in the respective Dataset Terms of Use.

"**Data Processing Agreement**" means a written contract concluded between a controller and a processor that processes Personal Data on behalf of the controller, which sets out the subject matter and duration of the processing, the nature and purpose of the processing, the type of Personal Data and categories of data subjects, and the obligations and rights of the controller.

"**Data Provider**" means any natural person or an organisation that provides Data for the Parties to use via the Data Network.

"**Dataset**" means a collection of Data whose use the Data Provider authorises via the Data Network. Datasets and their related terms and conditions are defined more in more detail in the respective Dataset Terms of Use.

"**Dataset Terms of Use**" means the terms under which the Data Provider grants a right to use the Data included in the Dataset to the Service Providers and/or End Users.

"**Derived Material**" means information derived from Data or information that is created as a result of the combination, refining and/or processing of Data with other data. In case there is a need to clarify the borderline between Data and Derived material, additional requirements for what is not considered Derived Material shall be identified in the respective Dataset Terms of Use.

"**End User**" means any of the Parties to which Service Providers provide Data and/or services or to which the Data Provider provides Data, and which do not redistribute the Data further.

"**Founding Members**" are the initial Parties that execute the Constitutive Agreement.

"**Governance Model**" means an appendix to the Constitutive Agreement that includes a network-specific description of the rules and procedures of accession (i.e., who may be admitted to the Network and how), applicable decision-making mechanisms, and further governance provisions regarding the administration of the Network.

"**Intellectual Property Rights**" means patents, trademarks, trade and business names, design rights, utility models, copyrights (including copyrights in computer software), and database rights, in each case registered or unregistered and including any similar rights to any of these rights in any jurisdiction and any pending applications or rights to apply for the registration of any of these rights.

"**List of Members**" means a list of Parties which is updated upon the accession of new Parties and the termination of incumbent Parties.

"**Operator**" means any Party that provides data system or any other infrastructure services for the Data Network that are related e.g., to identity or consent management, logging or service management.

"**Operator Service Agreement**" means any service level agreements governing the services provided by any of the Operators to the Data Network or to its Members.

"**Party**" or "**Member**" means a party to the Constitutive Agreement and/or to an Accession Agreement and a member of the Data Network.

"**Personal Data**" has the meaning set forth in Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (the General Data Protection Regulation) ("**GDPR**").

"**Schedule**" means any schedule to the Dataset Terms of Use.

"**Service Provider**" means any of the Parties that combines, refines and processes data and provides the processed Data and/or a service, which is based on the Data, to the use of End Users, other Service Providers or Third Party End Users.

"**Third Party**" means a party other than a Party.

"**Third Party End User**" means any Third Party that receives any Data directly or indirectly from any of the Service Providers.

3 ROLE-SPECIFIC RESPONSIBILITIES

3.1 The potential roles defined under these General Terms and Conditions for the Parties to the Constitutive Agreement are (1) the Data Provider, (2) the Service Provider, (3) the End User and (4) the Operator. A Party may simultaneously occupy multiple roles. In such case, the relevant Party must comply with all applicable obligations related to each role and relevant Data. In addition, Third Party End User is a role recognised under these General Terms and Conditions as applying to any stakeholders who are not a Party to the Constitutive Agreement but who receive Data.

3.2 A more specific determination of role-specific responsibilities may be included in the Constitutive Agreement.

1.1 Data Provider

3.3 The Data Provider will be responsible for defining the Dataset Terms of Use for any Data that the Data Provider makes available within the Network. This includes, the right to define the purposes for which relevant Data can be processed, the right to allow the redistribution of Data to End Users and, where applicable, to Third Party End Users, and the right to prohibit the unauthorised use of Data and the right to refrain from sharing Data within the Network. The Data Provider must notify the Parties to whom the Data Provider makes the Dataset available of any refraining from sharing and new Dataset Terms of Use, after which the Dataset Terms of Use will bind the other Parties. Unless otherwise defined in the applicable Dataset Terms of Use, any end of the provision of Data or changes introduced by the Data Provider to the applicable Dataset Terms of Use will become effective within ninety (90) days from the relevant Parties to the Network being sent a notification of such change. Changes to the Dataset Terms of Use must not have retroactive effect.

3.4 The Data Provider shall provide Data for the use of the Network in a machine-readable form and by a method as defined by the Data Provider in the applicable Dataset Terms of Use (e.g., application programming interface, downloadable package or other method).

3.5 As an exception to the above clause 3.3, the Data Provider may undertake to grant the right to use certain specific Datasets or types of data to the Network for a fixed period, , in order to protect investments made in the Network by other Parties in good faith.

3.2 Service Provider

3.6 The Service Provider will be responsible for processing Data in accordance with the Constitutive Agreement and the applicable Dataset Terms of Use.

3.7 The Service Provider must keep records of its processing activities and deliver, on request, reasonably detailed reports on usage, processing and redistribution of Data to the relevant Data Provider(s).

3.3 End User

3.8 The End User must use Data in accordance with the Constitutive Agreement and the applicable Dataset Terms of Use.

3.4 Operator

3.9 The Network may involve one or several Operators. The Operator(s) are responsible for providing the Network with services that facilitate the operations of the relevant Data Network, such as authentication, identification, and identity/consent management services or for ensuring data security or providing

technical data protection solutions for the Network and as further defined in the applicable Operator Service Agreement.

3.10 Any Operator Service Agreement(s) concluded with the Party/Parties and the Operator(s) may be included as an Appendix to the Constitutive Agreement.

3.11 Operator shall adhere to any regulatory requirements such as notifications required by applicable legislation.

4 REDISTRIBUTION OF DATA; DERIVED MATERIAL AND ITS REDISTRIBUTION

Redistribution of Data

4.1 The Parties can redistribute Data to the other Parties, unless such redistribution is specifically prohibited in the applicable Dataset Terms of Use. Service Providers can redistribute Data to Third Parties only if permitted under the applicable Dataset Terms of Use.

4.2 Where the Data Provider permits the redistribution of Data to Third Party End Users, the Data Provider is responsible for defining further the applicable terms and conditions for the redistribution of Data in the respective Dataset Terms of Use. Service Providers are obliged to include such terms and conditions in any agreements they conclude with their Third Party End Users with regard to the redistribution of Data.

4.3 Notwithstanding the above, the Parties are entitled to redistribute any Data to their Affiliates, unless such redistribution is specifically prohibited in the applicable Dataset Terms of Use. Each Party will be responsible for ensuring that its respective Affiliates comply with the terms and conditions of the Constitutive Agreement.

Derived Material and its redistribution

4.4 Rights to Derived Material shall belong to the Party generating such Derived Material and the restrictions of use set out for the Data in the Dataset Terms of Use shall not cover Derived Material. Any restrictions for the use or redistribution of Derived Material shall be explicitly set out in the Dataset Terms of Use, if any.

4.5 The Parties are entitled to redistribute Derived Materials to the other Parties and any Third Party, unless specifically prohibited in the applicable Dataset Terms of Use.

Restrictions relating to Personal Data

4.6 The redistribution of any Personal Data or Derived Materials created on the basis of any Personal Data is always subject to the more detailed requirements disclosed in the applicable Dataset Terms of Use and applicable data protection laws.

5 GENERAL RESPONSIBILITIES

5.1 Data security, protection and management

5.1 Each Party must designate a contact person for data security matters, who is responsible for the relevant Party's data systems that are connected to the Network and for the implementation of the Party's security policy.

5.2 Each Party to the Data Network must have, sufficient capabilities to process Data securely and in accordance with the relevant data security standards and data protection legislation. The Parties must implement and maintain suitable technical, organisational and physical measures that are in line with good market practice, by taking into account the nature of the Data processed by the Party. Each Party must have the capability to properly perform its obligations under the Constitutive Agreement and applicable Dataset Terms of Use and, where necessary, to cease processing activities without undue delay for any relevant reason.

5.3 The aforementioned capabilities include e.g., the capability to control Data and its processing by being aware of

(i) the origins of the Data (specifically whether the origin is the Party itself, another Party or Third Party);

(ii) the basis for processing Data;

(iii) the restrictions and limitations that apply to processing Data; and

(iv) the rights and restrictions that apply to redistributing or refining Data.

5.4 Parties must also be capable of recognising Data and removing or returning it if the basis for the processing of Data expires. the obligation to remove or return Data is not applicable to Derived Materials, unless otherwise set out in the applicable Dataset Terms of Use.

5.5 Any identified data security breaches must be duly documented, rectified and reported to the affected Parties without undue delay. All involved Parties have a mutual responsibility to contribute reasonably to the investigation of any data security breaches within the Network.

5.2 Subcontractors

5.6 The Parties will have the right to employ subcontractors to perform their obligations under the Constitutive Agreement. Where and to the extent that the outsourced functions require it, the Parties may allow their subcontractors to access Data. The Parties will be responsible for the subcontracted performance as for their own.

6 FEES AND COSTS

6.1 Data is shared within the Network free of charge, unless otherwise defined in the applicable Dataset Terms of Use.

6.2 Each Party will bear their own costs related to accessing the Network and operating as a Member of the Network.

6.3 No costs incurred to a Party for the maintenance and administration of the Network will be allocated to the other Parties without express written agreement. For the avoidance of doubt, the maintenance and administration of the Network does not include the costs of Data where applicable and as defined in the Dataset Terms of Use in question.

7 CONFIDENTIALITY

7.1 The Parties must use any Confidential Information they receive in connection with the operation of the Data Network and/or regarding the Data Network only for the purposes for which such Confidential Information has been provided. The Parties must not unlawfully use or disclose to Third Parties any such Confidential Information they have become aware of in the course of the operation of the Data Network.

7.2 At the expiration or termination of the Constitutive Agreement, the Parties must cease to use Confidential Information and, upon request by any Party, verifiably return or destroy any copies thereof. Notwithstanding the above, the Parties are entitled to continue to use the Data subject to clause 10.2. In addition, the Parties may retain copies of Confidential Information as required by the applicable law or competent authorities.

7.3 If a Party is, under the applicable law or an order issued by a competent authority, obliged to disclose another Party's Confidential Information to the authorities or Third Parties, the obliged Party must promptly notify the affected Party whose Confidential Information will be disclosed of such disclosure if so permitted under the applicable law or the competent authority’s order.

7.4 The confidentiality obligations established in the General Terms and Conditions will survive the termination of the Constitutive Agreement.

8 INTELLECTUAL PROPERTY RIGHTS

8.1 The Intellectual Property Rights of the Parties must be respected and protected in connection with the operation of the Data Network.

8.2 Signing the Constitutive Agreement and sharing any Data within the Network does not result in the transfer of any Intellectual Property Rights. More specific provisions, if any, concerning the Intellectual Property Rights that relate to specific Datasets are included in the applicable Dataset Terms of Use. For the avoidance of doubt, any new Intellectual Property Rights created by a Party will vest in the creating Party as further defined in the applicable legislation governing Intellectual Property Rights.

8.3 The Data Provider is responsible for ensuring that it has sufficient rights for the provision of Data in accordance with the Dataset Terms of Use.

8.4 The Parties are entitled to utilise software robots or other forms and applications of robotic process automation or machine learning or artificial intelligence when processing Data, provided that they respect the confidentiality obligations set out in clause 7 and the data protection obligations set out in clause 9. In accordance with the aforementioned and the applicable Dataset Terms of Use, the Parties have the right to learn from Data and to use any professional skills and experience acquired when processing Data.

9 DATA PROTECTION

9.1 Any Personal Data processed within the Data Network must be processed in accordance with the applicable data protection laws and regulations.

9.2 Terms that are not defined here, have the meaning stated in the GDPR or other applicable data protection laws.

9.3 For the purposes of processing Personal Data within the Network, any Parties disclosing or receiving Data are, individually and separately, assumed to be controllers under the provisions of the GDPR. The said Parties are also assumed to be processing Data on their own behalf unless the Parties have concluded a written Data Processing Agreement that sets out the subject matter and duration of the processing, the nature and purpose of the processing, the type of Personal Data and categories of data subjects and the obligations and rights of the controller and the processer. Where any such Data Processing Agreement is applicable in general to certain Dataset(s) or services provided under the Constitutive Agreement, it must be included as an Appendix to the Constitutive Agreement.

9.4 The Parties must prevent the unauthorised and unlawful processing of Personal Data by employing appropriate technical and organisational measures. The Parties must ensure that persons allowed to process Personal Data have committed to keeping such data confidential or are bound by an appropriate statutory obligation of confidentiality.

9.5 Personal Data that is shared within the Network can be transferred within the European Union and the European Economic Area (EEA). This kind of Personal Data can also be transferred outside the EU and the EEA in compliance with the data protection regulations, unless otherwise prescribed by the applicable Dataset Terms of Use.

10 TERMINATION AND VALIDITY

10.1 If the Constitutive Agreement is concluded for a fixed period, it will expire without separate notice at the end of the applicable fixed period. If the Constitutive Agreement is concluded for an indefinite period, it will expire upon termination by the Parties.

10.2 The Parties are entitled to continue to use any Data received through the Network prior to the termination of the Constitutive Agreement, unless otherwise determined in the applicable Dataset Terms of Use or agreed by the Parties in the Constitutive Agreement. In such case, the clauses governing use of Data in these General Terms and Conditions, Dataset Terms of Use and/or in the Constitutive Agreement, remain in force according to the Clause 17.1.

10.3 Any Party may choose to terminate the Constitutive Agreement as defined in the Constitutive Agreement. Notice of termination must be provided in writing to the Parties of Constitutive Agreement. In the event that there are more than two Parties to the Constitutive Agreement, the Constitutive Agreement will remain in force for the remaining Parties following the termination thereof by one Party.

10.4 Where the Parties have agreed on a process for amending the Constitutive Agreement otherwise than by the written consent of all Parties, any Party that objects to such an amendment in writing after having become aware of it will be entitled to terminate the Constitutive Agreement by notifying the other Parties thereof. The termination will become effective after the objecting Party has submitted the aforementioned notice to the other Parties at the time the amendment will enter into force unless the agreeing Parties have agreed on a later date. In the event a Party does not exercise its right to terminate the Agreement, the Party is considered to accept the amended Constitutive Agreement and is bound by it.

10.5 In the event that there are only two Parties to the Constitutive Agreement and one Party commits a material breach of the provisions of the Constitutive Agreement, the other Party will have the unilateral right to terminate the Constitutive Agreement with immediate effect by providing the other Party with a written notice.

10.6 In the event that there are more than two Parties to the Constitutive Agreement and one Party commits a material breach of the provisions of the Constitutive Agreement, the Steering Group will have the right to terminate the Constitutive Agreement with the breaching Party with immediate effect. Notice of any such termination must be provided in writing to all Parties.

10.7 If the breach can be rectified, the non-breaching Party/Parties may resolve to suspend the performance of their obligations under the Constitutive Agreement until the breaching Party has rectified the breach.

10.8 Where a Party's membership in the Network is terminated as a consequence of the Member's material breach of the Constitutive Agreement, the breaching Member's right to use the Data and any Derived Material incorporating the Data will end at the date of the termination. The breaching Member must cease to use the Data and, upon request by any Party, verifiably return or destroy Data and any copies of Confidential Information including copies thereof. However, the breaching Member is entitled to retain the Data as required by the applicable law or competent authorities provided that the breaching Member notifies the Data Provider of such a data retention obligation by the date of termination.

11 LIABILITY

11.1 The Parties will only be liable for direct damages that result from a breach of the provisions of the Constitutive Agreement as defined hereinafter and where applicable, in the Constitutive Agreement. Any other liabilities are hereby excluded, unless otherwise specifically defined in the Constitutive Agreement. Parties are not liable for loss of profits or damage that is due to a decrease or interruption in production or turnover, or other indirect or consequential damages.[8]

[8] Parties may wish to note that the concept of indirect or consequential damage varies between different jurisdictions.

11.2 The Parties will not be liable for any losses, damages, costs, claims or expenses howsoever arising from a mechanical or electrical breakdown or a power failure or any other cause beyond the reasonable control of the Party; and

11.3 the Parties must fully compensate any damages resulting from an intentional or grossly negligent breach of the provisions set out in the Constitutive Agreement.

11.4 8.3Each Party, severally and not jointly, will be liable for any infringements of personal data obligations set out in the GDPR in accordance with Article 82 of the GDPR.

12 FORCE MAJEURE

12.1 No Party will be liable for injuries or damage that arise from events or circumstances that could not be reasonably expected beforehand and are beyond its control (*force majeure*).

12.2 A Party that is unable to perform its obligations due to an event of force majeure must inform other Parties of any such impediment without undue delay. These grounds for non-performance will expire at the moment that the force majeure event passes. This clause is subject to a long-stop date: where performance is prevented for a continuous period of one hundred and eighty (180) days or more, the Parties are entitled to terminate the Constitutive Agreement as set forth in clause 10.5 or 10.6, as applicable.

13 AUDIT

13.1 A Data Provider will be entitled to audit the Parties processing the Data made available by the Data Provider at its own expense, including also material and reasonable direct costs of the audited Party. The purpose and the scope of the audit is limited to verifying compliance with the material requirements of the Constitutive Agreement, the applicable Dataset Terms of Use, and applicable legislation.

13.2 The Parties are responsible for imposing the same auditing obligations as set out herein on their Affiliates, and the Parties will act in good faith to ensure that the objectives of the Data Provider's audit rights materialise with regard to the subcontractors of a Party.

13.3 The auditing Party must notify the audited Party of the audit in writing at least thirty (30) days prior to the audit. The written notice must disclose the scope and duration of the audit and include a list of requested materials and access rights.

13.4 The audited Party is entitled to require that the audit is conducted by a mutually acceptable and/or certified independent Third Party which undertakes to commit to customary confidentiality obligations.

13.5 The Parties are required to retain and provide to the auditing Party and/or the Third Party auditor, for the purposes of the audit, all records and documents as well as access to all necessary data systems and premises and to interview personnel that are of significant importance for the audit. Records and documents thus retained must span to the previous audit or to the accession of the audited Party to the Network, whichever is later.

13.6 The auditing Party and/or Third Party auditor may only request such records and documents and such access to data systems and premises and to interview personnel that are of significant importance to the audit.

13.7 All records, documents and information collected and disclosed in the course of the audit constitute Confidential Information. The auditing Party and/or Third Party auditor may not unlawfully utilise or disclose Confidential Information that it has become aware of in the course of the audit. The auditing Party represents and warrants that any Third Party auditor, where applicable, complies with the applicable confidentiality obligations. The audited Party is entitled to require that the auditing Party and/or Third Party auditor or any other persons participating in the audit sign a personal non-disclosure agreement provided that the terms and conditions of such a non-disclosure agreement are reasonable.

13.8 The results, findings and recommendations of the audit must be presented in an audit report. The audited Party is entitled to review any Third Party auditor's audit report in advance (and prior to it being provided to the relevant Data Provider(s) by the Third Party auditor). The audited Party is entitled to require the Third Party auditor to make any such changes to the audit report that are considered reasonable while taking into account the audited Party's Confidential Information and the applicable Data Provider's business interests in the Data. The audited Party must provide its response to the audit report within thirty (30) days. If no response is provided, the audited Party is considered to have accepted the contents of the report.

13.9 If the auditing Party justifiably believes the audited Party to be in material breach of the obligations imposed thereupon in the Constitutive Agreement, an additional audit may be conducted.

13.10 In the event that the audit reveals a material breach of the obligations imposed in the Constitutive Agreement or the applicable Dataset Terms of Use, the audited Party will be liable for reasonable and verifiable direct expenses incurred as a result of the audit.

14 APPLICABLE LAWS AND DISPUTE RESOLUTION

14.1 The agreement incorporating these General Terms and Conditions is governed by and construed in accordance with the laws of Finland without regard to its principles of private international law and conflict of laws rules.

14.2 Any dispute, controversy or claim arising out of or in relation to the agreements based on the General Terms and Conditions, or the breach, termination or validity thereof, shall be finally settled by arbitration in accordance with the Arbitration Rules of the Finland Chamber of Commerce. The number of arbitrators shall be one, the seat of arbitration shall be Helsinki, Finland and the language of the arbitration shall be English.

15 OTHER PROVISIONS

15.1 Unless otherwise agreed by the Parties, any amendments to the Constitutive Agreement and its Appendices must be made in writing by the Parties or by a decision of the Steering Group as defined in Appendix 1 of the Constitutive Agreement.

15.2 No Party may assign the Constitutive Agreement, either wholly or in part, without a written consent of the other Party/Parties. Notwithstanding the previous, no consent shall be required where the assignee is a company that belongs to the same group of companies as the Party pursuant to the provisions of the Finnish Accounting Act.

15.3 If any provision of the Constitutive Agreement or any applicable Dataset Terms of Use is found to be invalid by a court of law or other competent authority, the invalidity of that provision will not affect the validity of the other provisions established in the Constitutive Agreement.

15.4 Each party represents and warrants that it is validly existing and in good standing under the applicable laws of the state of its incorporation or registration. Each Party also represents and warrants that it has all required power and authority to execute, deliver, and perform its obligations under the Constitutive Agreement and, where applicable, to bind its Affiliates.

15.5 The Parties intend to create a Data Network that is subject to a single set of contractual terms, and nothing contained in the Constitutive Agreement may be construed to imply that they are partners or parties to a joint venture or the other Parties' principals, agents or employees. No Party will have any right, power, or authority, express or implied, to bind any other Party.

15.6 No delay or omission by any Party hereto to exercise any right or power hereunder will impair such right or power, nor may it be construed to be a waiver thereof. A waiver by any of the Parties of any of the covenants to be performed by the other Parties or any breach thereof may not be construed to be a waiver of any succeeding breach thereof or of any other covenant.

16 NOTICES

16.1 All notices relating to these General Terms and Conditions and the Constitutive Agreement must be sent in a written or electronic form (including post or email) or delivered in person to the contact person and/or address specified by the respective Party. Each Party will be responsible for ensuring that their contact details are up-to-date. Notices will be deemed to have been received three (3) days after being sent or on proof of delivery.

17 SURVIVAL

17.1 Clauses 1, 2, 3, 4, 5, 8, 9, 11, 14, 16 and 17 of these General Terms and Conditions will survive the termination of the Constitutive Agreement in its entirety together with any clauses of the Constitutive Agreement that logically ought to survive the termination.

17.2 Clause 13 of these General Terms and Conditions will survive for a period of three (3) years following the termination of the Constitutive Agreement in its entirety.

17.3 Clause 7 of these General Terms and Conditions will survive for a period of five (5) years following the termination of the Constitutive Agreement in its entirety.

Traffic Data Ecosystem – Code of Conduct

Code of Conduct

Introduction

This Code of Confuct should not be seen as a way to restrict the actors of a data ecosystem but instead as a set of commonly acceptable norms that make cooperation between members more convenient by setting the direction for more detailed rules defined by implementing organisations. The code is not an obstacle. Like laws, it helps to create trust in a data network, which is needed for gaining real benefits and new business opportunities. This code of conduct is based on the respect between different stakeholders, transparent communication and ambition to seek the values that are commonly acceptable.

Acting ethically is not a mere cost but possibility for a resilient business.

Ethical Basis and Shared values of the Data Network

The purpose of this code is to approach the topic from the practitioners' point of view and to provide conceptual and analytical tools for assessing reasons on the basis of which the question "what should we do?" can be answered. This is done by presenting the values seen as important for data economy as well as by offering the maturity model (see next section) which can be employed in the analysis of the state of affairs in an organisation and consequently in the search of ways of improvement and development..

The following values have been found to be important in the research conducted during the IHAN project. In order the aim of fair data use to be achieved these values should be noted and respected in everyday practises..

Accountability and Auditability

The members of the data network are responsible for what they do, and they must be able to give satisfactory reasons for it. This means that all actors are expected to follow the Rule Book of the data network and especially its contract. All the contracts also should follow the Code of Conduct and the Rulebook of this data network. The responsibility is towards members of the data network, but also the external stakeholders – e.g., individuals, whose personal data may be processed in the data network. The operations within the data network must be reported in a comprehensive way.. Therefore, the members' records, logs and documents on data processing are suggested to be well-organized and complete, their personnel are transparent in their dealings with their auditors, and the members have a good system of internal control, security and documentation in relation to data processing.

Avoid harm

All actors in the data network should avoid causing harm but instead focus on creating value (direct or indirect) for the whole data network and all the people that are affected by the actions of this data network.

Justified Processing of Personal Data

Personal data shall be processed on a fair and lawful basis, like for example on the basis of an informed consent of the individual, in accordance with a contract with the individual, a legal obligation, a vital interest of the individual, in the public interest, or for the purposes of the legitimate interests, given that the interests and fundamental rights and freedoms of the individual are not threaten, in particular where the individual is a child.

Fairness, justice, and equality

All actors in the data network should promote fairness, justice, and equality among individuals. Fairness means that everyone is treated with respect regardless of their socio-economical background or status. Likewise, the benefits (economical and others) must be

balanced between all stakeholders in such a manner that individuals that are the source of data are not seen as mere exploitable resources.

To ensure fair use of their information, individuals are granted true possibilities to understand and control their personal data that are collected, transferred and otherwise processed in the data network.
The rules and the structure of the data network secure the benefits and rightful expectations of all the parties. This requires a balanced power structure in the data network and transparent consensus-oriented governance.

Human-centricity

People live in different environments and they have personal lived experiences of their own life. They must be respected and empowered. This means that individuals have to be seen and treated as active actors with opportunities to make their own choices in the data network. They must be able to keep full and effective self-determination. Furthermore, their needs and wishes should be taken account instead of reducing them as objects or subjects.

Privacy

Privacy is one of the central issues in data economy. Therefore, privacy must be respected and protected. The data network is based on the use of information, which sets high demands for privacy as information can be sensitive and private. Thus, this means that personal data shall be processed lawfully, fairly and in a transparent manner in relation to the individuals. Personal data shall be collected for specified, explicit and legitimate purposes and it shall not be processed further in a manner that is incompatible with those purposes. Only personal data, which are adequate, relevant and limited to what is necessary in relation to the expressed purposes, shall be processed. Organizations do not collect personal information that they do not need. All the personal data that are processed have to be necessary for the specific use. The members of the data network take reasonable measures to ensure that personal data are accurate and up to date. Personal data must not be stored longer than necessary for the purposes for which the personal data is processed. To ensure the integrity and confidentiality of privacy, personal data must be processed in a manner that ensures appropriate security of the data, including protection against unauthorized or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organizational measures. To preserve the integrity, confidentiality and availability of the data, organizations are encouraged to develop and implement an information security policy framework. When merging data sets, privacy should be guarded even more carefully than normally. Anonymization of data is recommendable, whenever feasible. Any organization must also be accountable, i.e., it needs to be able to demonstrate its compliance with the principles mentioned above. Therefore, the processing of personal data must be planned and documented. There should exist clear, documented processes for data collection, storage, use, and distribution. For collected data, there needs to be a clearly documented lifecycle plan where the collection, archiving and possible erasing of data are described. The relevant parts of the lifecycle plan are available to data providers and individuals related to the data.

Security

All the members of the data network are responsible that their collection, use, storage, sharing, and other processing of data are secure. This means that proper security solutions and processes are used and also that monitoring, patching, and reporting of security issues are properly designed. Personal data on individuals must be properly secured and the risks to the rights and freedoms of individuals should be analysed. All the necessary technical, organisational and personal actions must be implemented to minimise security threats to individuals whose information is processed. Taking into account the state of the art, the costs of implementation and the nature, scope, context and purposes of processing as well as the risk of varying likelihood and severity for the rights and freedoms of individuals, all the members of the data network shall implement appropriate technical and organisational measures to ensure a level of security appropriate to the risk.

Likewise, data breaches must be responded without delays. When the personal data breach is likely to result in a high risk to the rights and freedoms of natural persons, the responsible member of the data network shall communicate the personal data breach to the data subject without undue delay.

Sustainability and Circular Economy

All the members of the data network are guided and incentivised to develop and deploy sustainable solutions in alignment with a more sustainable, circular economy. The members will implement the data network in a manner to make its operations more sustainable and circular, thus reducing its negative externalities on the environment, climate, and natural resources and avoiding doing significant harm to any stakeholder groups.

Transparency

The data network is based on co-operation and respect for information sources. Transparency is important to develop trust. The data shall be processed lawfully, fairly and in a transparent manner. Any information addressed to the public or to individuals must be concise, easily accessible and easy to understand, and clear and plain language and, additionally, where appropriate, visualisation is used. This does not mean that information is open to everybody without restriction. Instead, it means that all the members in the data network should know (when/if possible), what data are offered in the data network and by what requirements to promote transparency of network. To support real-time economy, the members of the data network do not unnecessarily detain data but share them as soon as possible.

The use of unnecessary legal jargon should be avoided. If an individual is asked to give a consent or to accept an agreement, it must be presented in a manner which is clearly distinguishable from the other matters, in an intelligible and easily accessible form, and using clear and plain language. Additionally, honest information should be provided to individuals for understanding what data regarding them is being collected and how it is being processed.

Continuous improving

Ethical issues vary and different issues may come up case by case. Thus, ethical evaluation should be a continuous process in organisation and there should be institutional support for this. Therefore, the management of a network member should support the organization's employees by ensuring that they have real opportunities to uphold, promote, and respect the principles of the Code of Conduct. Ethics is implemented in daily actions of individuals or it is not implemented at all, as only individual can make the moral decision. However, without institutional support for ethical decisions there is a higher risk of unethicality as individuals lack the needed autonomy for being able to make moral decisions. The steering group has a mandate to follow up and develop the ethical model of the Traffic data ecosystem. The ethical maturity model will be in a development.

Support for individuals

All the members of the data network should support individuals in (a) getting information about use of their personal information, (b) understanding information, practices, contracts, and their consequences, and (c) participating, contributing, and influencing in systems and practices when using personal information of those individuals. The aim is to ensure that if individuals need information or have justified demands for Information, they are given needed support (Guidelines, personal help etc.) in transparent ways. The focus should be in creating low-barrier way to look overuse of personal information for those individuals from whom it is directly collected or other way received. However, the Traffic data ecosystem encourages individuals strongly to support adding value by using data responsibly.

Communication

Appropriate communication is fundamental throughout the data network's life circle. It is essential for individuals, organizations, and the society as a whole. Each of them needs in addition to different contents and timing, also apposite communication channels and manners. A dialogue is a key way to build up trust in the network. The above-mentioned ethical principles are put into practice with communication. Furthermore, communication is the way to demonstrate the organization´s commitment to them. The management has a special responsibility to articulate, apply, and support the organization's culture and processes that reflect the principles of this Code of Conduct.

Ethical maturity model

The maturity model presented in next page is tool that is developed to helps organisation to evaluate its ethical maturity. However, it is developed such way that it would help the practitioners to have deeper view of situation in own organisation. Likewise, it provides conceptual and analytical tool that can be used to clarify the question “what should we do” by emphasising issues that needs not only to deal with but give deeper focus and considerations. Hence, the maturity model should not be seen as mere list of checkbox items, that is filled and forgotten. At best maturity model can serve as ground for discussion about organisational culture and values by providing different themes that help to start to critical self-investigation in personal and organisational levels.

Table 1. Ethical maturity model

	Security	Commitment to ethical practices	Transparency and communication	Sustainability	Human-centricity	Fair Networking	Purpose

Level 0	"I believe that this is very secure"	"We prefer not to commit, we are free"	"Just trust us"	"Let it burn"	"What this has to do with the people?"	"Anarchy"	"We do what we want to do"
Level 1	There are proper Antivirus, Firewall and other needed security tools in use and they are properly updated.	Organisation follows regulations and the best practices of its own field.	Organisation follows the regulations and uses truthful communication.	Organisation has documented sustainability plan/program.	The individuals are recognised as stakeholder and their rights are taken account.	Organisation aligns it rules and regulations to best practices of industry	Organization has stated reasons for data collection and usage
Level 2	There is a dedicated person to keep up with information security.	Organisation has implemented and is committed to following ethical code(s) or other codes of conduct.	Organisation supports open internal communication and responsible information sharing.	There is an evaluation model for sustainability with clear indicators.	The organisation collects information of the needs of individuals to improve people-centricity.	Organization defines and documents practices and provides the needed information for network partners	Organization has transparent rules how data can be used in the future
Level 3	There are clearly documented procedures for the preparation of security threats.	There are clear well documented procedures for actions to be taken when ethical issues occur.	There is a transparent, documented plan for internal and external communication	Organisation impact on the environment is neutral or positive.	Individuals have low-level ways to communicate with the organisation and their opinions are systematically noted.	Organisation supports and encourages a fair data sharing in ecosystems.	The organisation negotiates with information sources to gain mutual understanding of fair information use
Level 4	The whole organisation has internalised the importance of security and it is constantly monitored and developed through the organization.	Organisational policies and procedures are developed critically from ethical perspective together with all relevant stakeholders.	Organisation and its representatives openly communicates its procedures and policies.	Organisation is actively advancing the sustainability of its business field.	Organisation will actively involve all relevant stakeholders in decision making.	Organisation actively seeks to ways to advance possibilities of whole ecosystems.	Organisation has clear, public, documented goals and procedure of information use

Further Material on Ethics

ACM code of ethics is ethical code that gives insights for computing professionals and managers to ethical issues that should be taken account in practice.

https://www.acm.org/binaries/content/assets/about/acm-code-of-ethics-booklet.pdf

Ethics Guidelines for Trustworthy Artificial Intelligence by High-Level Expert Group on AI set up by the European Commission.

https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai

Data ethics canvas provided by ODI (Open Data Institute) that focuses on helping identify and manage ethical issues of using data.

https://theodi.org/wp-content/uploads/2019/07/ODI-Data-Ethics-Canvas-2019-05.pdf

The ethics of Big Data: Balancing economic benefits and ethical questions of Big Data in the EU policy context

https://www.eesc.europa.eu/sites/default/files/resources/docs/qe-04-17-306-en-n.pdf

Traffic Data Ecosystem - Accession Agreement

Accession Agreement

ACCEDING PARTY

(2) [Acceding Party][12]

APPENDICES

Appendix	Description
1	Constitutive Agreement
1.1	Description of the Traffic Data Ecosystem
1.2	General Terms and Conditions
1.3	Code of Conduct

BACKGROUND

The Acceding Party has expressed its interest to accede to the Constitutive Agreement regarding Traffic Data Ecosystem that was signed on [●].[13]

DEFINITIONS

As used in this Agreement, including the preamble and the Appendices hereof, unless expressly otherwise stated or evident in the context, the following terms and expressions have the following meanings, the singular (where appropriate) includes the plural and vice versa, and references to Appendices and Sections mean the Appendices and Sections of this Agreement:

"Acceding Party"	means the entity defined under section Acceding Party.
"Accession Agreement"	means this Agreement.
"Constitutive Agreement"	means the Constitutive Agreement regarding Data Network on Traffic Data Ecosystem, dated [●].

[12] **Note:** Please insert the Acceding Party's details herein.

[13] **Note**: Please insert a reference to the Data Network herein.

ACCESSION TO THE CONSTITUTIVE AGREEMENT

The Acceding Party has expressed its interest in acceding to the Constitutive Agreement.

The Acceding Party accedes to the Constitutive Agreement and to the Data Network under this Agreement.

ENTRY INTO FORCE AND APPLICATION

This Agreement will enter into force as of its execution by the Acceding Party and after it has been duly approved by the Data Network's Steering Committee.

APPLICABLE LAWS AND DISPUTE RESOLUTION

This Agreement is governed by and construed in accordance with the laws of Finland, without regard to its principles of private international law and conflict of laws rules.

Any dispute, controversy or claim arising out of or in relation to the agreements based on the General Terms and Conditions, or the breach, termination or validity thereof, shall be finally settled by arbitration in accordance with the Arbitration Rules of the Finland Chamber of Commerce. The number of arbitrators shall be one, the seat of arbitration shall be Helsinki, Finland and the language of the arbitration shall be English.

COUNTERPARTS

This agreement has been executed in two identical counterparts, one for the Acceding Party and one for the Steering Committee.

In _____, on _____ 20

[Signatures on the next page]

	[PARTY 1]		**[PARTY 2]**
	_____		_____
Name:	**[Name]**	**Name:**	**[Name]**
Title:	**[Title]**	**Title:**	**[Title]**

	[PARTY 1]		**[PARTY 2]**
	_____		_____
Name:	**[Name]**	**Name:**	**[Name]**
Title:	**[Title]**	**Title:**	**[Title]**

Version control:

Version	Date	Authors	Comments
0.1	7.10.2021	Lautanala, Kallio, Majala, Venäläinen, Lausvaara	Initial draft
0.2	12.12.2021	Lautanala	Minor mods

Purpose for Data and Service Description

In order to allow potential data and service users to successfully and cost-efficiently discover the relevant data, it is necessary to properly describe the content and structure of this data using appropriate Metadata. There is a need to harmonise Metadata descriptions and structures for the following
reasons:

- to help to make data and services available and searchable for pan-European service providers,
- to ensure Metadata to be machine-readable in a later stage, and
- to ensure a common understanding of the listed data content and services.

This document describes the most important Metadata elements, a technical description of the Metadata elements.
The objectives of this paper are:
• Definition of data elements which are necessary to describe a dataset/service in a minimal
but adequately way
• Definition of wordings and semantics
• Definition of predefined categorisations
• Definition of data field name
• Definition of data value type
• Recommendations of data field length
The definition of data elements, wordings and predefined categorisations form the core element for data exchange and interoperability. For a technical information exchange and later database operations technical parts like value type and length need to be harmonised.

Definitions

Certain terms and definitions need to be specified to achieve a common understanding. This figure is used for an easy understanding and the common idea of the metadata that describes both, the content of data and the publication i.e. the way data is accessible (Source: EU EIP Metadata Catalogue):

EU EIP_Coord. Metadata Catalogue_Annex I_v2.0_191115.xlsx

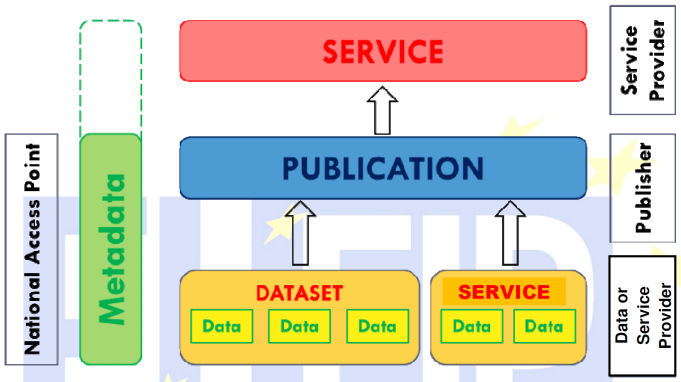


Figure 1: Concept of data provision and the relevance of Metadata

Dataset: A data set contains the data which are provided by the data owner.
A Publisher is the entity (company, authority or person) who publishes a dataset ("publication"). He holds up the data access and defines data routines.
Service: A combination of data and application logic provided (either a publication or a end user).

Metadata descriptions - Dataset

The following table shows an overview of the Metadata elements, as defined in this document. The most-right column shows an example, how the Metadata elements could be filled for a specific data set.

Area	Element name	Element type	Mandatory	Example
Metadata info	Metadata date	Date	Yes, automatic	4.10.2021
	Metadata language	Predefined (en/se/fi)	Yes, automatic	en
Content info	Dataset name	Free text	Yes	Finnish traffic cameras
	Dataset description	Free text	Yes	Pictures of public Fintraffic owned traffic cameras

	Data provider	Free text	Yes	Fintraffic
	Data contact	Free text	Yes	Mika.Ahvenainen@fintraffic.fi
	Resource type	Predefined	no	Pictures, JPEG
	Dataset category	Predefined	no	Road/Safety/Cameras
	Keywords	Free text list	No	Cameras, Finland, Traffic
	Data use cases and value	Free text	no	Check status of Finnish main roads
	Data coverage	Free text	no	Finland main roads
	Data origin	Free text	No	Fintraffic cameras
	Data size	Free text	No	1.5MB / picture
	Contains PID	Yes/no	No	No
Access info	Data encoding	Predefined / Free text	No	JPEG
	Data format	Predefined / Free text	Yes	JSON
	Access URL / Location:	Free text	Yes	https://tie.digitraffic.fi/api/v1/data/camera-data
Quality info	Update frequency	Predefined	Yes	Every 10 mins
	Quality description	free text	no	680 x 380 pixels, XYZ Certified data
	Service levels	Predefined / free text	No	Best effort

Rights	Rights to use	Predefined / free text	Yes	CC4.0
	Resctrictions for use	Predefined / free text	no	Please see digitraffic.fi
	Fees and payment terms	Predefined / free text	no	Free
	Authentication / Authorization	Yes/no	no	No authentication required
Additional info	Additional info	Free text	No	Fintraffic providess also other datasets. Please see provider URL for more info.
	Data provider URL:	URL	No	www.digitraffic.fi

Metadata descriptions - Service

Area	Element name	Element type	Mandatory	Example
Metadata info	Metadata date	Date	Yes, automatic	6.10.2021
	Metadata language	Predefined	Yes, automatic	en
Content info	Service name	Free text	Yes	Liikennetilanne
	Service description	Free text	Yes	Liikennetilanne provides info about Finnish traffic situation. For more info https://liikennetilanne.fintraffic.fi/palvelukuvaus
	Service provider	Free text	Yes	Fintraffic
	Service contact	Free text	Yes	mika.ahvenainen@fintraffic.fi

	Service type	Predefined	no	Web site
	Service category	Predefined	no	Situational awareness
	Keywords	Free text list	No	Finland, traffic, situational awareness
	Service use cases and value	Free text	no	Check traffic in Finland
	Service coverage	Free text	no	Finland main roads.
	Data origin	Free text	No	Digitraffic.fi
	Data size	Free text	No	
	Reused components and data	Free text	No	Digitraffic data, latausasemat.fi data
Access info	Security and authentication	Free text	Yes	Free access
	Access URL	Free text	Yes	liikennetilanne.digitraffic.fi
Quality info	Update frequency	Predefined / Free text	Yes	Real time
	Quality description	free text	no	High quality data
	Service levels	free text	No	Best effort
Rights	Rights to use	free text	Yes	Free access
	Resctrictions for use	free text	no	None
	Fees and payment terms	free text	no	Free service

Additional info	Additional info	Free text	No	mika.ahvenainen@fintraffic.fi

Traffic Data Ecosystem – Dataset Terms of Use [TEMPLATE]

Dataset Terms of Use [Template]

DATA PROVIDER

_____ acts as the Data Provider.

SCHEDULES

Schedule	Description
1	Dataset Description [no. 1][14]
2	

BACKGROUND

The purpose of this Dataset Terms of Use is to define, the Data that the Data Provider makes available through the Network and to set out the terms and conditions for the use of such Data.

DEFINITIONS

As used in this Dataset Terms of Use, including the Schedules hereof, unless expressly otherwise stated or evident in the context, the following terms and expressions have the following meanings, the singular (where appropriate) includes the plural and vice versa, and references to Schedules and Sections mean the Schedules and Sections of this Dataset Terms of Use:

"Data Provider"	means the entity defined under section "Data Provider" above.
"User"	means any End User, Service Provider, Operator or Third Party End User who processes any Data that is made available by the Data Provider under these Dataset Terms of Use. [Otetaan kontrollilistaan kysymys siitä, että miten eri skenaarioissa mm. datan edelleen jakelu ja siihen liittyvät ehdot on määriteltävä]
"[defined term]"[15]	means [definition]

Other terms and expressions have the meanings defined in the General Terms and Conditions.

[14] **Note**: Where the Data Provider provides several Datasets under the Dataset Terms of Use, the Data Provider may prefer to include individual Dataset Descriptions as separate Schedules herein. It should be noted that, where the terms and conditions for different Datasets are different, the Data Provider must define separate Dataset Terms of Use for any such Datasets.

[15] **Note**: Please list herein, where applicable, any definitions introduced in these Dataset Terms of Use.

APPLICABILITY AND SCOPE

These Dataset Terms of Use apply to the Dataset(s) provided by the Data Provider under the Constitutive Agreement [dated [●] [●] 202[●] / as acceded by the Data Provider under the Accession Agreement dated [●] [●] 202[●]][16] and as further defined in **Schedule 1**.

By using any such Data, the User undertakes to use the Data in compliance with these Dataset Terms of Use.

In the event that a discrepancy arises between the Constitutive Agreement or any of its appendices and these Dataset Terms of Use, these Dataset Terms of Use and its Schedules will prevail. Furthermore, in the event that a discrepancy arises between these Dataset Terms of Use and any of its Schedules, these Dataset Terms of Use will prevail.

DATA

The Data as well as its location and method of distribution are defined in the Dataset Description(s) (**Schedule 1[- ●]**[17]).

THE DATA PROVIDER HAS THE RIGHT TO PROVIDE THE DATA TO THE USER AS FURTHER DEFINED IN THE CONSTITUTIVE AGREEMENT AND THESE DATASET TERMS OF USE. RIGHT TO USE THE DATA

Subject to these Data Set Terms of Use, the Data Provider hereby grants the User a non-exclusive right to the Data to[18]

Forms of use:

(1) receive, process and reproduce[19];

(2) refine and modify to generate Derived Material;

(3) [*Forms of redistribution:*

(4) redistribute the Data to the other Parties; and

(5) redistribute[20] the Data to Third Party End Users [provided that the Service Provider includes in its agreement with any Third Party End User the terms and conditions of this Dataset Terms of Use / clauses […][21] of this Dataset Terms of Use]]

[16] **Note:** Please edit based on the date on which the Data Provider has become a party to the Constitutive Agreement.

[17] **Note**: Where applicable, please add references to additional Schedules.

[18] **Note**: The list hereinafter provides an example of the matters to be included in this clause with regard to the right to use the Data. The Data Provider and/or the Members of the Network may want to consider preparing a more specific Network specific template(s) for the Dataset Terms of Use to reflect the business context of the Network.

[19] **Note**: Please note that Derived Materials can be distributed to Third Parties without restrictions. Thus, it is important that the Data Provider considers on a case-by-case basis whether

[20] **Note**: Please note that, in accordance with the General Terms and Conditions (clause 4), Data can be redistributed to Third Party End Users only if permitted under the applicable Dataset Terms of Use. As such, please remove the redistribution right where it does not apply to a specific Dataset(s).

[21] **Note**: Alternatively, the Members or the Data Provider may want to prepare a separate Schedule, including any terms and conditions that must be included in any redistribution agreements.

in [Finland/the European Union and the European Economic Area/globally].

The User is entitled to utilise software robots or other forms and applications of robotic process automation or machine learning or artificial intelligence when processing Data provided that the applicable confidentiality obligations are respected. In accordance with the aforementioned, the User has the right to learn from the Data and to use any professional skills and experience acquired when processing the Data.

RESTRICTIONS ON THE USE AND REDISTRIBUTION OF DATA

The Data may not be processed for [●].[22]

[The Data may not be redistributed to [Affiliates] or [●]].

DERIVED MATERIAL

The following shall not be considered as Derived Material and the rules relating to the use of Data continue to apply in case:

[(i) the Data can be readily converted, reverted or implied from the Derived Material to recreate the Data;
(ii) the Derived Material can be used as a substitute for the Data;
(iii) individual Data Providers of the Data can be identified from the Derived Material;
(iv) the Derived Material contains any Data Provider's Confidential Information; or
(v) ...]

[For the avoidance of doubt, in case a Dataset is modified only in minor ways and used for substituting the original Dataset, it shall not be regarded as Derived Material and remains under the restrictions set out above for the Data.]

[RESTRICTIONS ON THE USE AND REDISTRIBUTION OF DERIVED MATERIAL]

Derived Material may not be used for [●]]

[Derived Material may not be redistributed to [●]].

FEES AND PAYMENT TERMS

The use of Data is subject to fees and charges, as further defined in **Schedule 1**.[23]

REPORTING

The use of Data is subject to the following specific reporting obligations: [●].[24]

[22] **Note**: Please describe herein any specific restrictions that apply to the Dataset(s).

[23] **Note**: Where applicable, any fees or charges related to the Data should be defined and referred to herein as the default option under clause 6.1 of the General Terms and Conditions is that the Data is provided free of charge.

[24] **Note**: Please describe herein, where applicable, any specific reporting obligations that apply to the use of the Dataset(s).

AUDIT

The use of Data is subject to the following specific audit obligations: [●].[25]

DATA SECURITY

The use of Data is subject to the following specific data security obligation: [●].[26]

CONFIDENTIAL INFORMATION

The Parties acknowledge that the Dataset, as defined in **Schedule [1]**, includes Confidential Information and that its use and processing is subject to: [●].[27]

DATA PROTECTION

The Data includes personal data, and its reception and processing is subject to the following: [●].[28]

INTELLECTUAL PROPERTY RIGHTS

[●][29]

DISCLAIMER AND LIMITATION OF LIABILITY

[**Example**: Unless otherwise expressed in these Terms, the Data Provider offers the data "as is" and "as available" with no warranty of any kind. The risk inherent in the suitability of the data for the User's purposes remains solely with the User. Notwithstanding the above, this does not limit the Data Provider's liability under clauses 11.3–11.4 of the General Terms and Conditions [and clause(s) of the Constitutive Agreement]].[30]

EFFECTS OF TERMINATION

[ADDITIONAL TERMS, IF ANY] ENTRY INTO FORCE AND APPLICATION

This right to use the Data will enter into force when the User accesses the Data and apply until the User stops processing the Data.

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[25] **Note**: Please describe herein, where applicable, any specific conditions for audits (see clause 13 of the General Terms and Conditions and the Constitutive Agreement).

[26] **Note**: Please describe herein, where applicable, any specific data security requirements for the Dataset(s) (see clause 5 of the General Terms and Conditions and the Constitutive Agreement).

[27] **Note**: Where the Dataset(s) include Confidential Information, the Data Provider should detail herein any specific requirements it deems necessary in order to make the Data available within the Network.

[28] **Note**: Clause 9 (see below) of the General Terms and Conditions defines the default terms and conditions that apply to data protection. In the event that the Data includes personal data, the Data Provider must consider defining herein the terms and conditions for the transfer and processing of personal data in further detail. In addition, further consideration is required where the Data includes personal data (or anonymised personal data), which would be redistributed to Third Party End Users.

[29] **Note**: Where the Data Provider considers it necessary to derogate from the default approach for Intellectual Property Rights (clause 8 of the General Terms and Conditions), Dataset specific derogations should be described herein. However, to manage the Intellectual Property Rights effectively, the Members should consider whether it would be feasible to define the default approach to Intellectual Property Rights for the Network by establishing a standard template for Dataset Terms of Use that apply to the specific Network.

[30] **Note**: Clause 11 of the General Terms and Conditions sets out provisions that apply to the limitation of liability. Any Dataset specific derogations regarding liability should be defined herein. Please note, where applicable, that the Members may have derogated from the liability clauses of the General Terms and Conditions, in which case such liability clauses should be referred to herein for clarity.

REFRAINING FROM SHARING DATA AND AMENDMENTS

The Data Provider may refrain from sharing Data within the Network and change these terms and conditions (including but nor limited to the content or quality of the Dataset) at any time by notifying all other Members to the Network of such change in writing. The provision of Data will end or the modified terms will enter into force within ninety (90) days after the Data Provider has notified the other Members of the refraining of sharing or amendments made to these terms and conditions, but the amendments will not apply to any Data received by the Users prior to the entry into force of the amendments.

OTHER TERMS

[●][31]

[APPLICABLE LAWS AND DISPUTE RESOLUTION[32]

These Dataset Terms of Use are governed by and construed in accordance with the laws of Finland, without regard to its principles of private international law and conflict of laws rules.

Any dispute, controversy or claim arising out of or in relation to the Data shared under these Dataset Terms of Use, or the breach, termination or validity thereof, shall be finally settled by arbitration in accordance with the Arbitration Rules of the Finland Chamber of Commerce. The number of arbitrators shall be one, the seat of arbitration shall be Helsinki, Finland and the language of the arbitration shall be English.]

[31] **Note**: The Data Provider (and the Members of the Network) should consider, on a case-by-case basis, whether any other terms regarding the use of Data are considered necessary.

[32] **Note**: Please note that this clause is potentially relevant only where the Data can be redistributed to Third Party End Users as one of the conditions, which should be included in the agreement governing the redistribution of the Data to Third Party End Users.

APPENDIX:

Metadata description - Dataset

The following table shows an overview of the Metadata elements, as defined in this document. The most-right column shows an example, how the Metadata elements could be filled for a specific data set.

Area	Element name	Element type	Mandatory	Example
Metadata info	Metadata date	Date	Yes, automatic	4.10.2021
	Metadata language	Predefined (en/se/fi)	Yes, automatic	en
Content info	Dataset name	Free text	Yes	Finnish traffic cameras
	Dataset description	Free text	Yes	Pictures of public Fintraffic owned traffic cameras
	Data provider	Free text	Yes	Fintraffic
	Data contact	Free text	Yes	Mika.Ahvenainen@fintraffic.fi
	Resource type	Predefined	no	Pictures, JPEG
	Dataset category	Predefined	no	Road/Safety/Cameras
	Keywords	Free text list	No	Cameras, Finland, Traffic
	Data use cases and value	Free text	no	Check status of Finnish main roads
	Data coverage	Free text	no	Finland main roads
	Data origin	Free text	No	Fintraffic cameras
	Data size	Free text	No	1.5MB / picture
	Contains PID	Yes/no	No	No
Access info	Data encoding	Predefined / Free text	No	JPEG
	Data format	Predefined / Free text	Yes	JSON
	Access URL / Location:	Free text	Yes	https://tie.digitraffic.fi/api/v1/data/camera-data
Quality info	Update frequency	Predefined	Yes	Every 10 mins
	Quality description	free text	no	680 x 380 pixels, XYZ Certified data
	Service levels	Predefined / free text	No	Best effort

Rights	Rights to use	Predefined / free text	Yes	CC4.0
	Resctrictions for use	Predefined / free text	no	Please see digitraffic.fi
	Fees and payment terms	Predefined / free text	no	Free
	Authentication / Authorization	Yes/no	no	No authentication required
Additional info	Additional info	Free text	No	Fintraffic providess also other datasets. Please see provider URL for more info.
	Data provider URL:	URL	No	www.digitraffic.fi