



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Project Acronym: **infra4Dfuture**

Project Title: **Infrastructure for the Future**

Project Number: **824269**

Topic: **MG-2-4-2018 – Coordinating national efforts in modernizing transport infrastructure and provide innovative mobility services**

Type of Action: **Coordination and Support Action (CSA)**

D4.7 Information package for the strategic stakeholder conferences, including TRA 2020-Nr.2

Version 1.0

Deliverable:	D4.7 Information package for the strategic stakeholder conferences, including TRA 2020-Nr.2
Work Package:	WP4: Encouraging innovation and implementation through communication, exploitation and dissemination
Due Date:	M7 (postponed to M8)
Submission Date:	29/05/2019
Start Date of Project:	01/10/2018
Duration of Project:	24 Months
Organisation Responsible of Deliverable:	Centre for Research and Technology Hellas (CERTH)
Version:	1.0
Status:	final
Author name(s):	Eleni Mavropoulou, Evangelia Gaitanidou
Reviewer(s):	Maria Boile
Nature:	<input checked="" type="checkbox"/> R – Report <input type="checkbox"/> P – Prototype <input type="checkbox"/> D – Demonstrator <input type="checkbox"/> O - Other
Dissemination level:	<input checked="" type="checkbox"/> PU - Public <input type="checkbox"/> CO - Confidential, only for members of the consortium (including the Commission) <input type="checkbox"/> RE - Restricted to a group specified by the consortium (including the Commission Services)

Contents

List of Tables	3
Abbreviations	4
Executive summary	5
1 Introduction.....	6
1.1 2 nd i4Df Stakeholder Conference	6
1.2 Purpose of the document	7
2 2nd Stakeholder Conference dissemination materials	8
2.1 Introduction 2-pager	8
2.2 “Save the Date”, invitation e-mails and preparatory information for the Conference....	8
2.3 First i4Df leaflet	8
2.4 ‘Transport infrastructure capabilities for 2040’ (version May 2019).....	8
2.5 2 nd i4Df Stakeholder Conference agenda	9
2.6 Conference Power Point presentation	9
2.7 Participants	10
3 Conclusions	11
ANNEX I	12
ANNEX II	14
ANNEX III	15
ANNEX IV	16
ANNEX V	19
ANNEX VI	21
ANNEX VII	39

List of Tables

Table 1 2 nd i4Df Stakeholder Conference agenda	9
--	---

Abbreviations

Abbreviation	Definition
H2020	Horizon 2020 EU Research and Innovation Program
EC-DG MOVE	European Commission's Directorate-General for Mobility and Transport
NTIA	National Transport Infrastructure Authorities

Executive summary

The “D4.7 Information package for the strategic stakeholder conferences” document includes the information package for the 2nd Strategic Stakeholder Conference of the infra4Dfuture project. The deliverable has been produced by the Centre for Research and Technology Hellas (CERTH) / Hellenic Institute of Transport (HIT) team. The enclosed documents for the 2nd i4Df Strategic Stakeholder Conference have been produced by Coordinator and WP1 leader RWS. The organisation of a series of stakeholder conferences is part of the work in WP1.

This deliverable concerns information related to the 2nd i4Df Stakeholder Conference, like the professionally designed i4Df leaflet, the draft document “Transport infrastructure capabilities for 2040” (version May 2019), the 2nd i4Df Stakeholder Conference agenda, the presented Power Point and further dissemination materials.

In the 2nd i4Df Stakeholder Conference high level representatives of public issue owners, innovation programme owners, industrial lead suppliers and research providers participated in order to consolidate the results of the 1st i4Df Expert Workshop that took place in Bergisch Gladbach, Germany, on 25-26 February 2019. The participants of the 2nd i4Df Stakeholder Conference discussed possible options for coordination mechanisms to be developed in the i4Df initiative to roll out, deploy and sustain its potential key principles and jointly developed approach. The outcomes will contribute to an innovation ambition for the strategic stakeholders involved.

1 Introduction

infra4Dfuture (i4Df) is a 24-month project under the H2020 topic of MG-2-4-2018-“Infrastructure Innovation for the Future”.

i4Df aims to develop a demand-driven overarching strategy and coordination mechanism for the modernization of transport infrastructure including a shared strategic vision on future infrastructure capabilities and common pathways for innovation development and implementation.

Facing a variety of emerging challenges, such as climate change, resilience, ageing infrastructure, maintenance, digitalisation, automation, energy and electrification, the National Transport Infrastructure Authorities (NTIA) have urgent requirements for infrastructure innovation. In view of the long cycle times in infrastructure management and the rapid mounting pressure from these challenges, there is a need for fast delivery of ready-to-implement, cost-effective innovative solutions matching the requirements of the NTIA that jointly build the TEN-T network.

The i4Df consortium encompasses 20 partners from 17 countries, 19 of them being NTIA, joining forces to develop:

- a strategic coordination mechanism aiming to deliver a concerted cooperation and collaboration across a portfolio of relevant European and national innovation programmes and initiatives;
- a shared strategic vision on future infrastructure capabilities, each capability encompassing a series of focus areas for innovation.

i4Df is based on a sound and coherent consultation and dialogue process with relevant stakeholders. This process is structured in a sequence of strategic, decision-making conferences and a supporting, tactical sequence of expert workshops and regional events. These will culminate in the founding of the i4Df Stakeholder Platform for Infrastructure Innovation and Implementation (ISPIII) at the TRA 2020. ISPIII will ensure a continuation of the coordination mechanism and shared vision beyond the duration of the action. Follow-up ISPIII events will take place at the consecutive biannual TRA conferences.

1.1 2nd i4Df Stakeholder Conference

In the 2nd i4Df Stakeholder Conference, held in Brussels on 21 May 2019, the participants discussed possible options for coordination mechanisms to be developed in the i4Df initiative to roll out, deploy and sustain its potential key principles and jointly developed approach. A coordination mechanism will be built and organised around the identified Innovation Focus Areas (IFAs) as described in the draft document “Transport infrastructure capabilities for 2040”.

The following three questions were the starting points for the discussions in the break-out sessions of the 2nd i4Df Stakeholder Conference:

- What benefits do you expect from the IFA committees?
- What are eventual barriers?

- How can we get other stakeholders involved in the process (other national transport infrastructure authorities, industry, research, EC)?

1.2 Purpose of the document

D4.7 includes the requisite information package for the 2nd Strategic Stakeholder Conference. This sound information package has been developed appropriately reflecting the high level of the event.

D4.7 information package includes both printed and digital material in order to maximise the dissemination of the scope and impacts of the project to the high-level participants that attended the Conference. The deliverable refers to Task 4.3

2 2nd Stakeholder Conference dissemination materials

2.1 Introduction 2-pager

Prior to the 2nd Stakeholder Conference, participants received an Introduction 2-pager document which included basic information regarding the i4Df initiative (ambition, content development, staged stakeholder development) as well as the aim and agenda of the 2nd Stakeholder Conference (Annex I)

2.2 “Save the Date”, invitation e-mails and preparatory information for the Conference

“Save the date” and invitation e-mails for the 2nd i4Df Stakeholder Conference were sent to the wider relevant stakeholder community (Annex II and III). In subsequent e-mails participants were provided additional information regarding the Conference venue, the accommodation and instructions about how to reach the venue (Annex IV).

2.3 First i4Df leaflet

The project leaflet is an essential tool to raise awareness on the project. As such, CERTH/HIT has produced a professionally designed leaflet which is based on an initial leaflet created by RWS for the needs of the 1st i4Df Stakeholder Conference. Printed copies of the professionally designed leaflet were part of the preparatory package that was sent to the high-level participants of the 2nd i4Df Stakeholder Conference.

The leaflet is a threefold A4 flyer. It provides the following information: Project logo, origin, stakeholder engagement, approach, content, expected outcomes, consortium partners and coordinator contact details (Annex V).

2.4 ‘Transport infrastructure capabilities for 2040’ (version May 2019)

A well performing transport infrastructure network is essential for achieving the European ambitions and goals on competitiveness, growth and jobs, achieve alignment with the UN Agenda 2030 and related sustainability goals, which the EU has played an important role in shaping. Infrastructure is essential for the prosperity of Europe, especially in the peripheral areas. Its sustained provision in reference to the demands and requirements from the economy, society and environment poses a major investment challenge to the public infrastructure owners and managers. This investment challenge is the key driver for the infrastructure managers’ ambition to cooperate on infrastructure innovation and implementation actions, starting with the next multi-annual financial framework of the European Commission (2021-2027).

The draft document “Transport infrastructure capabilities for 2040” presents the reference base for further elaborating on this cooperation ambition: a common, systemic vision on surface transport infrastructure capabilities for 2040 and the main innovation areas that need to be evolved in order to reach the capabilities. The described infrastructure capabilities and Innovation Focus Areas (IFAs) serve as a guiding framework for structured, demand driven cooperation and collaboration between infrastructure managers, innovation programme owners, relevant industry and supporting research on infrastructure development, innovation needs and their implementation actions.

The document starts out with a demarcation of infrastructure that i4Df deals with, followed by the identification of required infrastructure capabilities for 2040 and their respective guiding objectives. From the required infrastructure capabilities 14 IFAs result for the period until 2030. The main part of the document presents the description of these IFAs. It concludes with a summary of requirements for professional competence development.

This document has been and will be further developed through a stepwise process. The current version (see Annex VI) reflects the outcomes of a consultation with infrastructure managers and the European Commission on 11 December 2018 (1st i4Df high-level Stakeholder Conference) and European experts from 16 countries during the 1st i4Df Expert Workshop (25-26 February 2019). It constituted a preparatory document for the 2nd i4Df Stakeholder Conference.

2.5 2nd i4Df Stakeholder Conference agenda

The agenda of the 2nd i4Df Stakeholder Conference is presented in Table 1.

Table 1 2nd i4Df Stakeholder Conference agenda

Registration	09:00-10:00
Welcome and morning plenary	10:00-11:00
Break-out sessions	11:00-12:30
Network lunch	12:30-14:00
Afternoon plenary/wrap up	14:00-15:00

2.6 Conference Power Point presentation

During the 2nd i4Df Stakeholder Conference, Power Point slides were presented by representatives of Coordinator RWS (Ministerie van Infrastructuur en Waterstaat), and the Polish Ministry of Infrastructure. More specifically, Mr. Mazur of the Polish Ministry of Infrastructure did the welcoming introduction to the i4Df project and conference and presented the event objectives. Subsequently, Mr. Ruijters of DG MOVE made a key note speech on “Investment, Innovative & Sustainable Transport”. After, RWS introduced the participants to the break-out sessions and presented the topics for discussion. After the break-out sessions in four parallel groups and a network lunch, Mr. Mazur of the Polish Ministry of Infrastructure did the wrap up assisted by the moderators of the four break-out sessions. Finally, RWS presented the next steps in the i4Df initiative (Annex VII).

2.7 Participants

The list of participants included experts, policy advisors, managers and directors, among other functions, of the following organisations:

- Latvian State Roads (LVC), LV
- Bundesanstalt für Straßenwesen (BASt), DE
- Ministry for Transport, Innovation and Technology (BMVIT), AT
- Société Nationale des Chemins de Fer français (SNCF), FR
- Agency for Roads and TRaffic (AWV), BE
- Danish Road Directorate (DRD), DK
- Forum of European National Highway Research Laboratories (FEHRL)
- Ministry of the Environment, Energy and the Sea (MEEM), FR
- ProRail, NL
- Finish Transport Infrastructure Agency (Vayla), FI
- The Swedish Transport Administration, SE
- European Association of Automotive Suppliers (CLEPA)
- Ministry of Economy and Inland Navigation (MGM), PL
- European Federation of Inland Ports, BE
- Ministry of Infrastructure (MI), PL
- Centre for Research and Technology Hellas/Hellenic Institute of Transport (CERTH/HIT), GR
- Service public de Wallonie (SPW), BE
- POLIS
- Federal Ministry of Transport and Digital Infrastructure (BMVI), DE
- Rijkswaterstaat (RWS), NL
- Bundesamt für Strassen (ASTRA), CH

3 Conclusions

Deliverable D4.7 presents the material that was distributed to the high-level participants of the 2nd i4Df Stakeholder Conference. The Conference was attended by high level representatives of consortium partners and further national transport infrastructure authorities and relevant stakeholders.

For the participants of the 2nd i4Df Stakeholder Conference in Brussels on 21 May 2019 an information package was prepared, including an informative 2-pager document with the agenda of the conference, “save-the-date”, invitation and additional information e-mails, a participants’ list, a project leaflet, a draft document “Transport infrastructure capabilities for 2040” and a Power Point presentation.

ANNEX I



Coordinating
Transport Infrastructure
Innovation and
Implementation



Introduction 2-pager

2nd i4Df Stakeholder Conference 21 May 2019

infra4Dfuture (i4Df) background information, aim of the 2nd Stakeholder Conference and agenda

i4Df initiative

The i4Df initiative concerns a collaboration of nineteen national transport infrastructure authorities (or their representatives) from seventeen countries in Europe, Turkey and Israel. The i4Df initiative is financed by the European Commission and has a 2-year duration from 1 October 2018 to 30 September 2020.

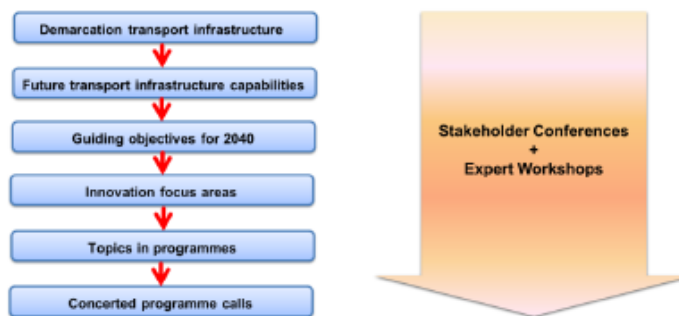
i4Df addresses innovation needs that emerge from investment challenges from the various societal challenges, its approach is multimodal and covers the period until 2040.

i4Df ambition

i4Df aims to develop an overarching strategy and coordination mechanism for future demand-driven multimodal infrastructure innovation and implementation that will allow national transport infrastructure authorities to better and more efficiently coordinate their efforts in modernizing the transport infrastructure network.

i4Df content development

i4Df applies a staged content development by following a sequence of consecutive steps that lead from identifying the needed future transport infrastructure capabilities, resulting guiding objectives for 2040 and from that distilling so-called innovation focus areas (IFAs). The annex 'Transport infrastructure capabilities for 2014' provides a detailed overview of three identified infrastructure capabilities and 14 derived IFAs. The IFAs will define the topics in (future) programmes and possibly culminate in concerted programme calls:



i4Df staged stakeholder involvement

The i4Df initiative involves all important and relevant stakeholders: from the demand side public issue owners and innovation programme owners and from the supply side industrial lead suppliers and research providers.

1

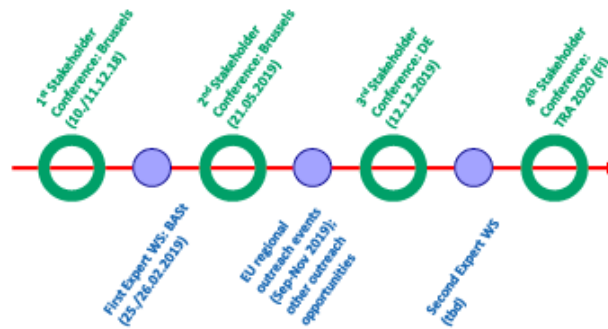
i4Df will develop content through a sequence of consecutive conferences, expert workshops and regional outreach events with the stakeholder groups (next page):

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Aim and set-up of 2nd i4Df Stakeholder Conference

Besides content also structure is important. In the 2nd Stakeholder Conference of 21 May the participants will discuss possible coordination mechanisms to be developed in the i4Df initiative to roll out, deploy and sustain its potential key principles and jointly developed approach. A coordination mechanism will be built around the identified IFAs, organised in IFA committees.

The following questions will be the starting points for the discussions in the break-out sessions of the 2nd i4Df Stakeholder Conference:

- What benefits do you expect from the IFA committees?
 - What are eventual barriers?
- How can we get other stakeholders involved in the process (other national transport infrastructure authorities, industry, research, EC)?
- How to coordinate between the various IFA committees?

These questions will be introduced and clarified in the preceding plenary session of the conference.

Agenda 2nd i4Df Stakeholder Conference 21 May 2019

Registration	09:00-10:00
Welcome and morning plenary	10:00-11:00
Break-out sessions	11:00-12:30
Network lunch	12:30-14:00
Afternoon plenary/wrap up	14:00-15:00

2

In the morning plenary session among others Herald Ruijters, director of DG MOVE will give a key note speech.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.

ANNEX II

SAVE THE DATE

2nd infrastructure4Dfuture Stakeholder Conference
Brussels, 21st May 2019

Dear Mr _____,

We are pleased to announce that the 2nd Stakeholder Conference of the infrastructure4Dfuture initiative will take place on 21 May 2019 in Brussels. The discussion will be on the foundations of the coordination mechanism for research and deployment for transport infrastructure managers. The objective is to support the continued voluntary national, regional and European cooperation across the European transport networks, over the next decade towards 2030. This cooperation will serve NTIAs in their transformations through to 2040.

As you may be aware, through the infra4Dfuture initiative, national (public) transport infrastructure authorities (NTIAs) across Europe are joining forces to coordinate their innovation actions with the objective to increase their effectiveness and efficiency against the backdrop of urgent societal challenges such as changing end-user needs, environmental and societal sustainability needs and driving benefits from digitalisation. They aim to do so through the harmonisation of innovation agendas, and a practical coordination mechanism for its roll-out in the next decade. An objective behind this initiative is the interest for NTIAs to preserve Europe's vanguard position of their supply chains in the global market, and to maintain the availability to them of excellence in service and skills.

The coordination as intended by the infrastructure4Dfuture initiative, does not imply centralised or even collective management, but rather voluntary alignment/concertation of national, regional and European activities according to the required scale and respecting the principles of subsidiarity.

For effective and timely delivery of innovative solutions from NTIAS suppliers in the relevant industry sectors, sufficient scales of economy are a precondition for enabling the market for step-change deployment actions. These conditions can only be delivered if the NTIAs coordinate their innovation actions across the national networks they are respectively responsible for. In the first Stakeholder Conference, on 11 December 2018, these networks have been defined as those on the TEN-T comprehensive network, including relevant sections of the national and regional networks that are non-TEN-T.

Therefore, in the 2nd Stakeholder Conference, planned for the 21st of May 2019, strategic stakeholder representatives from public infrastructure authorities, relevant industrial lead suppliers, supporting research providers, and public-sector innovation programme owners will be invited to review in a truly peer to peer setting how such a coordination structure may look like and work, focusing on its essential building blocks.

Please save the date of the 2nd Stakeholder Conference in your calendar and do not hesitate to contact us should you have any questions.

Please also note that invitations will be sent on the 5th of April, along with additional information. These invitations will be personal and not transferable.

We look forward to see you in Brussels.

Mr. Cees Brandsen,
Managing Director
Rijkswaterstaat,
The Netherlands

Mr. Herald Ruijters
Director Investment, Innovative & Sustainable transport
EC Directorate-General of Mobility and Transport,
Belgium

ANNEX III

INVITATION

2nd infrastructure4Dfuture Stakeholder Conference
Brussels, 21st of May 2019
Venue: The Square Meeting Centre

Dear Mr/Mrs ,

Following a save-the-date-message sent in March, you are now cordially invited to the 2nd Stakeholder Conference of the infra4Dfuture initiative on 21st of May 2019 in Brussels. The conference will take place from 10:00 to 15:00 at [The Square Meeting Centre](#) (Entrance address: Coudenberg 3, 1000 Brussels).

The draft agenda for the 2nd i4Df Stakeholder Conference is as follows:

- Registration 09:30-10:00
- Welcome and Morning Plenary 10:00-11:00
- Break-out sessions 11:00-12:30
- Networking lunch 12:30-14:00
- Afternoon Plenary/wrap up 14:00-15:00

Through the infrastructure4Dfuture (i4Df) initiative, national (public) transport infrastructure authorities (NTIAs) across Europe are joining forces to coordinate their innovation actions with the objective to increase their effectiveness and efficiency in order to address urgent societal challenges, such as changing end-user needs, environmental and societal sustainability needs, and driving benefits from digitalisation. The aim is to harmonise the innovation agendas and strategies by defining a common vision for 2040, and deliver a practical coordination structure for its roll-out in the next decade. This will reinforce the interest for NTIAs to preserve Europe's vanguard position of their supply chains in the global market, and to maintain the availability to them of excellence in service and skills.

The main goal of the 2nd i4Df Stakeholder Conference is to discuss how such structure could work in a (voluntary) setting of NTIAs defining the demand for innovation, and how it may be set in a larger framework of European and national programmes and networks of relevant stakeholders from public, industry and research sector. The conference will enable you to do this in a truly peer-to-peer setting with strategic representatives of these stakeholders, against the back drop of common infrastructure capabilities/guiding objectives (for 2040) and corresponding Innovation Focus Areas as they emerged from previous steps in the i4Df process.

A detailed, updated agenda and further additional information will follow one week prior to the conference. Travel and accommodation are not covered.

We kindly ask you to reply to this invitation before 6th of May by confirming your participation through the following [online form](#).

Note that this invitation is personal and not transferable without prior consultation of the i4Df organisation team.

In case you have any questions, please contact the project coordinators: Ruud Smit (ruud.smit@rws.nl) or Peter Wilbers (peter.wilbers@rws.nl).

We look forward to see you in Brussels.

Mr. Cees Brandsen,
Managing Director
Rijkswaterstaat,
The Netherlands

Mr. Herald Ruijters
Director Investment, Innovative & Sustainable transport
EC Directorate-General of Mobility and Transport,
Belgium



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269

ANNEX IV



Additional information

2nd infrastructure4Dfuture Stakeholder Conference

Brussels, 21st of May 2019

Venue: The Square Meeting Centre

Dear Mr/Mrs ,

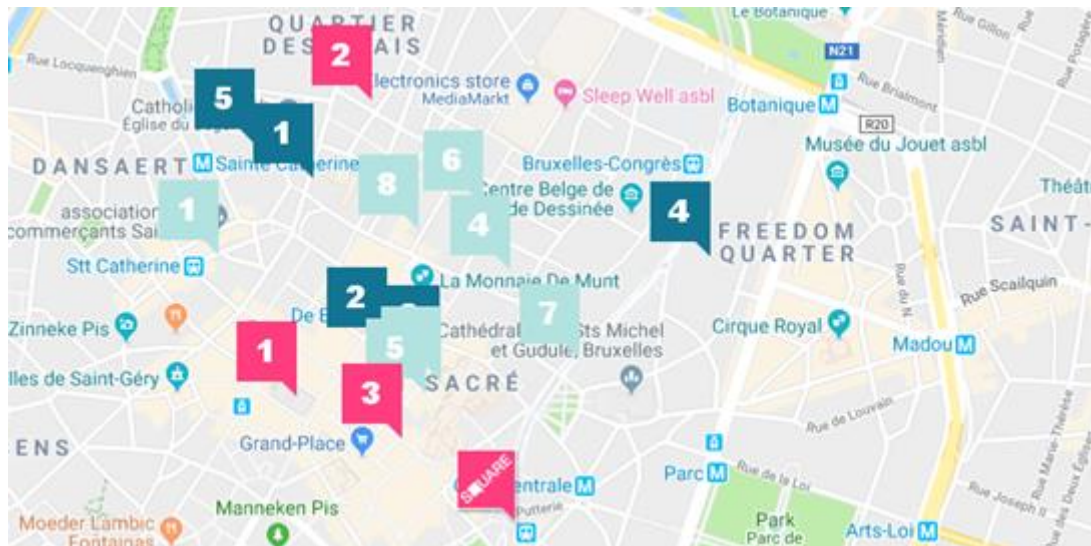
We are glad to confirm your registration to the 2nd infrastructure4Dfuture Stakeholder Conference.

The Venue

The workshop is going to be held in The Square Meeting Center, which is located at **Rue Ravensteinstraat 2 B-1000 Brussels**. Placed on the imposing Mont des Arts with a broad vista over Brussels, SQUARE sits in the historical and cultural heart of the city, very close to the center of European government. We suggest you to plan your arrival at least 30 minutes before the morning plenary session start time. A networking breakfast is available from 09.30 onwards and the plenary session starts at 10.00.

Accommodation

The city of Brussels offers a wide selection of quality accommodation and you can find somewhere to stay in almost every price range. With approximately 10,000 rooms in close vicinity of SQUARE alone, you are truly spoilt for choice.



★★★★★

- 1. Hotel Amigo Brussels - 173 rooms
- 2. Hotel Métropole - 286 rooms
- 3. Royal Windsor Hotel Grand Place - 267 rooms
- 4. Sofitel Brussels Le Louise - 169 rooms
- 5. Steigenberger Wiltcher's - 267 rooms

★★★★

- 1. Brussels Marriott Hotel - 221 rooms
- 2. Hotel NH Brussels Carrefour de l'Europe - 65 rooms
- 3. NH Collection Du Grand Sablon - 193 rooms
- 4. NH Grand Place Arenberg - 155 rooms
- 5. Novotel Brussels Off Grand Place - 140 rooms
- 6. Radisson Blu Royal Hotel - 281 rooms
- 7. Sandton Brussels Centre - 70 rooms
- 8. The Dominican - 150 rooms
- 9. The Hotel Brussels - 420 rooms

★★★

- 1. Adagio Brussels Centre Monnaie - 140 rooms
- 2. Aris hotel Brussels - 55 rooms
- 3. Ibis Brussels Off Grand Place - 184 rooms
- 4. Motel One - 489 rooms
- 5. Novotel Brussels Centre Tour Noire - 217 rooms

How to reach the venue

By car: There are two public car parks with over 1700 parking spaces. Parking Albertine is the closest car park and is situated underneath SQUARE with direct access to the venue from the inside. Both car parks are accessible 24h and both have recharging facilities for electric cars. For direct access from the car park, please go to level -3 and follow the directions to SQUARE. This route provides direct elevator access. A short walk away is the Grand Place car park which is conveniently placed midway between SQUARE and the UNESCO world Heritage site of the Grand Place.

By Public Transportation: The Central Station of Brussels is a short walk across the Mont-des-Arts public gardens. All main tram, bus, metro and train lines converge here, as well as the fast train from Brussels International Airport. Train routes to every part of Belgium run from the same station which includes the cities of Antwerp, Brugge, Charleroi, Gent, Mons and Liège.
 Metro lines 1 and 5, tram lines 38, 63, 65, 86
 Bus lines 29, 48, 66, 71, 86, N06, N08, N09, N10, N11
 Bus lines 48 and 9

By Plane: Brussels Airport is a speedy 17 minutes by train from the Central Station, stopping at the European Institutions on the way. At peak times, 6 trains run every hour and from the Central Station, which is only three minutes' walk to SQUARE.
 Brussels Airport; Leopoldlaan, 1930 Zaventem

In case you have any questions, please contact the project coordinators: Ruud Smit (ruud.smit@rws.nl) or Peter Wilbers (peter.wilbers@rws.nl).

We look forward to seeing you in Brussels, on the 21st of May.

*Mr. Cees Brandsen,
Managing Director*

*Mr. Herald Ruijters
Director Investment, Innovative & Sustainable transport*

*Rijkswaterstaat,
The Netherlands*

*EC Directorate-General of Mobility and Transport,
Belgium*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269

Dear Mr/Mrs ,

Thank you for registering for the 2nd i4Df Stakeholder conference in Brussel, on the 21st of May!

Please find enclosed the following documents for the conference:

- Introduction 2-pager (infra4Dfuture (i4Df) background information, aim of the 2nd Stakeholder Conference and agenda),
- Capabilities document, draft (evolving, living document),
- i4Df leaflet.

The 2nd i4Df Stakeholder Conference will take place from 09:30 until 15:00h at the Square in Brussels in the direct vicinity of the Brussels Central Station. For the location see the following [link](#).

Looking forward to meet you in at the 2nd i4Df Stakeholders Conference in Brussels on the 21st of May.

Kind regards,

*Mr. Cees Brandsen,
Managing Director
Rijkswaterstaat,
The Netherlands*

*Mr. Herald Ruijters
Director Investment, Innovative & Sustainable transport
EC Directorate-General of Mobility and Transport,
Belgium*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269

ANNEX V

stakeholder engagement

infra40future stakeholder engagement

The coordination mechanism will build on a structured dialogue between relevant stakeholders from public, industry and research. In this dialogue the demand side for innovation and implementation is formed by the public infrastructure managers as the 'issue owners' and hence the implementing client for innovation, and European and transitional public programme owners as funding client. The supply side in the dialogue is formed by relevant industry as lead supplier of innovation, and supporting research providers.

Innovation and Implementation DEMAND

PUBLIC ISSUE OWNERS

INNOVATION PROGRAMME OWNERS

↕

Innovation and Implementation SUPPLY

INDUSTRIAL LEAD SUPPLIERS

RESEARCH PROVIDERS

infra40future outcomes:

- **Concerted rolling transport innovation programme portfolio until 2040**, spanning European, and transitional innovation programmes
- **Comprehensive coordination mechanism**, supported by the relevant stakeholders, to guide the development and deployment of the activities within the respective concerted portfolio of programmes with aim to drive the effective delivery of demand driven, ready to implement, cost effective innovative solutions.
- **Supported framework for professional competence building** in order to support the implementation and deployment of the innovative solutions up to larger network scales. On basis of this framework the stakeholders from education and training can be engaged.
- **Strategic stakeholder platform** to deploy the coordination mechanism during a multiannual period – 2021-2027 involving the relevant stakeholders from public, industry and research and guiding from a common vision on infrastructure capabilities for 2040.

consortium

1. Rijkswaterstaat (Ministerie van Infrastructuur en Waterstaat) - NL
2. Vaylã - FI
3. Agentschap Wegen en Verkeer - BE
4. Latvijas Valsts Ceļi - LV
5. Vejdirektoratet - DK
6. Trafikverket - SE
7. Statens Vegvesen - NO
8. BMWi (Bundesministerium für Verkehr und digitale Infrastruktur) - DE
9. BASK (Bundesanstalt für Straßenwesen) - DE
10. ANAS S.p.A. - IT
11. bmvit (Bundesministerium für Verkehr, 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. Karayolları Genel Müdürlüğü - TR
20. TÜV Rheinland Consulting





Building a strategy and coordination mechanism for future demand-driven multimodal transport infrastructure innovation and implementation



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101019180



Coordinator contacts:

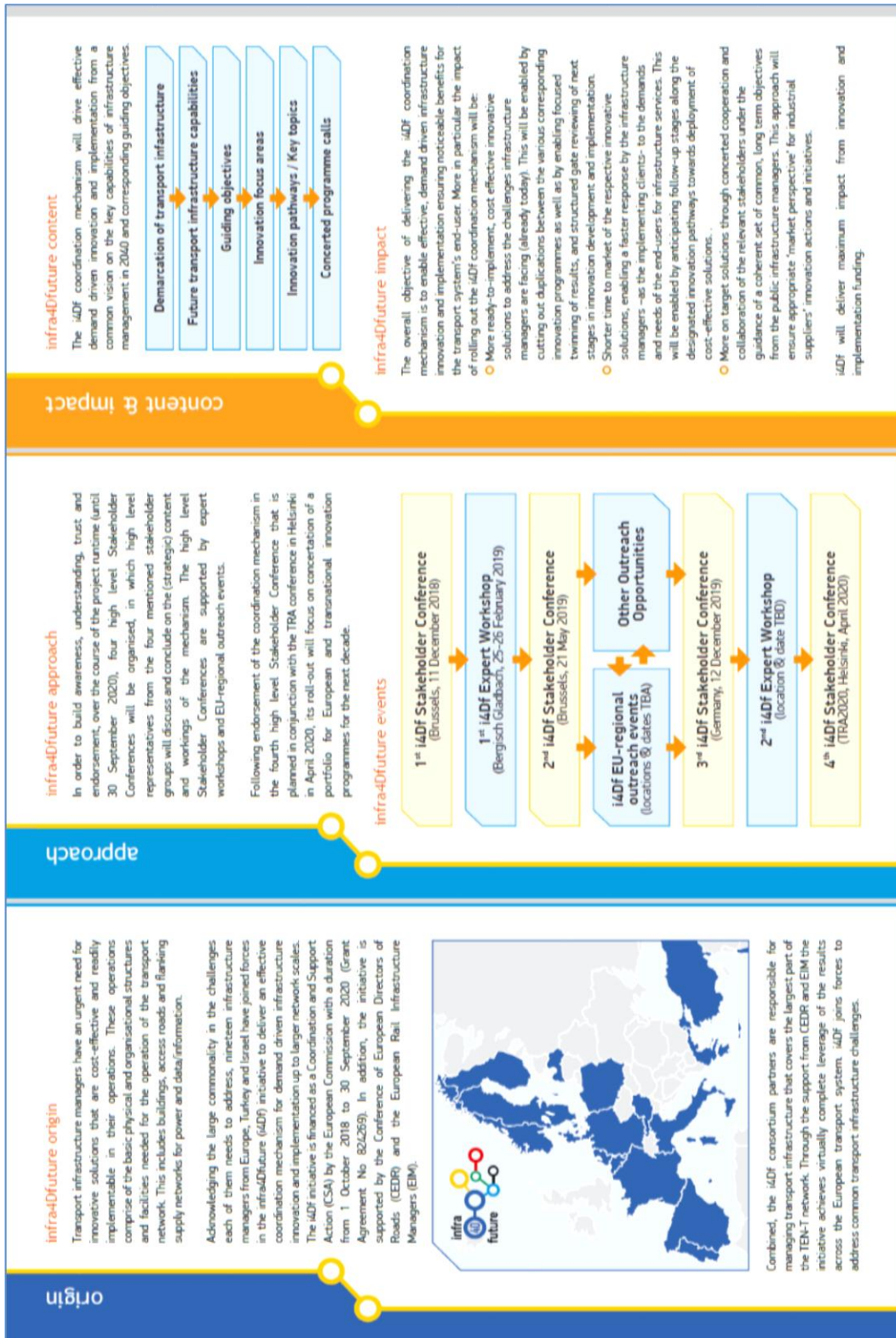
Peter Wilbers, Rijkswaterstaat
peter.wilbers@rws.nl, +31622907912

Richard van der Elburg, Rijkswaterstaat
richard.vanderelburg@rws.nl, +3125398527

www.i4df.eu

@i4dfproject

www.linkedin.com/groups/13655794/



ANNEX VI



Coordinating
Transport Infrastructure
Innovation and
Implementation



Transport infrastructure capabilities for 2040

Draft for 2nd i4Df Stakeholder Conference 21 May 2019

Version May 2019

A common innovation ambition of transport infrastructure managers in view of their investment challenge

Executive summary

A well performing transport infrastructure network is essential for achieving the European ambitions and goals on competitiveness, growth and jobs, achieve alignment with the UN Agenda 2030 and related sustainability goals, which the EU has played an important role in shaping. Infrastructure is essential for the prosperity of Europe, especially in the peripheral areas. Its sustained provision in reference to the demands and requirements from the economy, society and environment poses a major investment challenge to the public infrastructure owners and managers. This investment challenge is the key driver for the infrastructure managers' ambition to cooperate on infrastructure innovation and implementation actions, starting with the next multi-annual financial framework of the European Commission (2021-2027).

This document presents the reference base for further elaborating on this cooperation ambition: a common, systemic vision on surface transport infrastructure capabilities for 2040 and the main innovation areas that need to be evolved in order to reach the capabilities. The infrastructure capabilities and the innovation focus areas (IFAs) will serve as a guiding framework for structured, demand driven cooperation and collaboration between infrastructure managers, innovation programme owners, relevant industry and supporting research on infrastructure development, innovation needs and their implementation actions.

The document starts out by providing a demarcation of infrastructure, followed by a presentation of the three infrastructure capabilities for 2040 and their respective guiding objectives. The main part of the document presents 14 IFAs for the period until 2030. It concludes with a summary of requirements for professional competence development.

This document will be developed in steps. The current version reflects the outcomes of a consultation with infrastructure managers and the European Commission on 11 December 2018 (1st i4Df high-level Stakeholder Conference) and European experts from 16 countries during the 1st i4Df Expert Workshop (25-26 February 2019). The current version of this document is a preparatory document for the 2nd Stakeholder Conference that will take place 21 May 2019 in Brussels, Belgium.

1

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Introduction

The coordination and concertation of infrastructure innovation and implementation across the portfolio of EU and transnational programmes and initiatives will be done from a reference to future 'capabilities' that infrastructure managers expect to provide to the end user and society as a whole. Although presented here as independent entities, the following set of three capabilities work interdependently:

Infrastructure optimally meeting end user needs. The ability to provide the optimal transport infrastructure network capacity in order to accommodate ever increasing transport needs, and balancing cost, performance, safety and risk to provide infrastructure as a high quality service to end users.

Infrastructure meeting environmental and social sustainability needs. The ability to embed transport infrastructure networks in their immediate surroundings, optimally balancing interests from economy, society and environment.

Infrastructure achieving added value from digitalisation. The ability to harvest the benefits from digitalisation in internal processes of transport infrastructure management (e.g. planning, design, construction, operation, end-of-life) as well as in the relation between transport infrastructure management and its end user (smart mobility and logistical services, individual end users).

In the following sections of this document, first a demarcation of infrastructure management is presented, followed by a description of each of the three capabilities in terms of guiding objectives for 2040, the corresponding innovation focus areas (IFAs) that are key to achieving these objectives, and a first indication of professional competences that need to be developed alongside the innovation development and implementation.

The description in this document is aggregated at a strategic level as to support awareness, understanding and support at decision making levels. Further elaboration of the IFAs (in terms of specific challenges the infrastructure managers need to address, the expected impacts and the corresponding topics) will be achieved by engaging with a wide community of experts, starting with the discussions at the 1st Expert Workshop.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Demarcation of Infrastructure Management

In the i4Df initiative, the focus is put on transport infrastructure innovation and implementation for road, rail, waterborne and airborne transport of passengers and goods. As one of three components of the transport system, the trend for infrastructure management is towards rapidly growing interdependencies with vehicles, logistic and mobility services. As a consequence, the boundaries within the system become increasingly blurred. From this perspective, any demarcation of infrastructure management should be considered with appropriate flexibility. From this, a priority is on understanding these interdependencies and corresponding cross-cooperation and collaboration with the other stakeholders.

Demarcation and geographical setting

In the context of the i4Df initiative, transportation networks are a spatial framework of routes linking locations, enabling transport of people and goods from origin to destination. The routes can be tangible such as is the case with roads, railways, waterways, or less tangible such as is the case with air and sea corridors. The initiative focuses on the management of tangible infrastructure networks for surface transport in which 'infrastructure' is defined as the physical ('hard') and organisational ('soft') structures and facilities needed for the operation of the transport network. This includes the linear links and intersections, the corresponding buildings, the power and data/communication supplies and interconnections to all internal and external stakeholders and end users, as well as the governance and management structures and procedures across the line of sight from ministry to market.

In terms of geographical setting and functionality, the initiative focuses on the TEN-T comprehensive networks (links and nodes), including relevant supporting sections of the non-TEN-T networks that carry most of the traffic and are strategically most important (e.g. also in the context 'military mobility'). Airports and waterborne ports are regarded as singular nodes in the network with focus on accessibility, availability and reliability of the (inter) links.

These urban and economical nodes have an essential role in enabling effective and efficient distribution of passenger and freight flows across the multimodal European transport area. They can be of different scale and organisation but are typically set in the densely populated areas and economic centres of Europe. The utilisation of these nodes is usually to the maximum service capacity, i.e. highly congested.

The end user of the infrastructure network includes the direct user of the network and stakeholders who provide services and data for information to the direct users.

Key trends, drivers and enablers for infrastructure innovation

Infrastructure managers provide a broad range of services to the end users. Currently, the European mobility system is in rapid transition towards the provision of higher service quality to the end user from the perspective of an increasingly integrated system, enabling seamless and well informed movement of passengers and freight from origin to destination across different modes. Key challenges to this service provision are: the requirements of replacement and renewal; the intense competition for space and fiscal budget; demands and opportunities from digitalisation for economy and society; the sensitivity to economic and social pressures from disruption (e.g. end of life cycle, natural and manmade events); liveability and sustainability, adaptation to climate change; and the opportunities to synergise with data and energy network management (e.g. with TEN-E, the Trans-European Networks for Energy, in greening the transport energy pool).

The manifestation of these trends will be particularly noticeable on the 'soft' side of infrastructure as about 90% of the future physical infrastructures already exist today whereas this is only the case for approximately 10% of the organisational structures. For example, the impact of digitalisation will be a game changer throughout the current infrastructure management and operation as the rapid ingress of data will affect every aspect in the operational processes. On top, digitalisation will drive new, currently unknown business models which subsequently will drive profound changes in societal attitudes and behaviour, in turn affecting the current role and position of infrastructure managers.

3

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.

Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



- Quality orientated process control during the whole infrastructure life cycle based on existing technical standards for sensors and data processing. Among others, this can include full remote condition monitoring, robotics and BIM using automatically self-generated data from construction processes.
- Cost efficient, safety-orientated and intelligent maintenance planning systems, including digital twins and the network categorisation to determine optimal availability levels.
- Integrated mobility management systems to ensure minimal impact on accessibility during infrastructure construction projects.

1-2 Integrated infrastructure life-cycle management

Specific challenge:

The benefits of an integrated infrastructure life-cycle management from planning, building, operating to decommissioning are widely accepted, but the deployment of this approach needs to be facilitated further. There is a need to balance the use of affordable technical assets and good value services for maintenance and operation to ensure a high service quality to end users at a justifiable cost.

Expected impacts:

It is expected that innovations in this IFA will significantly increase the uptake and mainstreaming of life-cycle management across all transport infrastructure, especially for transnational and multimodal infrastructure.

Potential topics:

- Further social, economic, technical and environmental optimisation studies for sustainability of life cycle management are necessary which take into account all transport modes.
- The optimisation of Life-cycle costing (LCC) will allow justified investments and maintenance costs and lead to cost efficient and effective operations and the development of long-lasting structures.
- Infrastructure adapted to future needs and technologies. The development of long lasting infrastructure for future needs and to accommodate upcoming technologies, materials and construction methods will minimise future maintenance measures. From the beginning, the infrastructure has to be planned in a multi-functional manner considering cables, water pipes and further infrastructure to be installed within the infrastructure. Focus should be on the use of circular economy, i.e. recycling of materials and structures.
- Asset management system development: A self-sustaining asset management system including the focus on intermodal infrastructure needs to be designed, created and maintained. Life cycle analysis (LCA) and condition based management (CBM) are tools for the creation of predictive maintenance measures that should also include societal business cases. In this context, a performance-based approach has to be considered, i.e. actions on structures based on the introduction of a performance based standard (PBS) approach and a smart infrastructure access programme (SIAP).
- For each of these disciplines, a planning of the development in relation to the technological process needs to be created.
- For international operators, the use of national databases will become necessary and ways how to use this data have to be figured out.
- Decision making & costs: An assessment of the impact of the LCA, taking into account all different single transport modes from planning to operation and maintenance. This will allow the optimum allocation of the available budget. Ideally, this LCA needs to consider justified investments / maintenance costs of the whole life cycle as well as cost efficient and effective operations.

5

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



- Sound coordination of all phases of planning activities of the various stakeholders by means of precise simulation including an outlook on operation (principle of digital twins).

Links to other IFAs:

There is a link to IFA 1-1 “Guaranteed health and availability” that includes infrastructure asset management from a construction perspective taking into account the concept of digital twins.

1-4 Responsible procurement fostering strong innovation delivery mechanisms

Specific challenge:

Transport infrastructure owners and managers are facing a number of challenges in the implementation of innovations in the process of modernising the European transport infrastructure. Procurement is at the heart of this process as it manages the interaction and the risk sharing model between the public sector (i.e. usually the owner of the infrastructure) and the private sector (i.e. the contractors) when innovations are being deployed during the modernisation of the transport infrastructure. Additional pressure is put onto infrastructure owners and managers to use their purchasing power to support wider societal (e.g. support of SMEs, social return clauses to support apprenticeships) and environmental (e.g. use of recycled material) goals. Current procurement procedures are often seen as a barrier for the application of innovative approaches, transnational cooperation and the achievement of targets for wider societal goals such as sustainability. Procurement procedures and instruments need to evolve with the innovations that will be delivered on the transport infrastructure network to speed up the uptake and implementation of innovations.

Expected impacts:

Innovations in this area will strengthen the role of procurement in the early phases of the transport infrastructure projects when decisions are made about the scope, goals on innovation in the project, and collaboration with (transnational) public partners and the private sector. This will be achieved through novel collaboration structures and procurement parameters, developed and tested in a multi-modal and transnational context. The expected impact is a quicker and easier implementation of innovations during the modernisation of the European transport infrastructure.

Potential topics:

- Innovative contracting for construction and maintenance could play a key role in providing greener and more cost efficient transport infrastructure. The role of life-cycle costs analysis (LCCA) could be strengthened as a selection criterion during tendering procedures, considering aspects such as carbon footprint, material durability and other environmental impacts. Further, innovative contracting could support shared and unified procurement platforms in Europe for generic systems, components and subsystems (e.g. as already used in the automotive and aviation industries) in order to move away from customised locked-in systems.
- Innovative risk sharing and management approaches could provide suitable models to share risk between infrastructure owners, end-users, designers (e.g. design-build tenders) and contractors.
- In order to encourage innovative practices in contracts, innovations need to be assessed (e.g. simulation models) to optimise procurement processes. The use of proof of concept demonstrators for innovations will also facilitate and speed up procurement and deployment procedures.
- Linked to procurement processes are also innovative financing approaches to raise funds for new infrastructure investments.



Coordinating
Transport Infrastructure
Innovation and
Implementation



1-5 Key Performance Indicators to meet the end user's mobility and logistics needs

Specific challenge:

Transport infrastructure owners and their end users are currently facing a rapid change in the mobility and the transport infrastructure sector. Digitalisation is one of the main causes for these rapid changes as it enables infrastructure owners and their end users to benefit from new information sources that enable more informed decisions about the services infrastructure owners provide or journeys end users take. Further, end users are also becoming more conscious about the use of the transport infrastructure and they put more value on aspects such as sustainability or a access to digital services whilst using the infrastructure. Hence, it is clear that infrastructure owners need to broaden their understanding of end user needs (i.e. mobility and logistics) in order to provide services that are satisfactory to them. From an end user perspective the division line between modes (incl. new mobility services like MaaS) will become more blurred as the smart phone will become the main tool to influence daily mobility decisions.

Current key performance indicators (KPIs) and assessment techniques that are being used by infrastructure owners to measure end user needs do not reflect accurately the described changes. New KPIs are required that reflect the changing relationship between infrastructure owners and their end users. This puts infrastructure owners into the position to have a dynamic relationship with end users that results in better services and shapes the needs of end users.

Expected impacts:

Innovations in this area will facilitate infrastructure owners to become institutionally prepared to meet emerging end users' mobility and logistics needs. Among others, this will result in the development of new multimodal KPIs, data collection approaches, and analysis techniques and assessment tools.

Potential topics:

- Infrastructure owners need to develop updated definitions of their end users and their changing needs until 2040. These need to recognise and appreciate the varying acceptance and user needs for solutions across the EU. A dynamic exchange with end users is required to reflect the fast changing needs in the coming years.
- Current KPIs need to be thoroughly reviewed and updated. This includes the actual definition of the KPIs, their measurement techniques and the threshold values. The KPIs should reflect a wide set of end user needs, also including needs from the logistics sector. Market observations and big data (i.e. more value from data) could also be used to anticipate user needs.
- Implementation of services to provide synchro-mobility solutions, e.g. synchro-modal journey planning, tools for users including travel costs and reliable traffic info, and logistics related topics. This requires a clearer understanding of the data formats required and the use of new data sources (e.g. in-vehicle data provision).
- Solutions for interoperability with logistics planning and electronic transactions (e.g. block chain) along the logistics chain.
- Dynamic management of KPI's to regularly adjust to changes in user needs.

Links to other IFAs:

There are links to IFA 1-2 "Integrated infrastructure life-cycle management", IFA 1-3 "Service timed to the second" and IFA 3-4 "Data-driven and digitalized asset management".



Coordinating
Transport Infrastructure
Innovation and
Implementation



1-6 Strategies and approaches for ensuring optimal safety, security and resilience of the infrastructure network

Specific challenge:

Serious events such as disasters and terrorist attacks illustrate the importance of improving the safety, security and resilience of transport infrastructure. It is therefore necessary to engage in a holistic examination and appraisal of the transport infrastructure to establish the degree to which mechanisms are in place for preparing and planning for, as well as coping with and adapting to unexpected and adverse events, and making the infrastructure operational again as quickly as possible.

In the context of transport infrastructure, operators strive to ensure that transport assets and services function continually and safely in the face of a range of existing and emerging hazards. An effective risk assessment needs to be performed in both categories of events, natural disasters and terroristic attacks, by the Transport Infrastructure Manager. This has led to a specific focus on the concept of resilience and how this can be defined, measured and improved across the transport system. Following the results of this risk analysis, proactive measures to prevent these threats may be planned and taken, but also, mechanisms to face occurrence of hazards must be elaborated and activated. Use of new technologies and innovative technological tools will ensure integrity of the transport infrastructure and safety of end-users in a most effective way.

Expected impacts:

Significant improvement of transport infrastructure resilience to man-made and natural disasters. Achievement of zero fatalities and severe injuries of infrastructure workers and end users due to maintenance and construction works.

Potential topics:

- Intelligent construction site planning taking into account the effects on traffic safety of workers and passengers: The Intelligent Transportation Systems can be used to improve traffic flow and safety on roads by work zones: network cameras, traffic sensors, VMS and alert flashing signs. These innovative tools are established to reduce work zone-related congestion and improve safety. They provide delay and speed information to warn motorists of slowed traffic ahead and encourage diversion. Smart lighting, changeable speed limits may also be used to improve safety. Automated construction equipment will diminish construction and road closure time.
- Holistic consideration and assessment of the resilience of the transport infrastructure using risk-based approaches: Risk assessment is indispensable in order to identify threats, assess vulnerabilities and evaluate the impact on assets, infrastructures or systems taking into account the probability and the severity of the occurrence of these threats. Proactive engineering measures need be taken after a comprehensive risk assessment for every transport infrastructure segment. Moreover, innovative technological tools, such as satellite information systems (GNSS), early warning and public awareness digital panels, radio channels and digital telephony, are some of the potential means to mitigate the impact of natural hazards. The holistic consideration includes measures taken prior to an event, mechanisms addressing an incident under real-time conditions and recovery actions.
- Vulnerability analysis for infrastructure elements. Identification of critical elements: Vulnerability may be comprehended as the susceptibility to the damaging effects of a hazard. Specific vulnerability assessment for all critical elements, especially tunnels, bridges and intersections, must be carried out with regard to natural hazards: earthquakes, floods, landslides, storm surges. Intelligent monitoring may be effective with view of planning proactive measures. The INFRARISK project identified bridges, tunnels, earthworks (embankments and cuttings), retaining walls, road pavements, railway tracks and drainage systems as decisive civil engineering assets to provide safety and availability of land transport infrastructure.
- Dynamics safety management systems for motorways, bridges and tunnels: There is a growing trend in development and application of real-time crash risk prediction models within dynamics safety management systems. These real-

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



time crash risk prediction models are constructed by associating crash data with the real-time traffic surveillance data, collected by loop detectors. The objective is to develop real-time prediction models that will potentially appraise the traffic safety condition of a motorway. Application of these prediction models to bridges and tunnels, most vulnerable assets of transport infrastructure, is a challenge for road operators.

- Online security analysis and risk assessment for real-time recommendations for tunnel operators and tunnel control centers: Flexible, modular and innovative systems comprising detection sensors and risk assessment models are the core elements of new methods to prevent incident risks in tunnels. These methods help to pool the data as well as perform real-time analysis, plausibility checks and evaluation of safety-relevant data from various detection systems. Common traffic information and innovative detection data will be combined, merged and prioritized in real time. Through the integration of conventional and new detection technologies, such as infrared technology, Automatic Incident Detection (AID), or video detection, into the existing monitoring system of road tunnels, an optimization can be achieved, especially in the field of prevention.
- IT-security of tunnel and traffic control centers and strategies for improvement and protection: Industrial Control Systems (ICS's) in the Transportation Sector includes supervisory control and data acquisition (SCADA) systems, distributed control systems (DCSs), programmable logic controllers (PLCs), and general-purpose controllers (GPCs). Most ICSs began as proprietary, stand-alone systems that were separated from the rest of the world and isolated from most external threats. Today, widely available software applications, Internet-enabled devices and other non-proprietary information technology (IT) offerings have been integrated into most ICSs. This connectivity has delivered many benefits, but it also has increased the vulnerability of these systems to malicious attacks, equipment failures, and other threats. As a rule, ICSs must operate continuously and reliably, often around the clock. Unlike IT systems (which process, store, and transmit digital data), ICSs typically monitor the system environment and control physical objects and devices, such as switchgears, message signs, and valves; these devices are often located in remote locations.

DRAFT



Coordinating
Transport Infrastructure
Innovation and
Implementation



Infrastructure meeting environmental and social sustainability needs

The ability to embed transport infrastructure networks in their immediate surroundings, optimally balancing interests from economy, society, and environment.

Guiding objectives for 2040

Optimal contribution to climate change mitigation

- Facilitate the energy transition of the surface transport system. This concerns the transition in the energy pool of the transport modes and supporting measures to improve energy-efficiency of mobility services (passengers, freight).
- Minimise carbon footprint of the whole service-life of infrastructure, including the infrastructure delivery process chain.
- Achieve energy neutrality of the infrastructure management process. This concerns overall energy balance of the daily operational processes, e.g. lighting, signalling, data collection, information provision, lifting and ventilation.

Optimal contribution to liveability

- Collaborate on the minimisation of the impact of noise, vibration and pollutant emissions. This concerns the share of the impact that is contributable to infrastructure management.
- Collaborate on the optimal net benefit from embedding infrastructure in the spatial setting. This concerns the 'how' in infrastructure governance, balancing benefits for the economy, society and environment in the planning and approval stage.
- Compliance with COP21 and Agenda 2030/UN targets for sustainable development in the context of European objectives and targets.

Innovation Focus Areas

2-1 Resource efficient manufacturing, construction, operation and deconstruction

Specific challenge:

The transport infrastructure authorities need to contribute to the transition towards a circular and decarbonised society. This requires innovative, integrated approaches and strategies ensuring minimal reliance on non-renewable resources while securing a high degree of performance, efficiency and sustainability for the entire manufacturing and delivery chain.

Expected impacts:

Successfully addressing this challenge requires large scale transformations in which the public infrastructure authorities and industrial parties join forces to achieve the appropriate economy of scales from common objectives and perspectives. The innovation focus is on delivering a validated, next level suite of models, methods and data.

Potential topics:

- Frameworks and strategies for the distribution of costs, benefits and risks across the actors in the manufacturing and delivery chain.
 - Approaches to consider deconstruction/recycling during the planning and design phase of the lifecycle.
 - Approaches to enhance the reuse or recycling of construction materials at minimal (energy) costs while complying with technical requirements.

11

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



- Practical common toolbox for applying circular economy principles at low carbon energy costs

On the short term, innovation activities should focus on delivering a common toolbox of practical guidelines and specifications, building on the principle of learning from each other's strengths, utilising the various available good practices. Following the focus should be on delivering the (validated) next generation of these tools.

 - Methods for manufacturing, refurbishing or rehabilitating transport (related) infrastructures with the objective to significantly extend functional life spans of infrastructures.
 - Performance-based design models and manufacturing techniques (e.g. 3D-printing) with the objective to substantially reduce materials consumption.
 - Common ecological assessment methods and models for alternative materials.
- Assessing the sustainability of scaled-up approaches integrating circular economy principles

Applying circular economy principles does not necessarily translate into more sustainable practices. Robust life-cycle assessments are needed to support the deployment of innovative solutions. Hence the following shall be pursued:

 - Development of common databases related to (but not limited to) hazardous substance contamination/release, carbon footprint, energy and virgin material consumption over infrastructure service-life.
 - Harmonisation of calculation protocols and tools for life-cycle analysis ensuring transparency, comparability and reliability of assessment results.
- Developing methods, models and guidelines for sustainable procurement practices
 - Public authorities' involvement is key to a successful transition of new approaches into practice. Procurement practices shall evolve to foster a strong, stable demand for low carbon, resource efficient solutions. Accelerating these changes calls for the widespread development and promotion of methods or guidelines in public procurement building upon the latest scientific/technical/organisational advances and needs to helping innovative companies to reach proper economies of scale for a wide diffusion of best technologies/practices.

2-2 Advanced strategies and approaches for accommodation of the energy transition in transport infrastructure.

Specific challenge:

The transport system is committed to deliver its share in achieving the COP 21 targets. In addition, infrastructure management operations hold significant leverage on the energy transition and efficiencies in transport means (e.g. electrification, renewable energy) and transport operations for passengers and freight (e.g. through intelligent traffic management). Further on, the surface area and adjacent areas of transport infrastructure offer opportunities for harvesting energy. As part of the energy transition, energy efficiency is an important measure to reduce greenhouse gas (GhG) emissions, especially in infrastructure construction industry and operation. Infrastructure authorities across Europe and beyond already invest in innovations concerning energy efficiency, energy harvesting and the integration of energy (transport) systems in the transport infrastructure. However, this mostly occurs on a small case by case or pilot manner.

The biggest challenge here is combining the needs for roads and mobility with the needs and business models of the energy systems and energy sector. Therefore it is crucial to include the new stakeholders as partners (TSO and DSO¹, as

¹ TSO, Transmission System Operators (in NL, TenneT) and DSO, Distribution System Operators (in NL, Alliander, Stedinetc)



Coordinating
Transport Infrastructure
Innovation and
Implementation



well as producers) in the process in a systematic way. But it also implies that road authorities should be prepared to participate in climate and energy initiatives as one of the stakeholders, and need to communicate the needs and characteristics of the transport sector clearly in order to come to safe and sustainable solutions.

There are links to other the IFA 1.2 Integrated infrastructure life-cycle management, IFA 2.4 Advanced approaches and strategies for the integration of (urban) nodes in the TEN-T networks – multimodal, multi-scalar, and multi-objective, IFA 3.1 Managing the transition towards the accommodation of automated transport on road, rail and waterways infrastructure and IFA 3.3 Secure and resilient data and information provision across the multimodal, transnational network (road, rail, water, air) for all users.

Expected impacts:

- The closer integration of the strategic transport networks with the strategic energy networks on European, national and regional level.
- The increased production of renewable energy on transport infrastructure's assets.
- The seamless legislative integration of the new processes.
- The reduction of energy consumption by more efficient technological operations, e.g. while operating tunnels (LED technique) or maintaining roads.

Potential topics:

- Preparation of transport authorities for the energy transition:
- Integration of refueling and recharging infrastructures for electric vehicles, including energy logistics at rest and parking areas.
- Adaptive lighting systems to reduce energy consumption based on traffic volumes, luminance external values and road characteristics. Use of alternative ways to reinforce luminance at the entrance of tunnels by deploying natural light through mirrors and wave guides.
- Identification and assessment of the potential of harvesting renewable energy on infrastructure and its verges and assessment of the related challenges, e.g. impacts on land use.
- Assessment of the contribution of vehicles to storage capacity (vehicle2grid).
- Strategies for eco-efficient traffic flow management across corridors and routes.
- Energy management of the transport process, including cross-modal alignment and investments of the transport network in respect to the energy network.
- Foster best practices as new standards and share a cross-modal strategic programming approach:
- Development of supporting policies, including the fostering of new or harmonisation of existing standards.
- Support of the social acceptance of the transition process.
- Examples of partnerships of road authorities and TSO/DSO to foster shared standards.
- Facilitating modal shift towards „low energy“ transportation



Coordinating
Transport Infrastructure
Innovation and
Implementation



2-3 Collaborative strategies and approaches to minimise environmental impact

Specific challenge:

Minimizing environmental impact of the transport system requires innovative approaches and strategies that aim on establishing effective collaboration between transport means, logistical and mobility services and Infrastructure management.

Innovation focus is on the reduction of noise and vibration, reduction of pollutants to air, soil and water, and preservation of habitat and biodiversity.

Expected impacts:

- Improvement of human health, in particular in the immediate surroundings of the infrastructure networks.
- Improvement of environmental performance of the transport system as well as improvement of habitat quality and biodiversity.

Potential topics:

- Reduction of noise and vibration: Main focus has to be laid on the emissions from wheel-surface contact (source measures), but also noise abatement techniques (next generation noise barriers) and advanced traffic control and management strategies have to be considered. It is further necessary to improve the understanding of the impact of noise on human health (dose-response relationships).
- Implementation of a BIM system for noise measurements: Creation of appropriate tools to manage the design, implementation, operation and maintenance of noise mitigation measures, simulating noise perception (immersive virtual reality) to test the effectiveness of noise mitigation measures and of noise impact as a whole for environmental impact assessment.
- Reduce costs of noise mapping activities: Automation of the process of noise mapping, considering the possibility of using mobile phones could help to improve the accuracy level of noise maps.
- A large monitoring network, interconnecting public databases and further information systems (noise, air quality, traffic and meteorological data) would allow to achieving an overall view of the environmental impact.
- Reduction of emissions or transport to air, soil and water: This topic focuses on the emissions of NO_x, PM10, PM2.5 but excludes CO₂ emissions. The consideration and development of new pricing techniques unified on European level) based on pollutant emissions (noise, air, water) will lead to a re-thinking and the investigation of possibilities to mitigate air pollution directly at the source (smaller cars, gas treatment, brakes made of different materials).
- Treatment of emissions: Explore and implement the possibility to keep treatment options as natural as possible, taking into account the related space consumption and considering biodiversity. The implementation of on-site water run-off treatment using the local soil in the existing network should be facilitated for both the road and rail mode.
- Preservation of habitats and biodiversity: Based on a common understanding of what the habitats are and how they are affected by infrastructure (and transport), it is necessary to connecting the whole habitats, to allow the migration of species. Integrated solutions need to be taken into account reflecting the various aspects related to environmental impacts. Opportunities of the existing space belonging to the infrastructure have to be investigated to preserve and improve biodiversity.
- Use of new techniques: Drones have the potential to change the system delivery of freights. The necessity for more space for parking drones has to be investigated, taking into account their emissions (noise) and new safety questions.

14

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



2-4 Advanced approaches and strategies for the integration of (urban) nodes in the TEN-T networks - multimodal, multi-scalar, and multi-objective.

Specific challenge:

The European transport infrastructure system holds significant prospective efficiencies in accommodating the transport demand whilst addressing the challenges from economy, society and environment. Current practices in planning and design are typically focused on one specific infrastructure layer (i.e. local, national or international). This results in a situation where each planning entity only acknowledges to a limited extent that the subject under attention is part of a larger and dynamic system. This current practice has a significant impact on multimodality for passenger and freight, and how innovations are being deployed on the network.

Expected impacts:

Innovations in this area could lead to a better integration of varying planning levels to achieve a better performance of the TEN-T network and accessibility of urban nodes. This will reduce the need to allocate additional space for transport infrastructure and enable the more efficient use of the existing space already allocated to infrastructure. End users will improve their understanding and appreciation of the net benefit of transport infrastructure across various levels for economy, society and environment.

Potential topics:

- Mutual understanding and identification of innovative synergies among priorities at local, regional, national, European and international level.
- Smart networks and green planning of infrastructure. Involvement and participation of end users in the planning processes for transport infrastructure across different layers.
- Understand the impact on planning processes of the emergence of new, more sustainable transport business models for passengers and freight.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Infrastructure achieving added value from digitalisation

The ability to harvest the benefits from digitalisation in internal processes of transport infrastructure management (e.g. planning, design, construction, operation, end-of-life) as well as in the relation between transport infrastructure management and its end user (smart mobility and logistical services, individual end users). Use digitalisation to support the achievement of sustainability targets and provide a better service to infrastructure end users.

Guiding objectives for 2040

Full accommodation of connected and automated mobility, maintenance, and construction concepts on transport infrastructure

- Facilitate the transition towards smart mobility concepts (freight and passenger) for emerging concepts for automated mobility, e.g. Connected Cooperative and Automated Mobility (CCAM) for road and Automatic Train Operation (ATO) for rail.
- Use automated, semi-automated and remote-piloted solutions for infrastructure maintenance and construction to improve safety for workers and reduce costs.
- Proactively define the capabilities of infrastructure in the accommodation of automated and connected mobility, maintenance and construction solutions.

Optimal position in evolving data-driven infrastructure management processes

- Proactive position of the infrastructure manager within the infrastructure related data-driven ecosystem, including clearly defined data flows between multimodal, -national and -sectoral stakeholders.
- Ability to process internal and external raw data into smart data that can optimize infrastructure management processes, including maintenance and construction of infrastructure.
- Provide seamless data and information use and provision across the transport infrastructure network and logistics chain to the end user.

Physical, digital and virtual infrastructure aligned with data networks and energy grids.

- Facilitation of the alignment of TEN-T core network with data and energy networks to benefit from multi-purpose digitalised networks that can cater for future digital needs, e.g. Internet of Things (IoT) and smart grid based electric mobility.
- A clear business model and case for investment in and maintenance of digital and virtual infrastructure.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Innovation Focus Areas

3-1 Managing the transition towards the accommodation of automated transport on road, rail and waterways infrastructure

Specific challenge:

The entire mobility system is currently in a transition phase towards higher levels of digitalisation: This will result in more connected and automated functionalities, both for vehicles using the infrastructure and the infrastructure itself. The division line between "intelligence/knowledge" in the vehicle or infrastructure will become blurrier, which will have a multitude of effects on the relationship between vehicle owner, vehicle manufacturer and infrastructure manager. The coming decades will be a period for infrastructure owners with guaranteed uncertainty regarding, among others, vehicle penetrations rates, automated functionalities and, digital and physical infrastructure requirements. The key challenge for infrastructure owners will be to navigate these uncertain times by developing suitable governance models that foster an institutional readiness to tackle a variety of interdependent issues that infrastructure owners are currently facing:

- The position of the infrastructure owner within the value chain and governance structure of the deployment of connected and automated vehicles is subject to cross-sector (i.e. OEMs and infrastructure owners) agreement and alignment. Potential roles range from regulator, infrastructure provider to service provider.
- Understanding the impact of connected and automated vehicles from the perspective of infrastructure owners' core business activities, such as road safety, traffic efficiency customer service, maintenance and construction.
- Understanding the role of the infrastructure owner as the contributor and manager of the ODD that different types of CAVs will operate in. A clear business case for infrastructure owners to optimise the ODD through changes to the physical and digital infrastructure is still missing
- A multitude of research and innovation activities will be required to tackle the stated challenges. Even though there are numerous CAV research projects and test sites, they are often not looking at the needs of the infrastructure owner. Current research activities on impact assessment of the deployment of connected and automated vehicles have mainly focused on the perspective of the vehicle manufactures and wider societal issues.

Expected impacts:

Innovations in this area will facilitate infrastructure managers to become institutionally prepared to better plan and deploy strategies towards the accommodation of connected and automated transport on their infrastructure.

This will result in new governance structures that are based on new stakeholder processes across the value-chain of connected and automated vehicles. The structures and processes are established through a thorough understanding of potential impacts on the core business of the infrastructure managers that arise through varying penetration rates of mixed CAV fleets. This should place the infrastructure manager in an assertive position with a suitable business case to deploy and manage infrastructure elements of a complex Operational Design Domain (ODD) that enables CAVs to fulfil the expected positive effects on safety, traffic efficiency and other core business activities of infrastructure owners.

Potential topics:

- The investigation of the new and evolving role of the infrastructure owner in the context of the deployment of connected and automated vehicles. The role requirements include, among others, the supervisor of digital governance, strong stakeholder position in the value-chain of connected and automated vehicles, and an evolving of a sustainable business model for accommodating connected and automated vehicles. The new role will be based on a skilled workforce that is able to tackle the accommodation of connected and automated vehicles.
- The development of an impact assessment assessing the impact on the core business activities of infrastructure owners. The impact assessment needs to consider the evolving penetration rates of passenger and freight CAVs

17

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



fleets. The results need to provide clarity on the limitation of the current infrastructure (incl. tunnels and bridges) to derive approaches (e.g. limiting platooning on structurally weak infrastructure) to tackle potential side effects of the CAV deployment.

- Formulation of digital infrastructure requirements and the related business case for the deployment of connected functionalities.
- Identification of CAV functionalities that can support the core business activities of infrastructure owners, e.g. the use of CAV sensor data to collection data about infrastructure condition.
- Broaden the range of CAV testing activities to better consider the needs of the infrastructure owners. Testing the use of CAVs in infrastructure owner fleets, e.g. for safety vehicles during road construction.
- The newly developed "Infrastructure Support Levels for Automated driving" (ISAD), which strongly focuses on the needs of the infrastructure owners, is a first vital step in defining different ODD infrastructure classifications that can support the accommodation of connected and automated vehicles. The classification needs to be developed further to include wider aspects that consider the needs of infrastructure owners. This can also include aspects such as digital twins (e.g. OpenDrive) that can be used for the navigation of CAVs.
- Development of test facilities and processes that cater for the research needs of the infrastructure owners.

3-2 Advanced approaches and strategies for automated construction, maintenance, strengthening and inspection of infrastructure by artificial intelligence

Specific challenge:

The use of robotised equipment, drones or other (semi)-automated remote-piloted solutions and artificial intelligence (AI) is developing fast and applications are likely to become mainstream within the next years. Workers will work side-by-side with different forms of robotised equipment and get decision-making support from artificial intelligence. A transition phase, where old and new techniques are co-existent, is unavoidable. The following three different areas, which have their own specific challenges, can be identified in this IFA:

- Robotization in infrastructure will mainly be used for equipment to do heavy operation without using man power. Before 2030 remote control of individual machines by means of "joystick"-operation will be available and after 2030 gradually remote control of the complete work from a control room will become available. In this end situation the construction/maintenance process could potentially be completely driven by software-applications, which will also be capable to correct small deviations from the pre-programmed job execution. For bigger deviations control room operators are needed to intervene.

Standardising, modularising and industrial prefabrication of large percentage of the infrastructure and the use of 3D-printing techniques will ease the way to automate most construction, repair and retrofitting projects. Further, the use of BIM can be seen as a precondition for the deployment of robotised equipment.

- Data acquisition through sensors in or attached to the infrastructure, remote sensing by drones or high speed inspection vehicles and in-car data will gradually replace visual inspection and static extraction of specimens to control the specification and mechanical and chemical behaviour. This transition requires a relative long transition period in which data acquired by new techniques must be validated and calibrated with respect to current techniques. There is a challenge that sensors in the infrastructure might have a shorter lifetime than the infrastructure itself.
- Data interpretation by AI can both improve the maintenance/construction process and improve the determination of the correct maintenance moment. AI is only possible if BIM or other equivalent techniques are available and reliable. It is assumed that a data authority is required to regulate availability and reliability of

18

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



both data and the analytical tools. The transition from quality control based on fewer measurements to AI of less accurate but continuous measurements will require induce changes in construction standards.

Expected impacts:

Innovations in this area will facilitate infrastructure managers, among others, to improve workers health, reduce costs, and avoid traffic hindrance. It is expected that there will be a significant reduction of the labour shortage in the road construction and maintenance sector by developing less labour intensive processes for construction and maintenance. The quality of inspections can be improved, because up until now non-accessible locations (small pipes, under water, pillars etc.) and (almost) continuous and instant monitoring opens the doors to very accurate big data analysis. The governance structures of infrastructure managers will be adjusted to include AI into decision-making processes across the entire organisation.

Potential topics:

- An assessment of the barriers for the use of robotization in the construction processes could facilitate infrastructure managers to foster an innovation friendly environment that enables contracts to invest in more robotized equipment. Enabling activities such as the use of BIM, modular construction, mobile factories, 3-D printing, and Augment Reality and Virtual Reality can support wider robotization of construction processes.
- New validation and calibration techniques for inspection data can support the acquisition of data from new and not widely used data sources. Data catalogues and data exchange procedures will enable infrastructure managers to exchange data with contractors along the value chain.
- Infrastructure managers need to review legal requirements and organisation structures to enable the certification of data that is processed by AIs. Certification and quality standards can support a n AI-based data ecosystem with a common "language", which can extend across the value chain of construction, maintenance and inspection processes.

3-3 Secure, resilient and smart data and information ecosystem across multimodal and transnational networks for all users

Specific challenge:

Data is becoming a more and more important resource for infrastructure owners and managers, but current data-related research activities have mainly focused on data provision and exchange to the benefits of service providers and end-users, e.g. for trip planning and information provision. The role of infrastructure managers and owners in a multimodal and transnational data sharing eco-system needs to be defined and developed to enable infrastructure owners and managers to benefit more from digitalisation and big data in their internal processes, whilst securing a high level data security and privacy. Key challenges include:

Infrastructure owners are already major producers and managers of data that use sophisticated systems that have been developed over decades. The key challenge for infrastructure owners is to connected legacy systems to the evolving multimodal and transnational data sharing eco-system. In this context the role of the National Access Points (NAPs) in enabling infrastructure managers to benefit from and provide data to a multimodal and transnational data sharing eco-system needs to be explored further.

Infrastructure owners have access to a wide range of data sources, but new data sources (e.g. crowd sourcing information about construction sites) are becoming available that enable new forms of data analysis from within the organisations, but also external actors take a more dominant role as data providers and analysts. The key challenge for infrastructure owners is to ensure a high data quality and the certification of external actors to process and analyse data for infrastructure owners and managers. This challenge also needs to be seen in the context of the evolving use of artificial intelligence for data analysis and decision support.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824269.

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



Coordinating
Transport Infrastructure
Innovation and
Implementation



Expected impacts:

Innovations in this area should facilitate infrastructure owners to use data as a valuable resource, which can optimise processes across the entire organisation and lead to cost savings, better decision making and new cooperation approaches with professional stakeholders (e.g. engineers, start-ups and researchers).

Creating a multimodal and transnational digital layer that interlinks various transport activities to support EU-wide services for infrastructure owners.

Potential topics:

- Creating a strategic vision for the role of the infrastructure owner and manager in the evolving eco-system that clearly highlights the benefits of data sharing for internal and external. This includes the development of new governance models that enable cooperations across institutional, modal and national boundaries.
- Investigate the role of the NAPs in enabling infrastructure managers to benefit from better data collection and management, including the development of approached for meta-data catalogues, data quality standards, data security, data source certification and licensing.
- The integration of legacy systems for data management into the evolving multimodal and transnational data ecosystem.

3-4 Data-driven and digitalised asset management

Specific challenge:

Integrated infrastructure life-cycle management involving planning, construction, operation and eventually decommissioning is widely accepted as an ideal and sustainable approach, but the deployment needs to be facilitated further.

Traditional infrastructure management has been based on visual inspections along with random spot checks of e.g. material quality, but for many years there has been an ongoing evolution towards automated design, construction control and inspections etc. involving sensors and continuous and non-destructive measurements. Infrastructure owners and managers have to adjust their working approaches to benefit from the possibilities offered by this data-driven eco-system. Ideally, all data involved in all life phases of the infrastructure should be accommodated and processed by an integrated BIM-system, which is also capable of handling risk management procedures.

Infrastructure data used to be generated and treated internally by the infrastructure owner, but new (big) data from external data providers will offer new potential to benefit from digitalisation, which, if used rightly, can contribute to significant cost savings and optimisation in work processes. Artificial Intelligence (AI) can assist in this development by processing and interpreting all the already existing data that is currently not being used to any satisfactory extent, and AI may also eventually provide an important decision-support tool for infrastructure asset management.

Expected impacts:

Innovations in this area should facilitate infrastructure managers to use data as a valuable resource, ultimately resulting in cost efficient and intelligent maintenance planning.

Potential topics:

- The use of AI to process and interpret infrastructure data, especially for data that has previously been labour intensive and time consuming (e.g. GPR-data, crack and damage detection from photos).
- Incorporation of data from sensors mounted in vehicles, trains and vessels along with data from external sources (e.g. from mobile phones) into Asset Management Systems.



Coordinating
Transport Infrastructure
Innovation and
Implementation



- Data management and processing. Smart systems to make better use of data that already exists but is not used intelligently in infrastructure Asset Management. Identification of new and yet unused data sources and new combinations of data to facilitate identification of damages and structural problems.
- Development of measuring systems and systems for data processing to facilitate the creation of BIM models (digital twins) for the existing infrastructure.
- Cross-modal data management and combined BIM models for road, rail and waterways/ports. Identification of synergies.
- Cross-border corridor considerations (TEN-T network etc.) in relation to infrastructure data and Asset Management Systems.
- Long term ambition: Automated Asset Management System incorporating data automatically loaded from sensors, a automated decision tool and maintenance action ordering.

DRAFT



infra
future

**2nd i4Df
Stakeholder Conference**

Welcome!



infra
future

**2nd i4Df
Stakeholder Conference**

Welcome-introduction

Adrian Mazur
*Department for Transport
Strategy Polish Ministry of
Infrastructure*



Agenda for today

Registration		09:30-10:00
Welcome and morning plenary		10:00-11:00
General introduction	Adrian Mazur	
Key note from DG MOVE	Herald Ruijters	
Introduction to break-out sessions	Ruud Smit	
Break-out sessions		11:00-12:30
4 parallel groups		
Networking lunch		12:30-14:00
Wrap up/next steps		14:00-15:00
	Adrian Mazur	
	Peter Wilbers	

90 minutes

i4Df initiative

- collaboration of nineteen national transport infrastructure authorities from seventeen countries in Europe, Turkey and Israel
- financed by the European Commission
- 2-year duration from 1 October 2018 to 30 September 2020
- addresses innovation needs that emerge from investment challenges from the various societal challenges
- concerns a multimodal approach
- covers the period until 2040

i4Df ambition



i4Df aims to develop an overarching strategy and coordination mechanism for future demand-driven multimodal infrastructure innovation and implementation that will allow national transport infrastructure authorities to better and more efficiently coordinate their efforts in modernizing the transport infrastructure network



i4Df content development and stakeholder involvement



i4Df applies a staged content development by following a sequence of consecutive steps that lead from identifying the needed future transport infrastructure capabilities, resulting guiding objectives for 2040 and from that distilling so-called innovation focus areas (IFAs). This is realised via a sequence of consecutive conferences, expert workshops and regional outreach events with the stakeholder groups



Aim of today's conference



Today, in parallel break-out sessions, participants will discuss possible coordination mechanisms to be developed in the i4Df initiative to roll out, deploy and sustain its potential key principles and jointly developed approach. A coordination mechanism may be built around the identified IFAs, organised in IFA committees



Break-out sessions

Starting points for the discussions



Questions:


- I. What benefits do you expect from the IFA-committees?
 - *What are eventual barriers?**
- II. How can we get other stakeholders involved in the process? (other NTIAs, industry, research, EC)*
- III. How to coordinate between the various IFA-committees?*



infra
future

Break-out sessions - *Background*

Building demand driven coordination on innovation




European Programmes and Structures

National Programmes and Structures

e.g. **Multimodality:**
Specific to the national setting & policies

e.g. **Transnational cooperation:**
Various existing structures in place already


Action plans towards 2030 reflect interests in national innovation programmes



infra
future

2nd i4Df Stakeholder Conference

Herald Ruijters
DG MOVE: Dir B – Investment, Innovative & Sustainable Transport






infra
future



**2nd i4Df
Stakeholder Conference**

*Introduction to the
break-out sessions*

*Ruud Smit
Rijkswaterstaat
WP leader*



infra
future



Demand driven infrastructure innovation



From a common strategy and coordination mechanism

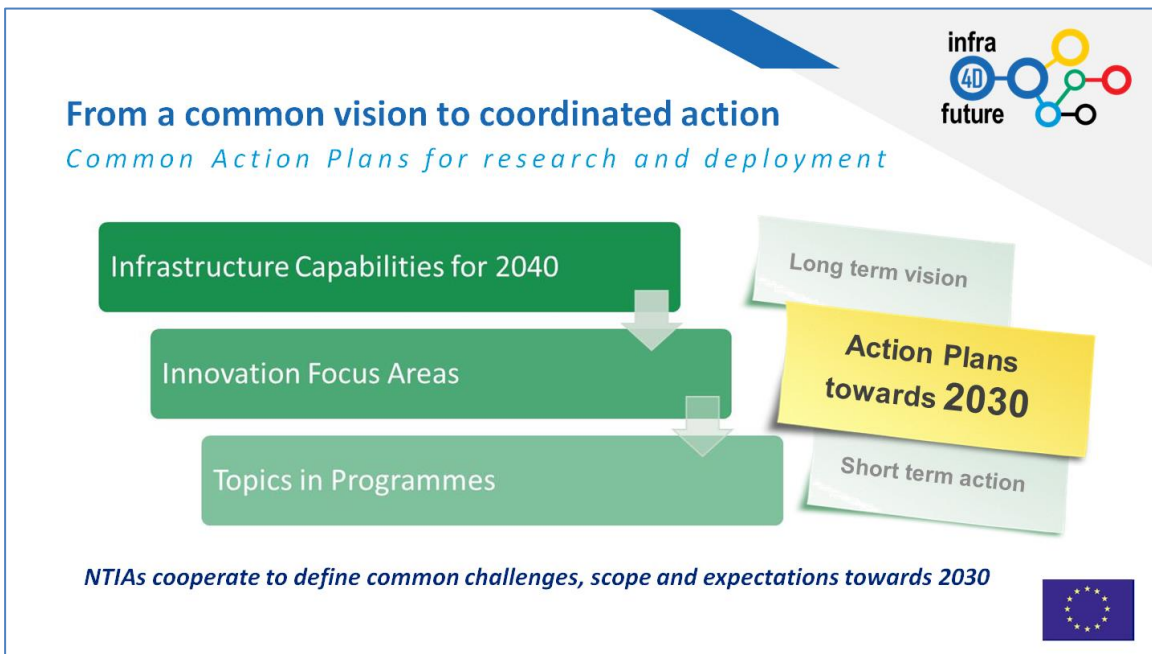
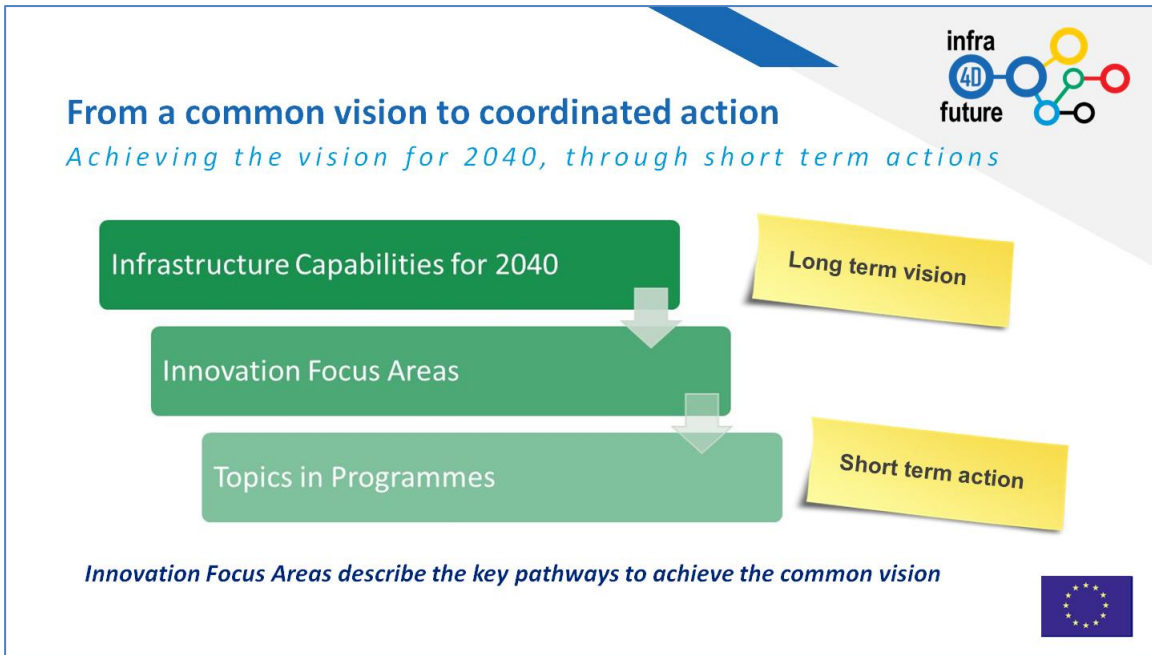
National Transport Infrastructure Authorities in the lead

- From common societal challenges/issues

Coordination and cooperation in research and deployment

- In dialogue with relevant stakeholders





infra
future

Building from National Programmes & Structures

Seeking practical opportunities at the European level

e.g.
Multimodality:
Specific to the national setting & policies

e.g.
Transnational cooperation:
Various existing structures in place already

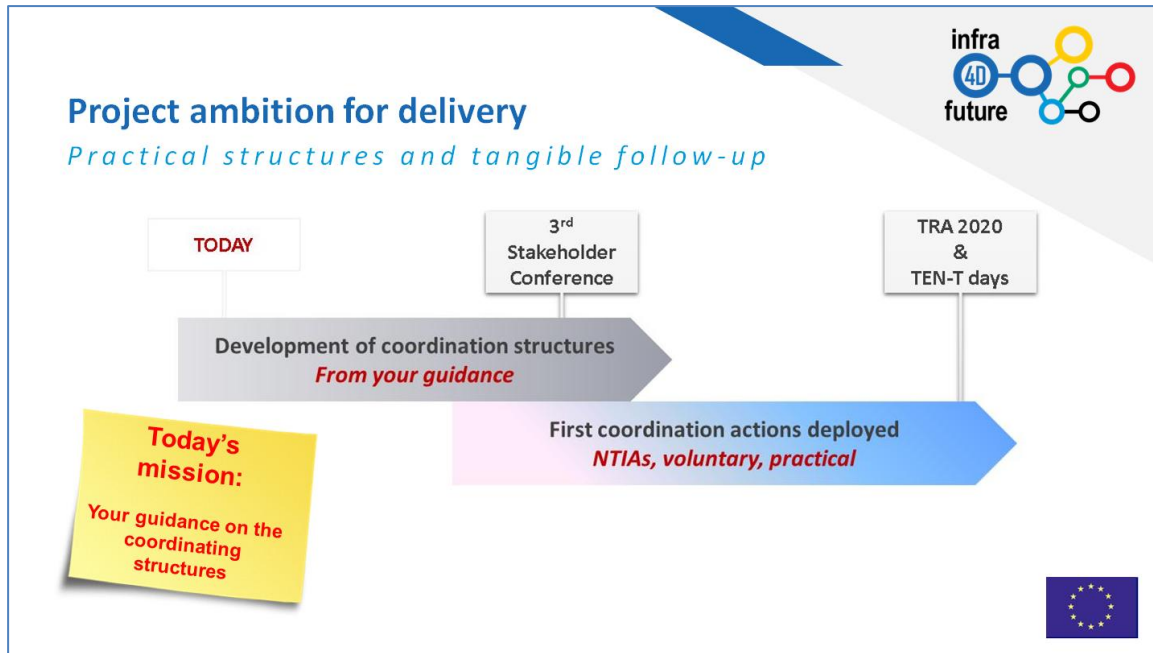
infra
future

Building from National Programmes & Structures

Organising "IFA committees" of NTIA Coordinating Experts

→

The "IFA committees" are to recommend the Common Action Plans towards 2030




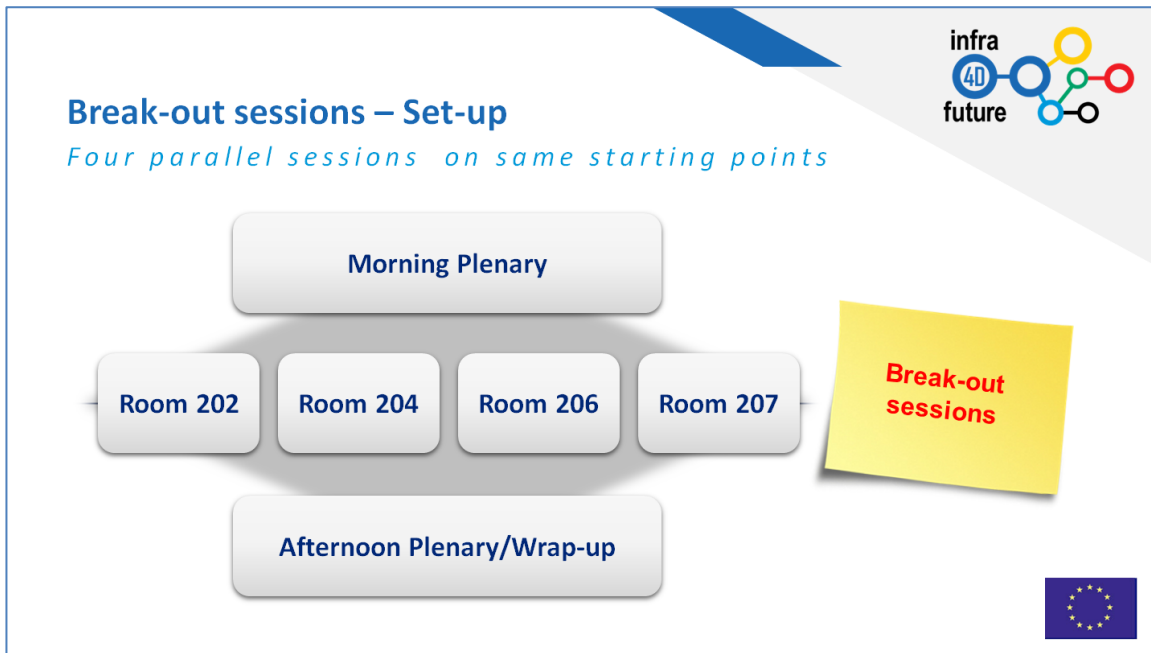
Your guidance on coordination structures

Starting points for the discussions

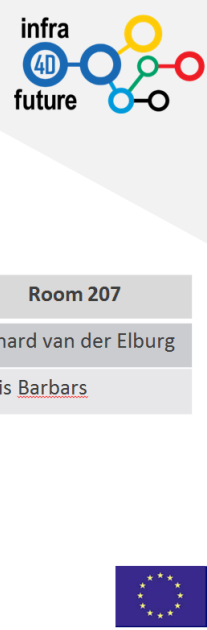
Questions:

- I. *What benefits do you expect from the IFA-committees?*
 - o *What are eventual barriers?*
- II. *How can we get other stakeholders involved in the process? (other NTIAs, industry, research, EC)*
- III. *How to coordinate between the various IFA-committees?*



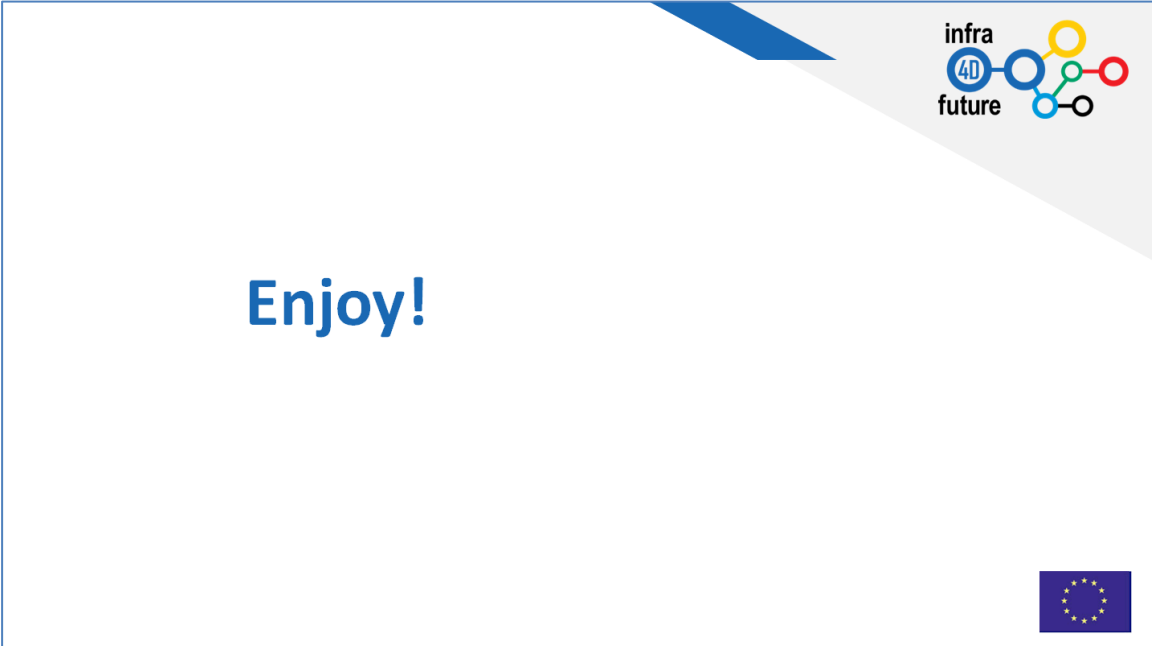


Your Moderators and Rapporteurs




	Room 202	Room 204	Room 206	Room 207
Moderator	Johan Jonsson	Peter Schmitz	Thibault Prevost	Richard van der Elburg
Rapporteur	Bernard Gyergyay	Ursula Blume	Marie-Thérèse Goux	Janis Barbars





infra
future

Enjoy!



infra
future

**2nd i4Df
Stakeholder Conference**

Wrap-up

Adrian Mazur
*Department for Transport
Strategy Polish Ministry of
Infrastructure*



Wrap up

Moderators
Concluding the harvest

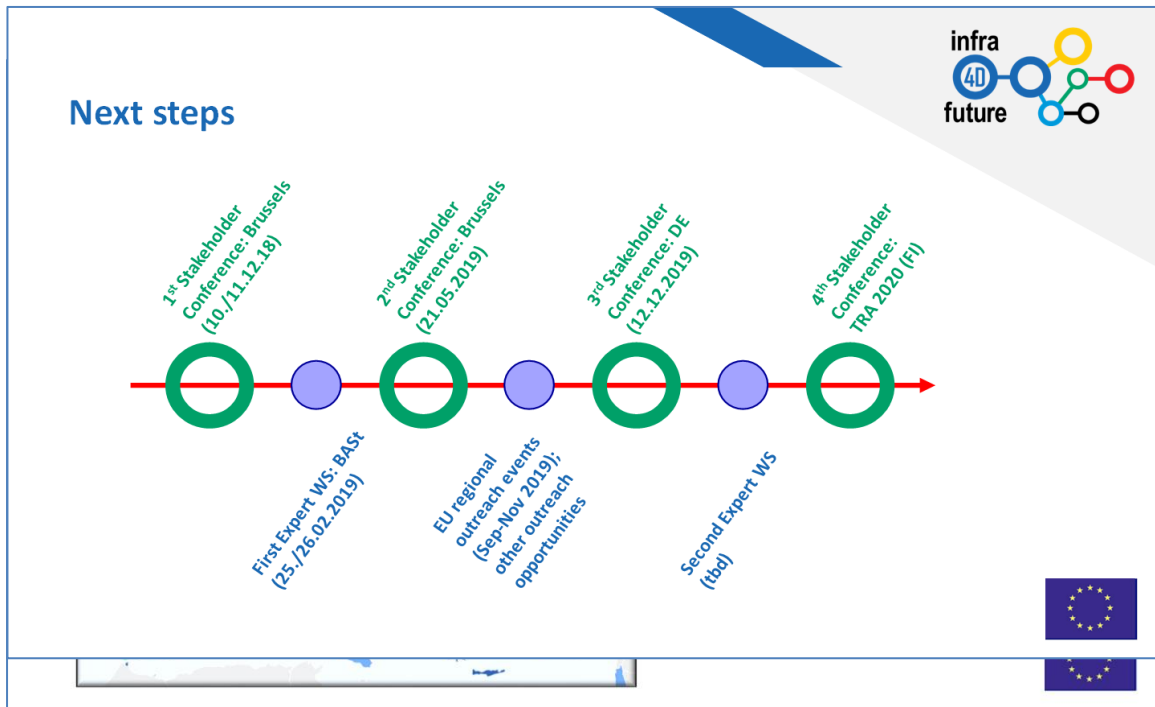


2nd i4Df Stakeholder Conference

Next steps

*Peter Wilbers
Rijkswaterstaat
Coordinator i4Df*





3rd i4Df Stakeholder Conference



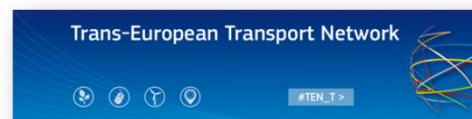
- 12 December 2019
- Bonn, Germany
- Ministry of BMVI
 - ✓ Consolidation of coordination structures

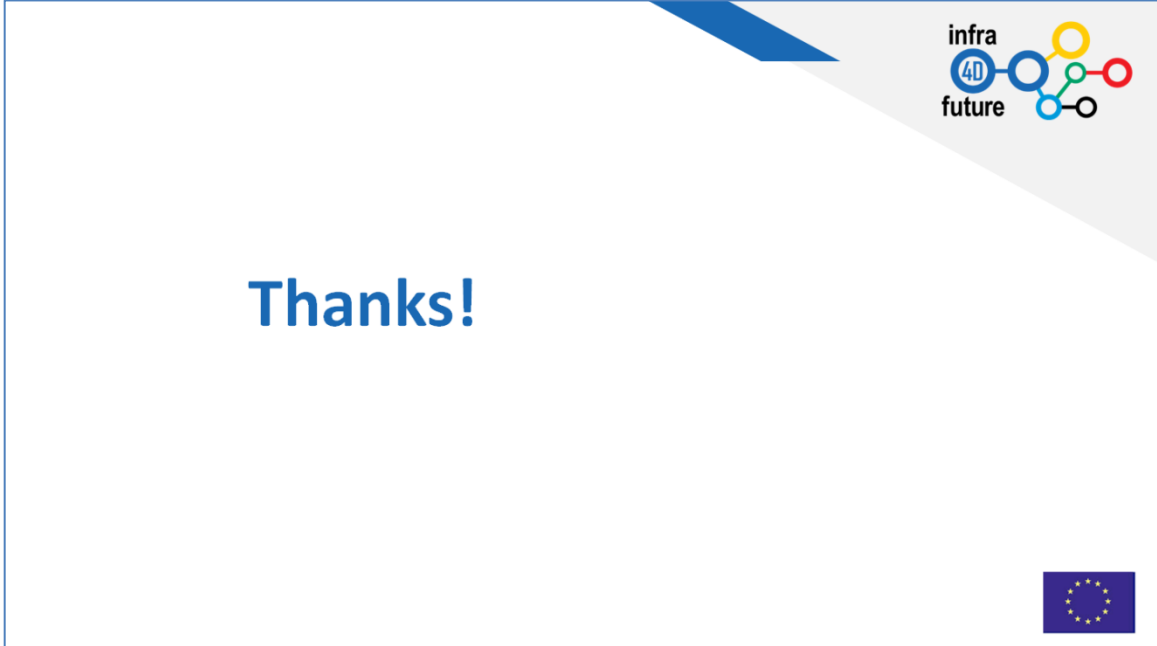


Concluding events



- 27 – 30 April 2020
- May 2020





infra
future

Thanks!

