



Developing High Speed Rail Projects Defining the Business Model

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Development of a High Speed Project

Technical & Planning Questions

1. What should the **network shape** be and which **cities** should be served?
2. What should the **travel time** be and therefore the **design speed**?
3. How should the **articulation with the conventional rail** network be made?
4. How should the **articulation with other transportation modes** be made? (airports, ports and road)
5.

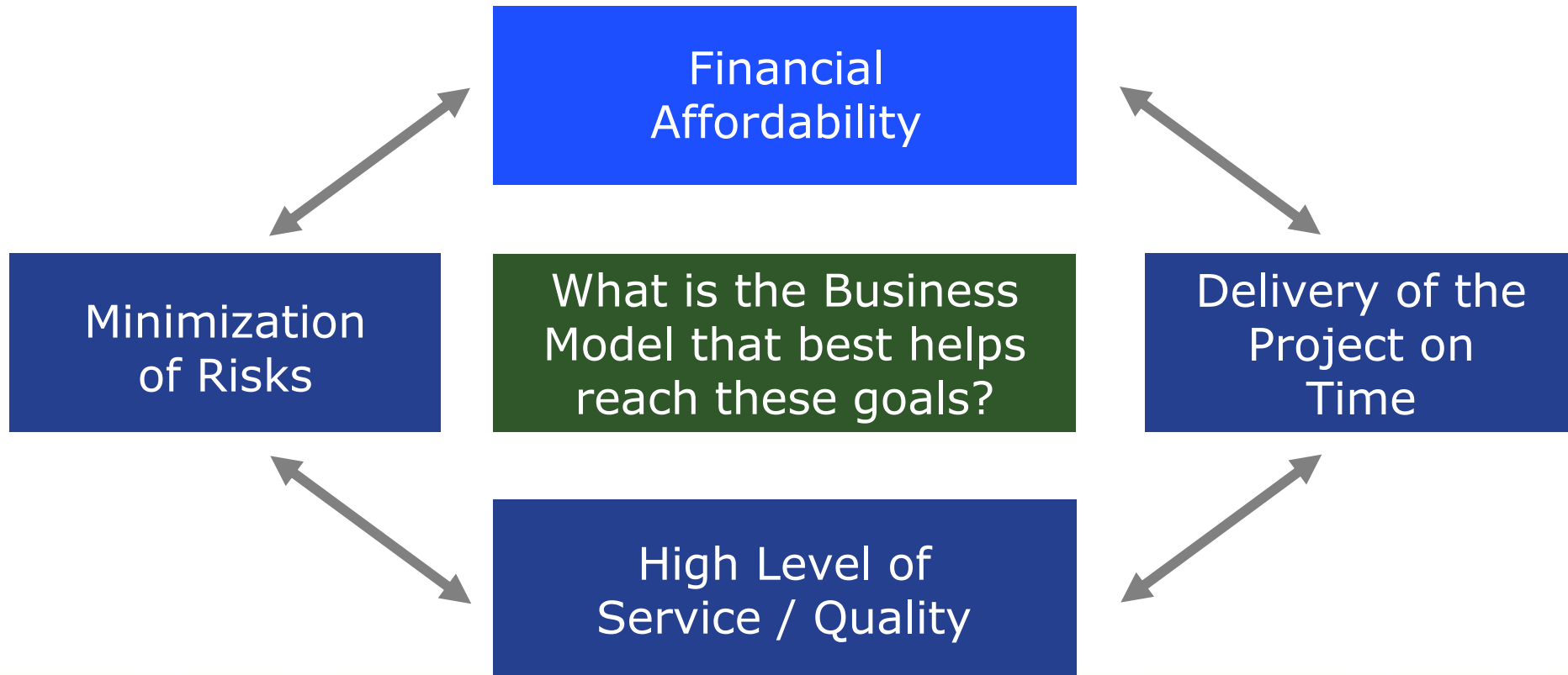
Financial & Management Questions

1. How should the public sector develop and coordinate the project? (**Public Sector's Role**)
2. What type of **involvement of the private sector** & what level of **Risk transfer**?
3. What type of **procurement**?
4. How should the project be **financed**?
5. How to breakdown the value chain of the project?

 **BUSINESS MODEL**



Business Model Strategic Goals





Defining Business Models

Basic Questions

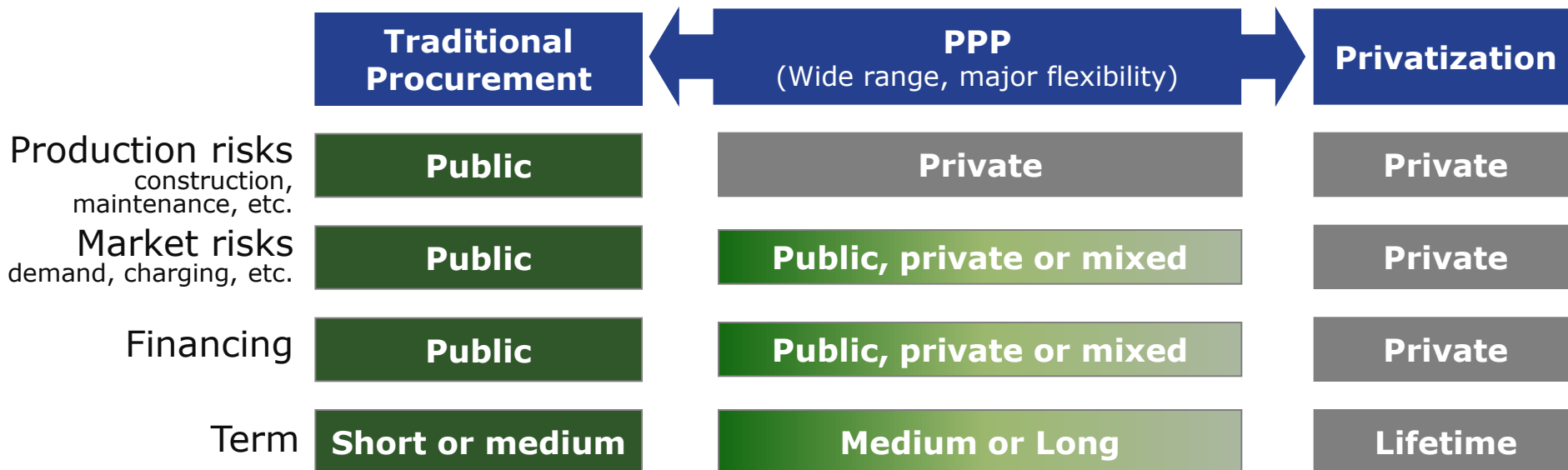
What level of private involvement and risk transfer?

How to breakdown the value chain of the project?



Defining Business Models

Basic Procurement Options





Defining Business Models

PPP Concept

PPP Key Aspects

Output focus

design, build and maintenance risks with private partner

Results/quality award

performance payments

Life cycle approach

medium to long term contracts

Public finance as much as possible

but keeping private partner with money at risk

Transfer risks that private partner can control



Defining Business Models

PPP Concept

Advantages

- ✓ Greater guarantees of meeting deadlines
- ✓ Less cost overruns
- ✓ Improved cost efficiency
- ✓ Higher level of innovation and optimization
- ✓ Quality warranty for long term

Disadvantages

- Longer procurement process
- Higher transaction costs
- More financial costs
- Greater vulnerability to changes
- Demands of expertise

Suitable Applications

- ➔ Large investments
- ➔ Green field projects
- ➔ Technical stability environment

Major Challenge

- ➔ Cultural change both in public and private sector



Defining Business Models

Basic Questions

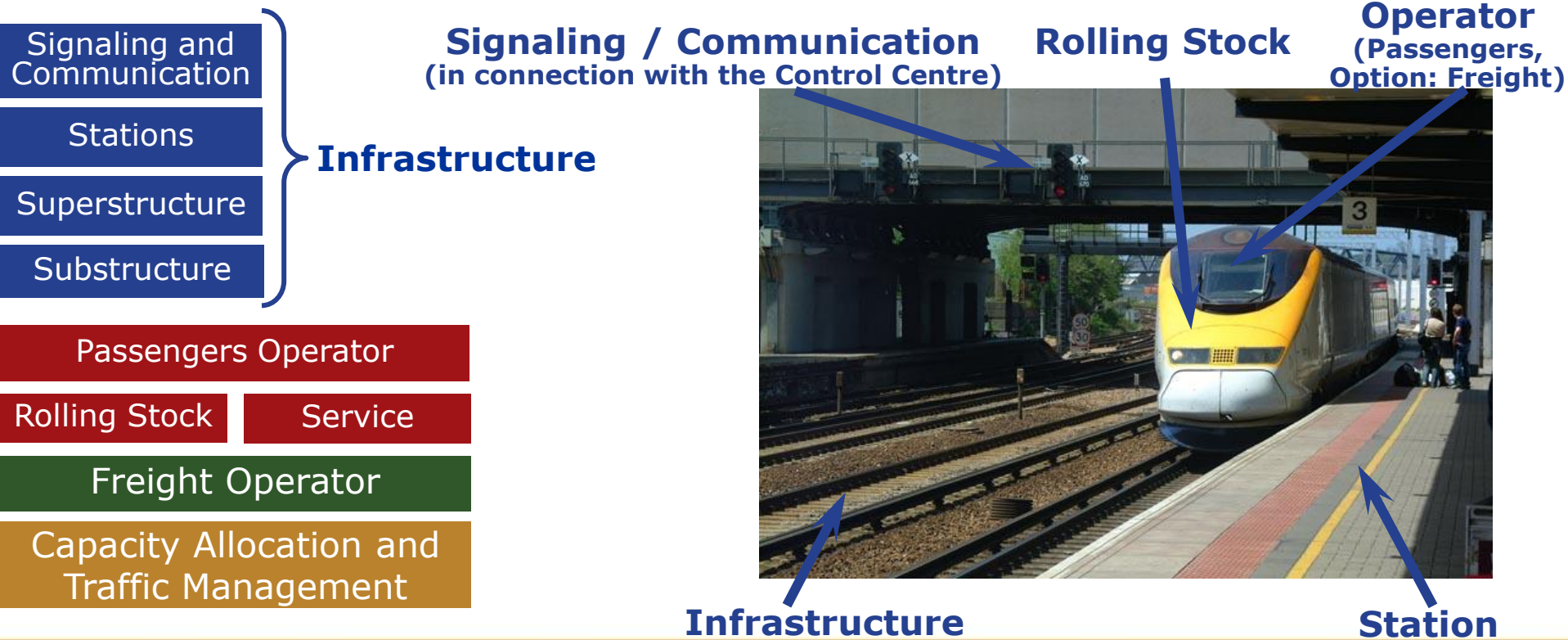
What level of private involvement and risk transfer?

How to breakdown the value chain of the project?



Defining Business Models

Breakdown of a High Speed Project





Defining Business Models

Breakdown of a High Speed Project

Key Aspects

Size

determinant to model efficiency and project attractiveness

Specificity

beware of suppliers' dependence on some components

Risk

major risk in one component may affect the whole project

Lifecycle

Contract term should be linked to assets lifecycle

Interfaces

difficult to deal with for public partner

Market condition

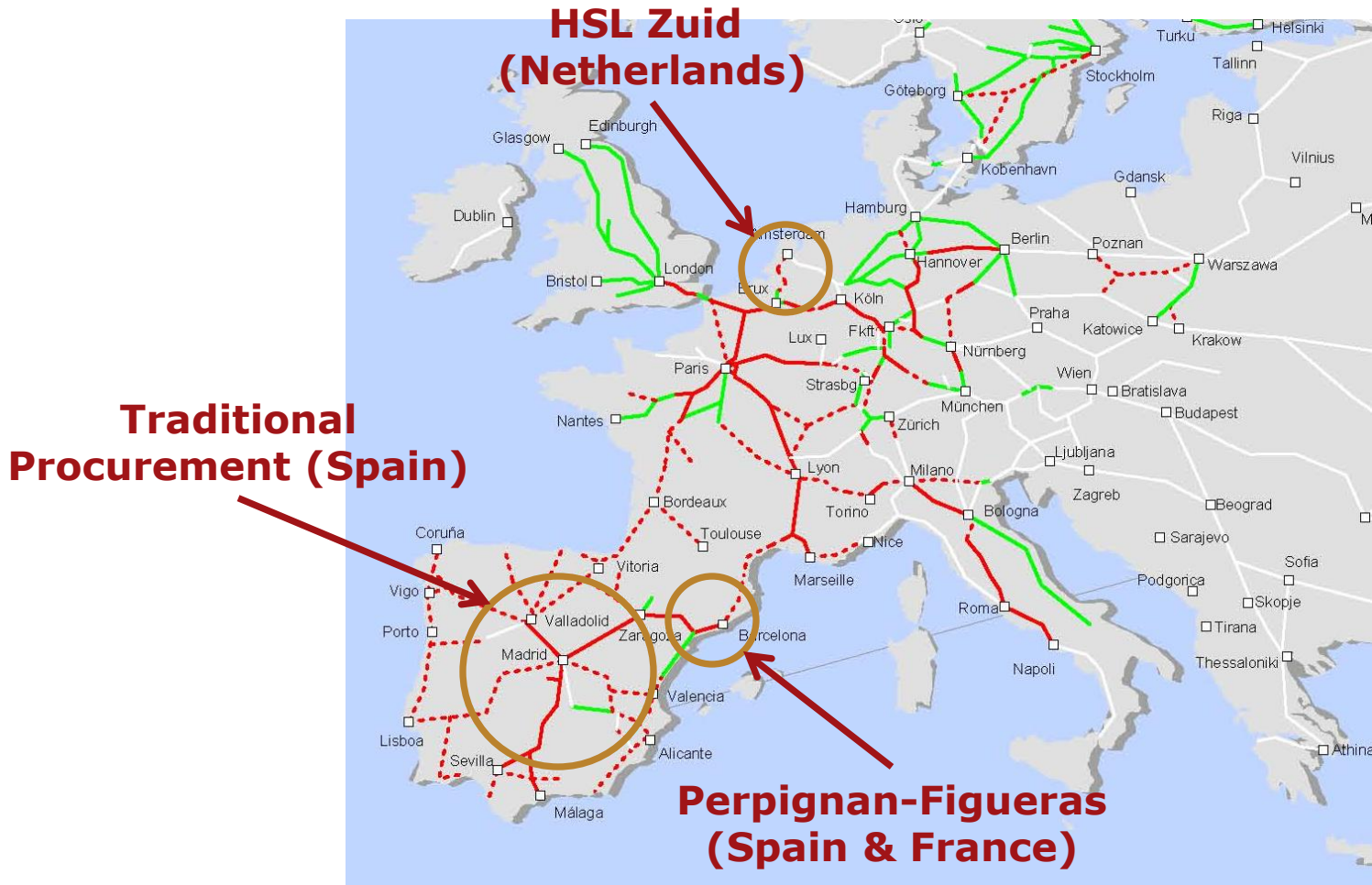
projects should be made attractive for the market



Benchmark Analysis



International Practicum on Implementing High-Speed Rail in the United States





Defining Business Models

International projects – HSL Zuid (Netherlands)

Business Model

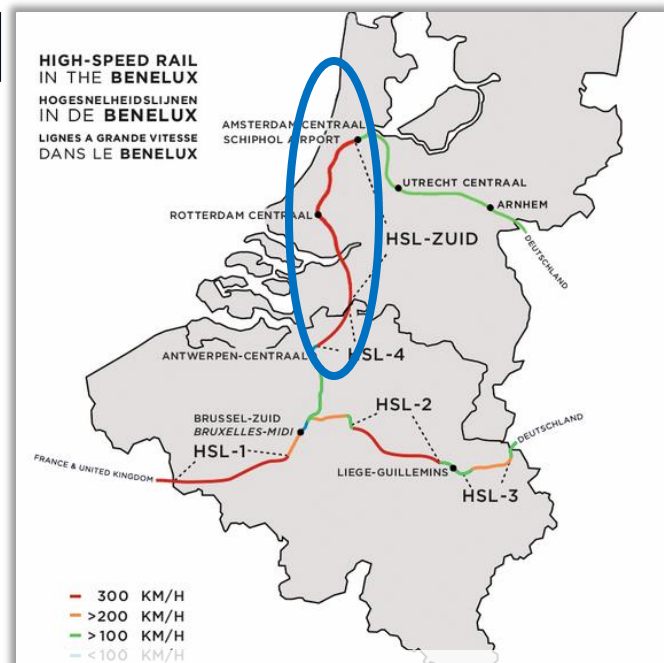
Traffic Management	State/Railway manager (ProRail)
Passengers operation	Public + Private (Joint venture NS + KLM)
S&T Superstructure	One PPP
Substructure	Several building contracts

Advantages

- ✓ **Life Cycle** transfer of **superstructure** to a **private entity**
- ✓ **Hybrid financing** through **Public Subsidies & Availability Payments**

Disadvantages

- ✗ **Complex Interfaces** between Super & Substructure – Public sector in the middle at great cost
- ✗ **Deficient specifications** in required S&T version



Opening date: 7 Sep 2009
Length: 77,7 miles (125 km)
Max speed: 186 miles per hour (300 km/h)
Investment: \$ 9.952 Billion (€7.154 Billion)



Defining Business Models

International projects – Perpignan / Figueras (Spain and France)

Business Model

Traffic Management	State/Railway manager
Passengers operation	Public + Private companies
S&T Sub & Superstructure	One PPP

Advantages

- ✓ **Life Cycle cost** optimizing
- ✓ Off balance sheet treatment
- ✓ **Simple Interfaces** (vertical integration between Sub, Superstructure & S&T)

Disadvantages

- ✗ Bi-national project with a **difficult tender** procedure
- ✗ Isolated piece (tunnel) with **poor integration** with the entire line
- ✗ Additional **costs** of financing due to the **50 year demand risk** (toll payments from primarily the two public national train operators)
- ✗ **Difficult** on **large scale** projects



Opening date: 2009

Length: 28 miles (45 km)

Max speed: 186 – 217 mph
(300 – 350 km/h)

Investment: \$ 1.391 Billion
(€1.000 Billion)



Defining Business Models

International projects – Traditional Procurement (e.g. Spain)

Business Model

Traffic Management

State/Railway manager

Passengers operation
S&T

Public companies

Sub & Superstructure

Advantages

- ✓ **Speedy procurement** phase
- ✓ **Lower Transaction Costs**
- ✓ Applicable to **small & large scale** projects

Disadvantages

- ✗ **Life Cycle Cost difficult to apply**
- ✗ More **risks** kept on the **public side** (e.g. design, construction & maintenance)
- ✗ Higher probability of **cost overrun** or **time delay**





Defining Business Models

Benchmark Analysis

Strategic Role

Regulation
Planning
Establishment of Requirements
Articulation of the System

Financial Role

Operational Role

Design
Build
Maintain
Operate

	France 1980/90 Spain 1980-actual	United Kingdom Decade 90	Holland 2005	Perpignan-Figueras (France-Spain) 2005	Bordeaux-Tours (France) 2007	Brazil 2009
Strategic Role	Public	Public	Public	Public	Public	Public
Financial Role	Public	Private(PPP)	Public and Private	Private(PPP)	Private(PPP)	Private(PPP)
Operational Role	Public	Private(PPP)	Public and Private	Public and Private	Public and Private	Private(PPP)

Trend

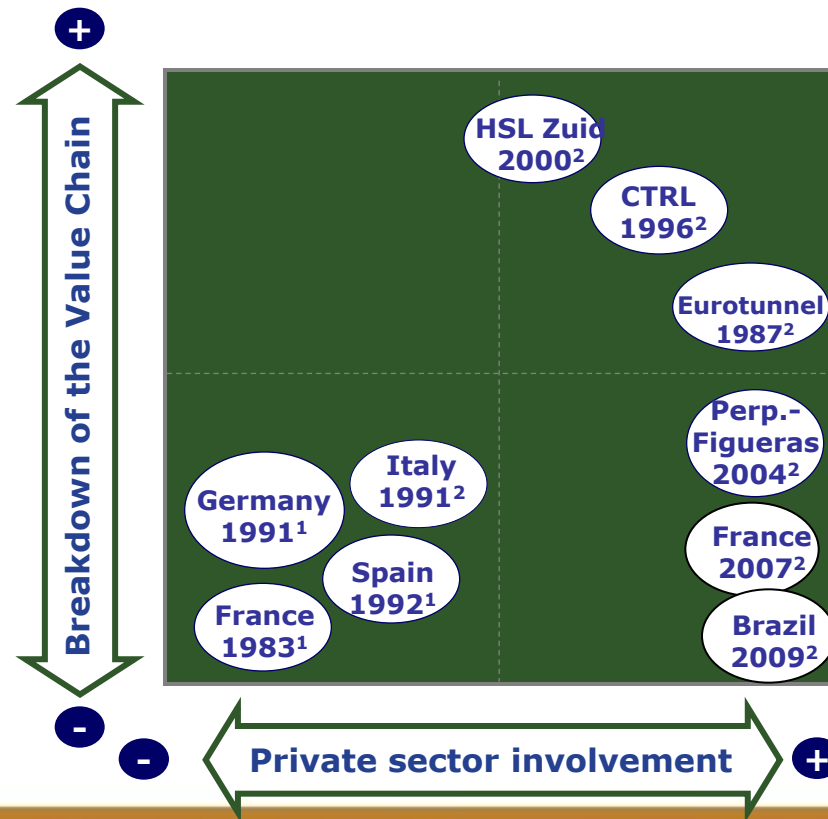
Reduction of public risk exposure





Defining Business Models

International Trend



¹ Start of operations

² Start of studies / contracts signed



The Portuguese Business Model



The Portuguese Business Model

Infrastructure

Capacity Allocation and Railway Traffic Management (State/REFER)

Signaling / Telecommunications (PPP6)

\$700 Million

Substructure /
Superstructure
(PPP1)

Substructure /
Superstructure
(PPP2)

Substructure /
Superstructure
(PPP3)

Substructure /
Superstructure
(PPP4)

Substructure /
Superstructure
(PPP5)

\$ 1.9 – 2.8
Billion each

- Dimension of the investment
- Technological risk
- Assure high level of competition
- Horizontal and vertical interface risks
- National & International experience
- Lifecycle / Useful Life
- Level of national incorporation
- Keep the strategic role with the public sector



The Portuguese Business Model

Infrastructure

PPP Substructure / Superstructure

Scope: Design, Built, Finance and Maintain

Concession Period: 40 years

Payment Mechanism:

Availability	(75%)
Maintenance	(25%)
Demand	(+/-2%)

PPP Signaling / Telecommunication

Scope: Design, Supply, Installation and Maintain

Concession Period: 20 years

Payment Mechanism: Availability

PPP5 Braga-Valença
2010

PPP4 Pombal-Porto
2011

PPP3 Lisbon-Pombal
2010



PPP6 Signaling / Telecommunications
PPP Tender Launched on February 2010

PPP2 Lisbon-Poçoirão / \$ 2.7 Billion
PPP Tender Launched on March 30, 2009
Bids Delivered on August 31, 2009

PPP1 Poçoirão-Caia / \$ 1.9 Billion
PPP Tender Launched on June 2, 2008
Contract award on December 10, 2009



The Portuguese Business Model

Financial Structure for Infrastructure

5 Infrastructure PPP's + 1 Signaling & Telecommunications PPP

Construction Period (Approx. 4Y)

Operation Period (Approx. 36Y)

Public
Payments

Public Funding

Performance Payment (75%)

+

Maintenance Payment (25%)

+

Traffic/Demand Payment (+-2%)

Financing
Model

European Investment Bank Loan

+

Commercial Banks Loan

+

Equity



The Portuguese Business Model

Performance Regime for Infrastructure

Basic Principles:

1. to reward a Concessionaire who makes the railway assets available with **full line capability over both tracks**, for the **whole operational day**
2. to reward a Concessionaire who **maintains in good condition other assets** that do not directly affect the availability of the railway.

Concessionaire's payment will be made against its performance



The Portuguese Business Model

Performance Regime for Infrastructure

Payment Deductions

$$D_t = D_p + C_p$$



Deductions by non-availability



Deductions by assets conditions

- ✓ Minimum Limit of Availability, above which no deductions
- ✓ Non-availability Rate expressed in €/NAU
- ✓ Bonus scheme encourages performance above the minimum limit
- ✓ Occurrences not attributable do not imply deductions
- ✓ Length default maintenance without deductions
- ✓ Incentives for early programming of maintenance interventions



The Portuguese Business Model

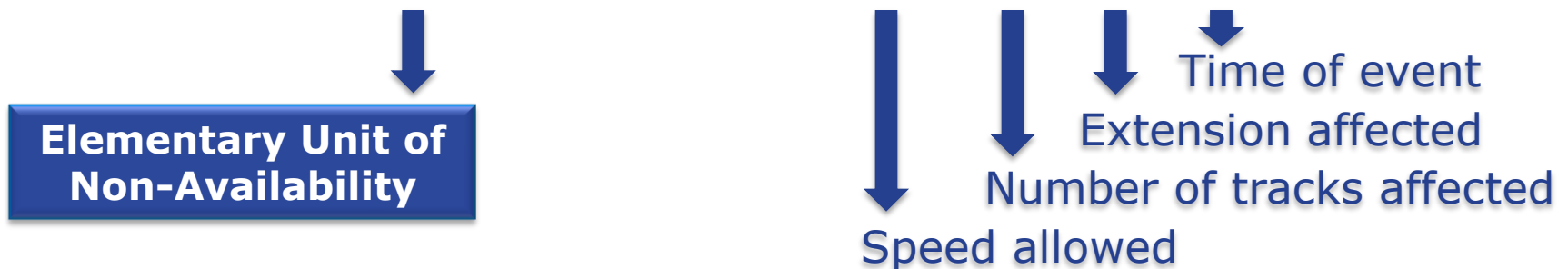
Performance Regime for Infrastructure

Availability Concept



Non-Availability Unit (NAU) Concept

$$\text{NAU}_{av} = (350 - v) \times r \times k \times t$$





The Portuguese Business Model

Stations

Lisboa ●

To be developed directly by the State (REFER/RAVE)

Évora, Oeste, Leiria, Coimbra, Aveiro, Porto, Braga and Valença ●

Integrated in PPP deals

New Lisbon Airport Station ●

To be developed by the NLA Concessionaire

Elvas/Badajoz ●

Still to be defined between Portugal and Spain





The Portuguese Business Model

Operation and Rolling Stock

Freight Sector

— Already liberalized sector

Passenger Traffic: Rolling Stock acquisition + Operation service

Main alternatives
analyzed

- A) State acquires Rolling Stock and leases it back to the Operator(s)
- B) Future HSR Operator(s) acquires the Rolling Stock

Relevant Issues

- Future liberalization of international passenger traffic
- Negotiation with Spain about the exploitation model for cross-border services
- Time needed for Rolling Stock acquisition
- Compatibility of Rolling Stock lifecycle w/ transferring demand risk to the future Operator(s)

Chosen
Alternative

Rolling Stock Acquisition: Tender to be launch by the government

Operation Service: Procurement Process to be defined in 2010, articulated with the EU directive on passenger services liberalisation



Main Results

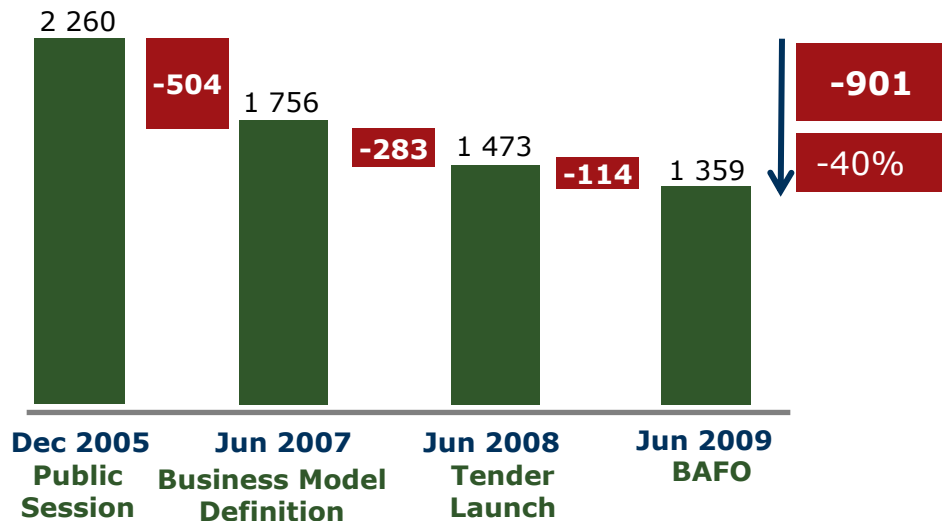


Main Results on the Lisbon-Madrid Axis

Cost Reduction of the Construction Investment

PPP1 (Poceirão-Caia)

(M€, prices of 2008)



Reductions of cost due to:

- ✓ Initial **conservative approach**
- ✓ Permanent **questioning technical options**
- ✓ Usage of **optimization tools**
- ✓ **Detailed treatment of critical areas**
- ✓ **Incentive for competition** through the business model:
 - **Freedom of conception and optimization**
 - Release of **information, long before tender initiated**
 - **Clear and transparent rules** for the tender

The HSL between Poceirão and Caia (103 miles), with a construction cost dropped to \$16.7 M per mile, is one of cheapest ever built



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