Bus and tramway:

the French way to high-level service

BHNS
Bus à Haut Niveau de Service

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Cerema

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9 fields of operation...

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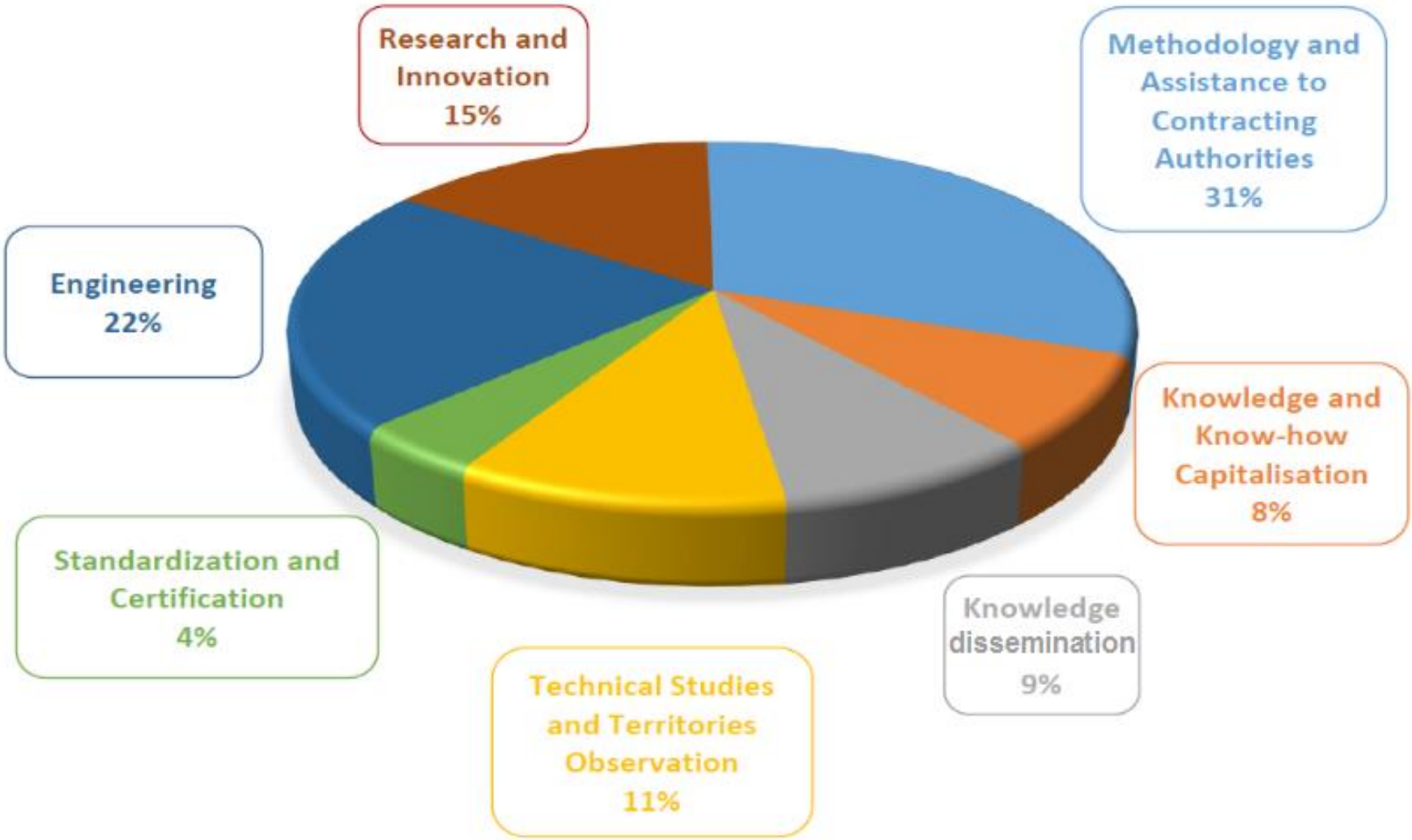
Mobility and Transportation

Management, Optimization, Modernization and Design of Infrastructures

Towns and Urban Strategies

... which intersect each other

Activity types



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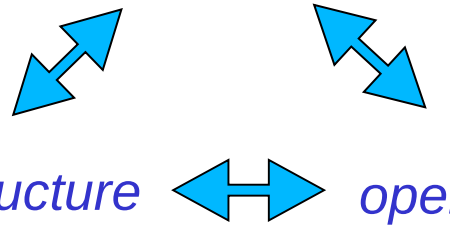
Tramway & BHNS :
what are we talking about ?!

Tram & BHNS as transport systems…

the rolling stock

Streetcars, bus, …



the infrastructure

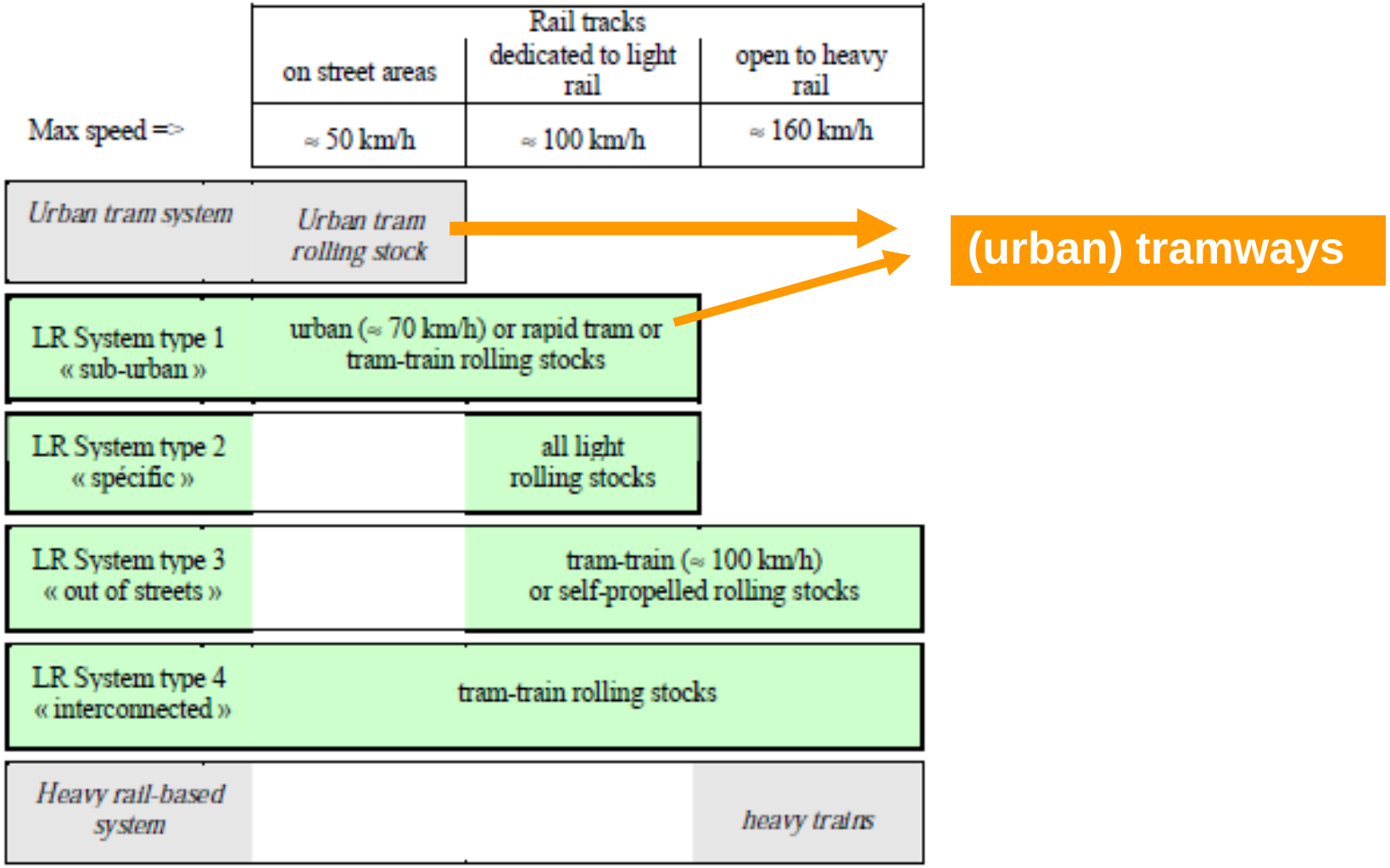
stops, junctions, linking sections

the operation

- **running conditions**
- **boarding/alighting of passengers**
- **network structure, intermodality**
- **image, communication**
- **maintenance**

Tramway : a functional based definition...

Light Rail-based systems *(« SFL » in French)*



Bus (with a) **H**igh **L**evel (of) **S**ervice *systems* : the idea of a bus operated as a tramway...

- **a road vehicle …**
- but **infrastructure design** and **operation manners** inspired from **rail systems**
  - dedicated lanes, right of way
  - stations (*and not simple stops*)
  - *ticketing, information*
  - *customized rolling stock*

Then, what is High-Level service …

« H.L.S. » refers both to

the level of service :

=> The quantity of proposed service

- frequency,
- capacity,
- travel time
- …

the quality of service* :

=> the respect of announced goals

- effectiveness of accessibilty
- reliability of information
- availability of the system

* European standard EN13816

The French meaning of High Level of Service (“HNS”)

Main indicators for High-Level Service :

- **regularity**
- **frequency**
- reliability / availability
- commercial speed
- *capacity, with a sufficient comfort*
- *accessibility (as compulsory)*

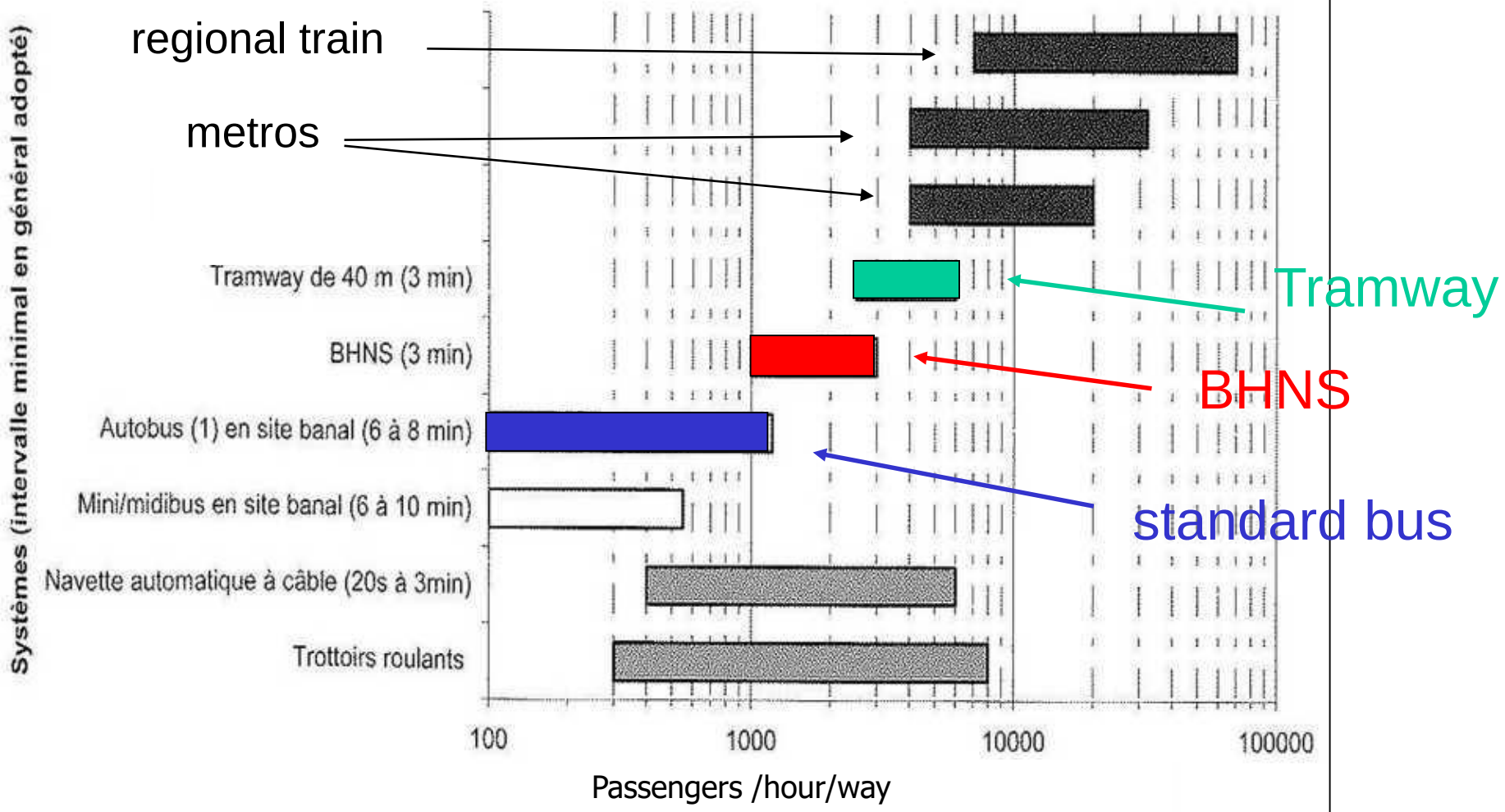
Additional criteria for attractiveness :

- wide operation hours range
- passengers information
- image

and the HNS system as backbones of a ranked network

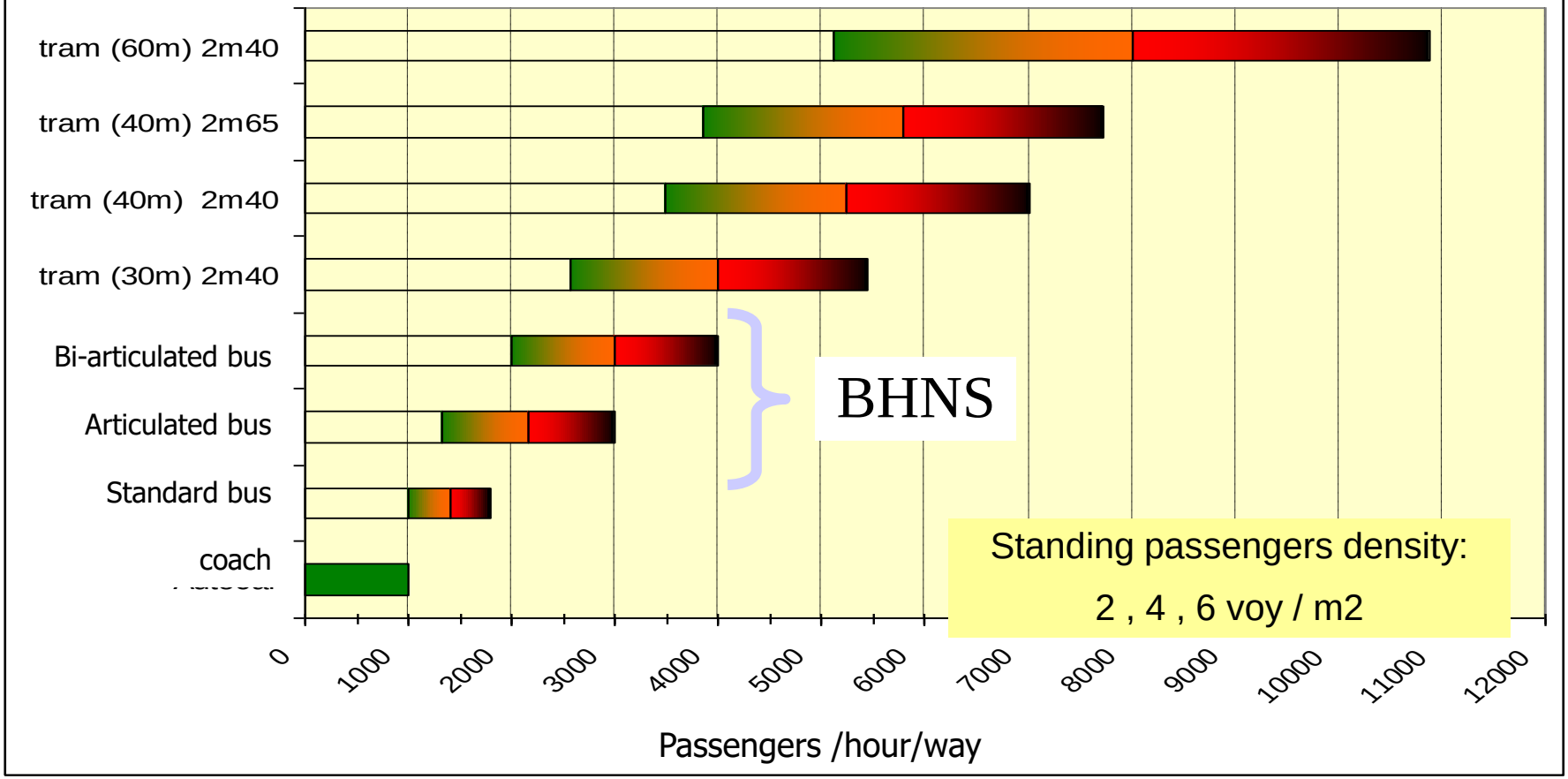
Tramway & BHNS, mass transit tools

for medium capacity needs …



Between Tramway & BHNS (and metro), a choice to be made

capacity is a criteria, but not the only one …

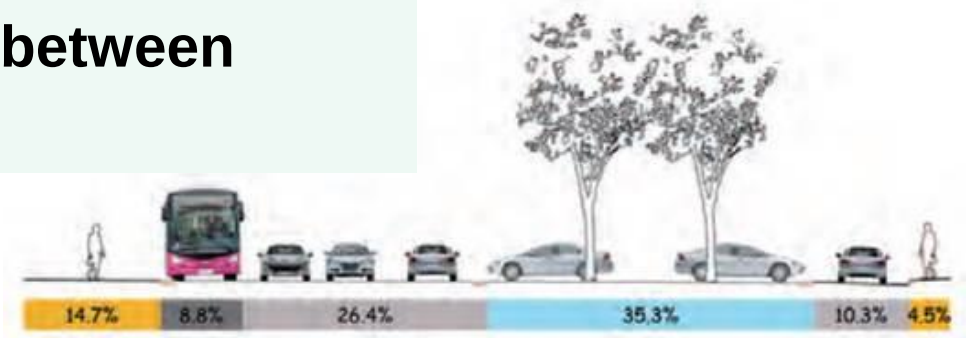


Tramway & BHNS, not only transport tools

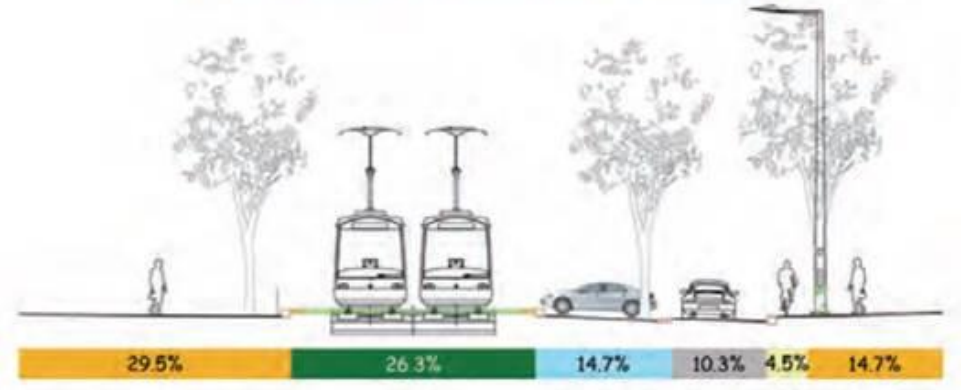
but also urban planning and public space design and uses management

Dijon : inversion of space distribution between users

before works



after works for tram line



Nantes Busway :
a former highway

Tramway & BHNS, not only transport tools

but also urban planning and public space design and uses management

(Urban) public transport : the French context

Actors in French public transport

- Regulation and control => **State**
- Management of PT systems => "**AOM**" : organising authorities
  - State => national railways & coach lines
  - Regions => regional railways, interurban coach lines
  - *Departments => local railways*
  - **Local "AOM" (*cities*) => urban transport**
- Providing of transport services => **Operator**s
  - **for urban transport**
    - mainly, private companies through a contract with AOM
    - a few public companies (cities)
- Roads and public space and traffic management
  - **In towns : cities** (or *federation of cities*)

The regulatory framework of French Public Transport

Management of PT projects

(as other infrastructure or building projects « MOP » law of 12 juillet 1985)

⇒ relations between

public contracting authority / (private) project management

Administrative procedures

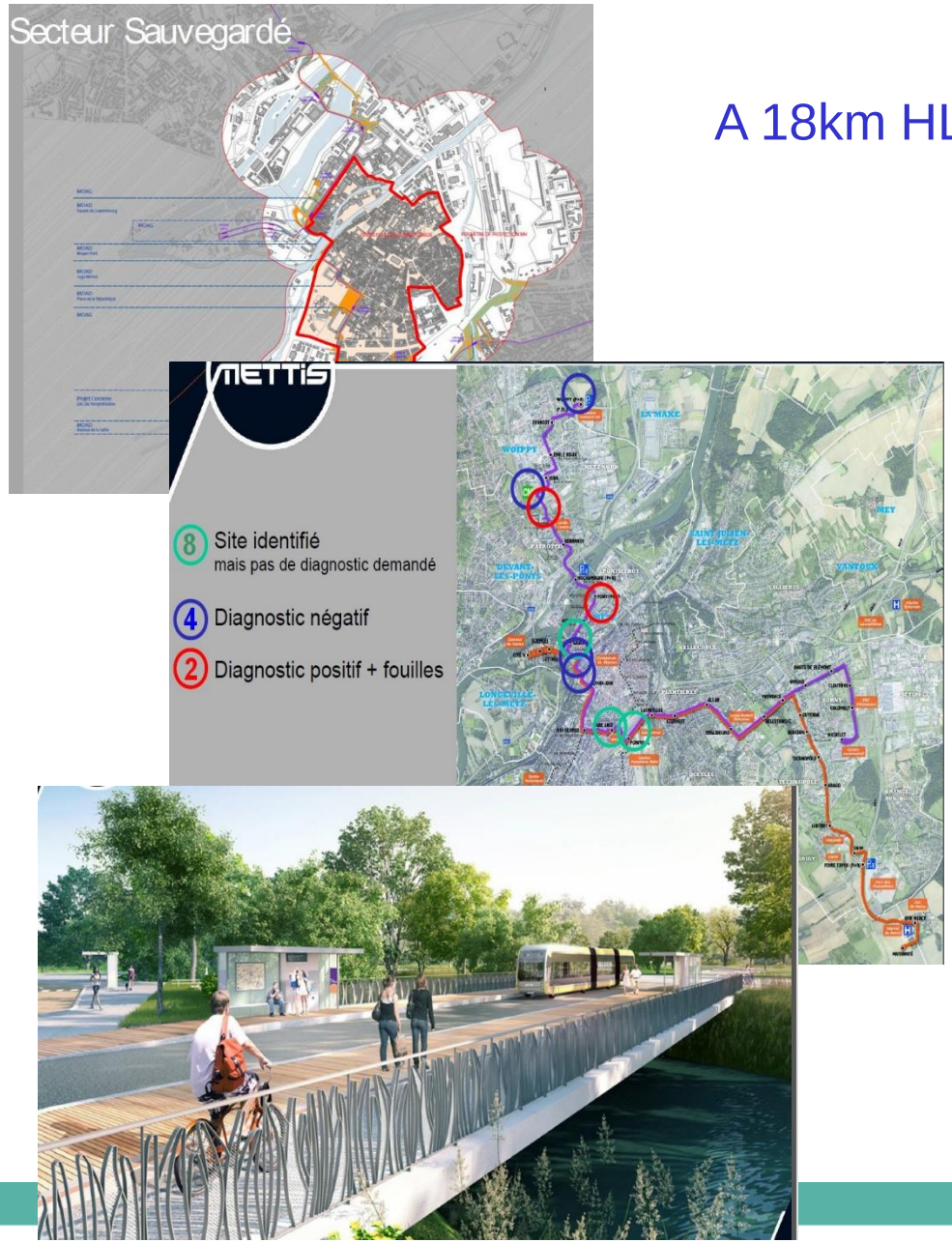
- a legal framework in constant evolution…
- Main topics
  - Public interest
  - Socio-economic viability
  - Environmental impact

Technical framework

- Construction issues
- Use issues
- Interaction with external context

=> rules, standards

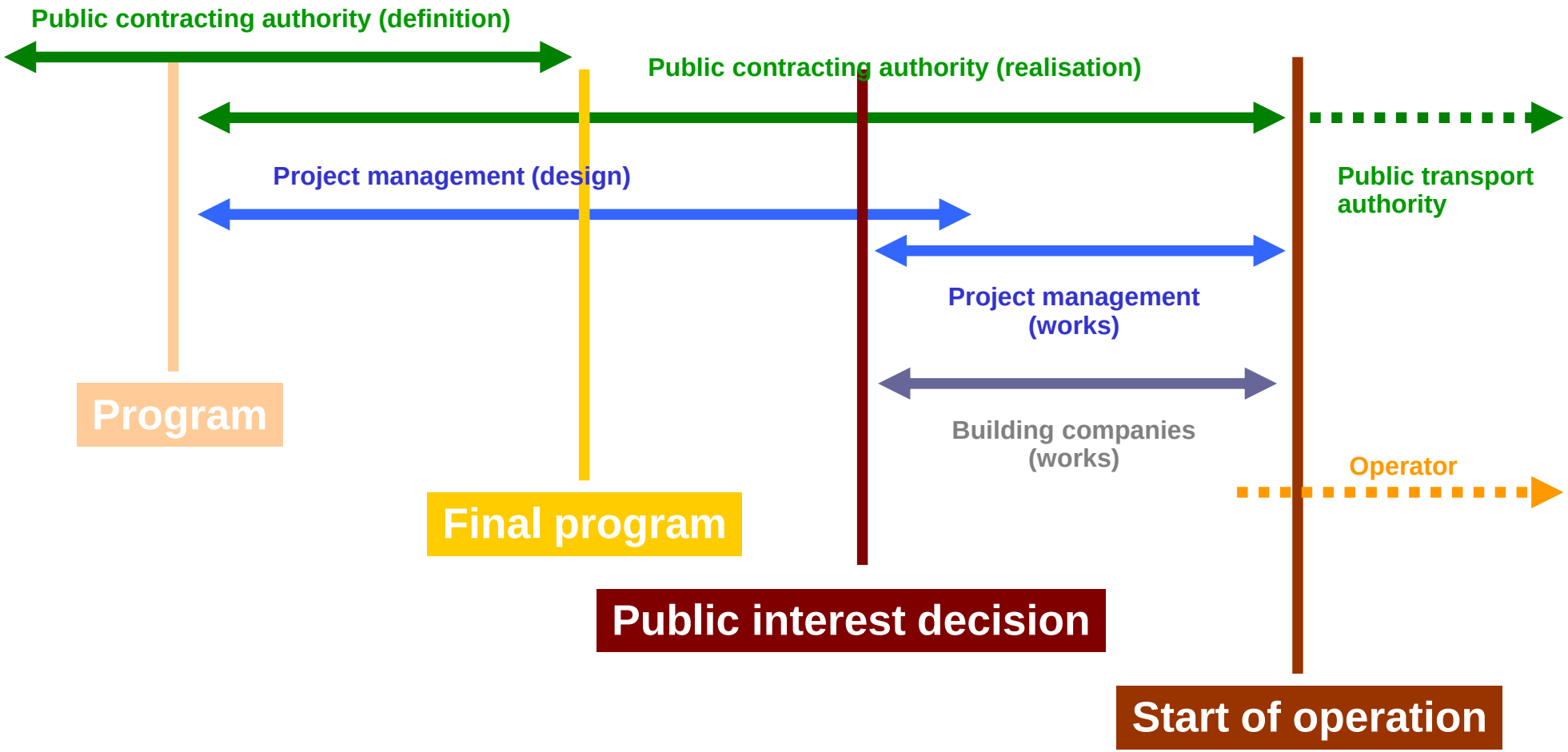
An example of constraints: « *Mettis* » BHNS



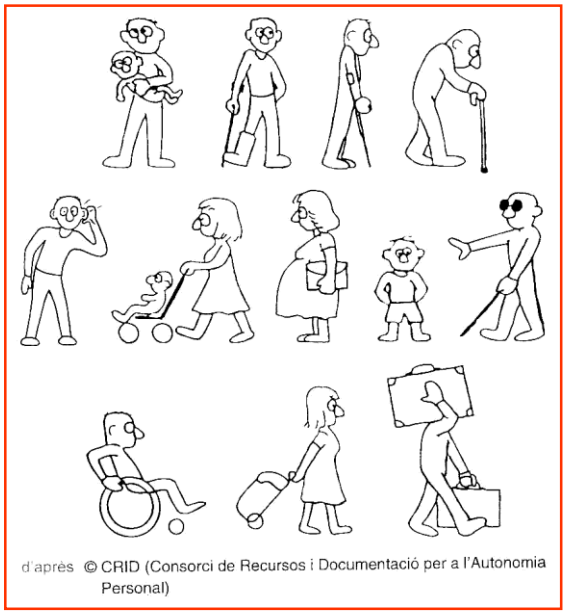
A 18km HLS system in Metz (2013)

- Protected area (downtown) : 25 files
  - Permit for destroy, build, authorisation for removing trees, for works, …
- preventive Archéological process : 8 sites
  - 8 potential sites, 2 sites with excavations
- « Water » law : 11 sites
  - 1 site with a special public consultation and impact evaluation
- Pyrotechnic premediation : 1 site

The standard schedule of a TCSP project



Accessibility for disabled people, a compulsory legal framework



As well for public space as rolling stock, information and for all disabilities …

Safety managent for tramways : “STPG”* regulations

a **regulation** background :

- ➢ new projects from 2003 :

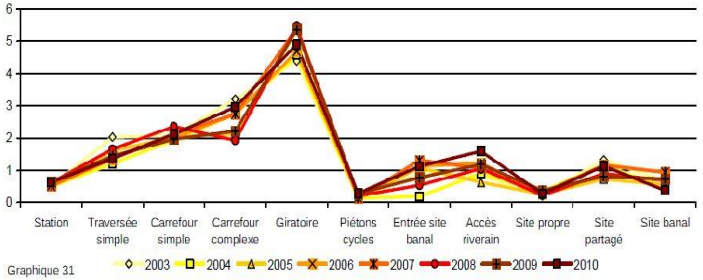
  commitments during the project

- ➢existing lines in 2003 :

  regularization in the 10 years

a continuous process :

- ➢ annual reports by operators
- ➢a national accidents database
- ➢ technical audits in networks by STRMTG *(state office)*



Graphique 31

* **STPG : safety for public guided transport**

Tramways & BHNS:
the current situation in France

Tramways & BHNS in France

- **26 tramway networks**

⇒ *quite all major cities are equipped*

⇒ *a few on-going projects, especially in Paris region*

⇒ *1 interconnected tram-train system*


Reims

- **about 15 to 20 BHNS systems**,

depending on which level is considered (full or light)

⇒ some medium cities turned from tram to BHNS

⇒ BHNS lines in addition to tram systems in some cities

⇒ Around 10 full BHLS lines (and some « strong lines »)


Mulhouse

Rouen


Nîmes


Nantes

Tramways & BHNS in France : a look at history

- **1985 – 1995**… : **resurgence of tramways** :
  - Tramways had almost disappeared as in many western countries
  - a 1st line in Nantes, then Grenoble, Saint Denis (Paris), Strasbourg, Rouen, …
  - a standard rolling stock, exclusive lanes
- **In the 2000's : development of tramways**… and some questions !...
  - Many projects in big cities… and smaller ones
    - Customized rolling stocks, STPG frame
    - questions about relevance / costs for medium cities or lower patronage
    - appearance of guided vehicles on tyres (TVR, CIVIS, Translohr)
  - In the meantime **: BRT (Bus Rapid Transit) concept rises up abroad** …

=> lead in years 2003 / 2004 to

the idea of « **the bus like the tram** » : The **BHNS** concept

(but not a simple transposition of BRT)

Tramways in France

- **26 networks, 71 lines, 703 km of tracks, 1293 cars** (end 2016)
  - Radial lines through city centres, based on traffic generation hotspots (universities, hospitals) & high density housing areas
  - Tram lines = base of re-structured PT networks
  - Park & Ride in suburbs
  - Mainly **exclusive right of way** (2% of total length in mixed traffic)
  - Layouts and rolling stock oriented on accessibility for disabled people – *compulsory application of the law*


Nice

Lyon

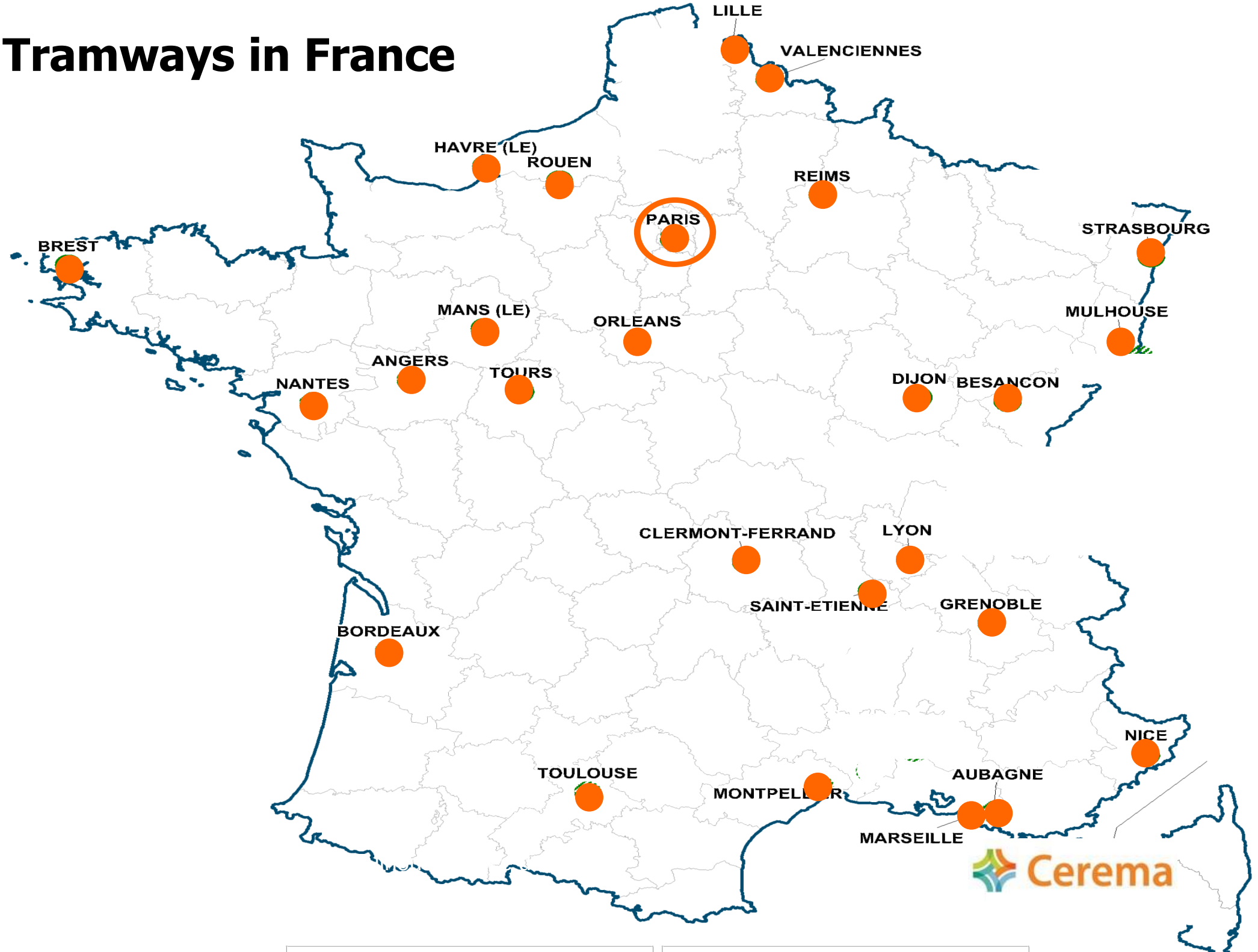
streetcars had quite disappeared in French towns...

to let tramway run (back*) in streets

… we had to take the cars' place !

- ⇒ getting dedicated running ways (most often)
- ⇒ Effective priority at junctions

Tramways in France



Tramways in France

networks in provinces (end of 2016)

- **diverse P**ublic **T**ransport **areas**

  => *from Aubagne (105 000 inhab.)*

  to Lyon (1 355 000 inhab.)

- **various size of networks**

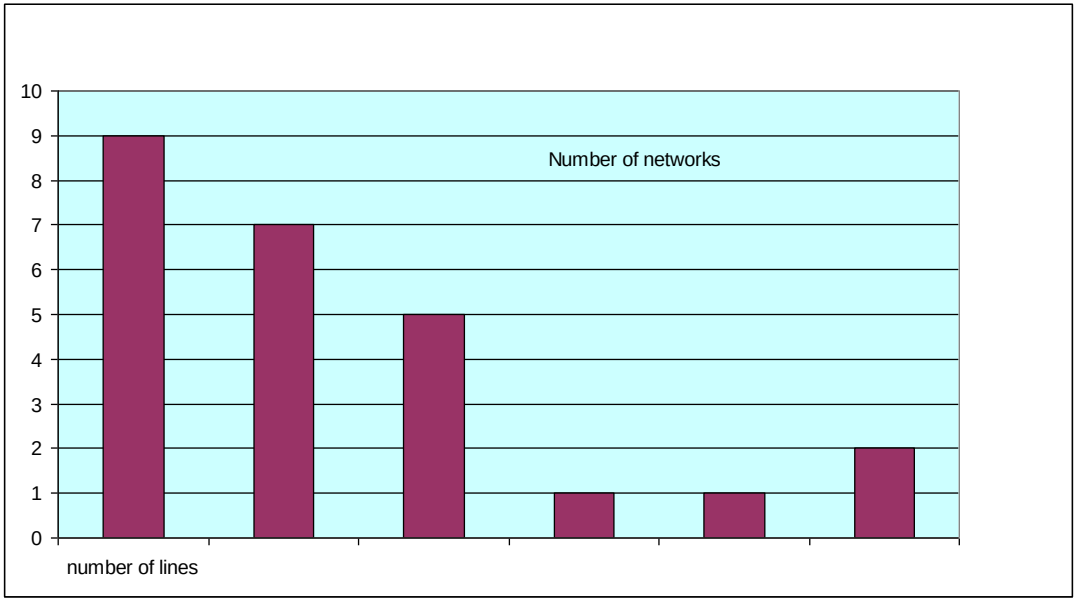
=> *from Aubagne (1 line, 7.2 km)*

to Lyon, Strasbourg (6 lines)

- **various length of lines**

=> *from Grenoble (5 km)*

to Bordeaux (20 km)



Tramways in Paris region

lines in Isle of France (end of 2016)

- **8 tram lines,**
  - **including 2 on tyres and 1 tram train**

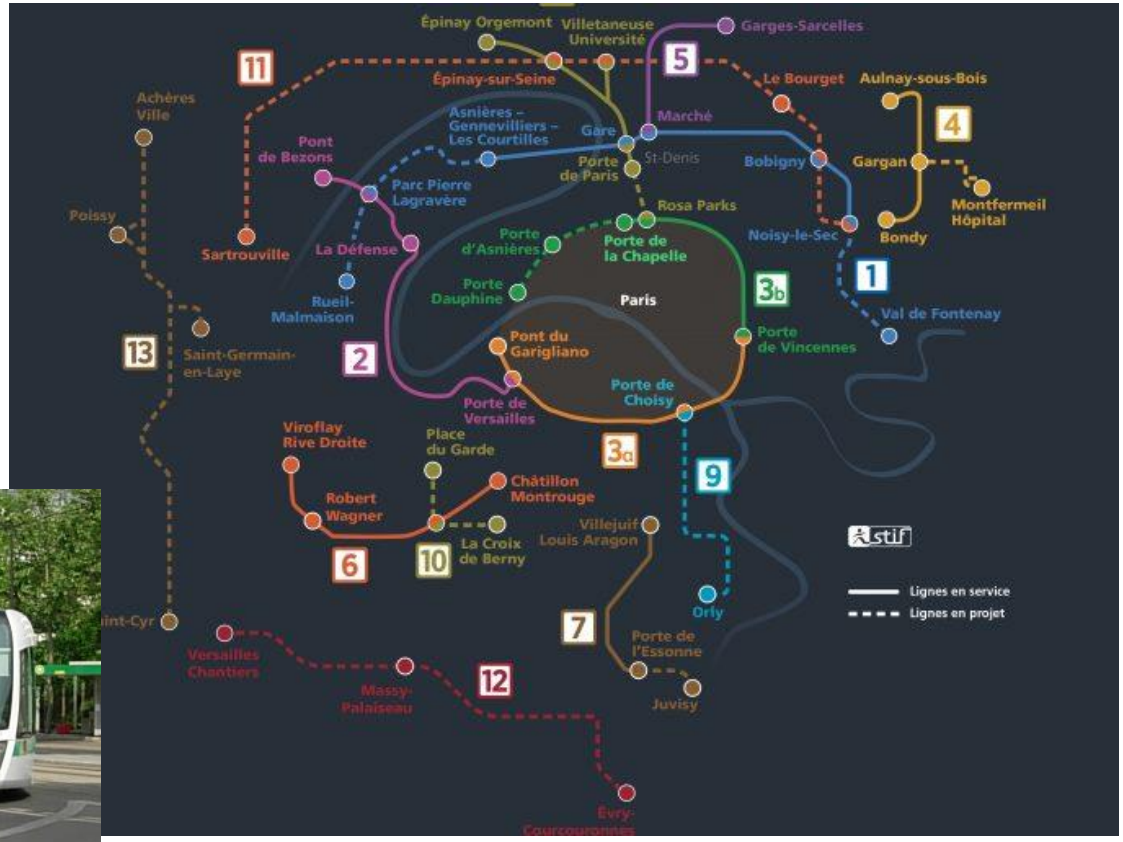
  not yet a real network …

  linked with metro and RER
- **105 km, 180 stations**

T3a+T3b => 22,5 km

(around Paris town)

- **244 cars**



Tramways in France : various configurations

From…

- pedestrian areas

- mixed traffic zones

To …

- fully segregated (and level crossings)

BHNS in France

- **around 10 « full » high-level service systems**
  - same as tramways (radial lines …, base of re-structured PT networks, P+R)
  - Mainly **exclusive dedicated lanes**
  - **Effective right of way in junctions**
  - **stations**
  - **Customized or dedicated vehicles**

- some « **strong lines** » (medium skill level)
  - not all « BHNS » requirements implemented
  - in main networks (or small cities)
    - (relative) high frequency and wide operation period
    - Optimizes layouts when needed
    - Standard vehicles

BHNS in France

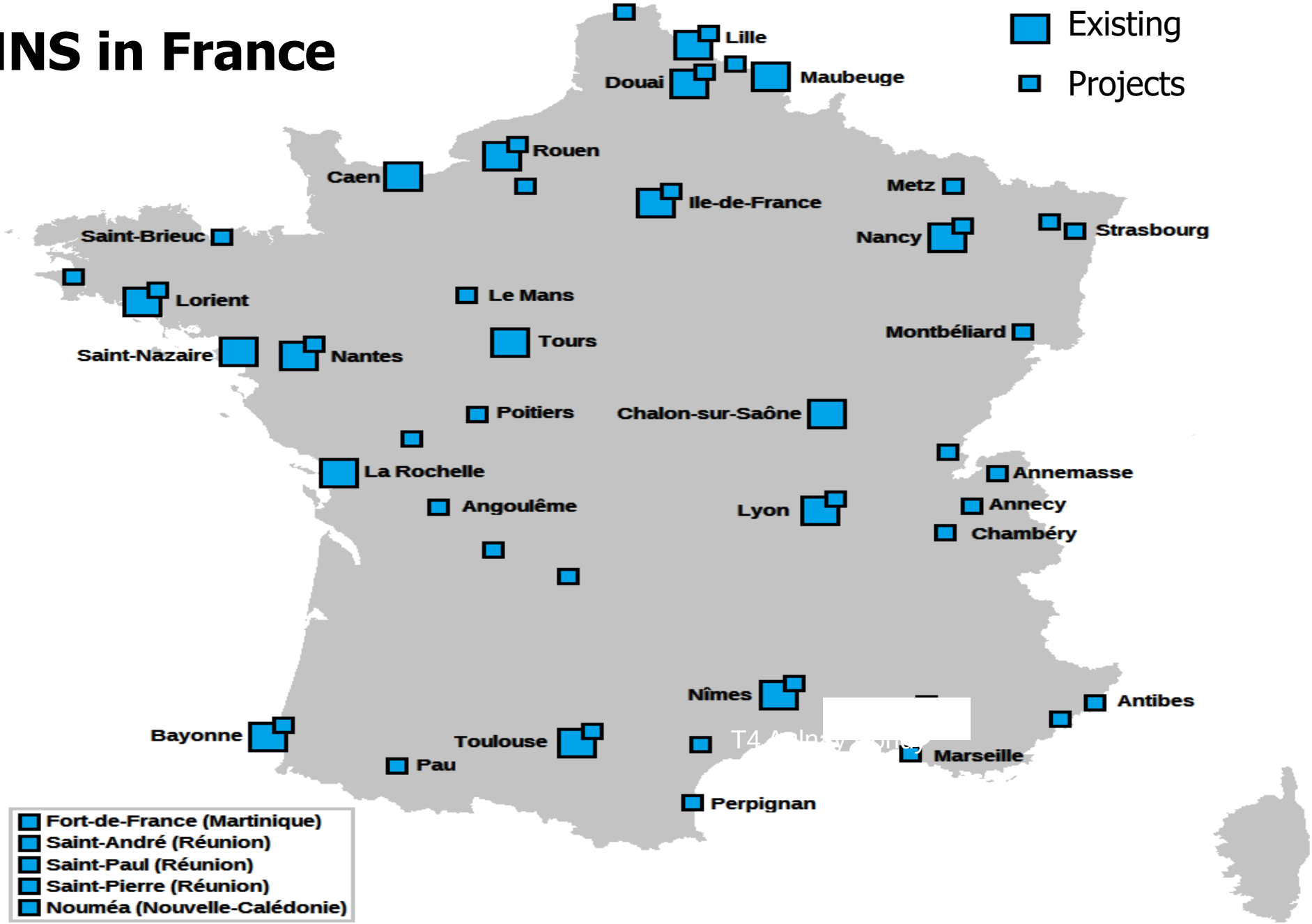


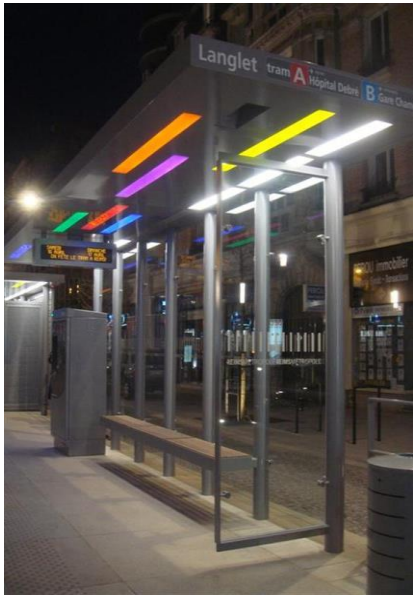
Image and design, key facts for success

Rolling stock :

- **customised** (head of) vehicles
- “clean” mode
- quiet, “friendly” vehicle

Infrastructure and layouts

- high quality materials and urban furniture
- “green tracks” (grass, plants)
- artistic acts



Operation

- effective priority
- efficient boarding/alighting
- real time information

the Urban insertion : design through safety

Safety, an essentiel stake for HLS

a direct stake …

as part of road safety

not many victims

however some spectacular and media-friendly accidents

and possibly severe with many involved people

Safety, an essentiel stake for HLS

but also an **indirect** one,

because of

impact on productivity :

- **regularity**
- **availability**
- **commercial speed**
- **corporate image**
- **operation costs**

disruptions due to accidents

immobilized vehicles

damaged facilities

services breaks

prevention methods

restrictives orders

distrusting driving

drivers' stress

Main key factors for tramway & BHNS (un-)safety

- *Obstacles to mutual visibilities*
  - *Plants, parked vehicles, urban furniture, buildings*
- *Readabilty of layouts and signalling*
  - *Design, materials*
- *Bad awareness of other modes needs*
  - *Pedestrians, cyclists needs*
- *Lack of attention and awareness of danger*
  - *Mobile phones, portables devices, …*
- *Speed of vehicles*

all these issues are due to conflicts with other uses of public space !...

What "*urban insertion of tramways* " is

= the physical integration of a transport system in the public space, and its interaction with other users and activities

- pedestrians
- bicycles
- motorized vehicles
- parking and deliveries
- residents' activities
- *urban services*
- *maintenance actions*

Then, a relevant tool to increase safety and reach HLS

=> sharing the public space
=> handling uses' conflicts

- in space => **infrastructure design**

- in time => **traffic management and operation**

Some favourable elements of context

Accessibility rules

(*"handicap" law, Feb. 2005*)

Promotion of active modes

Bicycles must be taken in account

in projects (*"LAURE" law*)

Moderation of cars in city centers

(*"Code de la rue" decrees*)

Clermont Fd

Main basics for lines design

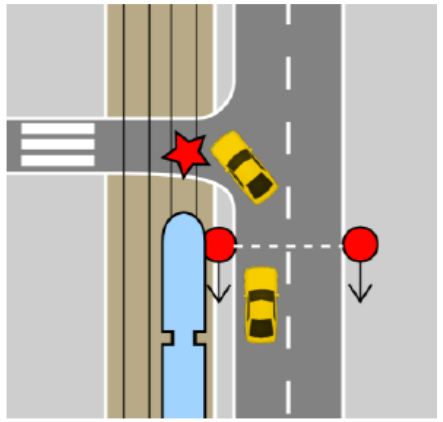
- **linking sections** *between junctions and stops*
  - *Segregated lanes when relevant*
  - *Other modes taken in account (to avoid use of reserved lanes)*
  - *Shared space with traffic management (put the PT veh. in front of cars)*
- *at* **stops**
  - *Accessibility for disabled people, an essential tool*
  - *Taking in account pedestrians routes (they will do so anyway)*
- *at* **junctions**
  - *Matching of design and traffic management*
  - *Believable signage and traffic management =>* ***priority to PT veh.***
  - *Mutual visibilities*
  - *avoid fixed obstacles downstream of conflicts zones*

And now:
current issues and perspectives

Tramways and BHNS : current safety issues

10 years of safety management "*STPG process*"

- ✓ all tramways networks 1st assessment achieved
- ✓ beginning of actualisation process
- ✓a solid (substantial) feedback (*accidents database*)



• Mains stakes confirmed

- ✓roundabouts
- ✓"turn_on" junctions
- ✓pedestrians : severity of accidents, distraction

- ✓Cyclists : use of reserved lanes, risky behaviour in junctions
- ✓Passengers falling due to emergency braking

✓Same issues for BHNS, to be confirmed by feedback (no database)

Tramways and BHNS : current issues and perspectives

Short term : at the end of high growth in Provinces,

straight inside boom around Paris...

Uncertainty regarding projects, due to

- global economic context (lack of fundings)
- political changes at local level

In provinces :

⇒ less & less new "full HLS" lines and new networks,

⇒ rather extensions of existing lines,

⇒ modifications due to change of urban context

⇒ optimization of operation (treatments of hotspots)

⇒ additional strong lines in networks

Tramways and BHNS : current issues and perspectives

For some big tramways networks...

<u>Some needs of fundings to maintain older systems (> 30 years):</u>

- heavy renewal of older tracks
- big services for Rolling Stock for life's lengthening
- replacement of older cars
- adaptation of layouts to new vehicles

For the first BHNS systems...

<u>Some needs of fundings to adapt the service to the demand:</u>

- replacement of vehicles with bigger ones
- adaptation of layouts to new vehicles

Tramways and BHNS : current issues and perspectives

In main and older networks,

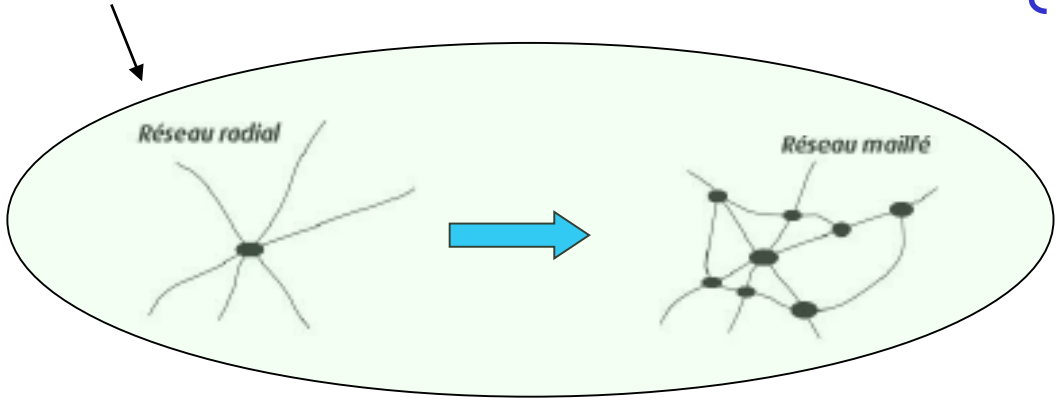
the need to adapt the supply to the demand !

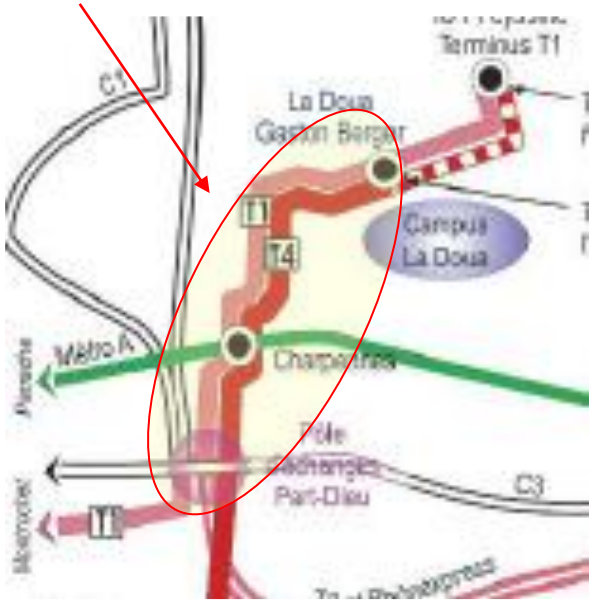
Several solutions implemented

- increase of frequencies
- interconnection of lines

→ Rise of fleet

→ Several lines on same route





- **rise of Rolling Stock capacity**
  - 33 m to 40 m long cars

Paris region LRT : even more projects !

"***Grand Paris***" and Olympic games context :

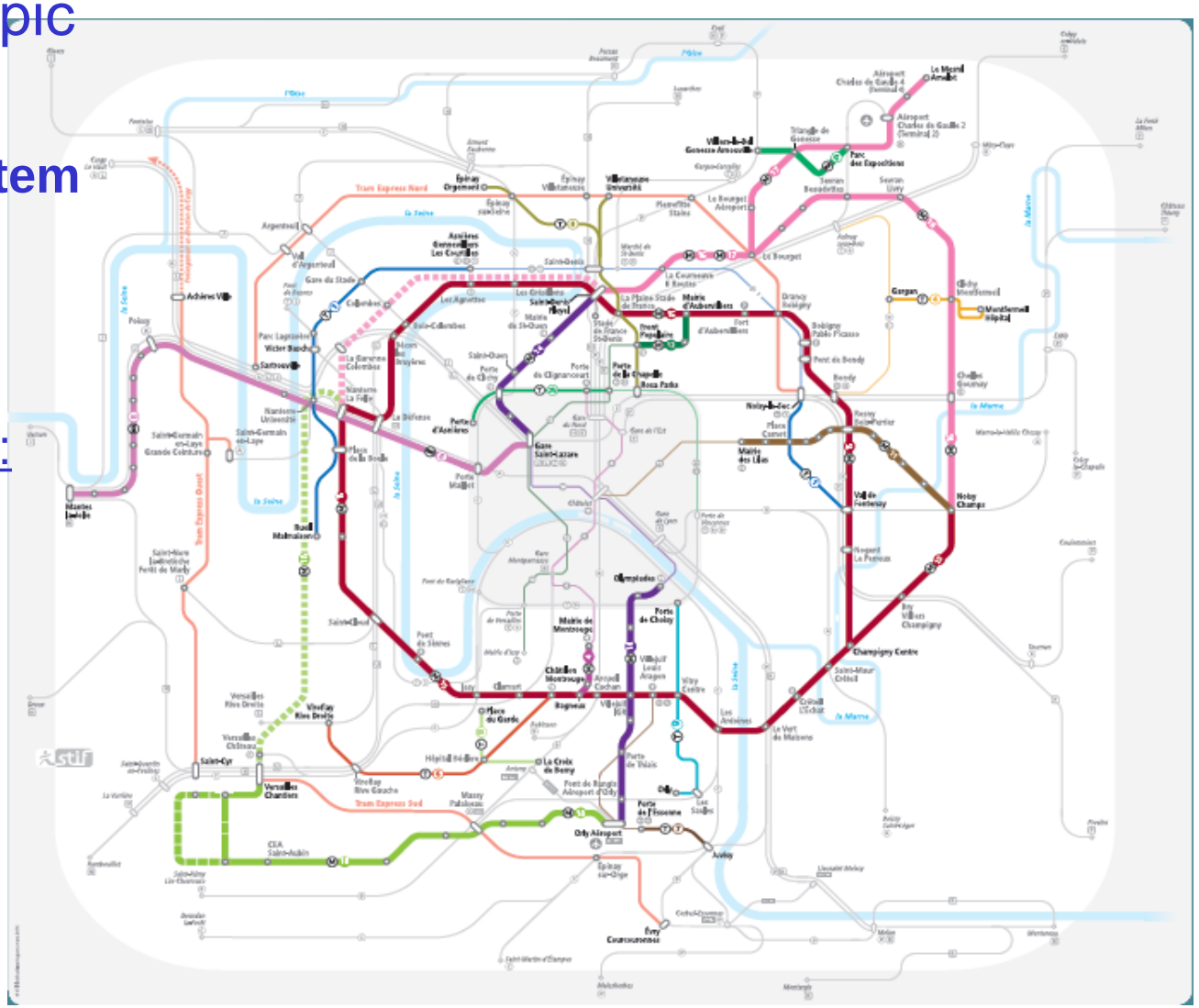
a big **automatic metro system**

besides this one,

many projects regarding

all public transport modes :

- Metro
- RER
- LRT **(tramways)**
- **BHNS** & busses



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Thanks !

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