ATM Àrea de Barcelona
Autoritat del Transport
Metropolità

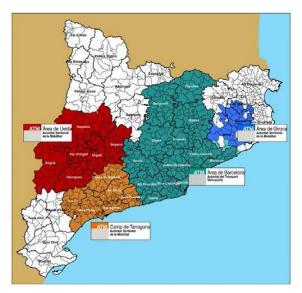# Digitalised light rail infrastructure in one of the world's smartest cities

Rail Live 2019
6th March 2019

1. ATM's Organisation

Board of Directors
Rector body of the ATM. 18 full right members:
- 9 members - Generalitat of Catalonia
- 7 **members** – Local Administrations
        (BCN Council and AMB);
- 2 **members** – AMTU;
- 2 **members** - AGE observers

Executive Committee
6 representation members:
- 3 of the Generalitat of Catalonia
- 2 of the local administrations;
- 1 of the AMTU.

Staff: 36 **people**

Budget 2018: 1.433 M€

2. ATM's territorial and operational scope

Catalonia

947 municipalities

7,6 M inhabitants
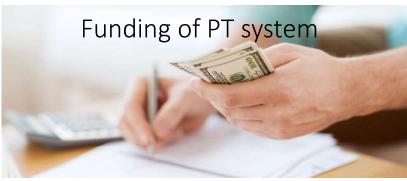

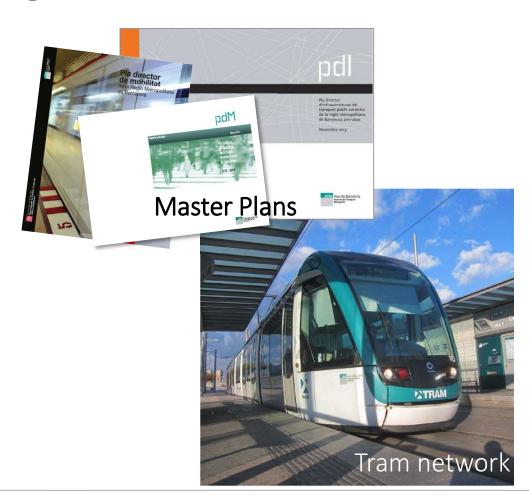Integrated Fare System Area

Planning Area (SIMMB)

311 municipalities

5,5 M inhabitants

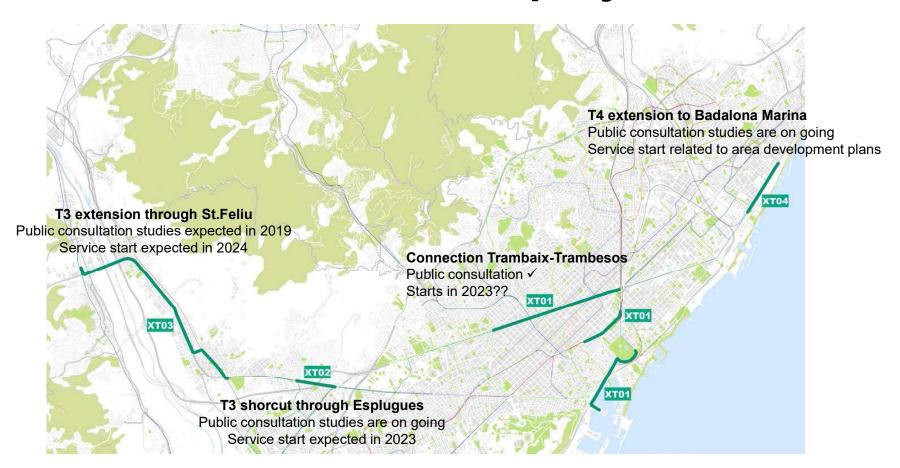346 municipalities

5,7 M inhabitants

3. ATM's main tasks

Integrated Fare System

Funding of PT system

Master Plans

Tram network

4. Tram network

T1 – T2 – T3 [TRAMBAIX]	2018	T4 – T5 – T6 [TRAMBESOS]
23	N. TRAMS	18
8,10	SATISFACTION	8,07
17,69 km/h	COMERCIAL SPEED	17,76 km/h
1.510.306	KM/YEAR	1.076.168
29	STOPS	27
19.059.687	**RIDERSHIP**	**10.026.574**

4. Tram network. Extension projects

T4 extension to Badalona Marina
Public consultation studies are on going
Service start related to area development plans

T3 extension through St.Feliu
Public consultation studies expected in 2019
Service start expected in 2024

Connection Trambaix-Trambesos
Public consultation ✓
Starts in 2023??

T3 shorcut through Esplugues
Public consultation studies are on going
Service start expected in 2023

5. A unified tram network. Alternatives

Alternative 1 – Tramvia Diagonal

Alternative 2 – Short tunnel in Diagonal

All alternatives

Alternative 3 – Urgell - Provença

Alternative 4 – Electric bus

5. A unified tram network. CBA & MCA

Social-Cost Benefit Analysis

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
	Tram Diagonal – Surface	Tram Diagonal – short tunnel	Tram Urgell-Provença-Diagonal	Electric bus
Net Present Value (NVP) with discount rate 3% (M€)	158,5	15,8	-180,9	-91,1
Payback	12 years (2033)	30 years (2051)	Too long	Too long
Incomes/Cost ratio	1,42	1,07	0,63	0,31

Multicriteria Analysis

	Objectiu	Pes	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1	Maximitzar la demanda servida	15%	1,41	1,50	1,04	0,13
2	Millorar el Sistema de Transport Públic (connectivitat, accessibilitat, eficiència d'explotació...)	15%	1,33	1,25	1,50	0,97
3	Minimitzar l'impacte ambiental i les externalitats (Fase de construcció i explotació)	15%	1,20	0,97	1,05	1,10
4	Maximitzar la Rendibilitat i la eficiència Econòmica	35%	3,50	2,20	0,70	0,35
5	Maximitzar la compatibilitat del projecte en el teixit urbà existent i afavorir la inserció urbana (Fase de construcció i explotació)	15%	1,27	0,71	0,95	1,45
6	Maximitzar l'impacte macroeconòmic sobre la economia Catalana	5%	0,21	0,50	0,23	0,10
	Puntuació		8,91	7,12	5,47	4,10
	Alternativa millor		Alt. 1			

Avaluació Ponderada de les Alternatives (Puntuació)

Alt. 1 — 8,91
Alt. 2 — 7,12
Alt. 3 — 5,47
Alt. 4 — 4,10

5. A unified tram network. Ridership
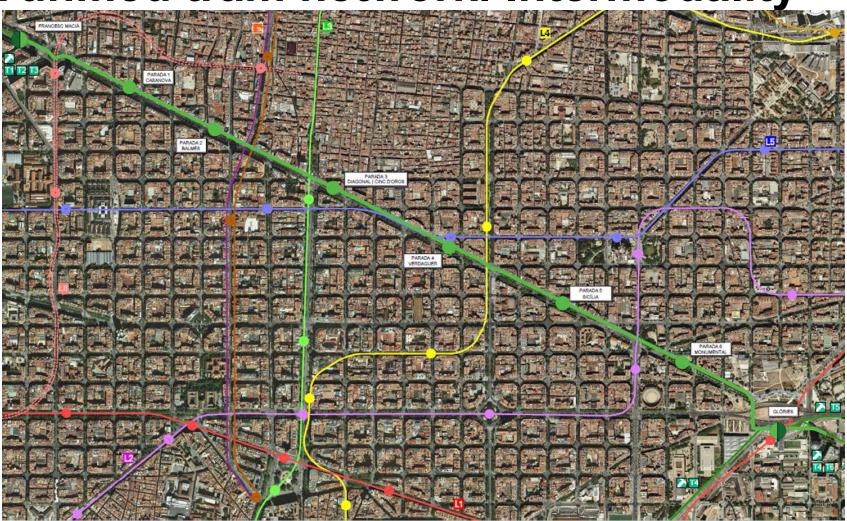## How can the demand be doubled?
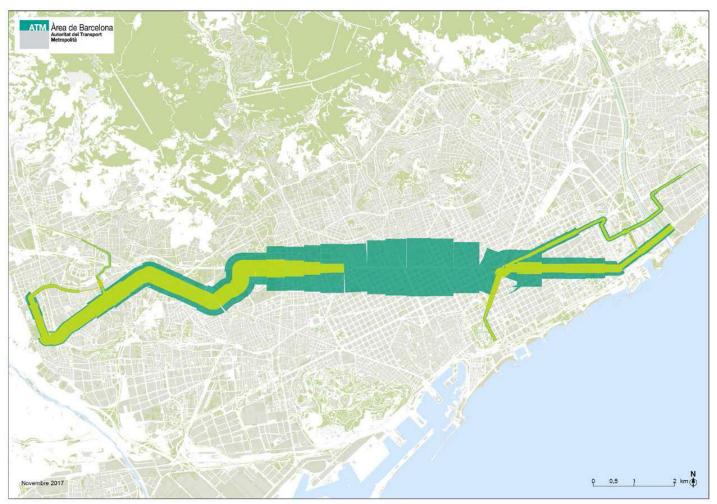
5. A unified tram network. PT offer

✘ No means of transport with medium-high capacity

✘ Bus bunching

✘ Commercial speed 9 km/h

5. A unified tram network. Intermodality

5. A unified tram network. Connectivity

5. A unified tram network. Traffic restriction

6. Strategy for Digitalisation of Mobility

Administration response to society's global digitalisation

Administration must lead to guarantee this process and its benefits to whole society

3 strategic topics:

1. Ensure quality of connexions
2. Cybersecurity
3. Training

Framework:

Catalan Digital Agenda 2020
SmartCAT strategy
National agreement for a digital society
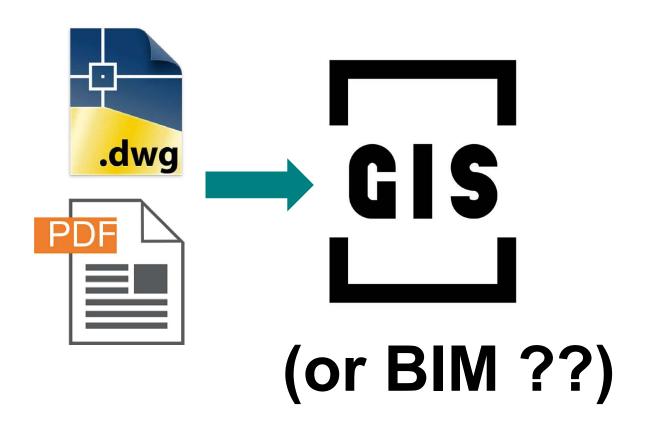
6. Strategy for Digitalisation of Mobility

Objectives

1. Benchmarking of International best practices

2. Reflection about best strategic lines and measures for digitalisation

3. Evaluation and prioritisation of measures depending on cost benefit criteria or weaknesses of digitalisation

4. Define the role of transport authority in each measure and tools for implement them

5. Develop the Roadmap for digitalisation of mobility in Catalunya

6. Monitorisation of undertaken measures

7. Digitalisation as a duty

1. Directive 2014/24/EU on public procurement (art 22.4)

> 4. For public works contracts and design contests, Member States may require the use of specific electronic tools, such as of building information electronic modelling tools or similar. In such cases the contracting authorities shall offer alternative means of access, as provided for in paragraph 5, until such time as those tools become generally available within the meaning of the second sentence of the first subparagraph of paragraph 1.

2. Spanish law 9/2017 on public sector contracts has adopted art. 22.4 UE Directive

3. Agreement of Catalan Government on 12th December 2018 obligates in a term of 6 months all public works contracts over 5,5 M€ (including their preliminary studies) to ask for implementation of BIM for the whole life cycle of the project.

8. Digitalisation of tram infrastructure

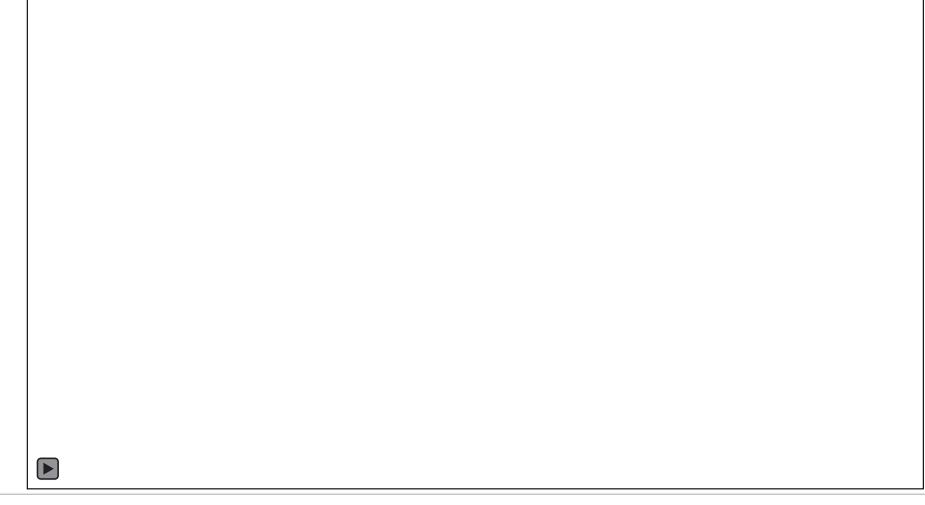# (or BIM ??)

8. Digitalisation of tram infrastructure

Steps

1. Definition of the Data Model

2. Processing As-Built CAD files

3. Data acquisition on site (3D map with Lidar, Google street view, photos)

4. Upload checked data into Data Base

5. Define symbology

6. Acceptance

8. Digitalisation of tram infrastructure

Objectives

- ✓ **DEFINITION OF A DATA MODEL** will allow us to upgrade tram infrastructure with new extensions or modifications

- ✓ Ensure last updates in infrastructure are registered for sharing, e.g, with third parties working in tramway domain.

- ✓ Make public consultation procedure more transparent and participative

- ✓ Follow up of concession contracts will be easier from backoffice

- ✓ Useful tool to maintenance purposes (first step to move for condition-based maintenance

9. LIDAR applications in tram systems

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Autoritat del Transport Metropolità

**Digitalised light rail infrastructure
in one of the world's smartest cities**

Bilbao, 6th March 2019

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