NordicWay
Cellular C-ITS Corridor

Interoperability Achievements

Jonas Sundberg
NordicWay Task leader, Sweco

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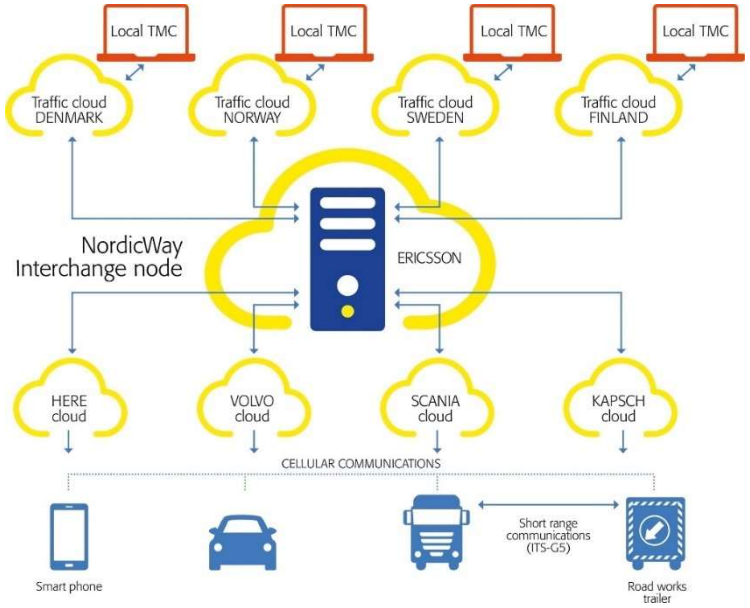

Session layout

- Introduction to NordicWay Interoperability Achievements
- Industrial panel

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Understanding interoperability

- **Interoperability** is a characteristic of a product or system to work with other products or systems, at present or future, in either implementation or access, without any restrictions
- **Interoperability** by definition does not take into account in which manner e.g. information is exchanged. As long as the systems can work together and the interfaces are understood, interoperability can be achieved
- **Interoperability** is a prerequisite for service quality
- **Interoperability** per se is without value. Interoperability becomes valuable when used in operation

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C-ITS service quality requirements

- **Timeliness**, which is the capacity of the system to detect and validate situations with a minimum delay
- **Latency**, which is the delay before a transfer of data begins following an instruction for its transfer.
- **Location accuracy**, which is the degree to which the stated location conforms with the correct location.
- **Error rate**, which is the probability that the stated information is not correct
- **Event coverage**, which is the probability that an event is reported through the service

	Level of Quality Parameters						
	Timeliness (95%)		Latency (contents) (95%)	Location accuracy (95%)		Error Rate	Event Coverage
	Start	Update/end		Area	Road		
All SRTI events/conditions, except wrong way driver							
* (Basic)	Best effort	Best effort	< 10 min	Admin. Regions	Link between intersections	<15%	Best effort
** (Enhanced)	Validation after first detection < 10 min	Best effort	< 5 min	Admin. Regions	Link between intersections	<10%	>90% of all validated events
*** (Advanced)	Detection & Validation < 5 min after event occurrence	Detection & Validation < 10 min after event occurrence	< 3 min	Geographic area; 10 km accuracy	< 5 km	<10%	>80% of all occurring events

Source: NordicWay – EU EIP

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What is needed for interoperable C-ITS?

Hardware, software, organization, trust, ….

- Number, distribution and quality of sensors
- Road network communication coverage
- Harmonized information (georeference, messages…)
- Harmonized interfaces (protocols)
- Security and trust
- An architecture and an ecosystem supporting
- All in operation!

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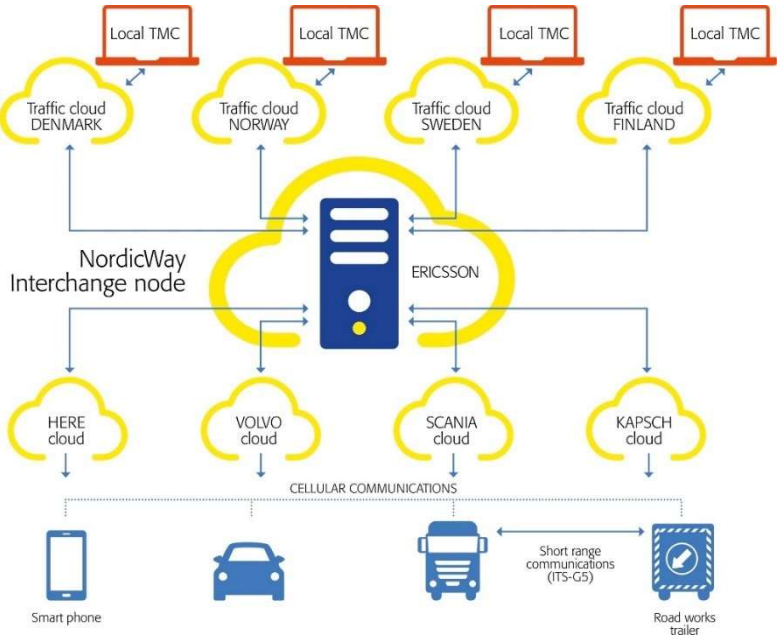
Key achievement 1 – The architecture

- NordicWay architecture designed to:
  - Fit with North European road transport system
  - Be border agnostic
  - Be relation agnostic
  - Accomodate hybrid C-ITS communication
  - Build on standards
  - Make use of existing structures to shorten time to full C-ITS implementation
  - Be scalable to European level
  - Support further development



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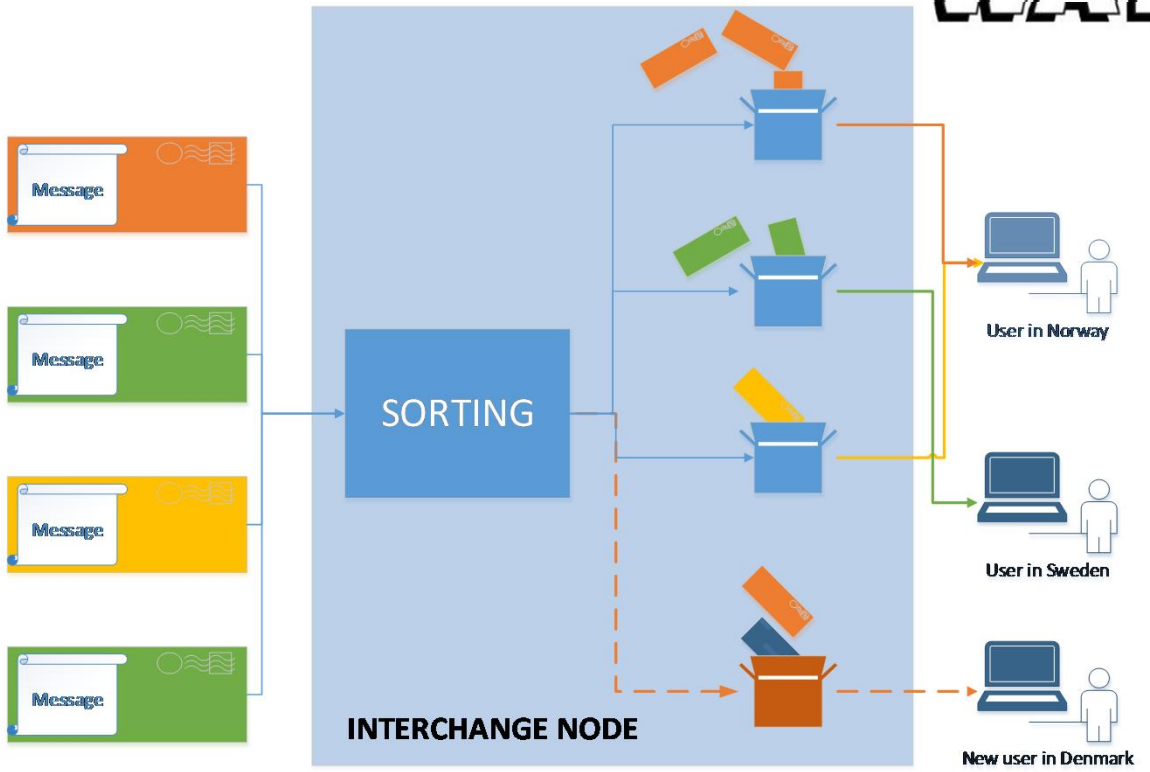
Interchange simply explained

- Interchange node receives all types of messages and information from different sources
- Users subscribe to requested information
- Interchange node provides the requested information to the users
- The information is instantly available for the users
- It is easy and straightforward to connect to the interchange node



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Key achievement 2 – The ”standards”

- Messages: DATEX 2 used for all messages routed
- Messages: DENM profile and message specification adopted to Cellular Communication (for hybrid use)
- The NordicWay Interchange Node (delivering C-ITS Day 1 SRTI messages) using already existing standards AMQP 1.0 (queueing protocol), TLS (security) and DATEX 2 (messages).
- Geo-referencing, we need to pick one method

- Key learning: Standards are not enough. Much effort needed on profiling within standard (in particular DATEX 2)

AMQP = Advanced Message Queuing Protocol

TLS = Transport Layer Security

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Key achievement 3 – Ecosystem enabler

Ecosystem requirements and ambitions:

- Very different organizations (authorities, service providers, vehicle OEM´s, comm providers,…) can participate within the same ecosystem
- Very different driving forces behind these organizations (road safety, profit from services, profit from vehicles, …)
- The solution allows for all kinds of relations between organizations involved, each relation with its own business agreement
- All roles within the organization can be subject to competition (authority exceptions?)
- The ecosystem should be inclusive – easy to join and select your preferences – and stimulate business
- This requires an architecture that is “relation agnostic”
- The ecosystem supports short time to deployment (open for aftermarket solutions, easy to join, …)
- The ecosystem should support further innovation (beyond Day 1,5 services)

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Key achievement 4 - Maturity

- C-ITS is happening today. Digitalization is a major driver in industrial development and in citizens life. SRTI is today subject to disruptive development
- If “road transport”, and in particular responsible authorities, want to retain its position, it cannot wait for development to be made
- A key achievement of NordicWay is to build and demonstrate a fully interoperable C-ITS ecosystem based on mature technologies and available standards
- Already existing services, devices and users can be connected to the C-ITS clouds which makes it possible to scale up C-ITS services faster

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Key achievement 5 - Scalability

- Scalability is a design requirement for NordicWay, reflected in the architecture
- The next step is to work further on the architecture, as a single Interchange Node may not fulfill the requirements of all stakeholders, and a more federated architecture consisting of multiple Interchange Nodes can be required
- NordicWay results are open!

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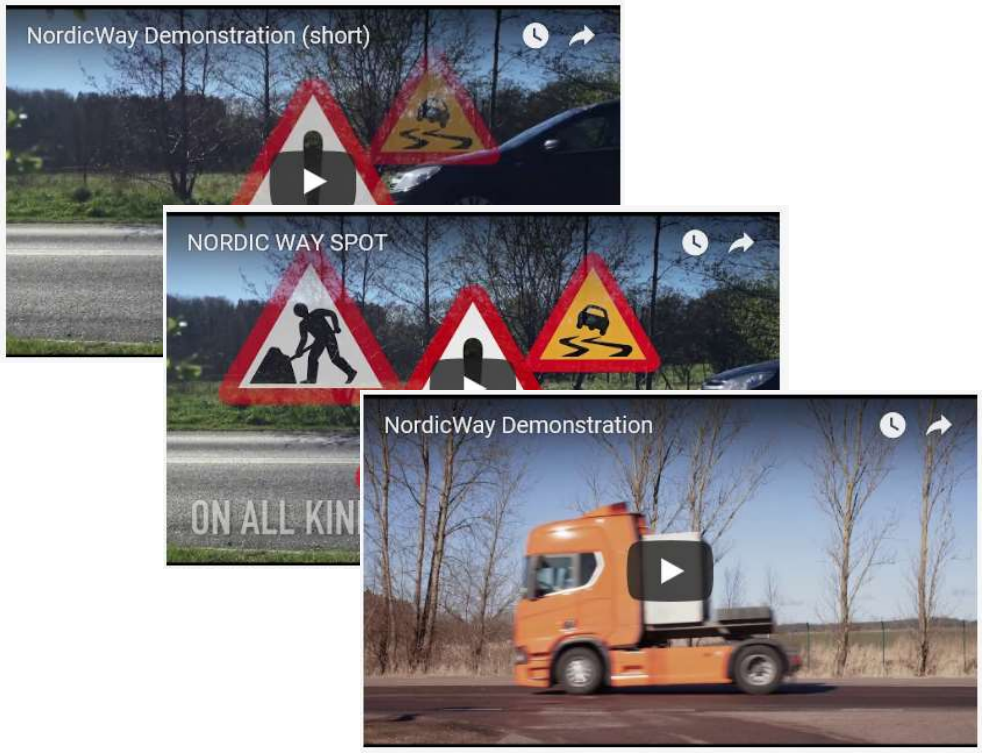
Key achievement 6 - Demonstrations

- Considerable efforts made on demonstrations involving all project participants
- 10 May 2017 demonstration live streamed across Europe
- Supported by demonstration in Denmark/Copenhagen
- Slippery road demonstration in Gothenburg
- All recorded and developed into information, notably videos



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Panel session:

Industry view on cross border C-ITS interoperability

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Panel participants

Stina Carlsson, Volvo Car

Ulrik Janusson, Kapsch TrafficCom

Andreas Höglund, Scania

Anders Fagerholt, Ericsson

Mika Rytkönen, HERE

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Session layout

- Each panelist will shortly introduce him/herself and the organization represented
- Each panelist will open with a statement on NordicWay achievements and the expected role of the organization represented in a future C-ITS ecosystem
- And we will then tur over to a discussion
- Input and questions from the audience are welcome!

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Let´s go.

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