Innovation for Road Maintenance the approach in Horizon 2020

Societal Challenge "Smart, green and integrated transport"

Cristina Marolda - EC DG MOVE
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Directive 2008/96/EC of the European Parliament and of the Council of 19 November 2008 on road infrastructure safety management

Concerns the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, the management of road network safety and safety inspections by the Member States.

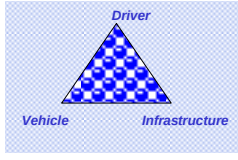
"safety inspection" means an ordinary periodical verification of the characteristics and defects that require **maintenance work for reasons of safety**

Strategic guidelines for road safety 2011-2020

Safer road infrastructure

- Road infrastructure can and must play an active role in enhancing the road transport system's safety performance
- Integrate the phases of conception, design, construction and maintenance
- Define and promote guidelines and best practices road construction and maintenance
- Possible involvement of CEN for renewed standards should be investigated.

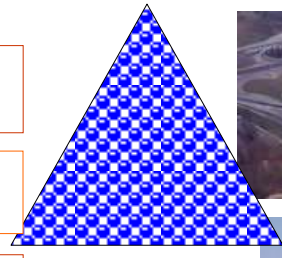
The Safe System



Rethinking the **design** towards a self-explaining and forgiving infrastructure with **extended service life**

Construction of the physical Infrastructure:
- New materials
- New production methods

Improved **operation**:
ITS, virtual infrastructure, e-call, traffic management, **asset management**



Infrastructure

Research and Innovation

Asset management and Climate Change

- **Service disruptions, premature asset failures and network breakdowns under extreme conditions are material risks under changing climate regimes. There is no guarantee that the past will reliably serve as a basis for the future, to predict interventions.**
- **Carrying out full and regular asset maintenance is a critical first line of defence against uncertainty – but this has proven to be one area where cuts in budgets are first made.**

Asset management and economic downturn

In a financial crisis, it is always tempting to forgo transport infrastructure investments.

Quality decay is visible and leading to increased **risk of service degradation and disruption**, thus **reduced safety level**.

Long-term financial planning - sustainability of funding sources is key. It is important to **balance revenues with total lifetime cost of ownership.**

Strategic asset management plans help address uncertainty.

Need for comprehensive and comparable **national asset inventories** and "balance sheets" to allow **informed choices.**

Mobility And Transport

Preventive, Predictive and Corrective Maintenance

Preventive Maintenance: scheduled or planned maintenence actions aimed at the prevention of breakdowns and failures

Predictive Maintenance: techniques that help determine the conditions of in-service equipment in order to predict when maintenance should be performed. Minimize disruption of normal system operations, while allowing for budgeted, scheduled repairs.

Corrective maintenance: repair of equipment/structure in order to bring it back to its original operating conditions

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The importance of maintenance

- Proper maintenance programs have huge returns
- Keep asset running longer
- Allow for scheduled, budgeted repairs
- Reduce unscheduled down-time
- Make infrastructure safer and more reliable

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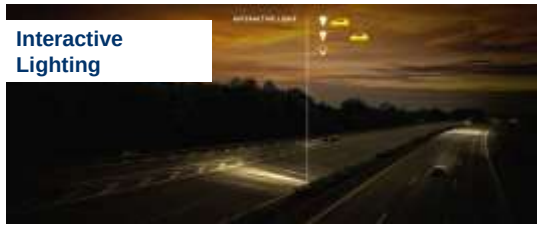
Needs for Innovation

Additional **research** is needed, on materials as well as on infrastructure engineering.

Promote research towards "**condition-aware**" infrastructure, applicable both for new works and for retrofitting.

Very significant **savings predicted** over lifecycle, in maintenance as well as in operation



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Condition-Aware Infrastructure

- New technology allows infrastructure to **permanently monitor** its material condition.
- From time-based to **condition-based maintenance** (large savings over lifecycle).
- **Initial cost higher**, introduction easier if led by public authorities' requests.
- Condition awareness is also efficiency-enhancing with regard to **operating conditions**:
  - Automatic detection and info relay of hazards related to weather, other natural factors, traffic incidents
  - Information to current users (drivers) but also more broadly to other network operators, logistics centres, etc.

Transport

Objective:

"To achieve a European transport system that is resource-efficient, climate-and-environmentally-friendly, safe and seamless for the benefit of all citizens, the economy and society."

Mobility and Transport

THE SPECIFIC PROGRAMME

SMART, GREEN & INTEGRATED TRANSPORT		1. Resource efficient transport that respects the environment	2. Better mobility, less congestion, more safety & security	3. Global leadership for the European transport industry	4. Socio-economic research & forward looking activities for policy making
Air	ACTIVITIES	1.1. Cleaner & quieter aircraft, vehicles & vessels	2.1. Reduction of traffic congestion	3.1. Next generation of transport means	4.1. Prospective studies
Rail			2.2. Mobility of people & freight	3.2. Smart control systems	4.2. Transport system modelling
Road		1.2. Smart equipment, infrastructures & services	2.3. New concepts of freight transport & logistics	3.3. Advanced production processes	4.3. Social & economic issues
Waterborne		1.3. Improving transport & mobility in urban areas	2.4. Reducing accident rates & fatal casualties & improving security	3.4. Exploring entirely new transport concepts	4.4. Policy support actions
Urban					
Integrated Transport					

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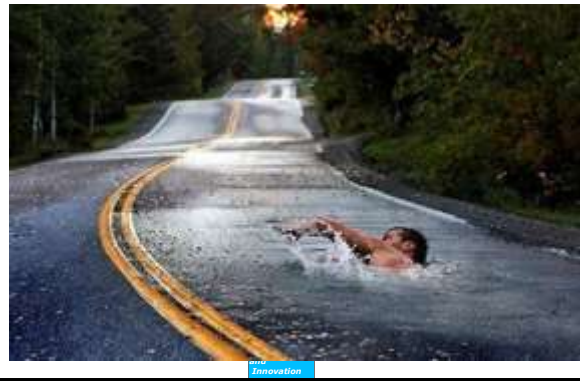
A ROADMAP FOR INFRASTRUCTURE IN THE TRANSPORT CHALLENGE



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	2014						2020
1. Resource efficient transport that respects the environment							
1.1. Cleaner & quieter aircraft, vehicles & vessels							
Infrastructure for cleaner and quieter vehicles		*Infrastructure for alternative fuels (in particular roads and ports)*		*Advanced energy supply infrastructure (including inductive charging)*		*Dedicated corridors for autonomous vehicles (road)*	
These activities are in support of the deployment of alternative powered vehicles – in particular cars and ships – and are following the expected market maturity of vehicles over time. Budget investment has to be quantified in relations of the expected vehicle market expansion.							
1.2. Smart equipment, infrastructures & services							
	2014						2020
Towards zero environmental footprint from Infrastructure	*Low energy construction, reuse and recycling systems* €€€	*Energy harvesting infrastructure* €€	*Reduced human annoyance infrastructure* €				
These activities are condensed in the first years to ensure availability of results within the duration of H2020, as they can be considered a pre-condition for European infrastructure development (both in terms of 'completion' and 'quality' of the European network). Budget reflects needed efforts.							
Resilient infrastructure network	*Mapping of climate risk 'hot spots'* €		*Emergency measures for extreme weather disruption* €		*Imbedded mitigating systems against extreme weather disruptions* €€€		
Activities planned in progression of knowledge advancements and technology development, supporting an advised planning and location of the adequate measures and systems.							
1.3. Improving transport & mobility in urban areas							
	2014						2020
All infrastructure related activities can be applied to both urban and extra-urban environment. It does not seem useful to highlight the urban aspect in this phase.							

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2. Better mobility, less congestion, more safety & security							
2.1. Reduction of traffic congestion							
	2014						2020
Smarter design, construction, maintenance	Non-intrusive inspection, monitoring and testing systems €€€			Self-monitoring, self-repairing infrastructure €€			
Need to invest sufficiently at the beginning of the H2020 for a more long-term target. The topic can possibly be updated during the duration of the Programme, according to achieved results from the first wave.							
Resilient infrastructure and operations	Intelligent traffic management strategies €€		Advanced capacity planning and incident mngmt €				
Needs deployment of ITS focussed in particular on multimodal traffic management and adaptive infrastructure. Technologies are available and fast deployment can be expected.							
2.2. Mobility of people & freight							
	2014						2020
Infrastructure contribution to seamless traffic flow	Integrated transport infrastructure data/information systems €€	Optimization of multimodal transport nodes and corridors €€			Synchro-modality over key transport corridors €		
	User information management €€						
The development of a complete integrated information system can be reached on a medium-long term. It is important to start as soon as possible the process that might need updates during the duration of the Programme to reach the target of a fully seamless transport for people and freight.							
2.3. New concepts of freight transport & logistics							
	2014						2020
n.a.							
2.4. Reducing accident rates & fatal casualties & improving security							
	2014						2020
Safe and secure infrastructure and operations	Predictive modelling and simulations to reduce accidents	Infrastructure-based pro-active safety systems	Infrastructure-based urban safety	Worker safety		New monitoring systems	
		Preventing disruption of critical infrastructures from malicious acts					
Safety issues should be continuously updated, following the increase of understanding of accident causation. Actions indicated in future calls are only indicative of possible evolution.							

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3. Global leadership for the European transport industry							
3.1. Next generation of transport means							
n.a.							
3.2. Smart control systems							
	2014						2020
Smart infrastructure governance		Advanced asset management systems €€					
These systems are aimed at optimizing the asset utilization and reducing the total cost of ownership							
3.3. Advanced production processes							
	2014						2020
Streamlined delivery of infrastructure production	Quick, cost-effective design, construction maintenance, rehabilitation and retrofitting systems €€€				Towards zero maintenance infrastructure €€€		
This activity requires not only technological development but also a major shift in approaching construction methods (prefabrication, quick assembly on place, remote interventions.....). This explains the need of a consistent budget to launch this process.							

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INFRASTRUCTURE

EUROPE NEEDS

- To make infrastructure more resilient
- To keep pace with the growing mobility needs and aspirations of people and businesses
- To reduce the impact of infrastructure on the environment
- To maintain and upgrade deteriorating transport infrastructures
- To facilitate the uptake of innovation

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WORK PROGRAMME 2014-2015

TOPICS:

- Smarter design, construction and maintenance *2014 – R&I: 2 stages; CSA: 1 stage*
- Next generation transport infrastructure: resource efficient, smarter and safer *2014 – R&I: 2 stages; CSA: 1 stage*
- Facilitating market take-up of innovative transport infrastructure solutions *2015 – Public procurement of innovative solutions*
- Smart governance, network resilience and streamlined delivery of infrastructure innovation *2015 – R&I: 2 stages; CSA: 1 stage*

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URBAN MOBILITY

EUROPE NEEDS:

Innovation in resource-efficient and competitive urban mobility and transport ('CIVITAS 2020'):

- Transformation towards a cleaner and better urban mobility and transport
- Five complementary challenge-topics
- Framework for coordinated evaluation, dissemination and information exchange
- Build on legacy (CIVITAS, STEER market take-up, …)

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URBAN MOBILITY

TOPICS:

- Transforming the use of conventionally fuelled vehicles in urban areas *2014 – 2 stages*
- Reducing impacts and costs of freight and service trips in urban areas *2014 – 2 stages*
- Tackling urban road congestion *2014 – 2 stages*
- Strengthening the knowledge and capacities of local authorities *2015 – 2 stages*
- Demonstrating and testing innovative solutions for cleaner and better urban transport and mobility *2015 – Innovation actions: 2 stages; CSA: 1 stage*

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LOGISTICS

EUROPE NEEDS:

- To increase efficiency and sustainability in the EU logistics supply chain
- To remove the communication bottlenecks between stakeholders
- To improve the potential for collaboration, the utilization of equipment and connectivity across the transport modes

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LOGISTICS

TOPICS:

- Fostering synergies alongside the supply chain including e-commerce *2014 – 2 stages*
- De-stressing the supply chain *2014 – 2 stages*
- Common communication and navigation platforms for pan-European logistics applications *2015 – 2 stages*

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INTELLIGENT TRANSPORT SYSTEMS

EUROPE NEEDS:

- ITS and ICT technologies provide a set of strategies for addressing the challenges of:

Assuring safety and reducing congestion; Delivering safe, efficient, sustainable and seamless transport options across Europe; Accommodating the growth in passenger and freight traffic; Safeguarding the competitiveness of the European industry

- Progress in the ITS area under H2020 shall contribute to decarbonizing the transport sector and materializing the "Zero" vision of road safety
- Topics adding value to mode-specific activities

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INTELLIGENT TRANSPORT SYSTEMS

TOPICS:

- Connectivity and information sharing for intelligent mobility
  2015 – 2 stages
- Towards seamless mobility addressing fragmentation in ITS deployment in Europe *2014 – R&I: 2 stages; CSA: 1 stage*

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SOCIO-ECONOMIC and BEHAVIOURAL RESEARCH and FORWARD-LOOKING ACTIVITIES for POLICY- MAKING

EUROPE NEEDS:

- To help generate the innovative solutions necessary for smarter, greener and more integrated transport and mobility by embedding the social sciences and humanities throughout this challenge
- To address the specific needs in terms of socio-economic and behavioural research: data, models and scenarios; user needs and behaviour; transport economics and policy support

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SOCIO-ECONOMIC and BEHAVIOURAL RESEARCH and FORWARD-LOOKING ACTIVITIES for POLICY- MAKING

TOPICS:

- Transport societal drivers *2015 – 1 stage*
- User behaviour and mobility patterns in the context of major societal trends *2014 – 1 stage*
- Analysis of funding schemes for transport infrastructure *2014 1 stage*
- Research, technology development and market prospects for the European transport industries *2014 – 1 stage*
- Fostering transnational cooperation in European transport R&I – NCP network *2015 – 1 stage*
- Strengthening the R&I strategies of the transport industries in Europe *2014 – 1 stage*

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CALL 'SMALL BUSINESS AND FAST TRACK INNOVATION FOR TRANSPORT'

EUROPE NEEDS:

- The best products and services, in a time and cost efficient manner, in order to preserve transport sector's leadership and create new jobs
- The role of SMEs is critical in order to meet these challenges

Research and Innovation

CALL 'SMALL BUSINESS AND FAST TRACK INNOVATION FOR TRANSPORT'

TOPICS:

- Small business innovation research for Transport
  2014-2015 – SME instrument
- Fast Track to Innovation *2015*

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Thank you for your attention!

Find out more:
www.ec.europa.eu/research/horizon2020

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