



“Comparison between ropeway systems and other public transport systems - the example of Toulouse”



Cyril LADIER

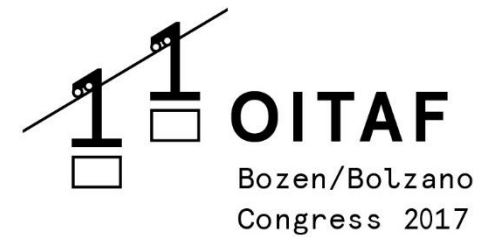




OITAF
Bozen/Bolzano
Congress 2017

Toulouse Presentation





Toulouse

City of excellence



Spencer, robot européen, un des sujets d'étude sur l'interaction robot-humain au LAAS-CNRS à Toulouse.
Spencer, a European robot, one of the subjects of a study on human-robot interaction at the LAAS-CNRS laboratory in Toulouse





tisséo



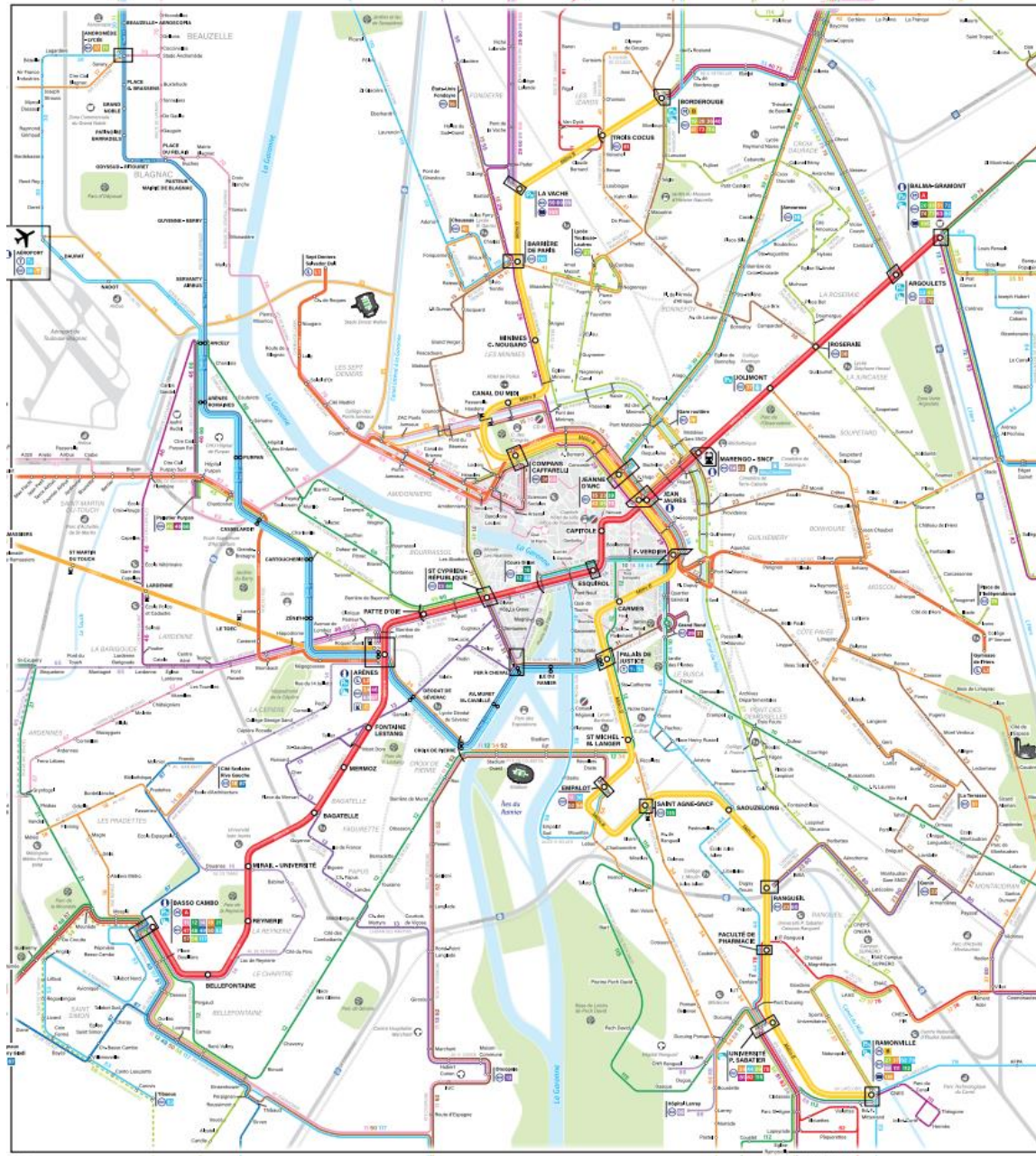
2 lines 27 km
More than 400 000 trips per day



2 lines 16 km
More than 40 000 trips per day



95 lines
More than 240 000 trips per day



OITAF
Bozen/Bolzano
Congress 2017

Toulouse Public Transport



COVOITURAGE
UN SERVICE TISSÉO

Carpooling



citiz
TOULOUSE Carsharing



Pastel Ticketing system



Mobility Agency



- Toulouse is one of the most dynamic and attractive metropolitan area in France, for economy, housing and studies:
- + 15 000 new inhabitants per year,
- + 150 000 new employments over last 20 years.

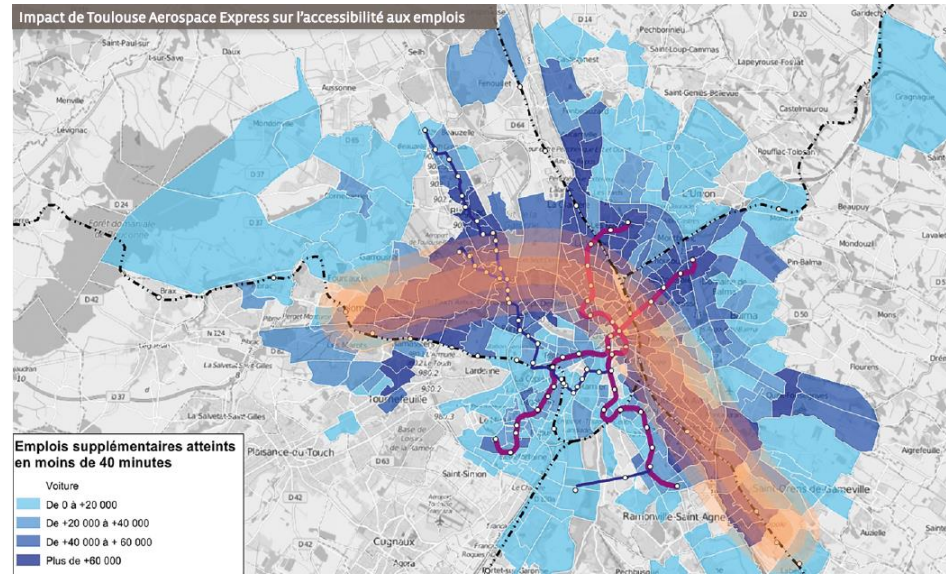
BUT...

66,000 private sector jobs are not to date covered by public transport facilities, most of them are part of the Aerospace Valley world competitiveness cluster

We have three major objectives for the future:

- Reinforce accessibility to the metropolitan area of Toulouse,
- Maintain the attractiveness of business and employment areas,
- Organize the mobility conditions in the perspective of an sustained growth.

500 000 new daily trips at horizon 2025



Toulouse Aerospace Express: a 3rd line of metro
 The major diagonal for the economy, innovation and quality of life: covering **one of every two jobs of the Greater Toulouse**



Toulouse

Looking to the future



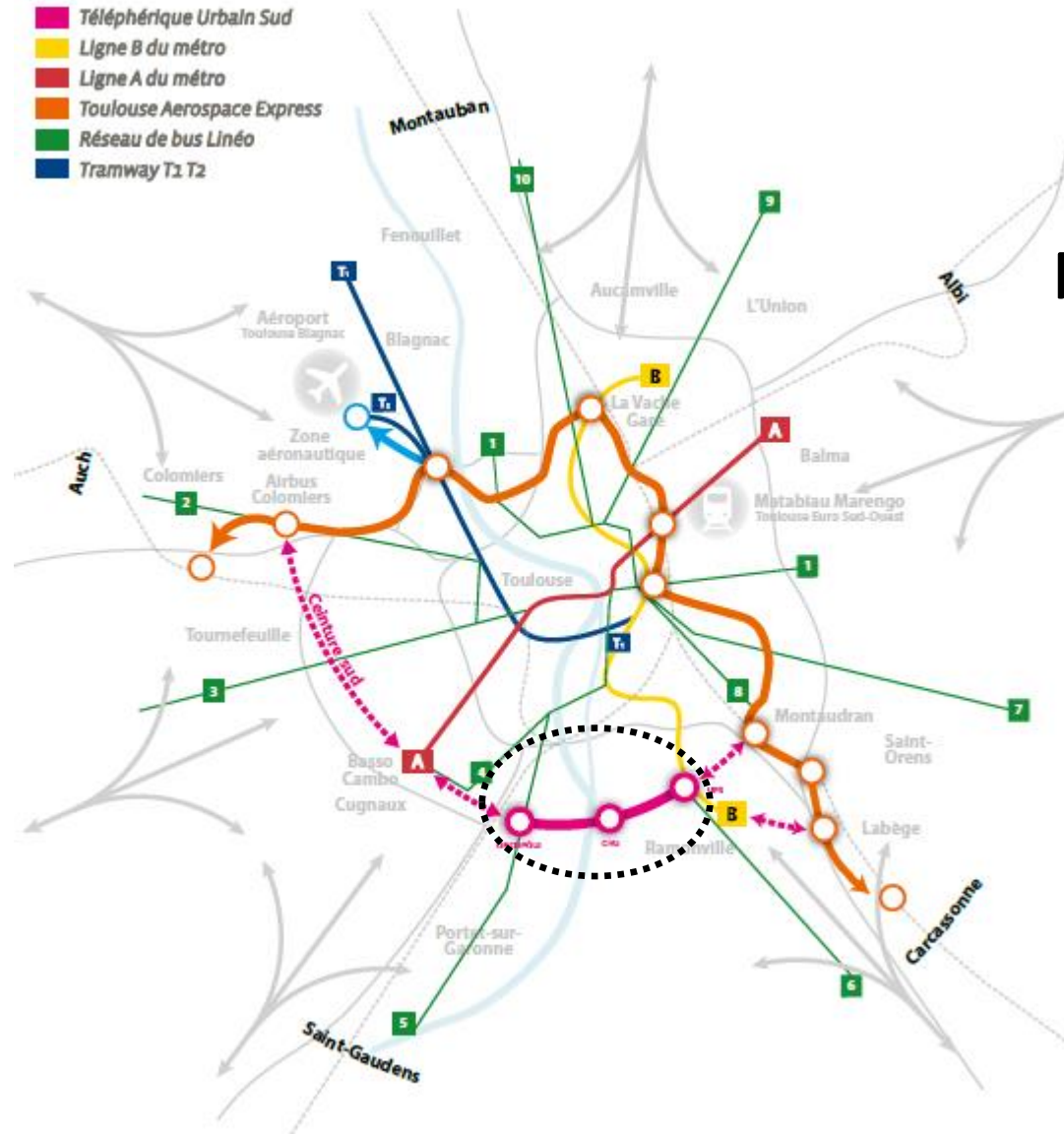


One « *Projet Mobilités* » for major Investment



3 billions of Euros to be invested in public transport at horizon 2030

- Current main projects are :
 - Doubling of the Line A capacity
 - An High Performance Bus network named Lineo (10 new lines)
 - The South belt with the implementation of an innovative Cable Car system
 - Toulouse Aerospace Express, 3rd line of metro
 - + 4G in metro



Toulouse
Future of public transport



Business and employment area to deserve ...

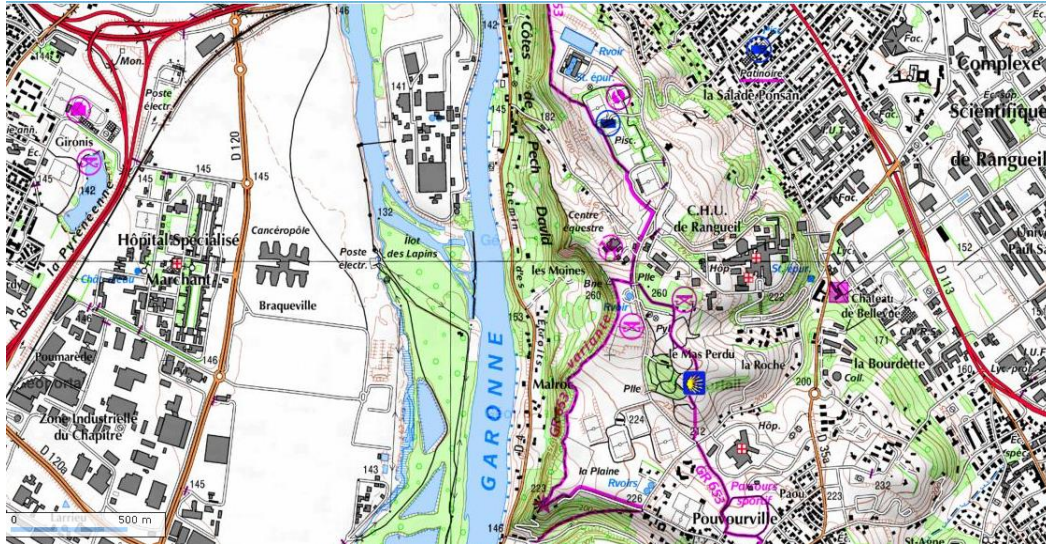


... in a constrained area



Rangueil Hospital
230 000 consultations / year

Toulouse Project Area



Rangueil Sciences Campus
27 000 students and 4 000 teachers / searchers / staff



Oncopole
Research and treatment
center against cancer
More than 3 000 jobs



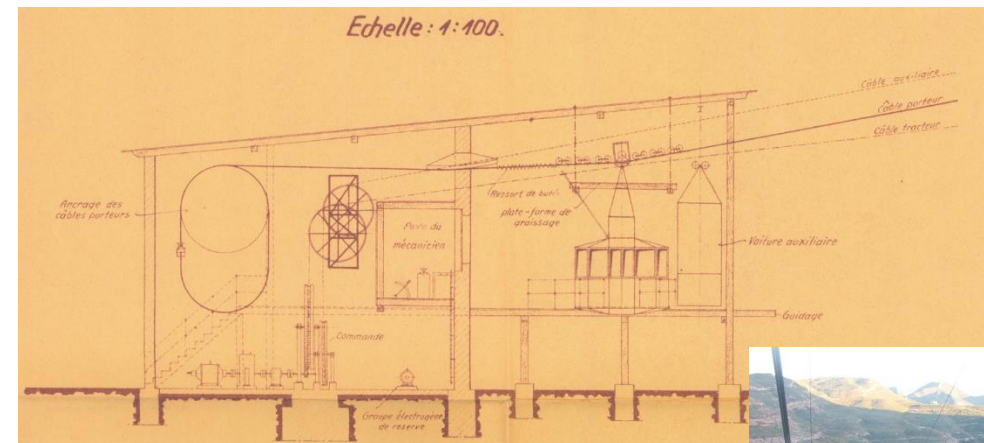


Jaussely Plan
1926-1928

Road projects

From the 1920's

When cable car project in Toulouse were
just for leisure
(studied by Bleichert / Zuegg in 1936)

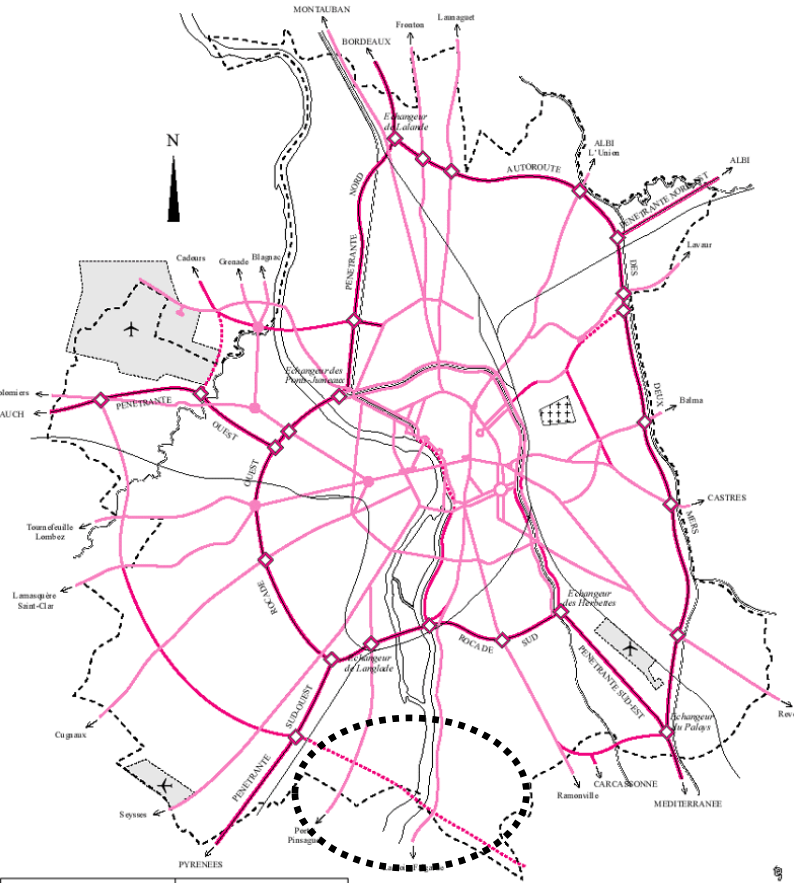
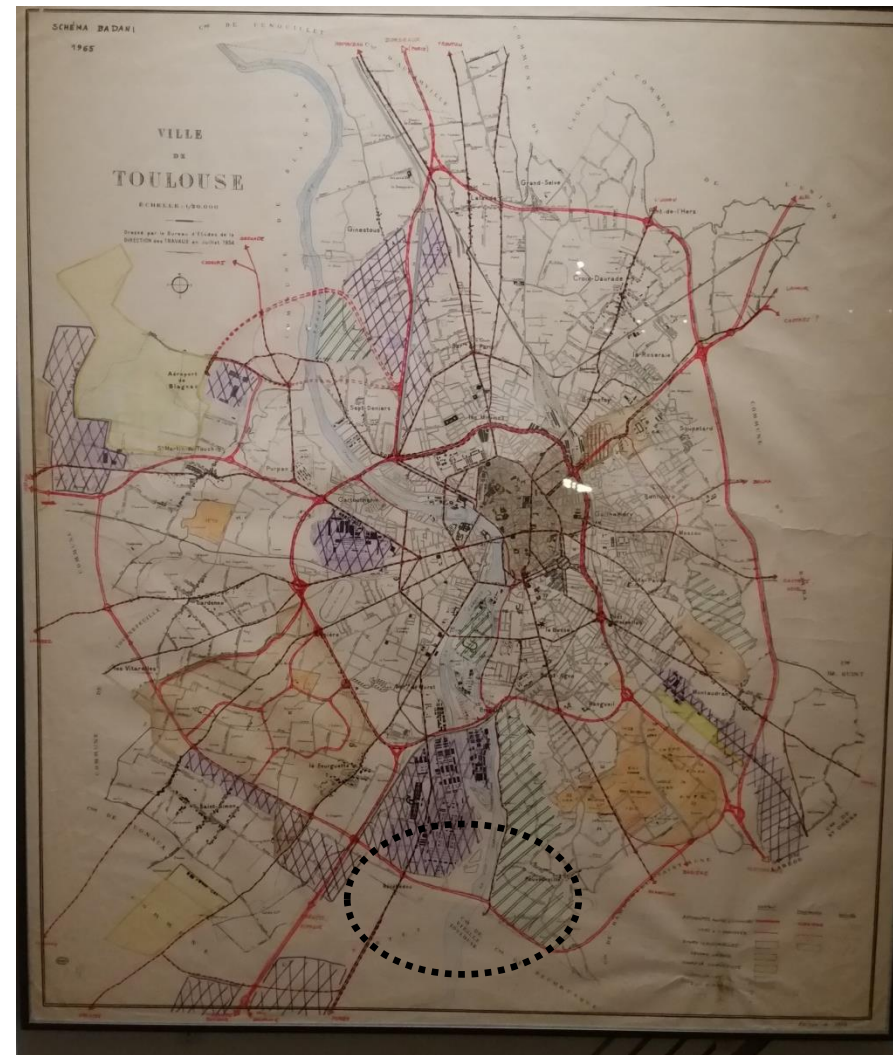




Road projects

During the 1960-1970's

With little consideration for patrimony and nature



VOIRIE A DOUBLE CHAUSSEE	voies ferrées
— existantes	◇ échangeurs
VOIRIE A CHAUSSEE UNIQUE	✈ aérodrômes
— existantes en 1965	⊕+⊕+ canalisations
— existantes depuis	
— restant à construire	

Badani Scheme 1965

0 1 2 3 km

Réalisation Edith Glasinger

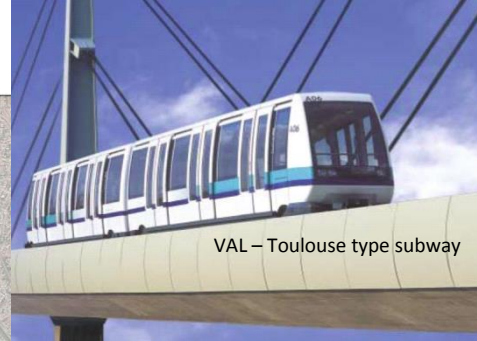
Bozen/Bolzano 6 - 9 June 2017

Some were achieved ... but not all of them



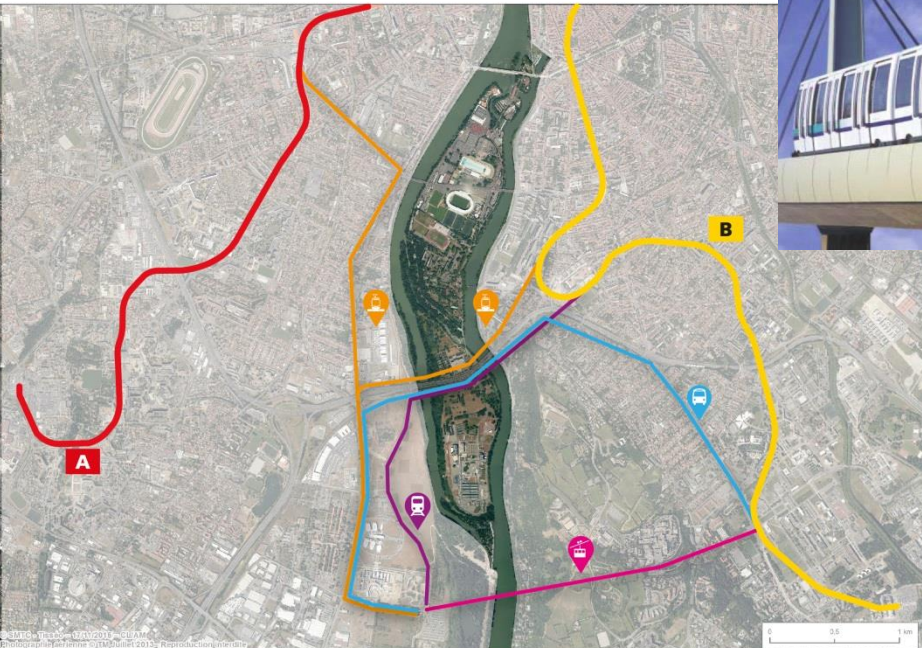
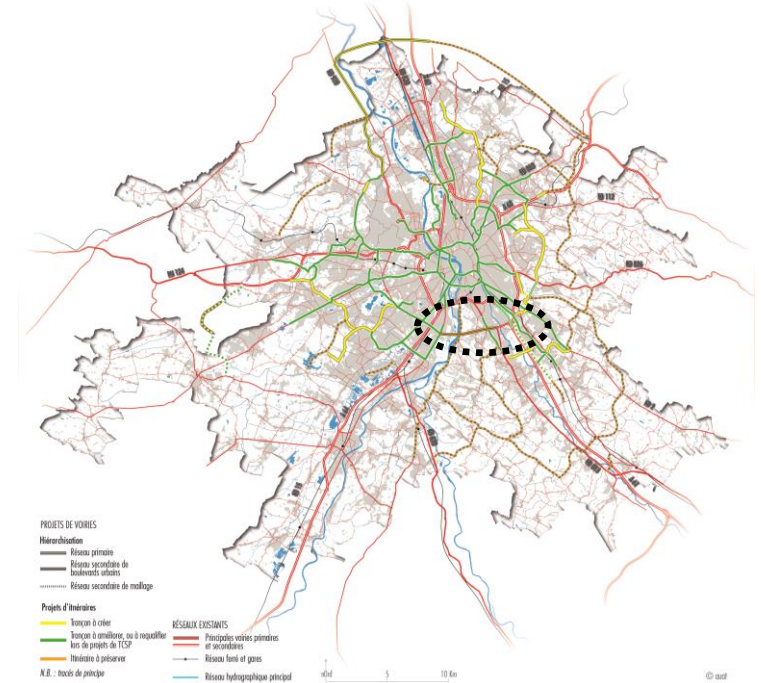
Public Transport projects

Studies from 2006



LOHR – Clermont Ferrand / Clermont Ferrand Wheel Light Rail

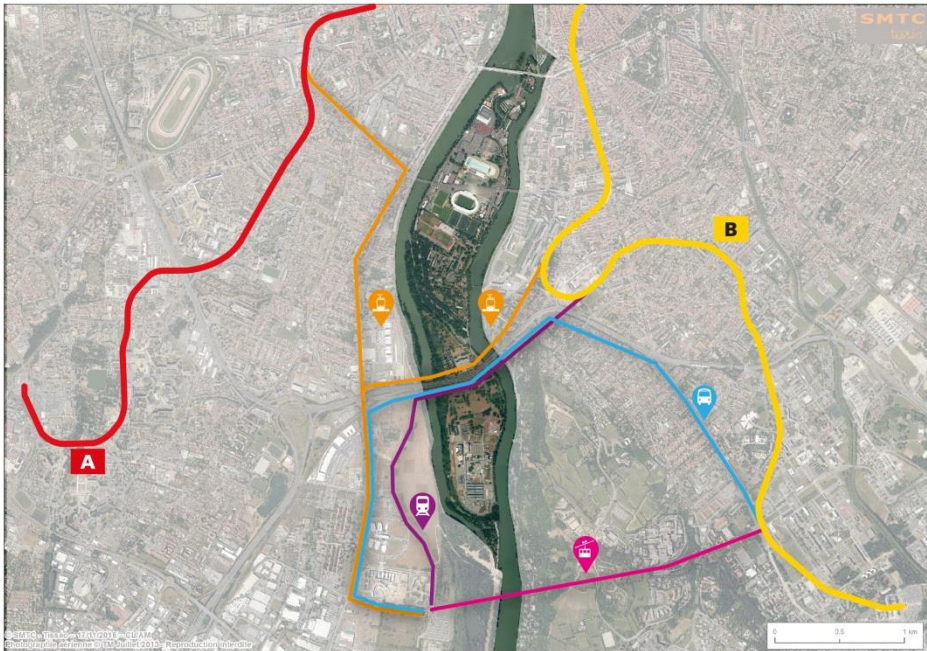
Even if road projects were not abandoned





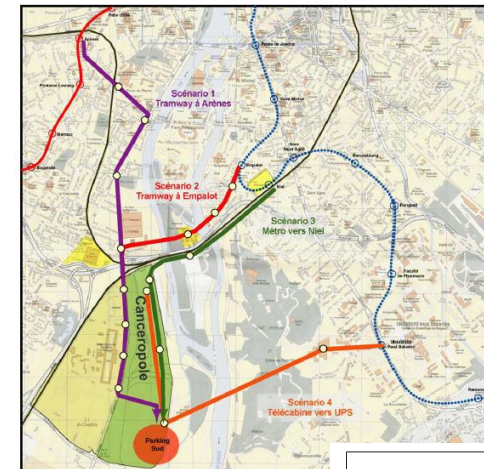
Public Transport projects

Studied in details

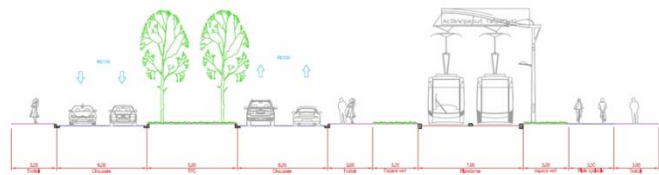


Les scénarios testés

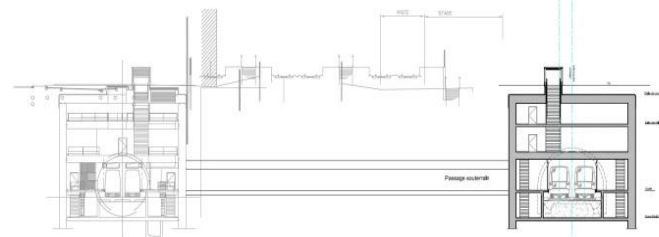
- Scénario 1
 - Ligne A à Arènes
 - Mode tramway (prolongement de la ligne E)
 - 10 stations dont 5 sur le Cancéropôle
 - Variante : Test de sensibilité à la contrainte de stationnement sur le secteur Cancéropôle
- Scénario 2
 - Ligne B à Empalot
 - Mode tramway
 - 10 stations dont 5 sur le Cancéropôle
- Scénario 3
 - Ligne B à Niel (nouvelle station sur ligne B)
 - Mode métro léger
 - 5 stations dont 3 sur le Cancéropôle
- Scénario 4
 - Ligne B à Université P. Sabatier
 - Mode télécabine
 - 4 stations dont 2 sur le Cancéropôle



Traffic studies

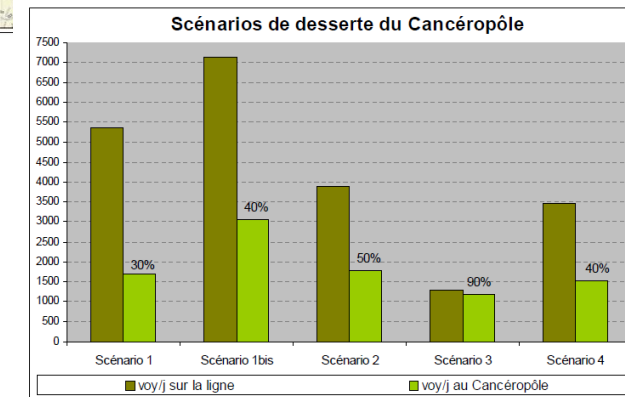


Light rail



Subway

Bozen/Bolzano 6 - 9 June 2017



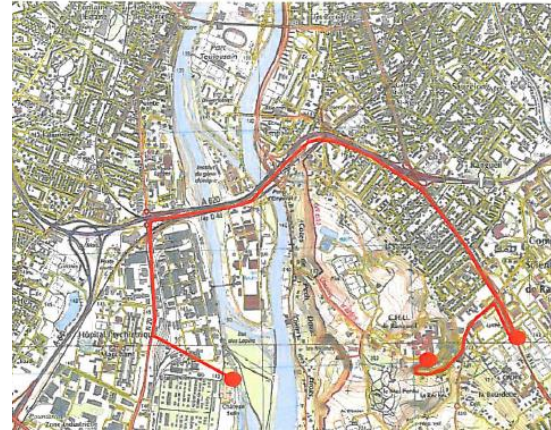


Public Transport projects

Studies in 2010 - 2011



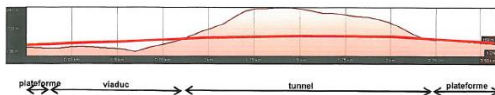
Tracé mode tramway



Bus with dedicated lanes



Profil mode tramway



Light rail



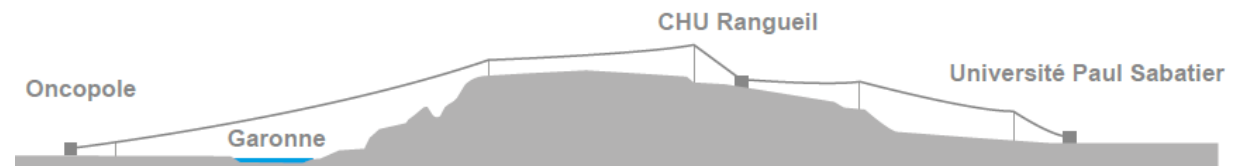
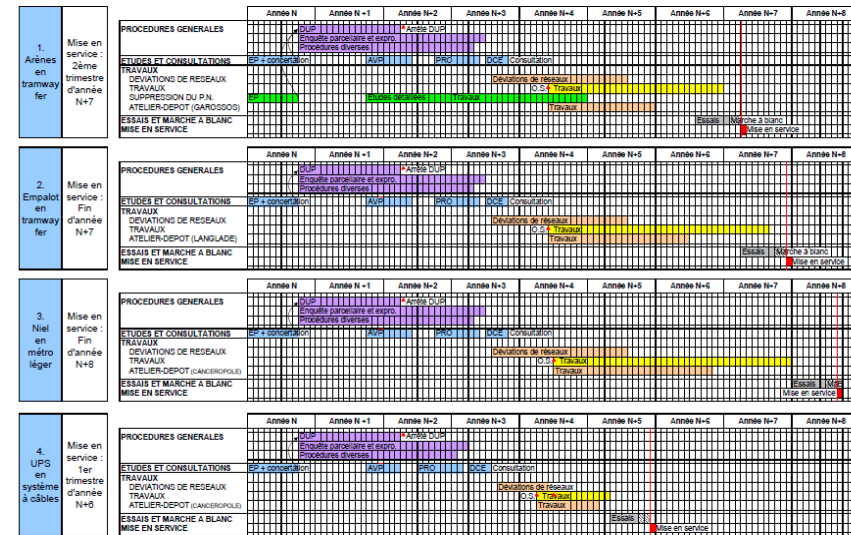
Cable car technologies



	Téléphérique (Cable Car)	Tramway (Light Rail)	Bus (Bus with dedicated lanes)	Funiculaires (Funiculars)
Longueur (Length)	2 600 m	3 000 m	7 500 m	1 700 et 900 m
Station Oncopole (Oncopole Station)	En élévation (in elevation) 50 x 20 m H = 8 m	Plateforme en léger remblai (Platform with light bank) 30 x 12 m	Plateforme (Platform) 20 x 12 m	En viaduc (viaduct) 30 x 20 m H = 8 m
Station CHU (Hospital Station)	En élévation (in elevation) 75 à 100 x 20 m H = 3 m	En tunnel (in tunnel) 40 x 60 x 20 m Profondeur (depth) 100 m	Plateforme (Platform) 20 x 12 m	En viaduc (viaduct) 60 à 80 x 20 m H = 0 m
Station Université (University Station)	En élévation (in elevation) 50 x 20 m H = 8 m	Plateforme (Platform) 30 x 12 m	Plateforme (Platform) 20 x 12 m	En viaduc (viaduct) 30 x 20 m H = 8 m
Ouvrages (works)	5 pylônes (5 pylons)	Viaduc (viaduct) 800 m Tunnel (tunnel) 1 400 m	Site propre (dedicated lanes) Viaduc (viaduct) 1 200 m	Viaduc (viaduct) 2 600 m
Véhicules (vehicules)	20 cabines de 35 places (20 cabins of 35 persons)	7 rames de 30 m (7 30 m long trains)	12 bus de 18 m (12 18 m long buses)	4 véhicules de 80 places (4 80 places vehicules)
Capacité système (system capacity)	1 500 voy/h/sens (travelers per hour per direction)	2 200 voy/h/sens (travelers per hour per direction)	1 200 voy/h/sens (travelers per hour per direction)	900 à 1 200 voy/h/sens (travelers per hour per direction)
Fréquence (Frequency)	1.5 minutes	5 minutes	5 minutes	5 minutes
Temps parcours (Travel Time)				
Oncopole - UPS	10 minutes	5 minutes	20 minutes	10 minutes
Oncopole - CHU	5 minutes	2.5 minutes	25 minutes	5 minutes
CHU - UPS	4 minutes	2 minutes	5 minutes	3.5 minutes
Coût investissement (invest Cost)	41 M€	250 M€	120 M€	155 M€
Coût d'exploitation annuel (Annual operation costs)	1.2 M€	2.8 M€	5 M€	1.5 à 2 M€
Insertion	Pylônes and câbles Stations en élévation (Pylons and cables Elevated station)	Bonne (good) Problème station CHU profonde (issue with Hospital station depth)	Nombreuses acquisitions (property acquisitions); Insertion très délicate route de Narbonne (Narbonne street narrow)	Viaduc (viaduct)
Impacts	Emprise au sol limitée aux gares et pylônes (very little footprint)	Difficulté de réalisation du tunnel en terrains instables (Hard to build tunnel with unstable ground)	Emprise site propre à libérer délicate route de Narbonne (lot of properties on Narbonne Street)	Fondations profondes dans le versant instable (deep bedrock on the unstable side of the hill)

Comparison between modes

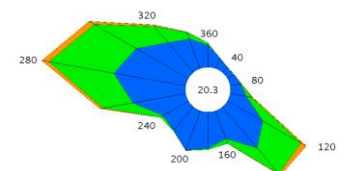
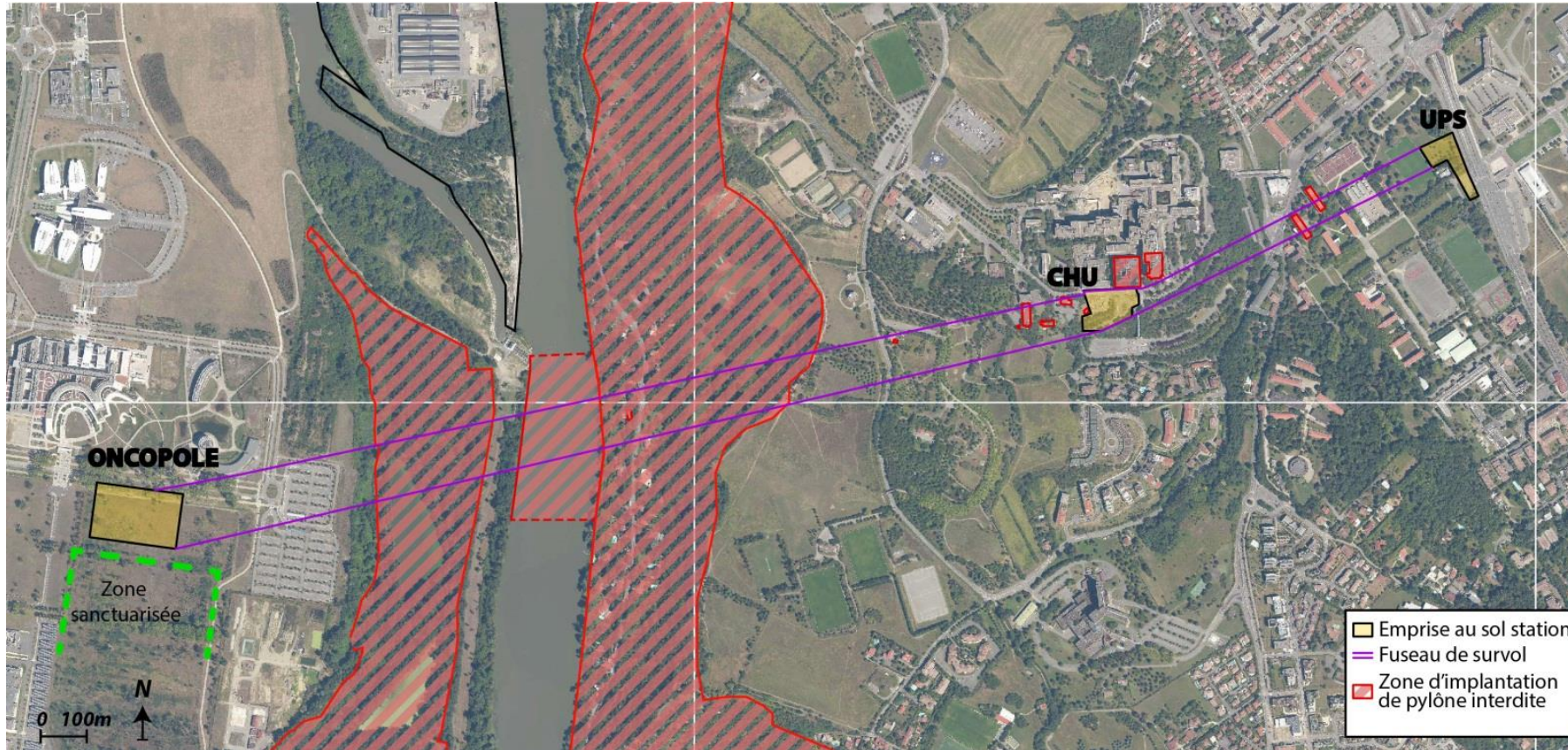
Cable car is the cheapest and fastest to build

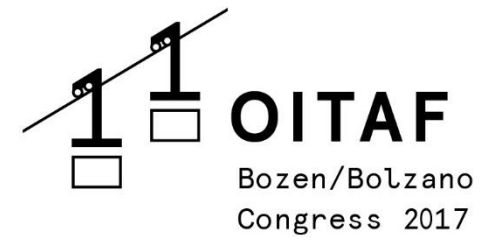




Cable car project

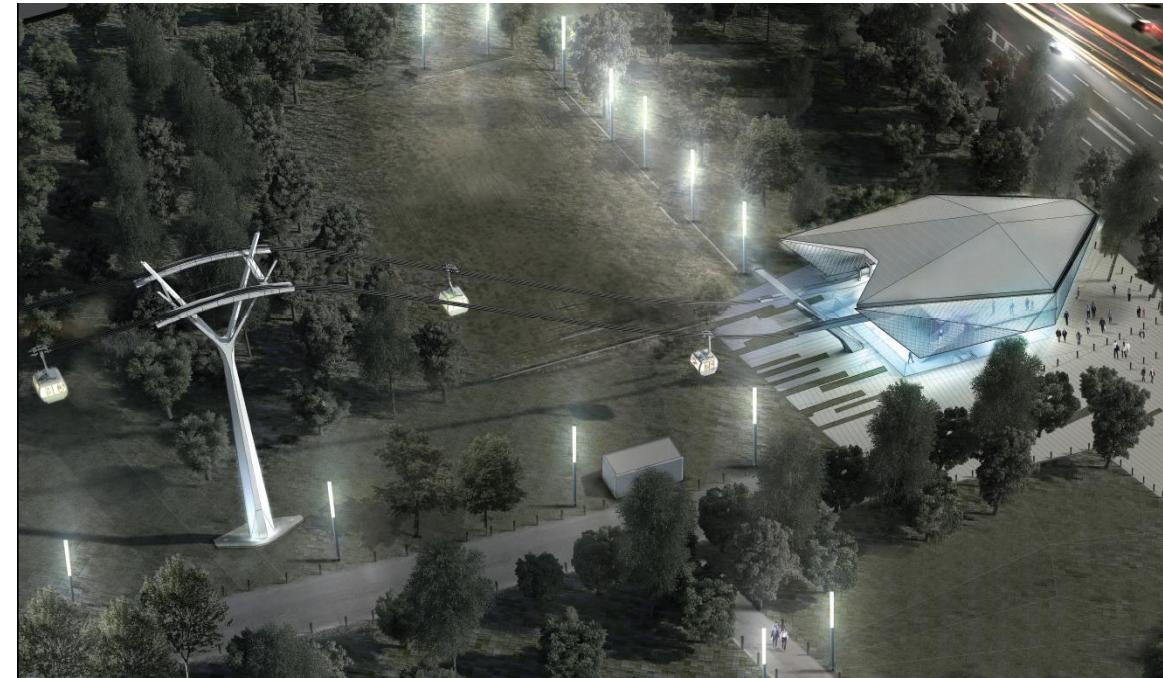
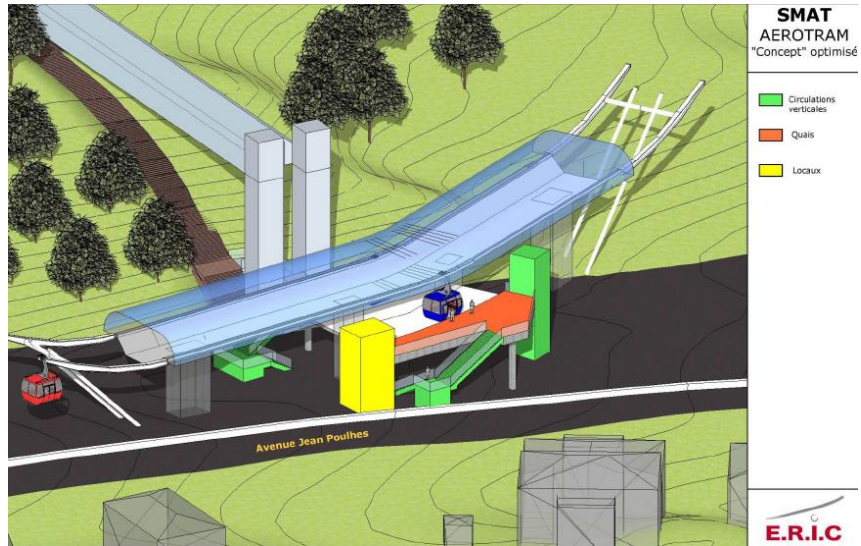
Constraints





Cable car project

The studies



Projet Etudes Préliminaires / Preliminary Studies Project © Wilkinson Eyre Ltd.

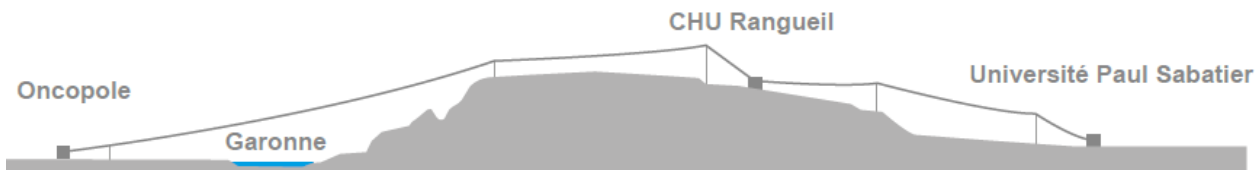


Proiet 3S / 3S project © PPA



Cable car project

The studies



Proiet Monocâble / Single-cable project © POMA



Le Téléphérique Urbain Sud

To come by the end of 2019



Groupement POMA

Bozen/Bolzano 6 - 9 June 2017

