

ERRAC Plenary

21 March 2019 - Brussels



Agenda

- 1) **Welcome from the Chair– Alberto Parrondo**
- 2) Approval of the Agenda
- 3) Approval of the Minutes of 30 November 2018 Plenary
- 4) Keynote speeches - European Commission viewpoint
 - 1) *Keir Fitch, DG MOVE*
 - 2) *William Bird, DG RTD*
- 5) Shift2Rail update – Carlo Borghini
- 6) ERRAC Working Groups
 - 1) *WG1 Vision&Strategy – Ulrich Meuser*
 - 2) *WG2 Collaboration – Johan Jonsson*
 - 3) *WG3 Communications – Lotta Andersson*
- 7) ERRAC Academia PAG – Prof. Sebastian Stichel
- 8) Guest Speaker – Christoph Schneider, Secretary General, ACARE
- 9) TER4RAIL – Panel:Armando Carrillo, Secretary General, EURNEX
- 10) Concluding remarks and date of next meeting – Alberto Parrondo

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Approval of the Minutes of 16 May Plenary



European Rail Research Advisory Council

ERRAC Plenary MINUTES

Friday, 30 November 2019, 09:30 – 13:00

Maison des Associations Internationales (MAI) Rue Washington, 40, 1050 Brussels

- No comments received.
- Plenary is asked to approve the Minutes as presented.

1	Welcome from the Chair	
	Alberto Parrondo – ERRAC Chair	Alberto Parrondo welcomed and thanked the participants for attending the second ERRAC Plenary of 2018.
2	Approval of the Agenda	Alberto Parrondo presented the agenda.
	Alberto Parrondo – ERRAC Chair	The agenda was approved by the participants.
3	Approval of the Minutes of the ERRAC Plenary held on May 16	Alberto Parrondo presented the Minutes of the May 16 Plenary for comment and approval. There were no comments.
	Alberto Parrondo – ERRAC Chair	The Minutes of the May 16 Plenary were approved by the participants.
4	Keynote speech from the European Commission	In her speech, Mrs de la Torre underlined the following:
	Clara de la Torre, Director, DG Research & Innovation	Ministers were discussing with the Commission the financial pre-conditions for the research and innovation funding programme for the 2021-27 period. This increase would enable a significant increase in capacity for research. The programme comprised three pillars – Open Science, Challenges and Open Innovation. Clusters, including one on Climate Energy and Mobility, were implemented via calls, missions and partnerships. The make-up of partnerships was not yet agreed. There were three different arrangements for partnerships – co-programmed, co-funded and institutionalised. The STRIA roadmap on Connected and Automated Transport (CAT) linking the railway to the other transport sectors' research efforts. See Mrs de la Torre's presentation for more information

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R&I for rail transport: Horizon Europe and STRIA - another update...

**ERRAC Plenary
21 March 2019**

**Bill Bird
DG RTD**

Horizon Europe – Commission newsflash!

"Yesterday (early) morning 20/3, European Commission, Parliament & Council reached provisional partial agreement on the Horizon Europe Framework Programme Regulation & the content of the Horizon Europe Specific Programme.

This agreement, reached at historic speed of less than three months, is a very good and balanced outcome and preserves the key elements of Commission proposal, such as the structure, the cross-sectoral cluster approach, strategic planning as direction-setting for the work programmes, missions as novelty of the Programme, the EIC as one stop shop for innovation and the partnership landscape.

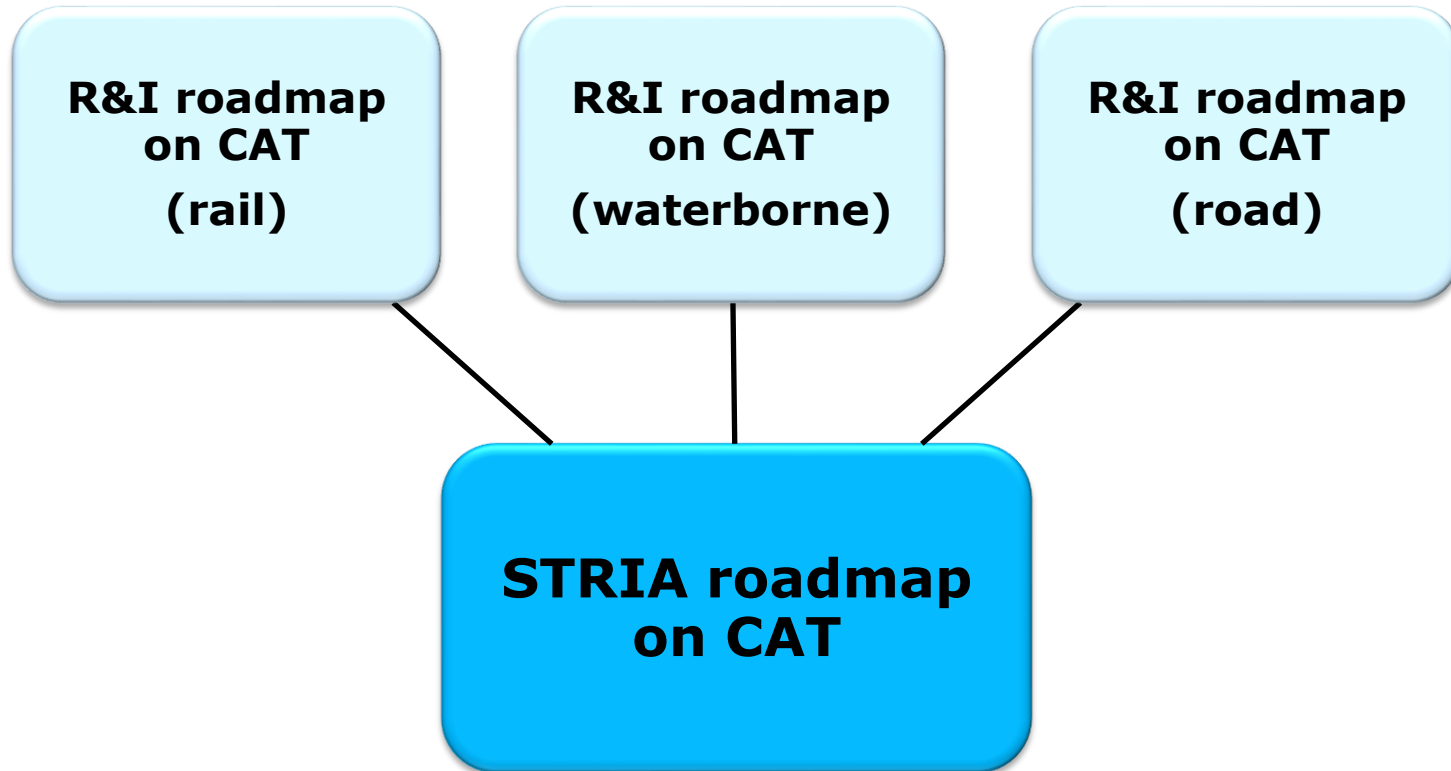
It allows us to start with the co-creation and co-design of preparations of the implementation of Horizon Europe together with the other institutions and our stakeholders and civil society."



Horizon Europe: next steps

- Preliminary political agreement by European Parliament, Council & Commission needs formal approval by European Parliament (ITRE committee 2 April and Plenary 15 April) and Council (COREPER 27 March).
- A trilogue between the three institutions on the Specific Programme (consultation procedure).
- Horizon Europe budget depends on agreement on the EU's next long-term budget (MFF).
- Synergies with other future EU programmes and policies depending on progress with other proposals in MFF.
- The Commission preparing Horizon Europe implementation First draft work programmes published for programme's launch on 1 January 2021.

STRIA roadmap on Connected and Automated Transport (CAT)

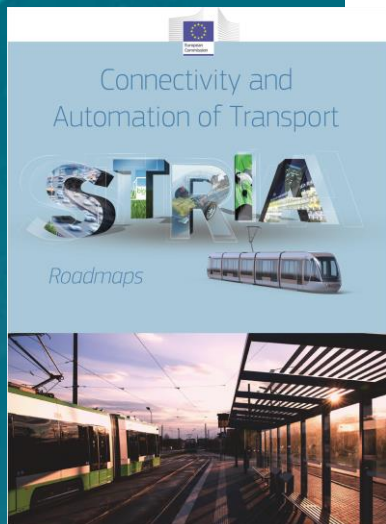


Draft Completed for approval by STRIA board:
134 pages incorporating all 3 roadmaps + cross-
modal coordination

STRIA roadmap on Connected and Automated Transport (CAT)

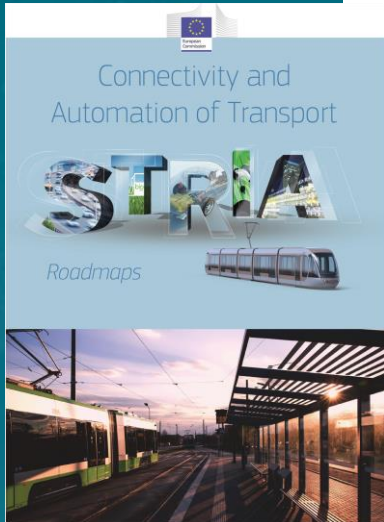
❑ Rail section

- ❑ Rapporteur Vincent Blervaque (Railenium)
- ❑ Includes participation from **ERRAC, S2R, UNIFE, UITP, UIC, JRC**
- ❑ Addresses **policy targets & objectives**
 - ❑ **Decarbonisation, Competitiveness, Safety**
- ❑ Assesses **state of the art**
- ❑ **Concrete list of** potential short, medium and long-term **R&I Actions**
- ❑ Other actions to **accelerate deployment**
- ❑ Fields of **cooperation** and **common actions** between **Member States**, the **EC** and **Industry**
- ❑ Better **coordination** of **national** and **multinational** funding **programmes** in the area of **CAT**



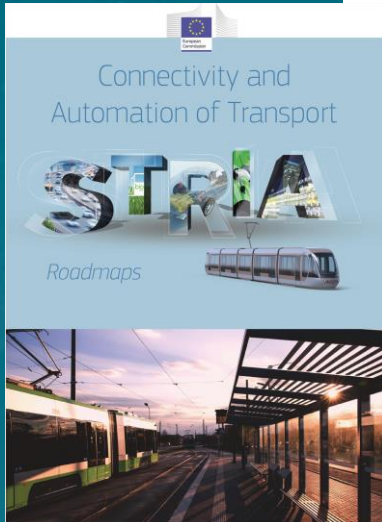
STRIA roadmap on Connected and Automated Transport (CAT)

- ❑ Some general recommendations
- ❑ European Commission:
 - ❑ e.g. **support** fundamental & high risk **research** via **Shift2Rail**; continue to ensure **interoperability**; use procurement to **facilitate innovation**; cross-fertilisation **across modes**
- ❑ Member States:
 - ❑ e.g. Address regional differences through **harmonisation**; **integrate** national **R&I** initiatives with European strategy; bilateral cooperation **across borders**; **support** standardisation; encourage knowledge transfer
- ❑ Industry:
 - ❑ e.g. **demonstrate commitment** for active contribution to ensure **consensus** in **pre-normative research**; support **industry standards** for economies of scale; take **leadership** in **international cooperation** to promote **EU results**
- ❑ More specific recommendations on **rolling stock**; large-scale **demos**; environmental/operational **monitoring**; **network** info, management, maintenance, control; **socio-economic** impact; **human factors**; digital/physical **infrastructure**; **Big data**, **AI**;



STRIA roadmap on Connected and Automated Transport (CAT)

- ❑ Cross-cutting activities covers
 - ❑ Cross-modal links/common issues
 - ❑ Connectivity & data collection; cyber security; human factors; universal design & user acceptance; testing & validation etc
 - ❑ Transfer potentials
 - ❑ Safety philosophy; Environment perception; V2X communication
 - ❑ New opportunities
 - ❑ More efficient freight operations along transport chain; Seamless passenger travel; Cross-modal ride, vehicle, infrastructure sharing
 - ❑ Innovation support measures
 - ❑ Funding cross-modal R&I on automated operations; Citizen participation; feasibility studies
- ❑ Anticipated as potential input for Horizon Europe/S2R2





Thank you!

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ERRAC S2R JU ACTIVITIES

21 MARCH 2019

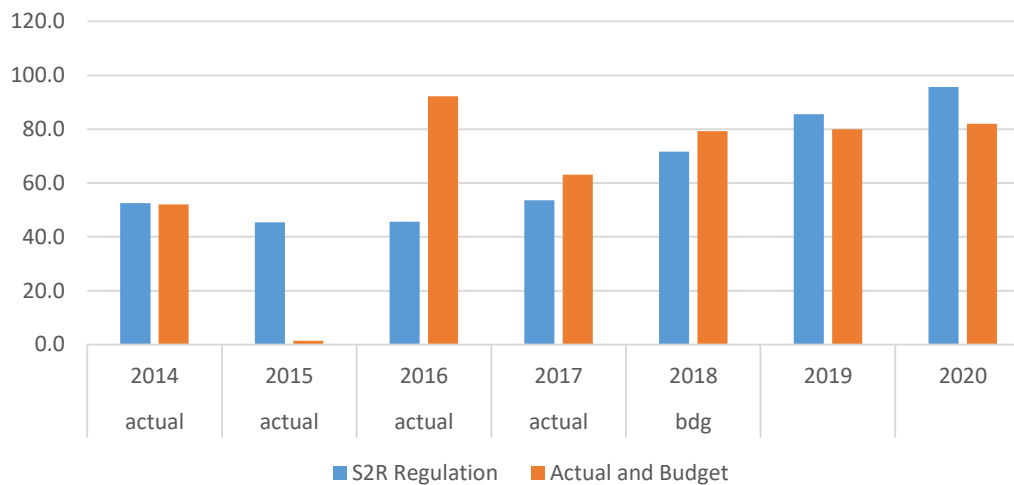
@Shift2Rail_JU
#Horizon2020



What's going on ... Programme

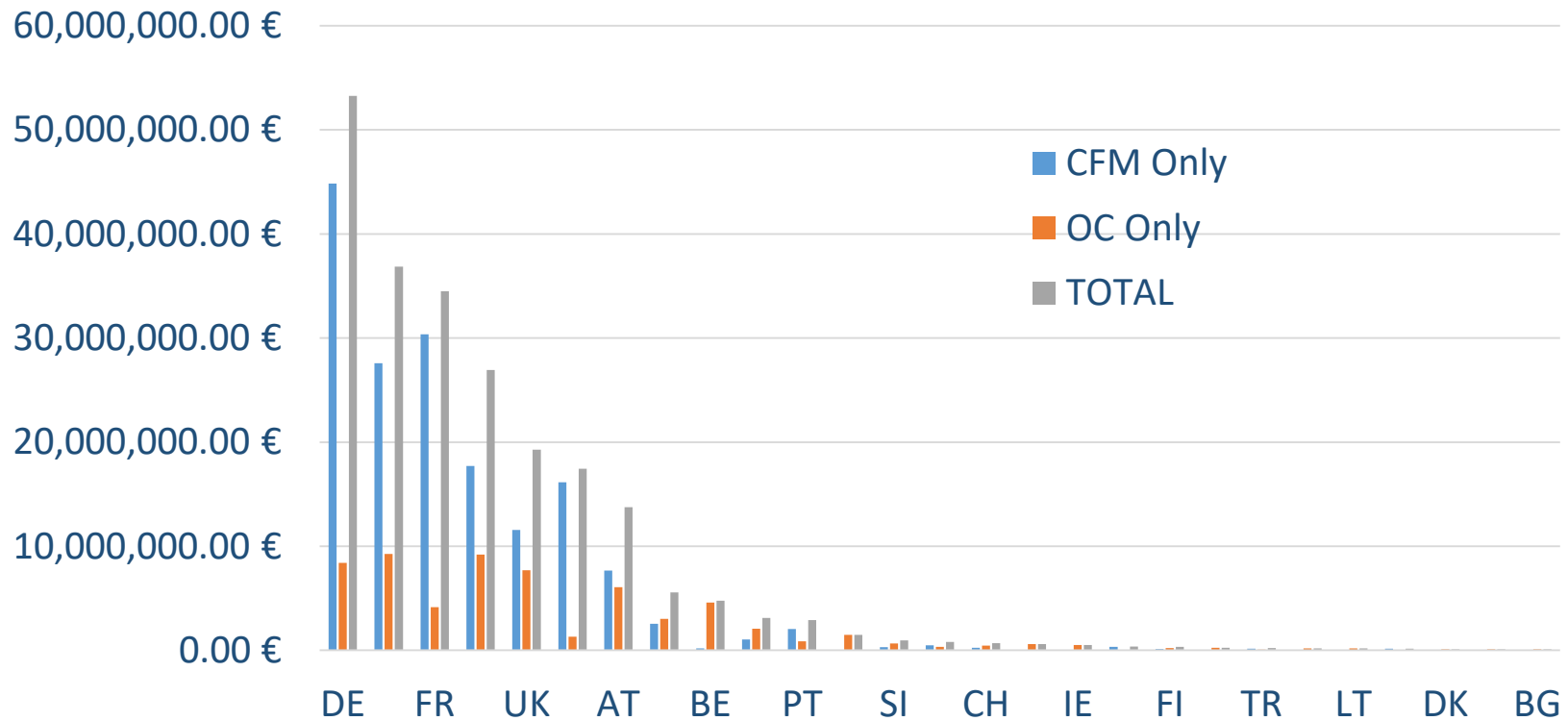
- CFM and OC Projects' reviews show
 - Programme **in line with objectives**
 - overall slower funding absorption
 - adjustments of Projects and transfer of resources to intertwined Projects
- **16 Grants** 2018 signed
- **14 Projects finished: 10** (2015-16 – 4 CFM, 6 OC) **4 Lighthouses** → transfer of results (link with CCOLA)
- RCA and System of Systems approach on its way
- Cross IP meetings planned for Jan IP weeks

What's going on



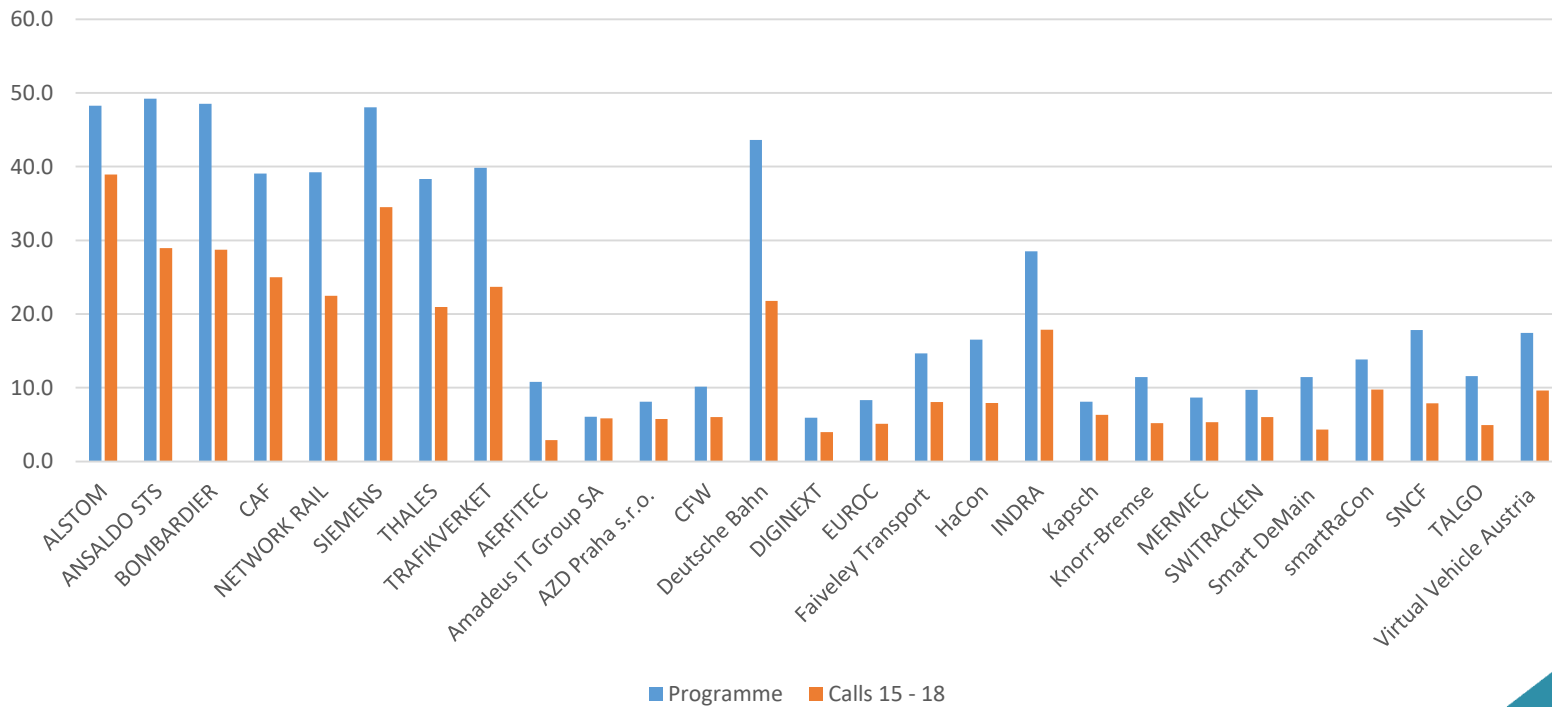
		actual	actual	actual	actual	bdg			
Commitments EUR Mio		2014	2015	2016	2017	2018	2019	2020	Total
S2R Regulation	admin	0.5	1.4	1.6	1.6	1.6	1.6	5.2	13.5
	lighthouse	52.0	0.0	0.0	0.0	0.0	0.0	0.0	52.0
	ops	0.0	44.0	44.0	52.0	70.0	84.0	90.5	384.5
	total	52.5	45.4	45.6	53.6	71.6	85.6	95.7	450.0
Actual and Budget	admin	0.0	1.4	1.6	1.6	1.7	1.7	5.6	13.5
	lighthouse	52.0	0.0	0.0	0.0	0.0	0.0	0.0	52.0
	ops	0.0	0.0	90.6	61.5	77.6	78.3	76.4	384.5
	total	52.0	1.4	92.2	63.1	79.3	80.0	82.0	450.0

S2R Grants 2015-2018 per MS & Assoc. Countries



S2R JU Grants 2015-2018 per Member

Programme Implementation (S2R JU Calls 2015 - 2018)
Total Commitment vs Signed Grants
Total Programme Cost Mio Eur



What's going on

- **Agreement with Regions/MS, other Bodies and Organizations**
 - Sesaari: signed @ InnoTrans at the presence of the Commissioner
 - ETSI: expected to be signed by early 2019
 - UIC: under discussion similarly to ERA / UIC exchange of letters
 - Agreement with CZ Republic: 7 Dec 2018
 - CUTRIC: follow-up Jan 2019

ANNUAL WORK PLAN 2019



AWP 2019, targets and content

Million of EUR	Total	Members only	Open to non-Members
Value of the Call for Proposals R&I	150.3	129.5	20.8
<i>S2R Maximum Co-funding</i>	76.8	57.5	19.3
<i>In-Kind Contribution</i>	73.4	71.9	1.5
No of topics	18	6	12
Value of Call for tender R&I	1.4	0	1.4
No of topics	4	0	4

AWP 2019, targets and content

- EACH PROJECT contributes to the **achievement of the Master Plan and the MAAP objectives**
- EACH PROJECT is part of a programme and **cooperation with other projects** must be ensured
 - Through the **collaboration and input to the JU Members**, EACH PROJECT will support the realization of **long-term S2R technological demonstrations or innovative break-through**
- Particular attention is given to ensure that there is **no duplication of work** between EACH PROJECT and current/future R&I activities
- EACH PROJECT results are taken into consideration for the next annual work plans to ensure sufficient **complementarity** and **coherence**

Railway System Architecture

RCA

- High level decomposition of RCA delivered by Feb 2019.
- Workshops with Members and stakeholders organised, including to assess possible impacts on IP2 and the rest of the Programme
- Proposal of integration of the activity in S2R and of a dedicated governance structure to be established

Railway System Architecture IPX

- Topic on CDM extended in scope to focus on a system approach (including RCA, system engineering, etc) also for next gen Programme

MAAP Part B (next steps)

- | | |
|----------|--|
| March 19 | S2R demo plan integration
new IPx system architecture / CDM integration
→ <i>first draft publication</i> |
| May 19 | Possible adjustment of Part A (pending also RCA and outcome workshops discussions) |
| Jun 19 | Formal submission to the GB for discussion and open consultation |

Standardisation Rolling Development Plan

- 16 October a S2R standardisation rolling development plan (RDP) was presented to RASCOP
- All parties and stakeholders involved have been invited by the EC to provide feedback (ERA, JPC-R, UIC, etc.) by the end of November
- The RDP is continuously updated
- Discussion with stakeholders taking place (S2R participation to the UIC standardisation conference on 6 November)
- Mind mapping / training of researchers necessary: awareness about standards is important from the start of the activity

Upcoming Events in 2019

Event	Date & Venue	Main target Audience	No. of Participants
S2R 2019 Info Day	6 February, Brussels	All rail stakeholders	250
S2R Event in Spain	12 February, Madrid	Spanish rail companies	100
International Railway Summit – IRITS	20-22 February, Frankfurt	Rail policy makers	300
Rail Live Bilbao 2019	6-7 March, Bilbao	Rail companies	3000
Space for Innovation in Rail	18-19 March, Vienna	All rail stakeholders	150
International Exhibition of Railway Technology - SIFER 2019	26-28 March, Lille	Rail companies	5,000
World Congress on Railway Research - WCRR	28 Oct. – 1 Nov. Tokyo	Rail research community	1,000

2019 High Level Planning

2019 activities

• Jan – Feb 2019

- 14 Jan 2019 onwards IPs week
- **15 Jan 2019** publication of the **Call 2019**
- 27 Jan 2019 deadline reporting Total Project Cost (including IKOP) +IKAA
- 5 Feb 2019 SIWG Programme Level (*InnoTrans 2020 QW preparation, Global Planning, RCA, MAAP*)
- 6 February S2R Info-Day
- Draft AWP2020 preparation
- Contribution to the discussions on S2R 2
- **13 reviews/checks:** 2 *Lighthouses* +2 OC 2017 +6 OC 2015-2016 +3 CFM 2015-2016 Projects

2019 activities

Mar – Apr 2019

- 1 Mar 2019 Provisional Annual Accounts
- **25 Mar 2019 GB (AAR 2018, Prov Annual Accounts 2018, S2R 2, ...)**
- Control gates projects 2015-2017
- 18 reviews/checks: *10 CFM 2015-2016 +7 CFM 2017 +1 OC 2015-2016 Projects*
- IPs SteeCos
- **30 Apr 2019 TPC(IKOP) and IKAA audit certificates**

May – Jun 2019

- **18 Jun 2019 Deadline Call 2019**
- Interim Payments 2019
- **24 Jun 2019 GB(Final Annual Accounts 2018, AAR 2018, MAAP, S2R 2...)**
- First draft AWP2020
- 1 review of *OC 2017 Project*

2019 activities

Jul – Aug 2019

- **22 Jul 2019** Consensus week Call 2019
- GAP tables preparation
- 2 reviews/checks of *OC 2015-2016 Projects*

Sep – Dec 2019

- **6 Sep 2019** extraordinary GB award of Call 2019 (or 4 Sep or first week of Aug)
- Launch GAP 2019
- Pre-Financing 2019
- **14 Nov 2019** GB (AWP 2020, S2R 2, ...)
- Demos activities with NSA
- 11 reviews/checks: 3 *OC 2015-2016* +8 *OC 2017 Projects*

FOUNDING MEMBERS



ALSTOM

Ansaldo STS A Hitachi Group Company

BOMBARDIER

CAF

NetworkRail

SIEMENS

THALES

TRAFIKVERKET

ASSOCIATED MEMBERS

amadeus



DIGINEXT
be visionary

Faiveley Transport
A Wabtec Company

HaCon

indra

kapsch >>>

KNORR-BREMSE

mermec
AN ANGEL COMPANY

SNCF

Talgo

Virtual Vehicle Austria consortium+
(VVAC+)

European Rail Operating
community Consortium (EUROC)

Swi'Tracken consortium

Smart DeMain (SDM) consortium

virtual vehicle

ARSENER LINEN

ÖBB
Immer in Bewegung

bis

RAILENIUM

Universidade
de Pais Vasco

Strukton
Rail

cemosa

FCP
getzner
engineering a quiet future

TATRAVAGÓNKA
POPHRAD

COMBOIOS DE PORTUGAL

Liik
EFTIHO
VIRA
STO

PORTO

University of
Málaga

Fraunhofer
IVI

acciona

KIRCHDOERFER
Technische Universität Berlin

ACT
Association of
Czech
Transport
Manufacturers

PKP
POLSKIE KOLEJE PAŃSTWOWE
Spółka Akcyjna

SBB CFF FFS

TATA STEEL

vossloh

TRONICO
HILSEN

DLR

Plasser & Theurer

MCL
Machining
Center
Laboratory

ProRail

Infraestruturas
de Portugal

izt
Institut für
Zugmaschinen und
Schienenantriebe

egis

voestalpine
ONE STEP AHEAD

PJM

TCDD

Slovenske železnice

**EURO
TUNNEL**

AVL

AERFITEC

Competitive Freight Wagon
Consortium (CFW)

Smart Rail Control
(SmartRaCon) consortium

AERmova

ConTraffic
Connecting Networks for Traffic Systems

DLR

DLR

RAILENIUM

FIDAMC

DIE BAHNINDUSTRIE
DER VERBAND DER BAHNINDUSTRIE IN DEUTSCHLAND e.V.

ceit
IT & Q Innovations Center

ceit
IT & Q Innovations Center

NSL

tecnalia Inspiring
Business

WBN
Waggonbau
Niederbühlener
Werk

Shift2Rail

Shift2Rail

Shift2Rail.eu
#Horizon2020

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ERRAC Plenary WG 1 – Report

Ulrich Meuser

Brussels, March 21st, 2019



- **ERRAC WG 1**
 - **2 WG 1 meetings and a WebEX conference in 2019**
 - **9 Versions of the documents**
 - **Presentation of the document structure, ERRAC SC, February 5th**
 - **Involvement of ERRAC WG 3, February 21st**
 - **Distribution of the draft document to the ERRAC members, March 18th**
- **A lot of work is done but we have not finalised our work. We have to sharpen and to shape the document in detail. Comments and remarks are welcome until end of March**

- **ERRAC WG Meeting, April 17th**
- **Final document end April, hand over to ERRAC SC**
- **Support ERRAC WG 3**

Thank you to all of you for your valuable contribution and the energy you have spent for the development of the document

- **Contents**

- 1. ERRAC Vision by 2050 and Contribution of Shit2Rail**

- 2. Rail as a Backbone of Mobility in 2030**

- 3. Research priorities**

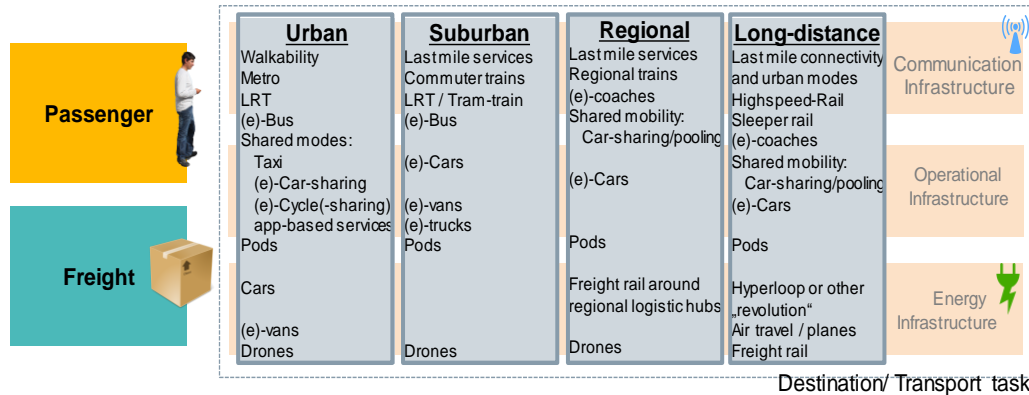
- **Automation of the Railway System including Autonomous Operation (ATO)**
- **Integrate the Railways in a Door to Door Mobility Ecosystem**
- **Intelligent Assets Lifecycle Management: Whole-Life Asset Approach**
- **Environmental Sustainability and Carbon Free Mobility**
- **Transversal Enablers**

- 4. Cost Efficiency and Rapid- Deployment of Innovations**

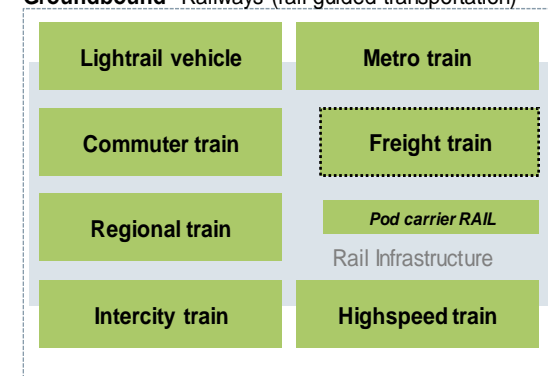
ERRAC WG 1

Multi-Modal Mobility

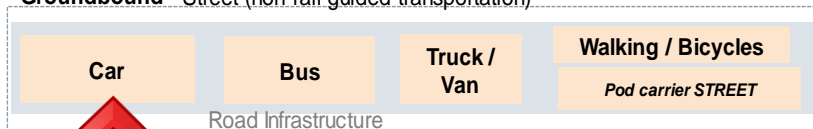
Overview Multi-Modal Mobility



Groundbound Railways (rail-guided transportation)



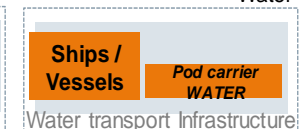
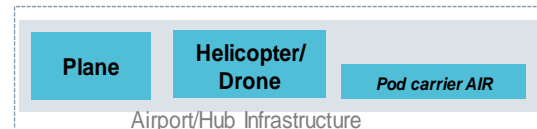
Groundbound Street (non rail-guided transportation)



Modular Pods for passengers and freight

Air

Water



Groundbound Hyperloop



ERRAC Plenary WG 2 – Report

Johan Jonsson

Brussels, March 21st, 2019



Why are we doing this?

Difficult to see ...

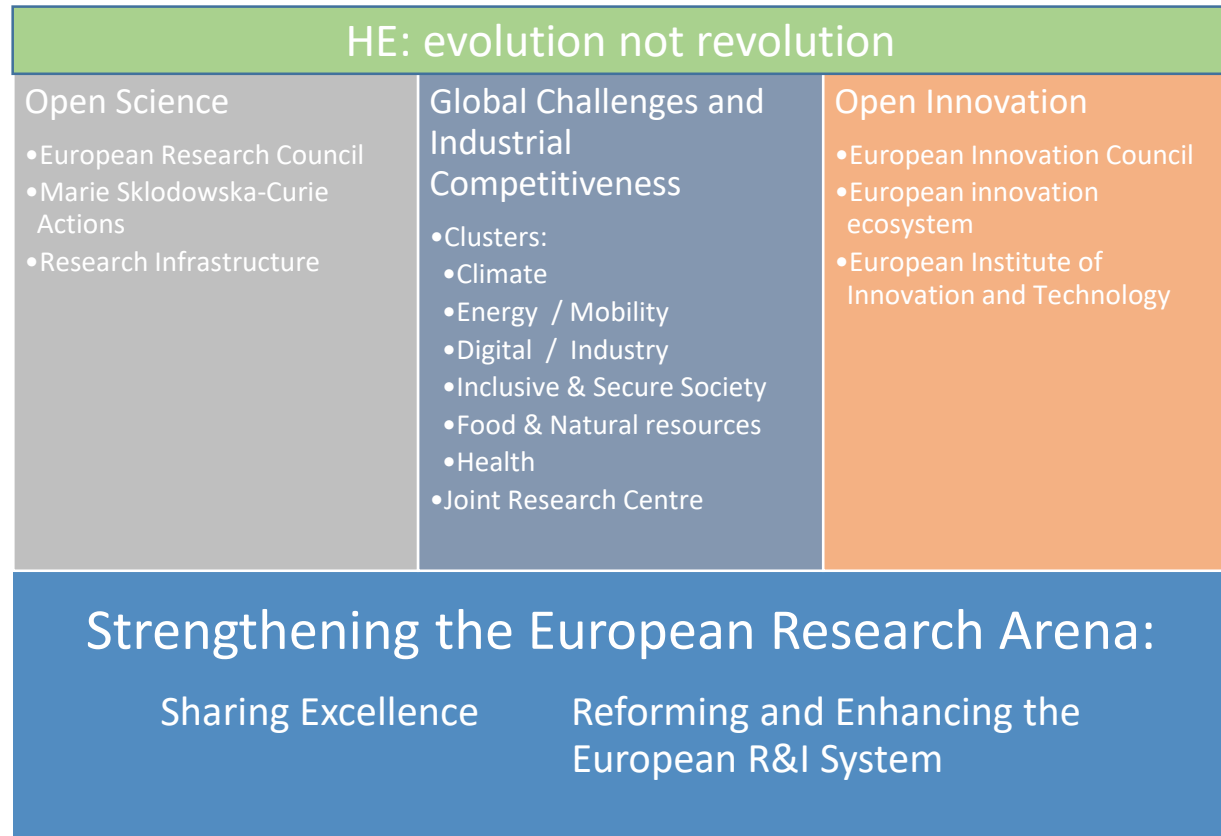


Recap from ToR

- Follow-up of projects supporting ERRAC activities
- Initiate and promote demand driven R+I and deployment
- Collaborate with other ETPs to find boundaries and commonalities
- Provide networking opportunities with other economic sectors
- Strategic R+I coordination mechanism

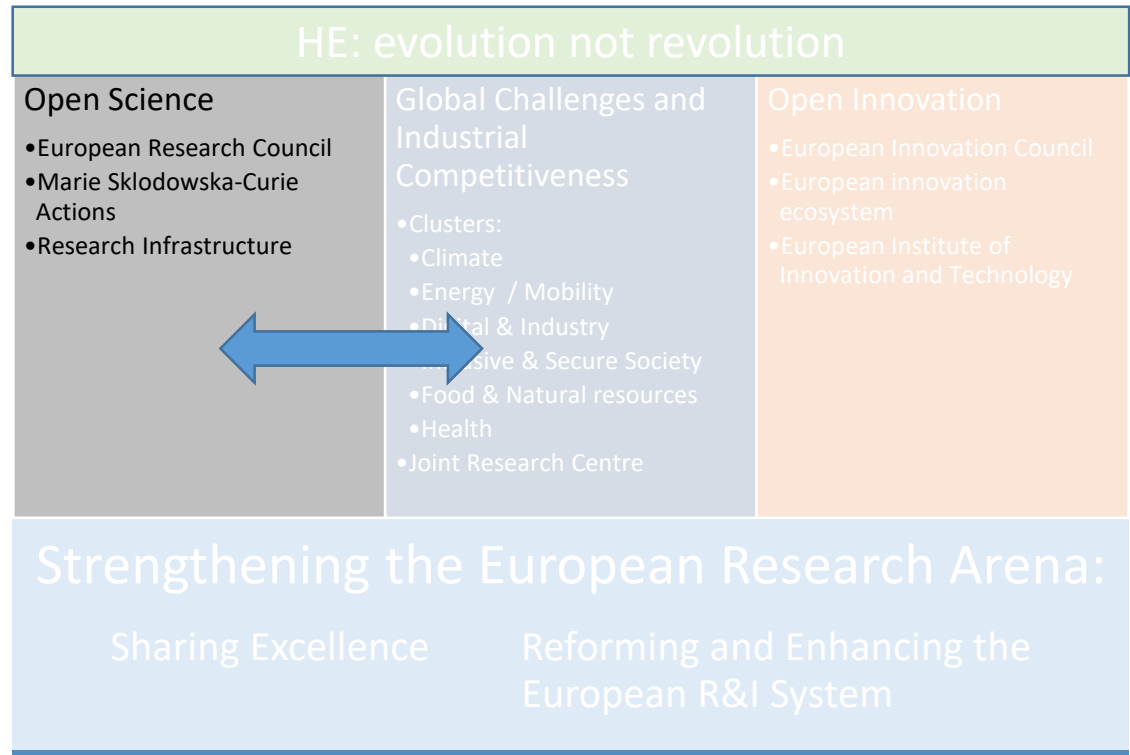
Where are the possibilities?

- Transition H2020/HE
- Program review to find synergies
- Instruments & resources (€)
- Not aiming for roadmaps but rather for results



An example

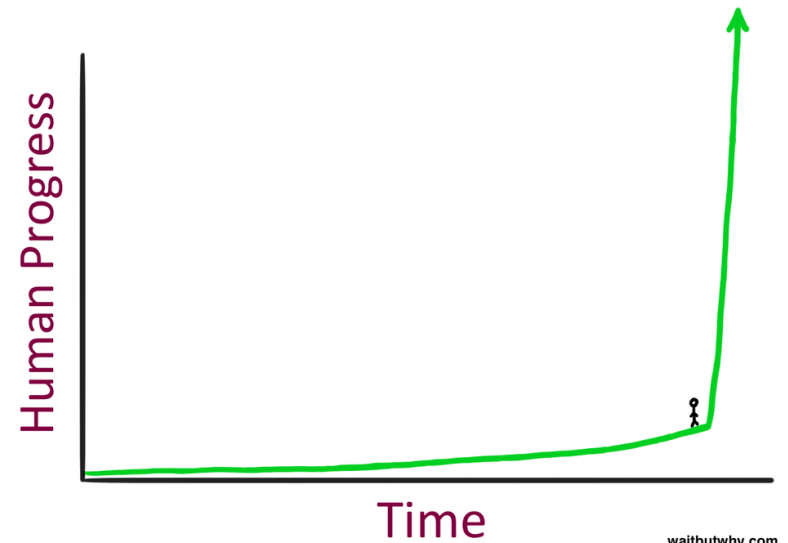
- Navigate in programs
- Cluster / area cooperation
- New technologies
- Find relevant programs and initiate collaboration



Are we on the edge of change?

The integrated circuit, 1958

Jack Kilby of Texas Instruments



Open science

- Be prepared to exploit new technologies?
 - Quantum computing:
 - encryption - cyber security
 - optimise large systems & big data
- **The digital twin**



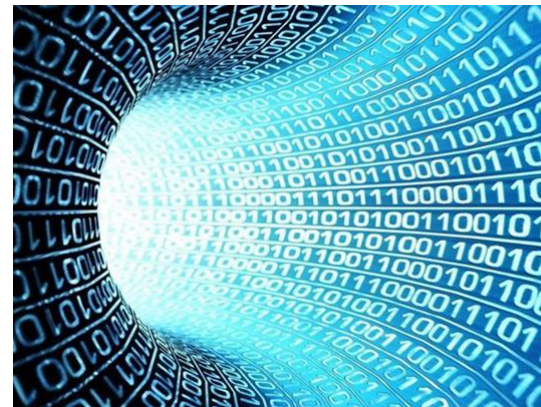
Benefits – collaborative R+I

Efficiency gains

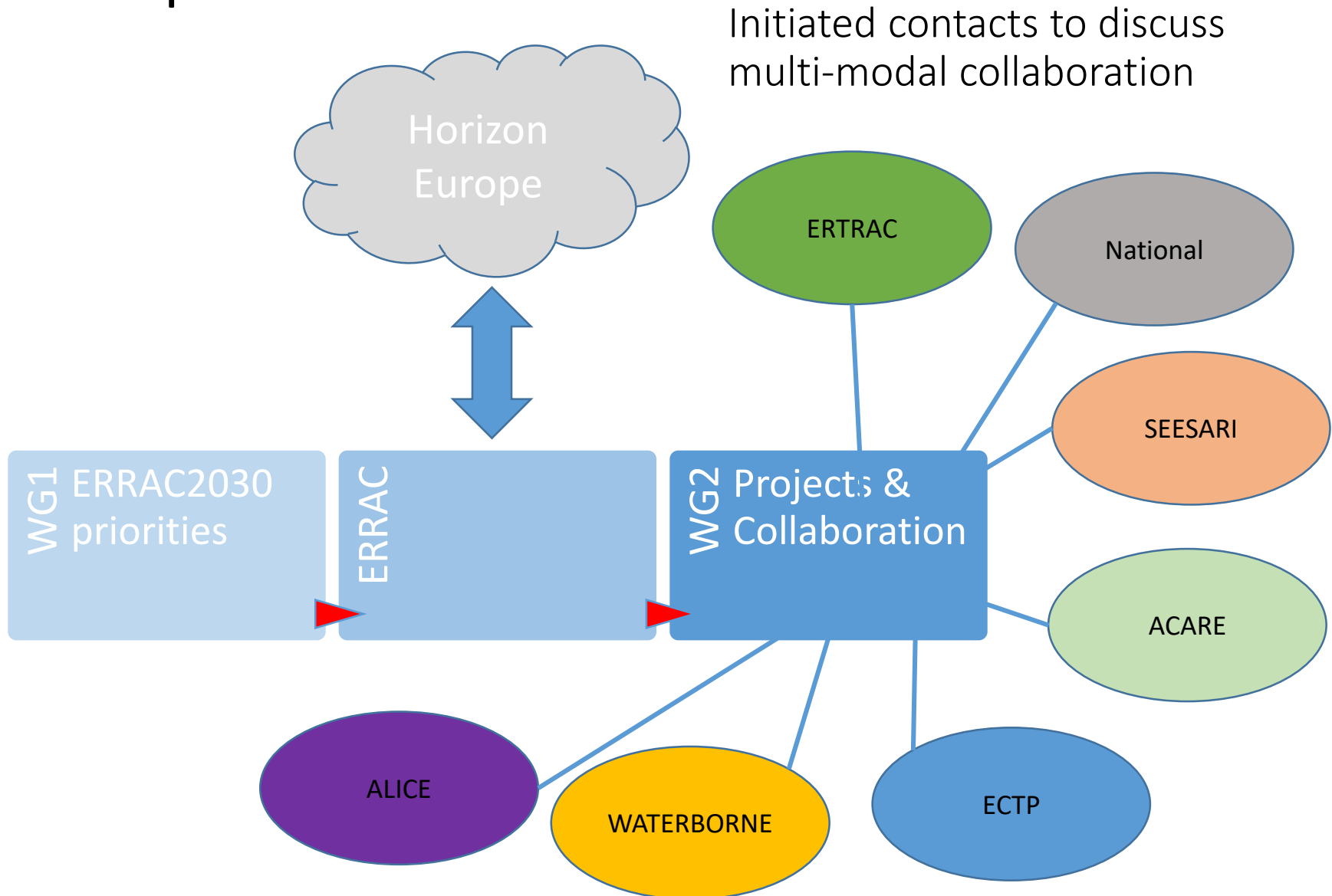
- Sharing risks, cost, scarce human resources
- Achieving economies of scale and critical mass
- Complementing competencies
- Stimulating clear objectives and structured approach

Strategic advantages

- Acting as technology watch
- Opening up to other players
- Benchmarking R+I



The process

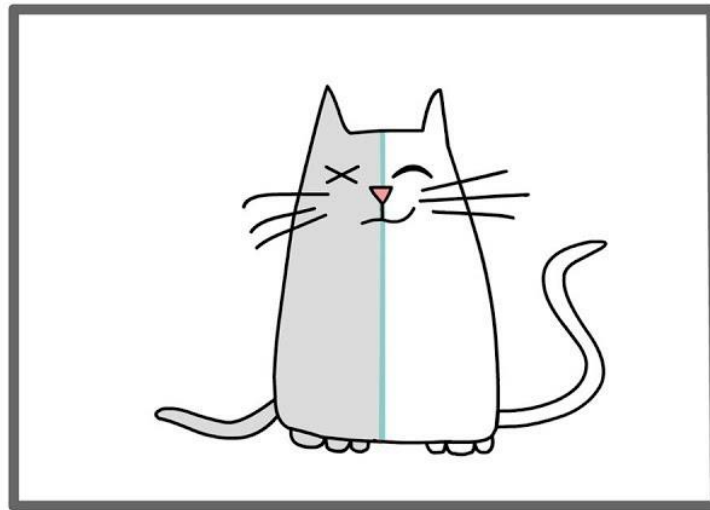


ERRAC WG2 – next step

- Meeting: 2nd April 2019, 13.00-16.30h
UIC Brussel
53 Avenue des arts
- Highlights from a proposed agenda:
 - Financial streams
 - An inclusive Europe
 - Ter4Rail update
 - PAG liaison
- Contact:
WG2 Chair: johan.jonsson@trafikverket.se
ERRAC secr. brennan@uic.org

We don't know until we have opened the box ...

Schrödinger's Cat



Thank you for your attention.

ERRAC Plenary WG 3 - Report

Lotta Andersson

Brussels, March 21st, 2019



A Celebration to Science – The Nobelprize



Prof. Frances H.
Arnold
The Nobel Prize
in Chemistry 2018
- for the directed
evolution of enzymes

- ❖ Knowledge sharing and innovations can stop climate change.
- ❖ We need growth but the right kind of growth.
- ❖ Governments, decision-makers and ourselves must control the right kind of growth.
- ❖ Research can lead to a better world.
- ❖ Use your brains to improve the world!

Sigge and Ilse – and our planet



“No one can do everything, but everyone can do something”

Rail – The backbone of Europe’s mobility

- ❖ The document “2030 R&I priorities towards ERRAC 2050 Vision” breaks down the vision into more comprehensible and feasible parts
- ❖ We see an excellent opportunity to renew and revitalize the communication
- ❖ Present the work in a accessible way with focus on the benefits for our stakeholders, freight customers, travelers, citizens and society



An attractive and versatile product

The product shall meet the requirements of being

- ❖ interesting and urgent/important
- ❖ easy to understand
- ❖ offer several clarifying illustrations
- ❖ clear in logic and recommendations

The text and illustrations in the brochure can be used, digital and physical, in various contexts such as:

- ❖ build a more attractive website
- ❖ illustrations can be transformed to moving graphics
- ❖ be used as message support
- ❖ transformed into a slide presentation
- ❖ constitute the basis for articles
- ❖ be scaled up or down dependent on stakeholders

Thank you!



ERRAC Academia PAG

Sebastian Stichel

Brussels, 21 March 2019



Meetings

Meetings held:

17 April 2018 – 9:00-14:00, Vienna

29 November 2018, 14.30-17.30, Brussels

20 March 2019, 14.00-17.30, Brussels

Upcoming meetings

28 June 2019 , London

28 November 2019, Brussels

Recent and upcoming activities

Recent

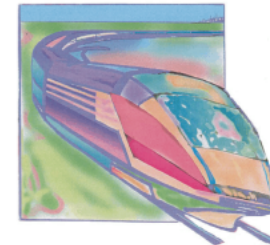
- Participation in TER4RAIL Questionnaire
- Participation in TRA2020 Programme Committee
- Discussion on contribution to Vision documents

Upcoming

- Further participation in TER4RAIL project.
 - Answering another Questionnaire.
 - Common workshop in London in June
- Participation in TRA2020
 - Programme Committee,
 - Topic group
 - Sending abstracts and
 - Acting as reviewers



Järnvägsgruppen



KTH Railway Group invites you to a seminar on
The European railway system of 2050: What is needed and
how can Shift2Rail contribute?

Wednesday, May 22, 2019, 13.00 - 17.00 with mingle
KTH room Q1, Malvinas väg 4, see map below

Agenda

- 1) Welcome from the Chair– Alberto Parrondo
- 2) Approval of the Agenda
- 3) Approval of the Minutes of 30 November 2018 Plenary
- 4) Keynote speeches - European Commission viewpoint
 - 1) *Keir Fitch, DG MOVE*
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- 5) Shift2Rail update – Carlo Borghini
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 - 1) *WG1 Vision&Strategy – Ulrich Meuser*
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 - 3) *WG3 Communications – Lotta Andersson*
- 7) ERRAC Academia PAG – Prof. Sebastian Stichel
- 8) **Guest Speaker – Christoph Schneider, Secretary General, ACARE**
- 9) TER4RAIL – Panel: Armando Carrillo, Secretary General, EURNEX
- 10) Concluding remarks and date of next meeting – Alberto Parrondo

Advisory Council for Aviation Research and Innovation in Europe

General Introduction to ERRAC

ERRAC Plenary, March 21st, 2019

ACARE BRINGS TOGETHER HUNDREDS OF STAKEHOLDERS



Strategy, Networking, Monitoring

The First EC Aeronautics Vision



Group of Personalities

Group of Personalities GoP Invited by EC – DG 12 2000


Pedro Argüelles


John Lumsden


Manfred Bischoff


Denis Ranque


Philippe Busquin


Søren Rasmussen


B.A.C. Droste


Paul Reutlinger


Sir Richard Evans


Sir Ralph Robins


Walter Kröll


Helena Terho


Jean-Luc Lagardère


Arne Wittlöv


Alberto Lina



Vision 2020
January 2001



Le Bourget
Kick-Off
June 2001

“The framework
programmes are the
key to acquiring the
technology required to
develop the vision”

Philippe Busquin

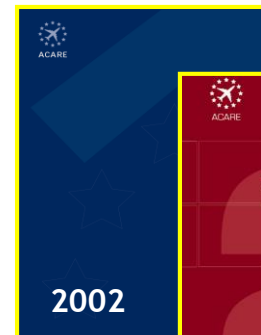
ACARE timeline (the first 10 years...)



*A comprehensive
response to Vision 2020*



*Maintaining global
leadership & serving
society's needs*



SRA-1



SRA-2



Addendum



Current Status (e.g. wrt emissions)



	Reference 2000	ACARE 2020 Goals (at TRL6)		ACARE 2050 Goals (at TRL6)		FORUM-AE Assessment (2017) (extrapolated at TRL 5-6 in 2020)
		High Level	detailed (SRA)	High Level	detailed (SRIA)	
CO ₂	<i>Representative technology of aircraft & engine with 2000 EIS, & representative 2000 ATM</i>	"-50% per pass km"	aircraft: -20% to -25% engine: -15% to -20% ATM: -5% to -10%	"-75% per pass km"	aircraft & engine: -68% ATM: -12% Other: -12%	aircraft + engine +ATM: ≈ -27% Regional ≈ [-38%, -41%] SMR ≈ [-19%, -26%] LR in average per pass km
NO _x (LTO)		"-80%"	engine: -60% CAEP6 ; complement achieved by aircraft + ATM	"-90%"	engine: -75% CAEP6 ; complement achieved by aircraft + ATM	engine: [-60%, -70%] CAEP6
NO _x (Cruise)		"-80%"	Achieved through -50% Fuel Burn & -60% cruise EINO _x reduction	"-90%"	Achieved through -75% Fuel Burn & further cruise EINO _x reduction	~ -40% (with high uncertainty) in average per pass km
Other emissions		"damaging emissions reduced"	emissions qualitatively reduced (particles, CO, UHC) and better understanding of impacts	"emissions- free taxiing" + qualitative reduction	knowledge of emissions (particles, VOC) and better understanding of impacts	experience gained in nvPM measurement campaigns on Engines & better knowledge of engines particles emissions

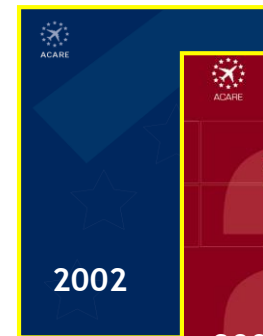
ACARE timeline (the full story so far)



*A comprehensive response to
Vision 2020*



*Maintaining global leadership &
serving society's needs*



SRA-1



SRA-2



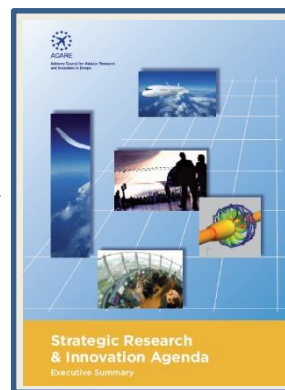
Addendum



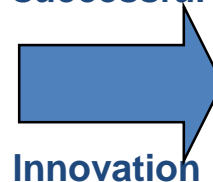
Flightpath 2050



SRIA- 2012



15 years of
successful



Innovation

Success
stories



SRIA update 2017



Strategic Research and Innovation Agenda (SRIA)



Road map for aviation research, development & innovation

Content aligned to five goals of Flightpath 2050:

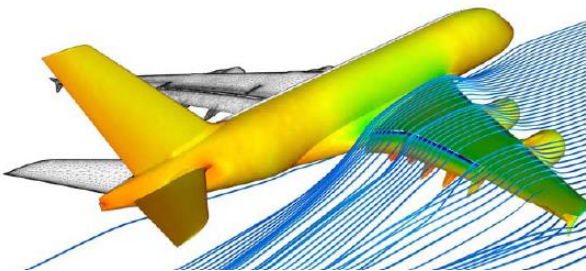
Meeting Societal and Market Needs

Maintaining and Extending Industrial Leadership

Protecting the Environment and the Energy Supply

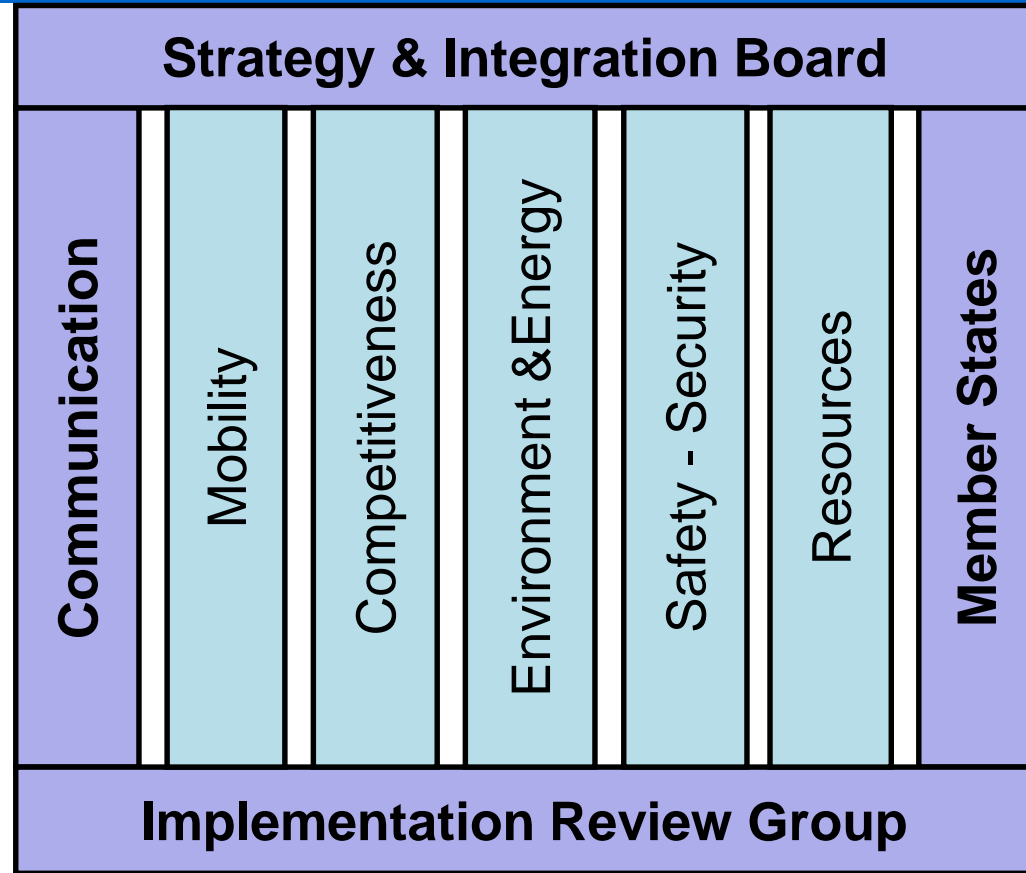
Ensuring Safety and Security

Prioritising Research, Testing Capabilities & Education



General Assembly

- ☐ 28 Member States
 - ☐ European Commission
 - ☐ Manufacturing Industry
 - ☐ Airlines
 - ☐ Airports
 - ☐ Air Navigation
 - ☐ EASA
 - ☐ Eurocontrol
 - ☐ Research Centres
 - ☐ Universities
 - ☐ Energy
 - ☐ Regulators
- Over 50 members





Prioritise Research, Testing Capabilities and Education

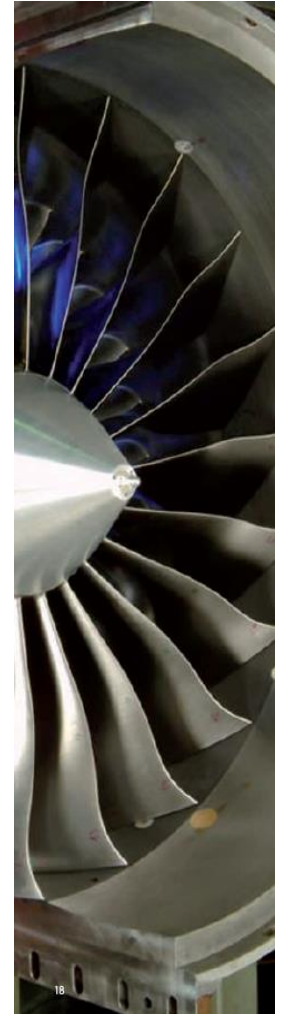
European research and innovation strategies are jointly defined by all stakeholders.

A network of multi-disciplinary technology clusters is created.

Strategic European aerospace test, simulation and development facilities are identified, maintained and further developed.

Students are attracted to careers in aviation. Courses offered by European Universities closely match the needs of the Aviation sector.

Flightpath 2050



Ensuring Safety and Security

The European air transport system has less than one accident per ten million commercial aircraft flights.

Weather and other hazards are precisely evaluated and mitigated.

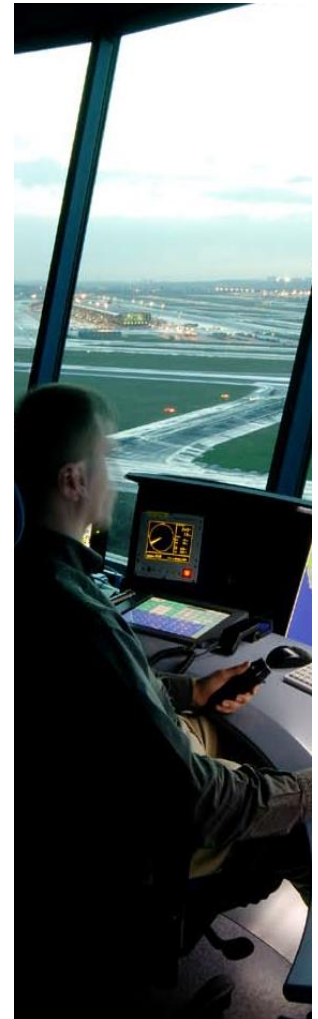
Seamless operations through fully interoperable and networked systems (including manned and unmanned vehicles).

Efficient boarding and security checks allow seamless security.

Air vehicles are resilient by design to security threats.

The air transport system has a fully secured global high bandwidth data network.

Flightpath 2050





Protecting the Environment and the Energy Supply

In 2050 technologies and procedures available allow

- ❑ 75% reduction in CO₂ emissions per passenger kilometer,
- ❑ 90% reduction in NO_x emissions, and
- ❑ 65% reduction in perceived noise emission of flying aircraft

relative to the capabilities in 2000.

Aircraft movements are emission-free when taxiing.

Air vehicles are designed and manufactured to be recyclable.

Europe is established as a centre of excellence on sustainable alternative fuels.

Europe is at the forefront of atmospheric research.



Maintaining & Extending Industrial Leadership

The whole European Aviation industry is strongly competitive.

Europe maintains leading edge design, manufacturing and system integration capabilities and jobs.

Streamlined systems engineering, design, manufacturing, certification and upgrade processes have addressed complexity and decreased development costs.

Flightpath 2050



Meeting Societal & Market Needs

European citizens are able to make informed mobility choices.

90% of travellers within Europe are able to complete their journey, door-to-door within 4 hrs.

A coherent ground infrastructure is developed.

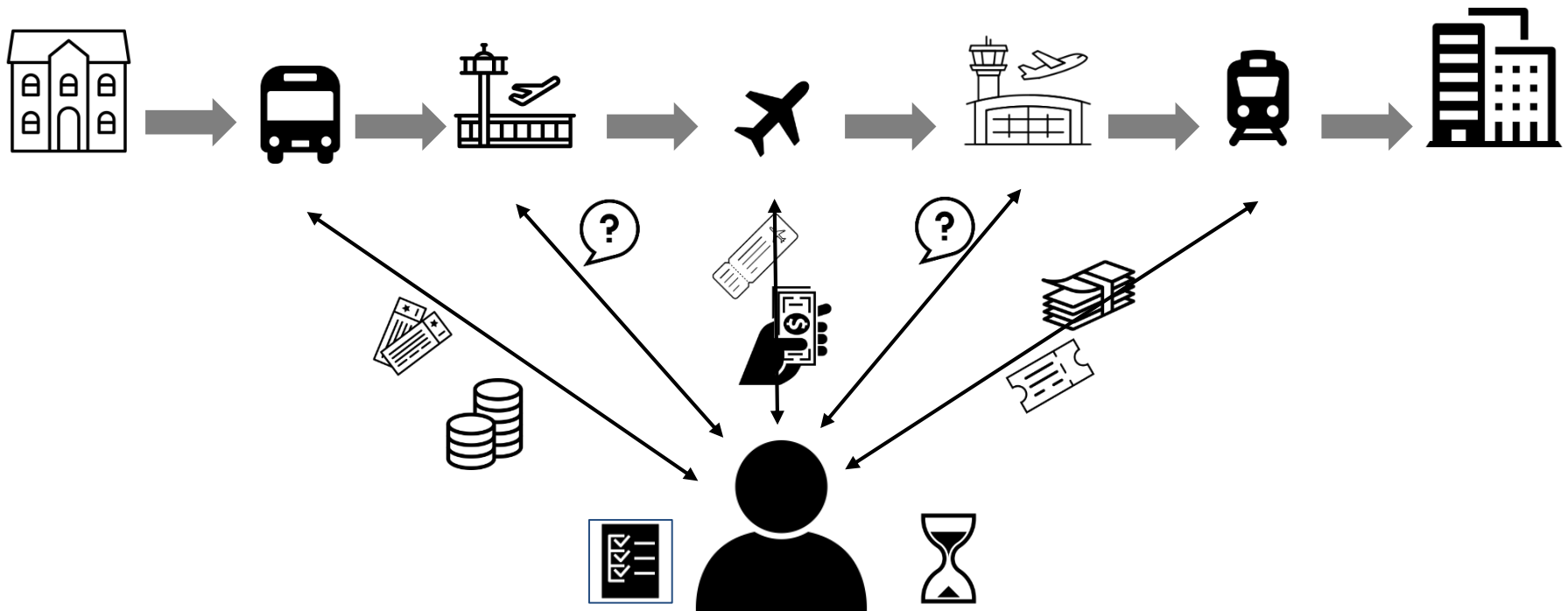
Flights land within 1 minute of the planned arrival time.

An air traffic management system is capable of handling 25 million flights a year in Europe.



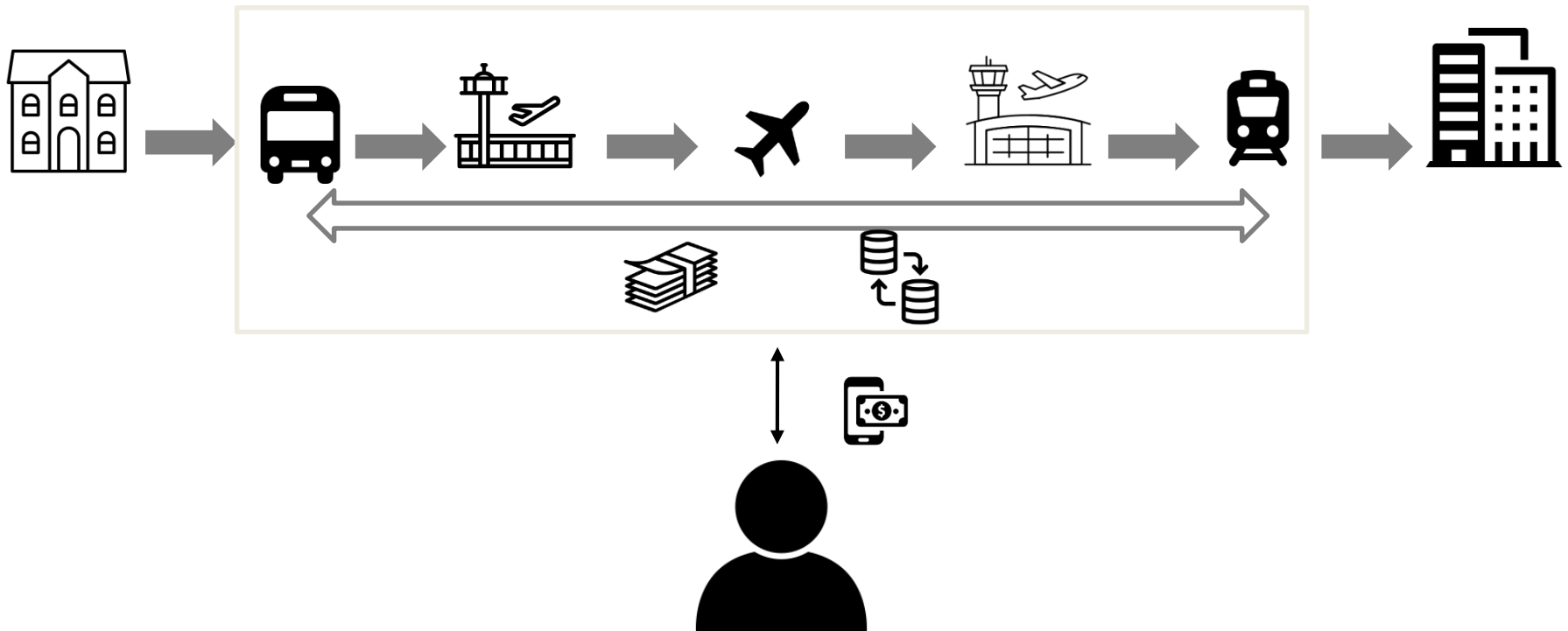
Passenger centrality as of today

Today's transport system is 'passenger-centric' only in a way that the passenger is in charge of planning, reservation and management of the journey ...



Passenger centrality of the future

The future transport system should be passenger-centric in a way that transport providers commit to a door-to-door transport contract and manage it accordingly ...





The case for cooperation...

We all share the same trends



ACARE

The pace of societal development & change has increased enormously ...

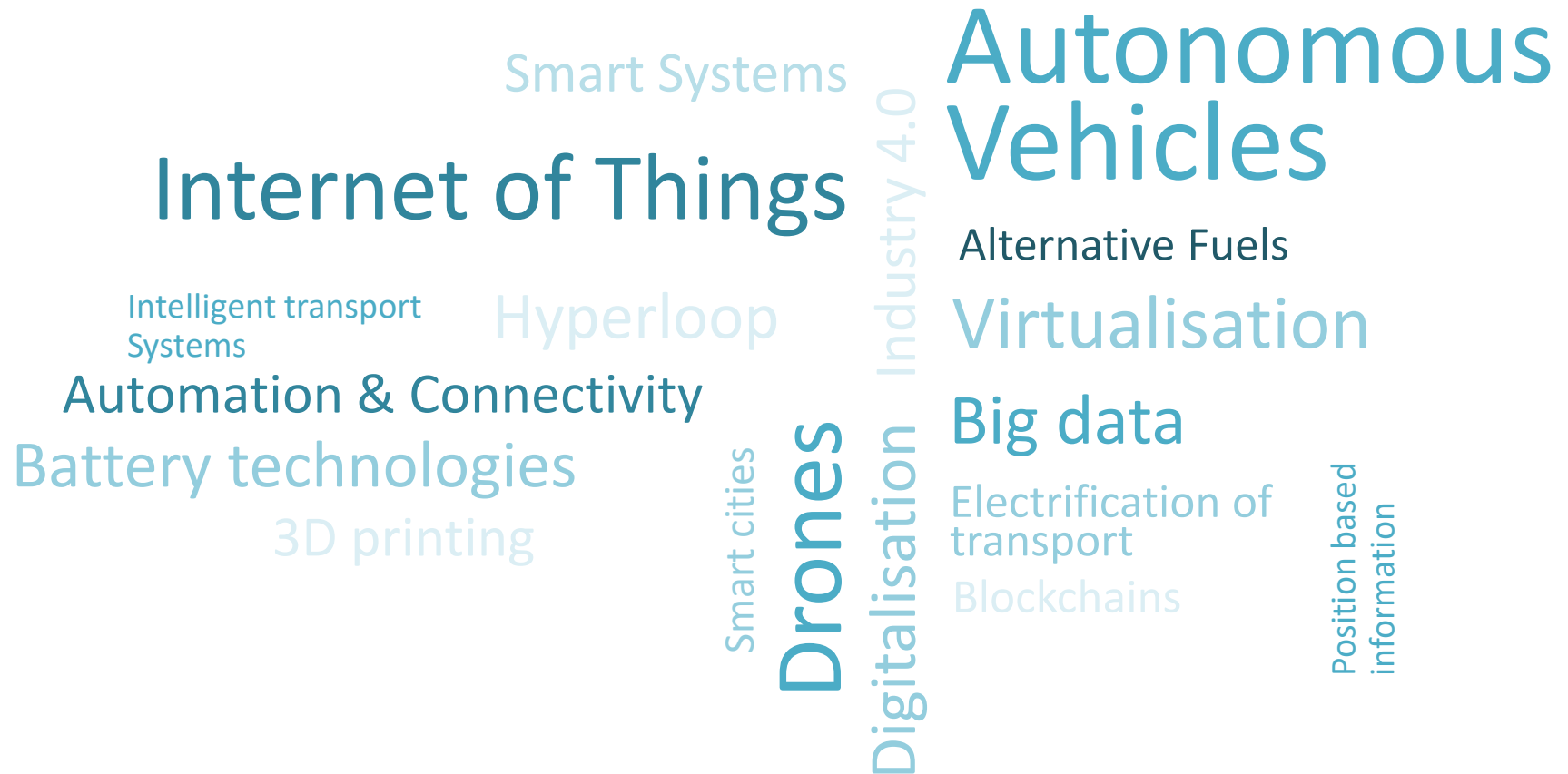


Disruptive change is in the air for all of us...



ACARE

The application and integration of new technologies offer a plethora of new services that can shake up the world as we know it ...



...and we all face similar uncertainties



Just because something is technically feasible and sounds good on paper does not mean it will be a huge market success or trigger disruptive change. Innovation has its own rules and dependencies...



We need others to achieve our goals ... (e.g.ACARE mobility challenge)



- 1a European Citizens are able to make informed mobility choices and have affordable access to one another, taking into account economy, speed and tailored level of service.
- 1b Travelers can use continuous, secure and robust high speed communications for added-value applications.
- 2a 90% of travelers within Europe are able to complete their journey, door to door, within 4 hours.
- 2b Passengers and freight are able to transfer seamlessly between transport modes to reach the final destination smoothly, predictably and on time.
- 3a Flights arrive within one minute of the planned arrival time regardless of weather conditions. The transport system is resilient to disruptive events; it is capable of automatically and dynamically reconfiguring the journey within the network to meet the needs of the traveler if disruption occurs.
- 3b Special mission flights can be completed in most weather and atmospheric conditions and operational environments.
- 4 An air traffic management system is in place that provides a range of services to handle at least 25 million flights a year of all types of vehicles, (fixed-wing, rotorcraft) and systems (manned, unmanned, autonomous) that are integrated into and interoperable with the overall air transport system with 24-hour efficient operations of airports.
- 5 A coherent ground infrastructure has been developed including airports, vertiports and heliports with the relevant servicing and connecting facilities to other modes as well.

Colour decoding: Red – cannot be achieved within aviation Orange – high aviation share Green – mainly aviation internal

- **WHITE PAPER FOR TRANSPORT (2011)**
 - **Seamless multimodal door-to-door travel** (Initiative 22)
 - Prompting the development of **measures** and **framework conditions** for further integration of transport modes and effective deployment of ITS
 - **Vision** of a complete **user-friendly experience** already at the **planning** stage
- Seamless experience including **multimodal scheduling, information, online reservation and payment systems and smart ticketing**, ideally via one website.
- Vision becoming a reality by 2020 by conceptualising a **framework** for a European **multimodal transport information, management and payment system**.
- Effective and objective **comparison of travel options** → true choice of the better solution (be it cheaper, shorter, greener or more comfortable)
- More travellers making such **informed choices** → a more efficient **European transport system** (less congestion, emissions, unnecessary costs)

Source: Geert van-der-Linden, DG MOVE, ACARE WG1 meeting

We co-organize TRA ...



... because we need a forum to identify and address cross-modal issues and learn from each other.



...contribute(d) to the STRIA ...



The STRIA initiative was based on a consultation process to

- Identify the options towards low carbon transport and mobility
- Create consensus among policy makers, stakeholders and civil society

Technical areas STRIA:

Electromobility

Alternative fuels

Vehicle design & manufacturing

Connectivity & automation of transport

Transport infrastructure

Network and traffic management systems

Smart transport and mobility services (incl. urban)

ACARE STRIA goals

Meeting Societal and Market Needs

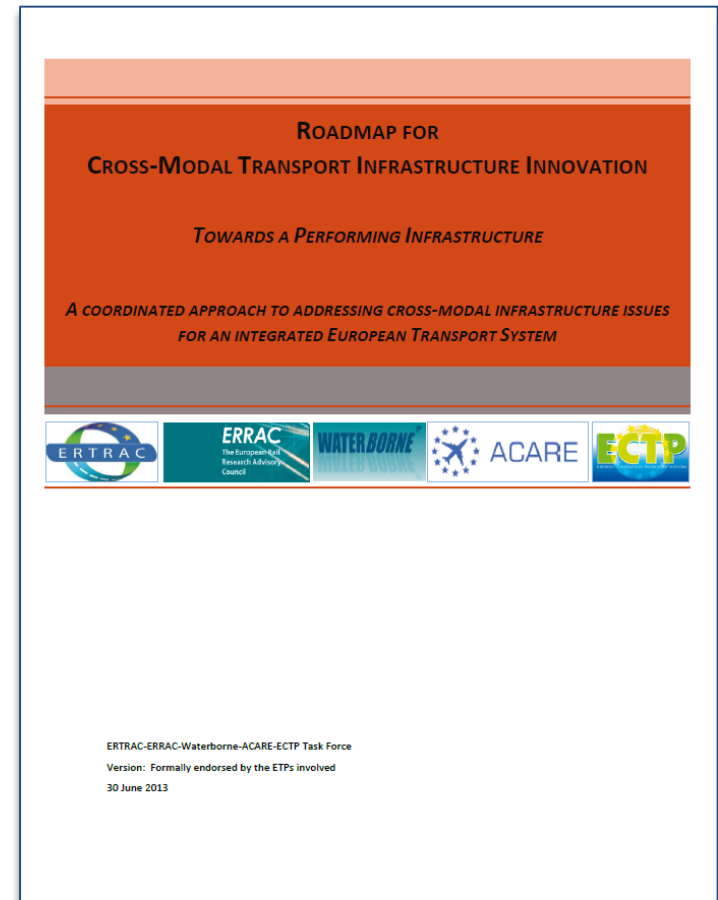
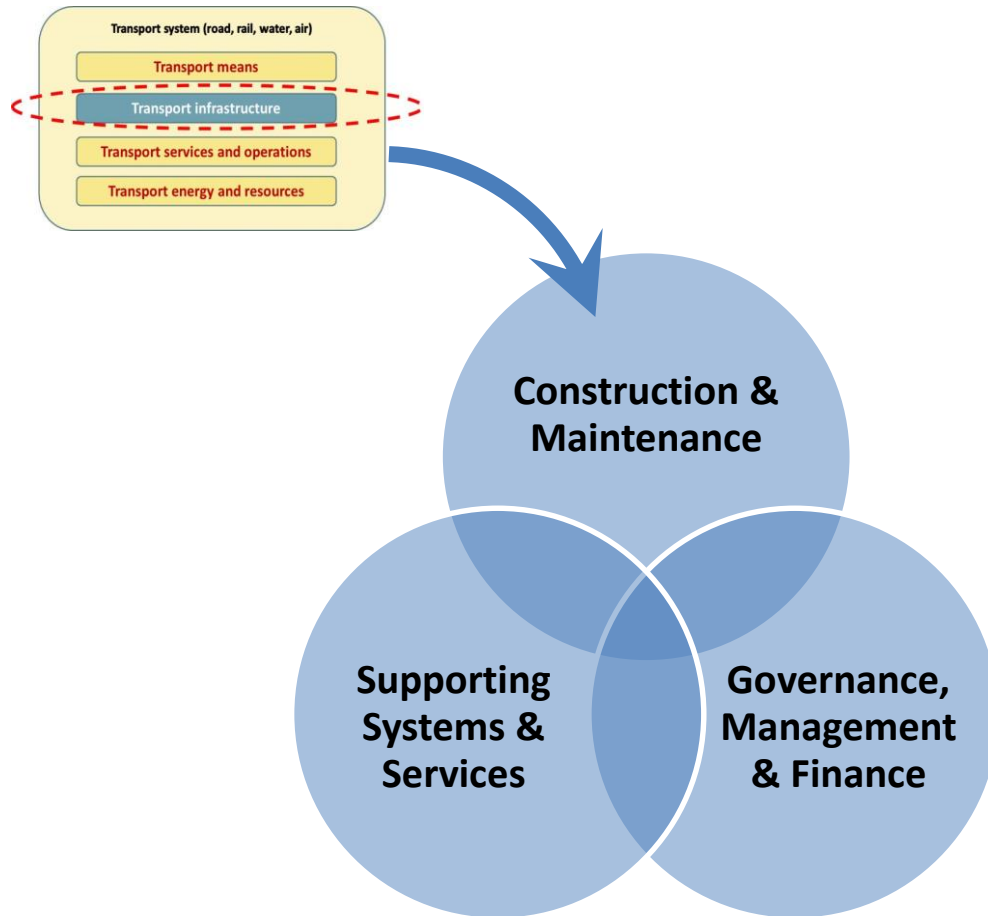
Maintaining and Extending Industrial Leadership

Protecting the Environment and the Energy Supply

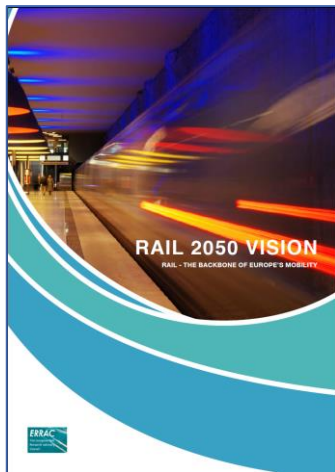
Ensuring Safety and Security

Prioritising Research, Testing Capabilities & Education

...and cooperated successfully before !



Our visions complement each other ...



“In 2050, rail transport in Europe is the backbone of an intermodal **“Mobility as a Service”** within cities and beyond, for both passengers and goods, meeting the needs of customers, EU citizens and society. The suppliers and service organisations of the **European rail industry are recognised as the world’s thought leaders** for railway products and services.”

“The European aviation community leads the world in sustainable aviation products and services, meeting the needs of EU citizens and society.”



Content aligned to five goals of Flightpath 2050:

Meeting Societal and Market Needs

Maintaining and Extending Industrial Leadership

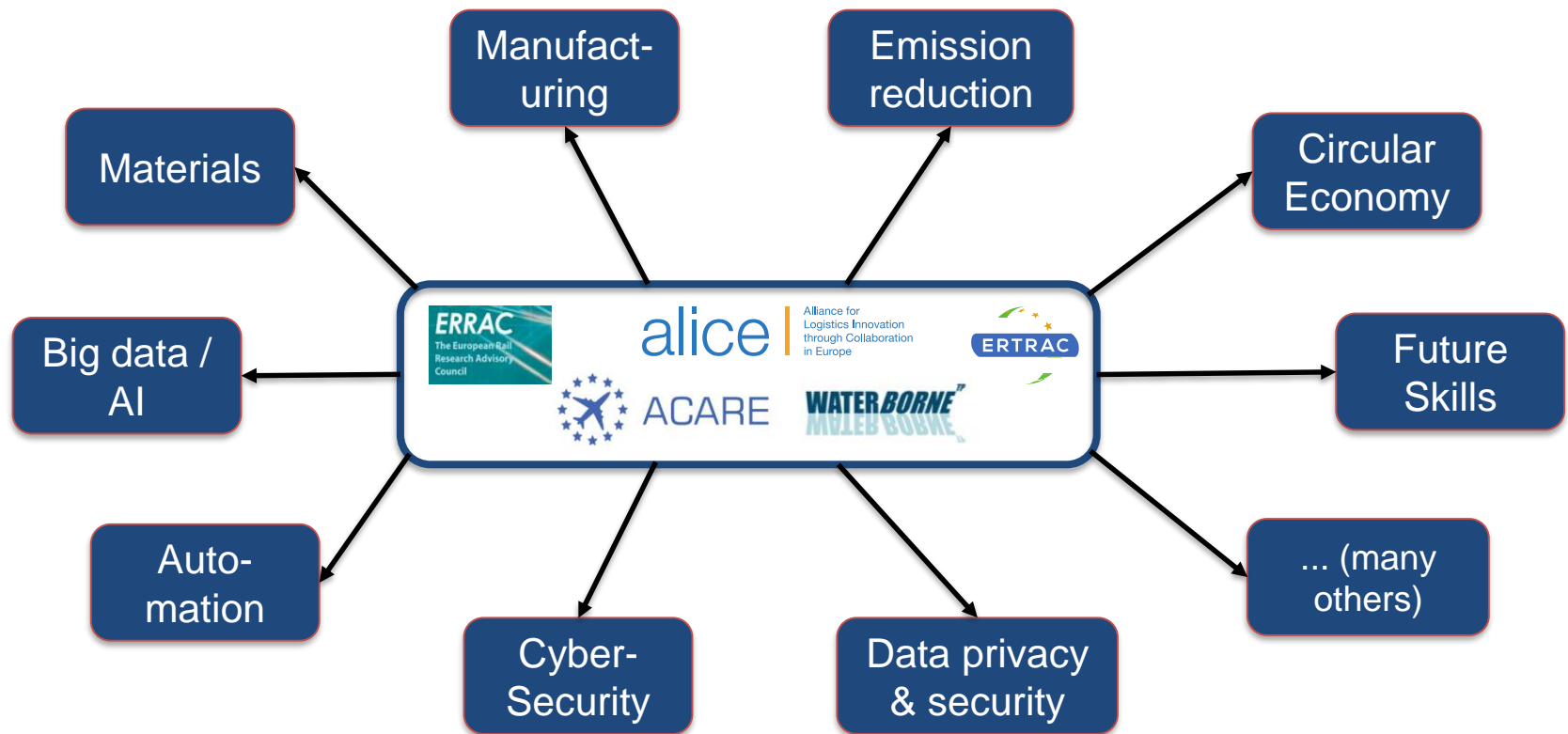
Protecting the Environment and the Energy Supply

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...and we are expected to reach out ...

... to create synergies between us and other domains and maximise impact of research funding.



However, synergies do not come for free



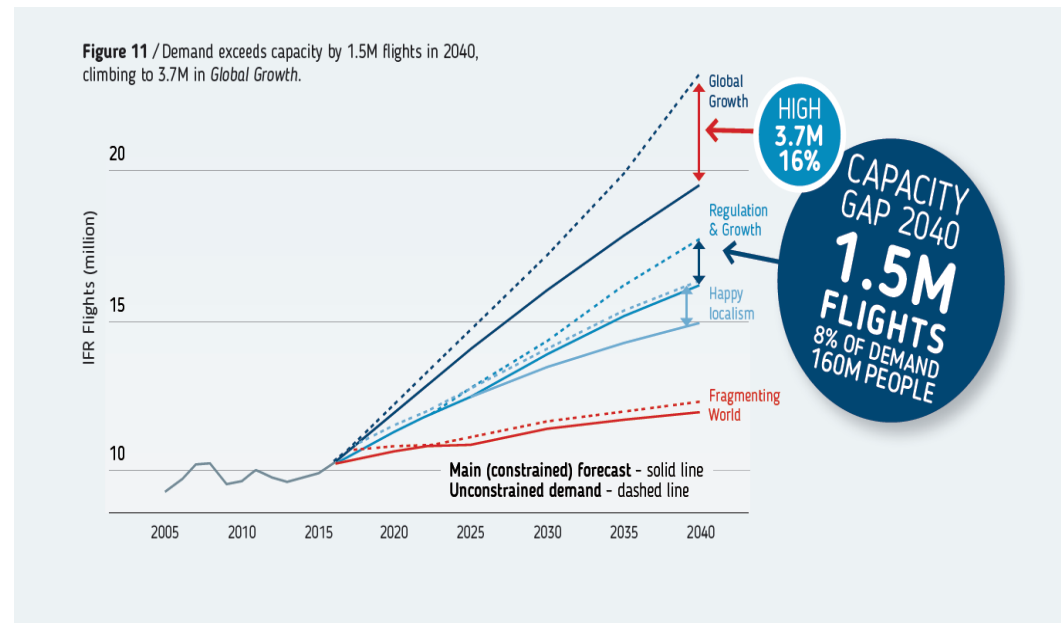
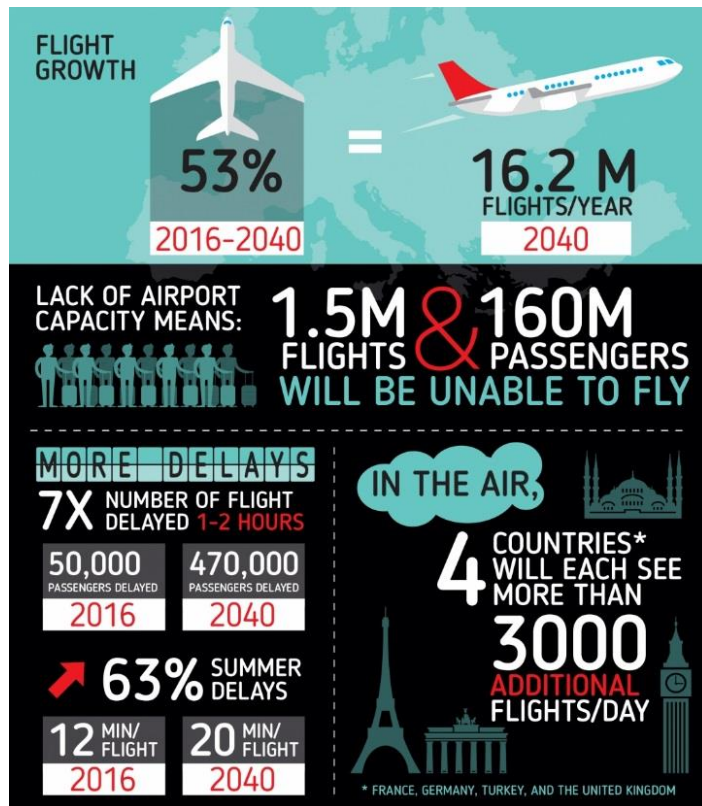
- We may have different goals and contexts
- We may only share a subset of requirements
- We may mean different things when using the same words
- We operate in different regulatory and business environments
- We may come from different knowledge and experience levels
- Results may only partially be transferable
- ...

- How can we identify areas of potential synergies between our modes and with other domains?
- Do we need extra / different mechanisms for that ?
- How can we make sure that relevance for our sector is seen in other programs ?
- Is there a role for the STRIA in addressing cross-modal and cross-sctoral requirements supplementing ETP's SRIAs?



Current challenges for aviation...

Eurocontrol study 'Challenges of growth 2018' shows significant airport capacity shortfall ... even if all currently projected infrastructures are built !

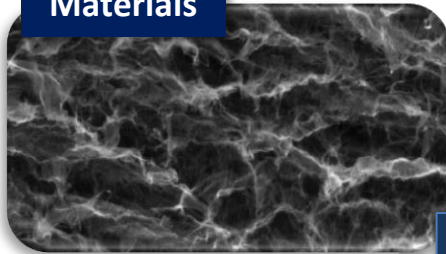


→ We need to push capacity while improving safety !

source: [eurocontrolhttps://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/challenges-of-growth-2018.pdf](https://www.eurocontrol.int/sites/default/files/content/documents/official-documents/reports/challenges-of-growth-2018.pdf)

New Topics Lead to Changes

Materials



HPC & Cyber Security



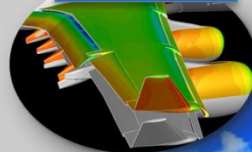
Internet



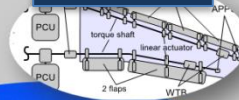
Manufacture



Flight Physics



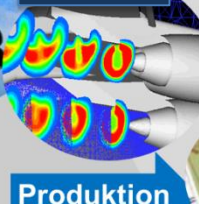
Systems



Tests



Propulsion



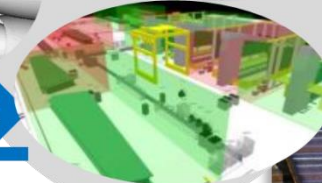
Cabin



Structures



Production



Sensors

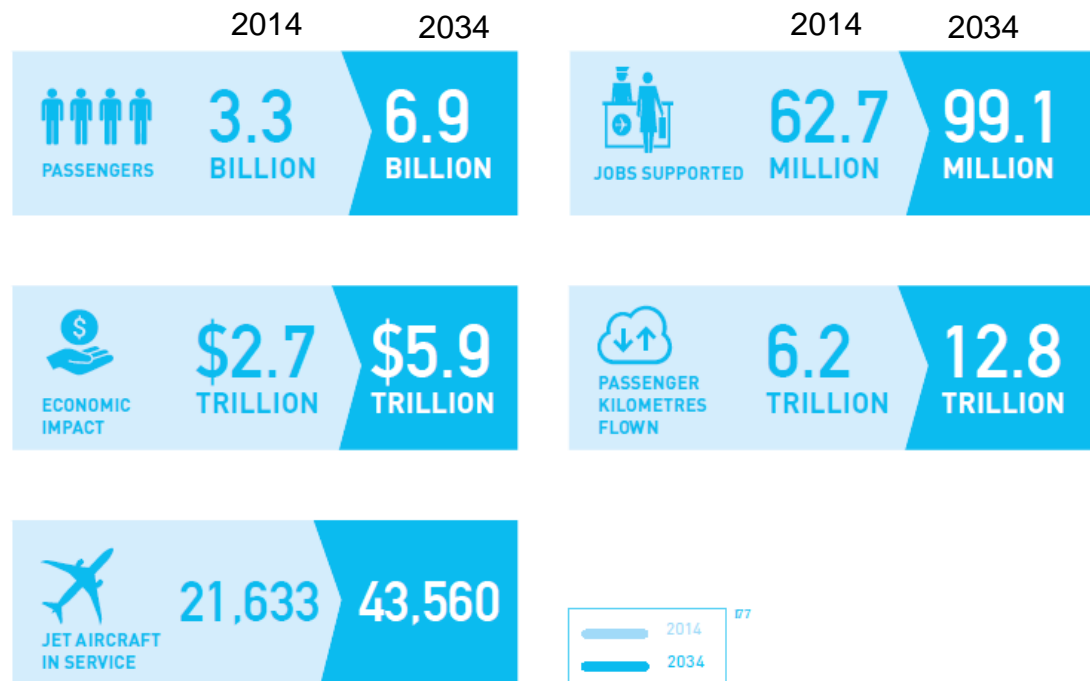


781 Million tonnes of CO₂ emitted by airlines (2015 IATA / ICAO data)

Current situation :

- ~2% of the global human emissions
- 80% of aviation CO₂ is emitted from flights over 1500 km of length, for which there is no practical alternative form of transport

The expected growth of traffic will induce huge economical benefits... but also challenges:



Other environmental challenges linked to this growth:

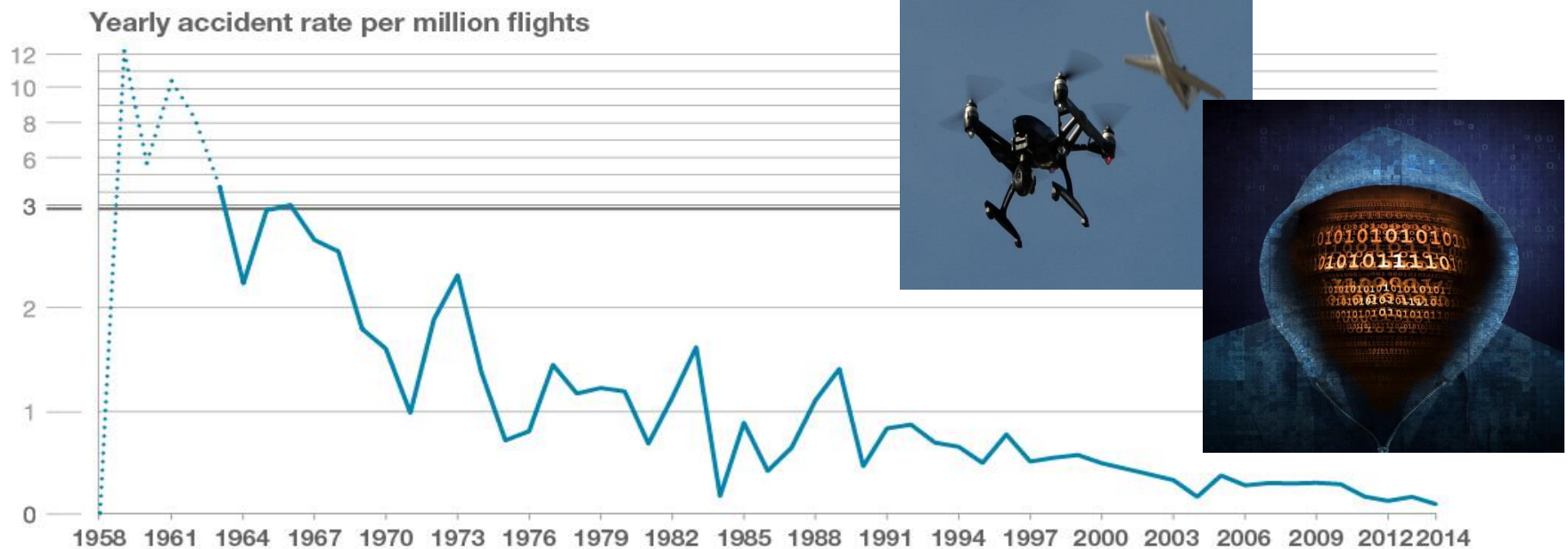


- Availability of sustainable fuels
- Local air quality:
 - NOx, particles emissions
- Noise level
- Recycling / end-of-life



Aviation is a very safe form of travel

But traffic is increasing, and there are new threats . . .



Three safety & security key Issues



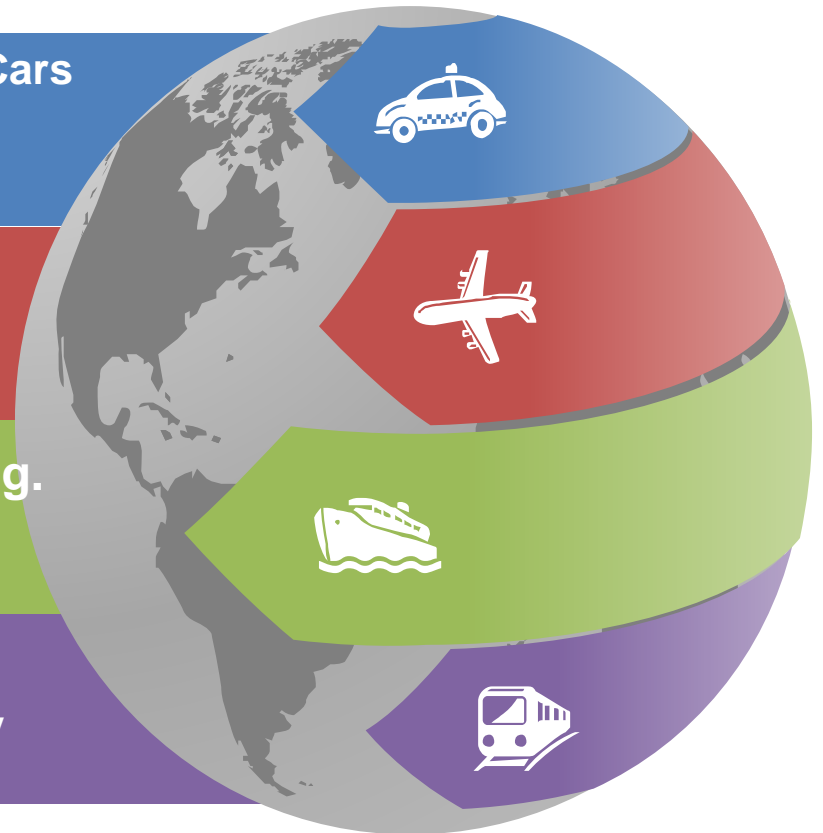
- We need to see around the corner to tomorrow's safety & security threats – *Big Data* analysis has now begun in aviation
- Safety & Security have traditionally worked apart – we need to bring them closer together
- Getting the human-automation partnership right – we need to move what we've learned in the lab out into industry!

DRIVER-LESS SYSTEMS – from Trains to Cars to Ships and to Sky-taxis and Aircraft

HUMAN FACTORS – similar issues in all modes – need to *deploy* Human Factors

INTER-MODAL COLLABORATION – e.g. current H2020 call: aviation-maritime

INTER-MODAL SAFETY CULTURE – the foundation for harmonising safety



Ensure the availability of the right aviation research infrastructure



Wind tunnels



Propulsion bench



Material facility



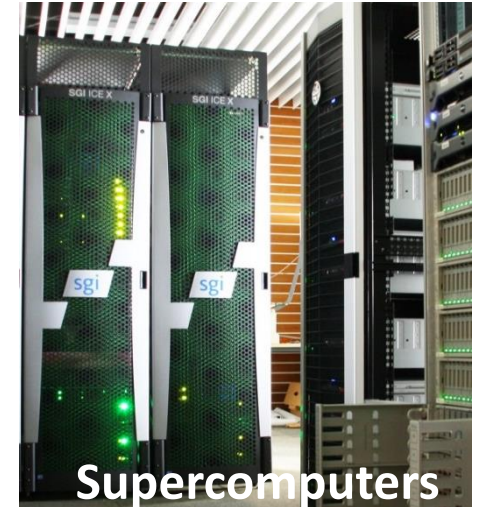
Aircraft Simulator



Flight Test Bed



Supercomputers



Greener Aviation needs Aviation Infrastructures for Demonstration, Validation
→ Ressources to run Infrastructures, Personnell, JU

Thank you !!



ACARE – ADDRESSING NEW HORIZONS IN AVIATION

www.acare4europe.org

Any questions ??



ACARE



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- 10) Concluding remarks and date of next meeting – Alberto Parrondo

This project has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement no. 826055 (TER4RAIL)

TER4RAIL

Transversal Exploratory Research Activities for Railway

Plenary ERRAC, 21.03.2019

Dr.-Ing. Armando Carrillo Zanuy
Sec. General EURNEX
acarrillo@eurnex.eu

This document reflects only the author's view and the JU is not responsible for any use that may be made of the information it contains

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❑ ERRAC 2nd 2019 Plenary – Friday November 29

❑ Note this is a changed date

Thank you for your attention!