infra4Dfuture

The infra4Dfuture (i4Df) initiative concerns a Coordination and Support Action (CSA), funded by the H2020 programme, with a duration of 24months (1 October 2018 - 30 September 2020). In i4Df 19 National Transport Infrastructure Authorities (NTIA) from 17 countries joined forces to jointly develop a demand-driven overarching strategy and cross-modal coordination mechanism for the modernization of transport infrastructure, including a shared strategic vision on capabilities needed for NTIA to effectively meet future challenges concerning transport infrastructure innovation and implementation, resulting innovation focus areas and related competences.

Key outcomes and achievements

Within the framework of the infra4Dfuture initiative, a ready to implement cross-modal coordination mechanism has been developed, supported by involved National Transport Infrastructure Authorities and relevant stakeholders. Aimed to guide the deployment of the activities within the respective concerted portfolio of programmes, it facilitates the effective delivery of demand driven, ready to implement, cost effective innovative solutions.
A collective effort of the partners of the infra4Dfuture initiative together with relevant stakeholders and experts has allowed to elaborate on a vision towards 2040, by outlining 3 main capabilities and related 7 Innovation Focus Areas.
The infra4Dfuture initiative has also generated a framework for professional competence building in order to support the implementation and deployment of the innovative solutions up to larger network scales and delivered a supporting toolkit.

The infra4Dfuture initiative key outcomes are:

Ready to implement cross-modal coordination mechanism
• Common product of and support from all NTIAs involved and wide support from stake- holders
• Strategic joint vision on future transport infrastructure capabilities and related Innova- tion Focus Areas (until 2040)
• Supporting toolbox
  ‣ Joint innovation pathways until 2040
  ‣ Human Capital Development, professional competence building for future capabilities and cross-modal approaches
  ‣ Collaborative structures for cross-modal, transnational information transfer between innovation programmes
  ‣ Staged-gate-reviewing   process
  ‣ Communication and dissemination tools

consortium

1. Rijkswaterstaat (Ministerie van Infra- structuur en Waterstaat) - NL
2. Väylä - FI
3. Agentschap Wegen en Verkeer - BE
4. Latvijas Valsts Ceļi - LV
5. Vejdirektoratet - DK
6. Trafikverket - SE
7. Statens Vegvesen - NO
8. BMVI (Bundesministerium für Verkehr und digitale Infrastruktur) - DE
9. BASt (Bundesanstalt für Straßenwesen) - DE
10. ANAS S.p.A. - IT
11. BMK (Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie) - AT
12. Ministerio de Fomento - ES
13. Infraestruturas de Portugal - PT
14. Ministerstwo Infrastruktury - PL
15. Ministerstwo Gospodarki Morskiej i Żeglugi Śródlądowej - PL
16. CERTH / HIT (Centre for Research and Technology Hellas / Hellenic institute of Transport) - GR
17. Ministère de la Transition écologique et solidaire - FR
18. Netivei Israel - IL
19. Karayollari Genel Müdürlügü - TR
20. TÜV Rheinland Consulting - DE

Coordinator contacts:

Peter Wilbers, Rijkswaterstaat
peter.wilbers@rws.nl, +31622907912

Richard van der Elburg, Rijkswaterstaat
richard.vander.elburg@rws.nl, +31625098927

🌐 www.i4Df.eu   🐦 @i4Dfproject   in www.linkedin.com/groups/13655794/

infra 4D future

Coordinating Transport Infrastructure Innovation and Implementation

infra4Dfuture brings together National Transport Infrastructure Authorities, Industry and Research in a structured dialogue

NTIA priorities for innovation and implementation delivery process

0	**IDEA**	Unproven concept, no testing has been performed
1	**BASIC RESEARCH**	You can now describe the need(s) but have no evidence
2	**TECHNOLOGY FORMULATION**	Concept and application have been formulated
3	**NEEDS VALIDATION**	You have an initial 'offering'; stakeholders like your slideware
4	**SMALL SCALE PROTOTYPE**	Built in a laboratory environment ("ugly" prototype)
5	**LARGE SCALE PROTOTYPE**	Tested in intended environment
6	**PROTOTYPE SYSTEM**	Tested in intended environment close to expected performance
7	**DEMONSTRATION SYSTEM**	Operating in operational environment at pre-commercial scale
8	**FIRST OF A KIND COMMERCIAL SYSTEM**	All technical processes and systems to support commercial activity in ready state
9	**FULL COMMERCIAL APPLICATION**	Technology on 'general availability' for all consumers

Through several consultation rounds with stakeholders and experts, the infra4Dfuture initiative developed a strategic vision on innovation and implementation towards 2040. For the delivery process of innovation and implementation process three stages have been identified that correspond to stages of the technology readiness level (TRL) scale:

Stage I: is concerned with research and development of potential solutions in laboratorial or managed situation, and ranges roughly from TRL 4 to TRL 7.

Stage II: is concerned with demonstrating and validating promising results from stage I in (representative) practical situations in infrastructure management, and ranges from TRL 8 to TRL 9. This stage is essential in order to yield common specifications and guidelines the NTIAs as issue owner and procuring clients can choose to adopt in their procurement frameworks.

Stage III: is concerned with picking up the cost-effective business cases from stage II and foster market introduction up to larger network scales (e.g. through launching customer/innovations procurement).

STAGE I	STAGE II	STAGE III
• Research & Developement	• Demonstration & Validation	• Market Uptake

From research and developement to market uptake in three stages.

The i4Df cross-modal coordination mechanism for demand driven transport infrastructure innovation and implementation
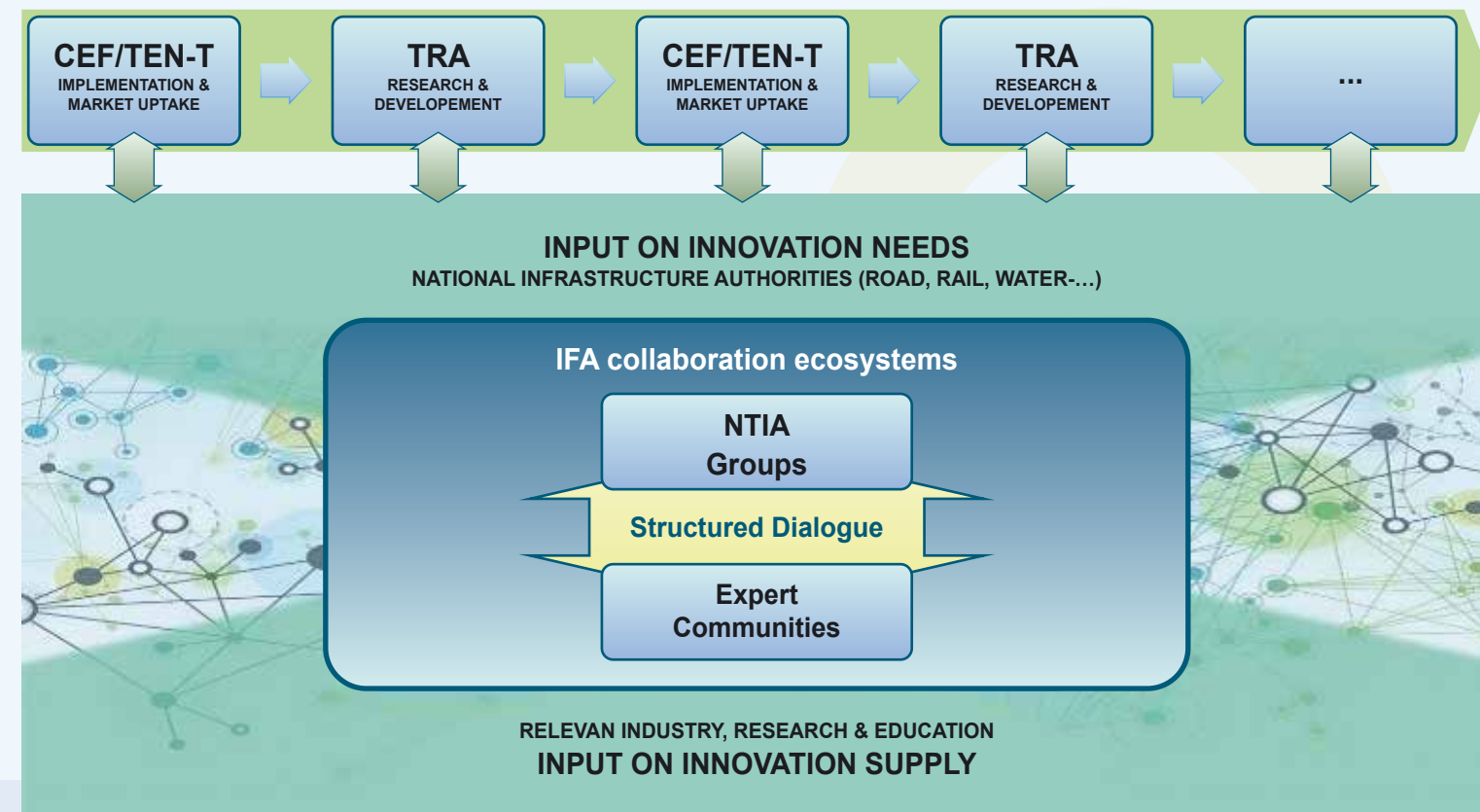
A leading principle of the i4Df cross-modal coordination mechanism and its IFA collaboration ecosystems is that the coordination mechanism builds up from the innovation activities level, and is centered around a structured dialogue between groups of advisors from the (public) national transport infrastructure authorities (NTIAs).

They represent the common public need (demand side) for innovation, while experts from the relevant stakeholders from industry, research and education represent the supply side of the delivery chain, following on the common demand for appropriate solutions. This structured dialogue builds from a willingness from both groups to explore opportunities for cooperative and collaborative innovation activities that they can subsequently recommend to their strategic representatives for endorsement.

In practice, this dialogue is framed in a series of thematic settings reflecting the common issues the NTIAs need to address in view of their vision for 2040. In that regard, the i4Df initiative has identified seven innovation focus areas (IFAs) considering the guidance of senior advisors from NTIAs and the various strategic research agendas from public, industry and research.

As such, the NTIA advisor groups and expert communities engaging in their structured dialogue resemble thematic collaboration ecosystems, i.e. one for each IFA. Each of these IFA collaboration ecosystems are concerned with concerting between a variety of innovation activities from the various

European and national programmes and initiatives. Their objective is to identify and scope opportunities for further and closer cooperation and collaboration, all on a voluntary basis.

In various consultations rounds with NTIAs, relevant stakeholders and experts the i4Df initiative succeeded in setting up a demand-driven overarching strategy and cross-modal coordination mechanism for the modernization of transport infrastructure. This includes a shared strategic vision on capabilities needed for NTIA to effectively meet future challenges concerning transport infrastructure innovation and implementation, resulting innovation focus areas and related competences. i4Df has delivered common pathways for innovation development and implementation towards 2040 from which elements will feed into the CEF and Horizon Europe programming.

It is advisable that the results from the IFA collaboration ecosystems are shared with and transferred to the wider European stakeholder setting in order to optimise their effectiveness across the combined European transport infrastructure networks for road, rail, water etc. Anchor points will be TRA and CEF/TEN-T days.

The mechanism is ready for take-off. Further implementation and operationalisation of the cross-modal coordination mechanism, with wide support from all involved NTIA and relevant stakeholders, will only start now.