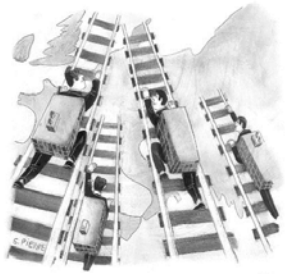
Institute of Transport Economics (LET)
University of Lyon – France

35th Symposium on Transport Policy Studies, Tokyo
27.05.2014

High Speed Rail in Europe

Laurent Guihéry

HSR Italy



HSR France - Germany
May 2014, Francfort

TOKYO 2015 HIGHSPEED
9th World Congress on High Speed Rail

Thank you in Japanese and in French ！

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みなさん、こんにちは。初めに皆様のあたたかいお出迎えに感謝致します。日本へ経つ前の数週間、わたくしは日本語を猛勉強いたしました。ですから、この場をお借りして日本語で少々はじめの挨拶を述べさせて頂きます。
私は常々生徒に、新幹線を世界で最初に開発したのは、フランスではなく、日本である、と申しております。日本の交通に関する研究は素晴らしいものであります。ですから、私はフランスと日本が互いに協力し合い、交通技術を発展させていけることを強く望んでおります。

Bonjour !
D'abord quelques mots en japonais. J'essaie vraiment d'apprendre le japonais !
Je tenais à vous remercier très vivement pour cette invitation.
Elle me fait découvrir votre pays et son système ferroviaire très réputé.
Je dis à mes étudiants : ce n'est pas en France qu'il y a le premier TGV mais au Japon !
J'espère que nous pourrons développer ensemble des coopérations. »

Outlines

1) Introduction : research Institute LET

2) HSR in Europe : state of the Art

3) Is there a European model of HSR ?

4) Future of European HSR and rebound : new business models facing new constraints

5) Conclusion and discussion

1) Introduction : LET – Univ of Lyon

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Laboratoire d'Economie des Transports
(*Transport Economics Laboratory*) , CNRS, University of Lyon
(Université Lumière Lyon 2, SciencePo de Lyon and ENTPE)
RESEARCH ACTIVITIES and TEACHINGS (MASTER)

- at the crossroads of transport, regions and society
- analyse and model passengers and goods spatial mobility, as well as household and activity locations,
- evaluate transport and land use policy,
- provide decision support for public policy

To sum up : both theory and applied science, mainly transport economics and public economics

Resources

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Staff:

- 35 academic teaching / research staff + 9 support staff
- 20-30 PhD students

Backgrounds: economics, civil engineering, geography, maths / stats + sociology, political science

2 sites in Lyon area

- ISH: Institute for Human Sciences (University + SciencesPo de Lyon) – Master Degree
- ENTPE: National School for Public Works

TransportNET : eight partners

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Universiteit Antwerpen

TU Delft

UNIVERSITY OF THE AEGEAN

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Università degli Studi di Genova

INSTITUTO SUPERIOR TÉCNICO
Universidade Técnica de Lisboa

Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 18

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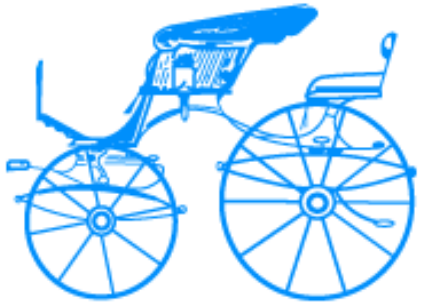

Laboratoire d'Economie des Transports
Unité Mixte de Recherche du CNRS n°5593

www.let.fr

2) HSR in EUROPE : state of the art

European Transport Policy Framework - See : Transforum Project
http://www.transforum-project.eu/

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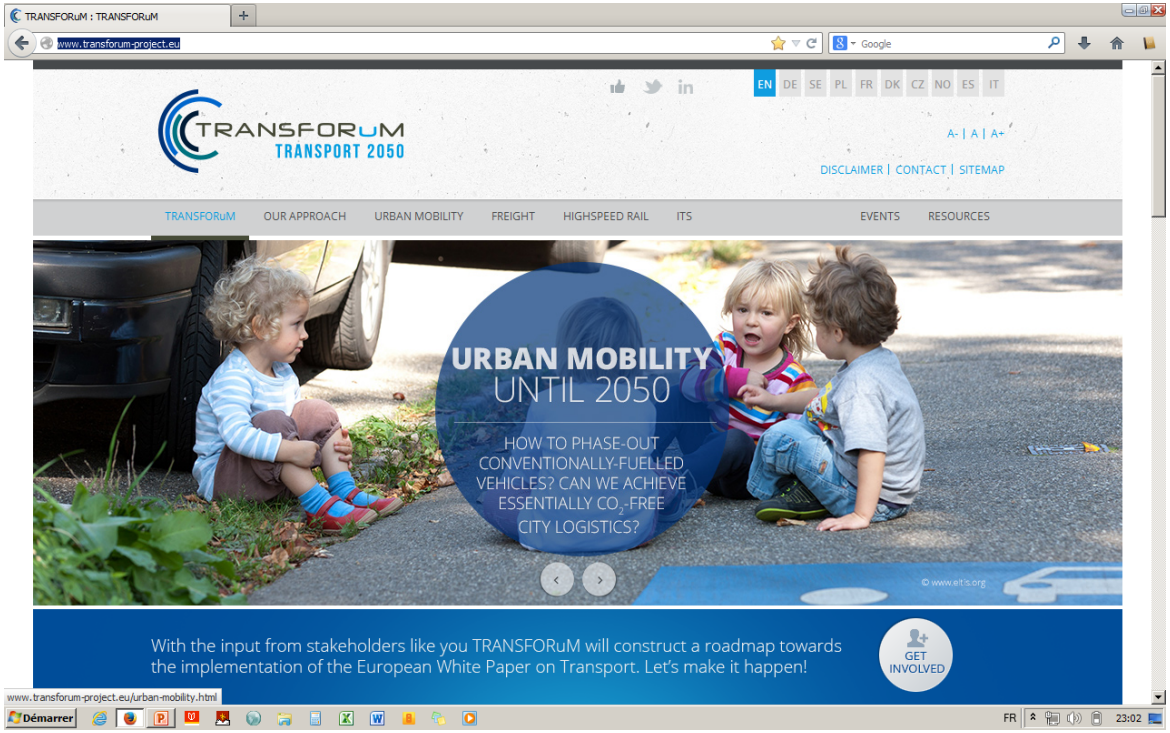
EU White Paper 2011 : objectives

✓Climate change and the European challenge : less CO_2 emission, renewal energy, quality of life, especially in cities (public transport, city logistics)
✓Change of modal split : Rail as a motor of substitute to road transport both for freight and passengers.
✓Freedom of mobility / free entrepreneurship
✓More jobs (maybe, we hope so !)
✓Innovation (Information Technology in Transport System)

TRANSPORT POLICY in EUROPE
http://www.transforum-project.eu/



First Results of EU TRANSFORUM Projects : Corridors (GEOGRAPHY MATTERS), importance of Stations as nodes in city center / Hub – regional trains (**Many thanks to the contribution of Mr. Toshifumi ISHIYA and his colleagues, JITI at the HSR Workshop in Lyon (nov. 2013)**

The European Union

EU White Paper 2011 : Objectives for High Speed Rail

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The White Paper on Transport specifies these targets for 2050 related to High-Speed Rail (goal no. 4):

- **… complete a European high-speed rail network,**
- **… the majority of medium-distance passenger transport should go by rail,**
- **… connect all core network airports to the rail network, preferably high-speed.**

It also mentions these intermediate targets:

- … Triple the length of the existing high-speed network by 2030,
- … while maintaining a dense railway network in all EU Member States.
- … deploy an effective European Rail Traffic Management System and
- … liberalize the transport sector by opening all modes of passenger traffics to competition.
    - IT IS NOT DOGMATIC : Competition as a TOOLBOX for a better efficiency / limitation of subsidies / incentives for quality

European Transport Policy framework : RAIL POLICY

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Underground objectives of European Transport Policy for Rail :

- Optimal level of subsidies for the rail sector (France : 1700 billion Yen subsidies+ 1400 billion Yen tickets revenues) ; 425 billion yen debt/year for total debt of 5670 billion yen ; Railway : 3260 billion yen spending / year)

- Better efficiency in rail operation : productivity gains

HSR IN EUROPE : STATE OF THE ART : INSTITUTIONAL ORGANIZATION

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European Legislative Framework: balance between the European Parliament, the European Commission and the Member-States

-Splitting infrastructure management from operation
-**Liberalization** - Opening to competition (not dogmatic) and **Regulation** (Independent Regulation Agencies)
-**Public Service Operation (**OSP) : Tendering compulsory (2019)
-**European Rail Agency (ERA)** : Security / Interoperability / ERTMS (standardization of signal system) / Certification of rolling stocks material
-European Freight Corridors
-INFRASTRUCTURE : **Trans-European-Network** (TEN)

- *A way to build maybe "United States of Europe" ?*

Trans-European transport network (TEN-T)
Priority axes and projects

1. Railway axis Berlin–Verona/Milan–Bologna–Naples–Messina–Palermo
2. High-speed railway axis Paris–Brussels–Cologne–Amsterdam–London
3. High-speed railway axis of south-west Europe
4. High-speed railway axis east
5. Betuwe line
6. Railway axis Lyons–Trieste–Divača/ Koper–Divača–Ljubljana–Budapest–Ukrainian border
7. Motorway axis Igoumenitsa/Patras–Athens–Sofia–Budapest
8. Multimodal axis Portugal/Spain–rest of Europe
9. Railway axis Cork–Dublin–Belfast–Stranraer
10. Malpensa airport
11. Øresund fixed link
12. Nordic triangle railway/road axis
13. United Kingdom/Ireland/Benelux road axis
14. West coast main line
15. Galileo
16. Freight railway axis Sines/Algeciras-Madrid-Paris
17. Railway axis Paris–Strasbourg–Stuttgart–Vienna–Bratislava
18. Rhine/Meuse–Main–Danube inland waterway axis
19. High-speed rail interoperability on the Iberian peninsula
20. Fehmarn belt railway axis
21. Motorways of the sea
22. Railway axis Athens–Sofia–Budapest–Vienna–Prague–Nuremberg/Dresden
23. Railway axis Gdansk–Warsaw–Brno/Bratislava–Vienna
24. Railway axis Lyons/Genoa–Basle–Duisburg–Rotterdam/Antwerp
25. Motorway axis Gdansk–Brno/Bratislava–Vienna
26. Railway/road axis Ireland/United Kingdom/continental Europe
27. 'Rail Baltica' axis Warsaw–Kaunas–Riga–Tallinn–Helsinki
28. 'Eurocaprail' on the Brussels–Luxembourg–Strasbourg railway axis
29. Railway axis of the Ionian/Adriatic intermodal corridor
30. Inland waterway Seine–Scheldt

Priority axes and projects

- Road
- Rail
- Inland waterway
- Motorway of the Sea
- Airport project
- Port project

Trans-European transport network

- Rail
- Road
- Inland waterway

Priority project numbers

- 13 Road project
- 6 Railway project
- 8 Multimodal project
- 30 Inland waterway project
- 21 Motorway of the sea
- 10 Airport
- 15 Galileo

HSR IN EUROPE : STATE OF THE ART
INSTITUTIONNAL ORGANIZATION

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	TARGET EU	France	Germany	Italy	UK
Level of splitting	TOTAL (1991)	Partial	Holding	Holding	Total
Debt Management	stabilizing	Infra. manager	Bund (Federal State)	State	Infra. manager
Law Compatibility with EU Guidelines	Independent	Problem of Independence (C-625/10)	C-556/10 Independent	Problem of Independence	Independent
Regulation	Independent	ARAF 35 employees INDEPENDANT	Bundesnetzagentur 2700 in 88 departments – multi-sectoral (5 Dept Railway) INDEPENDANT	In process	Office of Rail Regulation (ORR) 111 employees for rail) INDEPENDANT

Source : http://www.mobilettre.com/

HSR IN EUROPE : STATE OF THE ART LEVEL OF MARKET OPENING - 2013

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	TARGET EU	France	Germany	Italy	UK
Regional	2019 Tendering	Monopoly SNCF	Tendering	Tendering non obligatory	Total
HSR	Open Access	Monopoly	Possible Few	YES NTV – Trenitalia	Possible
Freight Growth Marketshare of newcomer	OPEN +++ +	OPEN -- 30 %	OPEN + 25 %	OPEN	OPEN +

Source : http://www.mobilettre.com/

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History and Geography are very different between Europe and Japan

- Japan 1987 : split of the network within integrated companies and yardstick comparison

-Europe 1991 (Sweden, 1988) : discontinuity of the network of nations of Europe ; European reform and vertical separation => access of third parties to national networks => open networks => favor European integration.

In both case EUROPE / JAPAN : GEOGRAPHY MATTERS

EUROPE – JAPAN
Maybe we can compare Italy to Japan HSR

KEY FIGURES on HIGH SPEEP RAIL (Source : Banister, Givoni, 2012):

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Rail accounts for 7 % of all EU 27 travel

HSR : 26 % of all rail travel in EU 27 (100 billion pass.km)

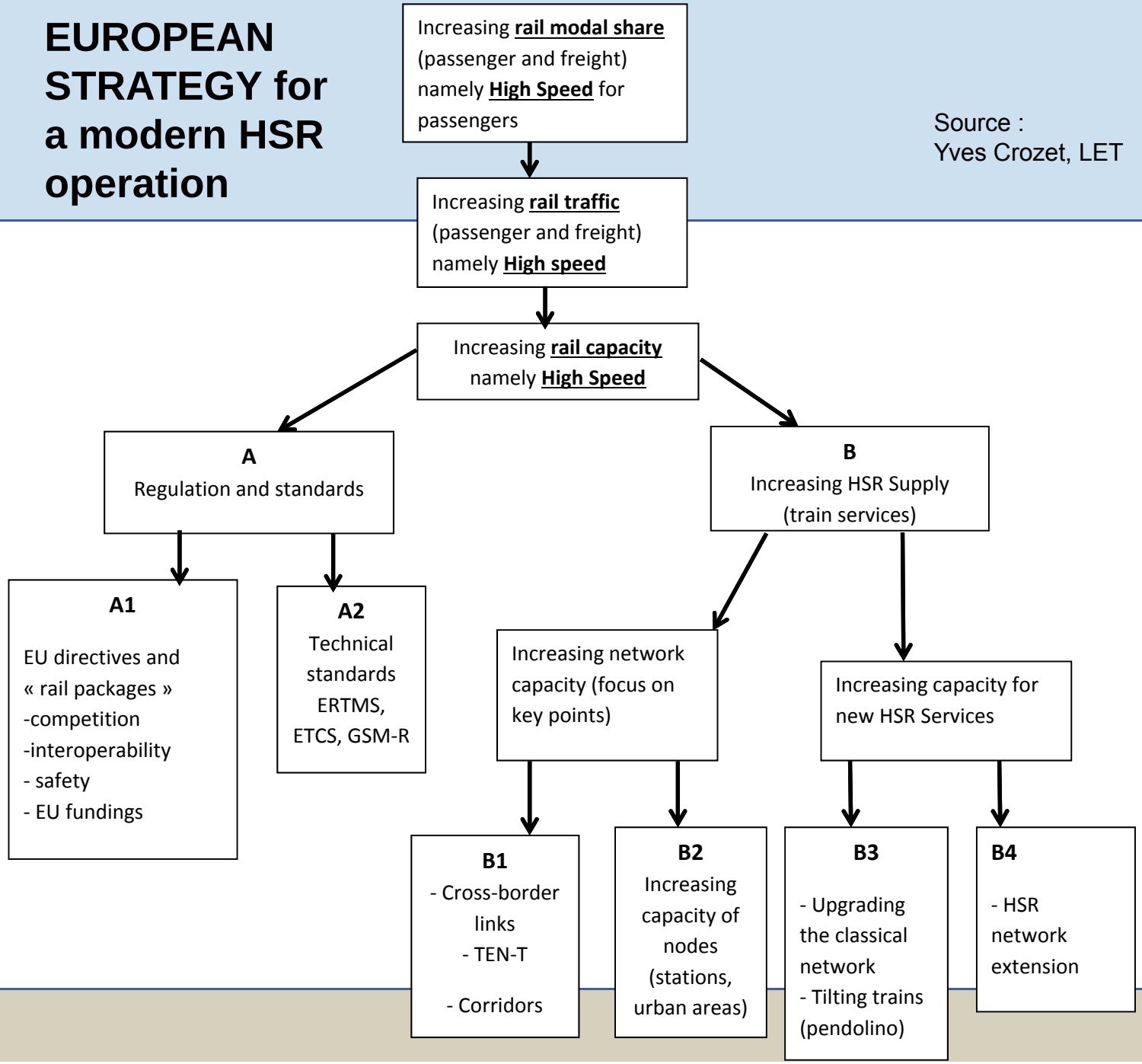
Investment in HSR has not resulted in greater growth in the rail market in these five countries ; Spain : more tracks (2000 km) than France (1700 km) but 1/5 of the traffic !

Importance of conventional rail traffic and regional transport

Limited budget now : considerable uncertainty over the future funding for rail in the EU

EUROPEAN STRATEGY for a modern HSR operation

Source :
Yves Crozet, LET



3) IS THERE A MODEL OF EUROPEAN HSR ?

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Different models of HSR in Europe :

- tilting rolling stock material (Slovak Republic [is planning HSR, feasibility study , intention to buy tilting units)
- upgrading the network (Poland : project Warsaw to Poznań and Wrocław : 2014 – 2019 ? , Czech Republic [230 km/h ; projects but not before 2020 ; Pendolino trains (tilting) in operation since 2004)
- support from outside (Romania with support from China ; Budapest – Bucharest line as a part of a larger TEN transportation corridor Paris-Vienna-Budapest-Bucharest-Constanza)
- new infrastructure but costly (France, UK (HSR2))
- model HSR and land use issues : Many stops (Germany)

For France :

Commercial service operated by a monopolist !

Issue to be solved for HSR in France/Europe : public service (**competition for the market** : tender) or competitive framework of services (**open access following European rules** : see Italy very interesting in this field because of HSR Competition between NTV and Trenitalia).

IS THERE A MODEL OF EUROPEAN HSR ?

Maybe looking to East Europe : new ideas !

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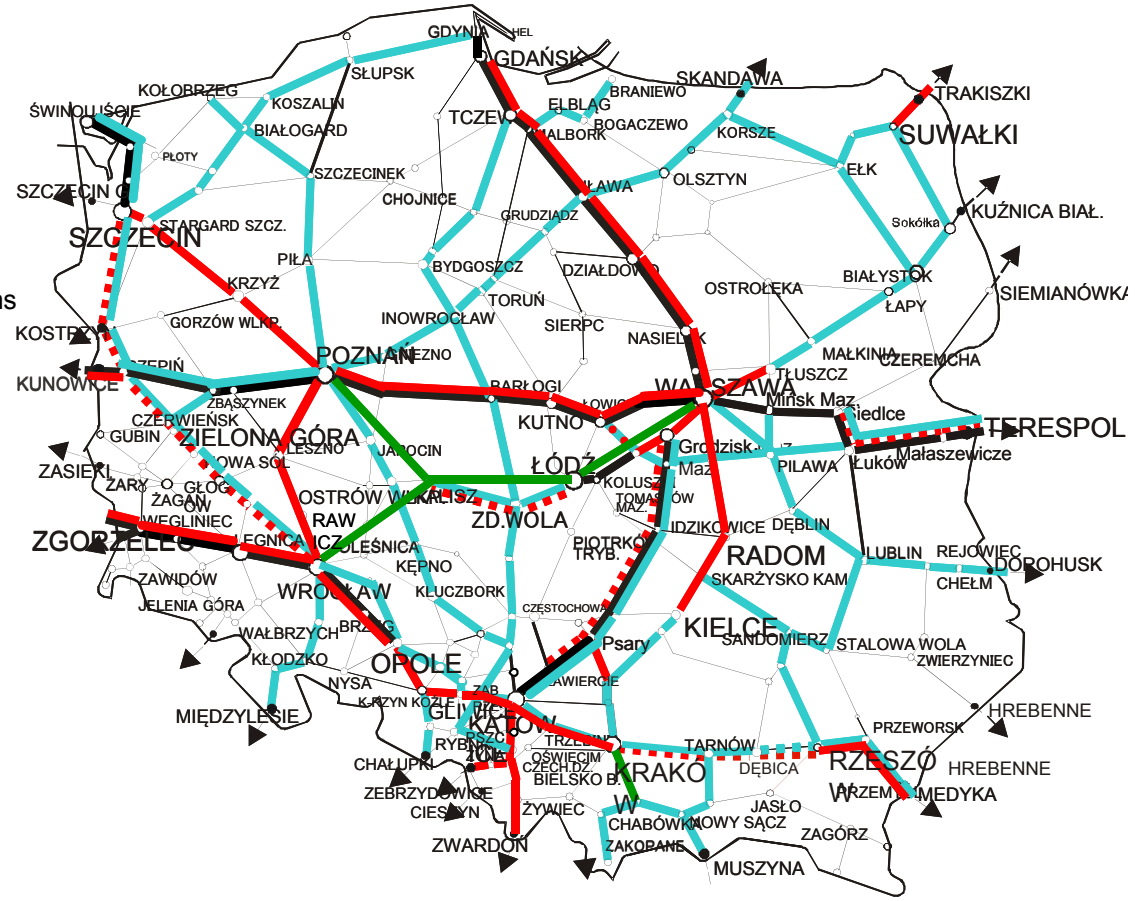
Rail development in Poland

Source :

Dr Przemysław Borkowski

Department of Comparative Analysis of Transport Systems

University of Gdansk



Modernized till 2006
Priority projects
Reserve projects
After 2013
HSR

France
HS trains and HS tracks

- 1975 : public decision ; 1981 : operation then extension
- Only 25 train stations on HS tracks
- But 200 train stations receiving HS trains.

MODEL: 30 years ago the first HSR between Paris and Lyon (450 km, a 2 hours trip, 23 return trips per day, train capacity 380 (1981) 500 (double level) or 1000, load factor close to 75%)

Geography matters: Paris region population = 11 M, Lyon region population = 1,5M. And almost a desert between the two!

The French “model” of TGV is therefore valid for an optimal mix between distance, speed and traffic in relation with a gravity rationale : SUCCESS

Good operating : 92 % punctuality

Break event point : 75 % pass load (Yield)

Source : Yves Crozet

TGV : success story…

Demand for high speed is a consequence of income growth (not a cause)

HSR is a relevant response for optimising business travel time, especially below the 3 hours threshold :but the demand of speed is the consequence of economic growth, not the cause ! But when you have economic growth, HSR is clearly a source of smart growth especially for collective land use and individual time management

HSR is a burden for public budget, it is necessary to compare the public cost and the private gains (consumer surplus)

HSR is convenient when the potential traffic is high enough, for instance 20 return trips/day : SUCCESS for PARIS- LYON for instance

BUT HSR is neither a « horn of plenty » nor a "magic wand" : France is learning this today…

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- Crisis of the French HSR model : LOW COSTS AIRLINES + POOLING (4% of travels now in France !) : there is almost no fully profitable HSR now in France. Public subsidies are necessary to cover, at least partially, infrastructure costs. So the question is: up to what extent are public subsidies relevant ?
-
- Elasticity less than 1 : decrease in price from 10% does not mean increase in traffic more than 10 % : Conjuncture crisis of demand in Europe (Speed / GDP) + structural (crisis of speed demand : saturation)

- Land use impacts : No major and systematic impacts, neither on the number of jobs nor on the number of inhabitants ; HSR station is "in the middle of nowhere" : no impacts. But a city not connected to HSR becomes a relative loser. The result is that all the local politicians want a HSR connection !

BUT HSR is neither a « horn of plenty » nor a “magic wand” France is learning this today…

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- There is an optimal size of the HST network : it is clear that the more we extend the network, the more we reduce the profitability of the new links. Debt level and over-investment in HSR (Spain ?) ; PPP : success or failures ?

- Last but not the least, for some relations, air transport is the cheapest mode, even when taking into account the external costs

- Winner are : Users HSR, Industrialists and HSR operators ; looser : taxpayers

  - WE NEED NEW BUSINESS MODELS

4) New Model of HSR :
a) competition maybe ?

See ITALY : competition in HSR : NTV-Trenitalia

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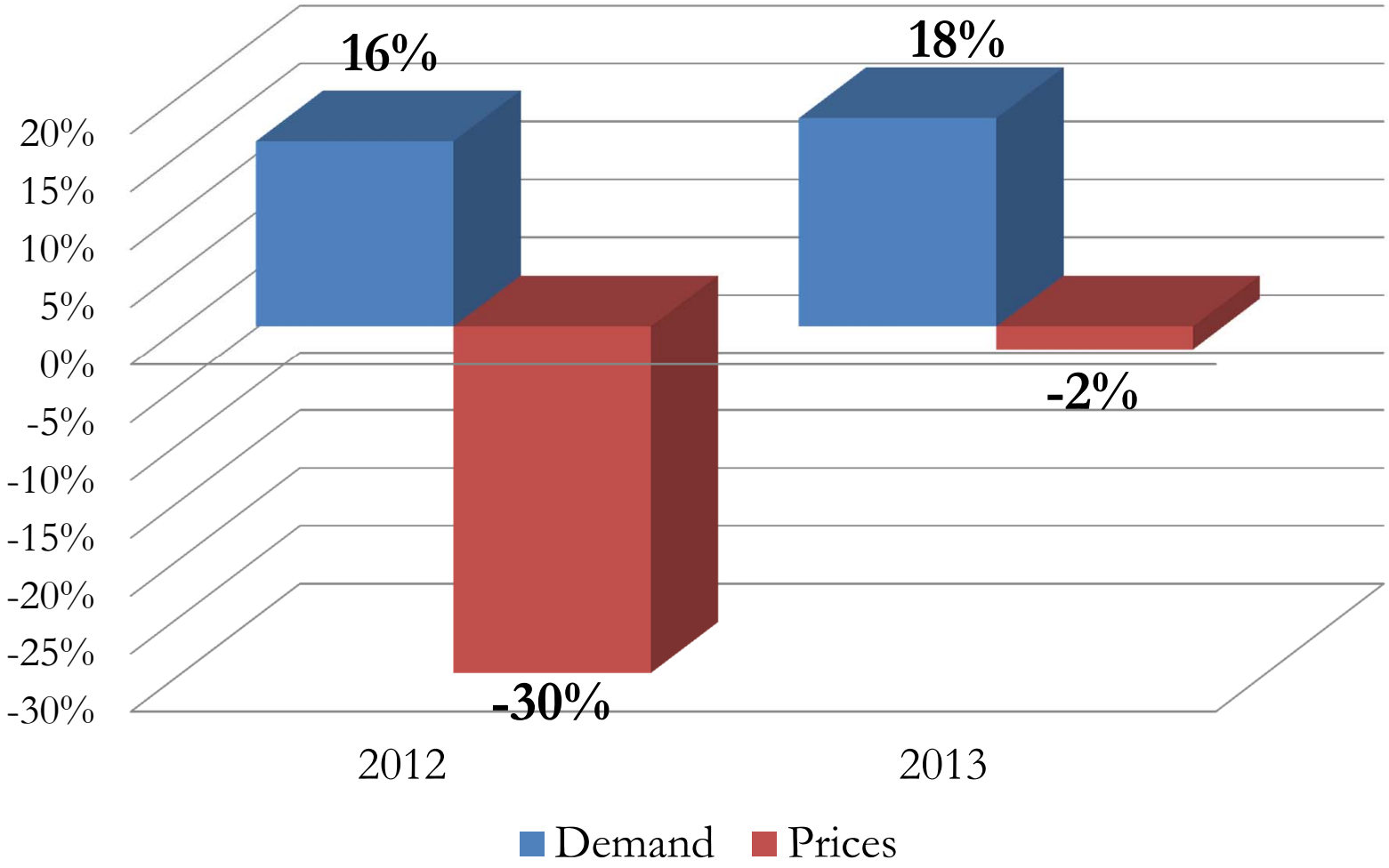
- 2006 : start (20 % for SNCF) ; July 2008, Homologation request
- March 2012, Homologation for Commercial service.
- April 2012, Italo starts operation in competition with Trenitalia.
- **45 months from request of homologation to commercial service :**
- 6,2 millions of passenger , punctuality > 95%
- 51% load factor
- 13 cities and 15 stations served

Source : NTV

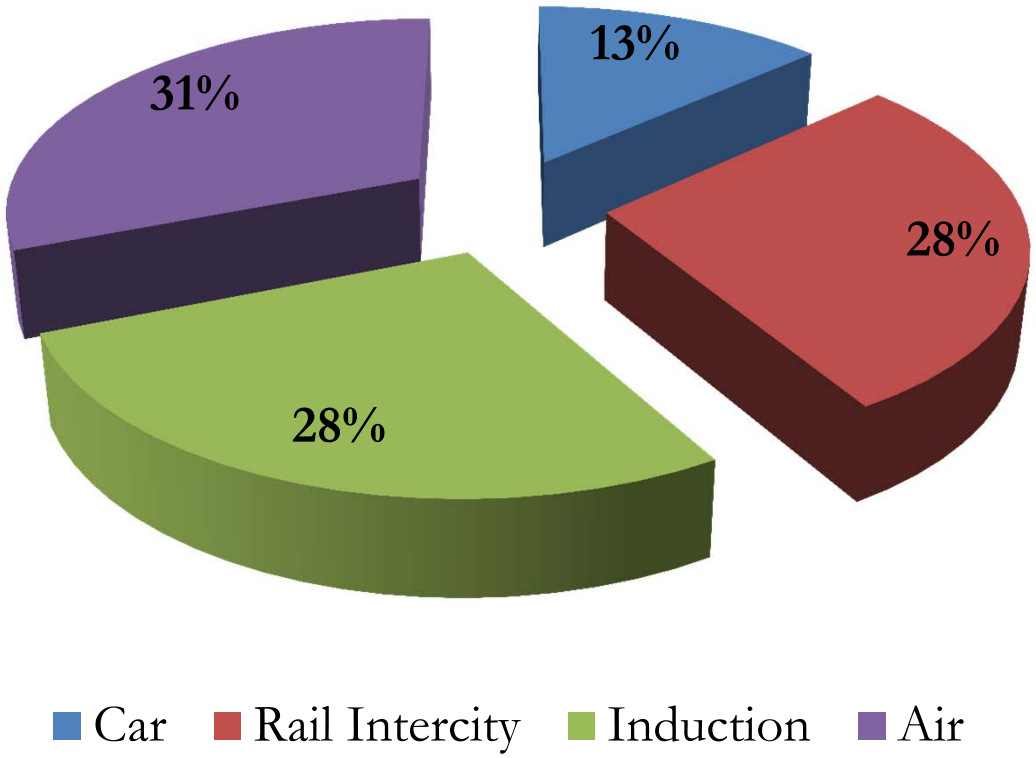
OPEN ACCESS IN ITALY



Font: Elaboration NTV Studies Office

Source : NTV

HSR - New demand in Italy in 2012 (7,1 Mln more Pax)



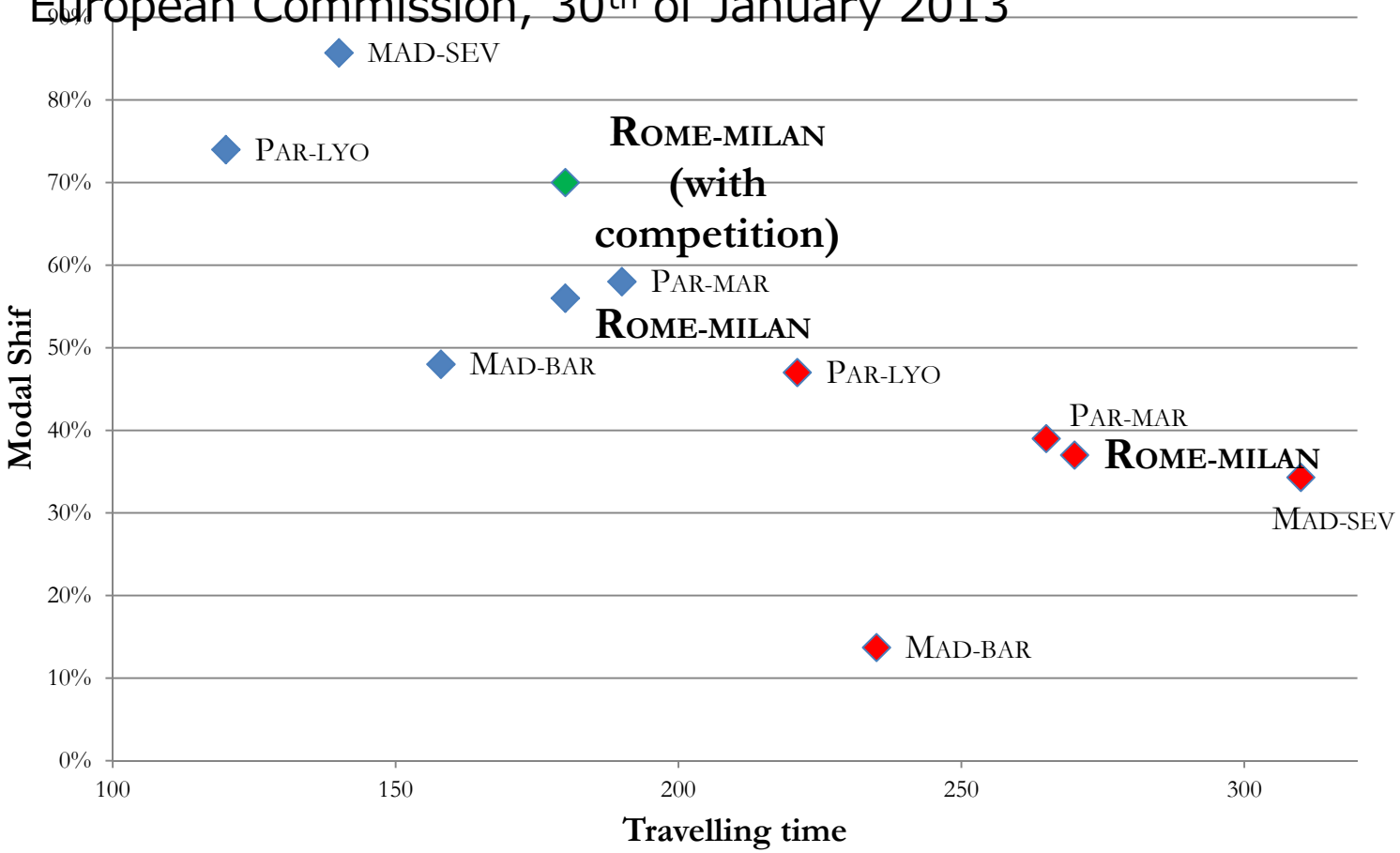
Font: Elaboration NTV Studies Office

Source : NTV

MODAL SHIFT AND COMPETITION

"This proposal will encourage modal shift from road and air"

European Commission, 30th of January 2013



In red: without HS

In Blue: with HS

In green: with HS in competition

Font: Elaboration NTV Studies Office

Source : NTV

ITALY : interesting : competition in HSR
NTV - Trenitalia

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Italo's entrance in the Italian Rail market is having a major impact on services delivered to customers and to the economy:

BUT :

1)NTV losses money : – 5 billion Yen in 2011 and – 10 billion Yen in 2012 ; cut off jobs in 2014 ; wages decrease for managers : DIFFICULT ! But Difficult Economic Situation in Italy too

2)DISCRIMINATION from TRENITALIA : slot allocation, access in train stations, indirect subsidies to incumbent operators,…

Source : NTV

4) New Model of HSR :
b) HSR : new intermodal competitors
Entrance of rail newcomer in Germany :
- 25 % revenues of DB – HSR response : Yield management

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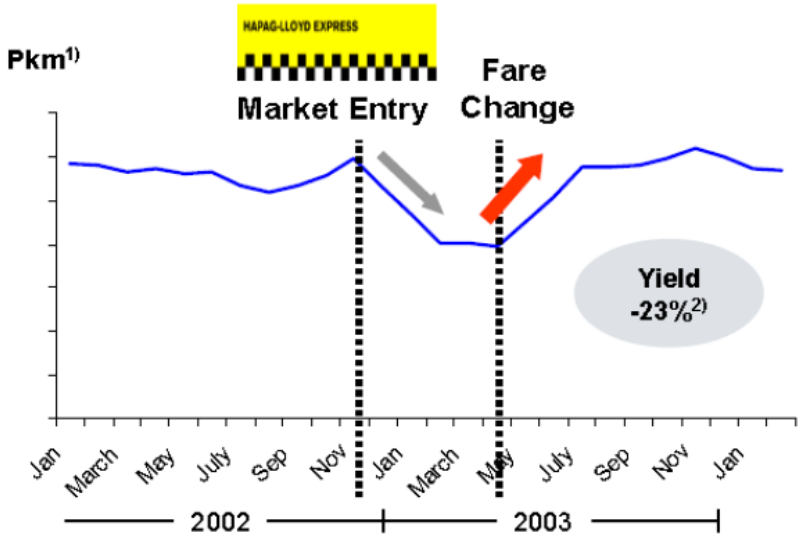
International Transport Forum

Impact of LCC entry on DB Cologne-Hamburg



Friebel and Niffka, 2005

HSR facing new competition :
1)Long distance coaches,
2)Car-pooling = 4 % of French long distance travels (collaborative transport)
3)Low Cost Airlines (LCC)

Source : ITF, Perkins, 2014

4) New Model of HSR :
b) HSR : competition with low cost carriers (Easyjet for example)

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Competition LCC – HSR : example in Europe

LCC really cheaper!

LYON – BARCELONA (tickets price in euro)					
		+ 1 day	+ 1 week	+ 1 month	+ 3 months
HSR	1 person	115,7	101,4	76,8	-
	Below 25 years old	115,7	101,4	76,8	-
	Family 2+2	356	320,00	236,8	-
LCC	1 person	70,48	39,88	36,82	56,2
	Below 25 years old	70,48	39,88	36,82	56,2
	Family 2+2	260,52	138,12	136,12	203,4

Source : Student report, IUT Lumière (Railway Workshop L. Guihery), University of Lyon, march 2014

4) New Model of HSR :
c) NEW MODELS : BETTER ACCESS to HSR and New mobility patterns

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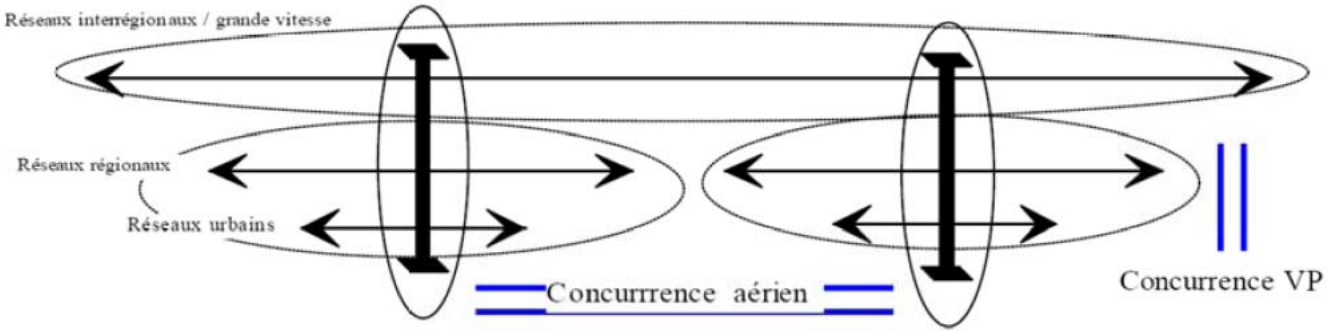
Seamless transport : interconnections with

- regional passenger transport : reform in Europe at this time : tenders starting in 2019
- airport connection
- Public Transport : trawmay, metro,…

My model !



"HSR as the strategic backbone of the transport system, an intermediate mode of transport and a network between urban public transport and long-haul air transport" (Banister, Givoni, 2012)

NEW MODELS : ACCESS to HSR
Thinking seamless transport / network integration
HUB and SPOKE strategy with regional railway transport

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RE
2
LYON

C'EST
MON VÉLO
TON VÉLO
SON VÉLO
NOS VÉLOS
VOS VÉLOS
LEUR VÉLO

STATIONS and NEW SERVICES :

- Stations in city center : high success (following the model of Japan : business centers and shopping centers)
-Biking rental near train stations (Kyoto)
-Park and Ride
-Bike and Rail (Germany) : folding bike

vélo'V
PARTAGER C'EST RESPECTER

Regional railway network as feeder : example LYON, France

Deux catégories de dessertes TER : le réseau de villes et le réseau de proximité

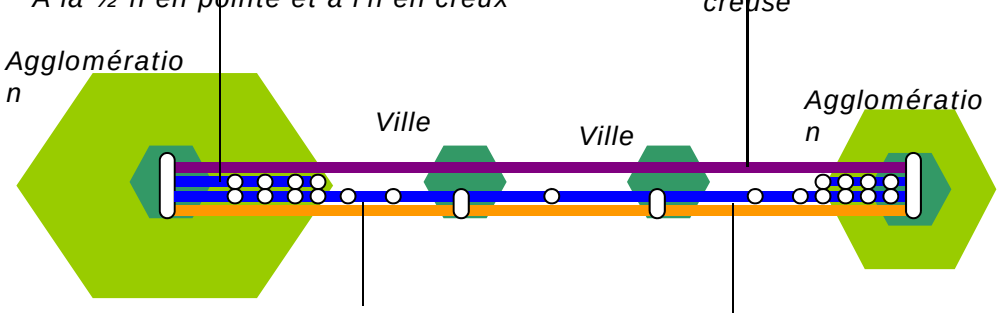
4 strategies (local train with multiple stops, express, ⋯ like in Japan !

Trains périurbains

- *desserte de proximité dans les aires urbaines*
- *À la ½ h en pointe et à l'h en creux*

Trains intercités

- *desserte rapide du réseau de villes*
- *À l'h en pointe et à l'h/2h en période creuse*



Période de pointe

6h30-9h30

16h30-19h30

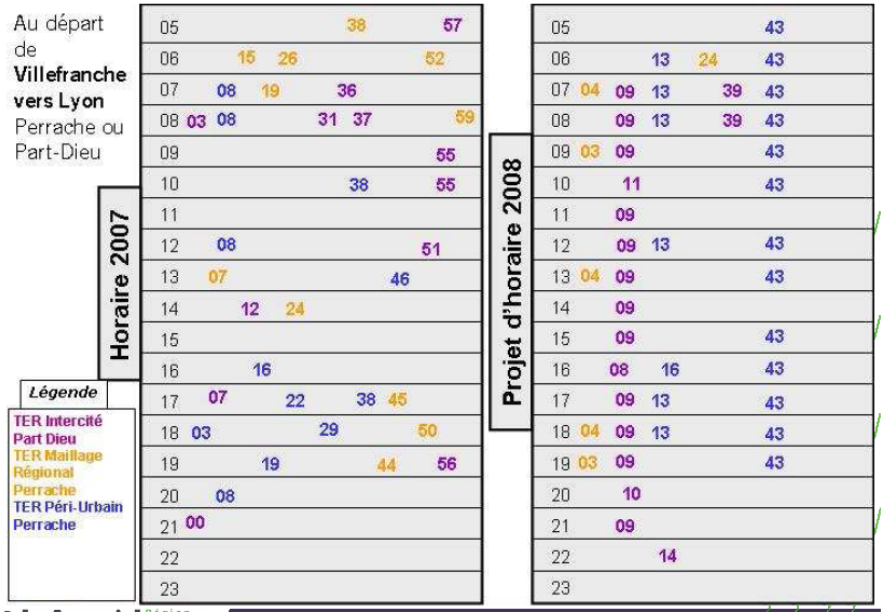
Trains de desserte de pays

- *desserte de proximité des zones rurales*
- *À l'h en pointe et aux 2h en creux*

Trains de maillage régional :

- *desserte du réseau de ville intermédiaire*
- *À l'h en pointe et à l'h/2h en période creuse*

New transport plan with « cadencement » (rythm)
Automatic connection : timetable before and after cadencing



4) New Model of HSR :

D) New model of HSR : INNOVATION in HSR ?

Research project in Germany (From DLR, M. Winter)

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Research project in Germany

new high speed line, with very high speed (400
modeling analysis is done for Paris – Stuttgart
– Wien (TEN) – Bratislava :

Figure 1: NGT HST running on a high speed line in 2035 (artist´s impression)

Train is foreseen to have 1600 passengers for 400 meters length.

At each stop : 400 passengers in and 400 passengers out in station.

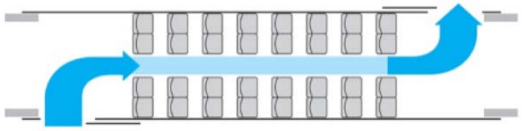
New Model of HSR : INNOVATION in HSR : SERVICES

Research project in Germany (From DLR, Dr. Winter)

There are two main innovations in the NGT researches:

- New system of luggage's management: luggage loaded in the train station like in airports,

- New system of passengers flow in and out of the trains at stops to avoid "collision" flow in and out : stops in train will take 90 seconds with 50 % of passengers coming in or out (without luggage, see before). 50 % change capacity in train stations in a double deck platform, a little bit like the A380 double deck loading platform today.



- In the model of NGT, the regional railway network and regional train operation is playing a key role : **and feeder system attracting regional passenger in main HSR Train Stations**

4) New Model of HSR :

E) New model of HSR : new infrastructure

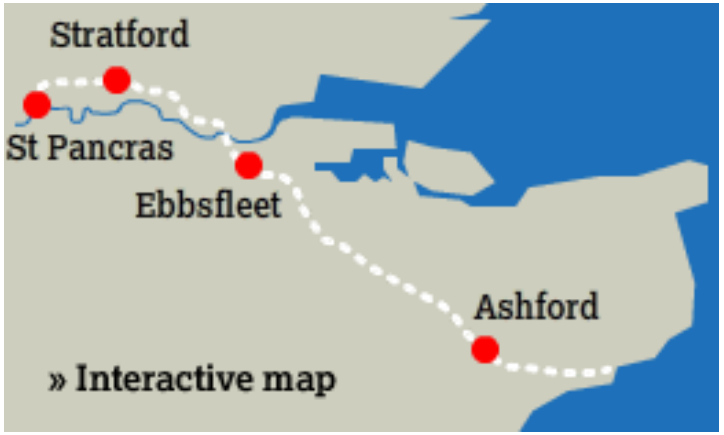
High-Speed 1

Opened in 2007 (phases 1 and 2)

£5,8 billion for construction

10,13 millions passengers (2013)

BCR 1,7

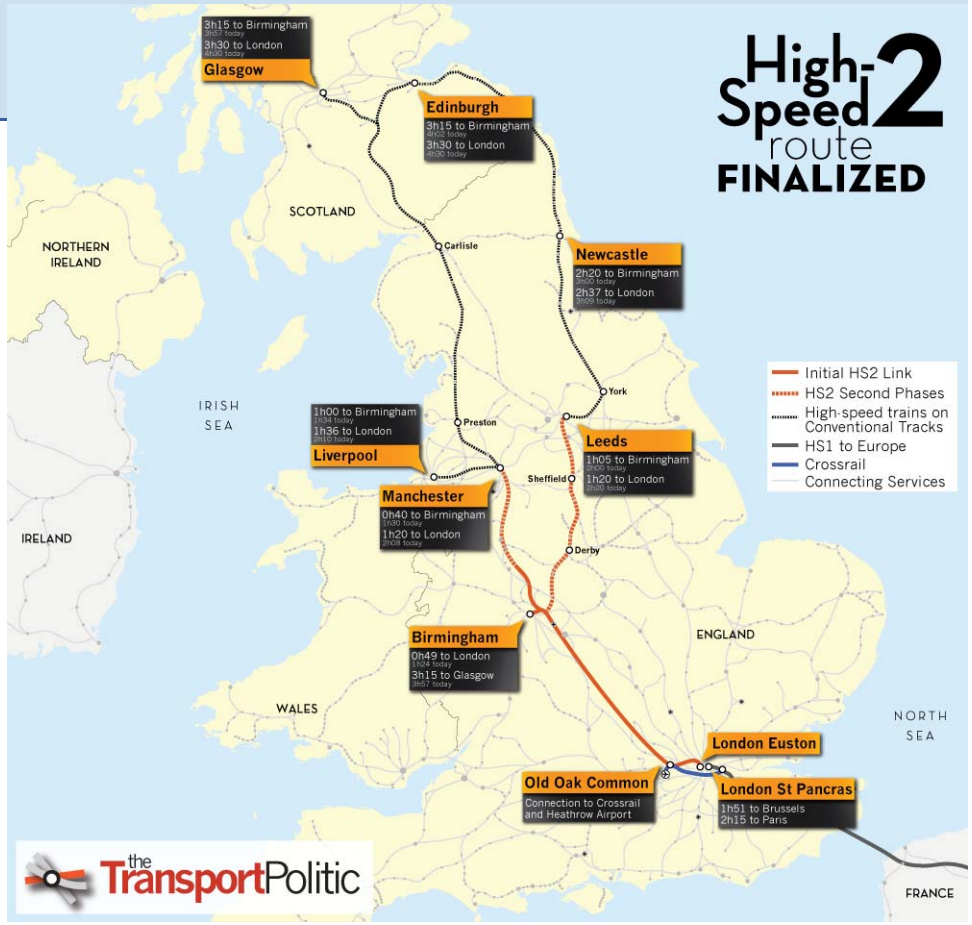


Operates the **high-speed services** between the Channel Tunnel and London St Pancras for a 30 year-long concession

Source : C. Chèze, LET

High-Speed 2

Controversial project
- Predicted costs ca. **£50 bn**
-Opening due to **2026** for Phase 1
-Strong political support



Phase 1: London-Birmingham (£21,4bn)
Phase 2: Birmingham – Leeds, Birmingham – Manchester (£21,2bn)

Source : C. Chèze, LET

Is UK rail market ready for a new HSL?

UNIVERSITÉ LUMIÈRE LYON 2
UNIVERSITÉ DE LYON

UK rail network: 15 742 km (5 261 electrified)

59,2 bn pass.km in 2013 (40,4 in 2003, 30,6 in 1993)

But a modal share of 8% (incl. Subways.) – 18% in 1952! Has never been so low

Private investment in rail has fallen down from £743 million in 2007 to £503 million in 2011

Strong competition with long distance coach (6% modal share)

Prices less and less affordable 2011: 178,0 (index 100 1997)

An average rolling stock age of 17 years

Source : C. Chèze, LET

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