High Speed Rail and Low Cost Air Intermodality

EUI workshop
Florence, 3 March 2014

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Agenda

The UIC Railways principles
Capacity
Intermodality
Concluding remarks
The UIC
Railways principles
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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 Mission

Promoting the development of rail transport at world level, in order to meet challenges of mobility and sustainable development.
Working group in activity since 1995
Studies on strategic issues
www.uic.org/highspeed

**Activities:**
- Benchmarking & data bases
- System analyses & researches
- Technical workshops
- Training programs
- World Congress on High Speed

**High Speed:**
- Systems in operation
- Future developments
**High speed reports.** Recent examples:

- High speed and the City (I & II)
- High speed handbook
- High speed contribution to sustainable mobility
- Optimal speed on high speed systems
- Infrastructure cost for Intercity & HS services
- Etc.

Full Library of studies & reports available online: [www.uic.org/highspeed](http://www.uic.org/highspeed)

**Tourist OPPortunities on Rail Transport (TOPRAIL)**

New activity to explore and promote the potential of traffic on rail for leisure: High Speed, seasonal, charter, safety on vintage trains, cruise trains,… New chairmanship (Catalonian Railways)
Training on High Speed Systems

**THSS Basic**

One week (5 days) Training Seminar, in which all the elements involved in a high speed system are analysed.

10th edition - June 2014, Paris

![Training on High Speed Systems](image1.jpg)

**THSS Advanced**

One week (5 days) Training Seminar, focused on strategic aspects in a high speed system: traffic forecasting, station policy, environment, financing, etc.

Practical cases discussion.

Technical visits

2nd edition - March 2014, Spain

![Training on High Speed Systems](image2.jpg)

[www.uic.org/highspeed](http://www.uic.org/highspeed)
World Congress on HS Rail WCHS

July 2015 in Tokyo, Japan
Organized by the UIC & East Japan Rail
The UIC Railways principles Capacity Intermodality Concluding remarks
Basic principles of Railways

> Self-guided
  ("Surprising")

> Low deformation and
  low friction between wheel and rail
  ("300 - 15 - 3")
300 kg

15 kg

3 kg
Energy efficiency comparison

Traffic units carried (number of passengers * km) for one unit of energy (kilo-equivalent of petrol, kep)

(1 kWh = 0.086 kep)

Source: SNCF, ADEME, 1997
Advantages and disadvantages

> Advantages:
  High Capacity of transport
  Power (few energy, origin)
  Respect for the environment
  Easy automation. Safety

> Disadvantages:
  Limits in layout: gradients
  Traction and breaking: capacity and distances
  One degree of liberty: few alternatives
Advantages and disadvantages

Capacity

Respect for the environment

Safety

Railways = CAPACITY + sustainability
External costs (average)

External costs = Part of the ticket paid by society

Magnitude of external costs in a medium-distance corridor, non-rush hour and without considering congestion (€ per 1000 passenger km)
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
- ... 

Considering all of them is fundamental
High Speed is a system
• 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 world network

World network (V ≥ 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
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
Modal split HS train vs Aviation

% HS Rail

% Aviation

Roma-Bologna, 358 km
Paris-London, 430 km
Paris-Lyon, 494 km
Madrid-Sevilla, 471 km
Tokyo-Osaka, 515 km
Stockholm-Goteborg, 455 km
Paris-Amsterdam, 450 km
Roma-Milano, 560 km

(distances between 300 and 600 km)
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Railways principles
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Generalities on Railways – Resume

(High Speed) Railways = CAPACITY

High Speed (Railways) are systems

All (HS) Railways are equal but different
Most adequate domains for railways

Big passengers transportation
(urban and suburban trains)
Big cargo transports on long distances
High speed

Monorails, magnetic trains, pneumatic trains: cannot compete
Balancing capacity

Number of trains

Stability
(“Impact of 1 minute delay of one train on other trains”)

Different types of trains

L1 + L2 + L3 + L4 = Constant

UIC Leaflet 406
Capacity

Shinkansen

European HST
Capacity

**Shinkansen loading gauge**

- Length: 3,360 mm
- Width: 1,435 mm
- Height: 3,400 mm

**European loading gauge**

- Length: 2,904 mm (TGV-POS)
- Width: 1,435 mm
- Height: 3,150 mm
Evolution of sizes

The railway is the only transportation mode that has not grown in size in recent 50 years:
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High speed railways in the city

City C (h million inhabitants)
High speed railways in the city

City C (h million inhabitants)

\[ v = v_1 + v_2 + v_3 \]
Intermodality rail / air – main challenges

Traffic volume

Rail
high capacity

Air
low capacity

Trains HS, IC, Regio, Commuters

Long range
Air shuttle
Regional

Balance between traffic volumes
Frequencies and seasonality
Balance between types of traffic by rail:
- Passengers: going to city or hub
- Staff
- Other
Intermodality rail / air – main challenges

**Commercial**

Rail

“style” of travel

Air

“style” of travel

Fare policy
Ticketing, reservation, boarding pass
Companies/Alliances: transfer conditions
Security conditions
Baggage: type, sizes, operation
Intermodality rail / air – main challenges

Operations

Rail logistics operator

Boarding gates / platforms
Distance to walk and times
Boarding procedures
Accessibility conditions
Regularity (expected & actual)

Air logistics operator

Conditions for connexion
(Train to plane)
(Plane to train)
Intermodality rail / air – main challenges

Conception

Rail
- train station

Air
- airport-$\Sigma$ terminals

Design
- Functionality
- Business opportunities
- Accessibility
- Other intermodalities

Governance
## Airports connected to long distance rail

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<th>Europe</th>
<th>Other Regions</th>
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<td>Paris CDG</td>
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Conclusion

- Railways are **highly beneficial transport system for society**
- Railways provides **capacity** and **sustainability**
- Railways are **complex system**
- Transport conception is **not unique** and it must be adapted to each case
- Capabilities of each transport mode must be **optimised**
- All different transport modes should **not necessarily compete but should be complementary**
Complement and not compete
Thank you for your kind attention

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