



# Railway Stations

ADAPTING TO FUTURE SOCIETY

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## CONTENTS

**3**

FOREWORD BY UIC DIRECTOR-GENERAL

**5**

UIC STATION MANAGERS GLOBAL GROUP

**7**

HISTORY OF STATIONS: EVOLUTION OF THE CONCEPT

**03**

MODEL OF STATION CONCEPT

**11**

OPERATION FACELIFT: MAJOR PROJECTS  
STATION RENOVATION POLICIES, TRENDS AND CHALLENGES

**60**

A QUICK LOOK AT SOME STATIONS AROUND THE WORLD...

**70**

BIBLIOGRAPHY



FOREWORD BY  
UIC DIRECTOR-GENERAL  
**JEAN-PIERRE LOUBINOUX**

Stations emerged alongside railways, as the staging-posts of this new industrial era. They increased in number as railways developed into networks that, in turn, could only develop alongside stations. From the outset, stations have been essential to the departure, the passage and the arrival of trains, and to the ebb and flow of all the travellers they carry. A railway network can be seen as lines irrigating a geographical area in the same way as a network of arteries nourish and keep alive a body and living being. Stations are the nodes and beating hearts of this network, and sustain it by injecting and managing the movements of all the travellers which are its lifeblood and *raison d'être*.

Stations are places of life and emotion: goodbyes as people depart for far-off destinations, on holiday or to war; of reunions, shared moments and daily commutes between home and work; and of children's everlasting admiration for the beautiful steam engines or high speed trains which whisk them away. Stations are centres of transit, a "breather" between the city, its surroundings and other cities and places further away.

Stations have gradually become organised, transformed and developed to host all those passing through – whether travellers or not – and to offer board, lodging, or other everyday services. And since we must always go via somewhere in order to go anywhere, stations have become an interface between all the various modes of mobility – trains, metro, buses, cars and bicycles. They have thus become mediators and organisers of daily mobility.

This Next Station congress in Moscow – following that of Brussels – aims to highlight this evolution of stations in cities and the way in which they manage the ebb and flow of mobility in daily life.

Stations portend future change in society, and as the role of UIC is to anticipate change, this topic is of particular importance to our organisation, to help serve our members as always.

This brochure contains a variety of content, notably significant work undertaken by the UIC Passenger Department in consultation with the Station Managers Global Group (SMGG). The work focuses on **large station renovation projects around the world** through various examples illustrating this phenomenon.

In the visual representations you will see **the changing relationships between station stakeholders**. As well as a depiction of how the concept of a "station" has changed over time and the interaction between stations and their urban environment, two slides explain complex phenomena which vary according to the context and reality of each country and even each station, all focusing on a complex web of stakeholders and spatial interaction between stations and cities. This moves from the most simplistic vision of an "introverted" station and builds up to a complex model showing all the scenarios of change in station governance, taking into account the degree to which stations are open to the surrounding city, as illustrated by a model of an "open" station.

Let us not forget a **brief history of how the concept of "a station" developed between the 19<sup>th</sup> and 20<sup>th</sup> centuries**, documenting how stations grew from modest buildings – in some cases – to symbols of architectural achievement, **a snapshot of railway stations around the world**; and finally a **bibliography**. So plenty of material! The UIC editorial team hopes that you enjoy reading this issue!





Kazansky  
Railway Station.

## UIC STATION MANAGERS GLOBAL GROUP

Passenger activity represents an increasing business for UIC at global level. Whether on short or long distances, regional, mass transit or high speed, the transport of passengers by rail is an activity with positive expectations for the future.

Among all the necessary aspects needed to develop passenger transport (technology, marketing, ticketing, financing, etc.), the most important common point for rail companies, customers and society are stations.

Stations represent a key element in all passenger transport: for customers, the station is the only gateway to railway systems; for railways, they are sometimes the key to acquiring (or not acquiring) customers. But other than their strategic value for railway systems and for customers, stations represent an important business element and are essential element in city development.

Improving the functionality of stations (as a strategic element of railway passenger transport), improving the business concept and opportunities for centres which attract on a daily basis a large volume of potential customers (other than travel purposes) and strengthening the relationship between railway systems and society (increasingly complex) are the main objectives of the UIC Station Managers Global Group.

Chaired by Mr Carlos Ventura, Director of Passenger Stations at ADIF (Spanish Infrastructure Manager), and in conjunction with other UIC activities (Passenger Department and also the Rail System Department, Sustainable Development, Security, etc.) and all the UIC regions, this working group is open to all UIC members interested in passenger transport.

The benefits of this cooperation for members and for the railway system at global level are a good example of UIC's philosophy and activities.



# HISTORY OF STATIONS

## EVOLUTION OF THE CONCEPT

In the earliest days of railways, nobody knew how a station should be or what it should look like; it was simply to accommodate staff and passengers waiting for trains. Sometimes old buildings were used for station purposes.

Even the first names given to stations did not clearly indicate their function. In some countries (such as France or Spain), stations were initially called “pier” where people board ships. Similarly with airplanes, the word “airport” derived its name from ships as “the port for air traffic”. Intermediate stations were simply known as “halts”.

The first stations were often modest, functional buildings. In many cases, stations also served other purposes of the railway company such as main offices, sometimes headquarters or maintenance workshops, etc.

Stations were systematically located out of the city centre. There was no question of disrupting or destroying the cities at that time - in some cases that would come later. In the early days of railways the train was considered impressive and futuristic but not a clean mode of transport.

When the growth of passenger and freight traffic began to structure countries and society, railway companies became increasingly important and needed more financing. Consequently,

a railway’s façade to the city (the station) had to be more impressive in order to build investor confidence and attract more money to finance this mode of transport which would change the world.

In the second half of the 19<sup>th</sup> century large, iconic buildings started to emerge in big (and smaller) cities and the names of architects began to appear alongside those of railway companies.

The first dilemma regarding the functional design of stations (and railway operations in general) in big cities was whether they should be the terminus or a through-station. In big cities it was thought that stations should represent the end of the railway line, and consequently tracks should end at the station terminal.

In America, where trains (locomotives and carriages) became bigger much earlier than in Europe, large locomotives were not allowed inside station terminals because they released a great deal of smoke. For this reason it was quite common in the US for trains to enter the station by switching back, with the locomotive pushing the train and consequently keeping it out of the passenger waiting area.

Large stations required large train sheds. These needed to be a certain size due to the large battery rails and platforms and of a certain height in order to evacuate smoke from the locomotives.

**View of Budapest Nyugaty Railway Station, Hungary. The station, which was planned by August de Serres and built by the Eiffel Company, opened on 28 October 1877.**



**Picture 1:** Pennsylvania Railway Station in New York City in 1911, view from the northeast. Most of the buildings in the scene are no longer standing, and have been replaced with taller buildings and skyscrapers. The original Pennsylvania Station was considered a masterpiece of the Beaux-Arts style and one of the architectural jewels of New York City. Today, the Penn Station is one of the busiest passenger transportation facilities in the United States and in North America.

**Picture 2:** Saint Germain-en-Laye Railway Station, France, at the start of the 20<sup>th</sup> century, on the railway line to Paris Saint-Lazare Station. Inaugurated in 1837 between Paris and Le Pecq, this was the first railway line to be built out of Paris, as well as the first in France designed to carry passengers only. The Pereire brothers wanted a loading dock – the name given to stations at the time – at Place de la Madeleine in Paris. Following protests from local residents, however, the loading dock was eventually moved further down to Place de l'Europe. At Saint Germain-en-Laye the terminus was constructed in a trench in the castle gardens, interrupting the symmetry of the flowerbeds in the gardens designed by Le Nôtre.

While railways were developing, metallic structures became increasingly popular (something Mr Eiffel knew a thing or two about), and consequently large and rich railway companies started to build big train sheds. In some cases they were so proud of these structures that they incorporated them into the main façade of the station, facing the city. Budapest Nyugaty and Madrid Delicias stations are two examples of this.

The shape of the main building was also conditioned by the evolution of traffic.

The first station terminals included three main buildings or parts of buildings, in the shape of a “U”.

Soon, however, as traffic increased, the “U” became too small to meet the increasing traffic needs which were growing – sometimes unexpectedly, and the “U” shape did not allow the possibility for extension.

The best solution for this was to build stations in an “L” shape, with more important buildings in the front (or main façade) as well as on the “departure” side and giving the “arrivals” section a less important building, which was later rebuilt and enabled the station to be extended.

For many decades railway stations were some of the most important neuralgic points in the city. Everybody coming in or going out of the city needed to use the station. The first half of the 20<sup>th</sup> century was a period of mythical trains as well as impressive and mythical stations.

However almost nothing in life escapes change. Competition

from road and then air made rail transport decline and adapt in order to survive (where possible).

At the same time, railways were adjusting to a new life. As far as they were obliged to compete, they became more and more specialised in the areas where they were more competitive. One of the consequences was the development of mass transport, which required a particular type of station that was quite different to the big and solemn terminals.

As train stations and particularly train tracks moved more towards the city centre, this sometimes caused disruption to the city. The solution was to build an underground or viaduct, which resulted in different kind of station.

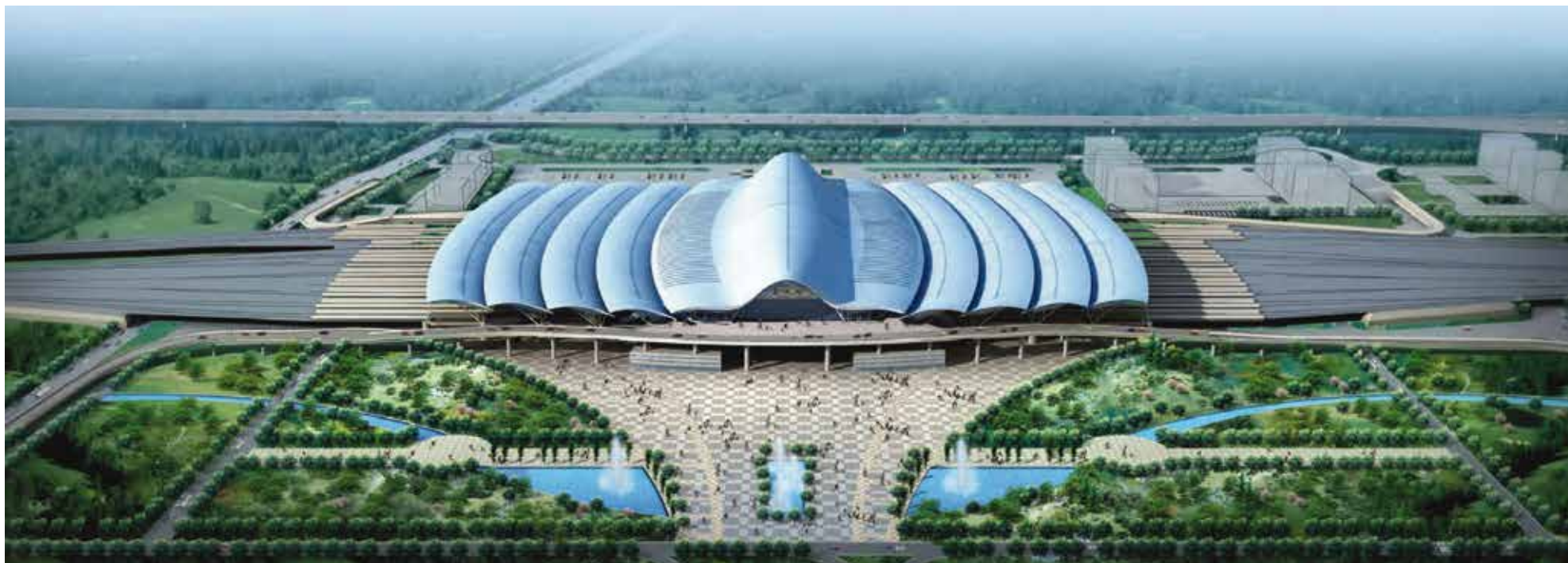
During the second half of the 20<sup>th</sup> century, train stations were presented with new visions and options. Business opportunities were generated by stations in privileged parts of the city as well as large volumes of people attracted by the stations themselves.

In some cases, these opportunities represented the end of station buildings, such as with Penn Station in New York City. The station still exists but now hidden in the middle of a business district and the well-known Madison Square Garden.

Its famous sister station, Grand Central, was saved at the last moment and has just celebrated its centenary.

Good examples of how stations can be magnets for business, shopping, leisure centres and restaurants are Tokyo Central (known as “Tokyo Station” or even “Tokyo”), and Seoul, etc.





In other cases both the train and the railway have been removed from the station, as is the case in Manila, in the Philippines. In cases such as these, the station is no longer a station but becomes something else.

The political and social interest derived from these iconic buildings serving city centres presents another opportunity for famous architects who have launched the rediscovery of these “cathedrals of the 20<sup>th</sup> (or 21<sup>st</sup>) centuries” such as Liège-Guillemins, Lisbon, Shanghai South and Beijing South. There are stations that even have a tropical garden in the middle of the city, such as Madrid (which is not exactly located in a tropical climate).

And what about the future?

Train stations will survive as long as railways survive. And railways

will survive, probably with some important differences, and will be increasingly important for society. Train stations of the future will be large or small, aboveground or underground, iconic or anodyne, discrete places or places of reference, historical or modern buildings, only with railways or multimodal transport, with good business or little business. None of this is important as long as there is a train and it serves a purpose.

What is most important is that the railway stations of the future will continue to be (good) railway stations.

**Project of Wuhan  
Railway Station,  
China.**

**Ignacio Barrón de Angoit**

UIC Director of the Passenger Department



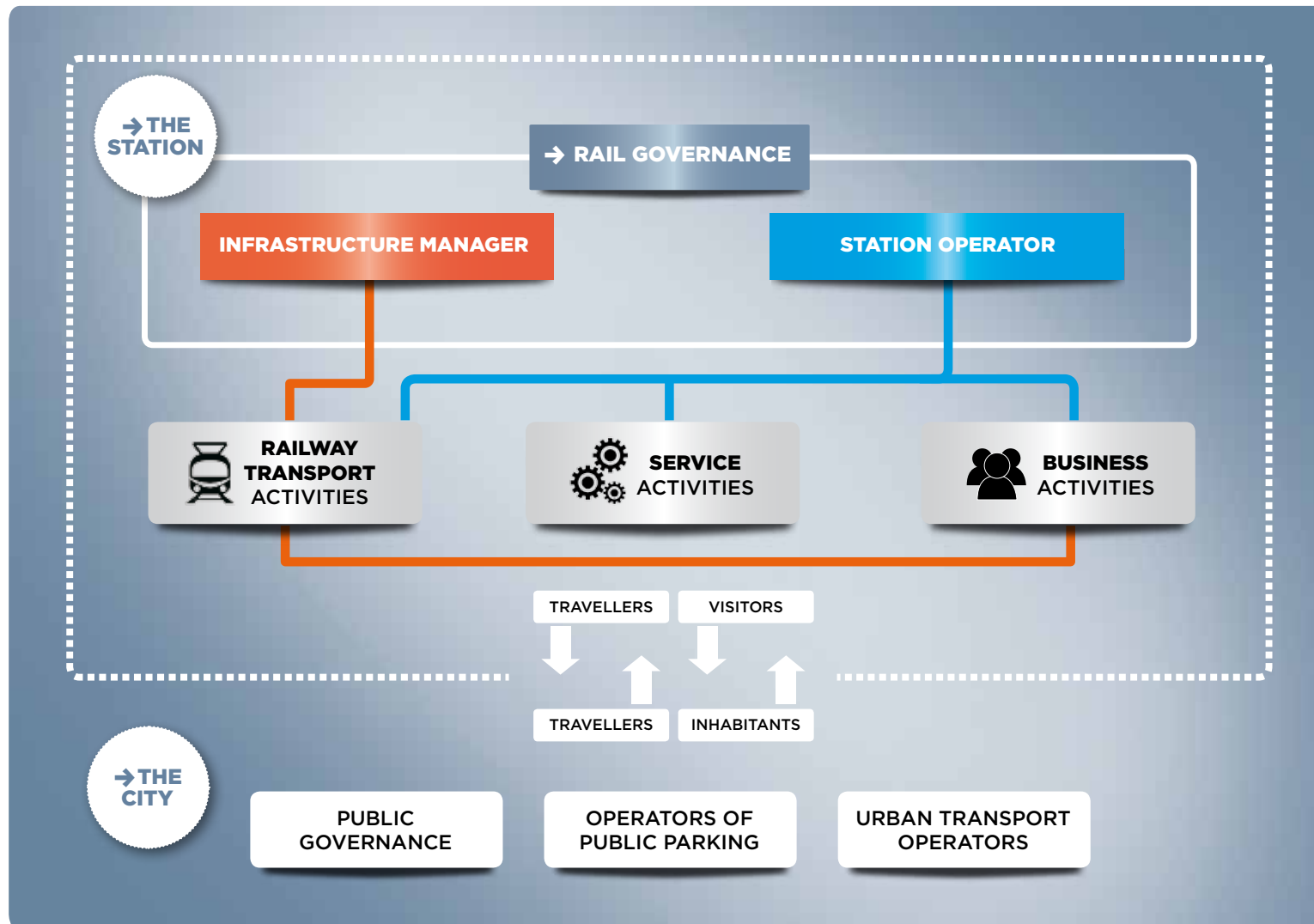
## MODEL OF STATION CONCEPT

The following two models are just one way of simplifying the complex phenomena of the interaction between stations and their environment, because station models differ depending on the context and reality of each country, and of course each station.

The aim is to highlight the evolution of governance and spatial interaction (station/city): starting from the most **simplistic** vision of an **introverted station** to a more **complex** model involving all scenarios of possible changes in the governance of stations, and the degree of openness of the station towards the city through an **open station model**.

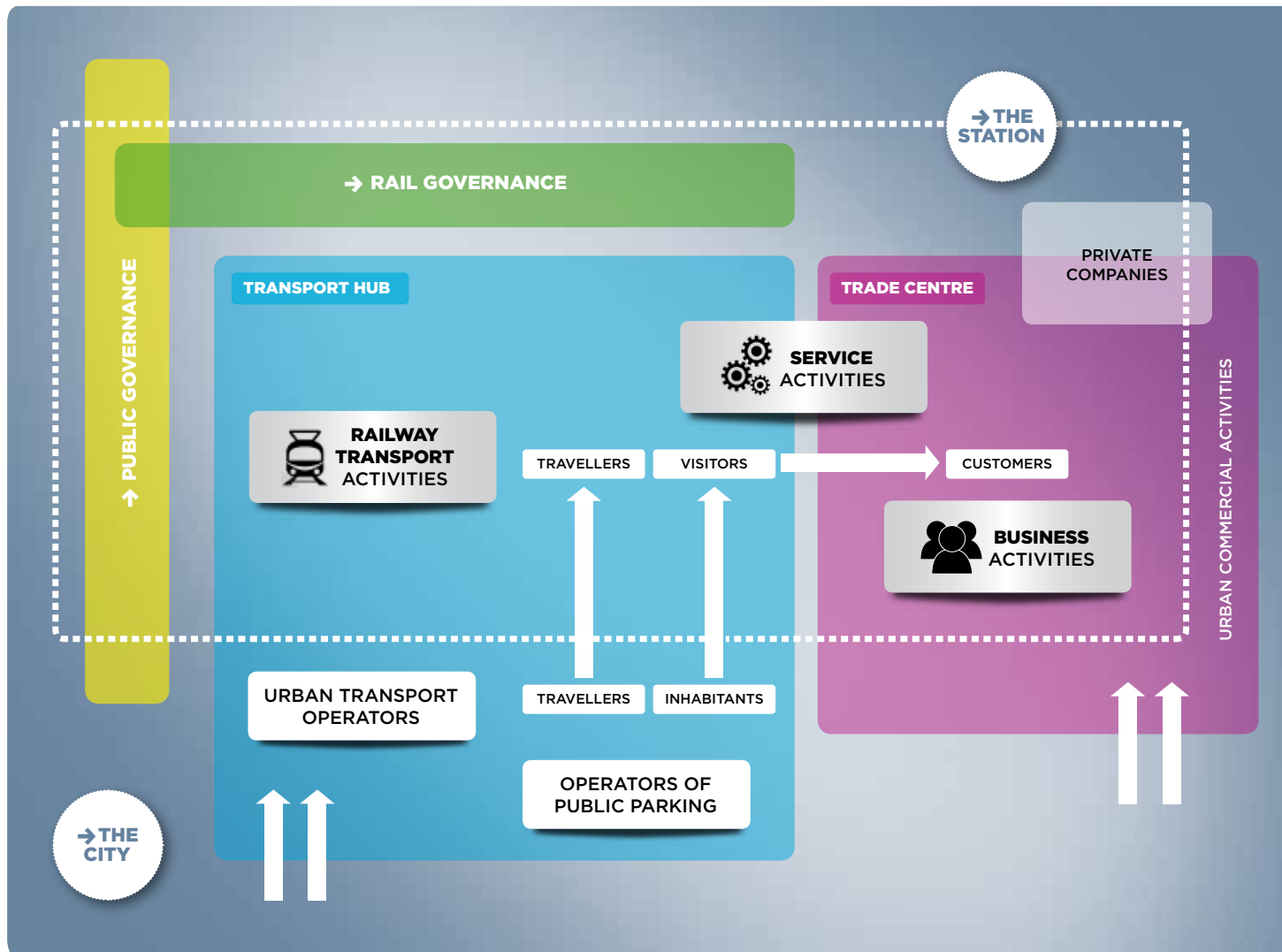


# THE “INTROVERTED” MODEL STATION/CITY INTERACTION



- Reduced interaction between the station and the city.
- Physical imperviousness of the station.
- Lack of communication between station stakeholders and those of the city.
- Mono-functionality and spatial zoning.
- Reduced operating urban station has potential.
- Station as an isolated object in the city.

# THE “OPEN STATION” MODEL STATION/CITY INTERACTION



- Increased interaction:
  - City/Station.
  - Public/Private.
- Spatial, economic and decision-making between the station and urban permeability.
- Expand the intermodal station into a transport hub.
- Functional mixity in the station.
- Station as a link to a global network:
  - Urban “urban square in the city”.
  - Commercial “a Business hub in the city”.
  - Transport “Transport hub in the city”.
- Removing station limits: the station as part of the city.



# OPERATION FACELIFT: MAJOR PROJECTS STATION RENOVATION POLICIES, TRENDS AND CHALLENGES

<b>Belgium</b> → Brussels Central and South Stations	16
<b>Denmark</b> → Copenhagen Central Station	21
<b>France</b> → Paris Saint-Lazare and Paris Gare du Nord	24
<b>Germany</b> → Stuttgart Station	30
<b>Italy</b> → Rome Termini Station	34
<b>Japan</b> → Tokyo Main Station	38
<b>The Netherlands</b> → Amsterdam Central Station	42
<b>Spain</b> → Madrid Puerta de Atocha Station	46
<b>Switzerland</b> → Zurich Central Station	50
<b>Russia</b> → Moscow Kazansky Station	54
<b>South Korea</b> → Seoul Station	57

# BRUSSELS CENTRAL AND SOUTH STATIONS / BELGIUM

## BELGIAN RAILWAY NETWORK

- Densest network in the world  
3518 km (2003)
- Standard gauge track (1435 mm)
- 2631 km of the network are  
electrified (direct current, 3000  
volts)
- Four international HSLs, alternating  
current, 25 kV: one running  
to Paris, two to Germany and one  
to the Netherlands
- Hub-and-spokes network with  
Brussels at the centre
- Due to the small size of the  
network, there is no distinction  
between long-distance / suburban  
/ urban transport

All Belgian rail traffic traverses one  
junction:

- the Brussels node, which is experiencing  
congestion problems
- Infrabel owns and manages the  
track, electrical signals and access  
areas to stations
- The network is open to competition  
in international traffic. SNCB  
has a monopoly over domestic  
traffic. In 2011 charges for  
infrastructure use ranged from  
€0.54-6.95/train-km, depending  
on the train type.
- In the European context, the  
network is at a strategic cross-  
roads between north and south.

## BELGIAN RAILWAY SYSTEM

### Organisation

Recent years have seen major structural reform in the Belgian railways, with a shift in 2005 from an integrated model to a group model under a holding company. This model still exists in 2013, with a split between the incumbent operator SNCB and the infrastructure manager Infrabel due to take place in 2014.

The state remains the majority shareholder of SNCB Holding as a company under public law, and is thus the owner of the Belgian network.

## GOVERNANCE AND FINANCING OF BELGIAN STATIONS

### Governance

→ Ownership: The 213 stations in the network are owned by SNCB Holding. Infrabel owns the access platforms.

→ Management: SNCB Holding manages the 37 major stations in which mixed or international traffic is operated. SNCB manages the 176 other stations.

### Financing

→ Financing of construction and renovation of Belgian stations: SNCB Holding,



Photo Mr.Guigon UIC 2013.

SNCB, the Federal Government, Infrabel and public-private partnerships.

→ Operating costs of stations: Operating costs are covered by two sources, SNCB Holding and SNCB, depending on the type of station and commercial revenue.

### General organisation of stations in Belgium

Belgian stations are classified according to traffic volume (number of passengers) in six categories (figures provided are based on number of passengers taking the train per week):

- Category A:  
Over 70 000 passengers/week.
- Category B:  
20 000 to 70 000 passengers/week.
- Category C:  
5 000 to 20 000 passengers/week.
- Category D1:  
2 500 to 5 000 passengers/week.
- Category D2:  
700 to 2 500 passengers/week.
- Category D3:  
Under 700 passengers/week.



## RENOVATION POLICY FOR STATIONS IN BELGIUM

A new strategy aimed at defining stations of the future has been implemented. It has three main objectives:

### 1/ Boost intermodality in stations



2/ Increase station size: SNCB Holding has title deeds, and traffic is set to increase according to forecasts.

3/ Open stations up to the cities and towns around them by multiplying services and improving their integration:

A major modernisation project for Belgian stations, due to be completed by 2020, was launched in 2010:

The recent drive to renovate Belgian stations is a response to a need for modernisation due to the risk of serious congestion. Emphasis has been laid on improving intermodality in stations, currently considered to be largely insufficient.



## CASE STUDY, BRUSSELS CENTRAL STATION

### GEOGRAPHICAL CONTEXT

- Brussels is a densely populated city with 1 300 000 inhabitants.
- It is the economic capital of Belgium.
- Urban context: central.
- At the heart of a dense urban fabric.
- The distance between Brussels Central station and the city airport is 14 km - 15 minutes by suburban train.

### STATION'S POSITION ON RAILWAY NETWORKS

- International hub at the heart of the European network.



### BRUSSELS CENTRAL, KEY FIGURES AND ACCESSIBILITY

- Construction year: **1952**
- Year of last renovation: **2012**
- Total station surface area: **Information not provided by SNCB**
- Number of passengers/year: **51 million per year**
- Number of visitors/day: **10% of the passenger/day**
- Retail space: **Information not provided**
- Number of retail outlets: **Information not provided**
- Restaurant space in station: **Information not provided**
- Infrastructure manager: **Infrabel**
- Operator: **SNCB Holding**
- Number of tracks in station: **6**
- Number of trains/day: **950**
- Number of metro lines: **2**
- Number of bus routes: **6**
- Number of metro stations with direct services from station: **27**
- Number of public car parks/parking spaces: **950**
- Cost of parking near station: **21 euros/day**
- Presence of checkpoints in station: **No**
- Transfer time in station: **8 minutes**

### DESCRIPTION OF STATION RENOVATION PROJECT

#### Situation

→ The Belgian network is one of the densest in the world. Within Europe it lies at a crossroads and traffic is on a constant increase.

→ The station is old, built in the '50s, and originally designed to accommodate 70 000 travellers. Travellers now number twice that figure and traffic is expected to increase by 20% by 2020.

#### Objectives

→ Increase the station's capacity by increasing its size.

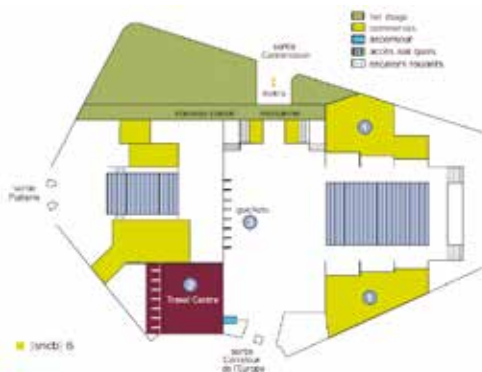
→ Restore the station's historical building.

→ Modernise the station by reorganising surface areas.

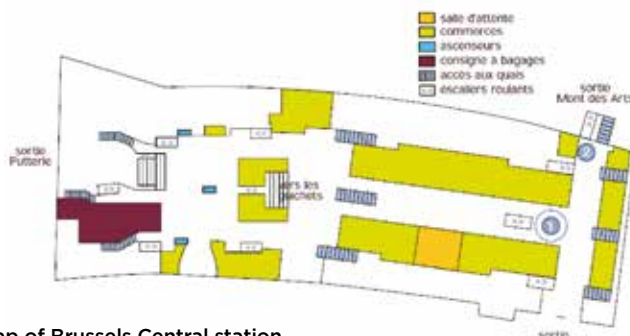
#### Renovation work (description)

The station and more specifically its façades, the ticket office and the building structure have been classified since 1995 as historically significant by the Royal Commission for monuments and sites in the Brussels-Capital region. The body in question will be closely overseeing the transformation process of the edifice.

The station is being modernised as part of a large-scale project, STAR 21, for modernising the domestic railway network.



**Map of Brussels Central station.**  
Source, SNCB website - UIC 2013



Since August 2001, the ticket office area has been reorganised, with the retail area being moved from the centre to either side of the main staircase leading to the platforms (no. 1 on the map).

The travel centre is a new Belgian concept that SNCB is aiming to roll out in several stations, including Brussels Central station.

marked by a lack of space and a complicated structure.

Works also brought improvements to accessibility on these floors, by means of additional escalators and lifts which give persons with reduced mobility full access to the platforms.

A new central corridor was created at this level, with retail areas on either side and waiting rooms offering high levels of comfort. The platforms were also completely renovated.

## RENOVATION OF BRUSSELS CENTRAL STATION

- Progress status: **completed**
- Duration: **2001 -2012**
- Phases:
  - 2001-2003:** Exterior facade restoration.
  - 2003 -2012:** Refurbishment of passenger building.
- Financing:
  - Holding (via state subsidy) and Infrabel for all platform and access related costs.**
- Stakeholders:
  - **State**
  - **Infrabel**
  - **SNCB Holding**

## CONCLUSION/EXPECTED OUTCOME

- Improve station accessibility for persons with reduced mobility.
- Increase station capacity.

### The plan includes

- At station level:
  - Better use of available space.
  - Easier transit for travellers and more functional use of space in the station.
  - Installation of more user-friendly signage.
  - Improved customer information.
  - Improved safety.
- At city level:
  - Reorganisation of roads around the station to improve its accessibility.

**1.** Renovation work has been organised in four phases:- Clean-up of façades: Façade restoration work was launched in May 2000. Two methods were used: non-abrasive cleaning to remove the dirt and specific treatment of the façade so it could regain its original aspect.

**2.** Renovation of the ticket office and creation of a travel centre:

The travel centre has six open ticket desks and serves to provide travel information and ticket sales for international travel (no. 2 on the map).

This area at the centre of the station is accessible to persons with reduced mobility and it improves interoperability in the station by ensuring easier access to information and thus to other modes. This phase was completed in 2003. Considerable improvements were also made to the main hall in terms of spatial quality (lighting, noise insulation, etc.), in line with the aim of improving service quality in the station. The retail area has been brought to the fore and has a place of choice in the new set-up.

**3.** Organisation of the mezzanine and platforms:

The lower levels of the station, in particular the mezzanine and the platforms, were

### 4. Modification of signage:

Station renovation work provided the opportunity to modernise the signage in the station. The improved signage is now suitable for persons with cognitive impairments.

### Expected outcome of renovation

- Improve station accessibility for persons with reduced mobility.
- Increase station capacity.

### Financing of renovation work

With investments amounting to over 30 million euros, this is one of SNCB's most ambitious projects.

These investments form part of the twelve-year plan for 2001 2012 (which represented over 17 billion euros of investments for the Belgian railways).

## HISTORY OF BRUSSELS CENTRAL STATION

The idea of a central station dates back to the late 19<sup>th</sup> century, with a project aimed at creating a so-called North-South junction between two terminus stations, Brussels-North and Brussels-South.

The project took a long time to be completed: the architect Victor Horta was entrusted with the design in the 1930s, the tunnel between Brussels-North and Brussels-South took 15 years to build and construction work on the building itself only began in 1947. The station was officially opened in 1952.

Due to a rapid increase in traffic, by the end of the 1980s the station's capacity was already in need of a boost. However it took until 2001-2012 for the station to undergo a significant renovation. To meet new demands, important and painstaking readjustments were needed to allow additional lifts and escalators to be installed. Finally, the underground platforms were lengthened to adapt to new train lengths, especially as with the new junction, HSTs and intercity trains can pass through Brussels and connect it to other Belgian cities and foreign capitals without any stopovers.

## CASE STUDY, BRUSSELS SOUTH STATION

### GEOGRAPHICAL CONTEXT

- Brussels is a densely populated city with 1 300 000 inhabitants.
- It is the economic capital of Belgium.
- Urban context: central.
- At the heart of a dense urban fabric.
- The distance between Brussels-South station and the city airport is 18 km – 20 minutes by suburban train.

### STATION'S POSITION ON RAILWAY NETWORKS

- Principal stations on the Thalys and Eurostar European mainline.



### BRUSSELS-SOUTH, KEY FIGURES AND ACCESSIBILITY

- Construction year: **1952**
- Date of last renovation: **1990-1995, project for 2014**
- Station surface area: **51 500 m<sup>2</sup>**
- Number of passengers/year: **50 million**
- Number of visitors/day: **70 000**
- Retail space: **7 200 m<sup>2</sup>**
- Number of retail outlets: **34**
- Restaurant space in station: **2 710 m<sup>2</sup>**
- Infrastructure manager: **Infrabel**
- Operator: **SNCB**
- Number of trains/day: **1 220, of which 684 long-distance (dom.: 570, int.: 114), 277 regional, 259 suburban**
- Number of metro lines: **2**
- Number of tram lines: **8**
- Number of bus routes: **5**
- Number of public car parks: **1650 parking spaces and 256 bike spaces**
- Cost of parking near station: **21 euros/day**
- Presence of checkpoints in station: **yes**
- Transfer time in station: **6 minutes**
- Mode of access: **10% taxi, 15% metro, 35% train, 40% pedestrian/bike**

### DESCRIPTION OF STATION RENOVATION PROJECT : PLANNED FOR 2014

#### In 2008

An initial stage of minor renovation work involved the opening of «Midi Village», a new retail area in Brussels-South station, by STIB, the Brussels Intercommunal Transport Company, before the retail outlets leading up to Tour du Midi (South Tower) were renovated.

«Midi Village» is a new retail area set to open by the end of 2013, before a final phase of works is undertaken, including the renovation of retail outlets leading up to Tour du Midi (South Tower). A retail area of over 450 m<sup>2</sup> has been renovated since 2008, the aim being to make it a «genuine village» where the 30 000 travellers passing through the station daily will enjoy a «modern, welcoming and



## RENOVATION OF BRUSSELS-SOUTH STATION

- Progress status:  
**plans for 2014, latest work in 1995**
- Duration:  
**Reconstruction project due to be launched in 2014**
- Stages:
  - **Work on the station itself**
  - **Work on the immediate surroundings of the station**
- Financing:  
**Holding (via state subsidy) and Infrabel for all platform and access related costs.**
- Stakeholders:
  - **State**
  - **Infrabel**
  - **SNCB Holding**

## CONCLUSION/EXPECTED OUTCOME

- Increase number of tracks and platforms.
- Increase public and retail surface area.
- Improve visibility and accessibility in station.
- Increase retail surface area.
- Improve intermodality.
- Improve comfort and service quality.
- Improve station integration within city.

light» space. «It is a major challenge for STIB to provide travellers with a pleasant environment and a variety of services».

### Project as of 2014

Brussels-South station will soon be renovated by Jean Nouvel. It is the largest station in Belgium. This is an innovative and astonishing project, combining transparency with height, for one of the busiest stations in Europe.

This project, imagined by Jean Nouvel and the fruit of two years of study, is based on the construction of a 120 m-high V-shaped structure rising above the railway tracks. This V-shaped building will reflect trains and the city like a mirror. Passengers will see «the city reflected on one side of the façade, and on the other side the place they have travelled from». Passers-by will see trains moving along

the façade of the V-shaped building. The building will essentially house offices, as well as a congress centre and a restaurant with a panoramic view open to the public. Jean Nouvel's plans will see the station include 250 000 m<sup>2</sup> of offices, a conference centre and several retail outlets. Here is a view of the project from the Europe esplanade. The preliminary project was submitted at the end of 2011.

The overall project ties in with the Brussels-Capital regional authority's «International development plan for Brussels». The plan involves promoting Brussels-South station and its surrounding area as a modern and innovative development hub within a move to promote the international role of the Brussels-Capital region. SNCB has tasked Euro Immo Star with studying and constructing a public building. A private group (composed of 99.9 % of public

shareholders: SNCB Holding and Tuc Rail). This project for renovating the station forms part of a wide-scale plan to renovate the Brussels-South neighbourhood by creating an «extrovert» station which is more visible and accessible. The station becomes an urban signal.

## HISTORY OF BRUSSELS-SOUTH STATION

Originally built as the terminus for the «Midi» (south) line created in 1939 to connect Brussels to the French border, the initial wooden structure was at a different location from the current station.

The success of the railway sector brought rapid growth to the Belgian railway network, and soon it became one of the densest networks on the continent.

In the face of such success, the idea of linking Brussels-North station to Brussels-South station had already surfaced in 1869, ultimately coming to fruition with a north-south link in 1952 and a much bigger station being built where Brussels-South now stands. Most of the existing buildings, designed by the architect Auguste Payen, were built between 1939 and 1954. Only one building, designed by the architect Marc de Vreese, was built more recently (1992) on Victor Horta square. The next major changes came with the arrival of high speed in 1993.



A modern, 550m-long façade and a transparent V-shaped building.

# COPENHAGEN CENTRAL STATION / DENMARK

## GEOGRAPHICAL CONTEXT

- Copenhagen is a densely populated city (7 300 inhabitants/km<sup>2</sup>).
- Economic capital of Denmark.
- Urban context: central.
- At the heart of a dense urban fabric.

## STATION'S POSITION ON RAILWAY NETWORK

- The journey from the central station to Copenhagen airport takes 11 minutes by direct link.

## SITUATION WITHIN COPENHAGEN TRANSPORT NETWORK

- The station is not connected to the city's metro network, but a project has been launched to build a circular metro line by 2018.



## DANISH RAILWAY SYSTEM

### Organisation

DSB was created in 1885 following a merger between Zealand Railways (state company) and the companies from Funen and Jutland. On 1 January 1999, DSB was reorganised into four business units:

- DSB Intercity (mainline passenger transport)
- DSB Regio (regional trains)
- DSB S-tog (suburban services in the Copenhagen area)
- DSB Gods (freight)

In the passenger sector DSB faces competition from Arriva, a British transport company [and subsidiary of Deutsche Bahn]. Freight services, operated in the past by DSB Gods, were taken over on 1 January 2001 by a subsidiary of Deutsche Bahn, Railion, following a political move to liberalise the Danish railways in 1999. DSB thus now operates as a profit-making company, although it still provides certain public services on the basis of contracts with the Ministry of Transport and Energy.

### Danish railway network

- The network is mainly used by passenger operators, and there is no high speed traffic.



Main entrance of Copenhagen station. Source: UIC

- Freight traffic is fully privatised and operated by a subsidiary of DB.
- Length of the network: 2 667 km in 2007, of which 640 km are electrified.
- The tracks are standard-gauge (1435 mm) and all electrified lines are alternating current, 15 kV / 16.67 Hz

## COPENHAGEN STATION, KEY FIGURES AND ACCESSIBILITY

- Date of construction: **1911**
- Date of last renovation: **2008**
- Total station surface area: **35 000 m<sup>2</sup>**
- Number of passengers/year: **120,000**
- Number of visitors/day: **10% of the number of passengers (estimate)**
- Retail space: **5 200 m<sup>2</sup>**
- Number of retail outlets: **40**
- Infrastructure manager: **BaneDanmark**
- Operator: **DSB, DSB S-tog, l'ORD son, Deutsche Bahn, SJ**
- Number of tracks in station: **13 (including 4 for S-tog [suburban] services)**
- Number of metro lines: **0**
- Number of suburban lines: **6**
- Number of bus routes: **15**
- Existence of checkpoints in station: **no**
- Transfer time in station: **5 minutes**



## GOVERNANCE AND FINANCING OF DANISH STATIONS

### Governance

Ownership: DSB: buildings and passenger areas.

BaneDanmark: platforms, tracks and access ramps.

### Financing

Construction and renovation of Danish stations is mainly government-financed, via the Ministry of Transport.

Financing of operating costs of stations: DSB and commercial revenue.

## RENOVATION POLICY FOR STATIONS IN DENMARK

### Latest trends

One of the main preconditions to be met before launching a station renovation project in Denmark is achieving a consensus among stakeholders, especially concerning financing for the project.

At present many major stations in Denmark need renovating, mainly to improve intermodality, for example with bicycles. Danish stations are completely overrun by bicycles, making it necessary to reconfigure the urban area surrounding the station by adding suitable parking spaces and improving station accessibility. Commercial activities are currently taking up more and more space in Danish sta-



Source: Frank Bach - Dreamstime

tions, and measures to reorganise commercial areas have thus been planned for many stations on the network.

Efforts are also being made to reduce staff numbers in stations by increasing the level of automation, in particular for ticket sales (target: 100% within the next 10 years), which will bring the dual benefit of generating free space in stations and ensuring they have longer opening hours.

### Project at station level

→ Increase of station capacity:

The central station has a capacity of 17 incoming trains per hour from the west. In a context of proposals for developing infrastructure in and around Copenhagen, the need to increase capacity has been mentioned on several occasions, in particular by the infrastructure commission. Proposals involving the central station, which remain to be discussed, suggest

several possible configurations, including increasing the number of tracks and platforms, or creating a satellite station or a new terminal.

Some of the works proposed for the expansion of the main station would optimise connections to the bus, metro and S-tog networks, while others would ensure better connections with Copenhagen airport.

→ Creation of a new intermodal terminal: The most likely location is above the station platforms, on a bridge at a right angle to the tracks. Among other purposes, this configuration would ensure better integration of the station within the city. Financing problems currently appear to be the main hindrance to station development; the only works to have begun so far are on the circular metro line. The projects may have to change, but the issues remain the same.

## RENOVATION OF COPENHAGEN STATION

- Progress status: **ongoing**
- Duration: **2010 -?**
- **Stages:**
  - Construction work for the station on the circular metro line.
  - Reconfiguration of urban areas around the station.
  - Construction of a new intermodal terminal.
- Financing: **Danish government, SDB, BaneDanmark**
- Stakeholders:
  - **Government**
  - **SDB**
  - **BaneDanmark**
  - **City of Copenhagen**

## CONCLUSION/EXPECTED OUTCOME

- Improvement of station accessibility in relation to its urban environment and greater intermodality.
- Solutions to the problem of insufficient cycle parking space.



The first three sections of Copenhagen metro were opened in 2002 and 2003. The success of these initial phases led to the decision to pursue work with the construction of a fourth section: a circle line around the city (the Cityringen), due to open in 2018. The Cityringen will measure roughly 15.5 km and connect the major neighbourhoods in Copenhagen, in particular the Danish parliament, the central station, the city hall, existing major stations with metro and suburban connections and the principal national monuments. Services will operate at intervals of 100 s, with a total of 28 trains (3 coaches, 39 m) running at 90 km/h. In total the Cityringen project is expected to cost 15 billion Danish crowns (2 billion euros).

### KEY DATES

- October 2007/April 2008: design study
- May 2008/April 2009: preparation of the tender
- May 2009/April 2010: negotiation of the contract
- May 2010/2018: construction

## HISTORY OF COPENHAGEN CENTRAL STATION

The station as it currently stands was completed on 1 December 1911. It was the third station built on the site; the two previous structures had been wooden. The station was completely renovated in 1980; escalators and lifts were installed to access the platforms and the main hall of the station was divided into arrivals, departures and freight and completely refurbished. Further renovation work was carried out between 2004 and 2008: the roof was replaced and platforms 3 and 6 were lowered in order to comply with international standards. The towers and the bridge over the platforms, on which the main building of the station is located, were refurbished.



# PARIS SAINT-LAZARE AND PARIS GARE DU NORD / FRANCE



Paris Saint-Lazare station.



Paris Gare du Nord station.

## GEOGRAPHICAL CONTEXT

- Paris is a densely populated city with 2 243 833 inhabitants.
- Economic capital of France.
- Urban context: central.
- At the heart of a dense urban fabric, next to another main Paris train station, Paris Est, forming a major rail hub in the capital.
- Distance between Saint Lazare station and Charles de Gaulle (CDG) airport 15km – 20 minutes by suburban train.
- Time on suburban trains from Paris to Orly airport - 30 minutes.

## STATION'S POSITION ON RAILWAY NETWORK

- Regional gateway to North-West France
- Part of the 'Parisian Hub' system made up of 6 main stations.

## SITUATION WITHIN PARIS TRANSPORT SYSTEM

- The main Paris station in the new Greater Paris network.
- 5 metro lines and line E of the RER suburban rail service.

## THE FRENCH RAILWAY SYSTEM

### Organisation

The French railways operate on a double-headed system: the owner of the network is RFF (Réseau Ferré de France – the rail infrastructure manager), while operations are run by a public industrial and commercial institution (EPIC), SNCF (Société Nationale des Chemins de Fer Français), which has different divisions for freight, high speed and stations.

### Structure of the French railway network

It is one of the most extensive networks in Europe, with a high-speed sector developed since the beginning of the 1980s and now 2 000 km long, and on which there is a predominance of passenger traffic over a declining freight sector, with 1 013 million passengers in 2006 and 10 billion tonnes-km of freight the same year.

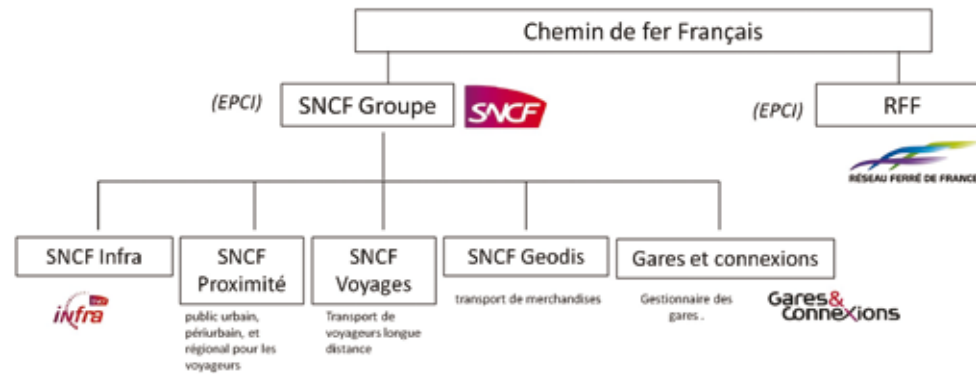
The network has a total length of 29 273 km (2006) including 15 687 km of electrified track (2006), most of which is standard

gauge (1 437 mm). The star-shape configuration of the network with Paris at its hub is highly centralised, and this layout is one of the current issues for the system, as it tends to make the towns and cities served by the high-speed lines more competitive while excluding those which do not have the benefit of this service. This has led to the establishment of new intercity services.



## PARIS SAINT LAZARE STATION KEY FIGURES AND ACCESSIBILITY

- Date of construction: **1846**
- Date of last renovation: **2002-2012**
- Total station surface area:  
**30 000 m<sup>2</sup>**
- Number of travellers/year:  
**100 million**
- Number of visitors/day: **450 000**
- Retail space: **10 000 m<sup>2</sup>**
- Number of retail outlets: **80**
- Restaurant space in station:  
**1 300 m<sup>2</sup>**
- Infrastructure manager: **RFF**
- Operator: **SNCF**
- Number of tracks in the station:  
**27, no dedicated HS tracks.**
- Number of trains/day: **1 600 (95% Île de France suburban trains)**
- Number of metro lines: **5**
- Number of RER suburban lines: **1**
- Number of bus routes: **27**
- Number of metro stations with direct services from station: **111**
- Number of public parking spaces:  
**250 for cars and 50 for motorcycles**
- Cost of parking near station:  
**€30 euros/day**
- Cost of cycle hire:  
**Vélib rental card €1.70/day**
- Presence of checkpoints in station: **yes**
- Transfer time in station:  
**10 minutes**
- Mode of access:  
**10% taxi, 30 % metro, 45% suburban trains, 15% pedestrian/cycle**



SMGG Study « Stations » - Bipolar model of the organisation of French railways. UIC 2013

## GOVERNANCE AND FINANCING OF FRENCH STATIONS

### Governance

→ Ownership: SNCF - the buildings and passenger areas. RFF: the platforms, track and access ramps.

→ Management: Gares et connexions, an SNCF subsidiary is in charge of the renovation and development of the network's 3 029 railway stations, from where 2 billion journeys are made, and which have a surface area of 2 million m<sup>2</sup>, with 180 000m<sup>2</sup> of commercial premises.

AREP, Parvis and A2C are subsidiaries of Gares et connexions, in charge respectively of design and project management, the management of commercial premises and of real estate transactions.

### Financing

Financing the construction and renovation of French stations: funds come from the French State and from local authorities, but examples of public-private station renovation partnerships exist in the form of PPP contracts.

Financing the operation of stations: funds come from SNCF through its Gares et connexions subsidiary, and from commercial revenue and station access fees.

The 2009 Keller report advised increasing the level of services and commercial opportunities in stations, and reflecting on ways of reducing the proportion of station operation financing that comes from SNCF and from subsidies.

## RENOVATION POLICY FOR FRENCH STATIONS - NEW TRENDS

Following the Keller report in 2009 (a report by French Senator Keller on the « station of the future » or modern stations), a major programme to renovate the main French stations was undertaken by Gares et Connexions, with the aim of:

- 1/** modernising stations, after an assessment of the state of disrepair;
- 2/** preparing stations to be ready for the arrival of high speed;
- 3/** extending certain stations, to offer more services;
- 4/** encouraging intermodality;
- 5/** reducing the amount of public funding;
- 6/** meeting the challenge of sustainable development.

To achieve this, SNCF has doubled its funding, but has also considered new forms of financing or of partnerships for stations, which would significantly influence the way stations were governed.

Extract from the Keller report of 2009 'Propositions on the modernisation of French stations':

→ Assert the status of the station as the centre of the town – a public area contiguous with its surroundings.

→ Develop 'soft' or active transport modes in stations – the station as a parking area for sustainable intermodal transport.

## RENOVATION OF PARIS SAINT-LAZARE STATION

- Duration: **10 years (2002 -2012)**
- Stages:
  - **2003- 2007**: work on the transverse platform
  - **2006-2008** : work on the urban area around the station
  - **2009-2012** : work on the passenger building
- Financing: **public-private partnership (PPP)**
- Stakeholders:
  - **SNCF /Gares et connexions**
  - **RFF**
  - **Local authorities**
  - **City of Paris**
  - **A private property developer, Klépierre**

## CONCLUSION/EXPECTED OUTCOME

- New opening hours: **shops open until 10pm**
- New visitor capacity: **450 000 per day**
- New surface area: **30 000 m<sup>2</sup>**
- New retail surface area: **80 retail outlets and 10 000 m<sup>2</sup>**
- New situation within the city: **creation of new access points into Rue d'Amsterdam.**
- Level of automation in station: **50%**
- New facilities:
  - **Outlet of a major retail chain**
  - **New shopping centre**

- Create the post of station manager, a single contact for all carriers, station operators and local councillors.
- Make substantial investment (between € 380 and €500 million/year by 2020)
- Set up Gares et connexions, clearly separated from SNCF.

### The challenges of renovation

- Urban: more effective integration in the city.
- Sustainable: improve the energy efficiency of stations.
- Financial: reduce the amount of public funding.

### French problems and difficulties

- Level of services provided in stations very outdated.
- Difficulties in financing renovation projects.

### The aim

- To modernise French stations.
- To extend stations in danger of exceeding capacity following the opening up to competition and the increase in traffic.

A new economic model for financing renovation programmes, leading to a new concept of French-style, highly commercialised station.

## THE PARIS SAINT-LAZARE STATION RENOVATION PROJECT

Following a call to tender by SNCF in 1998, which was won the same year by a consortium comprising Klépierre and Spie Batignolles Immobilier, it took 15 years to prepare and complete the project, including 3 years for construction site preparation work. This was a major construction project fraught with difficulties due to the nature of the building (a heritage site with numerous technical constraints), as well as the daily passage of more than 450 000 people through the station.

### First stage 2003-2007

Work focused on the transverse platform, creating a single-level, homogenous floor for the whole platform. The architectural heritage was preserved and enhanced by restoring the building and installing new information display screens.

### Second stage 2006-2008

Widening the passage from the station to Rue d'Amsterdam and creating a genuine side entrance improved access to the station and made it safer. A new mainline sales outlet was also created.

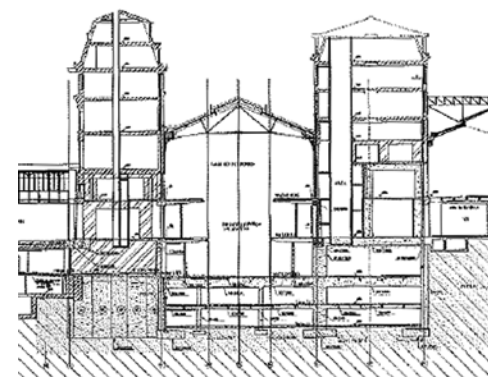
### Aims of the project

- to rethink the intermodality of the premises, and to simplify movement through the stations

- to improve the quality of service and increase what is on offer commercially in the station
- to create a new, French style, replicable model of station

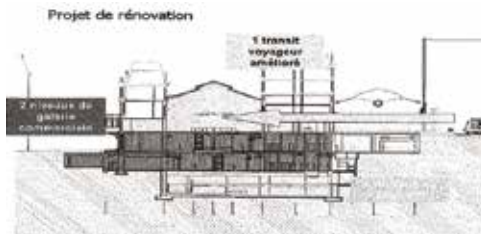
### Assessment of renovation of Paris Saint-Lazare Station (1 year on)

- Expected results of this renovation work: increased station capacity (financed by retail services), to improve visitor access to, and flow through, the station.



**THIRD STAGE 2009-MARCH 2012**  
Improved pedestrian flow in the station and constitution of an interchange on the level of the metro. Creation of 250 underground parking spaces, as well as 10 000 m<sup>2</sup> of retail and service space. More than 80 shops, service outlets and restaurants were opened on 21 March 2012. The retail space in the station provides travellers and visitors with improved service and convenience.

Cross section Paris Saint-Lazare Station Metro.  
Source Level "Transport April 2013" - UIC 2013



**Cross section Paris Saint-Lazare Station Metro.**  
Source Level "Transport April".

→ Financing station renovation work: total cost €250 million, including €160 million of private funding (from Klépierre), through a PPP (public-private partnership) agreement, which gives the private developer a 40-year franchise.

→ New commercial opportunities: increased retail capacity in the station of over 10 000 m<sup>2</sup>, and 80 retail and service outlets.

→ Turnover of retail area before and after renovation:  
Before (2007): €1 680/m<sup>2</sup>/year. After renovation: €14 000/m<sup>2</sup>/year and rental returns up by 8.2%

Opening of large retail outlets such as a 550-m<sup>2</sup> Carrefour City (convenience store), a 965-m<sup>2</sup> Virgin store and a 1 130-m<sup>2</sup> Flagship store.

→ Average time spent by visitors in the station before and after renovation:  
Before (2007): less than 15 minutes.



**Paris Saint-Lazare Station Shopping Arcades.** UIC 2013

After renovation: 22 minutes.  
The refurbishment has also made it possible to reduce by a quarter the time taken by passengers to reach their trains, and to provide a better information service to travellers on 300 information screens and boards in the station.

### Future plans

Having established a reliable source of funding by exploiting the retail potential of the station, the next stage which began in 2010, is to increase and improve the integration of the station into the urban environment. This will be achieved by refurbishing the forecourts, but also



by working hard to improve the quality of service provided in the station, examples being Gares et connexions' idea of setting up nursery facilities in Saint Lazare, as well as a gourmet restaurant, a business centre, etc.

The economic model used to finance Paris Saint Lazare station is considered now by Gares et connexions to be a "transferable" one, as stressed by manager Rachel Picard (See Ville et transports interview, 09/04/2013).

"We have 80 station renovation projects all over France in which we will increasingly offer new retail space".

### HISTORY OF PARIS SAINT-LAZARE STATION

A first provisional wooden station, called the 'Embarcadère de l'Ouest' was built in 1837 when the Paris Saint-Germain railway line was opened, followed by a second provisional but more solid structure in 1841.

A third station was built by the architect Alfred Armand and the engineer Eugène Flachet on the present site, Rue Saint Lazare, with a new layout which separated suburban and main-line traffic.

By 1867, it had become the leading Paris station, with 25 million passengers per year, making it necessary to carry out work to extend the station. This proved to be the first in a long series of enlargement projects carried out up to 1971 when it was declared a National Heritage site.

During the 1970s, the station was modernised to a limited extent: a shopping arcade was created in 1974 in the basement of the concourse, remote display screens were installed, as were escalators leading to the platforms to improve connections with the metro. Since 1970, in spite of the RER A suburban railway taking over two of its branch lines, traffic has increased in the station. However, unlike the other main stations in Paris, no underground suburban station has been built with corresponding major modernisation work, as has been carried out at the Paris-Austerlitz, Paris-Nord or Paris-Gare de Lyon stations, nor have any infrastructure improvements been made linked to the arrival of HS trains.



## THE PARIS GARE DU NORD RENOVATION PROJECT

### The challenges of renovation

Paris Gare du Nord has the distinction of being a listed building, making any restoration work a delicate operation, but it also has problems arising from the existing space becoming congested while any expansion is limited by the lack of available real estate. The possibility of extending the station over the tracks, or some other architecturally challenging schemes to enlarge the station have been judged as needing very considerable financial investment. Station managers have told us that the question of funding this type of project has been discussed but it is not currently possible. It seems the challenge can be summed up as being how to increase station capacity and commercial profitability within the limits of the space available.

### The current project

Pending any future enlargement projects, work will begin at the end of 2013 to redesign the interior of the station, with the aim of optimising its use by improving flow management and organising the retail and service areas more efficiently, maximising returns by making the most of the space currently available in the station. The work should take 2 to 3 years, and will be carried out in two stages:

- reclassifying the various zones in the station;
- increasing the retail surface area, adding up to 800m<sup>2</sup> of useable space.

The challenge of increasing the retail capacity of the station involves redefining the supply of commercial services. In this way it will not just be a question of increasing the area in square metres but above all of defining a new operating strategy in the station.

Services provided will be adapted to the target customer type, and the station subdivided into zones, each corresponding to a different commercial ethos:

- The Eurostar terminal, with exclusively international passengers and potential tourist and business customers, has been designed like an airport with top-of-the-range retail premises;
- The city level: access to Thalys, suburban and regional trains, with specific service needs such as restaurants and shops for impulse buying;
- The first basement (-1) level of the station: a transit area with very limited potential space;
- The second basement (-2) level of the station: essentially suburban and commuter traffic, requiring in-depth work to define exactly which retail and other services are suitable for consumers passing through daily.

### Description and stages of the renovation project

→ The Eurostar terminal: on the mezzanine level (+1) of the station, with 500 m<sup>2</sup> of retail outlets at present, but accounting for 20% of rental income, this is a part of the station with great potential and is the scene of lively competition between businesses, fighting for these few square metres of highly-prized retail space.

Space is very cramped, with issues of flow management linked to safety and border controls with Great Britain. An average of 10 minutes is taken to pass through the three control bottlenecks before reaching the waiting areas in the terminal, where once again the space currently available is very limited. Work to upgrade this commercial space will take place between now and the end of 2013, moving upmarket with the arrival of prestigious retailers such as Ladurée.

- The city level (platforms): there is a plan to reorganize the access area to the platforms to improve spatial legibility by:
  - redefining routes and concentrating routes into precise pathways;
  - improving the visibility of retail spaces by removing physical obstacles;
- restructuring the retail area by realigning the shops and marking the different areas on the ground;
- simplifying visual display boards in the

### GEOGRAPHICAL CONTEXT

- Paris is a densely populated city with 2 243 833 inhabitants.
- Economic capital of France.
- Urban context: central.
- At the heart of a dense retail and service urban fabric (Neighbourhood of Gare du Nord)
- Distance between Gare du Nord and Charles de Gaulle (CDG) airport 26km – 30 minutes by suburban train.
- Time on suburban train from Paris to Orly airport - 45 minutes.

### STATION'S POSITION ON RAILWAY NETWORK

- International hub for Thalys trains and the Eurostar line to London.
- Part of the "Parisian hub" made up of 6 main stations.

## PARIS GARE DU NORD KEY FIGURES AND ACCESSIBILITY

- Date of construction: **1837**
- Date of last renovation: **2013-2015**
- Total station surface area: **105 840 m<sup>2</sup>**
- Number of travellers/year: **190 millions**
- Number of visitors/day: **450 000**
- Retail space: **8 584 m<sup>2</sup>**
- Number of retail outlets: **85**
- Restaurant space in station: **3 433 m<sup>2</sup>**
- Infrastructure manager: **RFF**
- Operator: **SNCF**
- Number of tracks in station: **44, no dedicated HS tracks**
- Number of trains/day: **1 900 trains including 200 long distance**
- Number of metro lines: **2**
- Number of RER suburban lines: **6**
- Number of bus routes: **10**
- Number of metro stations with direct services from station: **46**
- Number of public parking spaces: **250 places for cars and 50 places for motorcycles**
- Cost of parking near station: **€25/day**
- Cost of cycle hire: **Vélib rental card €1.70/day**
- Presence of checkpoints in station: **yes**
- Transfer time in station: **8 minutes**
- Mode of access: **15% taxi, 32 % metro, 45% suburban trains, 10% pedestrian/cycle**

## RENOVATION OF PARIS GARE DU NORD

- Progress status: **complete**
- Duration: **10 years (2002 -2012)**
- Stages:
  - **2003- 2007:** work on the transverse platform
  - **2006-2008:** work on the urban area around the station
  - **2009-2012 :** work on the passenger building
- Financing: **public-private partnership (PPP)**
- Stakeholders:
  - **SNCF/Gares et connexions.**
  - **RFF**
  - **Local authorities**
  - **City of Paris**
  - **A private property developer, Klépierre.**

## CONCLUSION/ EXPECTED OUTCOME

- New opening hours: **shops open until 10 pm**
- New visitor capacity: **450 000/day**
- New surface area: **30 000 m<sup>2</sup>**
- New retail surface area: **80 retail outlets and 10 000 m<sup>2</sup>**
- New situation within the city: **creation of new access to streets**
- Level of automation in station: **50%**
- New facilities:
  - **Outlet of a major retail chain**
  - **New shopping centre**

station and reducing their spatial footprint;

- and finally the idea of gaining 800 m<sup>2</sup> of extra retail space was raised, achieved by optimising the use of space but also by reducing ticket-office type retail space in the station and increasing the proportion of sales from automated ticket machines. This would gain 250 m<sup>2</sup> of useable space. Simply realigning the retail outlets could free up a further 150m<sup>2</sup> in an area which generates 40% of the rental income of the station at present.

→ The first basement level (-1): this transit area, renovated in 2012 with new retail outlets covering 200m<sup>2</sup>, remains for Gares et connexions at present mainly a space where everyday services, such as medical laboratories and nurseries, can be found.

Use should be made of the transit potential of the area by relocating the waiting areas that were removed from the city level.

→ The second basement (-2): with heavy suburban traffic but also a third of the rental income of the station and two thirds of the station's retail space. For this area, reclassification will consist simply of redesigning the commercial services, focusing more on major retail outlets.

## HISTORY OF PARIS GARE DU NORD

The station was opened on January 25 1846 when the first stretch of the Paris-Nord to Lille line, the section between Paris and Clermont, was inaugurated and the company took possession of the station. On June 14 1846 the Paris-Nord to Lille line and the station were inaugurated. From 1861 to 1865 the Gare du Nord was rebuilt under the architect Jacques Hittorff. The station was renovated but above all extended over the years, with a change in the track layout in 1877, taking it from eight to thirteen tracks, then from thirteen to eighteen tracks in 1889, and finally up to 28 tracks in 1900. The underground station was developed between 1977 and 1982, followed by a major change with the opening of the northern HS line and the launching of the TGV Nord (northern high-speed train) in 1993, and then the inauguration in 1999 of the Magenta station on the RER line.

One of the key features of the station since the arrival of high-speed rail is track specialisation:

- track 1: serves mainly as a siding for engines awaiting departure or arriving from the yard
- track 2: used when there are problems for trains to get into the station, as well as to hold trains awaiting departure
- tracks 3 to 6: terminal for Eurostar trains to London via the Channel Tunnel
- tracks 7 and 8: for Thalys trains to Belgium, the Netherlands and Germany
- tracks 9 to 18: TGV Nord (northern HS train), mainline trains, some TER regional trains to Picardy
- tracks 16 to 21: TER regional trains to Picardy
- tracks 30 to 36: station for Île de France suburban lines
- tracks 41 to 44 (underground): station for RER suburban lines

# STUTTGART STATION / GERMANY



Project for renovating Stuttgart station. Source: wikipedia website

## GEOGRAPHICAL CONTEXT

- Stuttgart is a densely populated city with 613 392 inhabitants (twice the size of Zurich).
- Urban context: central.
- At the heart of a dense urban fabric.
- The distance between Stuttgart central station and Stuttgart airport is 20 km – 27 minutes by suburban train.

## STATION'S POSITION ON RAILWAY NETWORK

- International hub (less than 3h from France and 4h from Brussels), with connections that could be improved by the new Stuttgart - Ulm HSL.

## SITUATION WITHIN STUTTGART TRANSPORT NETWORK

- Central station of a regional express network: ICE (InterCity Express), RE (Regional Express) and RB (Regional Bahn) trains, and of a mainline and international network. This network is of great structural importance to the region, making the station the hub of a conurbation totaling 5.5 million inhabitants.

## ORGANISATIONAL STRUCTURE OF THE GERMAN RAILWAYS

### Organisation

Deutsche Bahn AG is structured as a holding company. The different subsidiaries under the responsibility of Deutsche Bahn AG have independent accounts, although the managers of each subsidiary have to

comply with the rules set by the parent company. Deutsche Bahn AG is a public company currently in the process of privatisation.

To ensure a maximum degree of neutrality on a network open to competition, a regulatory office was set up in 2006, the Bundesnetzagentur.

## German railway network

→ Organised hierarchically, dense, and extensive - one of the largest networks in Europe.

→ 41 315 km (2005): 19 857 km of the network are electrified (alternating current, 15 kV), 1 468 km are double track.

→ 3 000 km of privately-operated secondary lines, representing 280 networks. The railway network is open to competition from railway undertakings with a European licence. In 2011, network access charges for other companies amounted to € 2.64 - 14.45 / train-km.

The federal government owns the network infrastructure via DB AG, but only subsidises regional transport. Long-distance services do not receive any subsidy.

## GOVERNANCE AND FINANCING OF GERMAN STATIONS

### Governance

Ownership: DB AG: buildings and passenger areas.

DB Netz AG: platforms, tracks and access ramps.

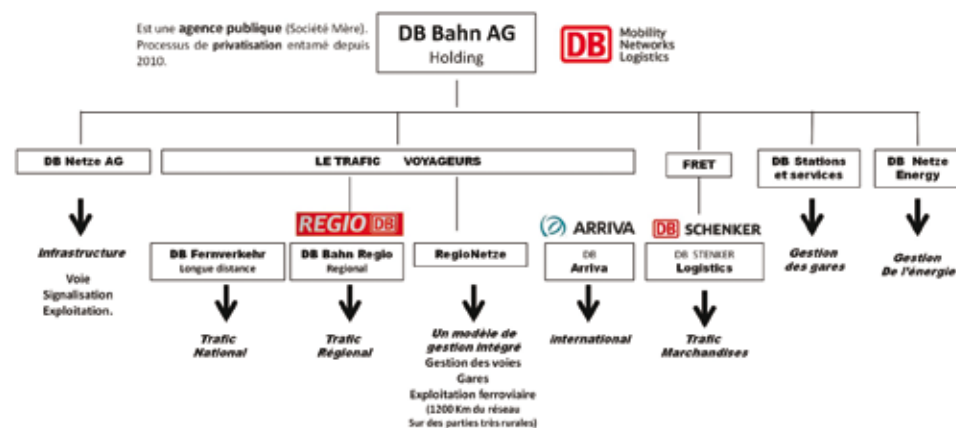
Management: Since 1999, DB Station & Service, a subsidiary of DB AG, has been in charge of the operational and commercial management of the 5 400 stations on the German network.

## STUTTGART STATION, KEY FIGURES AND ACCESSIBILITY

- Construction year: **1922**
- Date of latest renovation: **currently in project phase**
- Number of travellers/year: **87.6 million**
- Number of visitors/day: **200 000 visitors**
- Number of retail outlets: **40**
- Infrastructure manager: **DB**
- Operator: **DB**
- Number of tracks in station: **17**
- Number of trains/day: **600 trains (35% urban, 40% regional, 30% long-distance)**
- Number of metro lines: **7**
- Number of regional lines: **6**
- Presence of checkpoints in station: **yes**
- One of the specific features of the station is that it is situated in a declivity with a difference in height of 150 m.



7 light rail (S-Bahn) lines.



SMGG «stations» study - Holding-type organisation of German railways. UIC 2013

### Financing

Construction and renovation of German stations are financed by: the federal government, DB AG Holding, local authorities and public-private partnerships. Financing of operating costs of stations.

### RENOVATION POLICY FOR STATIONS IN GERMANY

#### Latest trends

In Germany, most stations are terminuses, cul-de-sacs, which is not the optimum configuration for traffic. In addition to various projects aimed at renovating and increasing the size of certain stations around the country, DB is focusing first of all on mammoth operations involving complete station reconfiguration, such as the highly

controversial «Stuttgart 21» project. These projects are extremely costly and the economic climate is very difficult for DB. Current station renovation projects in Germany are above all urban projects with a variety of goals: using the station project to regenerate a neighbourhood, revitalize a city, recover usable land or introduce high speed.

### DESCRIPTION OF STATION RENOVATION PROJECT

Stuttgart 21 is a rail and urban project aimed at completely reorganising and upgrading the Stuttgart railway hub.

Due to its urban scope, cost and controversial nature, the project is one of the

## PROJECT DESCRIPTION

A new station design, with a sub-surface station connected by means of tunnels to the airport and the main regional and international transport routes. This is more than a mere station renovation, it is a truly urban project on a national scale with international ambitions. It is also ambitious in financial terms, but the idea was sold thanks to the extra income due to be generated by the 100 ha of land made available in the city centre by the relocation of the station underground.



Stuttgart 21 project: La vie du rail. October 2010. UIC 2013.

most significant station projects of the early 21<sup>st</sup> century in Europe. The key priority of the project is to transform Stuttgart station from a cul-de-sac into an underground through station.

#### Purposes of renovation

Urban: recover usable land in the city centre, an increasingly rare resource. Regional: give the station international significance by improving access to the city airport, providing new direct services and making the station a central connecting point on the line between Paris and Bratislava.

## RENOVATION OF STUTTGART STATION

- Progress status: **ongoing**
- Duration: **2010 -?**
- **Stages:**
  - Underground work to change from a cul-de-sac configuration to a through-station configuration.
  - Refurbishment of station interior.
- Financing: **DB, local authorities, German government and Stuttgart airport.**
- Stakeholders:
  - **DB**
  - **Government**
  - **Local authorities (Land, Region, and city of Stuttgart)**

## CONCLUSION/EXPECTED OUTCOME

- New situation within city: through-station configuration
- New station underground.
- Increased surface area and commercial capacity.
- Recovery of 100 ha of land in the city centre.



Patrick Poendl - Dreamstime.

### Project at urban level

The project to renovate Stuttgart station is just one part of a much more extensive project:

- A new station, Filderbahnhof, is due to be built near Stuttgart airport.
- A new direct service to the central station will depart from the international airport, passing through the station of Filderbahnhof.
- Stuttgart-Untertürkheim (name of station neighbourhood) will be opened to S-Bahn services.
- New line towards Ulm.

### Project in figures

- For the Stuttgart 21 project:
- 57 km of new railway lines.
  - 30 km of high speed lines.
  - Removal of 157 km of overground track.
  - 16 new tunnels.
  - 18 bridges.

### A controversial project

Since the project was launched in 2010, it has been faced with fierce public opposition. The cost of the project, 2/3 of which will be offset by tax revenue, is partly to blame, but environmental concerns have

## RENOVATION PROJECT AT STATION LEVEL

Station entirely transferred underground and 100 ha (size of a small district in Paris) of land made available. Aside from Monaco, there has never been a railway project on this scale before. A whole urban project is centred around this transformation: the creation of the Europe quarter (new business district of the city).

The network and the station are being upgraded, the latter of which has seen little redevelopment work since its construction in 1922.

Renovation work will spare the historic station building, effectively the passenger part of the station, which over 200 000 passenger pass through every year and which includes 40 retail outlets.



Stuttgart 21 project: La vie du rail. October 2010 - UIC 2013.



also undermined the legitimacy of this huge project, as works would be set to last over ten years and have an extremely negative energy balance.

→ Ecology:

The worksite itself would produce adverse ecological effects in proportion with the scale of the project, not to mention use of «agricultural» land by the new high speed lines.

→ Project cost:

*Figures given in 2010:* total cost of € 4.088 billion, with € 1.469 billion financed by DB, € 1.229 billion by the Federal Republic of Germany, € 824 million by the Land of Baden-Württemberg, € 239 million by the city of Stuttgart, € 227 million by the airport and € 100 million by the Region of Stuttgart.

*Figures in 2013:* additional costs of € 2 billion, project authorities questioning its feasibility and alternatives currently being considered.

→ Heritage:

Stuttgart central station is one of the few stations that survived the Second World War. Half of this listed building would have to be demolished, a prospect that has been completely rejected by the people of Stuttgart.

### Questions

The Stuttgart project currently appears to be very compromised. Although its aims were highly praiseworthy, it has not been met with unanimous approval. One could ask what the reasons are for the controversy surrounding this project, which seems to be a perfect response to new demands of the railway sector, and whether it could be given a better image.

The number one source of controversy appears to be the cost. However, the issue should not be couched in such terms, as the project in itself seems to justify such expenditure; the main issue should rather be seen as the sources of financing! Private or perhaps European financing could perhaps be sought.

Regarding the environmental issue, would the impact not be offset by greater use of the railway mode in the future? If so, may be a balance can be achieved.

But beyond issues of style or scale, the fundamental question raised by a project of this nature concerns the new role of the station and the challenges raised by reimagining that role at the scale of the city - is Stuttgart presently a major hub? If so, for which network?

### HISTORY OF STUTTGART STATION

Construction began in 1914 and the station was opened in 1922. In addition to its great architectural value, the new building fitted in very well with the other structures in the city centre. This massive building is almost imperceptibly tailored to its precipitous surroundings - the distance from highest to lowest point is 5 m. During the Second World War it was seriously damaged on several occasions. Reconstruction work took place several years after the war. On 20 August 1987 the building was listed as a cultural monument of special significance. In response to the Stuttgart 21 project, which involved demolishing part of the station, on 25 November 2009 UNESCO conservationists proposed that the building be classified as a World Heritage site, forcing city authorities and Deutsche Bahn give up plans to partially demolish the building.



# ROME TERMINI STATION / ITALY

## GEOGRAPHICAL CONTEXT

- Rome is a densely populated city with 2 614 263 inhabitants.
- Economic capital of Italy.
- Urban context: central.
- At the heart of a dense urban fabric.
- The distance between Rome Termini station and the city airport, Leonardo, is 35 km – 30 minutes using the dedicated rail service (shuttle).

## STATION'S POSITION ON RAILWAY NETWORK

- In geographical terms Rome Termini station is relatively distant from the main European stations (11h from Paris, including one stopover).
- Rome Termini is also one of the stops on the high speed line running from the north to the south of Italy and connected to the French network right up to Paris.

## SITUATION WITHIN ROME TRANSPORT NETWORK

- 5 out of 8 regional lines (Ferrovie Regionali)
- 2 metro lines.
- 3 tram lines.

## ITALIAN RAILWAY SYSTEM

### Organisation

The Italian railways are managed by a holding company, Ferrovie dello stato (FS), which is 100% publicly-owned. In addition to managing the infrastructure, this body is in charge of operating most passenger trains and many goods trains.

The infrastructure manager, Rete Ferroviaria Italiana (RFI), a publicly-owned subsidiary of FS, is in charge of maintenance, traffic management, allocation of train paths and access to the network. RFI manages all the stations on the network, in some cases through small local infrastructure managers.

In Italy, the incumbent operator for passenger transport is Trenitalia, also a subsidiary of FS. Following the opening up to competition, other operators can use the Italian network, albeit under the watchful eye of the Ufficio per la Regolazione dei Servizi Ferroviari (URSF) since 2003.

### Italian railway network

The main railway network comprises 19 394 km of standard-gauge lines (track gauge of 1.435 m), Sardinia and Sicily included. Ferrovie dello Stato operate 16 178 km of standard-gauge lines in total,



including 10 688 km of electrified lines with 3 000 V direct current.

The narrow-gauge network represents roughly 1 300 km, including 1 211 km with a gauge of 0.95 m and 112 km of metre-gauge track. The network is sparse, especially in the south of the country.

In 2011 operating charges were between €1.40 and €6.99 per train-km, depending on the type of train.

## GOVERNANCE AND FINANCING OF ITALIAN STATIONS

### Governance

The stations are currently owned and managed by RFI (the infrastructure manager), Grandi Stazioni and Centostazioni. RFI manages the strictly rail-related elements of all stations. Grandi Stazioni and Centostazioni are in charge of maintaining and redeveloping the station buildings as well as renting and managing retail areas in stations.

## ROME TERMINI STATION, KEY FIGURES AND ACCESSIBILITY

- Construction year: **1862**
- Date of last renovation: **2012-2015**
- Total station surface area: **225 000 m<sup>2</sup>**
- Number of travellers/year: **170 million**
- Number of visitors/day: **1 000 000 visitors**
- Retail space: **34 000 m<sup>2</sup>**
- Number of retail outlets: **128**
- Infrastructure manager: **RFI**
- Operator: **Trenitalia**
- Number of tracks in station: **31, including 8 dedicated to HS traffic**
- Number of trains/day: **900 trains (140 high speed)**
- Number of metro lines: **2**
- Number of regional lines: **9**
- Number of bus routes: **80**
- Number of metro stations with direct services from station: **49**
- Number of public car parks: **1 300 parking spaces**
- Cost of parking near station: **18 euros/day**
- Presence of checkpoints in station: **Yes**
- Transfer time in station: **8 minutes**
- Mode of access: **12% taxi, 25% metro, 35% suburban trains, 20% regional trains, 10% pedestrian/bikes**



The Grandi Stazioni project was developed in view of transforming and renovating the major Italian stations (classified according to the aforementioned criteria): Turin Porta Nuova (TOPN), Milan Centrale (MIC), Genoa Brignole (GEB), Genoa Porta Principe (GEPP), Venice S. Lucia (VESL), Venice Mestre (VEM), Verona Porta Nuova (VRPN), Bologna Centrale (BOC), Florence S. Maria Novella (FISMN), Rome Termini (RMT), Naples Centrale (NAC), Bari Centrale (BAC) and Palermo Centrale (PAC). The deciding factor in this selection was the exceptional commercial potential of these stations. The project consists in:

- Turning 13 of the largest stations into multimodal transport hubs.
- Improving service quality in the stations and enhancing the range of commercial services.
- Improving accessibility in the stations.
- Improving security in the stations with the implementation of a new «surveillance and monitoring system for the general facilities».

Grandi Stazioni SA is owned by FS Holding (60%) and EuroStazioni (40%), the latter being a European company (Pirelli, Edizione, Vianini Lavori and SNCF). Grandi Stazioni SA manages 13 major railway stations in Italy. Grandi Stazioni's obligations are set out in 40-year concession contracts with RFI that were signed in 2000 (after the first renovation of Rome Termini). These contracts include obligations for Grandi Stazioni to renovate the stations it manages (Grandi Stazioni pays 40% of rental income back to RFI every year).

Centostazioni SA is in charge of redeveloping 103 stations on the Italian railway network. Since its creation in 2002, the aim of the company has been to develop and manage the real estate owned by FS Holding. The company is a partnership between FS (60%) and Archimède (40%), a company belonging to SAVE Group, Manutencoop, Banco Popolare and Pulitори ed Affini.

RFI is in charge of the operational side of business, while Grandi Stazioni and Centostazioni focus on commercial and real estate aspects; the main objective is to optimise the value of facilities in terms of commercial activity, real estate value and attractiveness to investors.

### Financing

→ Financing of construction and renovation of stations: Italian government, RFI and Grandi Stazioni.

→ Financing of operating costs of stations: rental income, station access fees.

Station category	Description
<b>Platinum</b>	Major stations with large passenger flows. High-quality services provided. Stations which are also shopping centres, providing services to people who are not travelling by rail.
<b>Gold</b>	Major stations with large passengers flows and appropriate services.
<b>Silver</b>	Stations for all passenger categories or for regional or suburban services with large passenger flows.
<b>Bronze</b>	Small stations that can be categorised as stops, with small passenger flows and no building serving as a station open to passengers.

## RENOVATION OF ROME TERMINI STATION

- Progress status: **ongoing**
- Duration: **42 months, works carried out in 2013-2015**
- Stakeholders:
  - **Trenitalia**
  - **RFI**
  - **Italian government**
  - **City of Rome**

## CONCLUSION/EXPECTED OUTCOME

- New capacity: **800 000 visitors/day**
- New surface area: **230 000 m<sup>2</sup>**
- New retail surface area: **40 000 m<sup>2</sup>**
- New situation within city: **the station as a component of the city in increasing interaction with its environment.**
- Level of automation in station: **50%**
- Level of outsourcing: **50%**
- New equipment:
  - **New car park.**
  - **New passenger services.**
  - **New lifts and access ramps.**

## Classification of Italian stations

According to the following criteria:

- Touristic / architectural / cultural value of the station.
- Number of different train types (high speed, intercity, regional, local).
- Connections with other transport modes.
- Presence of retail areas.
- Number of platforms for passenger trains.
- Number of tracks for passenger trains.

## RENOVATION POLICY FOR STATIONS IN ITALY

This is an ambitious project, initially set to last 3 years (starting in 2009) but somewhat extended subsequently.

## Financing the «Grandi Stazioni» project

The cost of renovating the railway stations was numbered at € 369 million, € 200 million of which were to be financed by Grandi Stazioni S.p.A. funds (€ 150 million financial agreement with the European Investment Bank). Additional costs for renovating other infrastructure at station level will amount to roughly € 21.56 million, of which € 20.66 million will be covered by mixed funds and € 0.90 million by the state.

## Aims

- Capitalise on the potential of certain major Italian stations.
- Improve the image of Italian railway

stations, with a very visual approach (stations as architectural objects).

→ Increase the commercial capacity of Italian stations: Project Carta Bianca, a marketing-based approach to commercialising stations, has allowed the rental contracts to be renegotiated (better defining supply compared to demand in each station).

The recent trend in renovating major Italian stations is to define station models according to station categories, with a model that can be reproduced from one station to another within a given category. New model of «Italian-style» major stations: architectural gems, accessible combination of stations and shopping centres.



New services in the station: service quality in Rome Termini station has been greatly improved by the modernisation of ticket sales, the enhancement of information structures, and the introduction of automatic ticket machines, new luggage lockers and a better surveillance system.

Rome Termini station. Source : Grandi Stazioni - UIC 2013



The central concourse has also been renovated with an increase in retail space, now covering an area 220 m long. There is a wide variety of retail outlets and restaurants. The underground levels of the station have become an actual shopping centre, «Forum Termini», with 14 000 m<sup>2</sup> of retail outlets and millions of customers, many of which are not travellers.

Rome Termini station. Source : Grandi Stazioni - UIC 2013



## DESCRIPTION OF STATION RENOVATION PROJECT

The station has undergone two major renovations in the past 15 years: one of the major renovation operations for Rome Termini station took place in 2000, with a project based on four courses of action:

- Reorganising and managing flows.
- Modernising passenger services.
- Introducing a certain number of primary and secondary services by promoting the creation of optimised multipurpose spaces.
- Improving quality and comfort in the station, as well as observing safety standards.

The latest «facelift» Rome Termini station has been given are the major works launched in 2013 involving the construc-

tion of a new car park with 1 300 spaces and a new, «floating» shopping arcade.

- **Make maximum use of the potential space available in the station:**
- **The new arcade will contain the passenger services in an area covering roughly 6 000 m<sup>2</sup> on a single floor above the railway tracks that enter the station.**
- **Four new panoramic lifts will connect the three levels of the station: the shopping «forum», shopping arcade and metro access floor.**

**New services in the arcade:**

- **10 600 m<sup>2</sup> of floor space • 2 800 m<sup>2</sup> for passenger services • 8 escalators**
- **14 CCTV cameras • 3 entry and 3 exit points to the level • 30 automatic ticket machines**

**Rome Termini station.** Source: Grandi Stazioni - UIC 2013

tion of a new car park with 1 300 spaces and a new, «floating» shopping arcade. Work is underway, and will bring two major benefits:

→ Improve the modal shift to rail at Termini station.

→ Improve the commercial opportunities provided by the station, in accordance with the specifications of «Grandi Stazioni».

Like the shopping arcade, the multi-storey car park, also above the tracks, is an innovative solution to the lack of available land in the city centre.

The car park will include 1 337 parking spaces and 85 motorbike spaces over 3 floors, and will be accessible via mechanical ramps. The cost of the project is € 85 million, with work scheduled to end in 2015.

## HISTORY OF ROME TERMINI STATION

Rome Termini station has been renovated and seen its size increase several times since its construction in 1867 by the architect Salvatore Bianchi. Although at the time the station seemed too large for the needs of the Pontifical State (180 000 inhabitants), 15 years later it was already saturated. The size of Rome Termini station has thus been increased on several occasions, with additional tracks and halls.

However, up to 1905 the building had kept its original dimensions. Six years later a temporary wooden structure had to be built in haste for ticket sales, and tracks had to be added for passenger trains. It was only in 1939, after more than 10 years of studies and a bid by the architect Mazzoni Angiolo, that work could begin. A monumental and emblematic façade was to be added, as was a vast entrance hall measuring 1 200 m<sup>2</sup>. It would be completely empty, with rail and other travel services relegated to the sides of the station. Works were interrupted by the Second World War before resuming in 1947. The station consisted of 4 distinct buildings covering a surface area of 14 000 m<sup>2</sup>. The striking feature of the entrance was an imposing and emblematic station roof, nicknamed «the dinosaur». By the end of works in 1950 the station had acquired the form it has at present.

# TOKYO MAIN STATION / JAPAN

## THE JAPANESE RAILWAY SYSTEM

### History of Japanese railways and introduction to the major private railway companies in Japan

Railways in Japan date back to 1872. It was in that year that the Meiji government decided to establish a transport sector. The aim at the time was to replicate a railway system similar to those found in the West. The lack of public funds meant that this task was entrusted to the private sector, and these foundations became the backbone of Japan's railway network.

1906 however saw a change in events with the enactment of the law on nationalisation which brought 17 private railway companies under the umbrella of the Imperial entity called the "Imperial Government Railways". This nationalisation however was not exhaustive. Around twenty private companies were left to continue operating on their often small networks (one hundred Kms at most) which had very little traffic, since they were deemed unviable or simply of no strategic importance. These companies which were never nationalised not only survived but went on (after consolidation and mergers) to become large national scale entities for



### JAPANESE RAILWAYS

- Very dense and efficient.
- Main mode of transport (modal share is four times that of Europe).
- Mostly metric gauge, i.e. 1 067 mm, except for the high speed lines.
- Total length of the network is 23 670 km of which 7 000 km in UIC gauge.



which railway business became a minority 40% of their overall turnover.

In the case of the other companies nationalised in 1906, the railway boom which lasted until 1945 helped the JNR group (Japan National railways) prosper. The advent of the motorcar and subsequent fall in modal share meant however that by 1964 the group was experiencing losses of 30 billion Yen, which ballooned

into 1361 billion Yen in 1986. This unsustainable situation prompted the government to take radical action and JNR was privatised in 1987, splitting the group into regional railway companies. Out of this action came: JR East (operating in the Tokyo area and eastern part of the Honshu Island network, including the Tokyo-Niigata Shinkansen line, the Joetsu Shinkansen and the Tokyo-Morioka-

**TOKYO MAIN STATION KEY FIGURES AND ACCESS**

- Built in: **1914**
- Last renovated: **2012**
- Total surface area: **182 000 m<sup>2</sup>**
- Pax/year: **450 million**
- Visitors/day: **2 000 000**
- Commercial floor space: **127 000 m<sup>2</sup>**
- Number of trading outlets: **173**
- Catering surface area: **10 500 m<sup>2</sup>**
- Infrastructure Manager: **JR group**
- Operators: **JRE + JRC**
- Number of tracks in station: **28, of which 10 HS**
- Number of trains/day: **3900 trains (1012 regional and 1990 urban trains)**
- Number of underground lines: **13**
- Number of Regional lines : **7**
- Number of bus lines: **21**
- Underground stations which can be reached without change: **26**
- Number of public parking spaces: **1 397**
- Parking fees around the station: **65.60 euros/day**
- Luggage check points in station: **Yes**
- Time required for transfer in station: **5-15 minutes**
- Accessibility per mode: **10% taxi, 21% underground, 20% suburban train, 39% Regional train, 11% on foot/bike**

Tohoku Shinkansen); JR West (operating in Osaka and across the western part of the Honshu Island network including Kobe, Kyoto and the Sanyo Shinkansen line between Osaka and Fukuoka, plus a small part of the network on the Island of Kyushu); JR Central (covering the central part of the Island of Honshu, Nagoya, as well as part of the Tokaido Shinkansen line (the largest line in terms of passenger volume) which runs between Tokyo and Osaka and accounts for 85% of the company's revenue); JR HOKKAIDO, JR SHIKOKU, JR KYUSHU (each of these three companies operating on the eponymous island); and finally JR Freight, which is the sole company for transport of goods following the breakup of JNR for the whole of Japan. This split was the most notable part of privatisation.

**FINANCING AND GOVERNANCE OF STATIONS IN JAPAN**

**Governance**

The breakup of the Japanese railway market into private undertakings led to the splitting of station management between the railway companies, in particular the larger stations, reflecting the number of companies operating in and out of it, such as Tokyo station which is divided up into five parts.

The split is not only between tracks used by each company but also between waiting areas, and commercial floor space in the station. There are clear and easily identifiable divisions of space in the station. Each railway company is owner of a share of the floor space, the building and in some cases even of some of the land

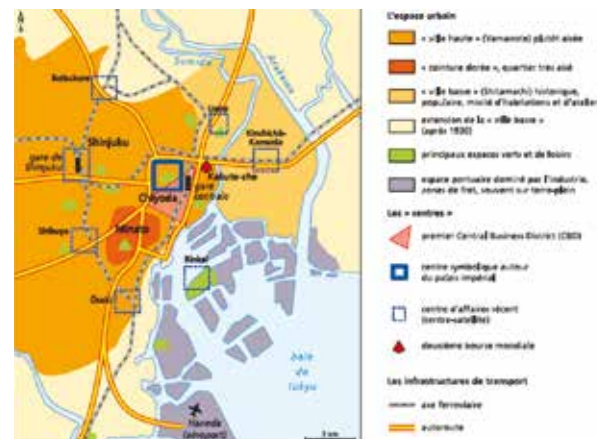
around the station, where it may in certain cases have located a part of its railway related business.

**Station financing**

- For day to day operations, building and renovation: funding is drawn on railway operating revenue, station access charges levied on other railway companies and rental income from the commercial floor space. However, private Japanese companies also rely on private bank loans for the construction of new stations or for major renovation work.
- For work deemed to be in the public interest, the state or local municipalities may contribute to its funding.

The way in which stations are generally organised in Japan:

**LOCATION**



**CONNECTION WITH TRANSPORT NETWORKS - INTERNATIONAL SCALE**



## RENOVATION OF TOKYO CENTRAL STATION

- Current state: **In progress**
- Duration of work: **7 Years (2007 -2013)**
- Stages:
  - Up until 2007:** work on Yaesu side.
  - 2007-2011 :** Restoration of the old station building
  - 2011-2013:** 2nd phase of work Yaesu side.
- Funding: **JR Group**
- Owners of the project: **JR Group. JRE+JRC.**
- Finance and banking groups: **City of Tokyo.**

## OUTCOME/EXPECTED RESULTS

- New opening times : **21 to 22h out of 24h**
- New capacity: **2 million pax/jour.**
- New floor space: **182 000 m<sup>2</sup>**
- New trading capacity: **127 000**
- New incorporation into surrounding city fabric: **The station becomes an integral part of the city with easier and more seamless access.**
- Level of station autonomy: **60%**
- Externalisation: **40%**
- New facilities :
  - New ticketing offices.
  - Extension to station hotel.
  - New elevated walkway between the station and skyscrapers on Yaesu side.

Stations in Japan are categorised according to traffic volume, with the largest handling over a million passengers per day in large cities such as Osaka and Tokyo. The categories are ranked in descending order down to minor stops which have no commercial services.

These categories depend not only on services and size of the station but also on the size of its payroll.

## RENOVATION POLICIES IN JAPANESE STATIONS

Japan is quite unique in the sense that the main purpose of private railway companies is to break even with no state aid, while being subject to state control on the number of train tickets being sold.

For this reason, these companies were soon driven to diversify their businesses and generate as much revenue as possible from mass commercialisation of floor space in and around stations, saturating the land around stations.

This effect of this policy is visible through the fact that stations in Japan have often evolved into vast shopping malls spilling out and saturating the land around stations. In Japan, following this logic of ever greater expansion of commercial space, depending on the amount of nearby available space, stations have therefore grown large underground shopping areas (where possible) or added several floors to a station covering the tracks and platforms.

Japanese experts have coined these stations as being the transitional development towards “station cities”. Major Japanese stations therefore grow into the available space around them before investing directly into the city. Tokyo Station is a classic example of this phenomenon. After a series of extensions, which practically filled the space around it, the station began investing into the urban space directly beyond this perimeter.

The challenge for station renovation in Japan today is to reinvent the concept of urban spaces; i.e. to build something which goes beyond the current notion of a railway station or even the modern station-cum-shopping mall of today and instead develop entirely new swathes of over equipped, urban space offering high-end services and shops.

## DESCRIPTION OF THE STATION RENOVATION PROJECT

### Developing the new concept of a “Tokyo Station City”

“Tokyo station city” is a phrase which was coined to conjure up the image of a railway complex which was unique in the world. Mr. Atsushi Kaise JR-HQ. A chunk of city, where culture, shopping, entertainment and business thrive – literally a hive of activity! A place where the station both shapes the city around it and becomes part of it. The cost of real estate has limited the extent to which networks can



expand and has forced private Japanese companies to invest in areas around the station in order to set up new business as part of their diversification strategy aimed at broadening their revenue source.

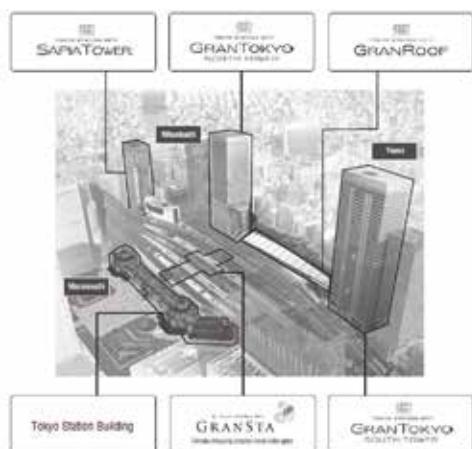
Tokyo Central station today is made up of the original old building and surrounding buildings which belong to the JR group and house various railway related and other types of business.

Tokyo Central station is a latest generation station. After multiple over-track and under-track transformations it has become a model for stations in urban settings.

### Renovation stages

➔ **Until 2007: Work on the Yaesu side :** Construction of “GranRoof” a concrete slab concourse between two towers covering part of the station; the structure is 234 m long and 27 m wide and represents the foundation of a new world scale business





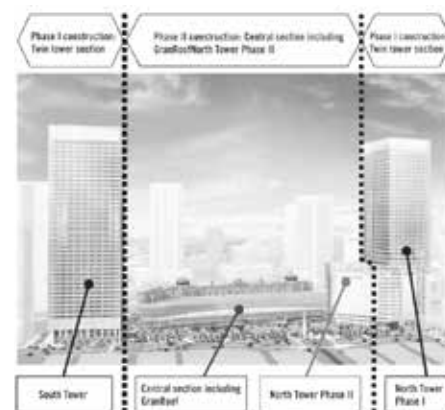
hub. The two towers, named "Gran Tokyo North" to the north is 205 m high with 43 floors of which the first is connected to the old station building via an array of underground and elevated shop-lined passages. The first few upper floors are home to the well-known JR Group "Daimaru department store". "Gran Tokyo South" has 42 floors with one level exclusively occupied by large chain stores, while the rest is mainly for businesses and services. The following 13 floors have been rented by the JR Group, while the remainder of floors are occupied by restaurants and various businesses related to tourism, culture, executive services, public departments, etc.

→ **2007** saw the opening of "Gransta Ekinaka facility" at the heart of the old station building. Based on the Japanese notion of station services or Ekinaka, this set up

comprises 80 shops, cafes and restaurants which offer direct access to the platforms, allowing passengers to enjoy the facilities while being able to keep an eye on their train.

→ **2007-2011** : The old building was restored over a period of five years, at a cost of 50 billion yen to JR East. The old red-brick building was therefore restored with the addition of a third floor and a shopping floor, as well as two basement levels to house technical equipment and car parking. New ticketing offices were opened and 150 rooms were added to the station hotel.

→ **2011-2013**: second phase of work Yaesu side : Construction of a second tower backing onto "Gran Tokyo North" and reconstruction of part of the middle of "GranRoof" with a hotel offices and shops.



**Two phases of the project on the Yaesu-Side.**  
Japan Railways and transport review. Dec. 2010.



**Phase II of the Yaesu-Side project.**  
Japan Railways and transport review. Dec. 2010.

- Share of land occupied by Old station in relation to Tokyo Main Station City (43%) as a whole.
- Graph showing distribution of business activity between the old part of the station complex and new constructions since 2007.
- Concentration of trading activity in the old part of the station. Business services and tourism in the remainder of the railway city.

### HISTORY OF TOKYO MAIN STATION

Tokyo Central station was built in 1914 and designed by King Tatsuno, who was the father of modern Japanese architecture. Tokyo station was one of the first train stations in Japan to have a purposely aesthetic design, and was drawn to reflect the glory of Japanese Railway Companies. The present building has undergone a number of transformations in relation to its original form, following its partial destruction during the Second World War, where it was deprived of its southern and northern most domes as well as its roof and interior ornamental decorations. Although restoration work was carried out after the war, a new renovation project was launched in 2007 with a view to restoring it to its original elegance while extending its practical use and reinforcing its resistance to future large scale earthquakes. The technical aspects of this work were extremely complex given that the main outside shell and structures of the building had to be preserved. The Marunouchi Building in Central station, the Tokyo Station Hotel and Tokyo station Gallery opened together. Over the years, the station has expanded downwards into basement levels and stretched across and over the tracks running into it, while being tightly woven in with the surrounding urban fabric through a close-knit web of tunnels and shop-lined passages. A succession of extensions to the station and its gnawing into surrounding real estate have transformed the station into a unique construction which blends almost seamlessly into its surrounding landscape.

# AMSTERDAM CENTRAL STATION / THE NETHERLANDS



## GEOGRAPHIC LOCATION

- Amsterdam is a dense city with 810,000 inhabitants.
- Municipality: 220 km<sup>2</sup> (15 districts).
- Economic capital of the Netherlands.
- Location in the city: central.
- Characteristics:
  - Urban sprawl around a network of semicircular canals.
  - The river Amstel runs through the city and empties into the IJ Lake.
  - Amsterdam Central station is located in Central District (the most touristy and most populated).
- Distance from Amsterdam Central station to Schiphol airport is 20 km – 15 minutes by train.
- The terminus of the important Thalys high speed line.

## THE DUTCH RAILWAY SYSTEM

### Organisation

Prorail, a body governed by private law, is the infrastructure manager and owner of the national rail network of the Netherlands. It is granted a concession by the Minister of Transport.

NS is a private company, whose main shareholder is the Ministry of Finance. It is a holding company with five subsidiaries:

- NS Hispeed – For the operation of the high speed network.
- NS Reizigers – For the operation of passenger trains.
- Abellio – NS international.
- NedTrain – For the maintenance of rolling stock.
- NS Vastgoed – Property manager.

The competition regulator is NMa (The Nederlandse Mededingingsautoriteit), one of the exclusive agencies of the Ministry of Economic Affairs, for a Dutch network which is open to competition.

One of the major features of the organisation of railways in the Netherlands is that the Dutch state is the sole shareholder. The Ministry of Transport owns the whole of the national rail network and finances the major part of the maintenance and construction of the railway.



Peter Lovás- Dreamstime.

### Structure of Dutch railways

Given its strategic position the Dutch network is a crossroad on a European and world level, even if there is no distinction between regional and long-distance traffic. The Dutch railway network comprises 2809 km of lines, all with standard track gauge (1.435 m) and 2061 km of electrified lines (1.5 kV DC), which constitutes an interoperable link in the European network.

A high speed service operated by Thalys International was recently introduced to

run between France, Belgium, Germany and the Netherlands around the Paris-Brussels route; however other endeavours to extend the network have not yet been completed.

## GOVERNANCE AND FINANCING OF DUTCH RAILWAY STATIONS

### Governance

NS Holding is the owner of all railway stations in the Netherlands, while Prorail is responsible for managing stations and

## AMSTERDAM CENTRAL STATION KEY FIGURES AND ACCESS

- Year of construction: **1889**
- Date of latest renovation work: **2002 - 2017**
- Number of passengers/year: **70 million**
- Number of visitors/day: **250,000**
- Retail space: **5000 m<sup>2</sup>**
- Number of shops: **30**
- Restaurant space in the station: **1300 m<sup>2</sup>**
- Infrastructure manager: **Prorail**
- Operator: **NS**
- Number of tracks in the station: **11, no dedicated high speed lines**
- Number of metro lines: **4**
- Number of tram lines: **10**
- Number of bus lines: **33**
- Number of metro stations served without transfer: **12**
- Number of public car parks: **2**
- Parking fee in the station area: **24.60 euros/day**
- Cost of bike hire: **free**
- Checkpoints in the station: **none**
- Transfer time in station: **8 minutes**
- Degree of access using the following modes: **10% taxi, 15% metro, 19% suburban train, 56% walking/bike**

transfer facilities, which include tracks, platforms, underground passageways, lifts, escalators, bike racks, signs and supplying passenger information. The station buildings belong to NS-Poort (subsidiary of NS Holding), also the manager.

*Etude SMGG « Gares » - Modèle de gouvernance des gares aux Pays-Bas - UIC 2013*

### Financing

→ Construction and renovation of stations: funds are allocated by the Ministry of Finance, NS, Prorail and station access charges.

→ For the running of stations: funds come from train path allocation charges and rental income from the letting of business space. NS has relatively recently introduced a policy to diversify these activities, and thus also manages property, with an annual turnover of 350 million euros. Around Amsterdam Central station, NS owns hotels (the IBIS) and intends to convert its premises into tourist hotels. NS-Poort also runs a mini chain of supermarkets in stations.

The scale of business activity of each station depends on its status in the classification system of Dutch railway stations and in accordance with the number of passengers per day. There are 360 stations in the Netherlands, classified into five categories:

- Cathedral: with over 75,000 passengers (up-bound/down-bound) per day.
- MegaA: with over 75,000 passengers (up-bound/down-bound) per day.

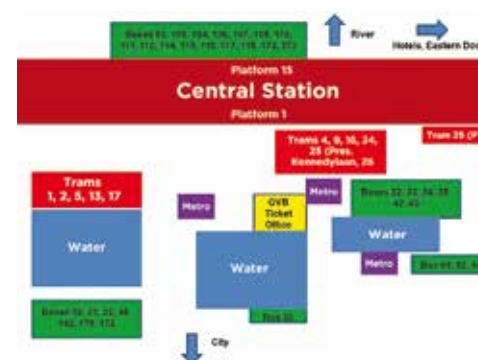
- Stations with over 25,000 passengers (up-bound/down-bound) per day.
- Basic stations with 10,000 passengers (up-bound/down-bound) per day.
- Stops with under 1000 passengers (up-bound/down-bound) per day.

### POLICY FOR RENOVATING DUTCH RAILWAY STATIONS

In the Netherlands a case-by-case policy has always been adopted as no operation is undertaken without discussion between the various stakeholders to agree on the needs and projects to adopt, focusing first and foremost on land planning in order to ensure station layouts meet planning needs.

#### ACCESS TO THE STATION FROM WITHIN THE URBAN AREA

The station is part of a network of the city's four main stations: Zuid, Arena, Centraal and Amstel. At city level the station is poorly served by the metro system with only one line, but can be easily accessed by bus and tram.



In the city of Amsterdam the main stations also serve different types of urban centres such as the stations of Amstel and Zuid which are business hubs, while Arena railway station which is also a major station that responds to the rhythm of the city's sports district and the crowds in the city's main stadium, while Amsterdam Central in the tourist area plays a vital role in the management of international flows. All stations either have been or are to be upgraded to specifically meet the needs of the area where they are located and the flows that they manage, with slight re-scoping, but also and most importantly, significantly improving the quality of service in stations remains the key challenge among all the renovation projects. In 2013 five to six new stations have been built and five others have been extended.

#### Challenges of upgrade projects

- Urban: incorporation and interaction of stations with their environment.
- Sustainability: responding to new European standards
- Transport: strengthening inter-modality at station level, and the quality of service in stations.

#### Problems and difficulties

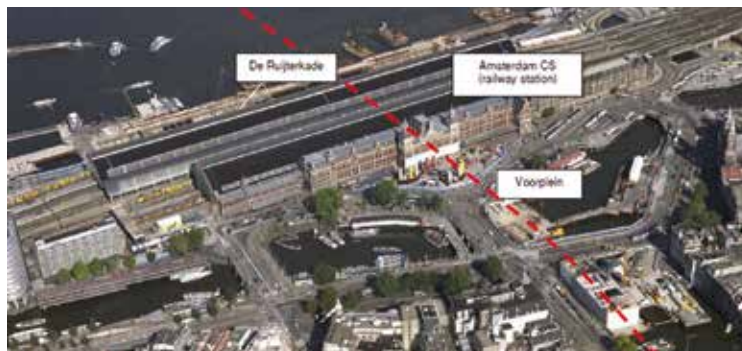
- Soil and risk of flooding.
- Sinking of some stations, notably in Amsterdam.
- Increase in traffic and risk of saturation.

## RENOVATION OF AMSTERDAM CENTRAL STATION

- State of progress: **ongoing**
- Duration: **15 years (2002-2017)**
- Stages:
  - **2002-2011:** Work on structure and foundations
  - **2011-2017:** Work on the station's passenger areas
- Financing: **Dutch government**
- Stakeholders:
  - **NS and NS station**
  - **Prorail**
  - **The Dutch government through the Ministry of Transport**
  - **The city of Amsterdam**

## OUTCOME/EXPECTED RESULTS

- New times: **24/7 (currently closed between 5am and 1am)**
- New capacity: **350,000 visitors/day**
- New retail capacity: **100 shops and triple the surface area**
- New urban integration: **Making the station part of an urban course within the Central district along the banks of the IJ**
- Degrees of automation in the station: **50%**
- Level of outsourcing: **50%**
- New equipment:
  - **New inter-change hub**
  - **New shopping arcade**
  - **New services: care centre, crèche**



### The aim

- Upgrade some stations by strengthening their foundations, particularly in cities such as Amsterdam where sinking has been observed.
- Improve station inter-modality and incorporation into the urban environment.
- Increase station capacity.

The new trend in upgrading major Dutch stations is to define a model: The new model of modern highly serviceable stations, with a made in Netherlands label guaranteeing the quality of service and a new European standard.

### OUTLINE OF THE STATION'S RENOVATION PROJECT

The station is currently being totally transformed in one of the largest renovation projects it has ever known. Set to take 15 years and costing 20 million euros, the project started in 2002 with major work

carried out on the station's foundations (pilings), in order to strengthen the foundations and create the necessary routes for the underground project crossing the city from north to south.

Such radical renovation of the station follows the prediction that the station will reach saturation point by 2020, as well a desire to improve the quality of service in Amsterdam Central station.

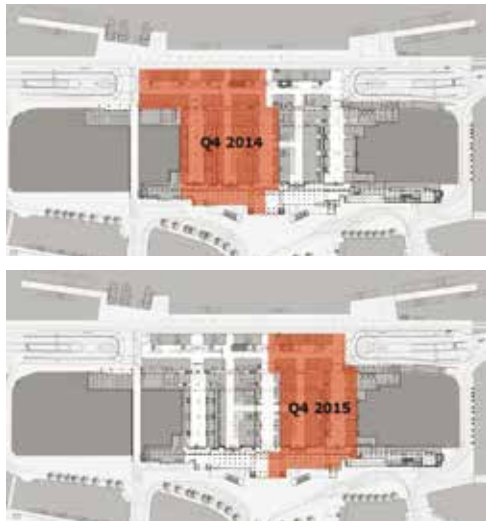
With this phase of the project completed, this will be followed by an important stage of transforming the visible part of the station, extensive work which was difficult to conduct whilst keeping the station running with over 70 million passengers a year. Among the changes to the station layout:

- Increase in the total surface area of the station with the new transit terminal
- Increase in retail space within the station
- Filling in roads around the station
- Changing the main entrance on the North and South sides

The new transit terminal is an extension of the station to Lake IJ, a multimodal hub with a bus station, access to the underground and waterway shuttle service. An impressive roof will cover it all while the urban level will become pedestrianised with the filling in of roads along the banks. The work being conducted on the terminal will be completed by 2017 and the multimodal platform is currently 50% operational.

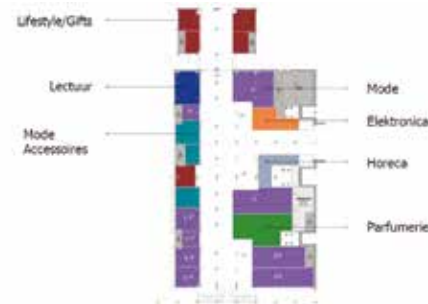
This renovation project also aims to improve the quality of service in the station, the leitmotiv of NS for all layout changes that have been made to the station since 2010. This is based on the premise that 38% of station users are tourists, with expenditure of up to 3.8 million euros for international tourists and 4 million for national users.

The decision-makers have therefore opted for a temporary spatial organisation of the station, and a targeted business strategy has been developed.

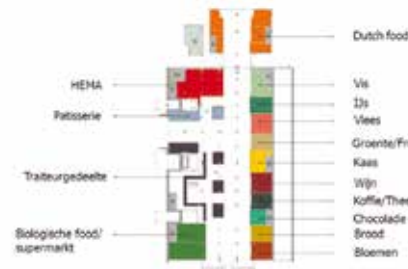


Each part of the station has been redeveloped to hold a number of businesses and services to match the targeted customers, the time they spend in the station and their consumer habits. The station is thus organised into three temporary sections:

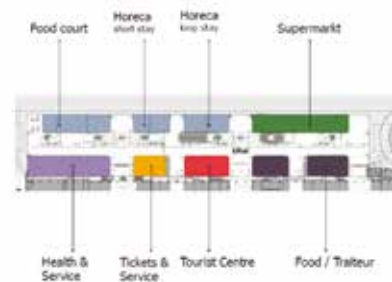
**1. Lifestyle (fashion, media, health, beauty and accessories)**



**2. Day (grocer, fast food, food products, hand-made products, little Amsterdam)**



**3. Work (Meetings and traditional catering)**



Work on the main part of the station over a period of two years between 2014 and 2015, where the station will be kept open.

**HISTORY OF AMSTERDAM CENTRAL STATION**

Built between 1881 – 1889 based on a design by architect Pierre J.H Cuypers and engineer Adolf Leonard Van Gendt. Building the station and laying the tracks required cutting Amsterdam off from its own waterfront, which avoided railway lines being built across the old city. The station was built on three man-made islands in the IJ lake connected by the filling-in of the canals that separated them. The sand that was used came from the North Sea Canal. Like many other buildings in Amsterdam, the station is built on 8687 wooden piles. Subsidence occurred when it was first being built, which led to several years' delay on the project, before the inauguration of the building which took place on 15 October 1889. The station's roof, consisting of a 45m roof span arch of cast iron, was built in 1889. A narrower extension of this roof was carried out in 1935, but since this did not cover a number of tracks, a third roof was then built in 1999.

➤ On an urban scale Amsterdam Central Station wishes to reconnect with its city with a new pedestrian walkway and better access to the station by filling in roads around the station and redevelopment of the squares on the north and south sides of the station.

# MADRID PUERTA DE ATOCHA STATION / SPAIN



## GEOGRAPHICAL CONTEXT

- Madrid is a densely populated city with 3 233 527 inhabitants.
- Economic capital of Spain.
- Urban context: 2 km from the city centre.
- At the heart of a dense urban fabric.
- Distance from Madrid Atocha station to Madrid airport is 25 km – 30 minutes by suburban train.

## STATION'S POSITION ON RAILWAY NETWORK

- Madrid Atocha station's geographical location in southern Europe makes it relatively distant from the main European stations, but it is the hub of the Spanish network.

## LOCATION WITHIN MADRID TRANSPORT SYSTEM

- 5 of the 8 regional lines.
- 2 metro lines.
- 3 tram lines.

## THE SPANISH RAILWAY SYSTEM

### Organisation

The Spanish railway system is run at present by the following organisations: Ministerio Fomento (Ministry of Transport); the regulator; ADIF (the only Infrastructure Manager in Spain); railway undertakings, RENFE being the sole passenger transporter. All these are public agencies.

### The Spanish rail network

The distinctive features of the Spanish rail network are:

1. The existence of different rail gauges: four gauge types on the 15 233 km network, including 8 791 km of electrified track (2004).
    - Broad gauge (1 668 mm): 11 829 km (6 950 km electrified at 3kV CC)
    - Standard gauge (1 435 mm): 1 450 km (all electrified at 25 kV DC)
    - Metre gauge (1 000 mm): 1 926 km (815 km electrified) and 914 mm gauge on just 28 km (all electrified)
- Since the 1980s, Spain has nevertheless applied a general policy of converting its network to standard gauge in order



Madrid Puerto De Atocha Station. Source: Adif

to facilitate international rail links with neighbouring countries, in particular France, including through the use of dual gauge track.

2. The expansion of the high speed network in Spain, thanks to the European programme, with corresponding alterations to the stations with the arrival of high speed.

## MADRID PUERTA DE ATOCHA STATION KEY FIGURES AND ACCESSIBILITY

- Date of construction: **1857**
- Date of last renovation: **2010**
- Total station surface area: **104 195 m<sup>2</sup>**
- Number of travellers/year: **46 million**
- Number of visitors/day: **94 000**
- Retail space: **7 400 m<sup>2</sup>**
- Number of retail outlets: **47**
- Infrastructure manager: **ADIF**
- Operator: **Renfe**
- Number of tracks in station: **15, including 11 dedicated to HS traffic**
- Number of trains/day: **700 trains (209 high speed/day)**
- Number of metro lines: **2**
- Number of regional lines: **7**
- Number of bus routes: **9**
- Number of regional stations with direct services: **99**
- Number of public parking spaces: **617**
- Cost of parking near the station: **€27.95/day**
- Presence of checkpoints in the station: **yes**
- Transfer time in station: **12 minutes**
- Mode of access: **26.9% taxi, 13.6% metro, 12% suburban trains, 8.9% pedestrian/cycles**

## GOVERNANCE AND FINANCING OF SPANISH STATIONS

### Governance

ADIF owns and manages a total of 1648 stations and other logistics equipment in its network. Some suburban stations, 482 in number, are run by RENFE Operadora which does not have a specific stations department.

Of the stations operated by ADIF, the largest, national ones have commercial and retail premises on site and are run by a specific department of ADIF, the “Dirección de Estaciones de Viajeros” (Passenger Stations Management), which is responsible for 99 stations used by 170 million passengers a year. These stations contain:

- 91 000 m<sup>2</sup> of retail space
- 35 820 m<sup>2</sup> of restaurant space
- 14 605 car parking places

### Financing

Financing of construction and renovation is by the Spanish government, Adif and Renfe.

Financing the operation of stations depends on the category, of which there are three in Spain:

1. Mainline stations
2. Suburban stations
3. Other stations

Besides the fact that this classification defines the type of station governance, it also provides the basis for the funding policy

of each station: ADIF itself operates some of the retail space in the larger stations (around 50 shops per station) under the trade name Vialia, which is 40% owned by ADIF and 60% by Riofiosa, a commercial property developer; and in stations with 5 to 10 shops under the trade name “tiendas de la estación” (station shops), 100% owned by ADIF. This constitutes a significant diversification of the business and an important source of funding, in addition to access fees and rental income.

## DESCRIPTION OF THE STATION RENOVATION PROJECT

Madrid Puerto De Atocha station has been altered many times since it was opened, in order to adapt to the growing need to increase capacity.

One of these first renovation projects consisted of increasing the number of tracks to cope with higher traffic levels, leading to the building of tracks outside the centre of the station, which then became vacant. This is the area now occupied by the nature park at the heart of the historic building.



The various renovation projects at Madrid Atocha station since 1892. Source: ADIF.

## RENOVATION OF MADRID PUERTA DE ATOCHA STATION

- Renovation: **2010**
- Duration: **2004-2010**
- **Stages:**
  - Construction of the new arrivals terminal
  - Reorganisation of the flow of arrivals and departures in the station
- Financing: **government, railway undertakings**
- Stakeholders:
  - **City of Madrid**
  - **Transport Ministry**
  - **Railway undertakings**



Site coverage of station extension in 2010. From left to right: Project to expand Atocha Railway Station for tertiary purposes: a total of 3,500 parking spaces and other commercial purposes (in green); Project to expand the station for rail purposes (in blue); Existing railway complex (in yellow). Source : Adif.



Views of the new arrivals terminal in the station. Source: Adif.

Later, in 1990, major renovation work was carried out, to separate traffic flows in the station, reduce transit time and manage flows in the station. This was achieved by the construction of a new terminal for urban and regional traffic, a significant reorganisation that prepared the way for the arrival of high speed in Atocha station in 1992, when very large-scale construction work was carried out to adapt the station to the demands of this new traffic. The question of restructuring the layout of Madrid Atocha station has often been linked to issues of flow management, since the station's geographical location has always placed it at the heart of the Spanish network, giving it the primary vocation of being a national and international hub.

This need to expand the station was again behind the latest renovation project, dating from 2010, to build a new arrivals terminal.

### Challenges of the renovation project

With the increasing risk of seeing the station congested, there was a need to extend the station on the basis of the available real estate around the historic station building.

### The project

As there was sufficient land available around the station, the project consisted of extending it on a free area parallel to the mainline tracks.

## CONCLUSION/EXPECTED OUTCOME

- Reorganisation of flows through the station
- Preventing the risk of the historical mainline terminal becoming overly congested
- Construction of a dedicated arrivals terminal

### KEY PROJECT DATA

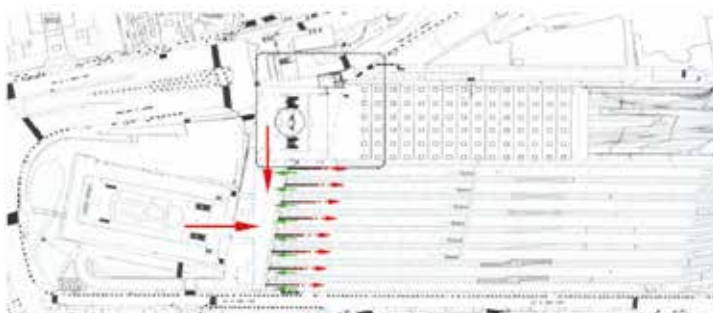
- Total surface area: 2708 m<sup>2</sup>
- New retail area: 408 m<sup>2</sup>
- Number of new retail outlets: 8

The new retail space is relatively small compared to the potential space in the new terminal and to the 105 000m<sup>2</sup> total surface area of the station, which has total retail space of 7500 m<sup>2</sup>. However, this renovation project was centred on transport issues, to find solutions to the problems of flow management experienced in Madrid Atocha station.

- 210 m of arcades between the pre-existing terminals and the new one
- 6 new lifts
- 12 mechanical ramps

Madrid Atocha station has focused on improving accessibility, and fluidity of movement in the open spaces of the station, in its bid to attract increasing numbers of passengers.





Station Plan between 2004 and 2010. Source: ADIF

A new arrivals terminal is planned, as well as a new car park, both connected to the original two terminals by a whole network of ramps, escalators and lifts.

By comparing flows in Atocha station in 2004 and in 2010, it can be seen that there has been a complete reorganisation of the station, with separate, dedicated terminals, and this has facilitated access to the platforms. This project has also included updating the station, with an ultra-modern terminal and innovative facilities.

The focus has been placed on improving access for people with disabilities, by increasing vertical and horizontal mechanical links.

### HISTORY OF THE STATION

The original building was constructed by MZA railways for the Madrid Alicante line, and was opened in 1851 with the name 'Estacion de Mediodía' (Southern Station). It was Madrid's first station.

A fire in 1856 destroyed a large proportion of the station, which was then rebuilt with a metal structure in 1892.

The station has undergone several renovations, the most recent work being carried out for the arrival of high speed in 1992, when the architect Raphael Moneo had a 4 000 m<sup>2</sup> park constructed in the middle of the station with 7 000 trees and plants, and a wide variety of tropical birds.



# ZURICH CENTRAL STATION / SWITZERLAND

## SWISS RAILWAY SYSTEM

### Organisation

The Swiss railways are organised within an integrated structure, with specialised subsidiaries. Several railway undertakings operate on the Swiss network, their size depending on the network area they cover and the amount of passenger traffic they manage. The Swiss Federal Railways (SBB-CFF-FFS), a state company supervised by the federal government, are the leading company in terms of traffic. The second major Swiss company is a private one, BLS. There are also more than 80 private companies operating on small sections of the network, some covering less than 30 km.

### Swiss railway network:

The Swiss network has a very specific configuration, which explains in part how the railways are organised:

→ Dense and not very centralised, saturated in certain parts, total length 5 129 km (2008), 80% standard-gauge track (1 435 mm).

→ Organised hierarchically according to traffic flows:

1/ Major routes: two

North-south: international transport, with



two through lines (Lötschberg base tunnel and Saint Gotthard tunnel).

East-west: Geneva to St. Gall, domestic passenger and freight traffic.

2/ Main lines: *intercity trains, ICE, TGV, Euro-city.*

Includes high speed lines and freight traffic representing over 2 million tonne-kilometres per year.

3/ Regional lines: *Regio and Regio Express trains. Mainly in the north of Switzerland and on the plateau.*

4/ Urban and suburban lines: S-Bahn trains (suburban to short-distance regional ser-

vices) at regular intervals, stations located close to one another and specific tariffs. Good interconnections and through traffic in town and city centres.

The specificities of the network are the presence of several track gauges and different voltages depending on the line section, effectively forming several networks of varying sizes. There are two main networks (SBB and BLS) and the small private companies operate small and very small networks, some of which are no longer than a dozen kilometres.

### GEOGRAPHIC LOCATION

- Zurich is a densely populated city with 372 047 inhabitants (similar to a medium-sized French city such as Toulouse).
- Economic capital of Switzerland.
- Urban context: central.
- At the heart of a dense urban fabric with commercial and service activities (Bahnhofstrasse area).
- Distance between Zurich Central Station and Zurich airport: 15 km - 10 minutes by train.

### STATION'S POSITION ON RAILWAY NETWORK

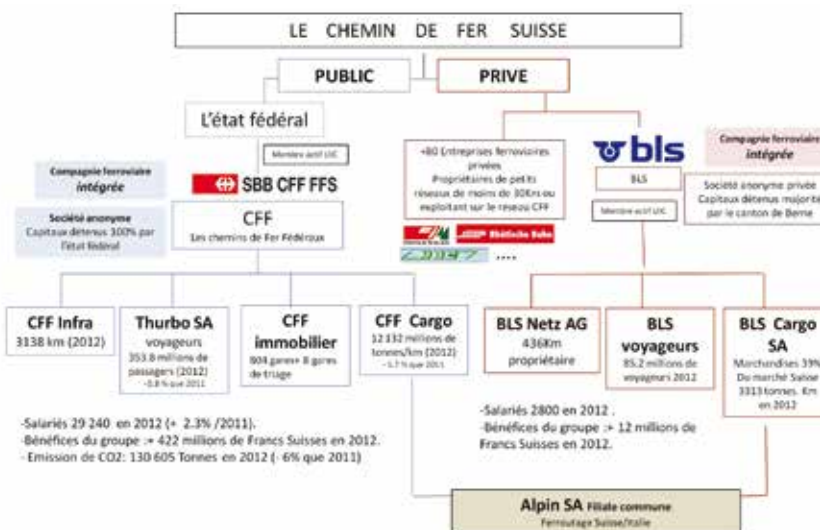
- International hub system
- Part of the main national route (highest amount of traffic), 2h30min from Geneva.

### SITUATION WITHIN ZURICH TRANSPORT NETWORK:

- Zurich Central Station is served by 8 out of 13 tram lines.
- Zurich Central Station is served by 6 S-Bahn [suburban] lines.

**ZURICH CENTRAL STATION  
KEY FIGURES AND ACCESS**

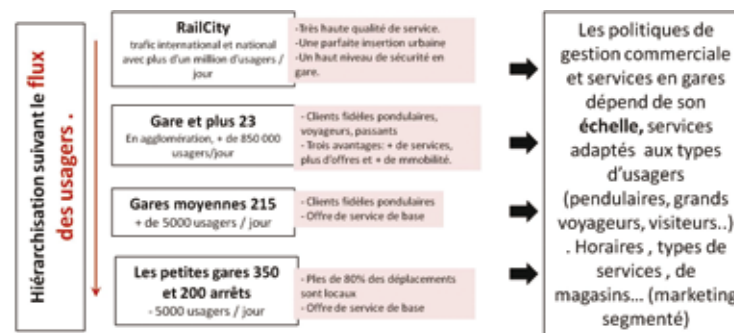
- Year of construction: **1847**
- Date of last renovation: **2011-2014**
- Total station surface area: **105 000 m<sup>2</sup>**
- Number of travellers/year: **130 million**
- Number of visitors/day: **400 000 visitors**
- Retail space: **18 000 m<sup>2</sup>**
- Number of retail outlets: **122**
- Infrastructure manager: **SBB-CFF**
- Operator: **SBB-CFF**
- Number of tracks in station: **26, including 16 dedicated to HS traffic**
- Number of trains/day: **3000 trains (42% urban, 28% regional, 20% long-distance)**
- Number of tram lines: **8**
- Number of regional lines: **6**
- Number of bus routes: **46**
- Cost of parking near station: **4.2 Swiss francs/h**
- Presence of checkpoints in station: **yes**
- Transfer time in station: **6 minutes**



SMGG «stations» study - Organisational structure of the Swiss railways. UIC 2013



SMGG «Stations» study - Governance of Swiss stations. UIC 2013



SMGG «Stations» study - Financing model for Swiss stations. UIC 2013

**GOVERNANCE AND FINANCING  
OF SWISS STATIONS**

**Governance**

Ownership: CFF Immobilier: an independent real estate company on a competitive market which manages the 800 stations on the CFF network as well as 3 500 buildings and 4 000 land plots throughout Switzerland. CFF Infra: platforms, tracks and access ramps.

Management: CFF Infra and CFF Immobilier: governance is organised based on the nature of the station, with a hierarchical classification of stations on the Swiss railway network.

CFF Immobilier (independent real estate company which includes station management among its responsibilities), signed 30 000 station lease contracts in 2012.

**Financing**

Financing the construction and renovation of Swiss stations: CFF, CFF Immobilier, the federal government and CFF Infra finance renovation work in stations. Public-private partnerships also exist for the construction of new stations.

Station operating costs are covered through market segmentation and diversification of the railway undertakings' activities within the stations, with a focus on sales and services.

With regard to financing station operating costs, improvements to services and commercial improvements as a source of

funds depend on the nature of the station and its significance on the Swiss network; the more a station is considered significant, the more support activities will be provided in the station.

## RENOVATION OF ZURICH CENTRAL STATION

- Progress status: **ongoing**
- Duration: **2011-2014**
- **Stages:**
  - Sub-surface work to change from a cul-de-sac to a through-station configuration.
  - Reorganisation of space within the station.
- Financing: **CFF Immobilier and federal government.**
- Stakeholders:
  - **CFF**
  - **Government**
  - **Local authorities**

## CONCLUSION/EXPECTED OUTCOME

- New capacity: **500 000 visitors/day**
- New surface area: **105 000 m<sup>2</sup>**
- New retail surface area: **18 000 m<sup>2</sup>**
- New situation within city: **through-station configuration**
- Level of automation in station: **60%**
- Level of outsourcing: **70%**
- New facilities:
  - **New car park.**
  - **New passenger services.**
  - **New shopping arcade.**

## RENOVATION POLICY FOR STATIONS IN SWITZERLAND

### Latest trends

The new policy for station renovation was effectively launched after the 2011 CFF report on the risk of serious congestion in Swiss stations by 2040. In the 70 major Swiss stations, the number of passengers is set to increase by 40 to 140% by 2040. In the medium term, twelve stations will need resizing, including Morges and Rolle (VD) in French-speaking Switzerland.

Redeveloping these 12 stations will require 200 million Swiss francs of short-term financing. In the long term, 2 to 3.5 billion Swiss francs will be needed. The Geneva-Lausanne line, which is the most vulnerable part of the network, will be the top priority.

### Purposes of renovation

- Urban: stations in harmony and interacting with their environment.
- Sustainable: in line with new European standards.
- Financial: increased station cost-effectiveness.

### Swiss problems and difficulties

- Scarcity of available land around the stations.
- Historical significance of station buildings (listed).
- Increase of traffic and risk of serious congestion.

### Aims

- Generalise the new concept for Swiss stations and establish the right image by improving services.
  - Integrate stations into their environment and improve the image of stations (as architectural objects).
  - Increase the capacity of the Swiss stations that are highly congested. The lack of available land around the stations, which often lie at the centre of towns and cities has led to the development of underground stations in Switzerland.
- The recent trend in renovating major Swiss stations is to define a new model of «Swiss-style» major stations: service-oriented components of cities, commercially efficient and perfectly connected. Concentrating passenger activities underground appears to be one of the preferred solutions in Switzerland.

## DESCRIPTION OF STATION RENOVATION PROJECT

### Observations

With over 3 000 trains / day (884 main-line trains) and 400 000 passengers / day,

- figures which are set to rise by 45% by 2030 (national estimate), Zurich station reached saturation point in the mid-2000s due to:
  - Timetables with regular intervals between trains.
  - Development of the suburban network.
  - Commercialisation of the station.

### Objectives

The project is aimed at expanding and reorganising flows and activities within the station by grouping them and allocating sectors.

### Renovation work

The station will become a more visible element of the urban landscape, better integrated with other transport infrastructure.

- From a cul-de-sac to a through station: the current configuration of the station makes trains have to stop for longer in the station. By way of an example, travelling from Berne to Zurich takes 56 minutes by train. No other transport mode comes close to matching that journey time. However, before leaving again in the other direction towards the airport and St. Gall, the train has to wait at the platform for nine minutes due to Zurich central station being a cul-de-sac. Renovation is centred around a new cross-city line which will save time for intercity and regional services.

The line will include three major civil engineering structures: Weinberg tunnel, which will allow trains to reach Oerlikon



Project for cross-city line to Zurich station. UIC 2013

directly by an underground route, a new through station 16 metres under the tracks of the central station and, to the west, two bridges which will pass over the tracks parallel to the central station and cross the road bridges at right angles. Culminating at a height of 20 metres and supported by 30 pillars over a distance of more than one and a half kilometres, the two bridges will have a major impact on the urban landscape.

→ Optimisation of station space: the factors identified as causes of congestion included a lack of flow management and an excessive number of different uses, multiplying the number of journeys and the need for space. This situation could be worsened by the increase in commercial

services in the station should that increase not be thought out intelligently:

Zurich station has always been used for many purposes: its main hall, emptied of all clutter following renovation work in 1997, now hosts commercial activities (market, sales exhibitions, etc.). In addition the station includes several retail outlets, a post office, an opera house, an exhibition room, a police station, a church, a dental clinic, a doctor's surgery and a shopping centre (in the basement, the 4th largest in the country).

The renovation project was aimed at consolidating this configuration by grouping together activities of the same type. The basement thus saw an increase in commercial activity whereas at street level the station was rearranged around service

activities, with movements of people organised into optimised, planned and smaller flows.

### Expected outcome of renovation

Increase station capacity (including commercial capacity to offset financial cost), shorten train stopover times and optimise flows.

### Financing of station renovation work:

The total cost is 2 billion Swiss francs. Financing is shared between CFF Immobilier and the federal government.

### Outcome of renovation work

→ New commercial possibilities: increase in station's commercial capacity of 2 500m<sup>2</sup>

→ Layout (2012 merchandising)

A commercial area consisting of 3 levels (main hall, intermediate basement, underground shopping centre) with 122 retail outlets, including:

- 19 retail outlets on the main platform at street level (in historic building around Wannerhalle hall, 1 800 m<sup>2</sup>)
- 2 retail outlets on the intermediate underground level.

101 retail outlets in the underground shopping centre.

→ Average time spent by users in the station before and after renovation:

Before (2007): 15 to 20 minutes. After: 30 minutes (making it one of the European stations with the highest amount of time devoted to shopping).

### HISTORY OF ZURICH CENTRAL STATION

In 1847, the city's first station, simply named Bahnhof Zürich [Zurich station], was officially opened. It had been designed by the architect Gustav Albert Wegmann. It was to serve as the terminus for the Schweizerische Nordbahn [Swiss northern railway] line starting in Basel. In 1871 the station was extended and renovated to meet ever-increasing traffic demands. Its main entrance was rebuilt in the style of a triumphal arch.

The station used to be a cul-de-sac, with trains having to leave whence they came. Since then a tunnel has been built, allowing trains to continue on to Zurich Stadelhofen station. Originally used solely by the city's S-Bahn service, the tunnel is now open to InterCity Express services.

# MOSCOW KAZANSKY STATION / RUSSIA

## GEOGRAPHICAL CONTEXT

- Moscow is a densely populated city (4 500 inhabitants/km<sup>2</sup>).
- Economic capital of Russia.
- Urban context: central.
- At the heart of a dense urban fabric.



54

## STATION'S POSITION ON RAILWAY NETWORK

- Many international services depart from Moscow Kazansky Station to ex-USSR countries: Kirghizstan, Kazakhstan and Uzbekistan
- The station is part of an international hub consisting of three stations located around a square, «Komsomolskaya Square», also known as the three-station square.

## SITUATION WITHIN MOSCOW TRANSPORT NETWORK

- Having these three stations on a single square represents a major urban asset. Unfortunately metro services are poor, although a circular line connects the square to the rest of the network.

## RUSSIAN RAILWAY SYSTEM

### Organisation

Russian Railways are a public limited company (100% of shares are held by the Russian state). Following the collapse of the Soviet Union, the company inherited the entire Soviet network, which totalled 85 200 km (2<sup>nd</sup> largest in the world), and 987 of the 2046 companies that had been formed after the collapse. It operates 80% of the network, serving 1.3 billion passengers per year.

The company has an integrated vertical holding structure, and is distinguished by its significant international presence. It has a subsidiary specialised in international business which represents RZD on foreign markets, RZD Trading Company. For example RZD will be operating the Armenian railway network until 2038.

### Russian railway network

It covers 85 500 km with a track gauge of 1 520 mm (Russian gauge present in all ex-USSR countries). 22 000 km of lines

are electrified with alternating current (25 500 volts, 50 Hz) and 18 800 km are in direct current (3 000 volts). Some of the distinctive features of the network are its size, the importance of long-distance traffic and the international trans-European or trans-Asian lines such as the Trans-Siberian Railway, the Moscow Express, etc. There is no distinction between regional and urban traffic.

**MOSCOW KAZANSKY STATION, KEY FIGURES AND ACCESSIBILITY**

- Construction year: **1940**
- Total station surface area: **64 641 m<sup>2</sup>**
- Number of passengers/year: **1 400 passengers/hour**
- Retail space: **10 290 m<sup>2</sup>**
- Number of retail outlets: **71**
- Infrastructure manager: **RZD**
- Operator: **RZD**
- Number of tracks in station: **17**
- Number of trains/day: **416 trains (116 long distance)**
- Number of metro lines: **2**
- Presence of checkpoints in station: **yes**
- Station manager: **RV, subsidiary of RZD**



Organisation in 16 regional sections (subsidiaries) of RZD (Russian Railways). Source: RZD.

programme also involves modernisation and renovation of many stations across the network.

The objectives of the programme for stations include:

- 1.** Improving the organisation of flows of travellers in stations.
- 2.** Improving safety in stations.
- 3.** Improving station accessibility, particularly for persons with reduced mobility.
- 4.** Bringing better responses to environmental issues by reducing the energy impact of stations.
- 5.** Increasing the economic efficiency of stations in order to achieve financial autonomy in terms of operating costs.

**GOVERNANCE AND FINANCING OF RUSSIAN STATIONS**

**Governance**

- Ownership: RZD: buildings and passenger areas.
- RZD: platforms, tracks and access ramps.
- Management: RV, a subsidiary of RZD, is in charge of developing and managing the stations.

**Financing**

The construction and renovation of Russian stations is fully financed by RZD, in some cases with participation from private investors or in 50/50 partnerships with regional authorities.

Financing of operating costs of stations: RZD and commercial revenue.

**RENOVATION POLICY FOR STATIONS IN RUSSIA**

**Latest trends**

As part of a large-scale project launched in 2008 with the purpose of upgrading the Russian railway network, an investment programme running up to 2030 and representing 600 billion roubles (roughly € 20 billion) provides for the construction of new lines and renewal of the rolling stock fleet. RZD is set to finance 40% of this modernisation programme, with the rest of the investment sums to be covered by the federal and regional budgets. The

**Different types of station in Russia**

- Divided into four classes according to the type of traffic:
- Highest class: in major conurbations such as Moscow, with over 1 500 passengers/day.
- Class I station: 1 200 to 1 5000 passengers/day
- Class II station: 500 to 900 passengers/day
- Class III station: 300 passengers/day
- Class IV station: size < 500 m<sup>2</sup> and fewer than 300 passengers/day.



Moscow metro scheme

## RENOVATION OF MOSCOW KAZANSKY STATION

- Progress status: **ongoing**
- Duration: **2011-2013**
- Stages:
  - **Redevelopment of the passenger area.**
  - **Opening in 2012 of the Kazansky Station trade centre.**
  - **Rearrangement of station interior for Next Station 2013.**
- Financing: **RZD, Russian government and private funds for the parking areas.**
- Stakeholders:
  - **RZD**
  - **Government**
  - **Local and city authorities**

## CONCLUSION/EXPECTED OUTCOME

- **Improve service quality and modernise the station.**
- **Achieve financial autonomy for the station.**
- **Increase the surface area and commercial capacity.**
- **Transform the station into a modern hub.**



**Historic photograph of Kazansky Station.** Source: Moscow city website.



**Reorganisation plan for Kazansky Station in view of the International Next Station Conference.** Source: UIC 2013.



**View of one of the rooms provided for the International Next Station Conference 2013.** Source: RZD

## DESCRIPTION OF STATION RENOVATION PROJECT

Kazansky Station is the station with the highest amount of traffic in the Russian capital, and serious congestion is a genuine risk considering that the station has seen very few upgrades since its construction in 1940.

Two main objectives of renovation:

- Increase the financial autonomy of the station.
- Modernise the station and improve service quality.

The project has involved the opening in 2012 of a trade centre in the station, increasing retail space to 10 290 m<sup>2</sup> and the number of outlets to 71, with space for restaurants amounting to 4 367 m<sup>2</sup>. The

commercial surface area in the station is set to increase further.

- Improvements made to the station as part of the project include:
- Improved security in the station, with the installation of a CCTV system.
- Optimised passenger flows in the station to reduce travel time.

Reorganisation of certain areas for the 4<sup>th</sup> Next Station international conference:

In October 2013, Kazansky Station is hosting the 4th edition of one of the most important conferences on the subject of stations, Next Station. This edition is being organised by RZD (Russian Railways) and UIC (International Union of Railways). It will provide an opportunity for certain areas in Kazansky Station to be rearranged.

## HISTORY OF MOSCOW KAZANSKY STATION

Kazansky Station, formerly known as Ryazansky station, is a passenger terminal. It is one of nine railway terminals in Moscow.

The station building was constructed in 1862-1864 for the Ryazanskaya railways, becoming Kazansky Station in 1894.

The first train from Moscow to Kolomna departed from Ryazansky Station on 20 July 1862. Construction of the modern building of Kazansky Station began in 1913 and was completed in 1940. Kazansky Station is now the station with the most traffic in the city.



# SEOUL STATION / SOUTH KOREA

## GEOGRAPHICAL CONTEXT

- Seoul is a densely populated city with 10,464,061 inhabitants.
- It is the economic capital of South Korea.
- Urban context: central.
- At the heart of a dense urban fabric.
- Regional train: Incheon International Airport – Seoul station: 53 minutes

## STATION'S POSITION ON RAILWAY NETWORK

- The station is the gateway to South Korea, and the major point of entry to the high speed network.

## THE SOUTH KOREAN RAIL NETWORK

- The South Korean rail network comprises a total of 3378 route km; 39 % of lines are double-track, though only 49.5% are electrified. The network is built to standard gauge.
- High speed rail is a relatively recent appearance on the South Korean rail network, services having launched in 2004.
- The history of the railways has been dominated by the private sector, and most of the network was built under the Japanese occupation.

## THE SOUTH KOREAN RAIL SYSTEM

### Organisation

2013 reform: On 26 June 2013, the Korean government announced that the Korean rail system was to be restructured and a holding company formed, with three subsidiaries:

KTX for high speed services from 2014.

A freight subsidiary in 2015.

A maintenance subsidiary in 2015.

The restructuring includes the part-privatisation (51 %) of the South Korean railways.

## GOVERNANCE AND FINANCING OF SOUTH KOREAN STATIONS

### Governance

Ownership of station buildings: Korail.

Ownership of tracks, platforms, escalators, etc.: KR.

### Financing

Financing of construction and renovation of stations: South Korean government and private sector.

Financing of operating costs of stations: subsidies, station access charges, and retail activity.



### Renovation policy for stations in South Korea

Work building the South Korean high speed network began in 1992 with the line from Seoul to Busan; the Korean High Speed Rail Construction Authority (KHSRCA) was founded the same year to manage infrastructure construction projects, but also to renovate the major termini which would in future be served by high speed services.

The initial budget was 636 millions of dollars, an amount which increased by 81 % the following year. The network grew gradually, only culminating in 2004, when the KTX ran in revenue service for the first time.

There have been many projects to renovate South Korean stations, for example Busan, Daejeon, Mokpo and Seoul.

**SEOUL STATION, KEY FIGURES AND ACCESSIBILITY**

- Construction year: **1922**
- Date of last renovation: **2004**
- Total station surface area: **240,023 m<sup>2</sup>**
- Number of passengers/day: **100,000 passengers/day**
- Number of visitors/day: **1,000,000 visitors**
- Retail space: **31,854 m<sup>2</sup>**
- Number of retail outlets: **52**
- Infrastructure manager: **KR**
- Operator: **Korail**
- Number of tracks in station: **14, including 7 dedicated to HS traffic**
- Number of trains/day: **- trains (106 high speed)**
- Number of metro lines: **1**
- Number of regional lines: **1**
- Number of bus routes: **6**
- Number of metro stations with direct services from station: **27**
- Number of public car parks: **600 parking spaces**
- Cost of parking near station: **6.6 euros/day**
- Presence of checkpoints in station: **yes**

**DESCRIPTION OF STATION RENOVATION PROJECT**

The station has been renovated in two major stages:

1. Station renovated in preparation for the arrival of high speed services. Changes were made converting the station from a conventional terminus to a high speed station. This stage split the railway section into two parts.
  - Old part: including the old station building, this part would henceforth host customer service, ticket sales, and other services.
  - Dedicated high speed part: the rest of the station would receive high speed services, and the space would be redesigned to cope with greater passenger numbers.

This renovation significantly boosted the station's capacity and introduced a tailored range of new services and retail activities.
2. The second stage of renovation concentrated more on the old part of the station. This renovation had various goals: Restore the historic station building, which had not undergone any renovation since being built.

Year	Name of station	Service area	Parking surface area	Retail space
1989-2004	Seoul Railway Station (privately-funded)	9,448.40	5,173.00	16,612.81
2004-present	Seoul High Speed Railway Station	15,910.74	20,499.15	55,832.91



Sean Pavone - Dreamstime.

Boost intermodality at the station by improving access to other modes of transport. Align the station renovation project with wider urban planning aims, improving the station's integration into the surrounding urban environment. The station's conversion is part of an urban renewal project centring on the area north of the station. The locus of this project is the renovation of the central station, which now forms the focal point of this area. The new urban complex will comprise an international congress centre, hotels, housing, offices, public space, etc.

**HISTORY OF SEOUL STATION**

The first station was a 33 m<sup>2</sup> wooden building built in 1900 to coincide with the opening of the northern extension of the Gyeongin line.

The building was later destroyed and was replaced by what is now considered the «historical» part of Seoul Station. The newest part of this building is much more modern than the old, and was completed in 1957 by merging all the annexes of the old part.

For the 1988 Seoul Olympics, private investors funded an extension of the station, building the first purely private terminal.

## RENOVATION OF SEOUL STATION

- Progress status: **ongoing**
- Duration: **2004- 2014**
- Stages:
  - 2004:** Station redesigned for the arrival of high speed services.
  - 2009-2014:** Renovation of old part of station. Make the station an urban and commercial hub.
- Financing: **South Korean government and private sector.**
- Stakeholders:
  - **Korail.**
  - **KR.**
  - **South Korean government.**
  - **City of Seoul.**
  - **Private investors.**

## CONCLUSION/EXPECTED OUTCOME

- New opening hours: **05:10 – 23:00**
- New capacity
- New surface area: **240,023 m<sup>2</sup>**
- New retail surface area: **55,832 m<sup>2</sup>**
- New situation within city: **better connections with other urban transport networks.**
- Level of automation in station: **50%**
- New equipment:
  - **New high speed terminal.**
  - **Modernisation of old part of station.**

Better integrate station into the urban environment.



Urban regeneration project around Seoul Station.

Source: High Speed and the City, UIC final report 2010.

The renovation of the old station building, which no longer served its original purpose since the construction of the new high speed terminus in 2004.

Starting in 2009, renovation work has transformed it into a cultural centre comprising a multi-purpose exhibition and performance venue.

## **A QUICK LOOK AT SOME STATIONS AROUND THE WORLD...**



Guangzhou South Railway Station, China.



Moscow Kazansky Railway Station, Russia.

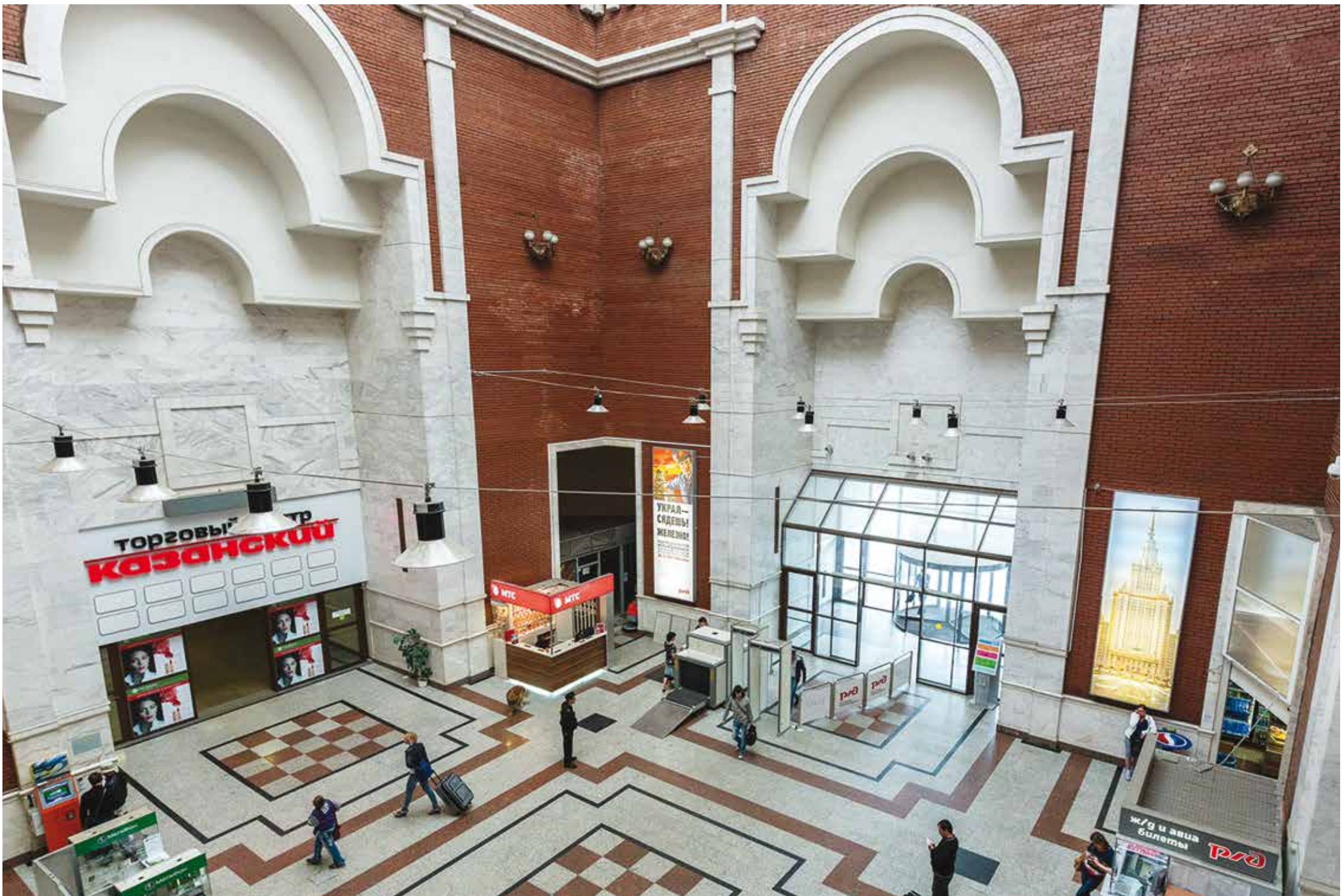


London Saint Pancras Railway Station, U.K.



Tokyo Railway Station, Japan.





Moscow Kazansky Railway Station, Russia.



Moscow Leningradsky Railway Station, Russia.



Meeting point in London Saint Pancras.



Tokyo Railway station, Japan.



Fes Railway Station, Morocco.

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# Railway Stations

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