ECTP: R&D for the Adaptation of Infrastructure to Environmental Challenges

Alain ZARLI - ECTP & CSTB
Miguel SEGARRA - ECTP & Dragados
Clemente FUGGINI – ECTP & RINA Group
Overview presentation

- ECTP in a nutshell
- Transportation & infrastructures: context & challenges
- R&D to tackle challenges: reFINE & REFINET
- Introduction to future R&I priorities for European TI – Climate change impact to infrastructures
ECTP: a platform for European innovation in Construction & Built environment (1)

Paramount challenges such as energy, climate change, efficiency & more generally sustainability prove to become of utmost importance for the Built Environment and very often need to be tackled within an integrated approach.

- ECTP (as an AISBL legal entity) is the European Construction, built environment & energy-efficient buildings Technology Platform
- It gathers 160+ member-organizations from the Construction sector and other sectors from the whole supply chain of the Built Environment.
- Its main mission is to develop new R&D&I strategies to improve competitiveness, meet societal needs & take up environmental challenges.
ECTP: a platform for European innovation in Construction & Built environment (2)
ECTP: a platform for European innovation in Construction & Built environment (3)

ECTP as partner of the cPPP on Energy efficient Buildings (EeB) (partnership for research and innovation in energy in buildings)
ECTP: a platform for European innovation in Construction & Built environment (4)
ECTP: a platform for European innovation in Construction & Built environment (5)

A networking forum within ECTP for all stakeholders that see the need to comprehensively tackle the challenges infrastructures are facing.
Transportation context

- Multiple modes
- Multiple industries
- People and freight
- Massive network – central to economy
- International in scope
- Decentralized
- Public-private mix
The centrality of the Transport Network

The Transportation Sector is Central to Enabling Operability in All Other Sectors

Challenges on transport network

- Natural disasters: blizzards, tornadoes, floods, hurricanes, wildfires, heat waves, earthquakes, and other natural hazards
- Human-induced disasters: acts of terrorism, financial crises, social unrest, cyber attacks
Transport & Climate Change

– Climate change/extreme events – When? Where? How often?
– Problem of uncertainty
– Needs sound risk assessment and management approaches
– Interdependencies between modes and sectors
– The emergent concept of Resilience

Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.

From: EU-US Transportation Research Symposium - Transport Resilience: Adaptation to Climate Change
C. Marolda, October 2016
Resilience

“Resilience” sits in an intricate interplay among individuals, communities, institutions and infrastructures.

“Resilience” involves different dimensions (e.g. cognitive, social) and therefore has to be elaborated within a rigorous framework and with a systemic approach.
Resilience to what

- Natural events such as:
  - Storm Surges & Sea Level Rise
  - Heavy Precipitation
  - River Floods
  - Wind Storm
  - Landslides
  - Drought
  - Heat Waves
  - Forest Fires
  - Avalanches
  - Hail
How to tackle those challenges

‒ Integrate climate change into transport plans
‒ Integrate mitigation and adaptation strategies
‒ Develop more robust climate change scenarios and dynamic adaptation planning methods
‒ Enhance simulation models to account for extreme events
‒ Consider cross-modal shift and connections during and after extreme events
‒ Identify vulnerable assets
‒ Assess and mitigate the impacts on transport infrastructure, materials, equipment and on supporting infrastructure (power grid, water supply)
‒ Introduce new technologies (UAVs, sensors) to assist in planning, managing and recovering from extreme events

From: EU-US Transportation Research Symposium - Transport Resilience: Adaptation to Climate Change
C. Marolda, October 2016
REFINE Initiative

- In this context REFINE initiative was launched in 2013 with the ambition of defining specific future R&I actions and priority areas, under R&I demands, which should be taken to design, maintain and operate European transport infrastructures according to the REFINET multimodal transport infrastructure model.

Refine expected impacts by 2030
- **Green**: -30% of CO₂ emissions
- **Smart**: +30% performance (capacity and safety)
- **Low cost**: -30% in new infrastructures and upgrading of the existing ones
As a follow action, REFINET - Coordination & Support Action was funded in 2014 by the European Commission under H2020 framework programme (GA 653789) aimed supporting the establishment of a coherent R&I programme for Transport Infrastructure (TI), promoting innovation in the whole value chain and demonstrating the relevance of the infrastructure sector in R&I programmes.
REFINET project (2)

REFINET has defined a European multimodal transport infrastructure framework, where key performances of the High Level Service Infrastructure have been identified TO:

– Establish a coherent approach to monitor research and innovation programmes.
– Help to establish strategic targets to Infrastructure operators.
– Contribute to evaluate innovation.
– Become a reference for benchmarking at EU level.
REFINET project (3)

Key Outputs:

- A Multi-Modal Transport Infrastructure (MMTI) model
  - Key performances (indicators) of the High Level Service Infrastructure

- A Collection of Best Practices
  - Most innovative approaches and practices in design, construction and maintenance of TI to guide transformation process in the transport sector

- A Catalogue of Technologies
  - High potential and incoming technological solutions, that are available but still need to be largely deployed or that are popping-up from R&I projects

- A framework for monitoring R&I projects
  - Identification and tracking of incoming innovations from recent FP7/H2020

- A Strategic Implementation Plan (SIP)
  - Identification of future R&I priorities for European TI

- A Platform for the analysis and clustering of technological demands → TI-Tech Mapper
REFINET project (4)

Identification of future R&I priorities for European TI:

- **Priority areas and specific actions for research and innovation** (examples below)
- **PRIORITY AREA A: URBAN MOBILITY**
  - Infrastructure networks support a high quality of life in sustainable European cities by ensuring a sustainable, continuous, seamless and safe circulation.
- **PRIORITY AREA B: MULTIMODAL HUBS**
  - Infrastructure networks are integrated, efficient and well-connected, thanks to multimodal hubs that constitute essential nodes of the transport systems.
- **PRIORITY AREA C: LONG DISTANCE CORRIDORS**
  - Infrastructure networks support a competitive European economy by providing efficient means for people and freight movement in Europe.
- **PRIORITY AREA D: SYSTEMIC APPROACH**
  - Integrated planning, implementartion, management and operation of european integrated infrastructure network.
REFINET project (5)

Identification of future R&I priorities for European TI – *Climate change impact to infrastructures (1/2)*

– **PRIORITY AREA A: URBAN MOBILITY:**
  - Increasing the resilience and adapting urban infrastructure to the impacts of environmental and man-made hazards, including: - Self-sufficient technologies to ensure day-to-day activities under exceptional circumstances - Understanding the impacts of severe weather events on infrastructure networks - Adaptation to both incremental and abrupt increases of weather and longer-term climate change - Terrorist attacks (explosions, cyberphysics) - Understanding the impacts of floods, earthquakes, landslides, volcanoes (could incorporate real time response, recovery technologies etc.)
  - Innovative management and technologies increase infrastructure resilience to environmental and man made hazards - Real-time travel options to users - Use of real-time info to forecast environmental hazards

Expected Impact

– **PRIORITY AREA B: MULTIMODAL HUBS**
  - Modelling of consequences via different scenarios assessment and preparedness to disruptive events, study of interdependencies, cascade effects and other consequences
REFINET project (5)

Identification of future R&I priorities for European TI – *Climate change impact to infrastructures (2/2)*

– PRIORITY AREA C: LONG DISTANCE CORRIDORS
  • Innovative solutions for preparedness, prevention, robustness and recovery from the occurrence of emergency situation based on disruptive events (natural and man-made hazards).
  • Infrastructure adaptation to climate change patterns resulting in an increase in the intensity and frequency of extreme weather events

– PRIORITY AREA D: SYSTEMIC APPROACH
  • Advanced traveler information - cross modal emergency evacuation/events/weather user information
  • Systemic multi-scale approach for assessment of the performance of transport infrastructure against multi-hazard risk
Contact information

ECTP - [http://www.ectp.org](http://www.ectp.org)