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

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)**

D4.9 Information package for the strategic stakeholder conferences, including TRA 2020-Nr.4

Final 1.0

Deliverable:	D4.9 Information package for the strategic stakeholder conferences, including TRA 2020-Nr.4
Work Package:	WP4- Encouraging innovation and implementation through communication, exploitation and dissemination
Due Date:	M24
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Nature:	☒ R – Report ☐ P – Prototype ☐ D – Demonstrator ☐ O - Other
Dissemination level:	☒ PU - Public ☐ CO - Confidential, only for members of the consortium (including the Commission) ☐ RE - Restricted to a group specified by the consortium (including the Commission Services)

Contents

List of Figures

List of Tables

List of Abbreviations

Abbreviation	Definition
i4Df	Infra4Dfuture
TEN-T	Trans-European Transport Network
H2020	Horizon 2020 EU Research and Innovation Program
NTIA	National Transport Infrastructure Authorities
TRA	Transport Research Arena
IFA	Innovation Focus Areas
RWS	Ministry of Infrastructure and Water Management
TRC	Tuev Rheinland Consulting GMBH

1 General Overview

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

i4Df 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 was structured in a sequence of strategic, decision-making conferences and a supporting, tactical sequence of expert workshops and regional events. Originally 4 high-level, strategic i4Df stakeholder conferences were planned of which the 4th one was scheduled at the TRA 2020 in Helsinki in April 2020. However, due to COVID-19 both TRA 2020 and i4Df stakeholder conference were cancelled. As an alternative, a series of 6 IFA dedicated digital workshops were organized from 23-25 June 2020.

2 COVID-19 disclaimer

From March 2020, the spread of the pandemic of Coronavirus (COVID-19) has significantly affected the operation and activities of institutions, businesses, governments and countries. Most European cities were locked-down from March till early May and consequently, a vast number of project related events were postponed and many of them were cancelled. Among those were the TRA 2020 conference and also the infra4Dfuture 4th Stakeholder conference/launch event scheduled at the TRA.

infra4Dfuture initiative partners, continued in their majority working remotely, still, due to events cancellations and pandemic conditions, some postponements on deliverables were agreed with the Commission. In general, the consortium continued with proper management of the initiative's Work Packages and the smooth conduction of all related tasks, arranged postponements on few deliverable dates without affecting the overall duration of the project.

The deliverable was originally foreseen to facilitate TRA 2020 and more specifically the 4th stakeholder conference in April at the TRA 2020, that both cancelled due to COVID-19, that we had the digital IFA webinars instead and we therefore take these to give substance to this deliverable D4.9.

Considering the above, D4.9 was originally planned for M18 (March 2020). However, this was rescheduled for M24 (September 2020).

Although COVID-19 has triggered a number of cancellations and delays in a wide variety of aspects that affect the activities of the initiative, through the united efforts of all partners, infra4Dfuture continued to achieve its goals and objectives.

3 Executive summary

D4.9 (“Information package for the strategic stakeholder conferences, including TRA 2020-Nr.4”), issued by the Hellenic Institute of Transport of the Centre for Research and Technology Hellas (CERTH/HIT), is the 4th consecutive report on the i4Df Information packages for the strategic stakeholder conferences, following, respectively, the Deliverables 4.6, 4.7 and 4.8, also developed by CERTH/HIT. D4.9 refers to task 4.3.

The final infra4Dfuture consultation events for National Transport Infrastructure Authorities (NTIAs) took place from 23rd-25th June, through WebEx platforms, as digital events. The events have been organised in the form of six webinars, gathering around 100 participants. Each webinar was dedicated to one of the Innovation Focus Areas (IFAs) identified by the infra4Dfuture initiative.

This series of webinars replaced the expert and stakeholder consultations originally planned in March (expert workshop in Copenhagen-Malmö), April (TRA 2020) and May (TEN-T days). The global outbreak of COVID-19 has led to the cancellation of these events previously.

The agenda and presentations that were presented during the webinars are included in the annexes of the deliverable.

3.1 Purpose of the document

Within the framework of the final i4Df consultation events (2nd expert workshop), a sound combination of tools and information was produced, aiming to inform the participants about the scope and content of the workshop as well as disseminate the project and its findings so far.

D4.9 deliverable aims to present the information package for the strategic stakeholder conferences, including TRA 2020-Nr.4 that has been developed in order to maximise the dissemination of the scope and outcomes of the i4Df initiative to the high-level participants of the final i4Df consultation events.

With the goal to disseminate the project and its outcomes to a wide audience of interested stakeholders, a number of useful tools and mechanisms have been created throughout the timeline of the infra4Dfuture initiative, properly communicating project activities and findings to relevant stakeholders as well as to the general public.

4 Introduction

Within the framework of infra4Dfuture initiative, a number of events and activities have been planned, such as before mentioned expert and stakeholder events in March (Copenhagen-Malmö), April (TRA 2020) and May (TEN-T days). However, with the spread of COVID-19, those and a number of other events were either postponed or cancelled, which consequently lead to the deviation from the initial activity plan of the project. New solutions were implemented, transferring the project activities and events to digital platforms, thus being able to respond timely to the new conditions and parallelly accomplish the initially planned actions in a new format.

5 Final i4Df consultation event: IFA webinars

Main goal of the consultation round through IFA webinars was to gather further guidance and updates on the i4Df capabilities and related IFAs from involved NTIAs and stakeholders. Further objective of this event was to consolidate the need for infrastructure innovation and implementation from the national transport infrastructure authorities that 'own the societal issues' for which innovative solutions are needed. This consolidated need can serve as the reference for an ensuing structured dialogue between relevant stakeholders from public, industry and research following on final delivery of the initiative, for example in the context of transnational collaborations or the new Horizon Europe and CEF framework programmes (Green Deal, Digital Europe, Resourcing and Finance).
6 Webinars were organized and dedicated to Innovation Focus Areas (IFAs). Each IFA was introduced and presented by the IFA coordinator. Participants stated their high interest to support content and approach of the different IFAs, the IFA collaboration ecosystems, as well as the proposed cross-modal coordination mechanism.
Finally, the participants had the opportunity to discuss and exchange information on the further optimization of the IFAs descriptions and optimisation of the operationalisation of the IFA collaboration ecosystems.

5.1 Invitation email

The IFA webinars were planned in a timely manner and communicated to the involved NTIAs and wider relevant stakeholder community. An "invitation" e-mail was sent in the beginning of June, in order to attract the interest of respective participants, notify them for the date and provide them with information on the scope and context of the consultation events (Figure 1). 100 invitations were sent to the relevant audience, including the consortium members and EC representatives (see ANNEX I).

Invitation | i4Df final consultation event for national transport infrastructure authorities (virtual meeting)

Dear invitee,

As the conclusion of several consultation rounds, the i4Df (also infra4Dfuture) initiative is now organising its final consultation event for national transport infrastructure authorities. The event will be digital, in the form of six successive webinars, each dedicated to one of the identified Innovation Focus Areas (IFA).

The objective is to consolidate the need for infrastructure innovation and implementation from the national transport infrastructure authorities that 'own the societal issues' for which innovative solutions are needed. This consolidated need can serve as the reference for an ensuing structured dialogue between relevant stakeholders from public, industry and research following on final delivery of the initiative, for example in the context of transnational collaborations or the new Horizon Europe and CEF framework programmes (Green Deal, Digital Europe, Resourcing and Finance).

In the webinars, you will be consulted on the key challenges to be addressed, the impacts to be expected for 2030, and the scope. In addition, the consultation will be on opportunities for synergies between the various national and transnational programmes and initiatives on the respective IFA.

The **schedule** for the webinars is as follows:

23 June @ 10.00-13.00h CET

- *10.00-11.30h: Preserving the environment*: ANAS
- *11.30-13.00h: Integrating multi-layer networks and nodes*: CERTH/HIT

24 June @ 10.00-13.00h CET

- *10.00-11.30h: Smart data and information ecosystem for accommodating automated and connected transport*: BMK
- *11.30-13.00h: Information provision for process optimisation in infrastructure management*: LVC

24 June @ 14.00-15.30h CET

- *Integrated network performance management:* TRV - RWS

25 June @ 10.00-11.30h CET

- *Decarbonisation of infrastructure management*: BASt

A draft programme together with the latest draft descriptions of the mentioned IFAs will be sent to you upon registration. For your orientation, we recommend to (re-)visit:

i4Df deliverable D1.2 (*Joint vision on transport infrastructure innovation until 2040*):
www.i4df.eu/images/downloads/deliverables/I4Df_D12.pdfhttp://www.i4df.eu/images/downloads/deliverables/I4Df_D12.pdf
European Commission's plans for the Horizon Europe framework programme

- STRIA Roadmap on Infrastructure: trimis.ec.europa.eu/stria-roadmaps/infrastructure
- Orientations towards the first Strategic Plan for Horizon Europe: ec.europa.eu/info/files/orientations-towards-first-strategic-plan-horizon-europe_en

You can find more information on i4Df using the link: www.i4df.eu

Registration:

We kindly ask you to send a **message to i4df@de.tuv.com until 18 June 2020** confirming your participation. If desired you can delegate the participation to an appropriate expert from your organisation.
The meeting will take place via WebEx and after registration a link to the virtual meeting room will be sent to you. Information about the WebEx tool and how to join is available here: help.webex.com/en-us/nrbgeodb/Join-a-Webex-Meeting#id_135400

Should you have any questions, please do not hesitate to contact us using the same e-mail address as above (i4Df@de.tuv.com).

Coordinating Transport Infrastructure Innovation and Implementation

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Figure 1: Invitation email for the i4Df Innovation Focus Areas (IFAs) webinars

The recipients of the e-mail were invited to confirm their participation in the final i4Df Consultation events until 18th of June. Subsequently, personal registration e-mails along with the access codes to the meeting and the draft version of each IFA description were sent to the confirmed participants of the webinars (Figure 2). Registration emails are presented to ANNEX II.

Dear participant,

Thanks for your registration to the upcoming i4Df Innovation Focus Area (IFA) webinar "Integrating multi-layer networks and nodes".

Please find below the access codes to the meeting. For your convenience, you will also find enclosed the draft version of the IFA description.

The IFA webinar will be recorded in order to allow the IFA coordinators and Capability coordinators to capture all input in their final documents. The recordings will not be made public and they will be deleted at the end of the project.
Should you have any objections to the recording, please let us know latest upon entering the meeting room.

Looking forward to welcoming you at the consultation webinar.

Kind regards,
On behalf of the i4Df Team

Meeting information

i4Df webinar: Integrating multi-layer networks and nodes

Tuesday, **Jun 23, 2020 11:50 am | 1 hour 30 minutes** | (UTC+02:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
Meeting number: 128 323 7131
Password: AfkgXjkM972
https://tuv.webex.com/tuv/j.php?MTID=m4622571747b01c7aff55c62d5c6d1e61

Figure 2: Registration email

5.2 Agenda

The participants were provided with the agenda prior the event. The agenda can be found in Figure 3.

Figure 3: i4Df Innovation Focus Area (IFA) webinars agenda

5.3 Registrations and participations for each webinar

Around 100 people in total participated in the IFA webinars. The participation was distributed over the sessions as presented in Table 1.

Table 1: i4Df Innovation Focus Areas (IFA) webinar participants

IFA presentations	Registrations	Participants
1.1	23	20
2.1	21	10
2.2	23	16
2.3	22	17
3.1	25	18
3.2	20	15

5.4 Presentations

During the final i4Df consultation webinars, a number of presentations were presented by the invited speakers. During the invited speaker presentations, each panellist's statement was displayed in a share power point slide, to be visible to the participants. Each webinar had the following approach: 1) Brief technical introduction (TRC), 2) introduction by each capability leader, 3) introduction/presentation by IFA coordinator, 4) discussion/Q&A moderated by capability leader.
The first webinar presentation was done by ANAS. In the presentation with title '*IFA 2.2: Preserving the environment'*, it was pointed out the description of the main environmental problems which targeted (noise reduction, reduction of *NOx, PM10, Pm2,5*, water pollution, preservation of habitat and biodiversity). Also, the expectations of Europe (Green Deal, Horizon Europe) were pointed, referring to the topics that had identified so far within the i4Df initiative.

Subsequently, the *'IFA 2.3: Integrating multi-layer networks and* nodes' were introduced by CERTH/HIT**.** The integrating multilayer networks and modes were described in detail. More specifically, ideas to optimize the performance of transport networks and nodes by technology and innovation were presented, with care for the preservation of the environment and the livability of urban centres.

During the third webinar, a presentation was delivered by BMK regarding 'IFA:3.1: Smart data and information ecosystem for accommodating automated and connected transport'. The speaker focused on the discussion and procedure for the completion of the IFA 3.1. At the end of the presentation he invited NTIAs to comment this IFA description and to add their own contributions to comment and supplement the IFA description.

During the fourth webinar LVC presented the *'IFA 3.2: Information provision for process optimisation in infrastructure management'.* In detail description of the three global stages of innovation delivery chain (from R&D to 'market uptake') which focuses on the IFA collaboration ecosystem were given.

In the fifth webinar, TRV and RWS representatives presented the 'IFA 1.1: *Integrated network performance management'.* In this presentation the merger of previously 2 IFAs was outlined by the speakers, emphasizing three strategic steps that were taken in consideration. These three steps were used to build four major scenario's to be further addressed in this IFA.

The sixth and the final webinar (BASt), the *'IFA 2.1: Decarbonisation of infrastructure management' was presented.* The speaker pointed out how the NTIA IFA group was set up, and analysed the operationalisation of the IFA 2.1 collaboration ecosystem.

5.5 Closing remarks

At the end of all webinars, dialogues took place between participants and valuable feedback and reflections were gathered on national and European framework conditions, trends and needs, which serve for further optimization of the IFA descriptions and optimization of the

operationalization of the IFA collaboration ecosystems. All the presentations can be found in ANNEX IV.
Following the webinars, the participants were sent the updated IFA description via email. Moreover, the presentations of the IFA webinars were presented also sent to the participants, aimed to give them access to the useful information that was shared during the webinars.

6 Conclusions

This deliverable was foreseen for reporting the facilitating services and communication activities for the organisation of the 4th i4Df stakeholder conference. This conference was scheduled at the TRA 2020 in Helsinki in April and due to COVID-19 both had to be cancelled. Same for prior consultation events scheduled in Malmö and Copenhagen in March. As an alternative for these cancelled consultation rounds, a series of IFA webinars was organised. Facilitating services and communication activities related to the IFA webinars serve as content for D4.9 instead of the originally planned, but cancelled 4th stakeholder conference.

The event was organised in the form of six webinars with digital attendance of around 100 participations. Each webinar was dedicated to one of the Innovation Focus Areas (IFAs) identified by the infra4Dfuture initiative.

Participants stated their high interest to support content and approach of the different IFAs as well as the proposed cross-modal coordination mechanism. This deliverable, includes the agenda of the event; as well as the shared presentations by the invited speakers.

The webinars included fruitful dialogues between the participants and valuable feedback and reflections on national and European frame work conditions, trends and needs, which serve for further optimization of the IFAs descriptions and optimization of the operationalization of the IFA collaboration ecosystems.

ANNEXES

ANNEX I: i4Df Innovation Focus Areas (IFAs) webinars Invitation e-mail

Dear invitee,

As the conclusion of several consultation rounds, the i4Df (also infra4Dfuture) initiative is now organising its final consultation event for national transport infrastructure authorities. The event will be digital, in the form of six successive webinars, each dedicated to one of the identified Innovation Focus Areas (IFA).

The objective is to consolidate the need for infrastructure innovation and implementation from the national transport infrastructure authorities that 'own the societal issues' for which innovative solutions are needed. This consolidated need can serve as the reference for an ensuing structured dialogue between relevant stakeholders from public, industry and research following on final delivery of the initiative, for example in the context of transnational collaborations or the new Horizon Europe and CEF framework programmes (Green Deal, Digital Europe, Resourcing and Finance).

In the webinars, you will be consulted on the key challenges to be addressed, the impacts to be expected for 2030, and the scope. In addition, the consultation will be on opportunities for synergies between the various national and transnational programmes and initiatives on the respective IFA.

The **schedule** for the webinars is as follows:

23 June @ 10.00-13.00h CET

- *10.00-11.30h: Preserving the environment*:
- *11.30-13.00h: Integrating multi-layer networks and nodes*:

24 June @ 10.00-13.00h CET

- *10.00-11.30h: Smart data and information ecosystem for accommodating automated and connected transport*:
- *11.30-13.00h: Information provision for process optimisation in infrastructure management*:

24 June @ 14.00-15.30h CET

- *Integrated network performance management:*

25 June @ 10.00-11.30h CET

- *Decarbonisation of infrastructure management*:

A draft programme together with the latest draft descriptions of the mentioned IFAs will be sent to you upon registration. For your orientation, we recommend to (re-)visit:

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- STRIA Roadmap on Infrastructure: trimis.ec.europa.eu/stria-roadmaps/infrastructure
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Should you have any questions, please do not hesitate to contact us using the same e-mail address as above (i4Df@de.tuv.com).

Best regards,

infra 4D future

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ANNEX II: i4Df Innovation Focus Areas (IFAs) webinars registration emails

Dear participant,

Thanks for your registration to the upcoming i4Df Innovation Focus Area (IFA) webinar "Integrating multi-layer networks and nodes".

Please find below the access codes to the meeting. For your convenience, you will also find enclosed the draft version of the IFA description.

The IFA webinar will be recorded in order to allow the IFA coordinators and Capability coordinators to capture all input in their final documents. The recordings will not be made public and they will be deleted at the end of the project.
Should you have any objections to the recording, please let us know latest upon entering the meeting room.

Looking forward to welcoming you at the consultation webinar.

Meeting information

i4Df webinar: Integrating multi-layer networks and nodes

Tuesday, **Jun 23, 2020 11:50 am | 1 hour 30 minutes** | (UTC+02:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
Meeting number: 128 323 7131
Password: AfkgXjkM972
https://tuv.webex.com/tuv/j.php?MTID=m4622571747b01c7aff55c62d5c6d1e61

Use VoIP only

ANNEX III: i4Df Innovation Focus Areas (IFAs) webinars agenda email

Dear invitee,

we would like to kindly remind you that the **infra4Dfuture final consultation event for national transport infrastructure authorities** is taking place between **23 and 25 June 2020**, as informed in the below e-mail.

Furthermore we would like to inform you about a small change in the starting time of two webinars:

23 June @ 10.00-13.20h CET

- *10.00-11.30h: Preserving the environment*:
- ***(new)*** *11.50-13.20h: Integrating multi-layer networks and nodes*:

24 June @ 10.00-13.20h CET

- *10.00-11.30h: Smart data and information ecosystem for accommodating automated and connected transport*:
- ***(new)*** *11.50-13.20h: Information provision for process optimisation in infrastructure management*:

24 June @ 14.00-15.30h CET

- *Integrated network performance management:*

25 June @ 10.00-11.30h CET

- *Decarbonisation of infrastructure management*:

We are looking very much forward to welcoming you at this event.

Best regards,
i4Df Team

Coordinating Transport Infrastructure Innovation and Implementation

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ANNEX IV: i4Df Innovation Focus Areas (IFAs) webinars power point presentations

i4Df Coordination Mechanism

More, faster and fit-for-purpose infrastructure innovation

This project is co-funded by the European Union under the Horizon 2020 (H2020) Research and Innovation Programme (grant agreement No 824269)

i4Df IFA webinars

June 2020

i4Df initiative

- ***Objective: demand driven infrastructure innovation***
  - Alignment of European and national innovation programmes and initiatives
  - Cross-modal; with 2040 vision
  - Structured dialogue with industry and research

- ***19 national transport infrastructure authorities***
  - 17 countries

- ***European Commission funding (CSA)***
  - Delivery on 30 September 2020

i4Df Deliveries

To deliver:

- ***Strategic coordination mechanism***
  - Enabling concerted cooperation across European and national programmes and initiatives
  - ***Shared strategic vision on future infrastructure capabilities***

This webinar!

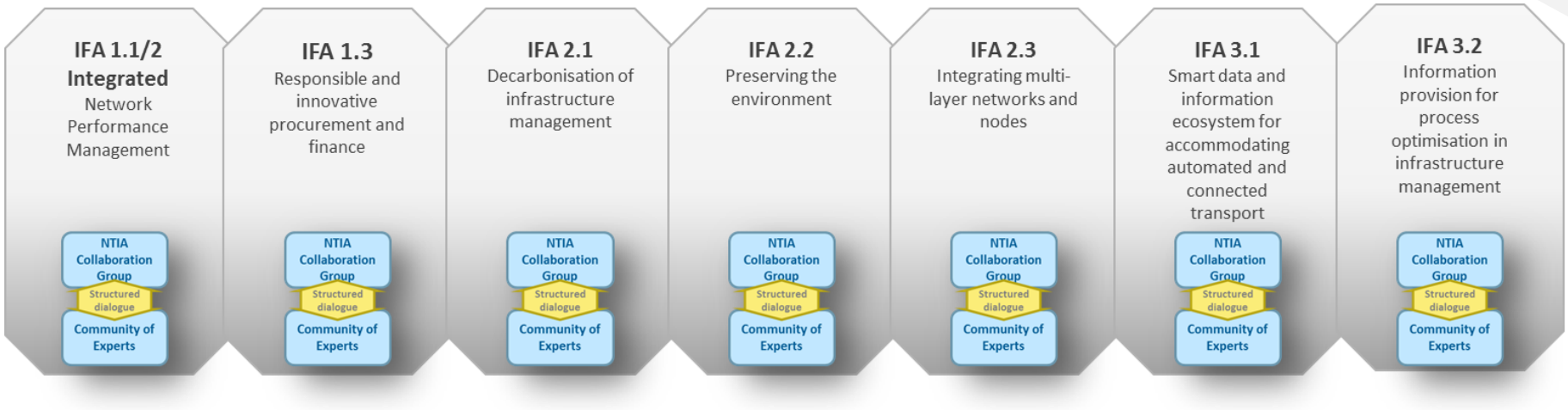
- ***Endorsement by relevant stakeholders*** from public, industry and research

Strategic vision on future infrastructure capabilities

- ***3 transport infrastructure capabilities***
  - Guiding objectives for 2040

- ***7 Innovation Focus Areas (IFAs)***
  - context/challenge
  - expected impact
  - Scope
  - Link to European and national initiatives
  - Human Capital Development issues

7 Innovation Focus Areas – Collaboration Ecosystems

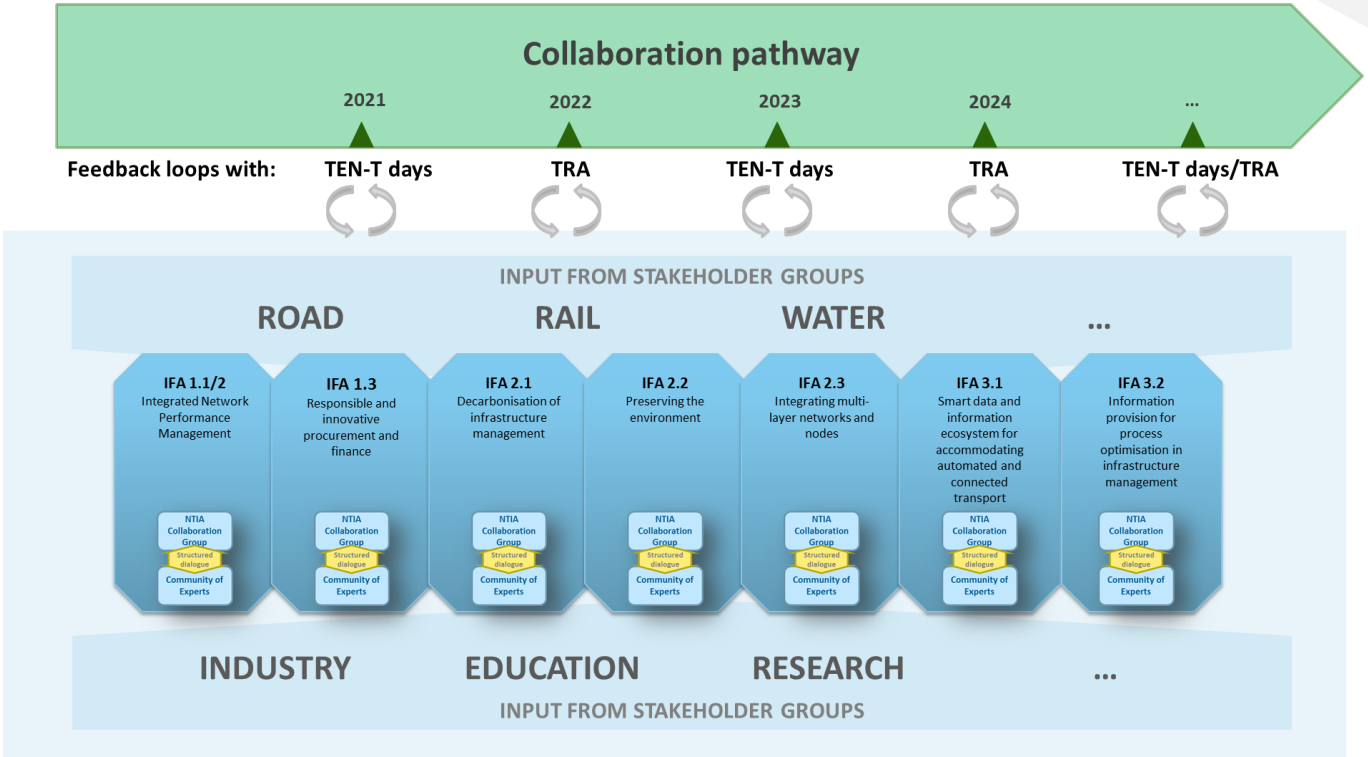


Stakeholder endorsement

- ***Stakeholder engagement events:***
  - 3 High Level Stakeholder Conferences
  - Expert workshop (February 2019)
  - 4 Regional outreach events with the stakeholder groups
  - ***6 IFA specific webinars***

- ***General:***
  - GB meetings (17 countries!)
  - Meetings with EC, and various public and industrial platforms

Stakeholder engagement



IFA .....

....

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i4Df IFA webinars

June 2020

IFA 2.2
Preserving the environment

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i4Df IFA webinars

June 2020

Preserving the environment

NOISE

AIR

WATER

BIODIVERSITY

- Improving the environmental performance of the transport sector
- Improving human health in the immediate surrounding of the infrastructures.

Preserving the environment

NOISE REDUCTION

REDUCTION OF NOx, PM10, Pm2,5

WATER POLLUTION

PRESERVATION OF HABITAT AND BIODIVERSITY

Webinar Outline

- Description of the main environmental problems targeted
- Europe expectations (Gree Deal, Horizon Europe)
- Topics identified so far within the i4Df initiative
- Discussion, suggestions, comments and remarks via chat/voice

Noise Reduction

Environmental problem targeted

Roads

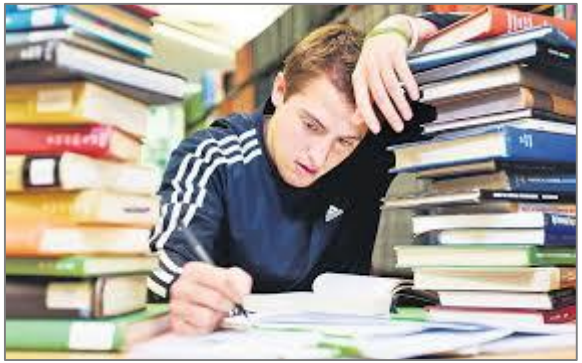
Railways

Aircrafts

Noise Reduction

Environmental problem targeted

Sleep

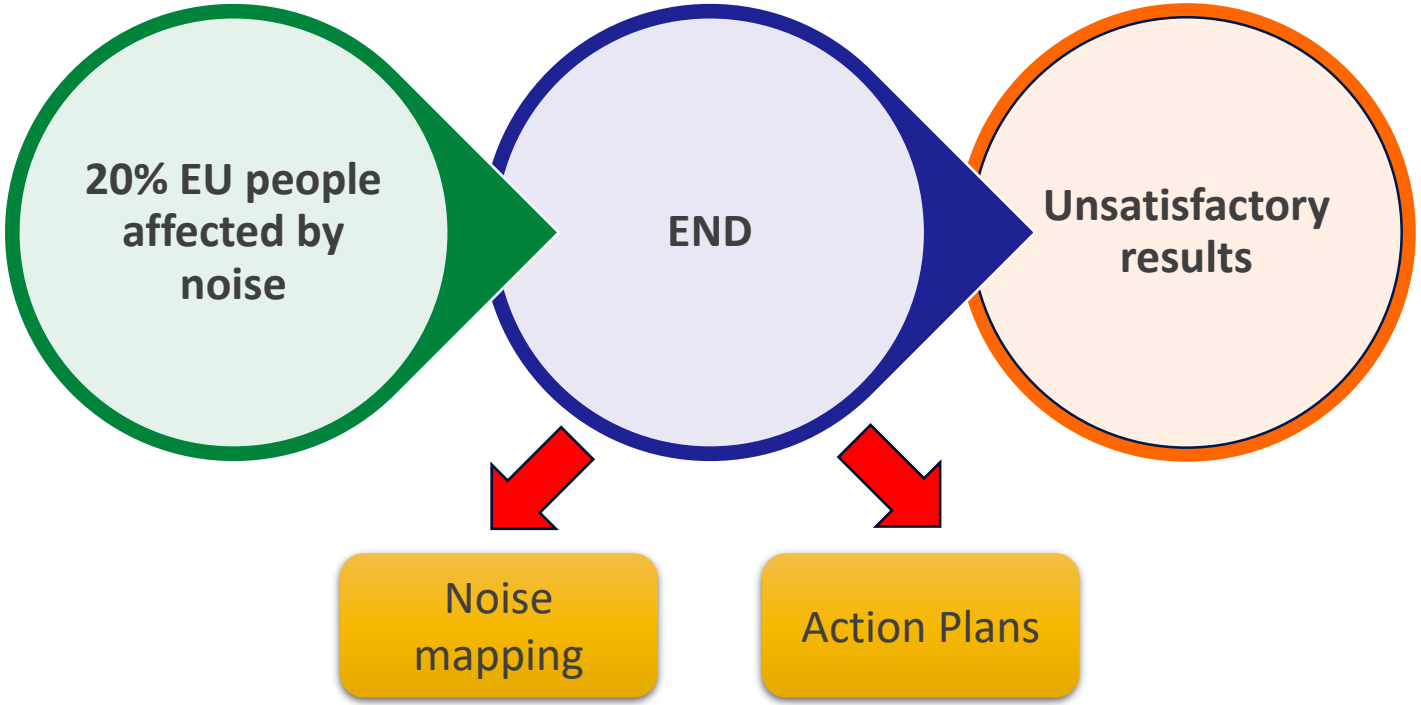


Study

Communication

Noise Reduction

Environmental problem targeted



Noise Reduction

Environmental problem targeted

- Noise mapping activities are quite expensive and require high qualified personnel.
- Noise mitigation measures are very costly and sometime poorly effective.

Noise Reduction
Expectations from Europe

GREEN DEAL

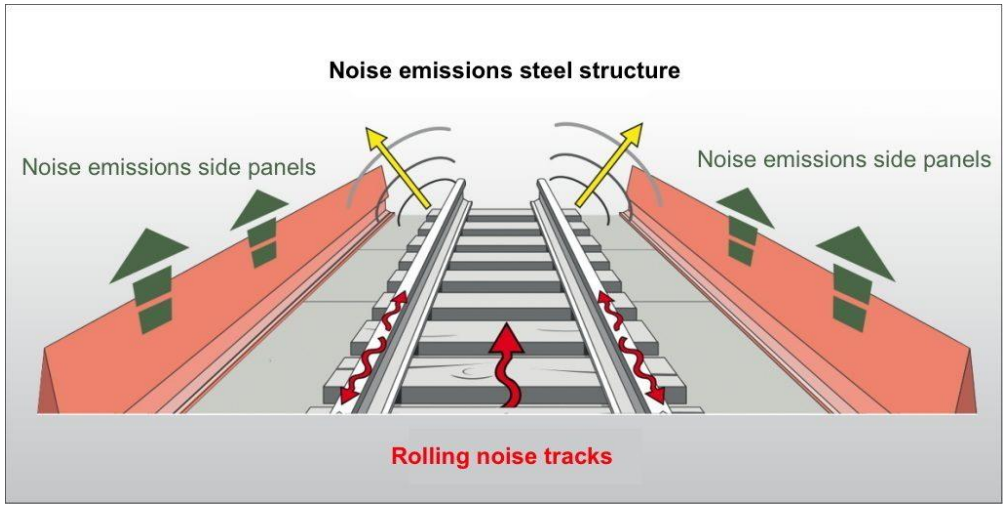
HORIZON EUROPE

Reduce the impact of transport on the environment and human health

- Deeper understanding of the impact of noise emissions on health and ecosystems;
- Develop/demonstrate solutions for the mitigation of these negative effects;
- Methods to influence environmentally virtuous vehicle end user behaviours and discouraging negative ones (aggressive driving, tampering etc.).

Noise reduction
Suggested topics

Innovative solutions to abate noise at the source.

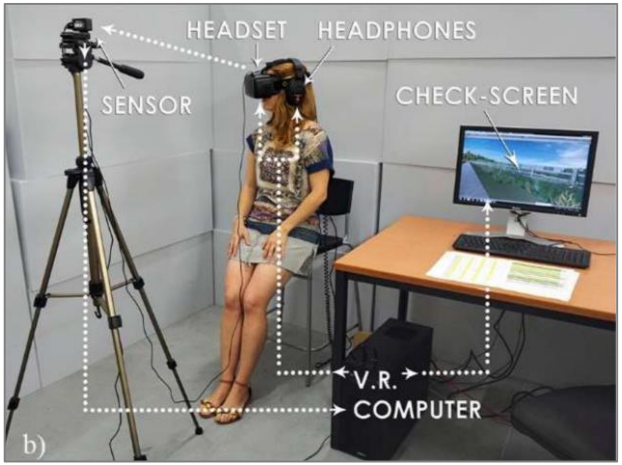


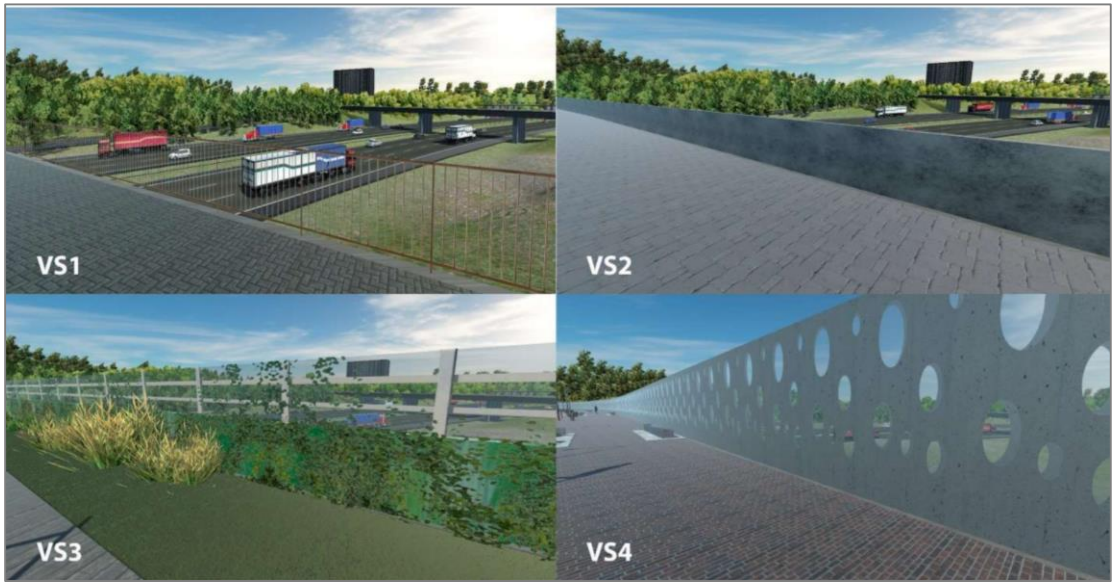
Noise reduction
Suggested topics

Next generation of noise abatement techniques, including advanced traffic control and management strategies (transport planning)

Noise reduction
Suggested topics

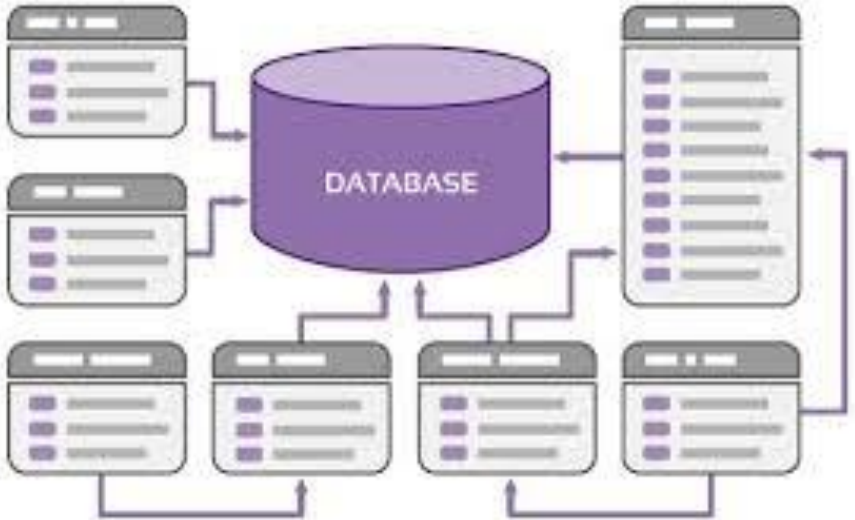
Next generation tools for impact assessment, assessment/simulation of design, implementation, operation and maintenance, and simulating noise perception (e.g. immersive virtual reality).



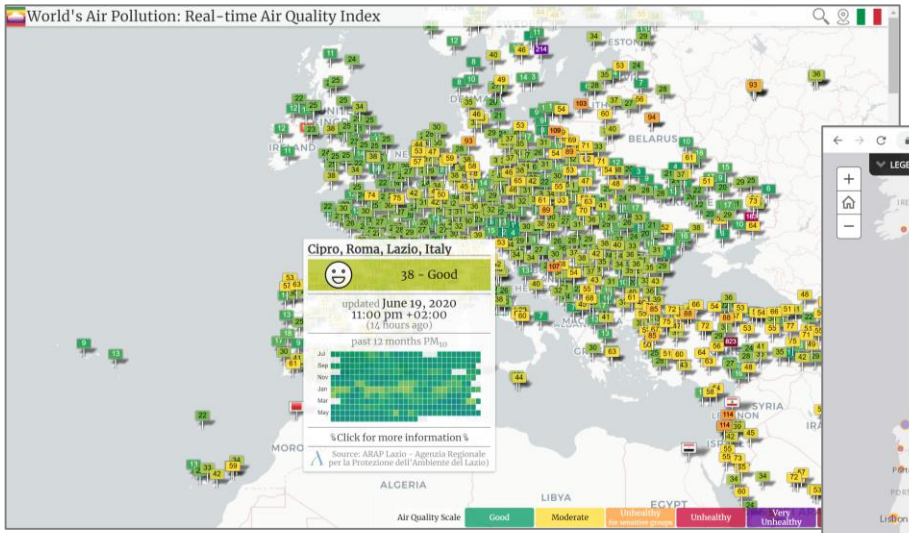


Noise reduction
Suggested topics

EU-regional scale monitoring network, interconnecting public databases and further information systems (noise, air quality, traffic and meteorological data), enabling a comprehensive overarching insight of the environmental impact of combined national infrastructure networks, including relevant regional sections.

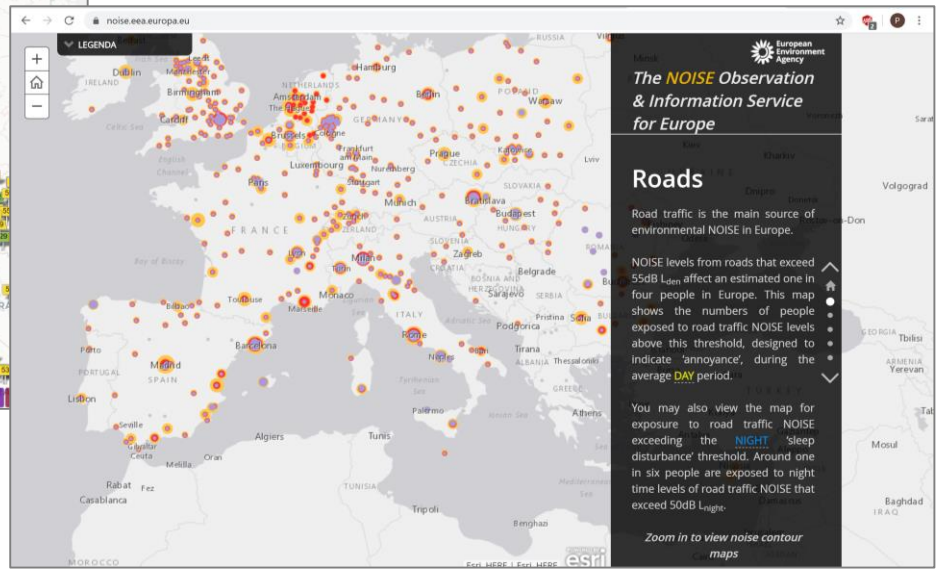


Noise reduction
Suggested topics

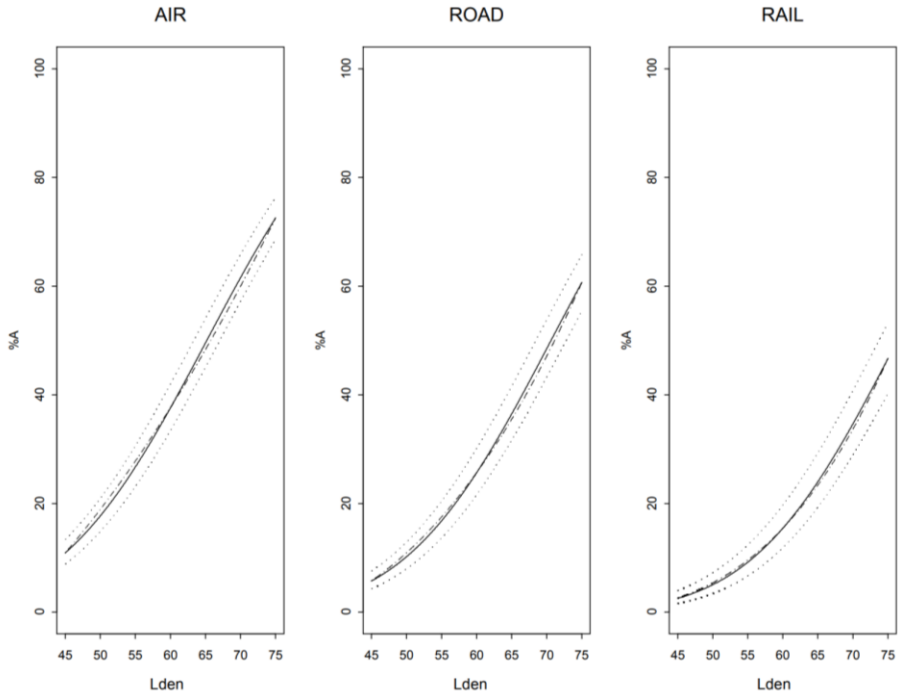


World's Air Pollution

NOISE Observation & Information Service for Europe

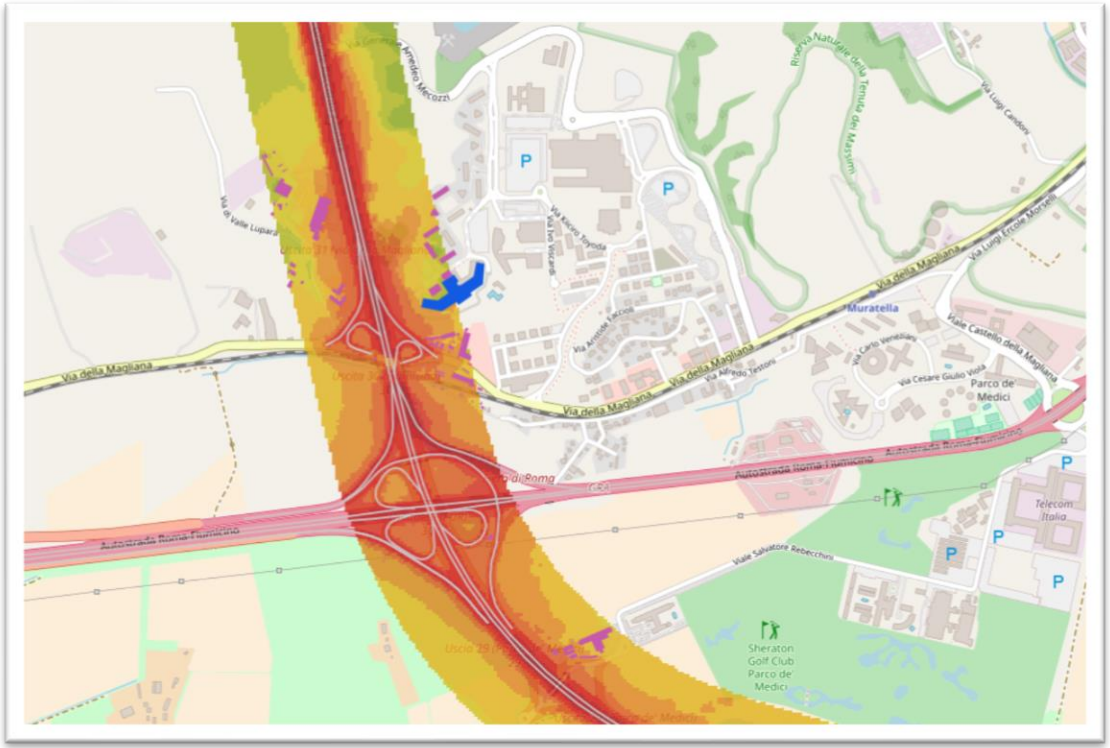


Noise reduction
Suggested topics



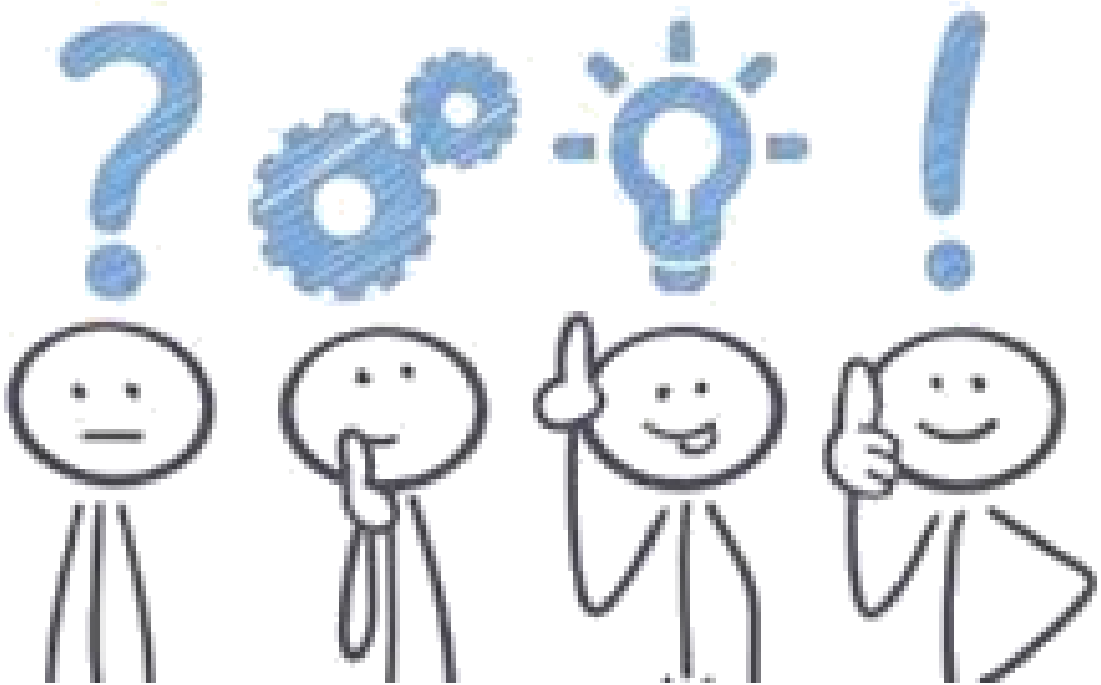
Improvement on dose-response relationships to better understand the impact of noise on human health.

Noise reduction
Suggested topics

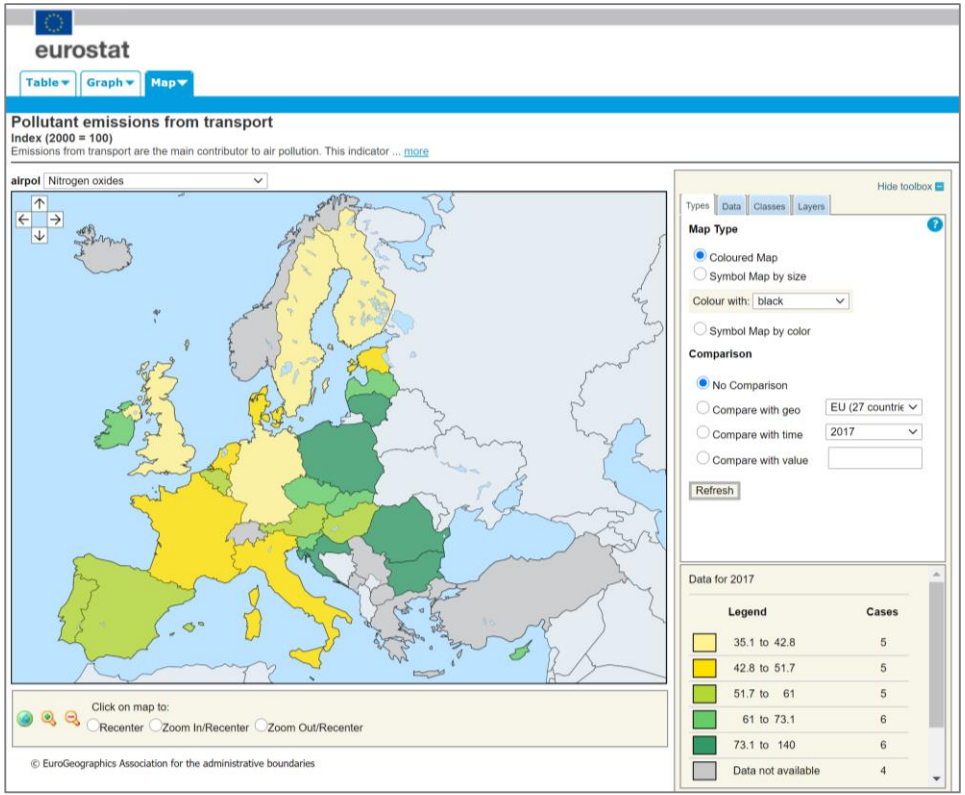


Automation of noise mapping, considering the possibility of using mobile phones, to improve the accuracy of noise maps and reduce the cost of the process.

Noise reduction
Feedback from the audience



Reduction of Air pollution
Environmental problem targeted



Emissions from transport are the main contributor to air pollution.

Particularly, road transport is one of the main source of pollution in urban areas.

Reduction of Air pollution

Environmental problem targeted

Emissions reduction target for transport

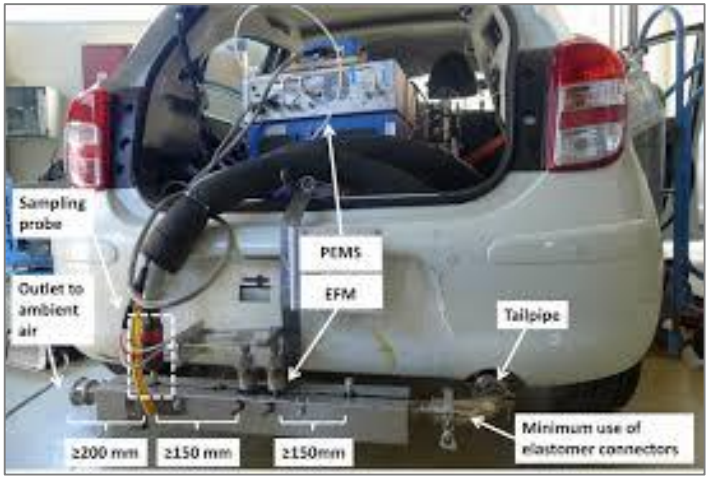
-60 %

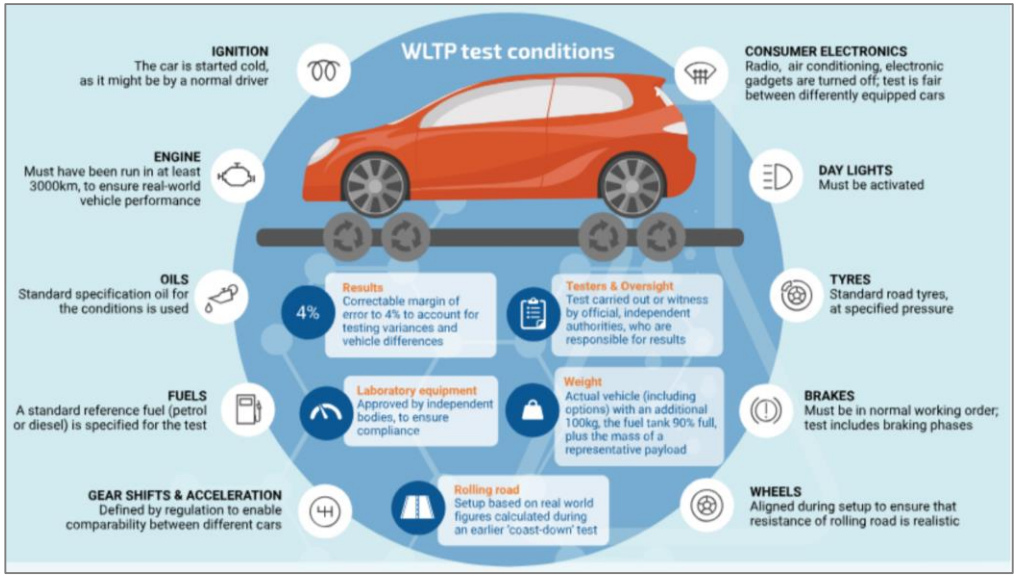
by 2050

NEC Directive and Gothenburg protocol

Reduction of Air pollution
Environmental problem targeted

Difference between emissions in real driving conditions and certified values for type-approval limits





Reduction of Air pollution
Expectations from Europe

GREEN DEAL

- Improve scientific knowledge on the impacts of existing and new transport emissions;
- Reduction of emissions and their impacts at the source and in the environment.

HORIZON EUROPE

Reduce the impact of transport on the environment and human health

- Deeper understanding of the impact of air pollution on health and ecosystems;
- Develop/demonstrate solutions for the mitigation of these negative effects;
- Methods to influence environmentally virtuous vehicle end user behaviours and discouraging negative ones (aggressive driving, tampering etc.).

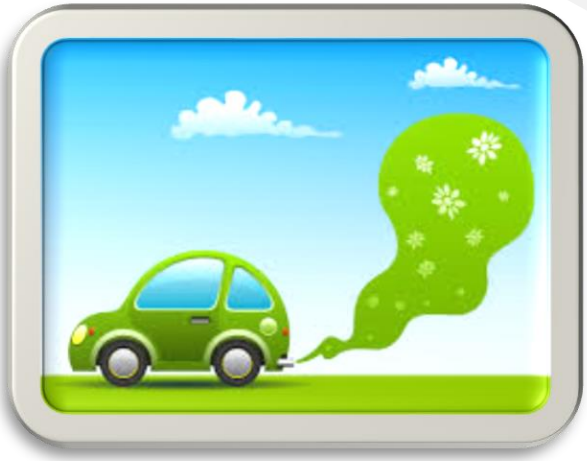
Reduction of Air pollution

Suggested topics

Assessment on possible common pricing techniques unified at European level based on pollutant emissions will lead to a re-thinking and the investigation of possibilities to mitigate air pollution directly at the source.

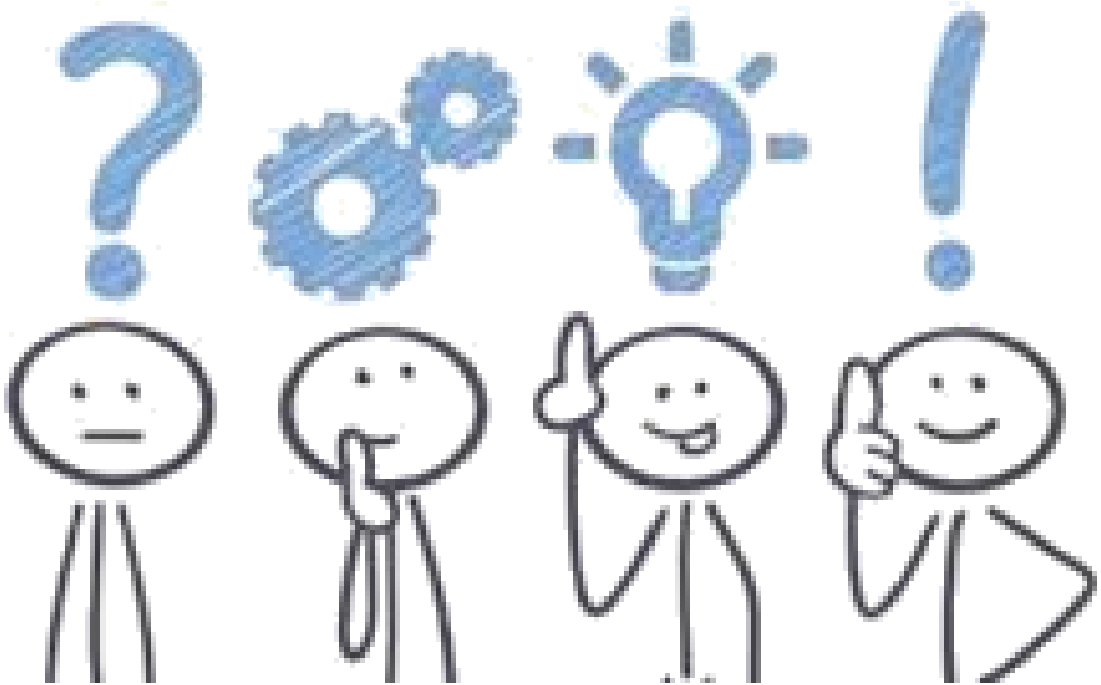
Reduction of Air pollution
Suggested topics

Promotion of cleaner real world driving by means of incentives, technological instruments and educational paths.



Reduction of Air pollution

Feedback from the audience



Water Pollution

Environmental problem targeted

Oil spots on roads | **Herbicides** | **Road de-icing**

Water and surface pollution, flooding and wildlife habitat damage

Water Pollution

Environmental problem targeted

Water Pollution

Environmental problem targeted

Solid waste

Blackwater and greywater

Oil spills

Water Pollution
Expectations from Europe

GREEN DEAL

- To reduce the environmental impact of the transport sector.
- To accelerate the development and the deployment of clean solutions in the shipping sector.

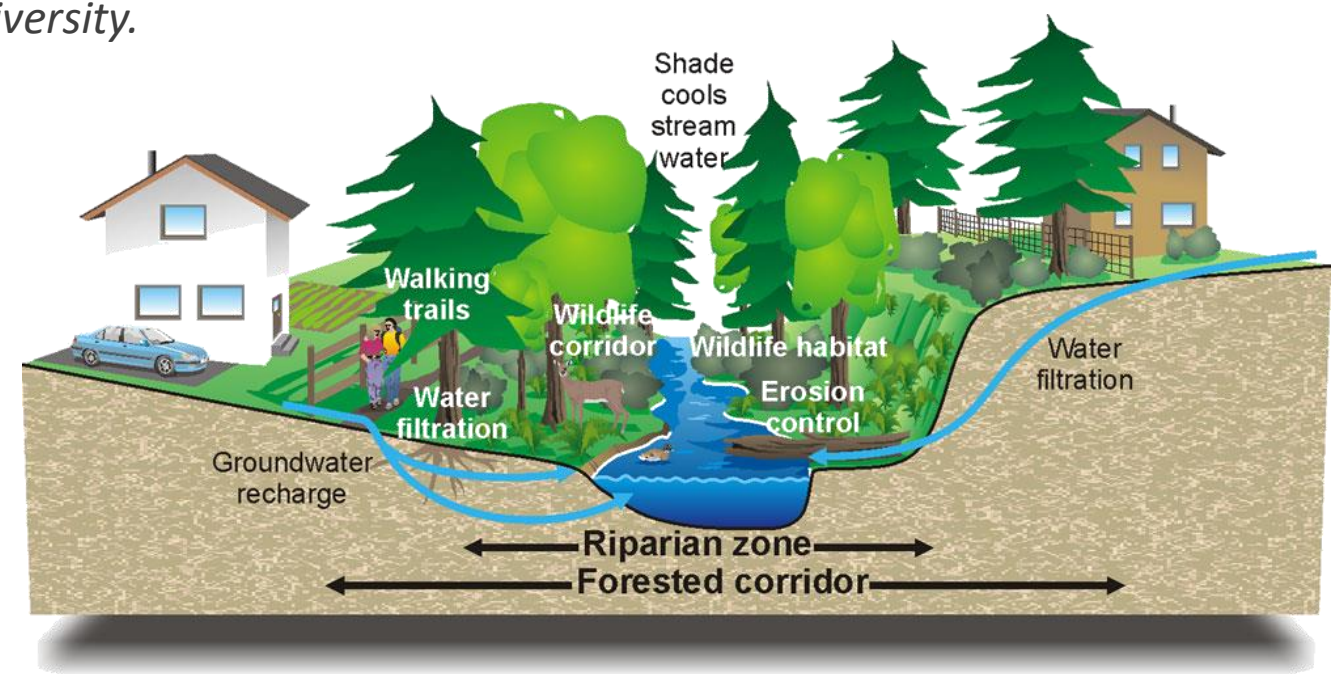
HORIZON EUROPE

To prevent water pollution from being generated as well as measures to clean and remedy it.

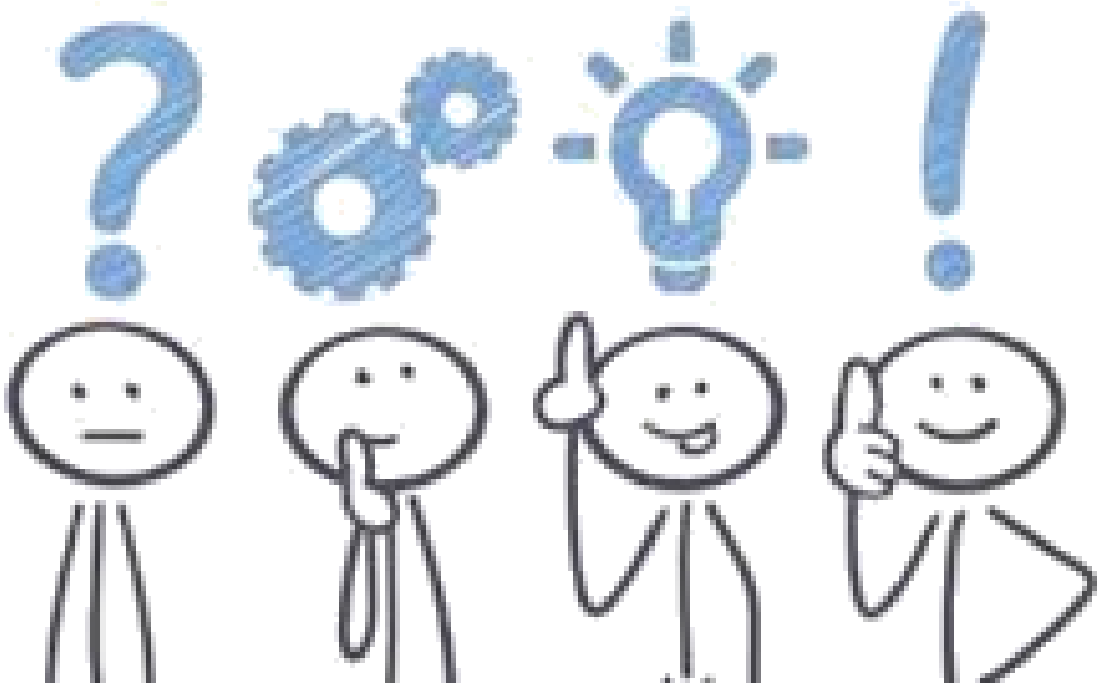
- measures to address pollution from urban runoff and from new or particularly harmful sources of pollution such as micro plastics and chemicals, including pharmaceuticals.
- systemic solutions for the prevention, reduction, mitigation and removal of marine pollution including plastics.

Water Pollution
Suggested topics

Explore and implement the possibility to keep treatment options as natural as possible, taking into account the related space consumption and considering biodiversity.



Water Pollution
Feedback from the audience



Preservation of habitat and biodiversity

Environmental problem targeted

Fragmentation of landscapes and habitats

Fragmentation of landscapes and habitats is a major cause of biodiversity depletion in Europe. Transportation infrastructures, mainly roads and railways, strongly contribute to habitat fragmentation.

Preservation of habitat and biodiversity

Environmental problem targeted

Preservation of habitat and biodiversity

Environmental problem targeted

Animal casualties associated with roads, railways and waterways

Preservation of habitat and biodiversity
Expectations from Europe

GREEN DEAL

- Legally binding **EU nature restoration targets**
- Green corridors and enlargement of Nature 2000 protected areas
- Implementation of Urban Greening Plan.

HORIZON EUROPE

Biodiversity and Natural Capital.

- Development and test of new methods of transport infrastructure maintenance and upgrade, with a view to improving safety, climate resilience and environmental impact (incl. habitat and biodiversity);
- development of new methodologies, technologies and solutions, to enable the protection, restoration and sustainable management of ecosystems and natural capital.

Preservation of habitat and biodiversity

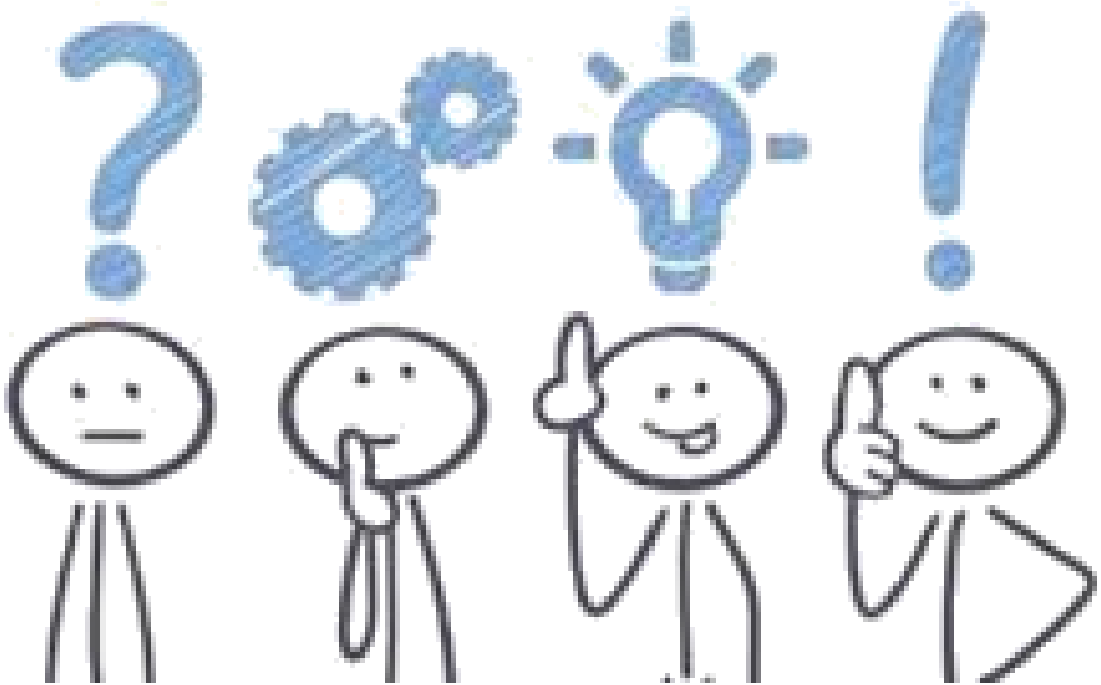
Suggested topics

Implementation of integrated solutions to connect the whole habitats, in order to allow the migration of species. Opportunities of the existing space belonging to the infrastructure have to be investigated to preserve and improve biodiversity.

Development of urban green infrastructures to preserve biodiversity, mitigate heat waves, air, noise and water pollution.

Preservation of habitat and biodiversity

Feedback from the audience

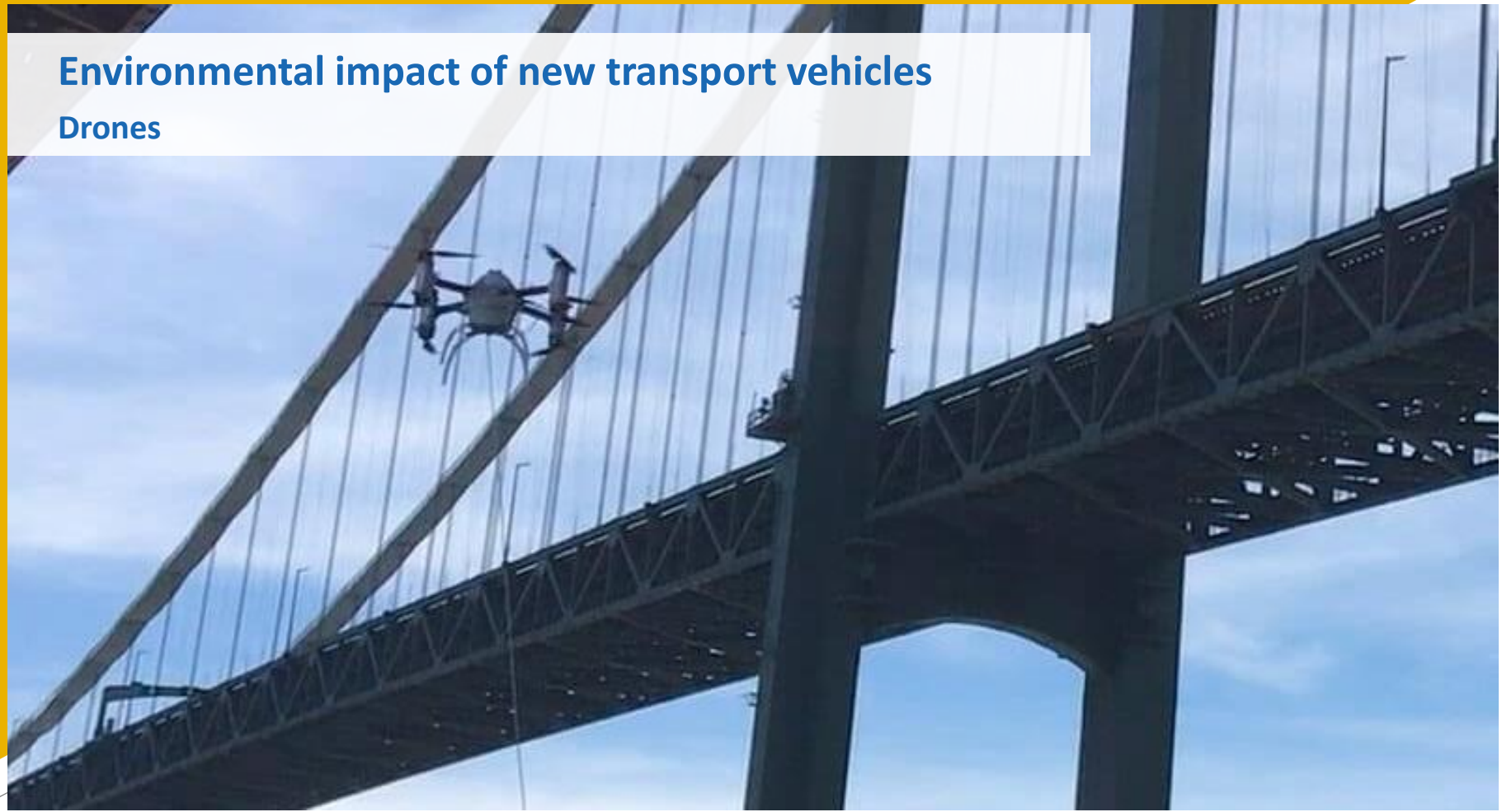


Environmental impact of new transport vehicles
Environmental problem targeted

- Noise and emissions
- Battery disposal
- Consumption of rear natural resources

Environmental impact of new transport vehicles

Drones



Environmental impact of new transport vehicles
Environmental problem targeted

Electric vehicles, despite their low noise and lack of exhausted gas emissions, pose sustainability problems and greater consumption of electricity.

Environmental impact of new transport vehicles
Environmental problem targeted

Safety and Waste

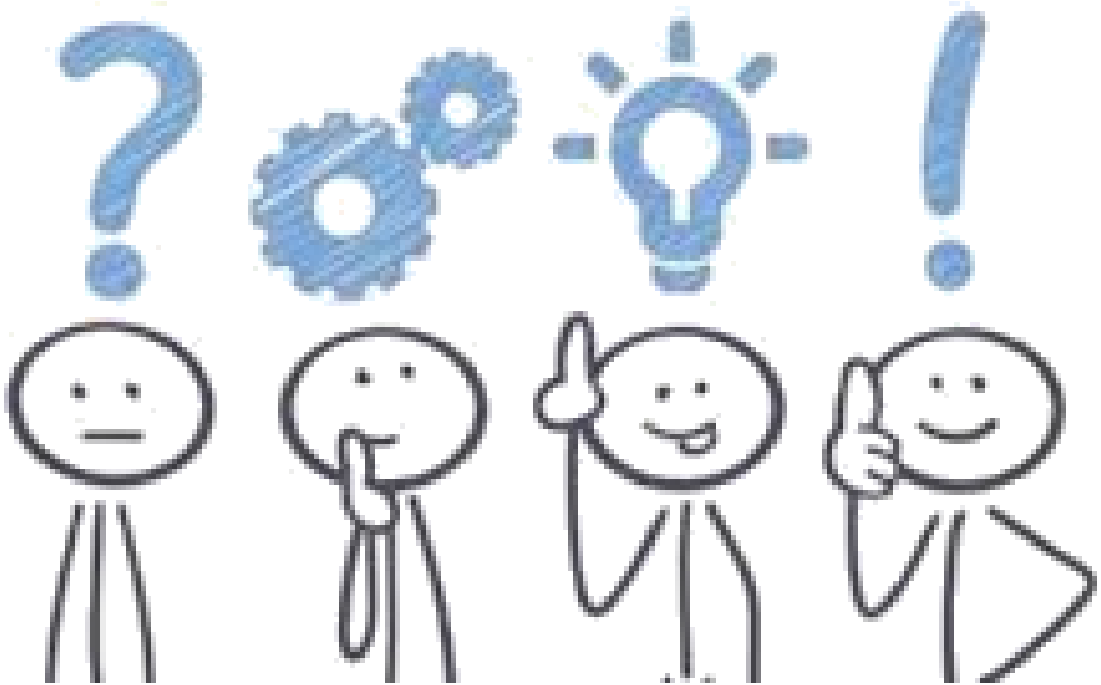
- Increased speed, willingness to commute longer distances and demand delivery service;
- Disposal problems and consumption of natural resources (silicon, coltan, etc.)

Automated vehicles

Environmental impact of new transport vehicles
Suggested topics

- *Environmental impact assessment of drones (emissions, noise, safety).*

Environmental impact of new transport vehicles
Feedback from the audience



IFA .....

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i4Df IFA webinars

June 2020

i4Df Coordination Mechanism

More, faster and fit-for-purpose infrastructure innovation

"Operationalisation: Innovation pathway for IFA 2.3"

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i4Df IFA webinars

June 2020

Innovation Focus Area 2.3

Integrating Multilayer Networks and Nodes :

Optimizing the performance of transport networks and nodes by technology and innovation, with care for the preservation of the environment and the livability of urban centres.

Transport in the European Union

Transport provides vital functions to the European Union enabling economic growth and access to jobs and services.

Nowadays, there are 7 main challenges to transport stakeholders: financing, energy, environment, serviceability, safety, climate adaptation, economy. Technology and innovation, but also, alternative policies, provide responses to these challenges.

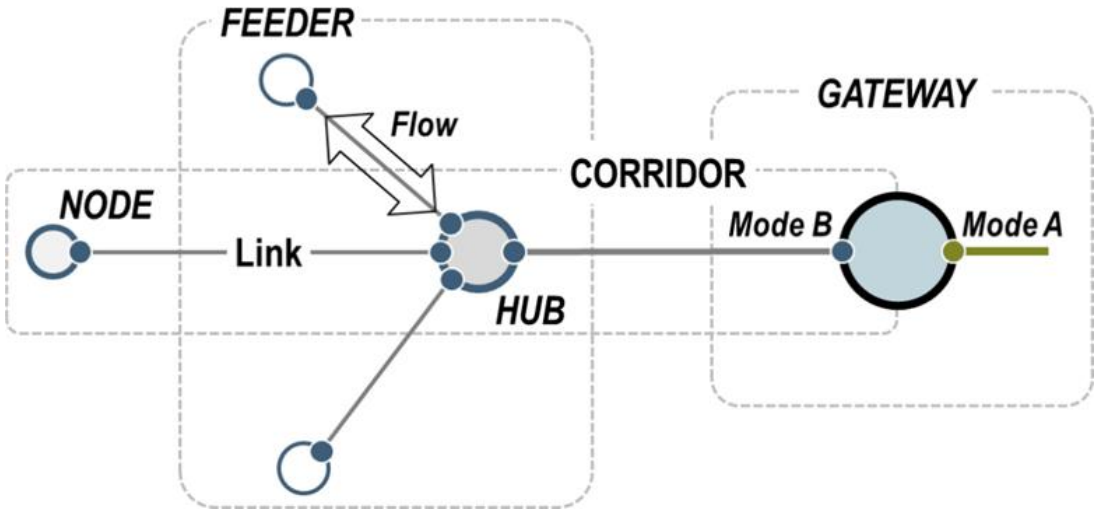
The TEN-T Plan

The Trans-European Transport Network (TEN-T) is the main action plan for transport infrastructure development throughout the European Union.

Transport infrastructure assets, overland links and nodes are key elements of the TEN-T network and have to respond to current and growing mobility needs as well as to provide innovative services and logistics to accommodate increasing freight transport.

Networks, Links and Nodes

Transport networks are made up of links and nodes.
Links are rail lines, metro lines, motorways, roads, streets, but also air connections and sea corridors. Their intersections across the network constitute the nodes, that is, rail stations, harbors, airports, bus terminals, but also, on a wider scale, urban centres, the mega-nodes.



Transport geography.org

Integration of Multilayer Networks and Nodes

-Critical problems on uni-modal networks, such as congestion, environmental impact, operations cost, are fairly known to transport engineers, although not effectively addressed. Multimodal networks and intersections present more complex issues: operability, interconnectedness, spatial adaptation, synchromodality

Linear links, such as roads, motorways, railways, waterborne routes, and nodes such as, freight hubs, passenger terminals and urban centres (major nodes on the TEN-T scale) must be effectively integrated, that is, provide connectivity, operability, safety, environment –friendliness and social acceptance.

Theaustralian.com.au

Basic and primordial issues of the TEN-T corridors

-While this multi-parametric approach is the scope of this IFA, other basic and primordial issues regarding the TEN-T core and comprehensive corridors are still open: The TEN-T corridors across Europe are hardly integrated in engineering terms : network completion and serviceability to users. In many European countries, the quality of existing infrastructure has declined with investment, pointing to outstanding maintenance needs.

-Across the TEN-T corridors heterogeneity of geometric features and deficient operability (information, toll fees, public lighting, rest areas) of links and nodes is obvious and calls for solutions with respect to users needs.

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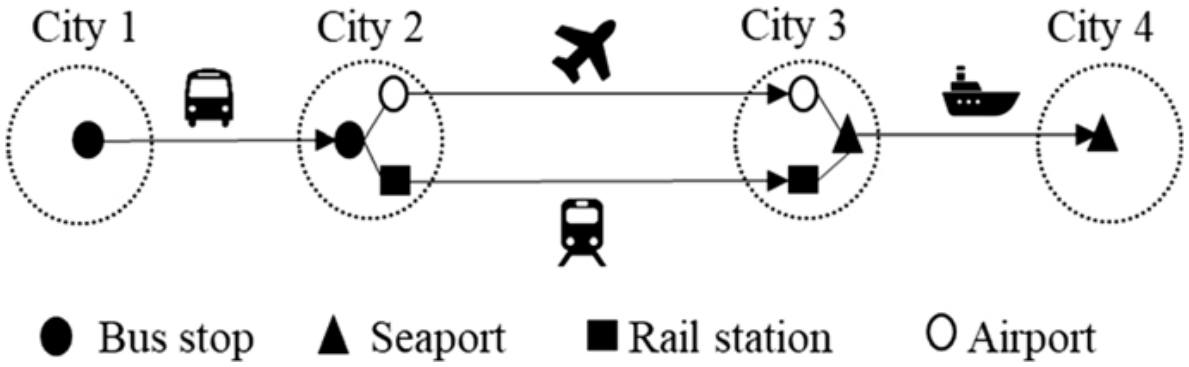


Integrating Urban Centres into the TEN-T

Across the TEN-T corridors, urban areas are key elements of the network and have to respond to growing mobility needs and increasing freight transport by ensuring seamless interconnection of transport modes through different intersections and multimodal hubs.
In this sense, urban centres are vital nodes of the TEN-T corridors, mega-nodes on the TEN-T scale.

In this context, there is growing concern about the actual effectiveness of these nodes. In fact, some existing TEN-T mega-nodes exhibit poor operability and performance while, in other cases, more intra-urban and peri-urban hubs are needed. However, with an increasing number of inhabitants, in combination with ever-growing freight transport volumes, spatial, environmental, traffic and financing problems arise in urban areas, which call for innovative, proactive and concerted actions.

4 Steps to Integration of Networks and Nodes

a. The Engineering Step : completion of links and intersections, upgrading of networks, serviceability of the infrastructure

b. The Sustainability Step : space, energy, environment, climate

c. The Connectivity Step : interconnectedness, operability, synchromodality

d. The Blending Step : combining mobility and transport needs to livability and social acceptance

Criteria of Performance and Integration of Transport Networks

By a wide-scale approach, several challenges and respective criteria of performance of multilayer transport networks, links and nodes may be identified, defining the effectiveness of their integration in a framework of space, time and economy.

a. Interconnectedness and synchromodality of means at terminals
b. Non-intrusive construction, maintenance, rehabilitation and renewal
c. High operability and serviceability of infrastructure
d. Low levels of air pollution and carbon footprint
e. Safety and security across the network
f. Traffic capacity of links and overall accessibility of nodes
g. Economy, low servicing cost and high investment IRR
h. Climate resilience of the network
i. Low environmental impact (land use, fragmentation, noise)

	PERFORMANCE CRITERIA, OBJECTIVES								
FACTORS, MEANS, TOOLS	Interconnectedness and synchromodality	Non-intrusive construction, maintenance, rehabilitation, renewal	Operability and serviceability of infrastructure	Air Pollution and carbon footprint	Safety and security	Accessibility and traffic capacity of links and nodes	Servicing cost	Climate resilience	Local environmental impact
INTERNAL FACTORS									
Governance and management	++	++	++	+	+	+	+	++	+
Smart and digital infrastructure	++	+	++	+	++	+	+	+	+
Advanced surveillance and monitoring	+	-	++	++	++	+	-	++	+
Innovative logistics	++	_	-	-	+	++	++	-	+
Cost management and Pricing policy	+	+	+	-	-	-	++	-	-
EXTERNAL FACTORS									
Renewable energy sources	-	-	_	++	-	-	+	+	++
Planning & development of decentralized hubs	++	-	-	+	-	++	++	-	+
Spatial expansion & environmental planning	+	+	-	++	-	+	+	+	++
Innovative automation technology	+	+	++	+	+	+	-	-	+

Legend: ++ significant impact, + moderate impact, - none

Factors affecting the Performance of Multi-layer Transport Networks

Priority Topics for the IFA 2.3 Ecosystem

a. Governance and Management

Single-mode transport networks are often directed and managed by different authorities. These may be public bodies, private companies, concessionaires and PPP schemes. Coordination of roles, services and management is decisive to the operation of multi-modal and uni-modal (C-Roads) networks and critical to the serviceability and reliability of multi-modal nodes.

Priority Topics for the IFA 2.3 Ecosystem

b. Smart and Digital Infrastructure for Seamless Mobility

Data collection and processing, Information and communication technologies, renewable energy systems, infrastructure for connected vehicles, driverless vehicles, electric trains, metro vehicles and cars, automated construction and maintenance are issues to be addressed with view to seamless and reliable mobility.

Priority Topics for the IFA 2.3 Ecosystem

c. Advanced surveillance and traffic monitoring

ITS technologies for traffic control and safety, congestion issues and level-of-service, structural and functional serviceability, digital twins, real-time safety management systems.

Priority Topics for the IFA 2.3 Ecosystem

d. Innovative Logistics for freight transport

Automation in freight transport centres, reception capacity, supply chain management, freight area and storage of goods, smart expansion of infrastructure and facilities, innovative cargo handling equipment, real-time monitoring of operations.

Priority Topics for the IFA 2.3 Ecosystem

e. Cost Management and Pricing Policy

Management of internal and external costs, maintenance and operation costs, cost-effective infrastructure, toll fee policy, congestion pricing, HOV pricing.

Priority Topics for the IFA 2.3 Ecosystem

f. Spatial Expansion and Environmental Adaptation

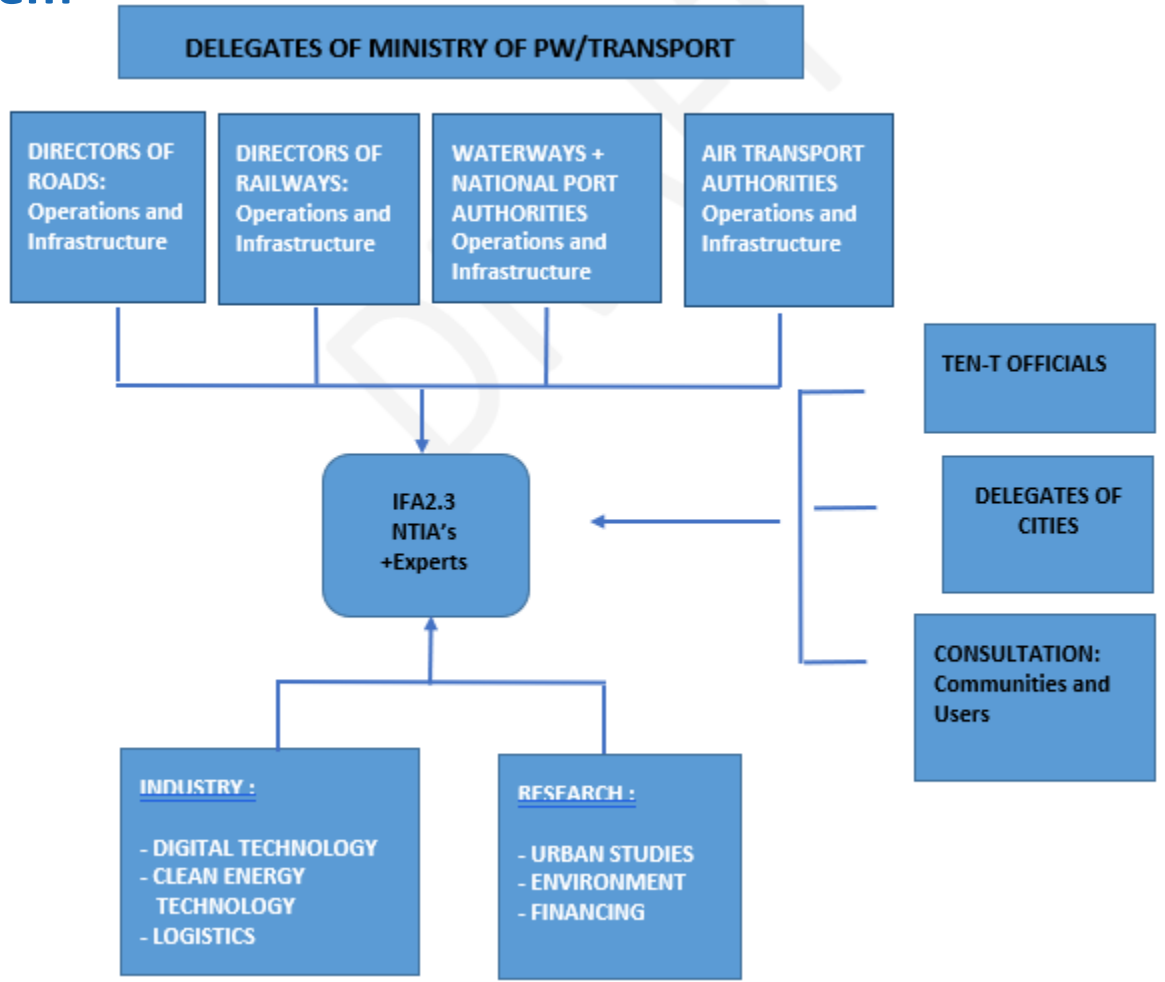
Congestion assessment of networks and nodes. Spatial expansion needs and options. Planning and constraints. Value engineering to assessing alternatives. Environment protection terms and provisions. Environmental adaptation of expansion projects.

Priority Topics for the IFA 2.3 Ecosystem

g. Energy-Harvesting Roadways and Terminals

Regardless of national policies on renewable energy sources, NTIA's and Infrastructure Operators have to deal with the issue of electric power supply. It must be absolutely clear that implementation of innovative technologies, such as electric cars, buses and trucks, is pointless if the driving power is not generated by renewable sources. Sustainability will be, in the near future, the prevailing criterion for social assessment and acceptance of all innovative technologies.

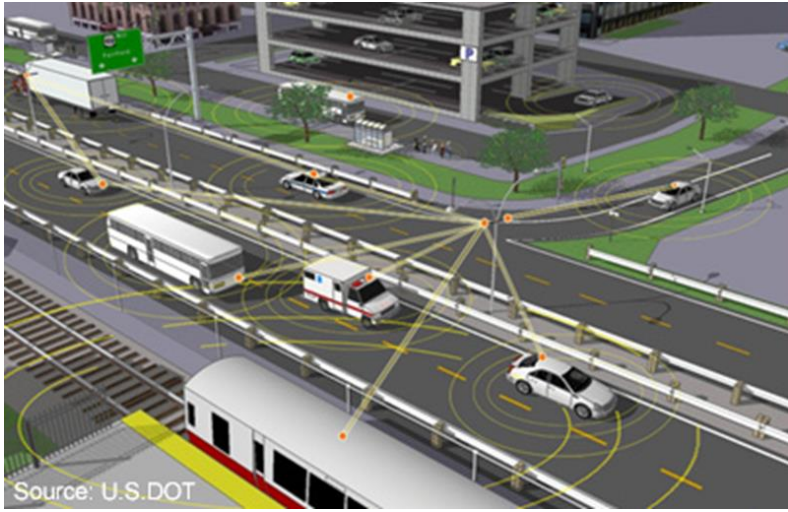
The IFA2.3 Ecosystem



Research and Innovation

- The i4Df Ecosystems in different domains, defined by respective IFA's, may identify, by consultation of experts, the most promising and the closest to implementation (high TRL) ongoing research so as to envisage technology transfer and application in a near future.

- This is a decisive step to modernization of transport infrastructure, prior to innovation and implementation, where the i4Df ecosystems may play an important role, enabling NTIA's to pro-actively search for financing and to proceed to preliminary actions (governance, public consultation, feasibility, technical design) with view to innovation.



Implementation and Expected impacts 2030

The herewith integrated approach, incorporated into the i4Df coordination mechanism, will enable NTIA's to achieve an adaptable, sustainable and robust transport network, offering to users an optimally integrated mobility chain and effective coordination of infrastructure and spatial development.
The basic component of this innovative transport system will be :

- Sustainable, multi-modal terminals and hubs
- Seamless, environment- and citizen-friendly urban mobility
- Complete, high-performance and safe long-distance corridors.

Next Steps for IFA 2.3

In the frame of the i4Df project, next steps will mainly consist of processing the input from the GB board members and of suitably finalizing the Descriptions document.

The next step, with view to preliminary steps to the formation of the IFA2.3 Ecosystem, a first inquiry among stakeholders, NTIA's and TEN-T officials may be conducted. A substantial coordination structure must be set up and draw a pathway of cooperation before completion of the i4Df project.

IFA .....

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IFA 3.1
Smart data and information ecosystem for accommodating automated and connected transport

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June 2020

Capability and IFA (Innovation Focus Area)

- Capability 3: Infrastructure achieving added value from digitalisation
  3.1 Innovation Focus Area: Smart data and information ecosystem for accomodating automated and connected transport

- Goal for todays Presentation, discussion and procedure for the completion of the IFA

- ToDo
  completing the section of the report on the innovation focus area and making the countries interested in this topic visible

IFA 3.1 – Contributors to the IFA description and members of the collaboration group

- *The members of the collaboration group give a* ***brief description of your own organisation*** *with an overview of structure and responsibilities.*

- *Current members: BMK (Austria) AWV (BE-FL), RWS (NL) and BASt (DE).*

- **ToDo**
  Additional members of the collaboration group should add their information here.

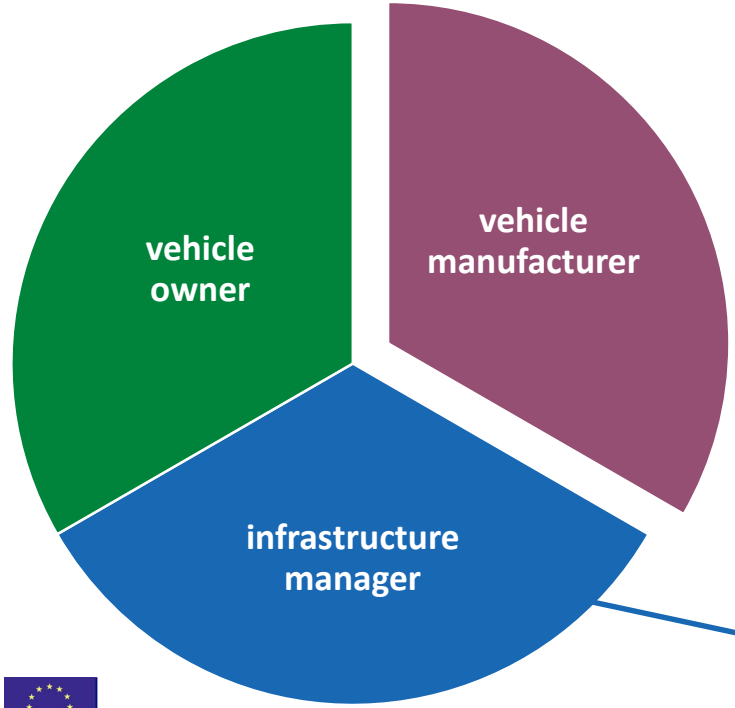
Operationalisation:
Innovation pathway for IFA 3.1

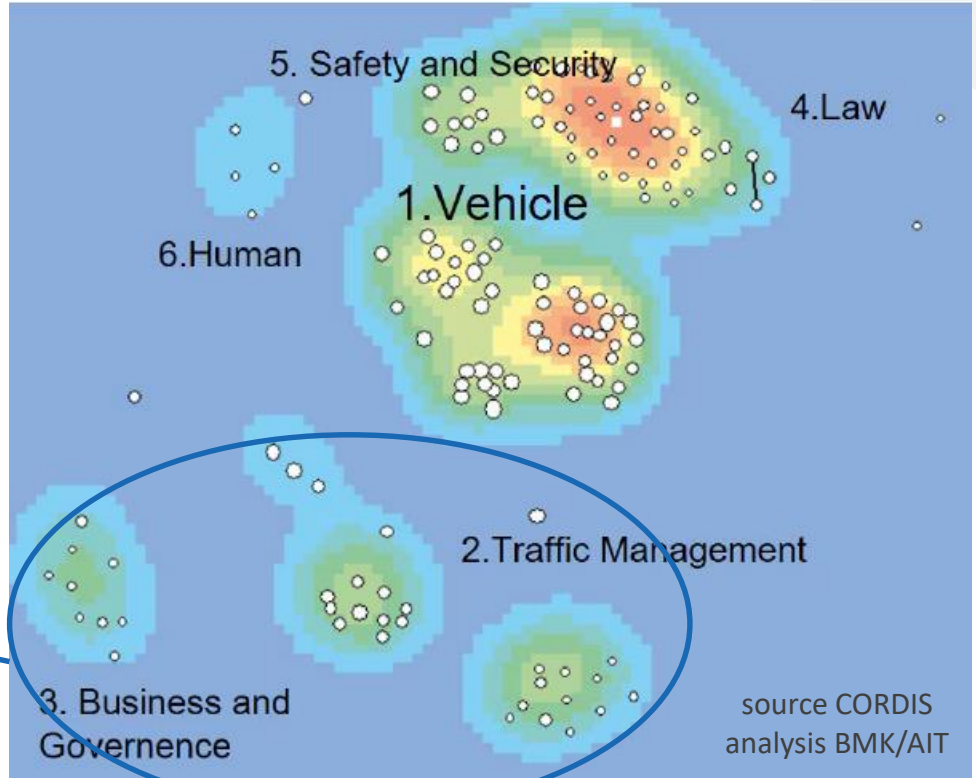
Strategic context and challenges

- *effects on the relationship between vehicle owner, vehicle manufacturer and infrastructure manager*

- *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 and managers** are currently facing*

Operationalisation:
Innovation pathway for IFA 3.1





Operationalisation:
Innovation pathway for IFA 3.1

Expected impacts 2030

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

- *Aim is 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 infrastructures owners.*

Operationalisation:
Innovation pathway for IFA 3.1

Innovation and implementation

- ***The new and evolving role of the infrastructure owner in the context of the deployment of connected and automated vehicles***
  - *The newly developed "**Infrastructure Support Levels for Automated driving**" (ISAD) classification needs to be developed further to include wider aspects that consider the needs of infrastructure owners*
- ***Secure, resilient and smart data and information ecosystem across multimodal and transnational networks for all users***
  - ***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.*

Operationalisation:
Innovation pathway for IFA 3.1

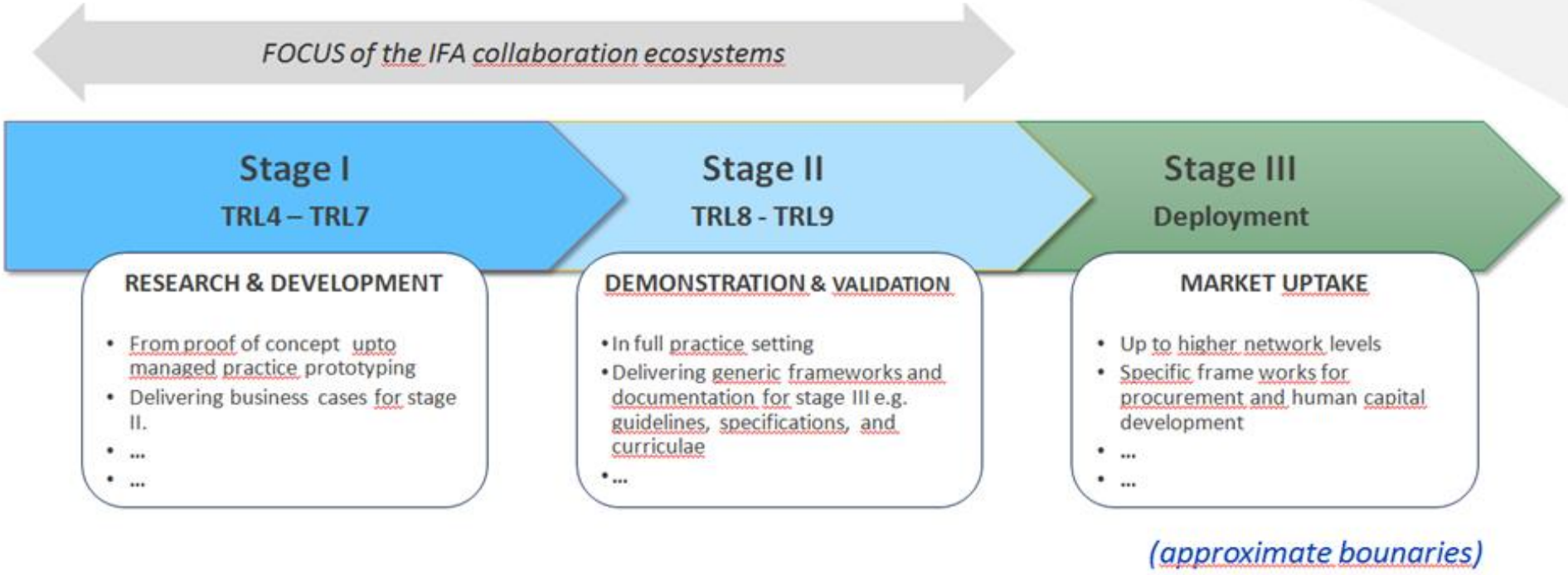
Based on the above description the following priority topics are suggested

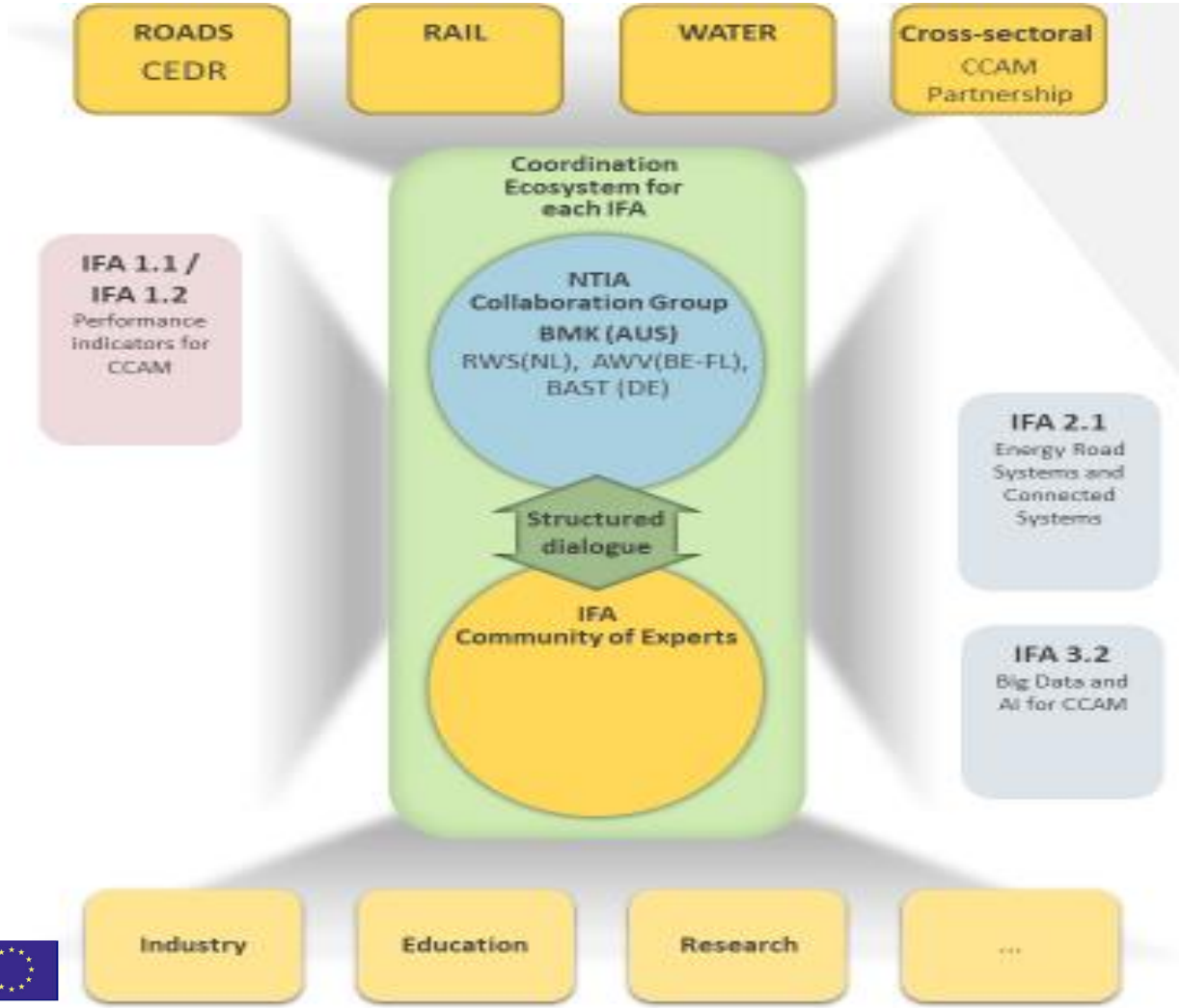
- ***Priority topic 1: Large-scale demonstrations focusing on the needs of the infrastructure owners/managers*** *… there is a strong need to* **harmonisation and interoperability** *of technologies*
- ***Priority topic 2: Physical and digital infrastructure*** *… to ensure that infrastructure owners*
  and managers ***invest in the most suitable*** *physical and digital* ***infrastructure***
- ***Priority topic 3: Governance models for infrastructure owners and managers to accommodate CCAM …*** *development of new governance models that enable* ***cooperation across institutional, modal and national boundaries***

ToDo

IFA members are invited to review the suggested priority topics.

Operationalisation:
Innovation pathway for IFA 3.1





Operationalisation IFA 3.1 Ecosystem

Operationalisation IFA 3.1 Ecosystem

supply of science-based research results

Operationalisation:
IFA 3.1 link to national initiatives

ToDo

IFA members are invited to suggest the most relevant national innovation and research initiatives and other relevant activities (e.g. events) that could be linked to IFA activities. Each national initiative should shortly be described.

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Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

Action Package Automated Mobility

- **Goal:** Safer, more efficient & more sustainable
- **Timeframe:** 2019-2022
- **Focus:** Mobility of persons and goods
- **Mode:** Road, Rail, Aviation
- **Actions:** 34 Measures
- **Investments:** 65 Mio. € national funding

Online:
https://www.bmvit.gv.at/en/topics/alt_transport_concepts/automated/actionpackage.html

Operationalisation:
IFA 3.1 link to transnational initiatives

Current examples: CEDR, H2020, Horizon Europe, DACH.

ToDo

IFA collaboration group members are invited to add for this IFA relevant transnational initiatives.

Outlook: Human Capital Development for IFA 3.1

The deployment of CCAM will need informed civil engineers and IT specialists. It can be noticed that many NTIAs currently phase a skills shortage for the priority topics identified in this IFA.

ToDo

IFA collaboration group members are invited to share their thoughts on the human capital development needs.

ToDo

all NTIAs (**N**ational **T**ransport **I**nfrastructure **A**uthorities) interested in this collaboration group are welcome to comment on this IFA description and to add their own contributions to the given sections by 26th June

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and please contact the persons in your network from other countries who are interested in contributing or participating

IFA 3.2 Information provision for process optimisation in infrastructure management

Online meeting, 24 June 2020

[redacted]

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i4Df IFA webinars

June 2020

Strategic context and challenges

- For many years there has been an ongoing evolution in infrastructure management 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 digital twin, of which the BIM-system is the fundamental backbone.
- 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. Virtual training, digital verification and validation can add tremendously to the availability and safety of the network, especially for critical nodes such as tunnels and bridges.
- 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.

Innovation and implementation

- **Data-driven and digitalised asset management**

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

Suggested priority topics

- **Data-driven and digitalised asset management**
  1. **Dynamic AMS**
  2. **Synthetic digital twin**
  3. **Dynamic and Automated AMS for network maintenance decisions**

Suggested priority topics

- **Advanced approaches and strategies for automated construction, maintenance, strengthening and inspection of infrastructure by artificial intelligence**
    4. **AI: Legal issues**
    5. **AI: Technical issues**
    6. **Robotization: avoiding barriers**

Operationalisation of magnet:c

- Participants – *send in the application*
- Loose structure – when founding members of the group are known, we can choose the structure
- Coordination
  - Different coordination models (based on existing network examples)

Innovation delivery chain

From R&D to "market uptake" in 3 global stages.

FOCUS of the IFA collaboration ecosystems

Stage I
TRL4 – TRL7

RESEARCH & DEVELOPMENT

- From proof of concept up to managed practice prototyping
- Delivering business cases for stage II.
- …

Stage II
TRL8 - TRL9

DEMONSTRATION & VALIDATION

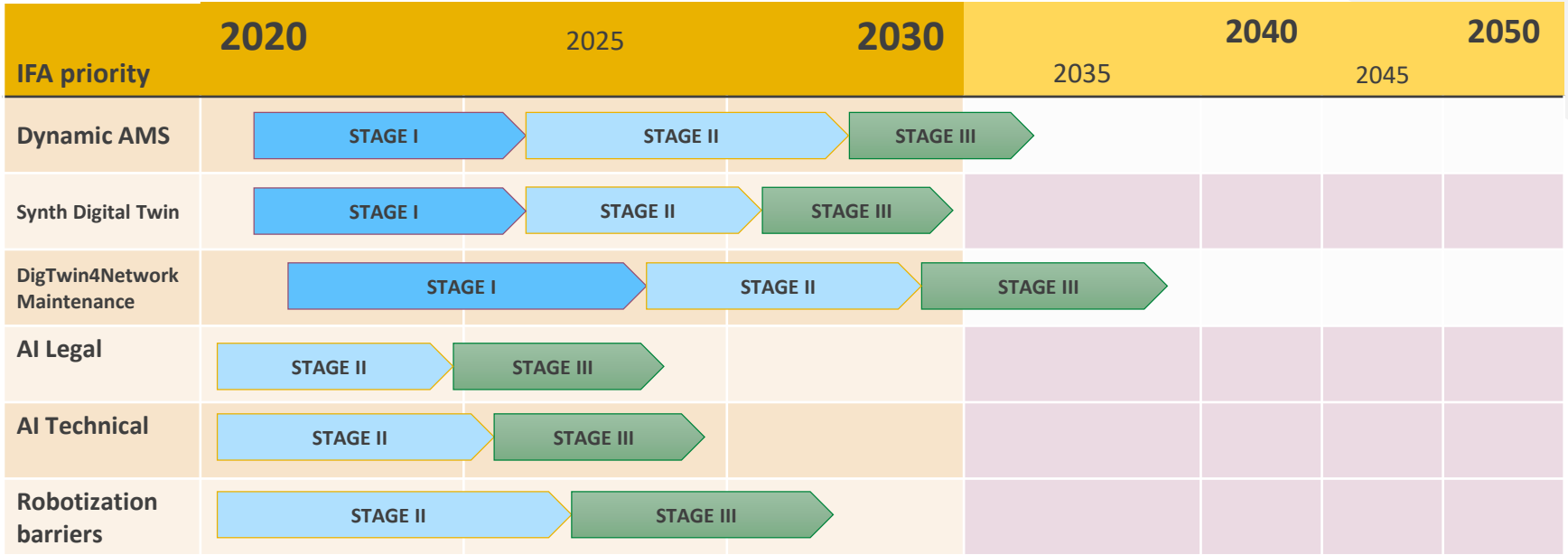
- In full practice setting
- Delivering generic frameworks and documentation for stage III e.g. guidelines, specifications, and curriculae
- …

Stage III
Deployment

MARKET UPTAKE

- Up to higher network levels
- Specific frameworks for procurement and human capital development
- …

Operationalisation of magnet:c



Expected innovation timelines for delivery

Operationalisation of magnet:c

Next steps I

- Topics shall be scanned against all other IFAs to find any overlaps, these overlaps shall be addressed within Capability coordination mechanism and or within IFA coordination mechanism;
- All interested NTIAs should be listed and contacted for expert nominations;
- All relevant national and transnational initiatives should be listed and analysed;

Operationalisation of magnet:c

Next steps II

- Collaboration scheme shall be chosen and established;
- All topics shall be re-evaluated and new innovation timeline developed;
- First IFA 3.2 (magnet:c) Transnational initiative shall be launched

IFA .....

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June 2020

Integrated Network Performance Management

Merging of IFA 1.1 Network Performance & IFA 1.2 Integrated Infrastructure Network Management

Expanding an existing collaboration of European infrastructure authorities

Presentation Webinar

June 24th, 2020

Merging 1.1. and 1.2

D1.2 “Joint vision on transport infrastructure innovation until 2040” (submitted to the EC in September 2019) is the starting point for the continued work on the operationalisation of the IFA as it defines the eight identified IFAs and their thematic scope.

Capability 1: Infrastructure optimally meeting end user needs

1.1 Innovation Focus Area: Network performance
1.2 Innovation Focus Area: Integrated infrastructure network management
1.3 Innovation Focus Area: Responsible and innovative procurement and finance

Capability 2: Infrastructure meeting environmental and social sustainability needs

2.1 Innovation Focus Area: Decarbonisation of infrastructure management
2.2 Innovation Focus Area: Preserving the environment
2.3 Innovation Focus Area: Integrating multi-layer networks and nodes

Capability 3: Infrastructure achieving added value from digitalisation

3.1 Innovation Focus Area: Smart data and information ecosystem for accommodating automated and connected transport

Participating Infrastructure Agencies

Overview of the members and the network types under their responsibility

Agency	Country	Roads	Railroads	Waterways	Air	Cycling paths
ANAS	Italy	Yes	-	-	-	-
RWS	Netherlands	Yes	-	Yes	-	-
Trafikverket	Sweden	Yes	Yes	Yes (maritime)	-	-
AWV	Belgium - Flanders	Yes	-	-	-	Yes
Vejdiretoratet	Denmark	Yes	-	-	-	-
Vayla	Finland	Yes	Yes	Yes	-	-
TII	Ireland	Yes	Yes (lightrail)	-	-	-
Statens Vegvesen	Norway	Yes	-	-	-	-
GDDKiA	Poland	Yes	-	-	-	-
Slovenia Infrastructure Agency	Slovenia	Yes	-	-	-	-
Minesterio de Fomento	Spain	Yes	Yes	Yes (maritime)	Yes	-

Strategic Context

Three steps

1 USER NEEDS AND EXPECTATIONS

2 ROLE OF INFRASTRUCTURE AGENCIES

3 LINKING USER NEEDS TO ROLE OF INFRASTRUCTURE AGENCIES

1

USER NEEDS AND EXPECTATIONS

Strategic Context

User Needs and Expectations

- The mobility and transport sector is evolving quickly in a field of rapid change.
- Users desire transport infrastructure that suits their needs like fluid mobility across the scales and borders, efficient transport, preserving the environment, improving living conditions, but also connecting the physical with the digital world.
- From an end-user perspective the division line between modes becomes more blurred as new information sources influence daily mobility decisions on a now-time basis.

2
ROLE OF INFRASTRUCTURE AGENCIES

Strategic Context

Role of the infrastructure agencies

- National transport infrastructure authorities (NTIAs) need to **respond adequately to all upcoming changes** in the field.
- They need to be sensitive and responsive to this **dynamic context influenced by policy, economy, society, and technology** (e.g. public procurement rules, cost-cutting drivers, and big-tech driven new mobility services).
- In addressing these challenges, NTIAs also need to be **effective coordinators in a myriad of public-public and public-private coalitions** to address the wide variety of connected issues (environment, finance, synchro-modality, urban/regional transport, digitalization, climate, circularity).
- Yet, in all these dynamics, NTIAs are also held to their **core responsibility to ensure their networks meet the current expectations on a day-to-day basis** (safe, reliable and cost-efficient).

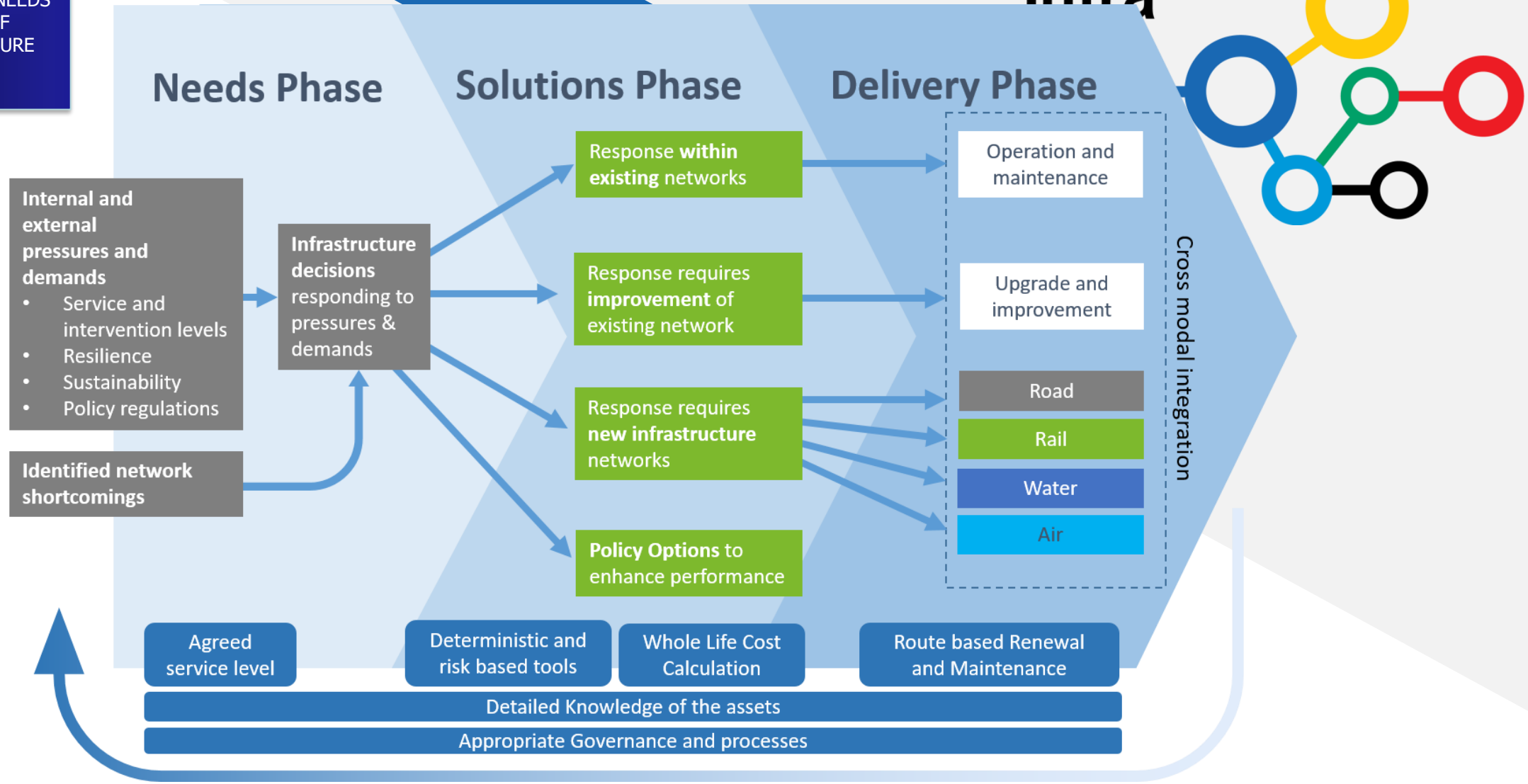
3
LINKING USER NEEDS TO ROLE OF INFRASTRUCTURE AGENCIES

Strategic Context

Linking user needs to role of infrastructure agencies

- Most Agencies have adopted a form of Asset Management, which is defined as ‘coordinated activities to provide value through the assets under their responsibility’.
- Such a framework provides a so called ‘line of sight’, linking high level ambitions through the various organisational layers all the way to practical activities. The line of sight clearly allocates roles and responsibilities to the asset owner, asset manager and service provider.
- This framework enables NTIAs to provide user oriented value, and will be helpful for NTIAs to adapt to mentioned changing circumstances as well.
- In other words; the user value might shift, activities need to change, or circumstances are different, but the framework itself remains highly needed to link concrete action to network performance.

3
LINKING USER NEEDS TO ROLE OF INFRASTRUCTURE AGENCIES



‘Line of sight’ - Endorsed common framework approach for governance and Management From AM4INFRA CSA initiative

Challenges

How to make this more concrete

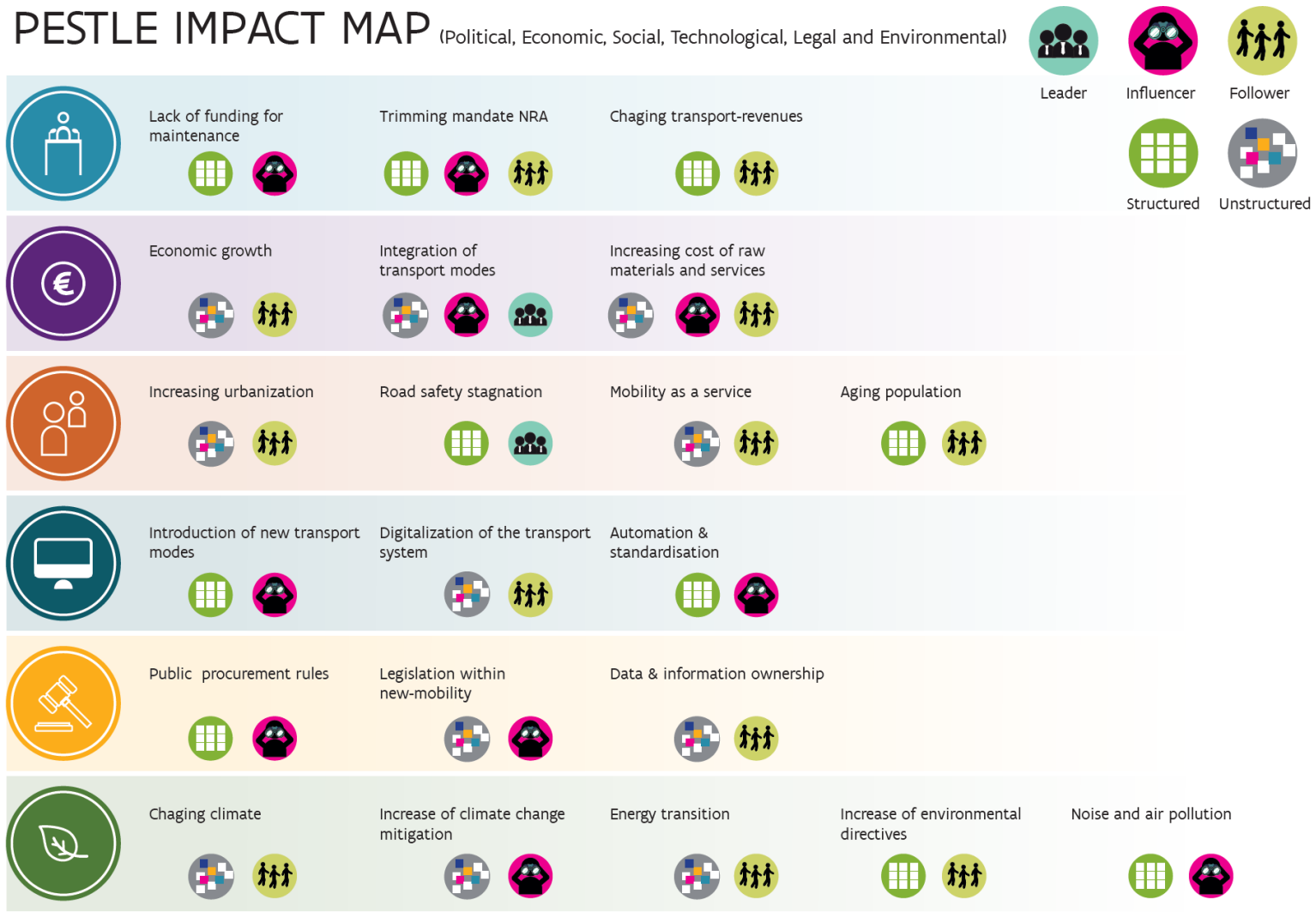
Delivering on the needs and desires of the public is key. But the **public's interests are also a rather abstract, fragmented and rapidly moving** target that is hard to reconcile with the lower tempi of infrastructure asset management.

They **need to be made more specific** in order enable NTIAs to appropriately translate network performance goals into specific service levels, KPI's, Infrastructure decisions and so on.

In order to do so, analyses were performed, and various group discussion were held to determine the most relevant trends for NTIAs. Many **trends were identified and characterized**.

Sample of trend analysis

PESTLE IMPACT MAP (Political, Economic, Social, Technological, Legal and Environmental)



Challenges

How to make this more concrete

This resulted in an overview where three major developments were seen as impactful, close to the core business of NTIAs, and highly determinant in terms of future outlook for the sector and offering various perspectives for the future. These are;

- **Greening:** sustainability; circular economy; decarbonisation; energy efficiency; biodiversity; environment
- **Digitalisation:** smart utilisation; optimal connectivity (delays, congestions and re-routing); data sharing, ownership and management (e.g. interoperability, cyber security); 5G deployment and digital maintenance.
- **Resourcing and finance:** Capital and capacity might be either plenty due to low capital interest rates and good economic returns on infrastructure or rather limited as national governments have restricted budgets. Both scenarios are challenging and might differ from country to country and might also change significantly over time.

Challenges

How to make this more concrete

These three trends were used to build four major scenario's which will be addressed in this IFA. These are;

Scenario 1: Core infrastructure (low resources, low digital, low green)

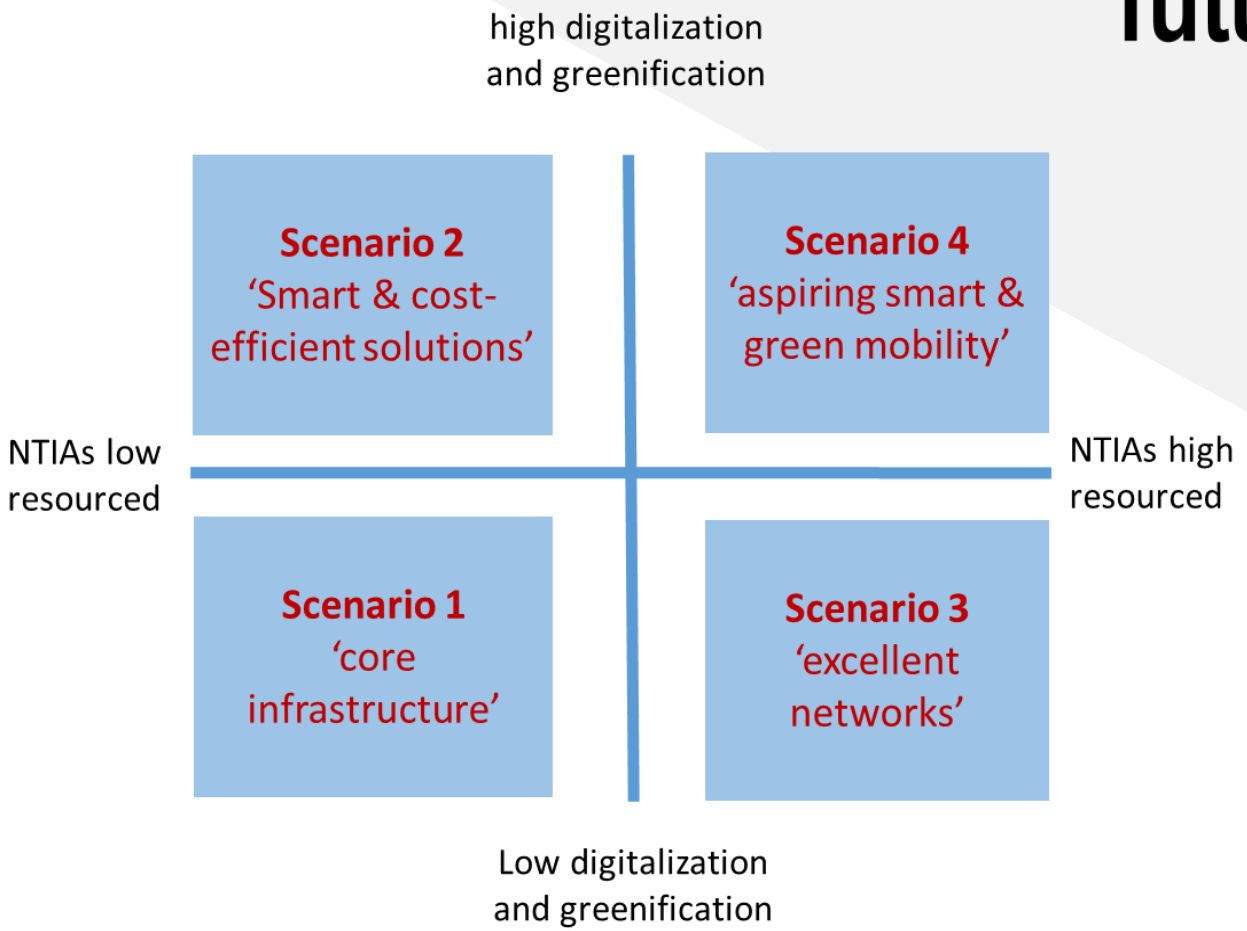
Scenario 2: Smart & cost-efficient solutions (low resources, high digital, high green)

Scenario 3: Excellent networks (high resources, low digital, low green)

Scenario 4: Aspiring smart & Green mobility (high resources, high digital, high green)

Challenges

How to make this more concrete



What about COVID19?

Two storylines for the scenario's

- Covid-19 has disturbed the global and European transport system on a profound scale
- It is expected to show effects on these systems for years ahead.
- Two main storylines might tell the expected impact of the pandemic on the above mentioned issues.

What about COVID19?

Two storylines for the scenario's

The **first storyline** assumes that the economic impact of the pandemic needs to be restored with increased public spending. Historically infrastructure is seen as a common target for such spending.

The common idea would be that the current green and digital agendas will be linked to these investments

What about COVID19?

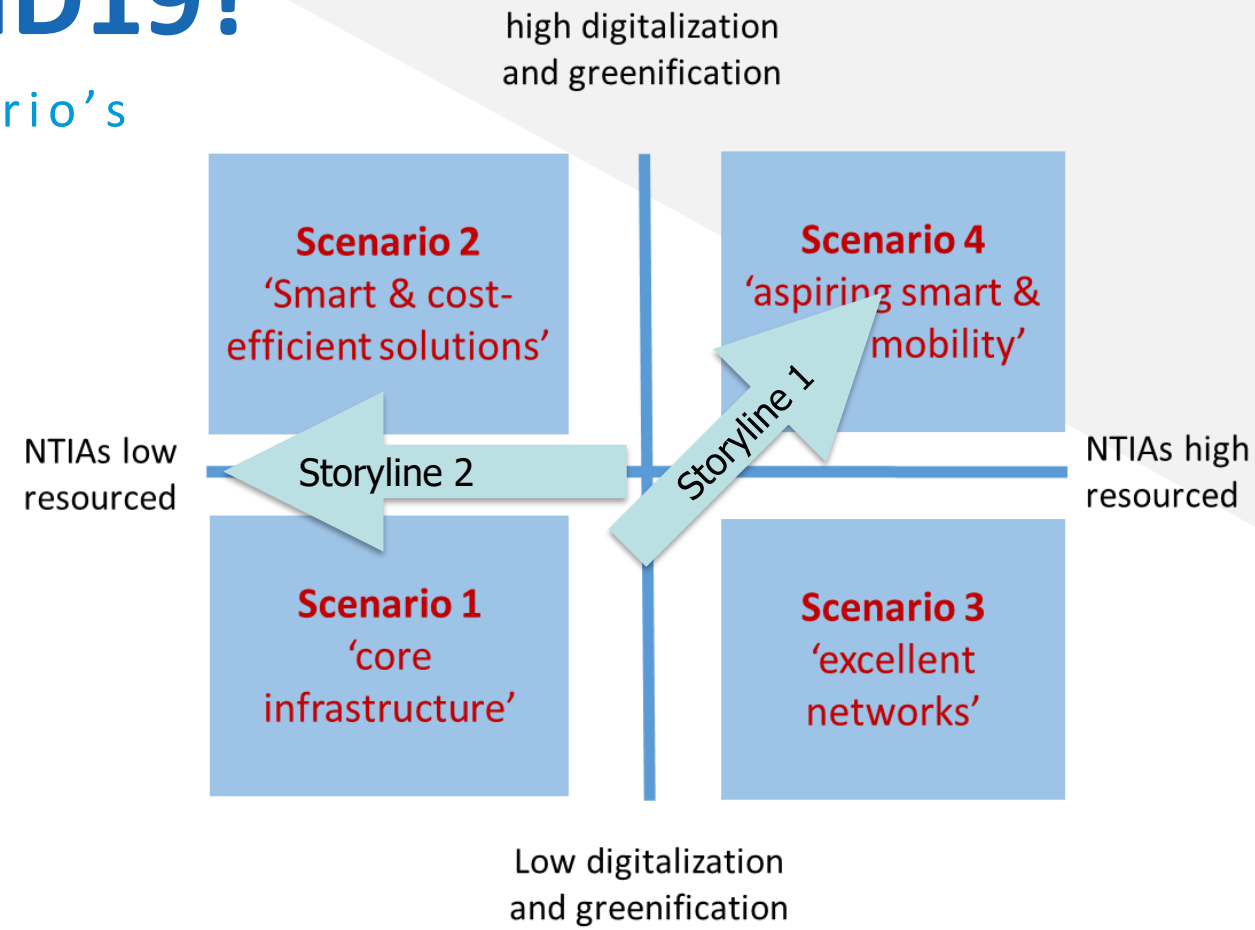
Two storylines for the scenario's

The **second storyline** reflects the idea that due to the society-wide recovery needs, spending on infrastructure will be limited. This latter situation calls for smart approaches by the NTIAs to deliver on the needs with limited budgets and capacity. Both storylines are covered by the main challenges as described.

What about COVID19?

Two storylines for the scenario's

Considering the earlier mentioned major trends for the sector, and the scenario's arising from those, the two storylines can be made more concrete.



Expected Impacts in 2030

What to achieve?

The aim is to deliver in 2030 a demonstrated and validated framework for performance management of the TEN-T core network.

The demonstration and validation will be achieved on cross-border segments of the TEN-T core network managed by regional cooperatives (Nordic countries, Benelux, Iberian etc).

Through implementation of this framework, national infrastructure authorities can achieve;

Expected Impacts in 2030

What to achieve?

- Routine alignment of relevant service levels defining the common performance requirements
- Wide adoption of a common consistent framework of corresponding KPIs, logically linked to relevant elements in the set of aligned service levels.
- Adequate reflection of (correlation with) end users' needs and requirements for the provision of infrastructure services.

Expected Impacts in 2030

What to achieve?

- Uniform information backbone suitable for linkage with third party systems and applications.
- Greening of infrastructure construction and maintenance as well as reduction of the environmental footprint of the usage of infrastructure. Reduction of externalities is a crucial element in infrastructure decision making.
- Improve resilience of transport resilience. Significantly improved ability to dynamically reroute strategic transport flows over the integrated networks in case of natural or man-made events, such as extreme weather incidents and unavailable/blocked assets etc.

Priorities

In order to achieve the intended impacts

- Compatible service levels and associated KPIs for European linked regions in order to facilitate cross-border and cross-modal network management in line with users' needs.
- Digital twinning of the integrated transport infrastructure network with a keen eye on compatibility over TEN-T networks
- Integrated mobility management systems
- Future proofing of infrastructure planning

Priorities

In order to achieve the intended impacts

- Conceiving sustainability targets and a correlated portfolio of KPIs and ‘line of sight’ steps to achieve these
- Uniformed language on ‘line of sight’ to understand mutual network management
- Test cases in existing regions of cooperation (Nordic Countries, Benelux, etc) to validate and practice above mentioned elements.

IFA .....

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June 2020

IFA 2.1
Decarbonisation of infrastructure management

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i4Df IFA webinars

June 2020

Capability and IFA (Innovation Focus Area)

- Capability 2: Infrastructure meeting environmental and social sustainability needs
- 2.1 Innovation Focus Area: Decarbonisation of infrastructure management

- Goal for todays Presentation, discussion and procedure for the completion of the IFA description

- ToDo:
  completing the section of the report on the innovation focus area and making the countries interested in this topic visible

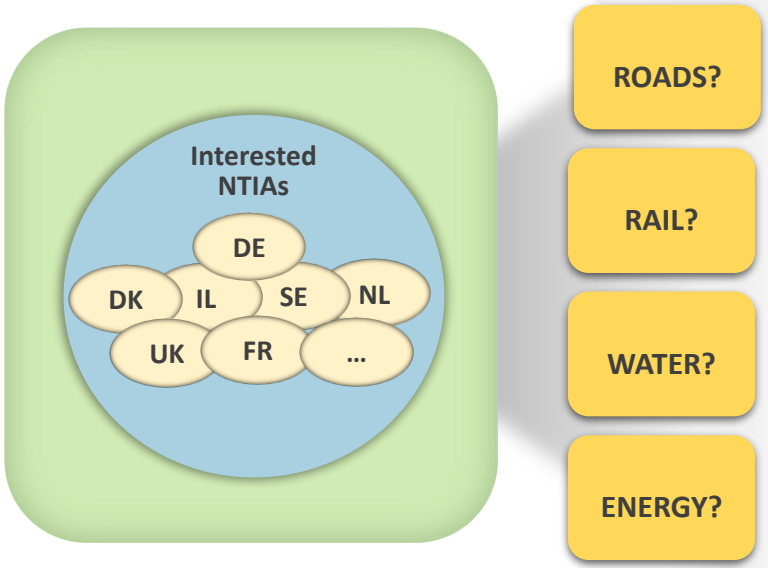
IFA Decarbonisation of infrastructure management

Strategic context and challenges

- GHG emission targets have to be met sectorwise
- Share of infrastructure of carbon emissions is not negligible
- Significant leverage on energy transition of transport system
- (Disruptive) change in energy supply: fossil fuels ⇨ electricity
- A new stakeholder ecosystem (crossmodal and cross-sectoral) for energy production and exchange has to be established.

IFA 2.1: Setting up an NTIA IFA group

- Reduction of the carbon emissions in transport infrastructure: e.g. circular economy and decarbonisation;
- Support of infrastructure for the energy transition: electrification, renewable energy, intelligent traffic management, green procurement.
- **Initial focus on:** (renewable) energy production, exchange and distribution → Support the energy transition
- NTIAs: NL, DK, SE, DE, IL, UK, FR
- Links with the wider stakeholder ecosystem still need to be determined



IFA 3.1 – Contributors to the IFA description and members of the collaboration group

- *The members of the collaboration group give a* ***brief description of your own organisation*** *with an overview of structure and responsibilities.*

- *Current members: BASt (Germany), AWV (BE-FL), RWS (NL), TRV (SE) and NTIC (IL).*

- **ToDo**
  Additional members of the collaboration group should add their information here.

Operationalisation:
Innovation pathway for IFA 2.1

Expected impacts 2030

•Better **economies of scale** from common objectives and perspectives for the energy transition in infrastructure by providing larger opportunities for industry as well as infrastructure managers. The innovation focus is on delivering a validated, next level suite of models, methods and data.

•The **increased production of renewable energy** on transport infrastructure‘s assets.

•The wider use of **electric road systems** across national and European transport networks.

•The seamless **legislative integration** of new processes that foster the energy transition.

•The **reduction of carbon emissions of infrastructure management processes** through more efficient technological operations, e.g. operating tunnels with LEDs.

Operationalisation:
Innovation pathway for IFA 2.1

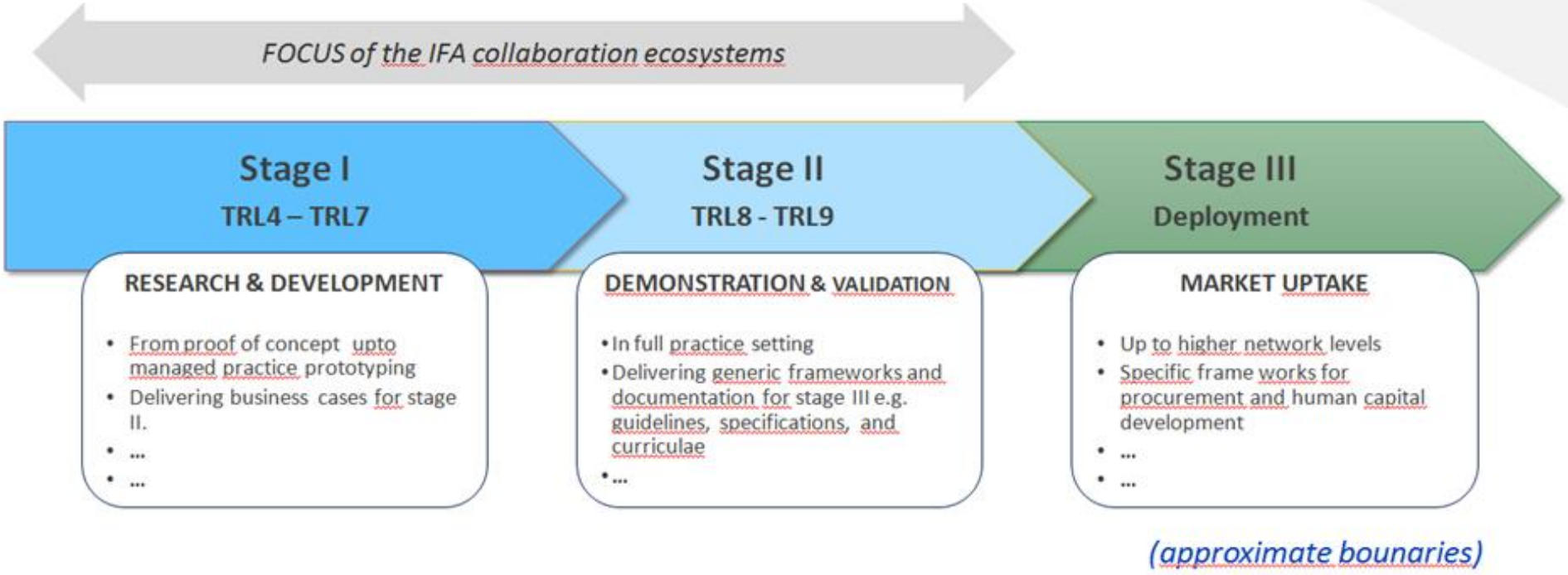
Based on the above description the following priority topics are suggested

- ***Priority topic 1:*** Electric road systems - cross-border demonstrators including pre-standardisation
- ***Priority topic 2:*** Energy Harvesting - Development of a European portfolio of technologies proven through demonstrators
- ***Priority topic 3:*** Development of new legal and governance models for the emerging new cross-sectoral (e.g. energy and transport) and cross-modal technologies and collaborations.

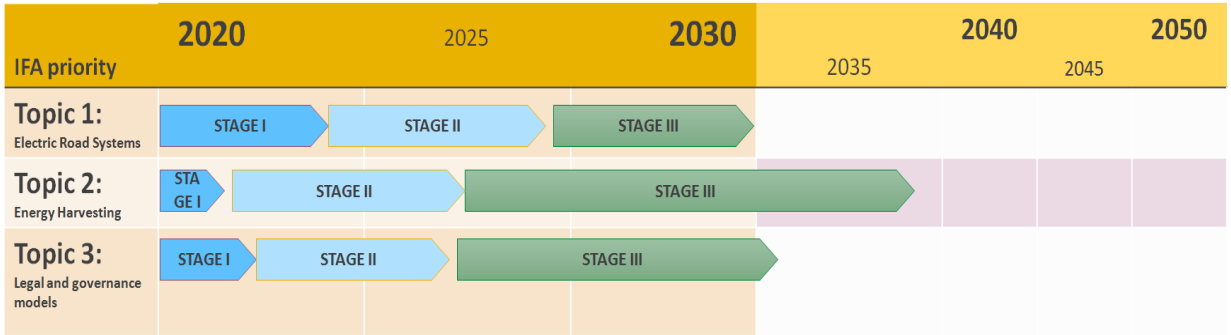
ToDo

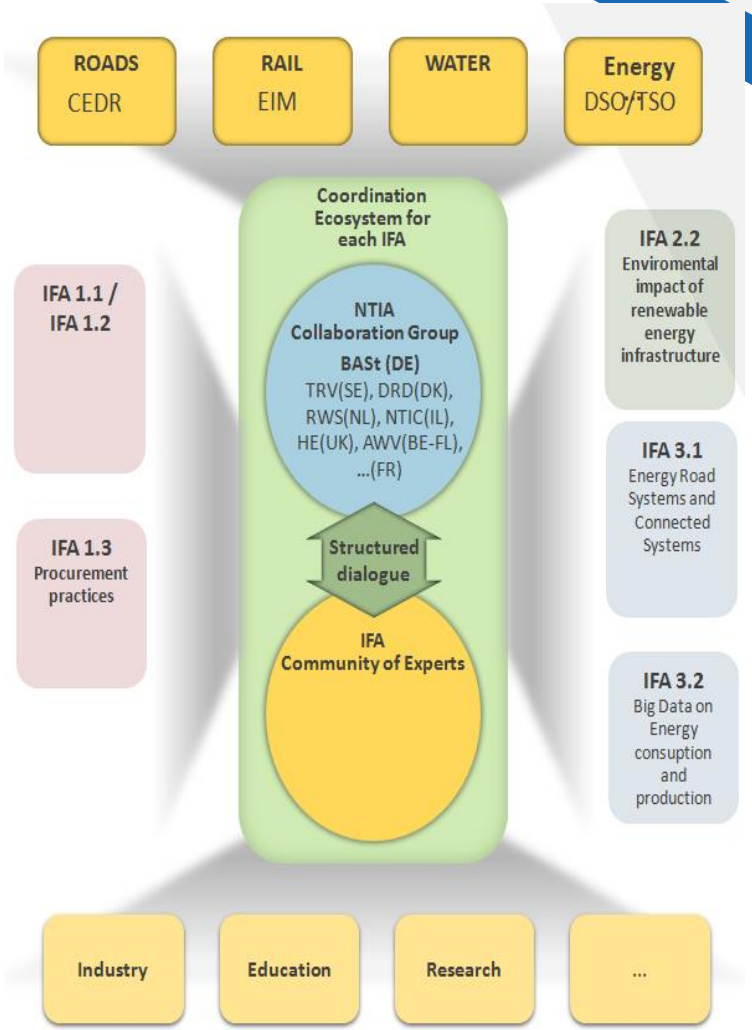
IFA members are invited to review the suggested priority topics.

Operationalisation:
Innovation pathway for IFA 2.1



Operationalisation:
Innovation pathway for IFA 2.1




ROADS
CEDR
RAIL
EIM
WATER
Energy
DSO/TSO
Coordination Ecosystem for each IFA
NTIA Collaboration Group
BASt (DE)
TRV(SE), DRD(DK), RWS(NL), NTIC(IL), HE(UK), AWV(BE-FL), ...(FR)
Structured dialogue
IFA Community of Experts
IFA 1.1 / IFA 1.2
IFA 1.3
Procurement practices
IFA 2.2
Enviromental impact of renewable energy infrastructure
IFA 3.1
Energy Road Systems and Connected Systems
IFA 3.2
Big Data on Energy consuption and production
Industry
Education
Research
...

Operationalisation IFA 2.1 Ecosystem

supply of science-based research results

Operationalisation:
IFA 2.1 link to national initiatives

ToDo

IFA members are invited to suggest the most relevant national innovation and research initiatives and other relevant activities (e.g. events) that could be linked to IFA activities. Each national initiative should shortly be described.

Operationalisation:
IFA 2.1 link to national initiatives

Expert network of the Federal Ministry for Transport and Digital Infrastructure

BMVI Network of Experts is a new format of departmental research. Under the guiding theme of Knowledge – Ability – Action, seven departmental research facilities and executive agencies of the Federal Ministry of Transport and Digital Infrastructure (BMVI) formed a Network of Experts in 2016.

Their objective is to address urgent transport questions of the future through innovations in the areas of adapting to climate change, environmental protection and risk management.

Website: https://www.bmvi-expertennetzwerk.de

IFA 2.1 link to transnational initiatives

- Previous/ongoing projects/calls
  - CEDR call 2019
  - DACH call 2019
  - National programmes: SE/DE cooperation on Electrified Road Systems
- Future calls
  - EU Horizon Europe
    - Abundance of topics in clusters 4 and 5

Outlook: Human Capital Development for IFA 2.1

Decarbonistation in construction, maintenance etc. will need informed civil engineers. For topics involving sector coupling and or cross-modal issues, a substantial amount of electrical engineers and IT-engineers will be required. It can be noticed that many NTIAs currently phase a skills shortage for the priority topics identified in this IFA.

ToDo

IFA collaboration group members are invited to share their thoughts on the human capital development needs.

IFA Decarbonisation of infrastructure management

- What's new about this IFA?
  - Starting from a "green field": self-organising, light and open
  - Interest is increasing
  - Crossmodal: Waterways, Rail, Road
  - Cross-sectoral: Energy and Transport
  - The most crucial feature for a transition to Renewables is cooperation in production, distribution and consumption across modes and sectors

ToDo

all NTIAs (**N**ational **T**ransport **I**nfrastructure **A**uthorities) interested in this collaboration group are welcome to comment on this IFA description and to add their own contributions to the given sections by 26th June

…

and please contact the persons in your network from other countries who are interested in contributing or participating