



INTERNATIONAL UNION
OF RAILWAYS

unity, solidarity, universality

High speed rail in Europe Lessons learned and experiences

TENT-T Workshop
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Agenda

UIC & High speed

High speed rail principles

Some facts & figures

HS in Europe and around the world

The future of high speed

Concluding remarks

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What's the UIC?

The UIC is a professional organisation serving the needs of rail transport through international cooperation at the global level



Since 1922

240 members on all continents

Members are:

Railways

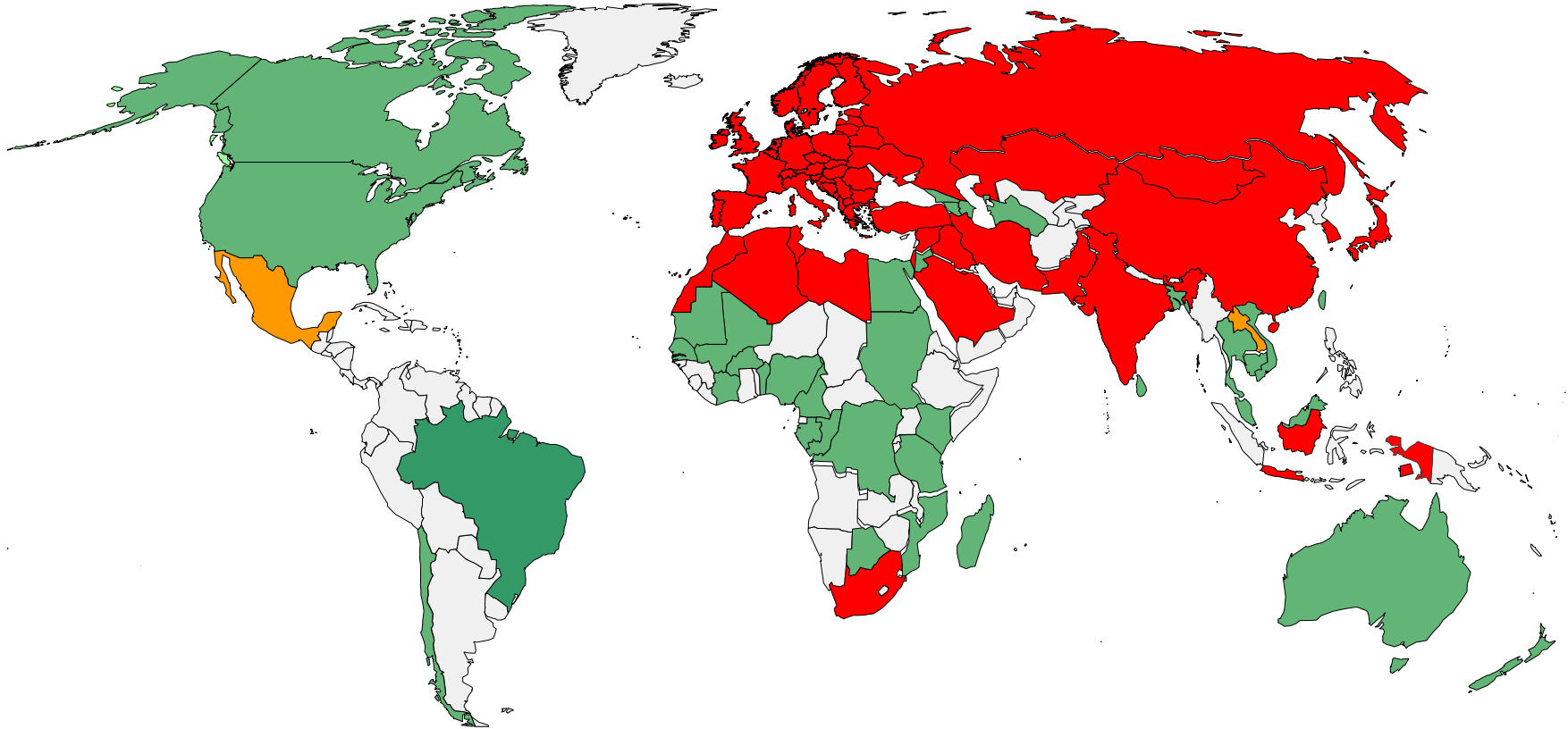
Rail operators

Infrastructure managers

Railway service providers

Public transport companies

UIC in 2014



Members ■ Active ■ Associate ■ Affiliate

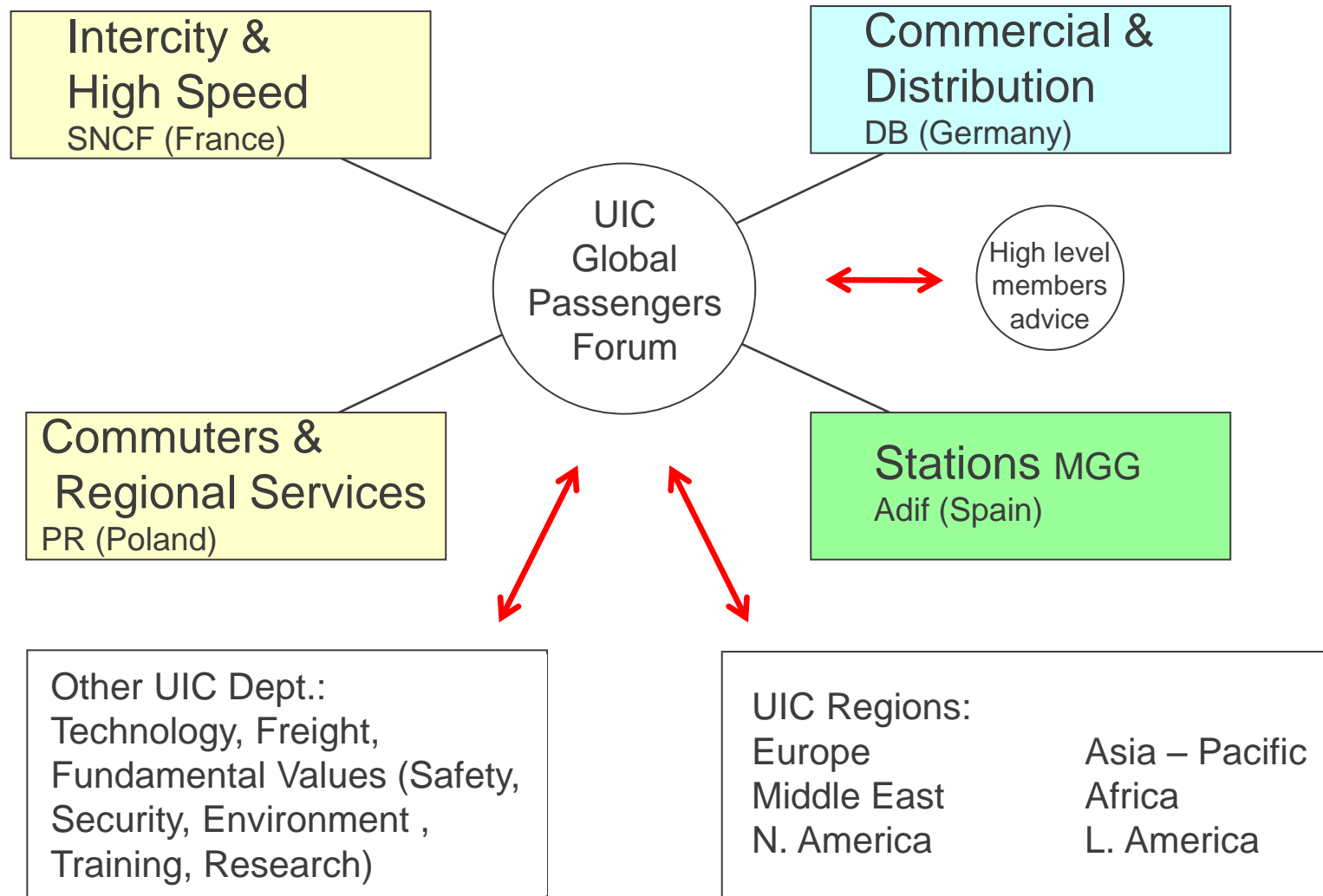
www.uic.org

UIC Mission

Promoting the development of rail transport
at world level,
in order to meet challenges
of mobility and sustainable development

UIC Passengers activities

Structure of the Passengers Department



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Definition of high speed

Is a “new transport mode”, fully compatible with classic rail (SNCF, 1981)

High speed means at least 250 km/h

But the definition is not unique
(EU Categories I, II and III)

High speed & high performances

Thresholds

Operating at more than (+/-) 200 km/h requires:

- special trains (train sets)
- special dedicated lines
- in-cab signalling

...and much more

Understanding high speed rail 1

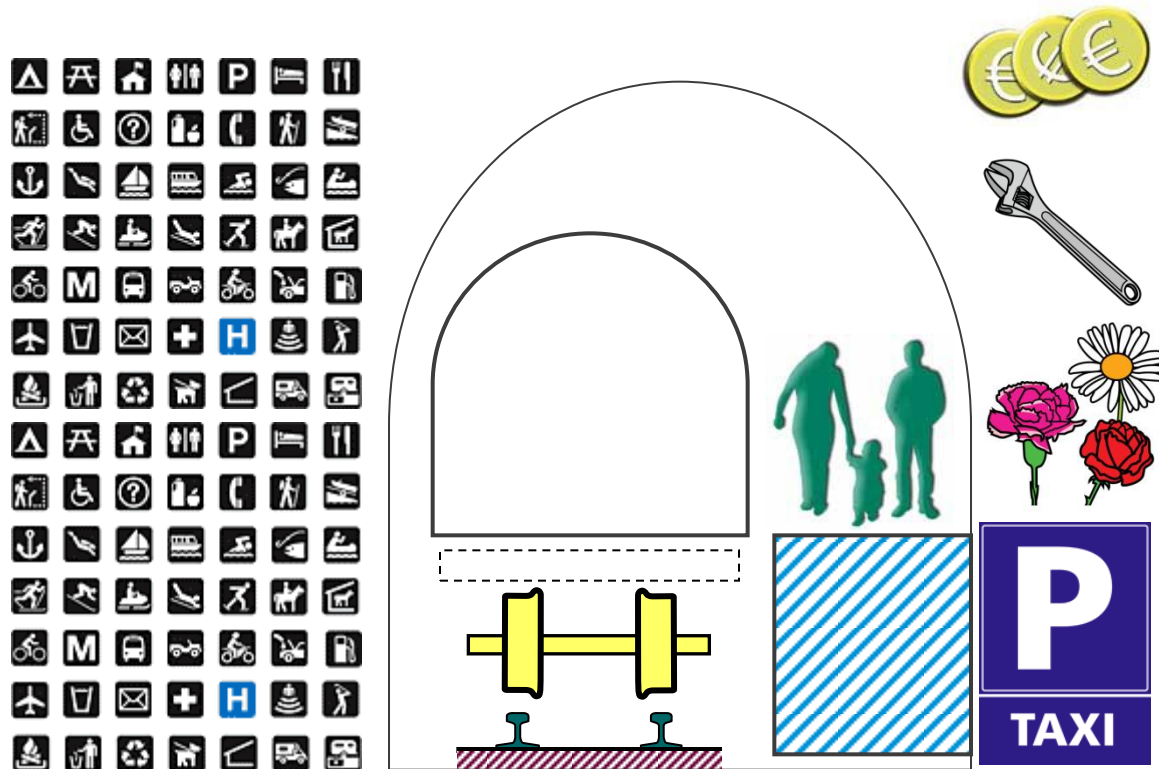
High speed is a system

A very complex system, comprised by the state of the art of:

- Infrastructure
- Rolling stock
- Signalling systems
- Maintenance systems
- Management
- ...
- Station emplacement
- Operations rules
- Marketing
- Financing
- Legal issues

Considering all of them is fundamental

High Speed is a system



Understanding high speed rail 2

High speed is not unique

- Many different commercial concepts of high speed (including services to customers, marketing, etc.)
- Many different types of operations (maximum speed, stops, etc.)
- Different ways to operate classic trains (in particular, the impact on freight traffic)
- Capacity and cost vary in each case

High speed advantages for society

- Offers a high capacity of transport
 - Up to 380 000 passengers per day, Tokyo – Osaka
 - Permits reducing traffic congestion
 - Helps economic development
 - Shapes land-use
- Offers sustainability

High speed contribution to sustainable mobility

- **Environment**

 - Land take

 - Energy consumption

 - CO2 emissions

- **Social aspects**

 - Reliability

 - Comfort

 - Impacts on health

 - Safety**

- **Economic aspects**

 - Green jobs

 - External costs

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High speed world network

World network ($V \geq 250$ km):

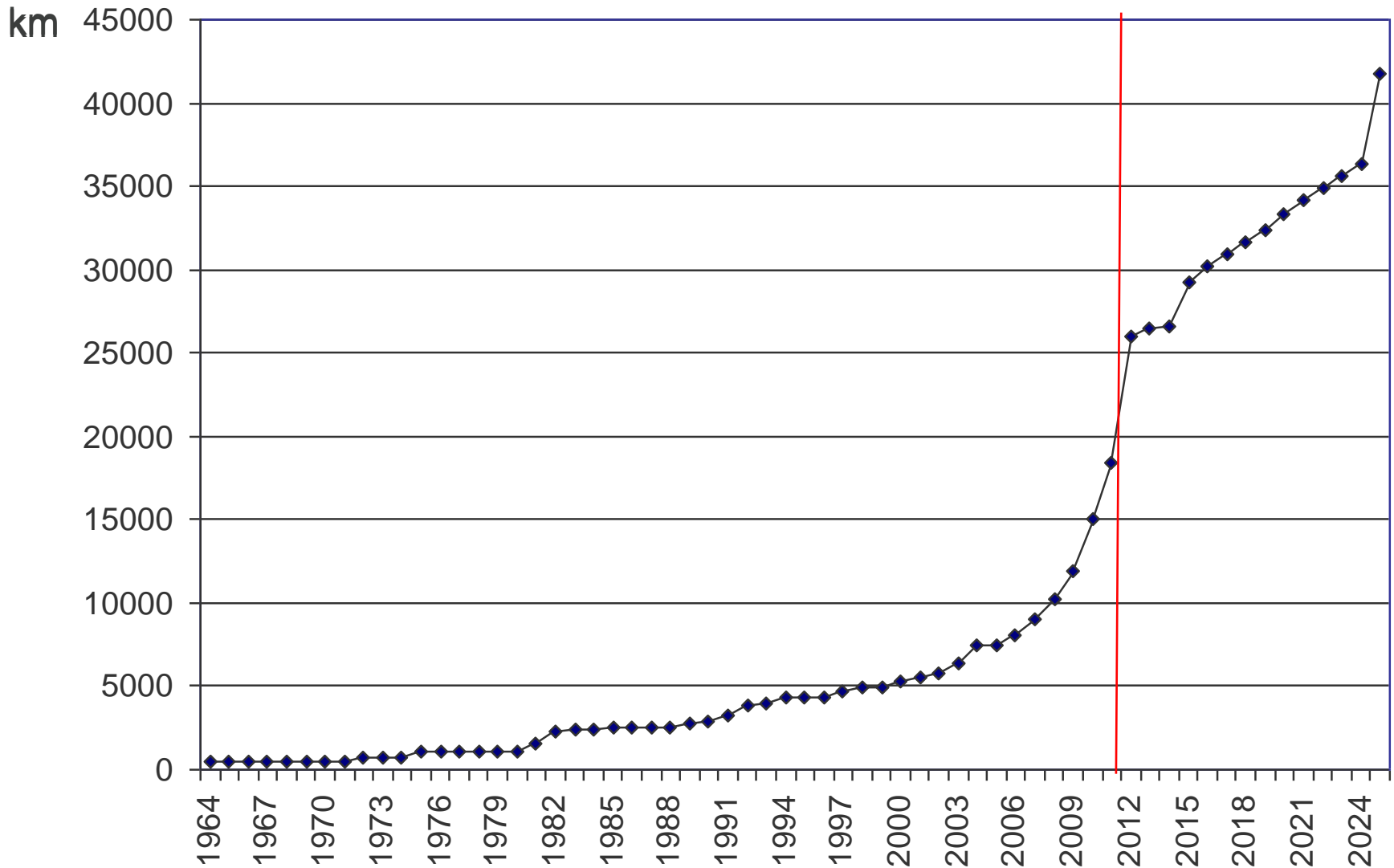
21 472 km of lines in operation

13 964 km of lines under construction

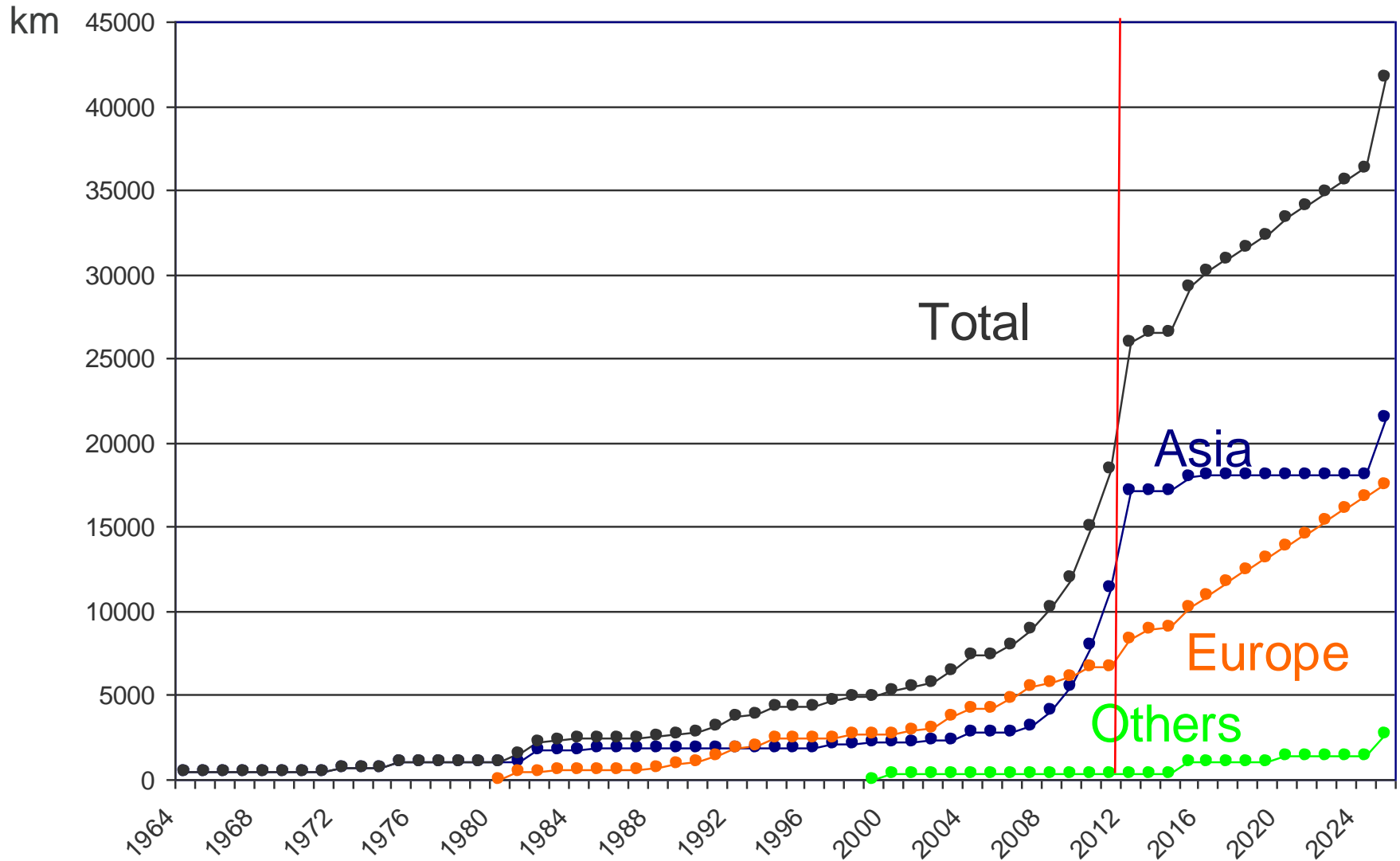
16 347 km of lines planned

November 2013

Evolution of the world HS network



Evolution of the world HS network



World rolling stock high speed fleet

High speed train sets* in operation in the world:

Maximum speed 200 km/h or more: 2 897

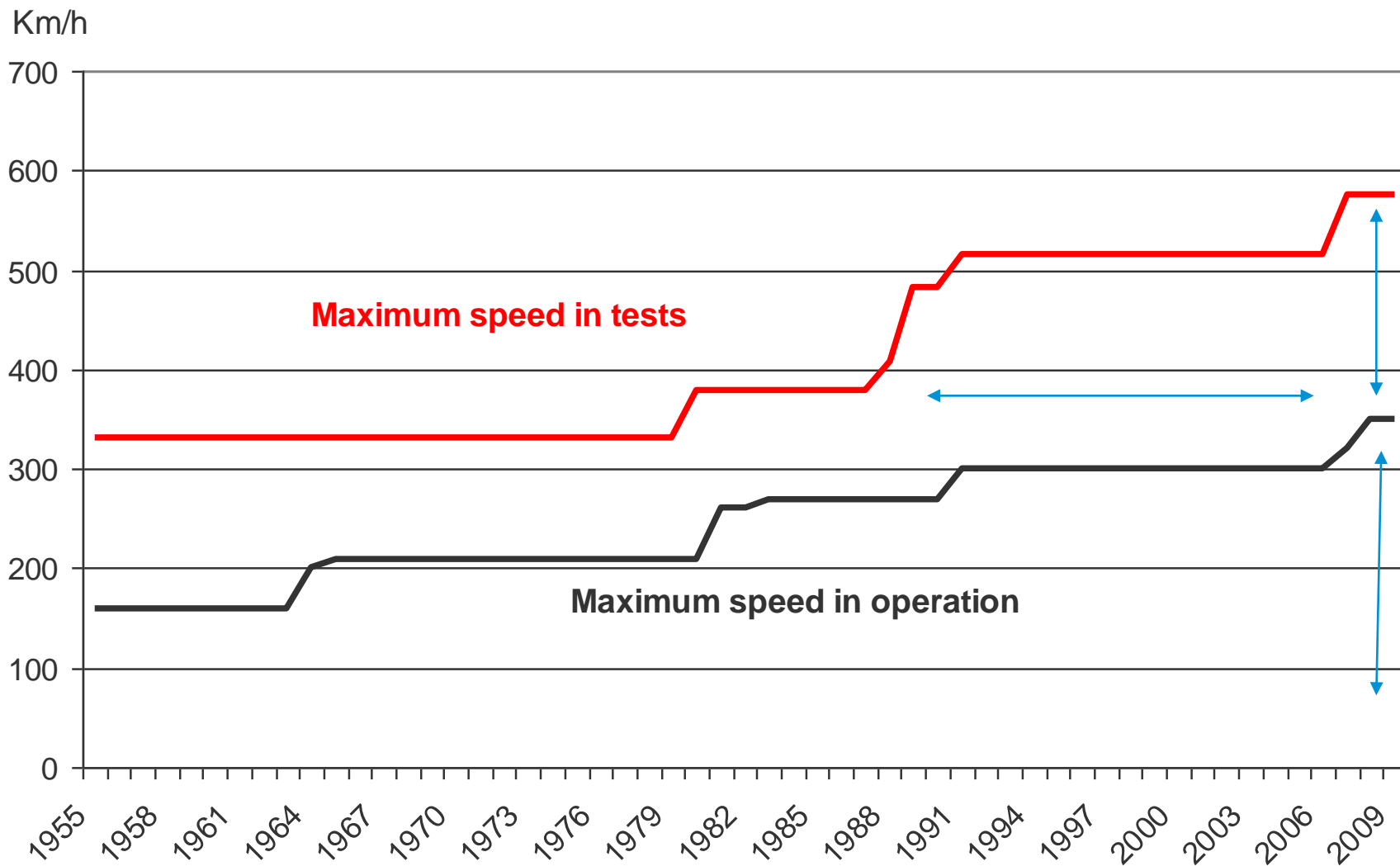
Maximum speed 250 km/h or more : 2 095

High speed train sets manufacturing: 945

* and trains operating on dedicated high speed lines

November 2013

Evolution of maximum speed on rails



World speed record: 574,6 km/h – France, April 2007



High Speed traffic volume

- 1.28 Billion passengers per year in HS trains
 - 600 Million in China
 - 300 Million in Japan
 - 130 Million in France
 - 250 Million in the rest of the world

- 15 Billion passengers have already travelled in HS trains

Twice the population of the Earth



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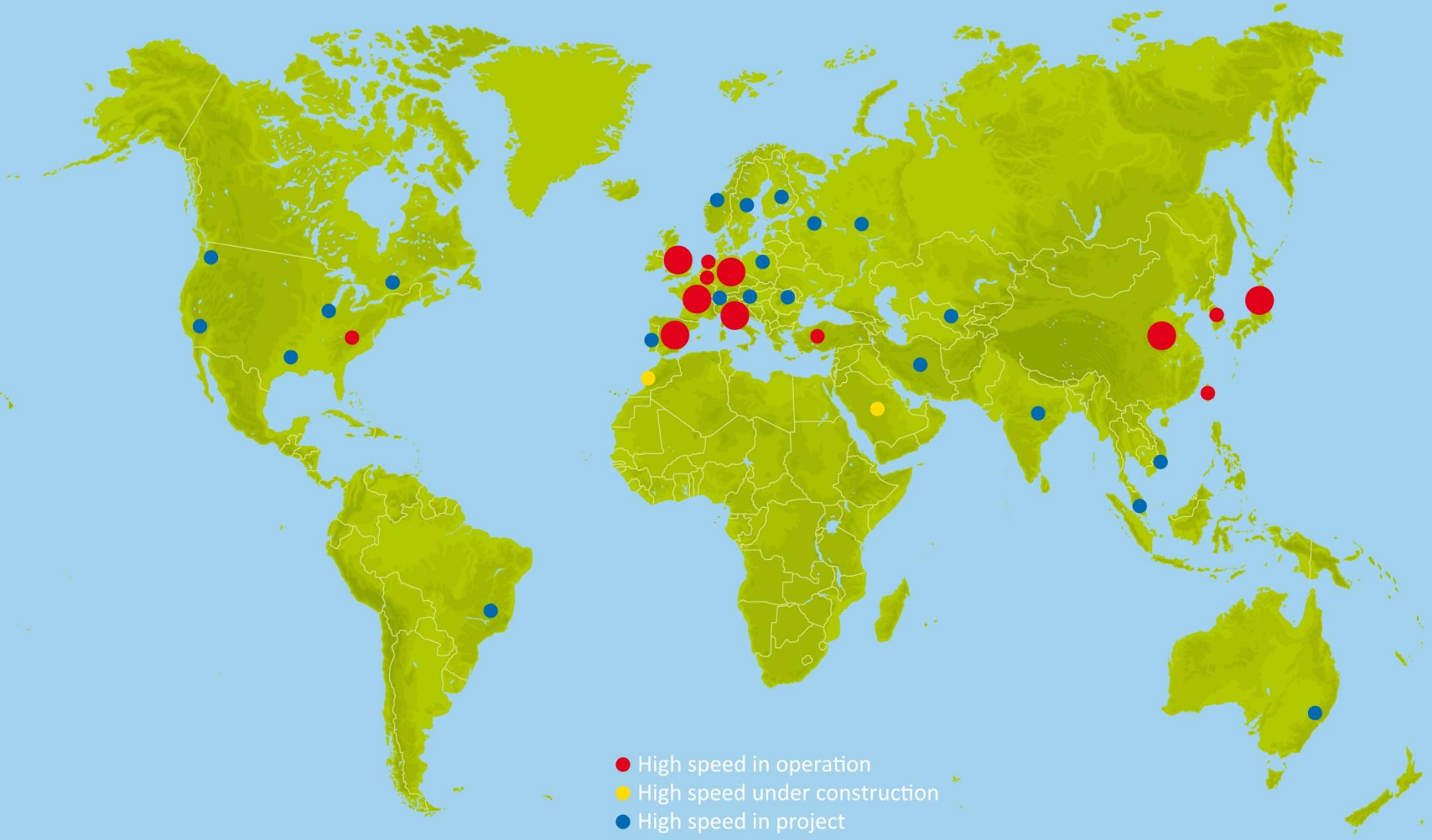
Concluding remarks

In operation: Belgium
France
Germany
Italy
Spain
The Netherlands
United Kingdom

Japan
Korea
China
THSRC
Turkey

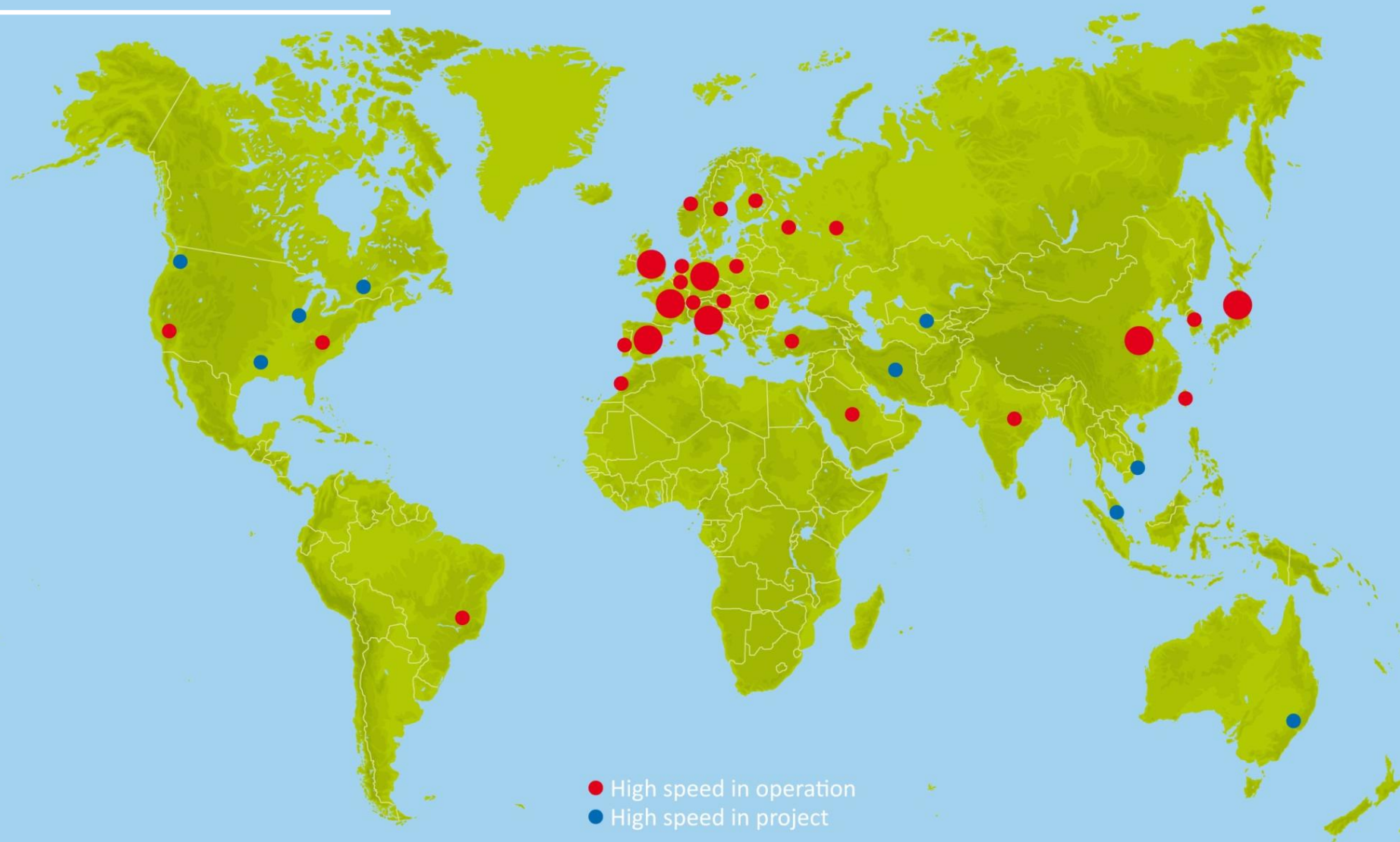
USA

Planned: Poland
Portugal
Russia
Morocco
India
Iran
Saudi Arabia
Argentina
Brazil
Indonesia
Canada
Mexico
...



- High speed in operation
- High speed under construction
- High speed in project





● High speed in operation
● High speed in project



European Region



Updated February 2013

France: at the heart of an European Network



Germany: a particular concept on HS network



Spain: Expanding a multi technology system



Italy: Competition now



Italy: Competition now



The Netherlands: Lights and shadows



Main challenge in Europe: Interoperability



Main challenge in Europe: Interoperability



Main challenge in Europe: Interoperability



Japan



Updated February 2013

Celebrating the 50th Anniversary



Most recent technologies Shinkansen (South)



Most recent technologies Shinkansen (North)



China: from 0 to 12 000 km of HRS in just 4 years



THSRC: The only example of BOT in HSR



South Korea: Technological evolution



South Korea: Technological evolution



Turkey: HSR contributes to develop and integrate



United States



Updated January 2013



USA: several possible models for HSR



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Liberalisation in Europe

New operators



NTV new Italian private operator

Will start operations with 25 new generation AGV trains

SNCF purchased 20 % of the capital

Globalisation



The future of high speed rail

- High speed technology is fully competitive today but new developments are necessary if we want keep this competitiveness for the next 20-30 year
- Developments in new technologies immediately follow the implementation of the first high speed system in any country

Requirements by Regions

Region	Europe	Asia	USA
Common requirements	<ul style="list-style-type: none"> <li style="display: inline-block; width: 45%; vertical-align: top;">• Reliability <li style="display: inline-block; width: 45%; vertical-align: top;">• Life cycle cost <li style="display: inline-block; width: 45%; vertical-align: top;">• Flexibility <li style="display: inline-block; width: 45%; vertical-align: top;">• Performance 		
Individual requirements	<ul style="list-style-type: none"> • Interoperability • Standardisation (reduction of the variety of trains / /components) 	<ul style="list-style-type: none"> • Localisation • Transfer of technology • Consulting 	<ul style="list-style-type: none"> • Creative financing • FRA compliance • "Buy America" (local content)

In the coming years, high speed will advance on

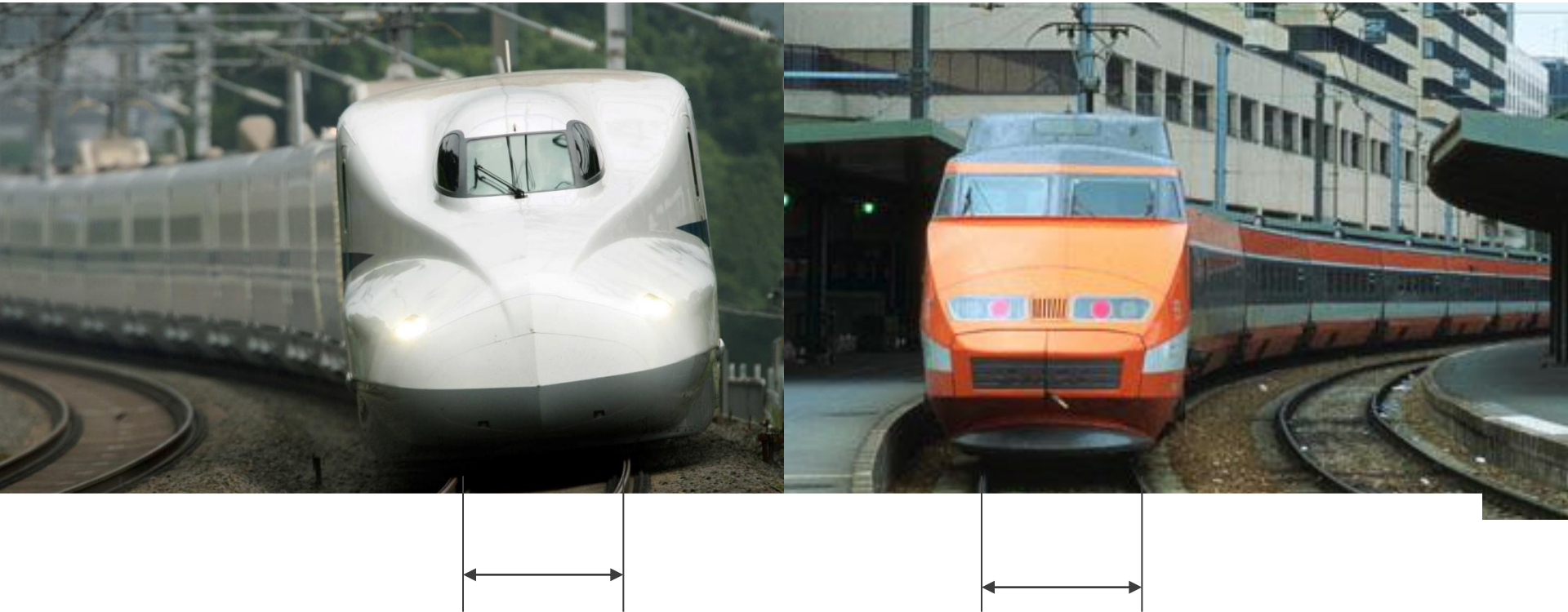
- Higher commercial speeds
 - maximum speeds in the range of 320 - 350 km/h
 - more availability time for the infrastructure
- New conception of the infrastructure elements:
 - ballasted or unballasted track, new fastenings systems
 - new materials (i.e. catenary wires)
- Standardisation and modularity of rolling stock
- New braking systems
- More respect to the environment (noise, energy efficiency)
- Improvements on safety, security and comfort
 - crossing winds, earthquake's detection, etc.
- New technologies (telecommunications, WiFi, etc.)

In the coming years, HS rail operators will ask for

Business

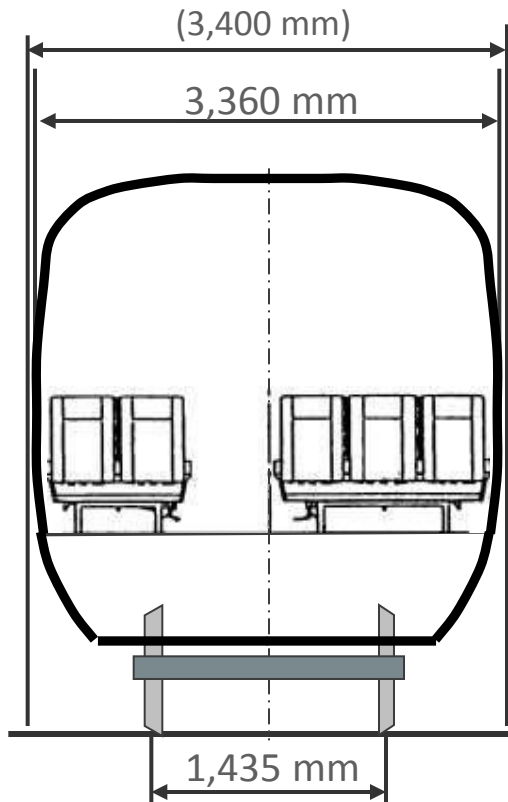
- More capacity (double deck &/or 2 + 3 instead of 2 + 2)
- More availability and maintainability of trains (RAMS)
- More reduced costs of (purchase and) maintenance (LCC)
- More reduced fees for infrastructure use
- More energy efficiency and less energy consumption
- Optimisation of the operation costs (i.e. when low occupancy)
- Globalisation
- ...

Capacity

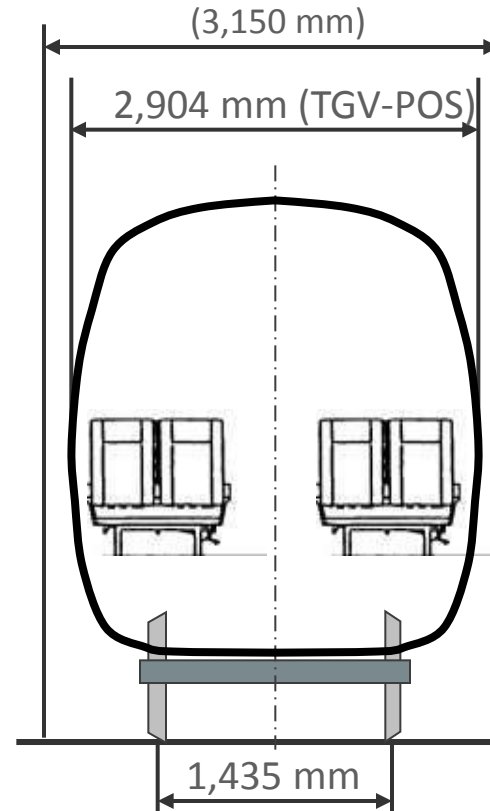


Capacity

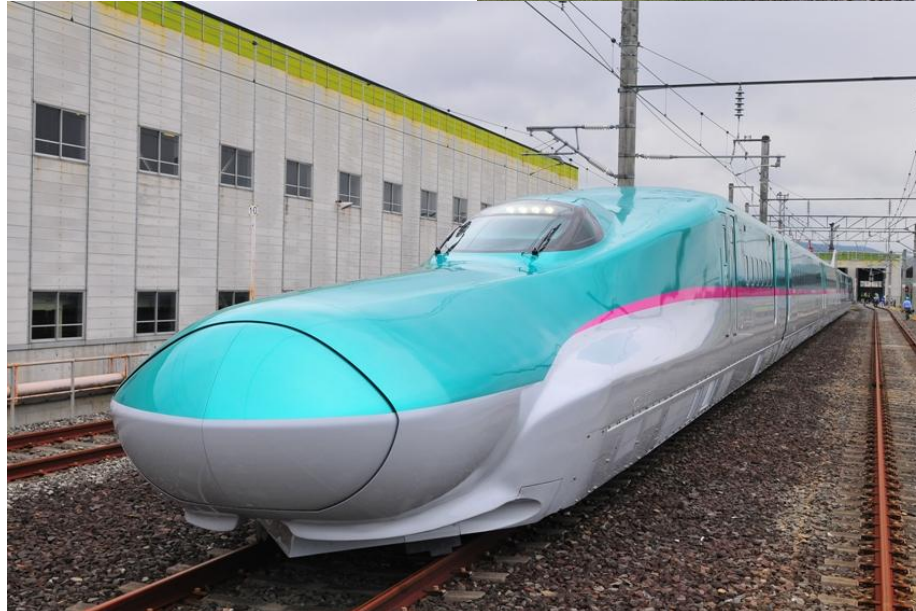
Shinkansen loading gauge



European loading gauge



New prototypes becoming series trains



New prototypes to compete



New prototypes developed by the industry



New prototypes developed by the industry



New prototypes developed by the industry



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Conclusions - Lessons learned

- Network: from a new HS line to a Continental HS network
- Operating on “classic”, “upgraded” and HS networks
- Capacity concept
- Stations: strategy. Situation, number, intermodality, accessibility, functionality
- Integral protection: safety, security, civil protection
- Environment and sustainability. Carbon balance
- Interoperability
- Skills & knowledge: how to follow
- **THE AIM IS THE SERVICE.** The construction of the line and purchasing rolling stock are the consequences

Conclusion

- High speed is **expanding dramatically** around the world
- A **highly beneficial transport system for society**
- High speed **always needs public help**
- High speed is a **complex system**
- High speed conception is **not unique** and it must be adapted to each case
- High speed (railways) must continue to make **innovations**, in order to continue serving Society

Complement more than compete



■ ■ ■ Thank you very much for your kind attention

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www.uic.org

www.uic.org/highspeed