EUEIP 4.1 OPTIMUM QUALITY TASK

KEY FINDINGS

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SRTI/RTTI QUALITY - DATA TYPES COVERED

- The work in EUEIP Activity 4.1. and its precedenting activities in EIP+ and EIP is concentrating in the quality of EVENT-BASED traffic information + Travel time info

Safety Related Traffic information
a. Temporary slippery road
b. Animal/people/obstacles/debris on the road
c. Unprotected accident area
d. Short term road works
e. Reduced visibility
f. Wrong-way driver
g. Unmanaged blockage of a road
h. Exceptional weather conditions

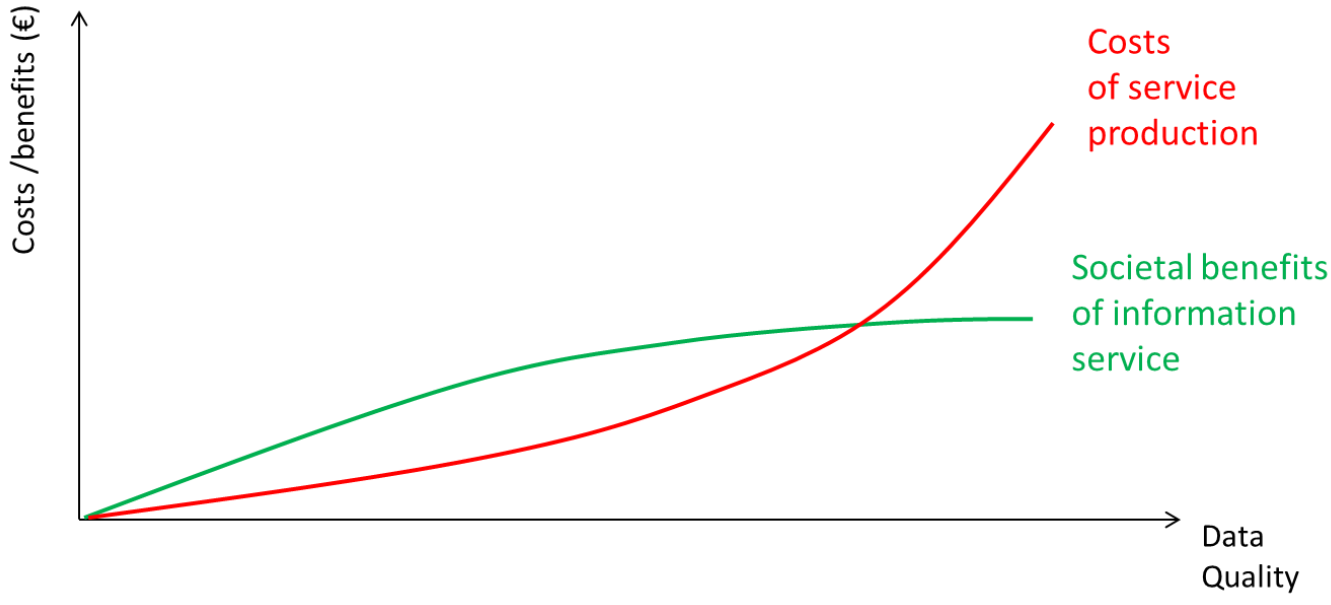
Real-time traffic information /dynamic road status data
(a) road closures
(b) lane closures
(c) bridge closures
(d) overtaking bans on heavy goods vehicles
(e) roadworks
(f) accidents and incidents
(g) dynamic speed limits
(h) direction of travel on reversible lanes
(i) poor road conditions
(j) temporary traffic management measures

SRTI/RTTI QUALITY - THE FRAMEWORK

Example. Validated Quality Requirements for safety-related events (all but wrong way driver)

	* Basic	** Enhanced	*** Advanced	****
Timeliness start	Best effort	95 % of events Acceptance after first detection < 10 min Time between occurrence and first detection: Best effort	95 % of events Detection & acceptance < 5 min after event occurrence	
Timeliness update/end	Best effort	Best effort	95 % of events Detection & acceptance < 10 min after event change/end	
Latency (content side)	80% of events < 10 min	80% of events < 5 min	95% of events < 5 min	
Location accuracy - Area	95% of events administrative region (TCI: n/a)	Geographic area; 95 % of events 10 km accuracy (TCI: n/a)	Geographic area; 95 % of events 5 km accuracy (TCI: n/a)	
Location accuracy - Road	95 % of events correct link between Intersections	95 % of events correct link between Intersections AND distance < 4 km	95 % of events correct link between Intersections AND distance < 2 km	
Classification correctness	> 85%	> 90%	> 95%	
Event coverage	Best effort	Best effort	> 80% of all occurring events	

THEORETICAL FRAMEWORK FOR THE TASK ” WORK TOWARDS OPTIMUM QUALITY OF ITS”



According to Capital Budgeting Theory, there is an economic inflection point, beyond which available quality improvement action no longer yields socio-economical benefits to the same extent that investments costs arise.

RESEARCH QUESTIONS, REVISED

1. to Identify different use cases and significant impact mechanisms in achieving societal benefits of selected information services
2. to Identify the importance of different quality criteria for the realisation of the significant impact mechanisms
3. to recommend a “target quality level” or an ”optimum quality range” for the critical quality criteria using the Validated Quality Package framework
4. to recommend road operators’ actions by which to improve the critical quality elements efficiently, taking into account ongoing technical development
5. to recommend road operators’ role and actions in the service value chain for different service types in order to maximise societal benefits

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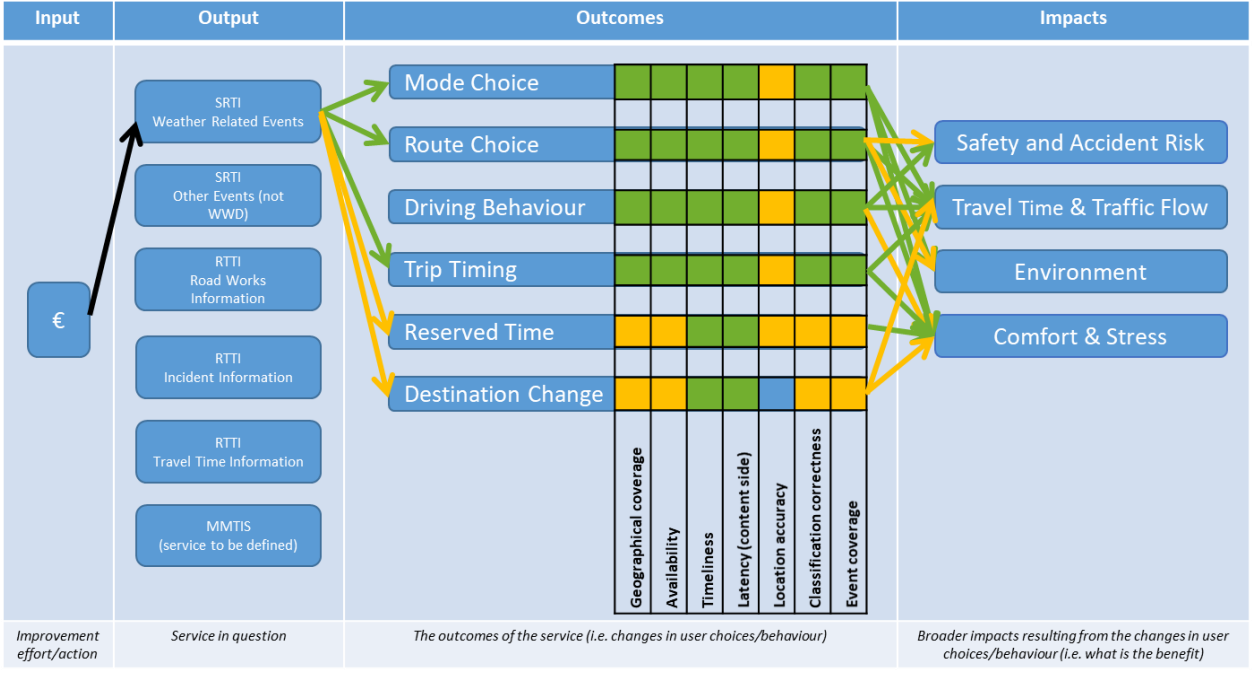
IDENTIFYING IMPACT MECHANISMS AND ADDING THE QUALITY ASPECT



The impact mechanisms and critical quality criteria of weather-related safety warnings (SRTI)

The most significant quality criteria over all analysed information services are (indicative result):

LOS criteria

- **Geographical coverage**

Quality Criteria

- **Timeliness (event-based information) / Reporting period (status information)**
- **Latency**
- **Classification correctness (event-based information) / Error rate (status information)**

PROPOSAL FOR OPTIMUM OR TARGET QUALITY LEVELS* FOR THE SELECTED INFORMATION SERVICES

	RTTI Travel time information
Geographical coverage	Optimum coverage may be **100 %** of the **regularly congested** TEN-T network and network where exists regular travel time fluctuation due to road works and incidents.
Reporting period	**Advanced** (1 min) for the congested or incident-prone OE's. **Enhanced** (5 mins) for less congested OEs.
Timeliness (update)	**Advanced** (95 % of all reports < 2 min)
Latency (content side)	**Advanced** (95 % of all reports < 2 min)
Error Rate	Depending on the OE **Enhanced** (5%/20%) or **Advanced** (5 %/10%)

	SRTI Weather related	SRTI events (other than weather & WWD)	SRTI short term road works warnings
Geographical coverage	**Enhanced** (80%) for the whole main road network and **Advanced** (95%) for TEN-network. **100 %** or roads that have local recurrent weather problems.	**Advanced** (95%) or **100%** of network even though detection infra does not cover the same network.	**Advanced** (95%) However, target should be **100% of all road works** in the responsibility of the road authority.
Timeliness (start)	**Enhanced** (For 95 % of all events: Time between event occurrence and first detection: Best effort Acceptance after first detection < 10 min)		
Latency (content side)	**Advanced** (For 95% of all events < 5 min)	**Advanced** (For 95% of all events < 5 min)	**Enhanced** (For 80% of all events: < 5 min)
Location accuracy	-	**Advanced** (< 5 km)	-
Classification correctness	**Advanced** (> 95%)		

**It should be noted that the proposal only applies for technologies and services that are currently in active and widespread use.*

RECOMMENDATION ON ROAD OPERATORS' ACTIONS TO IMPROVE THE CRITICAL QUALITY ELEMENTS EFFICIENTLY

	Identified methods
Geographical coverage	• Instrumentation of the road network (cameras and other sensors) • Human resources (road inspectors) and their location optimization
Timeliness (start)	• System integration (specifically with Emergency Response Centres) • Process optimization and development of automatic incident detection (e.g. Charm in the Netherlands, smart cameras) • Instrumentation and human resources for monitoring in the Traffic Management Centres • Mobile human resources (Road inspectors) • Development of weather-related event prediction models
Latency (content side)	• System integration and automatization (e.g. pre-filled event information template) • Use of vehicle data integrated to other data sources • Measure and display latency towards operators and set a quality target
Location accuracy	• Physical road markers every 100 m to improve accuracy of the first detection (usually manual call to 112 or similar service) • Use of smart cameras and data analytics to detect/verify the exact location of an event
Classification correctness	• Human resources continuous training

Identified actions related to event-based information

- **In the recent years** actions have been based mostly on non-scalable actions (road instrumentation, human resources), as well as system integration
- **Currently and in the next two years** mobile technologies are lowering the unit costs (€/km) and automatization and data fusion will be improving efficiency of the existing instrumentation and systems
- **In the near future (3-5 years)** the development and market penetration of C-ITS will make information more precise, more current and more dedicated to the individual road user and her current situation on the road.[7]

RECOMMENDATIONS ON ROAD OPERATOR'S ROLE AND ACTIONS IN THE SERVICE VALUE CHAIN

	Content detection	Content Processing	Service Provision	Service Presentation
Status type information services (e.g. travel time information)	Competition on the market and connected vehicles development keeps developing the services (no actions identified for road operators)		Use of reliability index in the service provision Provision of easy-to-use JSON interfaces in parallel to the DatexII/XML interfaces	Use of graphical route displays on road-side Investments in HMI research and development of guidelines National legislation of efficient and safe HMI of in-vehicle services
Event type information services	Developing business models for acquiring vehicle data from OEMs for traffic information purposes Development of data fusion methodologies (roadside and vehicle data) for improved detection	Use of all relevant data fields of the standard data models e.g. DatexII Reduction of the used event codes for process streamlining	Standardisation of content transmission over all channels Use of push-type data interface in the NAP to increase interest among app developers.	Improving the reliability of TMC network Design feature to filter events by type to minimize distraction Research, development and legislation for efficient and safe HMI of in-vehicle services

Additional proposals:

- national or regional actions that foster fleet renewal
- streamline the information value chain and improve reliability by building cooperation between road operators and service providers
- Certain questions need clear regulation in national legislations
- Role of service channels is gradually changing. During transition period, road operators should strive to maintain good quality of all service channels

MAIN TAKE-AWAYS FOR ROAD OPERATORS

1. Know your data quality

Use the EUEIP Quality Package to design the local quality framework and identify the most feasible quality assessment methodologies.

2. Set Quality Targets

Consider the current quality level and the recommended optimum/target quality levels and consider the different needs in various operating environments when setting the quality targets.

3. Assess ongoing development

Analyse how the ongoing technological development in your organisation (monitoring systems, vehicle data, development of IT systems and automation) will affect the data quality of different information services.

4. Define and implement actions

Identify the complementary actions needed to reach the targeted quality levels. Target especially those of the critical quality criteria that seem to be lacking most behind.

5. Engage in collaboration

Facilitate active and continuous collaboration with the global and local service providers and agree about actions that streamline the information flow in the whole value chain.

6. Evaluate improvements

Build a local quality monitoring system for continuous quality measurement and use a wide range of incremental quality improvement actions. Evaluate systematically the quality improvements achieved by the projects and actions.