Finnish Road Weather Maintenance Ecosystem - Innovation capability

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FIRWE – Finnish Road Weather Maintenance

- Potential for significant benefits for road operators, maintenance decision makers, road authorities and road users
  - better awareness and more proactive measures
  - reduced operational maintenance costs and lighter environmental footprint
  - improvements in traffic safety and traffic management

- Team: Vaisala, Arctic Machine, Foreca, Teconer and VTT in cooperation with other Finnish public & private sector actors
Value build-up

Examples:
- Road user information
- Warning services
- Asset management

Example Technologies:
- RWIS
- DSS
- Expert systems

Examples:
- Sensors
- Optics
- ICT
- Algorithms

Supply ≠ Demand
"Cash value" ≠ Societal benefits

Value curve

Safety

Accessibility

Reliability

Road weather stations, 614 units, 370 sites

Floating car data, traffic conditions

Optical stations, 154 units

Data collection

"Digitraffic"

Traffic monitoring, Stations, 450 units and services

Speed limit calculation

Data storage

Automated traffic control

Winter maintenance

Public and private traffic services

Online services

Traffic Control Centre

Variable message signs, 400 km, 1500 signs

Road condition cameras, 556 units

Radar and satellite images

Road weather forecasts

Source: Yrjö Pilli-Sihvola

Source: Y. Pilli-Sihvola 2013
...And now...
The current challenges in the road maintenance ecosystem

1. Winter road maintenance equipment
2. GPS and vehicle technology solutions
3. Meteorology and observation devices
4. Observation data
5. Public road weather and condition forecasts
6. Additional road weather information services
7. Emergency and road weather information services
8. Road maintenance services
9. Safe road conditions for winter traffic
10. Weather and winter road condition information
11. Winter mobility information
12. Motor insurance

• Personification and vague roles
• Short-term view
• Public-private procurement
• Network governance

End users / TRAFFIC
- Private
  - Leisure time
  - Commutation
  - Bicycle & pedestrian
- Commercial
  - Heavy traffic
  - Public transport
  - Delivery
- Other professionals
  - Emergency vehicles
  - Authoritative traffic
  - Critical infrastructure maintenance traffic
Boosting Innovations

Value co-creation: \[
\frac{\text{Function 1}}{\text{Resource 1}} + \frac{\text{Function 2}}{\text{Resource 2}} + \frac{\text{Function 3}}{\text{Resource 3}} = \frac{\text{Service}}{\text{Resource 1+2+3}}
\]

Complex product system (fitting roles and responsibilities)

Supply \leftrightarrow Demand \leftrightarrow End-customer

Value build-up

"Winter traffic mobility market"

Road & public authorities

End-customer requirements and engagement

Innovative procurement (pain-gain sharing)
Benefits and achievements (so far…)

- Automatic data collection solutions for maintenance equipment and operations (**Arctic Machine**)
- Advanced (long-term) forecasting methods for weather and driving conditions (**Foreca**)
- Mobile friction measuring solutions (**Teconer**)
- Measurement solutions, road maintenance decision support system and data integration (**Vaisala**)
- Socio-economic impact assessments, value networks, coordination (**VTT**)
Recommendations for the innovation policy

1. Focus on the long-term collaboration:
   a) utilizing public and independent research institutions to spread the publicly beneficial information
   b) testing and piloting as a part of productization and operative activities (road authorities as enablers)
   c) measurement and assessment of the impacts as a natural part of the systematic developments
   d) Win-win – situation (risk-revenue sharing)

2. Innovative project delivery and procurement methods (e.g., project alliancing)

3. Bringing all the views together and combining skills, services, and public interests in manner that delivers maximum benefit-cost ratio

4. The selection of ecosystem stakeholders should be based on competence, capability, and expertise

5. The vital role of the road authorities between the service providers and end-customers

6. Funding agencies should provide funding and support for agile piloting, best-practice monitoring tools and innovative procurement methods
Thank You!

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