Statens vegvesen
Norwegian Public Roads Administration

Implementing traffic light assistance in Trondheim

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Experience with C-ITS

To gain experience with C-ITS the Norwegian Public Roads Administration are sharing traffic light signals.

The project consists of two parts

- Facilitation of data signaling
  - Our responsibility, important to gain experience with the installation and operation
- Use of data from signaling
  - Managed by the market, important to acquire safe solutions

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Traffic light signals into the vehicle

- Through sharing the traffic signal status and planned shift, a vehicle knowns if it must stop or can pass freely at a selected speed.
- Information sharing in the installation in our implementations is based on **cellular communication** between the vehicle and a back-end solution
- We have established an solution open for utilization from February 2016 in Trondheim (48 intersections) and are planning a new installation in March 2017 in Oslo (20 intersections).

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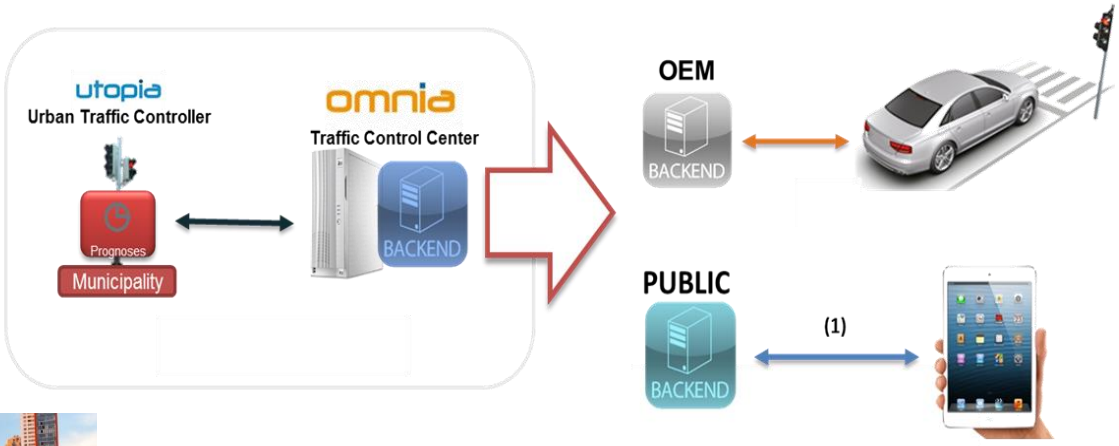
Information sharing

- Messages according to latest CEN/ISO TS 19091 standard
- We share information with both individual vehicle (apps) and car manufacturers (backend to backend)
- Big difference to serve 19 car manufacturers and potentially up to 100,000 users



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Challenges with controllers

We are using 4 different types of control unit (EC1, ELC, ITC-2 and ITC Linux)

- 20 units are 2-6 years old
- 8 units are 14 years old
- 20 units are 20 years old
- All must be connected in a network
- The first task is to get clocks coordinated
  Common problem with controllers

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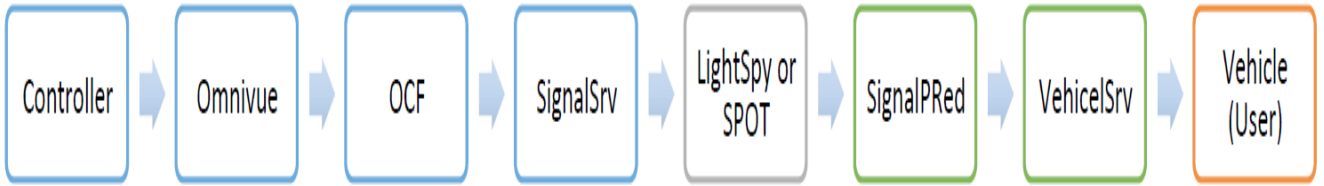
Managing the information – delay

- There are several subsystems (up to 9) in the value chain, so delay one of key indicator to assess the service. The value chain is distributed geographically in different places.
- Maximum delay of 550 milliseconds to send an SPAT message from local autonomous signal intersections.
- SPOT/UTOPIA intersections has a shorter value chain with a delay of 350/400 milliseconds.



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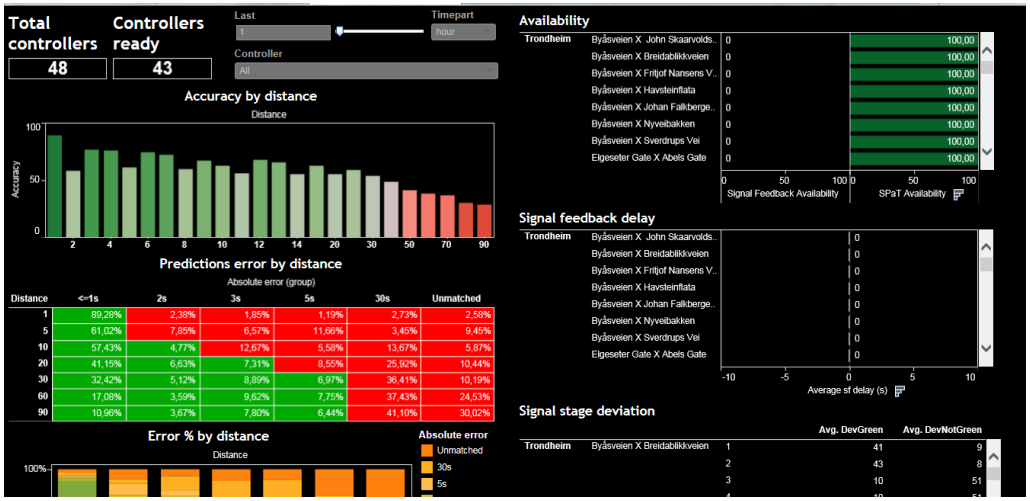
Managing the information – surveillance

- Our monitoring tool evaluates uptime and how successful the prognosis are
- Huge difference between fixed timings, adaptive signaling and local traffic actuation
- Preliminary conclusion – information for predicted change is not valuable everywhere.



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Utilization of traffic light assistance

Traffic signal into the vehicle

- NPRA cooperate with Volvo to show recommended speed and countdown to green signal (figures on the right)
- Speed recommendation shall take into account the time to signal changes, distance to the stop line, use of turn signals, speed of cars in front etc.
- The goal is that the car should react to information and adjust it's speed or stop on its own – and not leave this to the driver.

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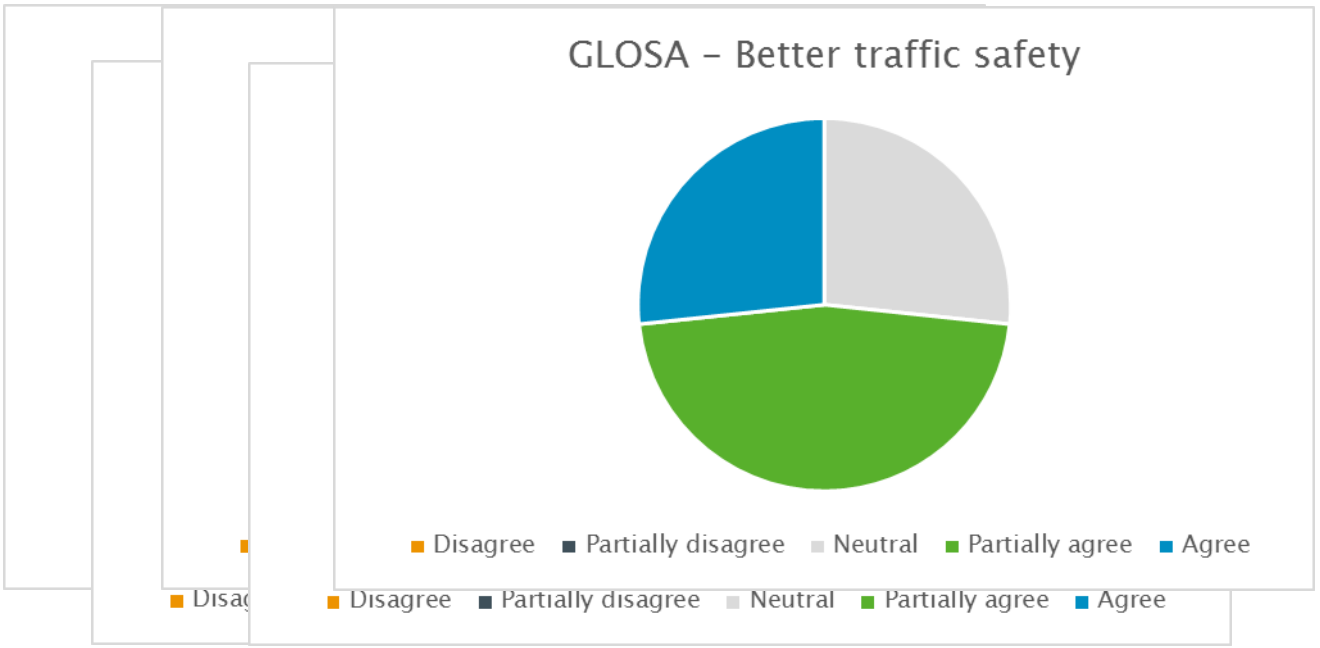
Utilization of traffic light assistance

Test driving the summer of 2016

- Super easy research based on 15 test drivers



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Video from Trondheim

Research challenges

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- We need to clarify and evaluate
  - Possible travel time and security changes?
  - Environmental improvements?
  - Which interface will work and how it affects the driver?
- How can a public authority contribute to ensure these effects?
- Technical developments like autonomous vehicles
  - Challenges with combination of normal drivers and autonomous vehicles


Thanks for the attention!
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