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Feasibility study for the development of a public-led MaaS platform in the city of Valencia

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Abstract

As cities evolve and change, new solutions to ease the everyday life for people should be developed. Growing both in size and population, cities are facing issues related to housing, pollution and growing inequalities. Metropolitan areas are characterized by complicate relationship between the main attractor and the constellation of smaller cities. The infrastructure produces barriers and bottlenecks while the needs of society are pulling these two realities closer together.

New technologies and frameworks have been proposed to tackle these issues. In 2013 Mobility as a Service (MaaS) was first presented to the world as the newest frontier for transport. More than 12 years have passed, and it has not yet delivered on its promises. The issues regarding data sharing and integration, high cost of the digital infrastructure and the disinvestment from public transport were blamed for the failed projects. Very few projects focused on users need, trying to create a system fitting those, but rather focused on solving the problems using MaaS without questioning if the instrument was fit for the purpose.
This study, carried out in the metropolitan area of Valencia (Spain), explores both the characteristics and willingness to the mobility providers and regulators to work to implement a MaaS system as well as the users experience and needs to understand whether Mobility as a Service is a fit solution.

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Chapter 1 - Introduction

The twenty-first century is characterised by the consolidation of the metropolis as the primary unit of human settlement. As urban areas expand, they are transforming from singular, contained entities into sprawling regions defined by the complex interdependence between the central city and its surrounding municipalities. This evolution presents a fundamental paradox: while social and economic dynamics are integrating these territories, demanding seamless movement for work, education, and leisure, the physical and administrative infrastructures inherited from previous eras often create barriers and bottlenecks.

Metropolitan areas are currently facing a *triple crisis* of housing[1], pollution (Iñiguez et al., 2022), and growing inequality (Mazorra Rodríguez, 2024). As urban cores become engines of economic growth and tourism, they also become increasingly unaffordable, pushing residents toward the periphery. This displacement forces a reliance on infrastructure that is often fragmented, leading to a dependency on private motorised vehicles that exacerbates environmental degradation. The modern challenge for urban planners, therefore, is not merely to facilitate movement, but to reconnect these fragmented territories in a way that ensures equitable access to opportunities for all citizens, regardless of their zip code or income level.

In response to these systemic inefficiencies, the last decade saw the emergence of a technological promise that captured the attention of the transport sector: Mobility as a Service (MaaS). First presented to the world in 2013 as the newest frontier for transport, MaaS was envisioned by pioneers like Sampo Hietanen as a distribution model that would bundle public transport, taxi, and shared mobility services into a single interface (Sampo Hietanen, 2014). The theoretical ambition was bold and transformative: to create a level of convenience so high that it would render private car ownership obsolete.

However, more than twelve years have passed since its inception, and MaaS has not yet delivered on its disruptive promises (Butler et al., 2021). The early enthusiasm, driven largely by private-led initiatives seeking rapid market scaling, frequently clashed with the stubborn realities of urban governance and operator resistance (Audouin & Finger, 2019). As highlighted in the review of the state of the art, the failure of many projects can be traced to structural issues rather than technological ones: the reluctance of operators to share proprietary data, the high cost of digital infrastructure, and a chronic disinvestment from the public transport backbone that must support any viable MaaS ecosystem (Butler et al., 2021; Kriswardhana & Esztergár-Kiss, 2023).

Too often, projects focused on the instrument (e.g., the app, the algorithm, the bundle) without questioning if that instrument was fit for the specific social purpose it was meant

[1] Cátedra Observatorio de la Vivienda. (2025, January 13). *Informe 4T 2024: El precio del alquiler se dispara un 8% en solo tres meses.* Universitat Politècnica de València (UPV). https://observa.webs.upv.es

to serve. Consequently, the academic and professional discourse is shifting. The conversation is moving away from MaaS as a commercial product toward a Public-led MaaS model, one where the integration of transport is treated not as a business opportunity, but as a tool for achieving societal goals like climate resilience and social inclusion (Mubiru, 2025).

This study grounds these global debates in the specific reality of the Valencia Metropolitan Area (AMV), Spain (Figure 1). Valencia serves as an ideal laboratory for this analysis because it encapsulates the tensions of the modern European metropolis. Geographically, it is a territory defined by the alluvial plain of the Turia river, historically an agricultural powerhouse (*l'Horta*) that has morphed into a dense conurbation of approximately 1.6 million inhabitants (Instituto Nacional de Estadística, 2024).

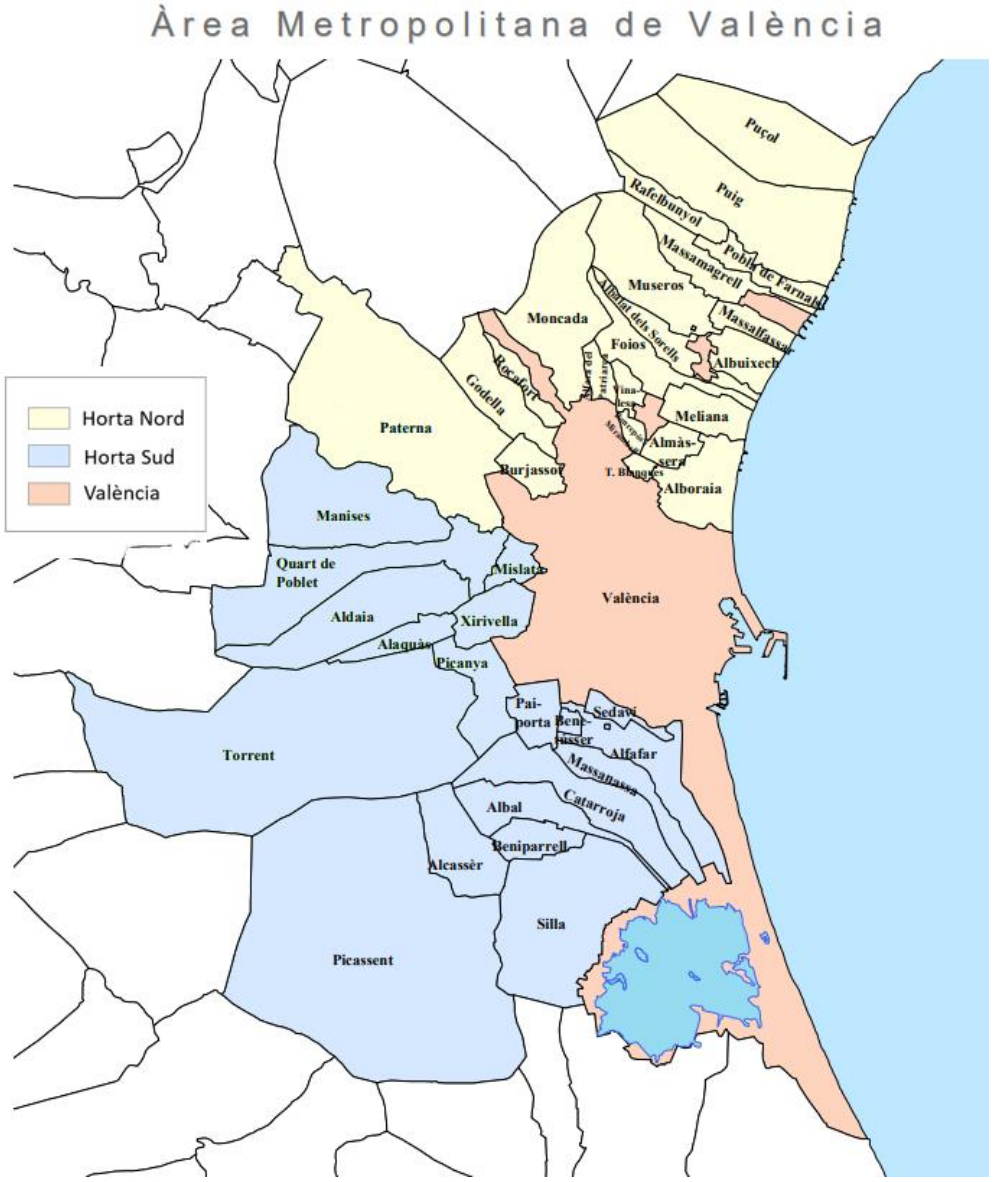

Figure 1 – Metropolitan Area of Valencia

The AMV is at a pivotal moment. On the surface, it has achieved significant milestones in integration. The 2021 launch of the SUMA card, which unified a previously chaotic

tariff system across Metrovalencia, EMT, MetroBus, and Renfe, demonstrate a clear institutional will to harmonise mobility by Autoritat de Transport Metropolità de València (ATMV).

However, deep structural issues lie beneath this progress. The region is characterised by a complex socio-economic gradient: a wealthy northern axis contrasting sharply with a working-class southern and interior belt, where reliance on public transport is higher but service quality is often lower. Furthermore, the area is under intense pressure from two external forces. First, a tourism-driven housing crisis is gentrifying the core, expelling residents to the periphery and altering commuting patterns (Galan, 2024; Nieuwland et al., 2025a). Second, the climate emergency has ceased to be a theoretical threat. The devastating DANA (isolated high-altitude depression) of October 2024, which caused catastrophic flooding in the *Horta Sud*, highlighted the fragility of the current infrastructure and the urgent need for a transport network that is resilient to extreme weather events.

In this context, the governance of mobility is further complicated by a Consultative Loop, a system where smaller municipalities have a voice but often lack the decisional power of the regional government (GVA) or the capital city. This raises a critical question: can a centralised digital system like MaaS function effectively in a politically fragmented landscape?

This thesis aims to go beyond a technical feasibility study to answer this question. While it assesses the digital and physical readiness of the network, its primary innovation lies in juxtaposing the willingness of the supply side (institutions and operators) against the lived experience of the demand side (the users).

Recent history has shown that MaaS projects fail when they ignore the user's reality (Sarasini et al., 2025; Suárez et al., 2025). Therefore, this study explicitly incorporates the voices of those often marginalized in high-level transport planning: student associations dealing with unreliable commutes, migrant organizations navigating bureaucratic barriers to access, and unions representing the workers who keep the city moving.

The specific research objectives (RO) are **RO1**) to situate Valencia within the European context by comparing it with successful public-led ecosystems (such as Vienna's *WienMobil* or Berlin's *Jelbi*); to highlight transferable governance models; **RO2)** to evaluate the compatibility of Valencia's current transport network, spanning EMT, Metro, and private micromobility players, with the requirements of a Level 3 (Integration of Service Offer) or Level 4 (Integration of Societal Goals) MaaS system (Sochor et al., 2018); **RO3**) to identify key stakeholders and analyse their perspective regarding mobility, integration and possible MaaS implementation (Dente, 2014); and **RO4)** to use the SWOT and PEST models to synthesize the findings (Bell & Rochford, 2016).

To achieve these objectives, the work is structured into a logical progression of analysis.

This thesis is composed of 6 Chapter structured as follows:

- Chapter 2 establishes the theoretical framework, deconstructing the definitions of MaaS and distinguishing between profit-driven private models and policy-driven public models.
- Chapter 3 presents the research objectives of the thesis and methodological approach employed in this research, detailing the spatial analysis used to map transport coverage and the qualitative interview process that gathered insights from key actors.
- Chapter 4 presents the diagnostic core of the thesis, offering a deep dive into the AMV's geography and presenting the qualitative findings from stakeholder engagement and illustrates them in the PEST and SWOT analysis.
- Finally, Chapter 5, (Conclusion), synthesises the findings of PEST and SWOT analyses to determine if Valencia is ready for MaaS, and more importantly, if MaaS is the right solution for Valencia's specific problems.

Chapter 2 - State of the art

This section explores the various definitions of Mobility as a Service (MaaS), the processes that led to its development, and the proposed evolutions. Afterwards, a series of examples, successful and not, are listed and explored as an assessment of the current implemented projects' characteristics.

The first definition of Mobility as a Service can be traced to an article on EuroTransport from 2014. The author, Sampo Hietanen, defines MaaS as *"a distribution model aiming to implement a single interface to offer all the services to meet all the mobility needs of the costumers."*. Hietanen is unanimously considered to be the founder of MaaS, His vision was to create and sell the services, public transport, and shared mobility into bundled packages to make car ownership obsolete. These options would be scalable and modifiable to better accommodate the specific needs of each kind of user. (Sampo Hietanen, 2014).

Alternative definitions were proposed by MaaS Alliance (MaaS Alliance, 2025), an association of MaaS operators aiming to export the model; they identified the ease of use of a single application as an additional value. Moreover, the single payment system simplifies the adoption of the system as well as the inclusion of different active transport (i.e., cycling) (Kamargianni & Matyas, 2017).

2.1 Public and Private MaaS models

The distinction between *public-led* and *private-led* models is fundamental to understanding how governance, objectives, and performance can differ (Lyko & Kębłowski, 2025).

A public-led MaaS is generally coordinated by a public transport authority or other governmental body acting as the integrator[2], the entity responsible for combining and managing different mobility services within a single digital interface (Smith & Sørensen, 2023). In this model, the public authority oversees service aggregation, payment integration, and data governance, while ensuring that the system aligns with broader policy objectives such as accessibility, social inclusion, and emission reduction (Mulley and Nelson, 2020). The operators, by contrast, are the individual mobility providers, public transport companies, micromobility services, or car-sharing companies, that deliver the actual transport services offered within the MaaS ecosystem (Jittrapirom et al., 2017).

A private-led MaaS, on the other hand, is typically orchestrated by a commercial actor that assumes the role of both integrator and platform manager, often developing proprietary ecosystems where access, data, and customer relationships are controlled for competitive advantage. Some operators are already integrating other services in their

[2] MaaS Alliance. (2017). *White Paper: Guidelines and Recommendations to Create the Foundations for a Thriving MaaS Ecosystem.* https://maas-alliance.eu;

platform, notably Uber[3] and FreeNow[4] allows to book trains and moped rides in many cities[5] [6]. The primary objectives in this case are market growth and profitability rather than direct alignment with public policy goals. Private-led MaaS models tend to prioritise agility, rapid scaling, and the creation of differentiated user experiences, but may raise concerns regarding equity, interoperability, and transparency in data management (Butler et al., 2021; Mukhtar-Landgren & Smith, 2019) Private-led MaaS may focus more on a user segment with premium services to maximize revenue and valorise the brand image(Kriswardhana and Esztergár-Kiss, 2023).

Comparing the two systems allow to understand how their governance affect the evolution stages of the project and how the final product will differ. The public-led model usually promotes open standards and interoperability, treating the MaaS platform as part of the public infrastructure[7] [8]. It ensures service coverage across all areas, including low-demand or socially necessary routes, and promotes integration of multiple transport modes under fair and transparent governance. Conversely, the private-led model may focus on profitable markets and customer segments, often relying on dynamic pricing or premium packages, and can lead to fragmented ecosystems where services are selectively integrated based on commercial interest (Esztergár-Kiss & Kerényi, 2020). In terms of revenue models, public-led systems often rely on subsidies, shared cost structures, or pre-purchased ticket bundles, while private-led systems tend to depend on commissions, data monetisation, and subscription-based schemes (Mulley & Nelson, 2020). The allocation of risks and revenues also differs in public-led MaaS. Risk is often shared among public authorities and operators, whereas in private-led systems it is borne primarily by the integrator seeking to balance profitability and service quality. Ultimately, the key differences between public and private MaaS models lie in governance structure, intent, and control. Public-led MaaS treats mobility as a public good, focusing on inclusivity, transparency, and societal benefit, while private-led MaaS treats mobility as a market service, aiming for efficiency, innovation, and competitiveness (Smith & Sørensen, 2023). In practice, most MaaS ecosystems adopt hybrid or Public–Private Partnership (PPP) approaches, where roles are shared: the public sector often defines the regulatory and infrastructural framework, and private actors contribute innovation, technology, and operational efficiency (Eckhardt et al., 2020).

[3] https://www.uber.com/
[4] https://www.free-now.com
[5] https://www.uber.com/gb/en/ride/travel/trains/
[6] https://www.free-now.com/es-en/ride/emopeds/
[7] ITF (2021), *ITF Transport Outlook 2021*, OECD Publishing, Paris, https://doi.org/10.1787/16826a30-en
[8] MaaS Alliance (2017), *Guidelines & Recomendations to create the foundation of a thriving MaaS system,* MaaS Alliance Press, https://maas-alliance.eu/wp-content/uploads/2017/09/MaaS-WhitePaper_final_040917-2.pdf

Examples of public-led MaaS initiatives include WienMobil[9] in Vienna and Jelbi[10] in Berlin, where the municipality or transport authority acts as integrator, coordinating multiple operators within a unified system[11]. Conversely, Whim[12] in Helsinki and UbiGo[13] in Gothenburg represented private-led or hybrid MaaS models, where commercial entities act as integrators and manage service bundling and payments while collaborating with public transport operators(Smith et al., 2018)

2.3 MaaS Levels of integration

To define the extent to which a MaaS application manages to integrate the mobility options (Sochor et al., 2018) proposed an analysis based on topology level. They identified four levels of integration for MaaS application (Table 1), assuming that the MaaS operator would be a private entity.

Table 1 – MaaS Levels of Integration

Level	Integration characteristics
4	**Integration of societal goals** – *policies, incentives, etc.*
3	**Integration of the service offer** – *Bundling of services, subscriptions and contracts, etc.*
2	**Integrations of booking and payment** – *Single trip find, book and pay functions*
1	**Integration of information** - *Multimodal travel planner, price information, real time traffic and schedules updates*
0	**No integration** – *Single separate services with no level of cooperation or integration*

This assumption is then changed at level 4 when the integration involves policies and prizes for positive behavioural changes in transport as public operators could have a better leverage for policies changes.

[9] https://www.wienmobil.at/
[10] https://www.trafi.com/jelbi-app-berlin
[11] ITF (2021), *ITF Transport Outlook 2021*, OECD Publishing, Paris, https://doi.org/10.1787/16826a30-en
[12] https://www.interregeurope.eu/good-practices/whim
[13] https://civitas.eu/tool-inventory/ubigo

A detailed description of each level is provided below:

- **Level 0 – Absence of integration**
  At level 0, the integration is absent, the separate services do not share information about each other and information aggregators (e.g. Moovit[14], Google Maps[15]) are absent. Each service is a separate close system.
- **Level 1 - Integration of information**
  At this stage, the MaaS application enables the user to make **informed travel** decisions by aggregating real-time data from **multiple operators** (e.g. public transport, dockless bike services). Contributors include local transport companies, providing General Transit Feed Specification Real Time (GTFS-RT), routes and fares; shared mobility providers, providing vehicle availability, costs, and battery/fuel levels; public transport authorities, providing rules and updates on the status of traffic, accidents, and road work; VTC and taxies, providing their current tariffs, the availability and distance of their vehicles; and weather services. More advanced and structured implementation can include **personalised trip planners** and **travel assistants** able to consider the preferences and needs of the users. The growth of artificial intelligence and large language model enables virtual assistant capable of planning trips with minimal user input, a particularly valuable tools for recurrent journeys (Nie et al., 2025).
  Many existing applications are currently implementing level one to some degree, notably: Google Maps, Moovit, CityMapper[16].
  Google Maps dominates the market due to its privileged position. Indeed, this application is pre-installed in all Android-based devices, which are currently around 62% of the smartphones in the European market and over 72% on a global level[17]. Its deep integration within the Google ecosystem, thanks to the embedding tools provided to other apps and websites, created the opportunities for this level of dominance.
  MaaS applications **struggle to substitute this dominant force**, particularly its advanced **Point of Interest (POI) search** function.
  Local authorities can play a strategic role by choosing **not to share GTFS-RT** data with global platform instead supporting the MaaS initiative with their higher quality data. Moreover, the MaaS operator must either establish protocols and define rules for the data sharing or operate the conversion of each individual company format into its platform.
- **Level 2 – Integration of booking and payment**
  To reach level two of integration, the application should be capable of handling **single ticket sales** without relying on external browsers or redirect links. Remaining within the app environment is fundamental to ensuring a **seamless**

[14] https://moovitapp.com/it
[15] https://www.google.com/maps
[16] https://citymapper.com/
[17] Mobile Operating System Market Share Worldwide | Statcounter Global Stats
https://gs.statcounter.com/os-market-share/mobile/worldwide

user experience. This is particularly relevant for intermodal travellers, as it allows them to save time and reduce the *computational* or mental cost associated with travel planning and execution.

This next step, however, introduces a **higher level of technical complexity** and requires **enhanced security** measures. Both development and implementation costs rise along with the difficulties of managing revenue sharing and pricing strategies.

In the case of a private-led MaaS, two possible solutions can be adopted to address the latter issue. The first involves the acquisition of a fixed number of tickets at a discounted rate, which the MaaS provider resells to users with a mark-up. The second relies on a commission-based model. Neither option has yet demonstrated clear superiority. Commissions for instance, can be hard to negotiate if the MaaS provider lacks a dominant market position. Moreover, the same platform may be offered to direct and indirect competitors, making them reluctant to any revenue share system. Shared mobility operators, often well-established companies, can secure better deals for their transaction fees with payment networks. With the growth in influence of the payment networks and the wide implementation of NFC-based payment technologies, the single ticket's function may lose its significance when not associated with bookings which is often the case with public transport.

The development of services such as Mastercard Transit Solutions has created significant opportunities for transport operators, especially public ones, to introduce *pay-as-you-go* systems with reduced transaction costs. It is interesting to notice that MaaS Alliance former president, Andy Taylor, works in the Mastercard's division dedicated to transport payment and is one of the minds behind the Mastercard Transit Solutions programme[18].

Finally, while the MaaS operator is responsible for the sale and ensuring the accuracy of the booking, this model exposes them to potential accountability for the quality of service over which they have no direct operational control. In a public-led MaaS instead, as the operator and the MaaS provider are the same company, the direct control allows to immediately take care of issues and refunds.

- **Level 3 – Integration of service offer**

  According to Hietanen's framework (Hietanen, 2014) and the analysis of Hensher (Hensher et al., 2021) level three represents the stage at which MaaS can realistically **compete with private car** ownership by offering a seamless, flexible and cost-effective alternative. Personalization becomes central as the MaaS operator focuses on implementing **bundles of services** tailored to the needs and preferences of the individual users. The available options can still rely on both *pay-as-you-go* and subscription-based plans.

[18] A year in review - Five Questions with Andy Taylor, Mastercard For Government https://www.linkedin.com/pulse/year-review-five-questions-andy-taylor-mastercard-for-government-qfrnc/

Revenue sharing remains a sensitive issue, bundled packages' earnings must be distributed among the involved stakeholders. As previously discussed for level 2, this can occur through either the pre-acquisition of ticket packages at discounted rates or through commissions calculated on the actual consumption of each transport mode. In the latter case, the MaaS operator should employ **educational campaigns** and **pricing policies** to incentivise the use of the most cost-effective modes, typically public transport, to maximise revenue. This approach enables them to offer comprehensive bundles with premium options at higher prices while still maintaining low commission to providers due to the customer's choices. At this level, data integration and analytics play an increasingly important role. The ability to monitor travel behaviour, forecast demand, and dynamically adjust offers based on real-time data becomes essential to deliver personalised solutions efficiently. This data-driven capability also establishes the foundation for the next level of integration, where MaaS systems align with societal and policy objectives.

- **Level 4 – Integration of societal goals**
  At Level 4, the integration of Mobility as a Service transcends individual user needs and evolves into a mechanism for achieving collective societal objectives. In this phase, MaaS becomes a strategic tool for implementing sustainable mobility policies, promoting objectives such as emission reduction, accessibility, social inclusion, and road safety. MaaS operators, public authorities, and transport providers **collaborate within a shared governance framework** that defines incentive structures, data-sharing protocols, and performance indicators. Transport choices are directly linked with public policy instruments through incentives, subsidies, or discounts that reward sustainable behaviour. For example, opting for public transport over private cars, travelling during off-peak hours, or combining trips with active mobility modes such as cycling and walking. Anonymised and aggregated data collected through the MaaS ecosystem can support evidence-based policymaking, allowing public authorities to monitor travel patterns, evaluate policy effectiveness, and plan infrastructure investments more accurately. This level also broadens the concept of integration beyond mobility to encompass urban planning, environmental management, and social policy. MaaS thus becomes a component of a larger *Smart City* ecosystem, in which mobility is interconnected with energy efficiency, air quality monitoring, and public health objectives. Nevertheless, the implementation of societal integration raises significant challenges. Issues of data governance, privacy, equity, and accountability must be addressed to ensure that public objectives do not compromise individual rights or market competitiveness. Ultimately, Level 4 represents the transformation of MaaS from a **market-oriented mobility platform** into a **policy-aligned ecosystem**, capable of supporting the transition toward sustainable, inclusive, and user-centred urban mobility systems. For this reason, level 4 has higher chances to be implemented in a public-led MaaS as the governance of the platform is already aligned with the policy makers.

2.4 Challenges and issues

So far MaaS has not imposed itself as a widespread model, during the different pilots and full-scale implementations many issues came out as reason for the negative results (Aba & Esztergár-Kiss, 2024; Huang, 2022; Lopez-Carreiro et al., 2021; Sarasini et al., 2025; Smith & Sørensen, 2023). In this paragraph the barriers are analysed and divided into categories: supply and demand following the blueprint of Butler. (Alonso-González et al., 2020; Butler et al., 2021; Hasselwander and Bigotte, 2022)

2.4.1 Supply Side Barriers

The supply side of MaaS faces significant hurdles, primarily categorised into a **lack of cooperation, insufficient business support, and risks related to data security**. In the following section, each of them is detailed and analysed.

Lack of Cooperation and Shared Vision. The first major issue identified is the lack of cooperation between stakeholders and the absence of a clear, shared vision. MaaS aims to integrate transport services, which requires **aligning the competing interests**, **goals**, and **strategies** of both the private and public sectors. However, MaaS is often characterised as a relatively new concept lacking a clear definition or well-established examples in many regions. This ambiguity contributes to uncertainty, where a lack of cooperation can lead to network inefficiencies, monopolisation, and political or business disinterest.

A significant friction point lies in the **misalignment of stakeholder lifecycles**. Public stakeholders, such as city, regional, and metropolitan governments and transport authorities, are often expressions of the political parties currently in power. As election dates are not aligned across different levels of government, regional and local power can be held by parties with **conflicting views and policies**. This misalignment can harm cooperation quality, especially when relevant figures in authorities and agencies are directly nominated by political powers. Consequently, the **potential change in policies** and goals may not be **compatible with the steady support** that MaaS initiatives require. While trials have been successful, this lack of consistent public support and shared vision often prevents them from translating into full-scale implementation.

Lack of Business Support and Economic Viability. Secondly, the lack of business support poses a substantial barrier. Early MaaS concepts generated optimism in both public and private sectors, however the initiative is often perceived as carrying **high economic and marketing costs** with a **low potential for short-term return** on investment. Furthermore, mobility providers may fear losing direct relationships with their clients or giving up competitive advantages.

To overcome these initial hurdles, investments and economic incentives are often used to support pilot programs and startups. Nevertheless, there is a risk of creating a *drugged market*. If pricing policies are based heavily on economic incentives rather than market realities, the **service may become unsustainable once the initial funding dries up**. Financial incentives must be used with caution to avoid manipulating the process of pricing services, which could threaten the ongoing economic sustainability of the MaaS ecosystem (Börjesson and Eliasson, 2026).

Data and Cyber Security. Finally, the integration of complex networks involves **sharing vast amounts of personal and business data**, which introduces significant security risks. For mobility providers, there are concerns regarding insider threats and the breach of intellectual property, which could result in businesses losing their competitive advantage. Establishing robust privacy regulations and maintaining trust between partners is therefore critical for the successful supply of MaaS (Chang et al., 2025; Rohunen and Markkula, 2019).

2.4.2 Demand Side Barriers

Demand side barriers refer to the factors affecting the consumption and user uptake of MaaS within cities. These challenges, described below, range from deep-seated cultural habits to financial perceptions and technological usability.

Overcoming the Culture of Private Vehicle Travel. The most significant barrier to MaaS adoption is the ingrained tradition of private vehicle use. Private vehicle users are consistently identified as the social group least likely to adopt MaaS, with many perceiving the car as the only option that fully satisfies their mobility needs. Even when users are open to reducing their car use, changing habitual behaviours can be difficult. Consequently, Pickford and Chung suggest that MaaS may initially be more successful if positioned as an alternative to a household's second vehicle rather than as a total replacement for ownership. (Pickford and Chung, 2019)

Willingness-to-Pay and Perception of Cost. There is a significant discrepancy between the cost of providing MaaS and the user's *Willingness-To-Pay* (WTP). Previous research (Liljamo et al., 2020) indicates that potential users are often only willing to pay approximately 64% of their current transport budget for a MaaS package. This reluctance is largely driven by the fact that **private car owners frequently underestimate their actual transport costs**. Because cost reductions alone may be insufficient to drive behavioural change, users tend to prefer subscription models that bundle unlimited public transport trips with shared services, rather than *pay-as-you-go* options.

Demographic and User-Specific Resistance. MaaS faces specific adoption hurdles among different user groups. Older generations show a strong reluctance to use MaaS, often due to a lack of experience with smartphones and ride-sourcing apps, as well as a psychological attachment to vehicle ownership. Surprisingly, existing public transport users also present a barrier; those who are satisfied with current public transport systems or who travel using only a single mode (e.g., only bus or only bike) often fail to see the value in a multimodal integration platform (Caiati et al., 2020; Suárez et al., 2025).

Platform Attractiveness and Trust. Finally, the success of MaaS on the demand side relies heavily on the digital interface. To compete with the comfort and convenience of a private car, the platform must offer seamless payment integration, real-time updates, and the ability to personalise trips. If the platform is not attractive or easy to use, it will fail to enhance the trip experience. Furthermore, generating demand requires establishing customer trust regarding the transparency of the organisation and the security of personal data (Cottrill, 2020).

2.5 Prospected evolutions

MaaS has seen different variation in the involved stakeholders and technological partners as well as in its governance. More recently, **Mobility as a Feature** has expanded some of MaaS key concepts hoping to overcome some of its main issues.
Mobility as a Feature (MaaF) was proposed by Hensher & Hietanen in 2023, it represent a so-called *second-generation of MaaS* (Hensher & Hietanen, 2023).
To overcome the financial sustainability issues and the limited user adoption that hindered first-generation MaaS, the mobility in **MaaF is embedded within other services**, becoming a feature among many others. Unlike MaaS, MaaF assigns the **role of integrator** to **large private enterprises**, namely insurance, banking or telephone companies, and not to a mobility operator or a public transport authority. More sustainable mobility is encouraged by **rewarding sustainable choices** through reward-based mechanisms that link travel behaviour to financial incentives.
For example, insurance companies can **offer lower premiums** or other advantages depending on customers' travel choices. In this way, companies incentivise users to reduce private car use while still providing mobility alternatives within their service plans.
This approach can **reduce the payout ratio** for insurance companies, since car usage lowers the number of claims, while also **contributing to broader societal objective** such as congestion and emission reduction (Hensher & Nelson, 2025).
Hensher and Nelson argue that such system can help overcome one of the MaaS' major weaknesses: its **dependency on public subsidies** and **private investment**.
However, the proposal fails to underline the transformative shift that MaaF implies in the way users are reached and engaged. MaaS primary objective was to reduce car dependency, the focus however was often on bundling the alternative services expecting an improvement in the supply to generate a raise in the demand. This strategy failed to directly appeal to car users, except for positive examples like Smart way to Antwerp[19] (Discussed in detail in Antwerp ecosystem) and the *MobilityChangers* experiment in Brussel[20], while reaching them through insurance companies can help show the alternative using reduced premiums as an incentive. Many companies (e.g., Cooltra[21], Cabify[22], FreeNow, Uber) give specific mobility solutions to companies that want to offer sustainable mobility options to their employee. From **reserved fleet** to **discounted rides** and **pre-paid trips**, the packages are **tailored to the company's needs** and characteristics, with a native dedicated application that helps track costs and environmental impact. TravelPerk, recently rebranded as Perk[23], currently offers both the planning and the instruments to record and process travel expenses. Although addressing

[19] Stad Antwerpen. (n.d.). *Slim naar Antwerpen.* Retrieved November 4, 2025, from https://www.slimnaarantwerpen.be/en/home

[20] Maestromobile. (n.d.). *Mobility changers*. Retrieved November 4, 2025, from https://www.maestromobile.eu/mobility-changers

[21] https://cooltra.com/it/

[22] https://cabify.com/en

[23] https://www.perk.com/

these as MaaS can be far fetching, especially for commuting, the use for business trips can establish as a niche version of MaaS. Using the topology proposed by Sochor in 2018, Business-to-Business (B2B) MaaS can be considered a version that partially skips level 2 and 3, as the payment is provided by the company, and reaches directly into level 4 with the integration with societal goals – or company goals (Sochor et al., 2018; Waller et al., 2024)

It is worth mentioning two other proposals that use the brand and recognisable acronym of MaaS to shift the narrative: **Mobility as a Right** and **Mobility as a Resource**. (ICLEI, 2025).

Mobility as a Right aims to generate a cultural shift with the intention of recognising and treating mobility as a **human right** and not as a commodity (or as a Service). This should guarantee its capillary diffusion and treat its absence as a matter of social justice and not only as a matter of planning.
It is based on six principles: (i) Adaptation to the local context, (ii) Embedding within the transport policies and the sustainable urban mobility plans, (iii) Multimodal collaboration, (iv) Prioritisation of sustainable actions, (v) Participatory approaches in transport and spatial planning, (vi) Impact measure and assessment (ICLEI, 2025).

Mobility as a Resource aims to build the **technological tools** to allocate and manage in **real time units of transport capacity**. The focus is on **guaranteeing** that **automation** will keep a human-centric approach. Transport capacity, including both the infrastructure and the vehicles, is allocated dynamically to respond real time to the urgency, demand, location and social priorities.
It would guarantee a better distribution of resources and a higher resilience in case of emergencies and natural disasters (Waller et al., 2024)

2.6 MaaS Examples

This section collects and discusses currently run MaaS projects. The examples were chosen to guarantee diversity and a larger scope of the possibilities of MaaS implementation. Each city was analysed based on their **characteristics** and **the role in their region**, the **specificity** of their **MaaS system** and their apps.

Antwerp ecosystem

Antwerp is one of the major cities in Belgium, hosting its largest commercial port and serving as the main hub for freight transport in the country. The city sits in the highly densely populated Be-Ne-Lux, the region including Belgium, Luxemburg and the Netherlands that shares an interconnected network of cities and services. As capital of the Antwerpen province, the city is the political and economic fulcrum of the area and the getaway to access the **well-developed railway system** for smaller towns.
The city government launched Smart way to Antwerp in 2016, a public-funded project to

foster a change in mobility habits in the city and the surrounding area. The Belgian legislation allows cities and provinces to develop MaaS projects autonomously (Van Audenhove et al., 2014).
With the combination of **educational programmes**, a routing application and high-quality open data, it improved the mobility balance of the city raising the percentage of trips completed with sustainable options[24].
The initiative also involves **free trial for companies** over 20 employees to use the sustainable solutions available in the city for free before creating a steady mobility plan with one of the many recognised business-to-business (B2B) mobility app. Smart way to Antwerp is not a MaaS project itself, although the associated application perfectly fits the requirements for Level 1 of integration, but it is fostering collaboration with different MaaS-like apps.
Their proprietary focuses on **routing** and is highly personalised allowing users to request greener, kid friendly or low emission routes.
The app utilises map services from OpenStreet Map[25] and MapBox[26], open data from the involved municipalities, congestion data from BeMobile, vehicle location from smart-mobility providers and real-time updates from public transport[27] (De Ljin[28] and SNFC[29]). However different available apps offer notable possibility of integration, placing them within level 2 of MaaS topology.

4411[30] is an application active in both Netherlands and Belgium allowing to pay for **parking and train, bus and tram tickets**. Initially born for parking, it has now increasingly been integrating public transport (Table 2). It does not provide routing on its own but has a function dedicated to show the way to the closest parking area seamlessly allowing to pay the parking ticket. A *Pro* version of the service is available; it offers an enhanced administrative tool for companies and processional to handle the monthly invoices and expenses.

Table 2 – Integration capabilities of 4411 App

Mobility Service	Description	Integration
Parking	Sends reminder to extend the duration of the parking.	Locate the closest parking and allow the payment for the service.

[24] City of Antwerp. (2025, June). *Mobility figures for Antwerp, Belgium 2023: Report on 15 years of mobility 2025* https://www.slimnaarantwerpen.be/en/about-us/mobility-figures-for-antwerp-belgium-2023?tab=report-on-15-years-of-mobility-2025
[25] https://www.openstreetmap.org/
[26] https://www.mapbox.com/
[27] Smart ways to Antwerp. (n.d.). *List of Data Sources*. Retrieved November 6, 2025, from https://www.slimnaarantwerpen.be/en/about-us/data-sources
[28] https://www.delijn.be/
[29] https://www.sncf-voyageurs.com/fr/
[30] https://4411.be/

Tolling	Seamless payment of tolls	Payment
De Lijn	Local Public Transport	Buy and validate single tickets
SNCF	Regional Trains	Buy and validate single tickets

KBC App[31], the application of the Insurance-Banking group KBC, allows to acquire a vast range of mobility services without external applications or registration on the services' platforms. It does not provide any routing opportunity (Table 3).

Table 3 – Integration capabilities of KBC App

Mobility Service	Description	Integration
Train tickets from SNCB and NMBS[32]	Regional and national single tickets rail travel	Booking, payment and validation
De Lijn	Local public transport	Payment and validation of single and carnet
Q-Park[33], 4411	Cashless parking on and off street	Pay for parking via phone with an integrate service from 4411 and Q-Park
Blue-Bike[34], Velo Antwerpen[35] or Mobit[36]	Docked Bike sharing	Availability, booking and payment
Q8	Gas Station	Paying directly from the app
MoveSmart mobility budget	Budgeting tool	Corporate or personal lease and assistance for both car and bike

uMob[37] is a private Dutch MaaS app, born in 2021. It recently acquired MaaS Global – the company founded by Sampo Hietanen – and its app Whim to expand its influence in the MaaS Market. uMob allows to plan, book and seamlessly pay for both public transport and shared mobility. However, in Antwerp the possibility to buy tickets for public transport is not yet being implemented. It is widespread in both Netherland and Belgium, and it is expanding in the European area operating in 15 countries. uMob initially enters a market alongside the mobility operator they already have an

[31] https://www.kbc.be/campaigns/mobile/en/
[32] https://www.belgiantrain.be/nl/
[33] https://www.q-park.be/nl-be/parkeren/antwerpen/
[34] https://blue-bike.be/
[35] https://www.velo-antwerpen.be/
[36] https://www.mobit.eu/
[37] https://umob.app/

agreement with and then works to include the other available options such as public transport and taxi services (Table 4).

Table 4 – Integration capabilities of uMob App

Mobility Service	Description	Integration
Taxi	Taxi	Booking and payment
Bolt[38], Voi[39]	Dockless Scooter and Mopeds	Availability, booking, charging levels and fare comparison for available options

Paris ecosystem

The MaaS ecosystem in Paris is anchored by the **Bonjour RATP**[40] application, developed by the state-owned operator *Régie Autonome des Transports Parisiens* (RATP).

Paris is the dense, monocentric capital of France and the economic heart of the Île-de-France region. With a city population of approximately 2.1 million and a metropolitan area exceeding 12 million, it is one of the most densely populated cities in Europe. The city structure is defined by its historic core, the *Périphérique* ring road, and the radial expansion of suburbs (*banlieues*) connected by the RER rail network. As the host of the 2024 Olympics, the region accelerated its *Grand Paris Express* infrastructure project to better connect suburbs without passing through the centre. Paris currently pursues a *15-minute city* urban planning model to decentralise services and reduce car dependency.

The state-owned public transport operator, RATP, launched its transformed MaaS offering, Bonjour RATP, in 2021. This move was a pivot from a pure transport operator to a digital mobility coordinator. To achieve this, RATP acquired the mapping service **Mappy**, integrating its proprietary mapping and point-of-interest data directly into the public transport app[41].

The application is a textbook example of a public-led aggregator that aims to retain the customer relationship while integrating private competition.

Bonjour RATP acts as a Level 2-3 MaaS solution. It goes beyond simple routing by integrating booking and payment for shared mobility directly into the interface.

The app utilizes RATP's real-time data for heavy rail (Metro, RER) and buses, while leveraging the Mappy tech stack for GPS navigation for walking, cycling, and driving. It integrates APIs from private scooter and bike operators to allow unlocking and paying without leaving the app. The app allows the use of the digital version of Navigo tickets,

[38] https://bolt.eu/it-it/
[39] https://www.voi.com/
[40] https://www.ratp.fr/en/apps/bonjour-ratp
[41] RATP Group. (2021). *RATP Smart Systems: The acquisition of Mappy to create a French leader in digital mobility*. Press Release

the regional ticketing system, via NFC. Table 5 shows the services included in Bonjour RATP app and the type of integration provided.

Table 5 – Integration capabilities Bonjour RATP App

Mobility Service	Description	Integration
Public Transport (RATP/SNCF)	Route planning and traffic updates for Metro, RER, Bus, and Tram.	Digital ticket purchasing and validation via NFC.
Vélib' Métropole[42]	Docked bike-sharing service.	Users can view availability and unlock bikes directly.
Lime[43], Dott[44], Tier[45], VOI	Free-floating e-scooters and e-bikes.	Locate, Book, Unlock, and Pay within Bonjour RATP.
LeCab[46]	Private ride-hailing (VTC) service.	Allows booking a ride directly through the app interface with an additional fare.
Noctilien[47]	Night bus network routing, critical for the 24-hour city economy.	Digital ticket purchasing and validation via NFC.

Wien Ecosystem

Vienna (*Wien*) functions as both a city and a federal state of Austria, granting it significant legislative autonomy over transport policy. The city serves a population of 1.9 million inhabitants, characterised by an exceptionally high modal split for public transport (38%). It implemented a *climate model city* strategy that aggressively disincentivises private car ownership through affordable annual passes (the €365 ticket) and *superblocks* that reclaim street space. The served area covers the **Core Zone (Zone 100)**, which includes all municipal districts, and connects seamlessly with the lower-density suburbs of Lower Austria.

The public MaaS solution, **WienMobil**, is operated by **Wiener Linien[48]**, the city's public transport provider. The technical backend is managed by *Upstream Mobility*, a municipal subsidiary that builds the Open Back-End infrastructure allowing third parties to connect[49].

[42] https://www.velib-metropole.fr/
[43] https://www.li.me/
[44] https://ridedott.com/
[45] Acquired by Dott on November 2025
[46] https://lecab.fr/ LeCab acquired Marcel in May 2024 joining the RATP system Marcel was already part of.
[47] https://www.iledefrance-mobilites.fr/it/le-reseau/services-de-mobilite/bus/bus-soir-noctilien
[48] https://www.wienerlinien.at/
[49] Wiener Linien. (2023). *Mobility Report 2022: Public Value in MaaS*. Vienna City Administration

WienMobil distinguishes itself through a governance model of *Public Value*, ensuring the municipality retains control over mobility data.

The app offers *Deep Integration* for city-owned assets and strategic partners. Registration and payment for these services can often be handled directly via the WienMobil account, rather than just linking out to other apps. Table 6 details the mobility app services offered in Wien.

Table 6 – Integration capabilities WienMobil App

Mobility Service	Description	Integration
Wiener Linien (PT)	U-Bahn, Tram, Bus.	Full ticketing, routing, and real-time updates.
WienMobil Rad	The official bike-sharing system (operated by Nextbike).	Fully integrated booking and payment.
WienMobil Auto	Station-based e-car sharing owned by the city.	Booked via the app.
Free2Move[50]	Free-floating car sharing.	Users can reserve cars via WienMobil, though validation require the native app.
Taxi	Taxi services	On-demand booking.

Berlin Ecosystem

Berlin is a polycentric city-state with a population of 3.7 million. Berlin is composed of distinctive neighbourhoods (*Kieze*) spread over a vast area (891 km²). The served area encompasses the entire **VBB tariff area (Zones A, B, and C)**, extending into the surrounding state of Brandenburg. The city's wide avenues and decentralised structure make it an ideal testing ground for micro-mobility to cover the *first and last mile* gaps between S-Bahn and U-Bahn stations.

The ecosystem is defined by **Jelbi**, a platform launched by the *Berliner Verkehrsbetriebe* (BVG) in collaboration with the tech provider **Trafi**. Jelbi is unique because it combines a digital app with physical infrastructure: *Jelbi Stations* are mobility hubs located at transit nodes where users can park, charge, and switch modes[51].

Jelbi is considered one of the most *open* MaaS apps in Europe, aggregating over 70,000 vehicles[52].

The proprietary technology by Trafi enables complete Level 3 integration. Users register once with Jelbi (verifying their ID and driver's license) and can then book and pay for

[50] https://www.free2move.com/it/it/car-sharing/
[51] BVG. (2024). *Jelbi: The Mobility Network of Berlin - Annual Report*. BVG Press
[52] Medium (2020) *BVG Jelbi - world's most extensive MaaS solution in Berlin*. Medium

almost all partners without downloading the partners' specific apps. In Table 7, a summary of the mobility services used in Berlin through Jelbi is reported.

Table 7 – Integration capabilities Jelbi App

Mobility Service	Description	Integration
VBB Public Transport	U-Bahn, S-Bahn, Tram, Bus, Ferry.	Ticketing for Zones A, B, C.
Voi, Lime, Bolt, Dott, Nextbike[53]	Micro-mobility (Scooters/Bikes)	Full booking and payment integration.
Miles, Sixt Share.	Free-floating car sharing	Fully integrated for booking/unlocking.
Emmy	Moped Sharing	Available for rent within the app.
Taxi Berlin	Taxi Service	On-demand booking.

2.7 MaaS Pilots

Before implementing MaaS at a full scale, public administrators and private entities rely on pilot projects to test the sentiment of the citizens and gather data to support the requests for fundings. In this section we analysed two currently ongoing MaaS pilot projects: Madrid and Turin.

Madrid

Madrid is a high-density capital with a population of 3.3 million. The city structure is defined by the **M-30 ring road**, which separates the central Almond (Central Zone) from the periphery. The city has strict Low Emission Zones (LEZ), driving the need for alternative mobility. The project is led by **EMT Madrid** (Municipal Transport Company) to support the *Madrid 360* environmental strategy.

The official application, **Madrid Mobility 360**, evolved from the earlier *MaaS Madrid* pilot. It acts as a public aggregator that prioritises sustainability and health over speed.

Its standout feature is the *Smart Planner* that calculates routes based on **bus occupancy levels**. It was the first major European app to offer this post-pandemic feature, allowing users to choose a route that might be slightly slower but less crowded. While it offers *Deep Integration* **Level 3** for public assets, it currently operates at **Level 2** (Discovery/Deep-linking) for many private operators[54] (Table 8).

[53] https://www.nextbike.de/berlin/en/

[54] EMT Madrid. (2022). *Madrid Mobility 360: Integrating the Low Emission Zone Strategy*. Municipal Report

Table 8 shows the integrated services within the Madrid Mobility 360 App.

Mobility Service	Description	Integration
EMT Madrid	Urban public transport	Real-time routing, allows purchase of the Single Ticket
BiciMAD[55]	Docked bike system managed by EMT	Users can find, unlock, and pay for bikes without leaving the app.
BiciMAD Go	Free-floating electric bikes managed by EMT	Users can find, unlock, and pay for bikes without leaving the app.
Zity[56], Wible[57], Free2Move[58], Acciona, Cooltra	Bike, scooter and moped sharing	It displays real-time location and battery levels on the map. Does not allow to unlock
Parking	EMT managed parking system	Allows in-app payments

Table 8 – Integration capabilities Madrid Mobility 360 App

Turin

Turin is a former industrial city of roughly 850,000 inhabitants, historically defined by the automotive industry. The city structure is a rigid grid, making it easy to navigate but historically car centric. Turin has been a part of the second round of testing ground for the national *MaaS4Italy* program, leveraging the region's existing smart ticketing system, BIP (Biglietto Integrato Piemonte).

Unlike cities that mandated a single public app, Turin adopted a **Competitive Aggregator model**. The city accredited **multiple** private *Super Apps* to compete for users, allowing citizens to choose their preferred interface while accessing the same public incentives. The five accredited apps are Wetaxi[59], Urbi[60], TabNet[61], ACI-SaraGo[62] and MooneyGo[63]. A summary of their characteristics and integration in provided in Table 9.

The pilot specifically targets *MaaS for Corporate* and university students to test behavioural incentives. A unique feature is the c**ashback mechanism**: users receive a

[55] https://www.bicimad.com/
[56] https://zity.eco/en/madrid/
[57] https://www.repsol.com/en/products-and-services/apps-and-tools/wible/index.cshtml
[58] https://www.free2move.com/it/it/car-sharing/
[59] https://www.site.wetaxi.it/
[60] https://it.urbi.co/
[61] https://www.tabnet.it/it
[62] https://acisarago.it/
[63] https://www.mooneygo.it/

refund (mobility credit) for choosing sustainable multimodal trips booked through these accredited apps (Caballini, 2024).

Table 9 – Integration capabilities and subsidised services per MaaS app

Application	Incentivised Service	Non-Incentivised Service
ACI- SaraGo	• GTT[64] – Public Transport • BIRD[65] – Bike/Scooter sharing	• Trenitalia[66] – regional trains • Arriva[67] – regional bus • TaxiTorino[68] - Taxi
MooneyGo	• GTT – Public Transport • BIRD – Bike/Scooter sharing	• Trenitalia – regional trains • Arriva – regional bus • TaxiTorino – Taxi • Italo[69] – High speed trains • Itabus[70] – national bus
TabNet	• GTT – Public Transport	• Trenitalia – regional trains
Urbi	• GTT – Public Transport • BIRD – Bike/Scooter sharing • Dott - Bike/Scooter sharing • Voi - Bike/Scooter sharing • Ridemovi[71] - Bike/Scooter sharing • Cooltra – Moped Sharing • TaxiTorino – Taxi	• Trenitalia – regional trains • Italo – High speed trains • Terravision[73] – national bus

[64] https://www.gtt.to.it/cms/
[65] https://www.bird.co/
[66] https://www.trenitalia.com/it.html
[67] https://arriva.it/
[68] https://www.taxitorino.it/
[69] https://www.italotreno.com/it
[70] https://www.itabus.it/
[71] https://ridemovi.com/it
[73] https://www.terravision.eu/italiano/

	• Flibco[72] – Airport shuttle	
WeTaxi	• GTT – Public Transport • Dott - Bike/Scooter sharing • Voi - Bike/Scooter sharing • Ridemovi - Bike/Scooter sharing • TaxiTorino – Taxi	• Trenitalia – regional trains

[72] https://www.flibco.com/it

Chapter 3 –Objective and methodology

This chapter explores the objectives of the thesis and the methodology used for the evaluation of the Metropolitan area of Valencia and its compatibility with a Mobility as a Service implementation.

The previous chapter provided an overview of Mobility as a Service (MaaS), outlining its main advantages and limitations, as well as presenting several examples of cities where the model has already been implemented or is being tested. The remainder of this thesis focuses on **applying the MaaS framework to the context of the Metropolitan area of Valencia**, examining how its principles can be adapted to local mobility needs and urban dynamics.

In recent years, Valencia Metropolitan Area has emerged as a relevant context for the study of sustainable and innovative mobility solutions. The city has progressively **expanded its public transport network**, **encouraged multimodality**, and **invested in digital mobility services,** making it a suitable environment for evaluating the potential applicability of MaaS. The ongoing efforts to integrate different modes of transport, implementing a single ticketing system for all the public transport of the region and enhancing user-centred mobility strategies, position Valencia as a meaningful case within the broader landscape of cities experimenting MaaS models.

The aim of this Thesis is to assess **whether a public-led Mobility as a Service system can be developed in the metropolitan area of Valencia**, considering its geographical characteristics, whether there are **the technical and institutional capabilities** to do so. Additionally, it investigates whether such implementation would be in the interest of its population, governance and mobility operators.

If the conditions will be favourable, the results of this research will serve as the foundation for a proposition of a public-led MaaS or, if the findings will indicate otherwise, they will be used as a diagnostic analysis outlining the barriers, limitations and the alternative mobility aspirations of metropolitan area.

The research objectives can be summarised as follows:

I. To compare the metropolitan context of Valencia with successful MaaS case studies, identifying transferable lessons and contextual constraints.
II. To evaluate the compatibility of **Valencia's metropolitan transport ecosystem** with the requirement of a MaaS implementation.
III. To analyse the perspectives of **key stakeholders** (including public authorities, operators, and citizens) regarding integration, accessibility, and digitalisation of mobility.
IV. To identify the **political, economic, social, and technological conditions** that may support or hinder the adoption of a public-led MaaS system.

The analysis follows a multi-scalar and mixed-method approach, structured into four main phases, combining qualitative, quantitative, and comparative methods:

1. Contextual and Comparative Analysis
2. Analysis of Transport Network
3. Stakeholder Analysis and Citizen Engagement
4. PEST and SWOT Analysis.

Each phase addresses the corresponding objective.

3.1 - Phase 1 – Contextual and Comparative Analysis

The first phase focuses on the territorial, socio-economic, and institutional characteristics of the Metropolitan Area of Valencia, establishing the background that influence travel behaviour and integration potential. It addresses the first objective, laying the foundation for the comparative analysis.

Particular attention is given to the competences of different authorities on mobility, planning, and digital infrastructure.

This phase includes:

- Administrative and institutional framework: analysing how power and responsibilities are distributed among the different authorities within the study area.
- Spatial and demographic configuration: analysing urban form, population density, and relationships between Valencia and surrounding municipalities.
- Socio-economic distribution: reviewing income and accessibility differences across the territory.
- Geographical and environmental conditions: assessing how physical constraints and climate vulnerability influence transport planning and infrastructure.
- Comparative analysis between Valencia and the case studies presented in Chapter 2 - State of the art: highlighting similarities and differences that may suggest a favourable or unfavourable environment for a public-led MaaS implementation.

This phase provides the **contextual foundation** for the subsequent analysis of the transport network, helping to interpret the structural and institutional conditions under which a MaaS system could be developed.

The methodological framework used to analyse the metropolitan area of Valencia defines the criteria, data sources, and analytical tools used to characterise the study area across multiple dimensions: geographical, socio-economic, institutional, and environmental.

Geography and Demographics

The analysis of geographical and demographic characteristics aims to define the **physical and functional boundaries** of the metropolitan area and to understand the distribution of population, activities, and infrastructures that determine transport demand.

This step includes:

- Defining the metropolitan boundary based on administrative limits
- Mapping population distribution using georeferenced data to identify density gradients and urban–rural transitions.
- Identifying spatial attractors: industrial zones, universities, logistics hubs, ports, and airports using land use data.
- Assessing climate-related vulnerability through cross-referencing environmental risk maps to highlight potential disruptions and resilience needs.

The outcome of this step visualised through a series of maps, created using the software **QGIS**, and matrix summarising the main territorial and demographic parameters relevant for MaaS design, such as population concentration, trip generators, and exposure to environmental risks.

Metropolitan relations

This analysis investigates the relationships between the municipalities of the AMV and the effect of tourism in shaping the latest changes.

The following methodological steps are applied:

- Identification of functional subareas (core, intermediate, and peripheral zones) based on commuting intensities and land-use data.
- Classification of mobility attractors, factories, education clusters, logistic nodes and touristic/cultural attractions, to understand trip purposes.
- Evaluation of cross-municipal dependencies, identifying municipalities that act as mobility hubs versus those with limited connectivity.

Effects of Tourism

Tourism's influence on mobility will be analysed to understand seasonal demand variations and spatial concentrations that affect transport planning.

The approach consists of:

- Data collection from official tourism statistics from Ayuntamiento de València, Instituto Valenciano de Estadística[74], Inside Airbnb[75] datasets and Datadista[76].
- Spatial analysis of tourist accommodation density in the GVA.
- Observation of mobility flows toward tourist areas (beaches, city centre, Ciutat de les Arts i les Ciències) using secondary mobility data and local reports.

[74] https://pegv.gva.es/es/institut-valenci%C3%A0-d-estad%C3%ADstica-ive-
[75] https://insideairbnb.com/
[76] https://www.datadista.com/

The results allow to understand tourist mobility and the implications of tourists' mobility on public transport demand and MaaS adaptability.

3.2 - Phase 2: Analysis of Transport Network

The second phase focuses on the **transport and digital infrastructure** of the metropolitan area addressing the second objective as it will highlight the characteristics of the transport network and its compatibility to MaaS. The goal is to assess the current level of integration, both at a physical and digital level, and determine whether the existing system can serve as the foundation for a MaaS ecosystem.

This analysis includes:

- Network coverage and diversity of modes (public transport, micromobility, carpooling, shared mobility services).
- Identification of underserved areas calculating the available transport services within walking distance.
- Service area of each company, including public and private providers.
- Availability and frequency of services, and their performance indicators.
- Fare systems, including pricing structures, discounts, and interoperability across different operators.
- Level of integration between operators, apps, and ticketing systems.
- The presence of digital platforms and mobile applications, evaluating whether a common digital infrastructure or data-sharing system exists.

This phase also identifies **technical, administrative and organisational gaps** that may hinder the implementation of MaaS, as well as ongoing projects or digital innovations that could serve as enablers. The transport network analysis aims to determine the structure, performance, and integration level of the current actors in the system, serving as the empirical foundation for assessing MaaS feasibility.

This phase involves a combination of **spatial mapping, data collection, and comparative assessment** through the following procedures:

- Inventory and classification of operators by mode (metro, bus, rail, micromobility, car sharing) and governance (public or private).
- Compilation of service coverage maps, using open transport data (GTFS) to calculate service hours and frequency indicators.
- Assessment of fares ticketing systems, analysing official fare tables and the existence of interoperability mechanisms between operators.
- Evaluation of digital tools, including existing apps, to identify current digitalisation levels and data availability for MaaS development.

Transit Accessibility and Connectivity Index (TACI)

A map to visualise the **accessibility of transport services** during the peak hours was created following the methodology proposed by Bosch-Checa et al. (2024).

To each building was assigned a **Transit Accessibility & Connectivity Index** (TACI) score integrating **generalised cost of access**, which accounts for time, effort and financial costs, with a **gravity-based measure** of the **network connectivity**. It assumes a single-mode travel behaviour (walk-to-public transport) and sums up the score of all available modes to determine the total location value using Equation 1. **Q** is the value of the index while **K** represents the coefficients for: capacity, reach and frequency.

$$Q_{total,i} = \sum_{m \in Modes} \frac{K_{cap} \cdot K_{reach} \cdot K_{freq}}{GC_{i,m} + \epsilon} \quad (1)$$

Generalised cost (eq. 2) represent the **total impedance** required to accede to the service. It converts the costs (time and money) into a unit of time (minutes).

$$GC = T_{walk} + (\alpha \cdot T_{wait}) + \left(\frac{C_{fare}}{VoT}\right) \quad (2)$$

Equation (3) represents the time spent **walking from the building to the stop or station**. To calculate the walking distance, the speed considered is 80 m/minute (4.8 km/h) following the indication of Transport For London (TfL), 2014[77]. The maximum distance considered is 650 m, equivalent to 8 minutes of walking, the same distance then used in the survey design described in section 3.2. This distance is chosen following Daniels and Mulley (Daniels and Mulley, 2013).

$$T_{walk} = \frac{\text{Distance}}{80 \text{ m/min}} \quad (3)$$

The waiting time (eq. 4) is calculated as the average value of the headway, time between two passages of the same options, and multiplied by a factor of two (eq. 4), based on (Wardman, 2004), which considers the perception of waiting time to be equivalent to 1.5 to 2.5 times the real amount.

$$T_{wait} = \frac{\text{Headway}}{2} \quad (4)$$

$$\alpha = 2.0 \quad (5)$$

Finally, in equation 6, the value of time is set at 10€/hour based on the minimum wage in the country[78], while the single ticket prices are set for each mode at respectively: EMT 2€, Metro 1.50€, Metrobus 1.80€ and Renfe 2.20€, as it is the median value of the longest possible distance price in AMV[79].

[77] Transport for London (2014). *Assessing transport connectivity in London.* Press Release
[78] https://www.eurofound.europa.eu/en/countries/spain/minimum-wage
[79] https://atmv.gva.es/es/titols-i-tarifes/titols-i-tarifes

$$\left(\frac{C_{fare}}{VoT}\right) = \frac{\text{Single Ticket Price (€)}}{\text{Value of Time (€/min)}} \quad (6)$$

Capacity factor is calculated as in equation 7:

$$K_{cap} = 1 + \ln\left(\frac{\text{Capacity}}{20}\right) \quad (7)$$

where capacity is set depending on the line and mode according to the official companies websites[80] [81] [82]. EMT buses are set at 80 for regular line and to 110 on the long-distance/circular lines like C3 and 19; Metro is set to 550 except for the tram lines and metro number 10, set at 250; MetroBus are set to 65; Renfe trains are set at 800.

Network reach is calculated in equation 8:

$$K_{reach} = \sqrt{\frac{\text{Reach}}{10{,}000\ \text{m}}} \quad (8)$$

where the reach is the maximum distance that can be travelled with a specific option without a transfer. This formulation prioritises the stops connecting users to distant opportunities and follows the Hansen's Gravity model of 1959 (Hansen, 1959).

The frequency bonus is calculated according to the equation 9:

$$K_{freq} = 1 + \frac{60}{\text{Headway (min)}} \quad (9)$$

and it is designed to **favour higher frequency solutions** and compensate the paradox generated by the ticket cost where the urbanised areas would be penalised by the shorter distance of the solutions (Brinckerhoff, 2013).

Data processing

The GTFS data[83] were processed using a Python script that reconstruct for each stop the arrival time of the trips, their direction and the distance left before the end of the trip. Even if GTFS are a standardised system, major differences were present between operators and had to be uniformised by stripping characters and removing tabulations. The area of the GFTS was also largely different; using the AMV map as a reference, the stop located outside a **5 km buffer** from its perimeter were discarded. This operation was

[80] EMT https://www.valencia.es/web/transparencia-emt/cas/vehiculos1
[81] Metro https://www.fgv.es/conoce-fgv/fgv-en-cifras/metrovalencia-en-cifras/parque-movil/
[82] Renfe https://www.renfe.com/es/es/grupo-renfe/grupo-renfe/flota-de-trenes
[83] GTFS Data Source – Transport Ministry https://nap.transportes.gob.es/Files/List

especially important for Renfe as the file included all the Cercanias trains in Spain. To ensure the best representation, the days with the highest number of trips were chosen for each mode. To associate the stops to each building, a **650m buffer** is generated starting from its perimeter, this ensures no building is classified as too far from a stop simply because its centre is inside the property. The distance used in the formula is then calculated using the closest point to the stop on the perimeter.

In order to avoid counting twice, in cases where the building is located in the middle of two stops served by the same lines, the solution with the best score for each different mode is chosen.

3.3 - Phase 3 – Stakeholder Analysis and Citizen Engagement

The third phase analyses the stakeholders, gathers data through semi-structured interviews and designs a survey to validate the data. It addresses objective number three.

The aim is:

- To have a complete understanding of the various **stakeholders and their power dynamics**.
- To capture both **experts** perspectives towards integrated mobility, digitalisation and public-sector leadership in MaaS, and **citizens** attitude toward the current transport supply and digital tools.

The interviews were conducted with three categories of participants:

- Representatives of workers' unions, youth organizations, student associations, organisations supporting migrants, to understand user experiences and accessibility issues.
- Experts from the private mobility sector: including consultants and professionals working in carpooling and digital mobility platforms, to explore operational and business perspectives.
- Institutional stakeholders: a board member of the ATMV (Autoritat de Transport Metropolità de València), to assess governance, policy priorities, and institutional readiness for MaaS adoption.

The interview outcomes, combined with secondary data and the designed survey, provide the basis for **identifying alignment and discrepancies between institutional strategies and citizen expectations**.

The methodology for stakeholder analysis proposed by Dente (2014) is a rigorous, multi-faceted process essential for mapping the political and social environment in public policy and territorial decision-making, utilising a language that is technically simple yet academically robust (Dente, 2014). The procedure initiates with the identification of all relevant stakeholders, followed by their immediate classification across several critical dimensions.

Firstly, actors are positioned within an *Institutional Hierarchy*, which includes International, National, Regional, Metropolitan, and Local levels; this stratification serves to appropriately contextualise the policy problem within multi-level governance structures.

Next, a *typology* of stakeholders is applied, categorising actors based on their **primary motivations** and **roles** in the decision process:

- **Political actors** are driven by legitimacy
- **Bureaucratic actors** focus on technical compliance
- **Special interests** pursue specific sector goals
- **General interests** advocate for public goods
- **Experts** contribute specialised knowledge.

The methodology then assesses the Resources available to each actor, as these assets directly define their capacity for influence. These resources are systematically classified as:

- **Political capital**, the capacity to generate consensus or exert formal authority derived from mandate.
- **Economic capital,** control over financial assets, investment capacity, or job creation.
- **Legal capital**, formal authority derived from a specific legal mandate or regulatory enforcement.
- **Cognitive capital**, control over specialised expertise, information, and knowledge.

These four resource types are fundamental to determining an actor's Influence/Power. For instance, a Bureaucratic actor may possess significant Legal and Cognitive resources, granting them high Influence/Power, even if they lack Political resources; conversely, a Political actor relies primarily on Political resources to wield power. Influence/Power is then not an abstract measure but a quantification derived from the possession and potential exchange of these specific resources. This resource-based assessment allows to map actors onto the Power/Interest Matrix (Figure 2).

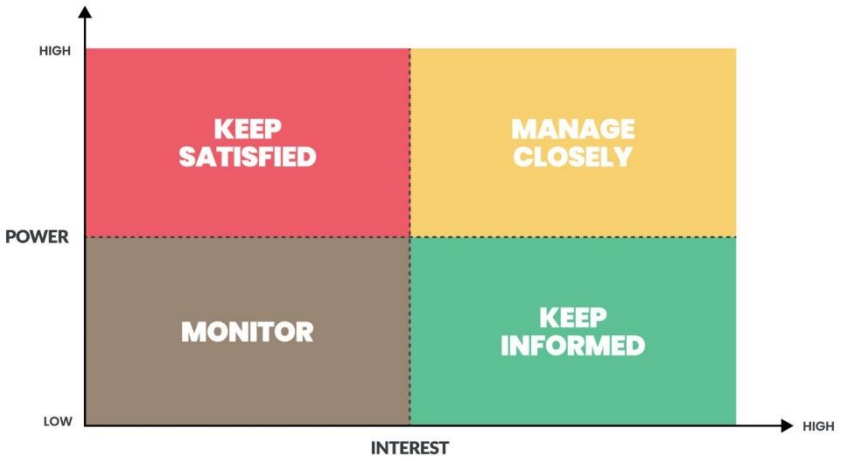

Figure 2 – Power Interest Matrix with engagement protocol

This matrix integrates the actor's assessed **Power/ Influence** with their **Interest/Support** (their position on the policy), yielding four key classifications that determine the necessary engagement protocol:

- **Key Players** (High Power, High Interest) require active **collaboration**;
- **Keep Satisfied** (High Power, Low Interest) must be consulted to **avert obstruction**;
- **Keep Informed** (Low Power, High Interest) are engaged for **input**;
- **Monitor/Minimum Effort** actors (Low Power, Low Interest) require **minimal attention**.

This systematic procedure ensures engagement efforts are strategically prioritised and precisely calibrated to manage support and mitigate conflict, thereby providing a robust foundation for subsequent analytical stages (Dente, 2014).

To identify and categorise the stakeholder, the Dente's methodology was used. The stakeholder analysis is organized in steps:

- Identify the main institutional, private, and social actors involved.
- Assess their respective roles, responsibilities, and influence within the ecosystem.
- Evaluate the degree of alignment or conflict among stakeholders
- Map their power and interest in relation to a potential MaaS implementation.

This analysis provides a structural foundation for understanding which entities can enable or hinder the development of a MaaS system and guides the subsequent interview design and policy recommendations.

3.3.1 Interview Design

The interview process was divided into two categories, **Users** and **Experts**, to ensure that both the demand-side and the supply-side dimensions of mobility were adequately represented. The selections of the interviewed stakeholders is based on the principle of

Purposive sampling where the participant are selected based on the judgment of the researcher (Etikan, 2016). What follows is the justification for the selection of the five users:

- Two union representatives, the first is the head of mobility for its union in the Valencian region, the second was a former driver and union representative in EMT Valencia and currently in the union board, they were interviewed to collect an informed opinion of representative of workers with traditional jobs, more prone to have a union membership.
- The migrants' defence organization was interviewed to examine the dynamics of social exclusion in relation with mobility, the vulnerabilities of a population segment disproportionately subject to residence in underserved areas and the labour instability and legal precarity effect on their opinion on transport.
- Representatives from the youth council and the university student union were interviewed to capture the perspectives of two demographics characterized by high participation in the night-time economy (both as workers and clients), yet constrained by limited financial resources and restricted access to private transport. Student's union representative was instrumental in providing insight into the perspectives and requirements of the university student population.

The justification for the three experts:

- ATMV Head of Urban Mobility was interviewed to gain a administrative and technical perspective over MaaS that can both include opinions and practical issues encountered by the transport agency.
- The second expert is a former MaaS start-up CEO currently working for a ride-sharing company, the objective was to gain insight of the difficulties of MaaS implementation from a first-hand source as well as leveraging its expertise on the possibility of integration of alternative modes into MaaS (e.g. ride-sharing, demand-responsive transport)
- The last expert is a mobility consultant working for one of the largest firm in the Valencian region. The aim was to balance the two previous interviews with a more neutral perspective as the firm have both public and private clients as well as a detailed knowledge of the private sector's obligations with the new mobility laws.

In both cases, the interviews were semi-structured, allowing the respondents to express their experiences and priorities freely while keeping the opportunity to steer the discussion towards the desired topics. The semi-structured format provided flexibility to adapt the discussion to each respondent while ensuring that core themes, including integration, governance, affordability, digital tools, and user participation, were consistently addressed (Galletta & Cross, 2013; Polit & Beck, 2010).
The interviews were held in Spanish, mother tongue of the interviewee, to allow them to freely express their opinions and concepts. The interviews were recorded allowing for a

deeper analysis and fact checking, this opportunity proved useful and led to post-interview feedback to clarify some unclear statements.

The user interviews main topics included:

- Perceived quality and accessibility of the transport network;
- Infrastructure coverage and availability of lines;
- Identification of underserved or overcrowded areas;
- Access to real-time information and reliability of digital tools;
- Ticketing systems, prices, and affordability;
- Perceptions and expectations regarding multimodality and integration across operators.

Opportunities to dive into other topics (e.g. bureaucracy, effects of tourism, users choices and mutual aid within communities) was incentivised and proved particularly useful with both youth representative and migrant's organisations. The objective was to identify recurring issues and priorities those that could inform the requirements of a future MaaS system, particularly in terms of inclusivity, accessibility, privacy and digital literacy.

The expert interviews focused on the strategic, regulatory, and technical dimensions of a MaaS implementation in Valencia. Key themes explored were:

- Feasibility of MaaS adoption in the metropolitan area given its administrative and political structure;
- Governance and cooperation between public authorities and private operators;
- Data sharing policies and privacy constraints;
- Opportunities and limitations of public procurement and tenders in fostering integration;
- The willingness and readiness of operators to participate in MaaS frameworks;
- Technical and financial feasibility of implementing MaaS without a proprietary application;
- Comparative advantages and risks of a public-led versus private-led MaaS model.

Opportunities to dive into other topics (e.g. AI use in transport planning and Demand-Responsive Transport) were offered and enabled a deeper exploration of governance issues, particularly during the interview with the ATMV board member. The semi-structured nature of the interviews allowed for in-depth exploration of each respondent's expertise, providing a nuanced understanding of the institutional and market readiness of the Valencia metropolitan system. The results of the interviews are reported categorising the answer depending on the topic and calculating, first for each interview and then for all of them, the amount of time each category and specific topic was mentioned, to be able to construct a pyramid of priorities (Rubin & Rubin, 2005).

3.3.2 Survey Design

The survey was designed as a quantitative extension of the user interviews, with the objective of validating and expanding their findings through a broader consultation process once institutional and logistical conditions allow its distribution. While the interviews provided an in-depth qualitative understanding of mobility issues, the survey was conceived to deliver a statistically oriented and spatially grounded picture of mobility habits, digital literacy, and socio-demographic characteristics within the metropolitan area of Valencia. The survey's language is Spanish, once developed it was validated with feedback from Spanish natives working in mobility, to ensure terminology and grammar were correct and understandable.

The main objectives of the survey are to:

- Validate the relevance and diffusion of the issues raised during the user interviews (e.g., accessibility, integration, affordability, digitalisation);
- Provide quantitative insights into travel behaviour and modal preferences across different demographic and geographical contexts;
- Assess the digital literacy of the population and their familiarity with existing mobility applications;
- Explore citizens' attitudes toward integrated mobility systems, data sharing, and trust in public versus private providers;
- Offer a structured data foundation to support the policy recommendations and MaaS feasibility assessment developed in the later stages of the research.

The survey was based on the work of Gaborieau and Pronello (2021) regarding mobility habits and used a modified version of Technology acceptance model (TAM) to investigate the relationship with mobility apps (Gaborieau & Pronello, 2021). Although the survey could not be disseminated, its design is included as a methodological component because it constitutes a replicable tool for future data collection and strengthens the analytical framework of Chapter 3 –Objective and methodology

Platform and Dissemination Strategy

The questionnaire was programmed on LimeSurvey[84], a digital survey platform that complies with the EU General Data Protection Regulation (GDPR) and allows the integration of interactive mapping features through plug-ins. This functionality enables respondents to visually indicate key locations, such as their main commuting origins and destinations, thereby generating georeferenced data on accessibility and mobility patterns.

[84] https://www.limesurvey.org/

Structure and Content

The final version of the questionnaire consists of eight thematic sections, each addressing a specific analytical dimension of mobility and digital behaviour:

1. **Introduction and Privacy Statement**
    a. Presentation of the study and its objectives.
    b. Estimated completion time and explicit consent form.
    c. Clarification of anonymity, confidentiality, and compliance with EU privacy regulations.
2. **Mobility Habits and Frequency of Use**
    a. Frequency and purpose of trips.
    b. Main transport modes used (car, metro, EMT bus, MetroBus, Renfe, micromobility, taxis, shared services).
    c. Use of multimodal chains and causes of travel delays.
    d. Mapping of main destinations through interactive geolocation tools.
3. **Availability and Accessibility of Transport Options**
    a. Distance and accessibility to key infrastructures (bus, metro, train, Valenbisi, shared mobility) within 5–10 minutes from home and destination.
    b. Evaluation of adequacy for commuting, leisure, and educational trips.
4. **Use of Digital Mobility Applications**
    a. Frequency of use of trip-planning and ticketing apps (Google Maps, Moovit, CityMapper, EMT Valencia, MetroValencia, MetroBus, Renfe).
    b. Interaction with shared mobility apps (Acciona, Cabify, Cooltra, FreeNow, YeGo, Valenbisi).
    c. Motivation for using on-demand mobility apps (convenience, safety, cost, reliability).
5. **Mobility Expenses and Safety Perception**
    a. Monthly expenditure for transport and type of subscription used.
    b. Evaluation of safety during night travel, including perception of metro and bus environments and knowledge of initiatives such as *Parada Violeta*.
6. **Awareness and Attitudes Toward MaaS**
    a. Short explanatory paragraph introducing the MaaS concept.
    b. Questions on perceived advantages and concerns regarding digital integration.
    c. Trust levels toward public versus private platforms and willingness to use or pay for integrated services.
7. **Impact of the 2024 DANA Event**
    a. Self-assessment of direct or indirect impacts of the flood (property damage, displacement, mobility disruption, financial loss).
    b. Duration and persistence of transport interruptions.
    c. Evaluation of recovery policies and measures (e.g., *Recuperem València* initiative).

8. **Personal Information and Demographics**
    a. Age, gender, origin (within or outside the Valencian region), disability status, and municipality of residence.
    b. Household size, vehicle ownership, employment status, and access to digital devices.

All items are closed-ended, using multiple-choice and Likert-scale questions ranging from *1 – Completely disagree* to *6 – Completely agree*. Conditional logic was applied so that only relevant questions were displayed based on previous answers (for instance, DANA-related items appear only for affected respondents).
No open-ended questions were included, as the primary aim was to collect quantifiable and comparable responses that could later be processed statistically.

3.4 - Phase 4 – PEST and SWOT Analysis

The results of the previous three phases will be evaluated with Political, Economic, Social and Technological (PEST) and Strengths, Weaknesses, Opportunities, Threats (SWOT) framework. The evaluation produces:

- An overview on how the various domains (Political, Economic, Social and Technological) can impact the sustainability of a MaaS system
- An overview on what are the main vulnerabilities and opportunities of the system that can be addressed to minimise risks in MaaS adoption.
- A draft of a targeted strategy toward a realisation of MaaS
- A detailed list of priorities to address before considering a MaaS implementation.

This phase serves as a synthesis of the research process. All the elements developed in the previous phases are brought together as inputs for the assessment, ensuring that the conclusions are grounded in a comprehensive understanding of the metropolitan context, transport system, and stakeholder perspectives.

3.4.1 PEST analysis

As part of the methodological framework, a PEST analysis is conducted to evaluate the external contextual factors influencing MaaS implementation in the Metropolitan Area of Valencia. The model examines Political, Economic, Social and Technological dimensions to enable a systematic identification of external drivers, constraints and emerging trends that may affect travel behaviours and the feasibility of a public-led MaaS ecosystem. Each dimension is examined through dedicated data collection and document review, as summarised in the Table 10.

Table 10 – PEST description and sources

Dimension	Focus	Sources
Political	Governance structure, policy orientation, inter-municipal coordination, political positions of the ruling parties, government stability.	ATMV, PMUS Valencia, EU SUMP guidelines, local policy documents, public declaration and newspaper interviews of politicians
Economic	Funding mechanisms, fare policies, and public–private collaboration.	Operator reports, municipal budgets, academic studies, EuroStat
Social	Equity, inclusion, and digital literacy related to mobility access.	Interview content, survey results, municipal social reports
Technological	Data sharing, interoperability, and app development.	ATMV open data, operator APIs, EU digital mobility standards, Application evaluation

Integrating the PEST framework into the methodology ensures that the evaluation is grounded in a comprehensive understanding of the macro-environmental context. Ultimately, the PEST analysis provides a structured interpretation of the external conditions shaping both the opportunities and the constraints for developing an effective, public-led MaaS ecosystem.

3.4.2 SWOT analysis

The SWOT framework distinguishes between internal factors (Strengths and Weaknesses) and external conditions (Opportunities and Threats), allowing the study to assess how territorial characteristics interact with environmental trends. Within the methodological structure, the SWOT serves as the concluding evaluative step, integrating all prior results into a concise, strategic overview that will inform the final assessment of the territory's readiness and compatibility with MaaS implementation. In this thesis, the SWOT analysis operates as the synthesis of all preceding phases, combining internal findings derived from the contextual, network, and stakeholder analyses with external insights generated through the PEST framework and the comparative assessment of similar initiatives.

The procedure includes:

1. Identifying strengths and weaknesses within the transport system and governance environment.
2. Recognising opportunities and threats emerging from broader economic, technological, and policy trends.

3. Weighting and prioritising each factor according to its relevance for MaaS feasibility.
4. Producing a strategic interpretation matrix, guiding the final discussion on the necessary conditions, reforms, and policy directions for a viable public-led MaaS in Valencia.

The final synthesis provides both a diagnostic overview and a strategic framework for evaluating the metropolitan area's readiness to embrace MaaS principles.

Chapter 4 – Results

In this chapter, the results of the study are explained and visualised through maps. The chapter follows the order described during Methodology: **Contextual and comparative analysis, Analysis of the Transport Network, Stakeholder and Citizen Engagement, PEST and SWOT Analysis.**

4.1 Contextual and comparative analysis

The contextual analysis provides the tools to understand the area of the study through maps designed with QGIS.

4.1.1 Geography, Demographics and Land use

The Valencia Metropolitan Area (AMV) stands as the **third largest urban region in Spain**, defined by a highly centralised and historically intense pattern of growth that has resulted in a dense conurbation.

The demographic structure is dominated by **Valencia**, capital city of the GVA, which maintains an overwhelming population density (approximately 826,000 inhabitants in 2024, with densities over 6,100 inhabitants/km² in the municipality, and significantly higher in the *Casco Urbano* core). The map (Figure 3) clearly visualises this structure, showing the intense clustering of 'High' and 'Very High' density zones radiating outwards from the city centre and **extending along the main corridors**. Within the city, most notably around the inner core of the Ciutat Vella, is possible to notice lower density areas corresponding to the census involving the Turia Park and alongside the rails track towards south.

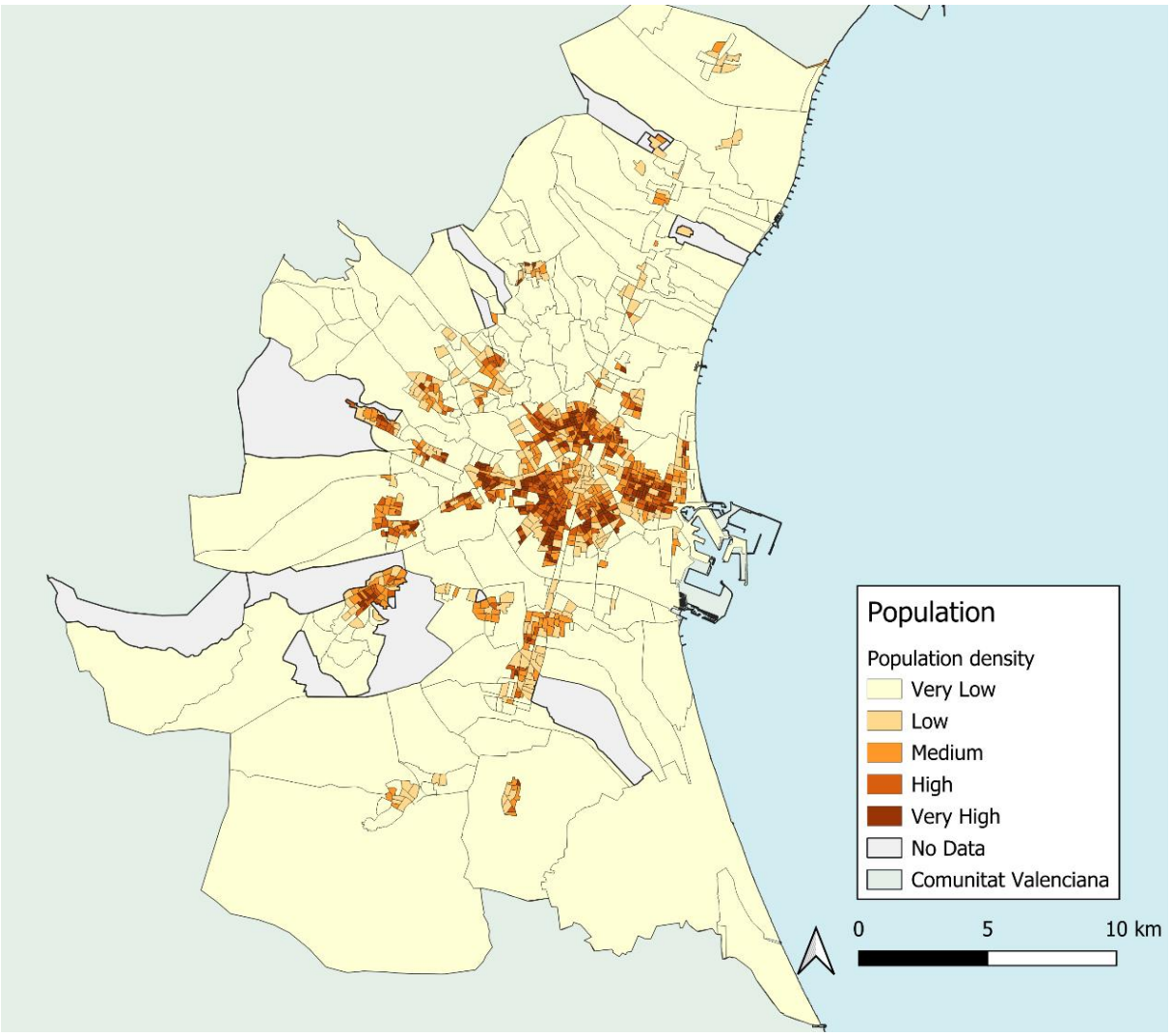

Figure 3 – Population Density in AMV

This concentration diffuses into a dense metropolitan ring, composed of around 45 municipalities, totalling approximately 1.6 million inhabitants. This zone, encompassing the historic *Horta Nord* and *Horta Sud* districts, is characterised by **intense suburbanisation**. Former agricultural towns have been transformed into highly dense **residential and service nodes**, such as **Torrent** and **Paterna**, acting as crucial sub-centres and absorbing population diffusion. This process has resulted in a continuous urban sprawl that has significantly consumed the surrounding agricultural landscape. Although many initiatives tried to conserve the original agricultural assignment of the land, many areas are being rapidly urbanised.

The distribution of wealth, as visualised in the Figure 4, highlights a clear and significant North-South socio-economic gradient.

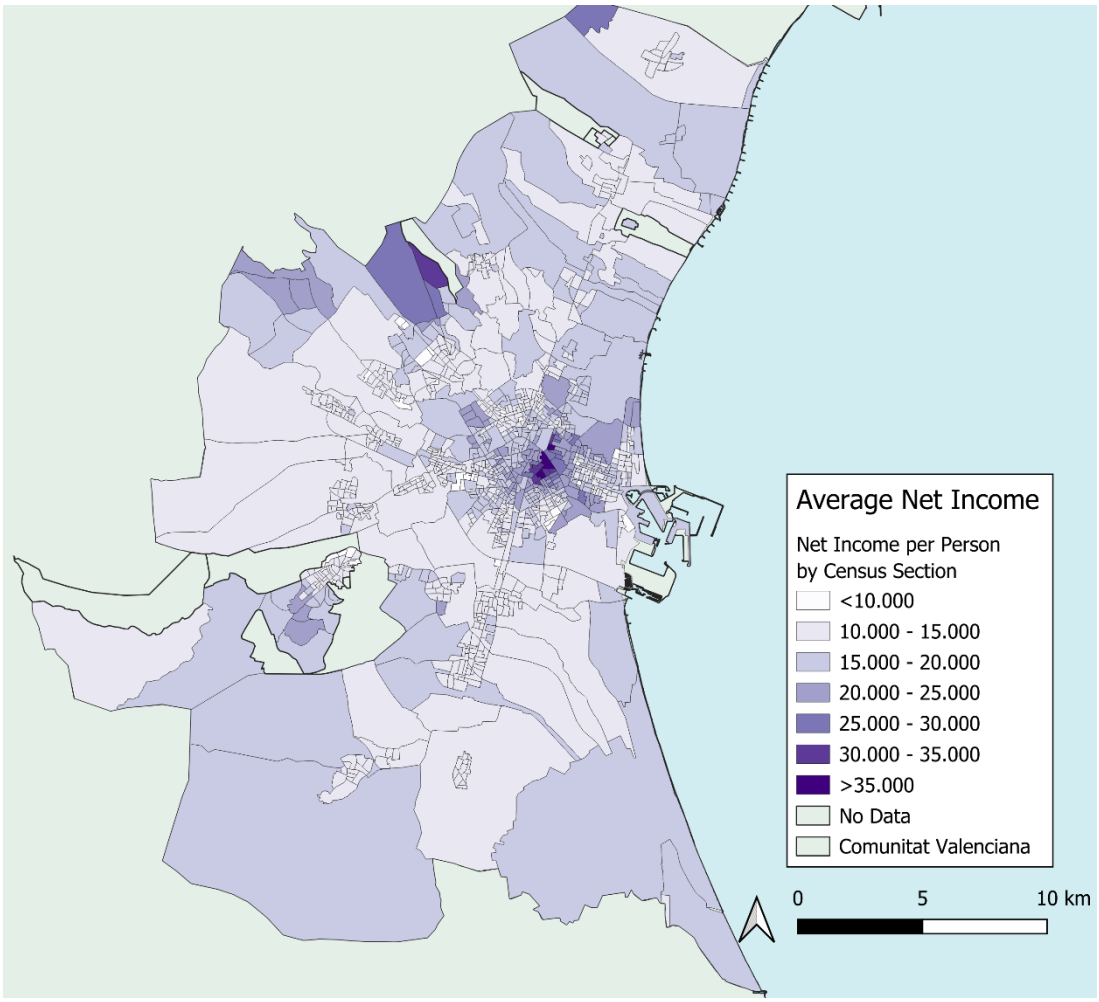

Figure 4 – Average Net Income in the AMV

The highest average per capita income levels (the darkest purple zones in the map) are concentrated in a selected group of municipalities located in the Northern and Northwestern sectors of the AMV, notably including residential towns like Rocafort (which often ranks as the wealthiest town in the Valencian Community), Godella, and Bétera. These areas function primarily as high-income residential suburbs.

Conversely, municipalities in the interior and southern sectors of the AMV generally register lower average wealth. These areas host **high concentration of migrants** as well as the groups that are being **expelled by the raise of cost of living** inside Valencia. This divergence reflects a socio-economic stratification rooted in historical development, the type of housing stock available, and the residential profiles of their populations, with the northern axis historically attracting affluent populations seeking proximity to the capital while maintaining a high quality of life.

Industrial and logistic activities (Figure 5) are largely decentralised from the high-value tertiary core of Valencia, strategically occupying large, dedicated industrial parks and polygons within the metropolitan ring.

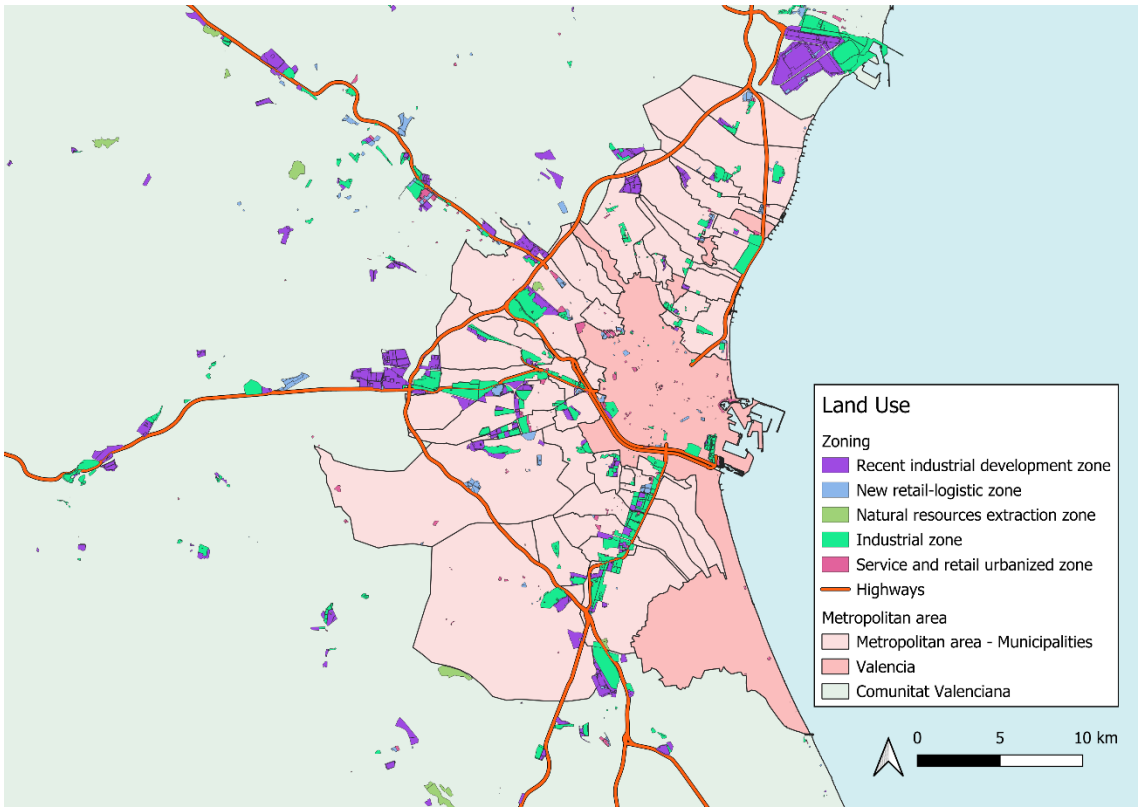

Figure 5 – Land use in AMV

Key industrial and logistics hubs are situated along the major highway junctions (V-30, A-3, A-7). Notable examples include:

Paterna: Home to massive, essential industrial complexes like Fuente del Jarro and the technological and innovative **Parque Empresarial Táctica**. Its location provides direct access to the airport and major western road links.

Quart de Poblet and Manises: Located near the Valencia Airport, these municipalities host logistics and industrial areas (like La Cova in Manises and Masia d'Espí in Quart de Poblet) that are critical for **national and international trade flow**.

Horta Sud (e.g., Picassent, Silla, Paiporta): These towns leverage their direct connections to the V-31 and V-30, offering large consolidated industrial plots that have attracted major logistic players (e.g. Amazon in Picassent), reinforcing the role of the southern periphery as a vital logistics corridor connecting the capital and the Port of Valencia.

The cohesion of the AMV relies on crucial arteries like the V-30 (surrounding the city core) and the A-7, facilitating internal and external movement, directly supporting industrial logistics and residential commuting. Although a **unified Metropolitan Council is absent**, the coordinated management of essential services, namely transport, waste management, and water management, through **sectoral metropolitan entities**, ensures the necessary administrative cohesion for the functioning of this large urban system.

4.1.2 Climate Resilience

The area of AMV sits upon an **alluvial plain** of the Turia, Magro, and Júcar rivers making it highly susceptible to flooding. Watercourse modification, which include the deviation of the original course of the Turia river to reduce the risk of flooding for Valencia in 1957, augmented the risk in other areas. Many *barrancos* (torrents/ravines), such as the Barranco del Poyo, Barranco de l'Huerta, and Barranco del Gallego, serve as crucial drainage channels but were suffocated by the urban sprawl and development of infrastructure (roads, railways, bridges) and have often diminished their drainage capacity, turning **natural overflow areas** into high-risk zones.

The rapid urbanisation observed since the mid-20th century has resulted in the construction of vulnerable infrastructure and residential areas in what were historically flood plains (Figure 6). The fast growth in urbanisation has built over porous soil, dramatically increasing the speed at which floodwaters reach the most populated zones.

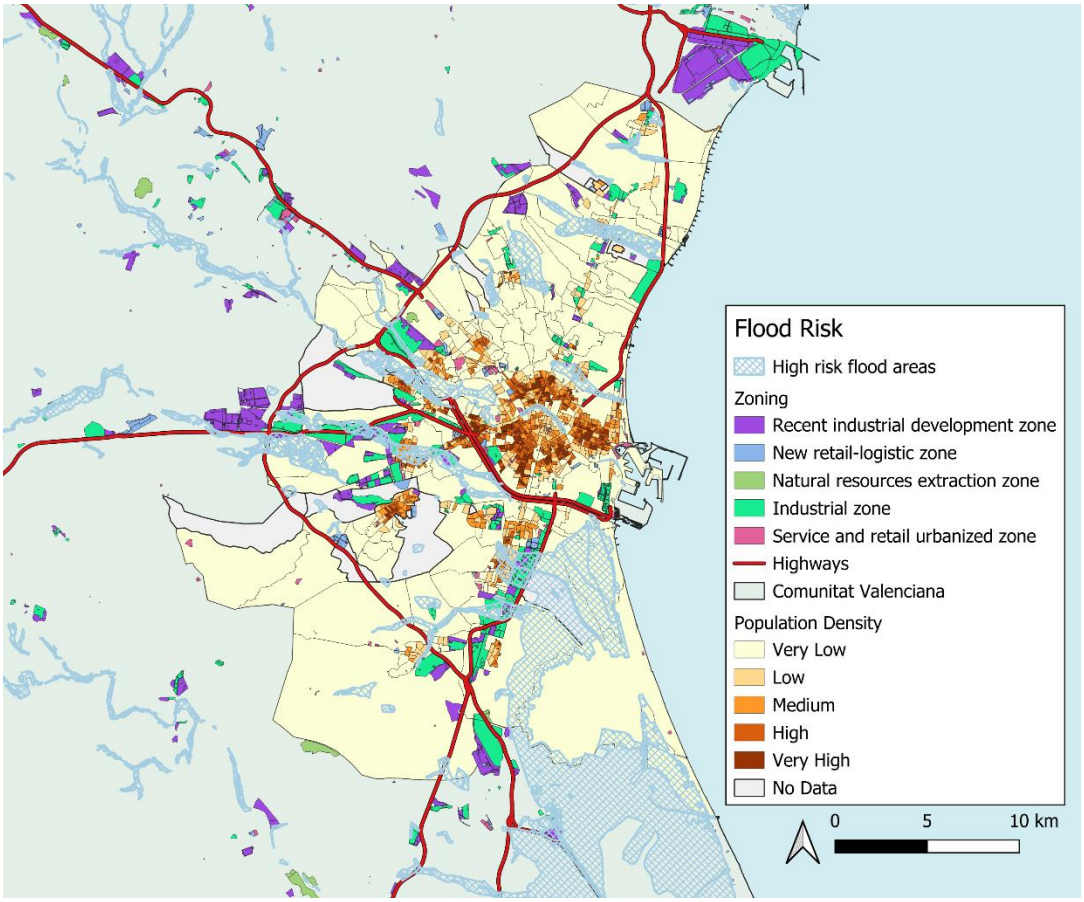

Figure 6 – Flood Risk

The probability and intensity of DANA events (Depresión Aislada en Niveles Altos) have increased with climate change, aggravating the flooding risks beyond historical expectations.

The devastating **DANA of October 2024** served as a critical turning point for the region's risk assessment. The event was characterised by unprecedented rainfall, particularly over the interior river basins (Turia and Magro), leading to catastrophic **flash floods**.

The most severe impacts were concentrated in the **inland and southern municipalities**, including Torrent, Aldaia, Paiporta, and surrounding areas in the *Horta Sud*. However, the destruction extended significantly into the Ribera Alta region (e.g., Requena, Utiel) and heavily **impacted infrastructures connecting the AMV to the rest of Spain**. The DANA resulted in a massive loss of life, 229 confirmed deaths and severe economic losses estimated in the billions of euros. The scale of the damage prompted immediate national and regional response efforts. Reconstruction efforts have focused on rapidly restoring essential services, housing, and critical transport links (such as the Madrid-Valencia high-speed rail line). This event underscores the urgent need to **integrate climate resilience** into future urban planning and land-use policies across the AMV.

Beyond flooding, the AMV faces two escalating chronic climatic threats: **Heatwaves** and **Urban Heat Island Effect** and **Water Scarcity**. The frequency and intensity of heatwaves are increasing due to climate change. This impact is severely magnified by the Urban Heat Island (UHI) effect in densely built areas, particularly in Valencia city and its high-density surrounding municipalities (Wei and Sobrino, 2024). The concentration of concrete, asphalt, and lack of green space traps heat, leading to significantly higher nighttime minimum temperatures compared to rural surroundings. This exacerbates heat-related mortality and **increases energy demand** for cooling, placing stress on infrastructure and public health. Regarding draught, the region, primarily reliant on the Júcar and Turia river basins, is prone to periods of water scarcity. The prolonged absence of rainfall stresses both agricultural production (the historically crucial *huerta* system) and **long-term urban supply**. The situation is managed by the Júcar River Basin Authority through contingency plans, but it may necessitate greater reliance on non-conventional resources like desalination and treated wastewater reuse. The exponential growth in tourism and the record high fruits and vegetables exportation largely increased the demand. The 2024 DANA provided a temporary, drastic replenishment to reservoirs, but the underlying structural risk of drought remains a major concern for the metropolitan area's future resilience.

4.1.3 Impact of Tourism and Housing Market Pressure

The rapid, geographically concentrated growth of tourist accommodation is exerting significant pressure on the **residential housing market** in specific high-demand areas, driving up both rental and sale prices, **modifying the commuting patterns in the AMV**.

The spatial analysis of tourist accommodation pressure (Figure 7) reveals several hotspots where the ratio of touristic accommodation (*Viviendas de Uso Turístico* - VUT) to residential homes is disproportionately high, particularly along the coast and in areas of cultural interest[85]. Coastal neighbourhoods like Cabanyal and La Malva-Rosa in Valencia city are a primary example of this. These areas, which combine a historical charm and direct beach access, have suffered intense gentrification. The conversion of traditional residential properties, often ground-floor homes, into tourist rentals is highly visible, directly reducing the stock of affordable housing for locals. This phenomenon is a primary

[85] DataDista (2025) – *Mapping Touristic Accommodation in Spain*. Press Release

driver of neighbourhood-level demographic and economic restructuring. In the current housing market, almost 40% of the housing purchase comes from developers aiming to turn them into short-term rent properties(Nieuwland et al., 2025).

The neighbourhoods (primarily within the Quatre Carreres, Ruzafa and Camins al Grau districts) surrounding the City of Arts and Sciences, the complex designed by archi-star Calatrava, show extreme pressure. These areas are characterised by high VUT density due to their proximity to major tourist attractions, modern infrastructure, and easy connectivity. Reports indicate that these districts are among the highest in the city for VUT saturation, competing directly with traditional hotspots like Ciutat Vella (Old Town) (Caravantes López de Lerma and Canet Benavent, 2024; Galan, 2024).

The wider effect can be perceived in the whole metropolitan area, while some earlier studies suggested a moderate direct influence of VUTs on overall city rental prices. An estimated 3.3% increase in city-wide rental prices attributed to VUTs between 2011-2021, according to the University of Valencia report[86], the situation has rapidly accelerated. More recent data indicates that the rental market in the city of Valencia and the surrounding Metropolitan Area (AMV) is experiencing a historic crisis. The average price per square meter has reached historic highs with a sharp annual increase over 19%.

The acute lack of housing stock and the soaring prices in the core are directly impacting the AMV. As families and workers are priced out of the capital, demand is shifting to municipalities in the *Horta Nord* and *Horta Sud* areas, contributing to a generalised increase in rental costs across the metropolitan ring, and increasing commuting pressure. In response to this pressure and the unequal distribution of VUTs (Figure 7), the City Council has proposed regulatory measures, including an attempt to establish a 2% limit on tourist housing per neighbourhood[87]. This tourism-driven pressure constitutes a major social and **urban planning challenge**, forcing the AMV to balance its economic dependence on tourism with the need to maintain affordable housing for its residents.

[86] UPV, (2025). *Observatorio sector imobiliario 2T 2025*. Press Release
[87] Ayuntamiento de Valencia (2025). *El Ayuntamiento expone a la ciudadanía la normativa diseñada para frenar la proliferación de apartamentos turísticos*. Press Release

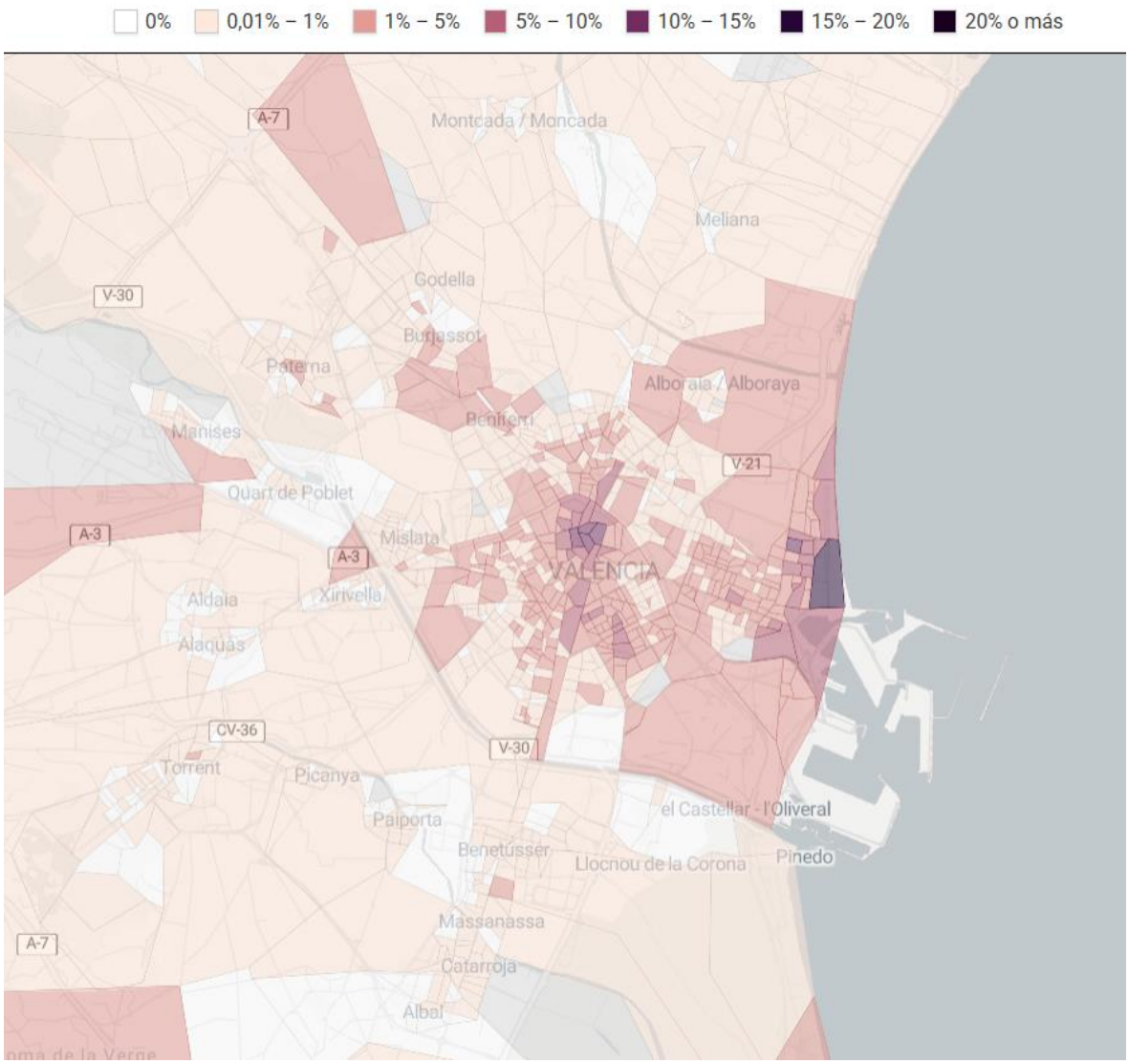

Figure 7 - Percentage of Touristic Accommodations

4.1.4 Administrative and institutional framework

The governance of the Valencia Metropolitan Area (AMV) is complex due to the **absence of a single, directly elected metropolitan authority** or a formal, stable assembly with legislative powers dedicated solely to the area. Also, there is no unanimous definition of the Metropolitan Area as the one given by the municipality of Valencia, and adopted in this study, includes only the first crown around the city, while the one adopted by the regional government includes all the up to the third crown (Figure 1). Instead, governance relies on **inter-administrative cooperation** among three cores, distinct tiers of government which provide political support and funding for regional initiatives.

The highest political and legislative authority is the **Generalitat Valenciana Autonomica** (GVA), the elected regional government which holds the status of an Autonomous Community and functions as a self-governing entity. This status grants the Generalitat extensive powers. It can legislate, regulate, and execute key public services such as Health, Education, and Social Services. Crucially, it defines and implements Land Use Policies and Urban Planning within the basic framework set by the central Spanish

government. The Generalitat also exercises regulatory and financial authority over metropolitan public transport through its agency, the **Autoritat de Transport Metropolità de València** (ATMV), and grants significant regional funds to local entities.

Below the Generalitat is the **Diputación Provincial de Valencia**, the administrative governing body of the province. It is not a directly elected government; its representatives are indirectly designated based on the results of the municipal elections across the province. Its primary role is to serve as an essential support mechanism for the smaller municipalities. It offers **legal, technical, and financial assistance** to these local governments, particularly through the *Fondo de Cooperación Municipal* to foster solidarity and fund communal projects, especially in rural areas. Furthermore, the Diputación is responsible for the **maintenance and development of the provincial road network** connecting the various towns and villages.

At the most local level are the **Municipalities**, which are directly elected governments with autonomy over their territories. They control their own finances and rule on local matters, being responsible for urban services, local police, the physical maintenance of non-university education infrastructure, and the implementation of local welfare and social services, often within the legislative framework set by the Generalitat. They also **manage their local public transport** unless they have **delegated this authority to the ATMV**.

Finally, the **Federación Valenciana de Municipios y Provincias** (FVMP) is a non-profit association that acts as a **cooperation and consultative body**. It unites the Diputación and the municipalities to collectively represent local interests. Its main utility is as a tool to **find consensus** and discuss cohesive strategies to present as a single voice to the regional government. It is important to note that the FVMP is a representative and consultative body that lacks administrative, regulatory, or financial power itself. Its council is composed by members nominated by the municipalities with no direct election from the population.

Regarding transport, the real crucial administrative body that regulates the field is the **Autoritat de Transport Metropolità de València**.

The ATMV is established as a **sectoral authority**, created as an instrument of the GVA to solve the pressing metropolitan problem of mobility in the absence of broader political integration. The ATMV is tasked by the GVA with planning, coordinating, and financing **all metropolitan public transport services** (Bus, Tram, and Metro) as well as promoting sustainable choices (cycling and walking). Its functional area covers approximately 60 municipalities, which notably includes territories of the second crown around Valencia such as Llíria, Castelló, and Riba-roja de Túria.

The ATMV holds **significant planning authority**, but every action it undertakes is ultimately **bounded by the approval and legal framework of the GVA**. Its governance is composed of 14 representatives, with 7 from the Generalitat, 5 from the Municipality of Valencia, and 2 from the remaining municipalities. This arrangement

grants an effective **unilateral control over policies, budget, and planning to the regional government and the capital**, cornering the smaller cities to a bystander role. The GVA uses the ATMV as a financial lever, acting as a redistributor of fare revenue and GVA subsidies to local operators (e.g. EMT and MetroBus concessionaires). For local governments to access integrated services and funding, they must submit to the ATMV's planning and fare structure, ceding a degree of local financial control. The two seats representing the peripheral municipalities are typically designated through **consensus-building processes** often mediated by the FVMP and the Diputación. This creates a ***Consultative Loop***, where the periphery's position is formally heard, even if their numerical vote is negligible.

The AMV's governance is further fragmented by a **lack of coordinated infrastructure planning**. While the ATMV plans for public transport and sustainable mobility, the Diputación Provincial funds and maintains the provincial road network used primarily by car traffic. These two bodies operate under different governance tiers with distinct priorities and funding streams, often resulting in **uncoordinated infrastructure decisions** where public transport plans may conflict with new road developments, reinforcing the AMV's reliance on sectoral, rather than integrated, planning. The ATMV's most significant functional achievement has been the establishment of **tariff integration** through the SUMA card system in 2021. This system **unified the previously fragmented metropolitan tariff structure**, allowing users to **travel on a single ticket** across all four major modes: Metrovalencia, EMT, MetroBus, and Renfe Cercanías. This provides crucial free transfers between modes, vastly improving commuting convenience.

Building on this, the ATMV acts as the primary agent for technological modernization, currently leading the leap toward Account-Based Ticketing (ABT). This involves upgrading infrastructure to support modern payment methods, including contactless bank cards and digital devices (e.g. smartphones, smartwatches), streamlining the user experience and improving service predictability across the metropolitan network. Since August 2025, the same solution has already been autonomously implemented by EMT[88].

[88] Ayuntamiento de Valencia (2025) *El nuevo sistema de pago MovimEMT mediante tarjeta bancaria permitirá viajar de manera ilimitada por 21 euros al mes*. Press Release

4.2 Transport Network

The results of the analysis of the transport network showed where the service is stronger, inside the main kernel of the city of Valencia and in the areas served by Metro, and where it is lacking, in rural areas and detached neighbourhoods of the capital.

4.2.1 Cycling network

The AMV cycling network has been a cornerstone of the campaign that led to the appointment of Valencia as the 2024 European Green Capital[89]. The map in Figure 8 shows the network coverage and the distinctions between exclusive areas and areas shared with motorized vehicles.

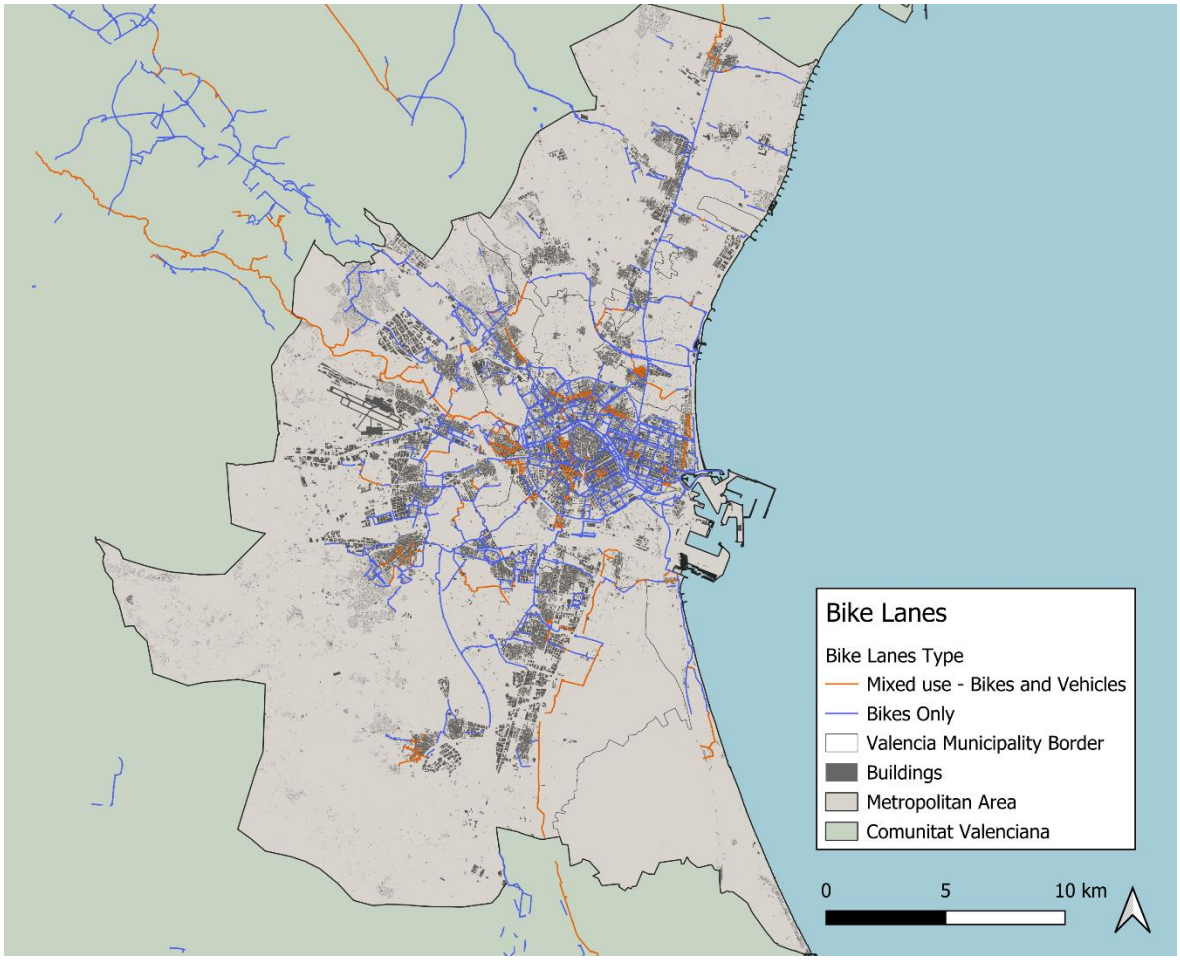

Figure 8 – Bike Lanes

The majority of the lanes are designed for exclusive bike use, with notable mixed-use areas alongside the Western corridor and inside the city. Notably no lane runs alongside the southern corridor except for a uncomplete mixed-use lane not passing through the urbanized areas.

[89] EU News (2023). *Valencia is the European Green Capital for 2024*. Press Release

4.2.2 Public transport operators

Different operators provide services in the metropolitan area both directly and through agencies via tenders.

Empresa Municipal de Transporte de Valencia – EMT Valencia (Urban Bus)

EMT Valencia is the public transport operator of the capital city. It operates over 45 lines and covers the whole area of the municipality of Valencia. The city's government have high decisional power over the policies and strategies of the company as its ***Consejal de la movilidad*** is the de-facto head of the company. EMT lines expands throughout the city (Figure 9) but it **cannot serve any area outside the municipality borders**. All their bus stops are, by law, required to be on city's territory. With the high urbanisation rate around the city, this can create small distortions as they are not supposed to provide service to areas they already reached. Small adjustments to this rule allowed to circumvent it with ad hoc agreements between municipalities.

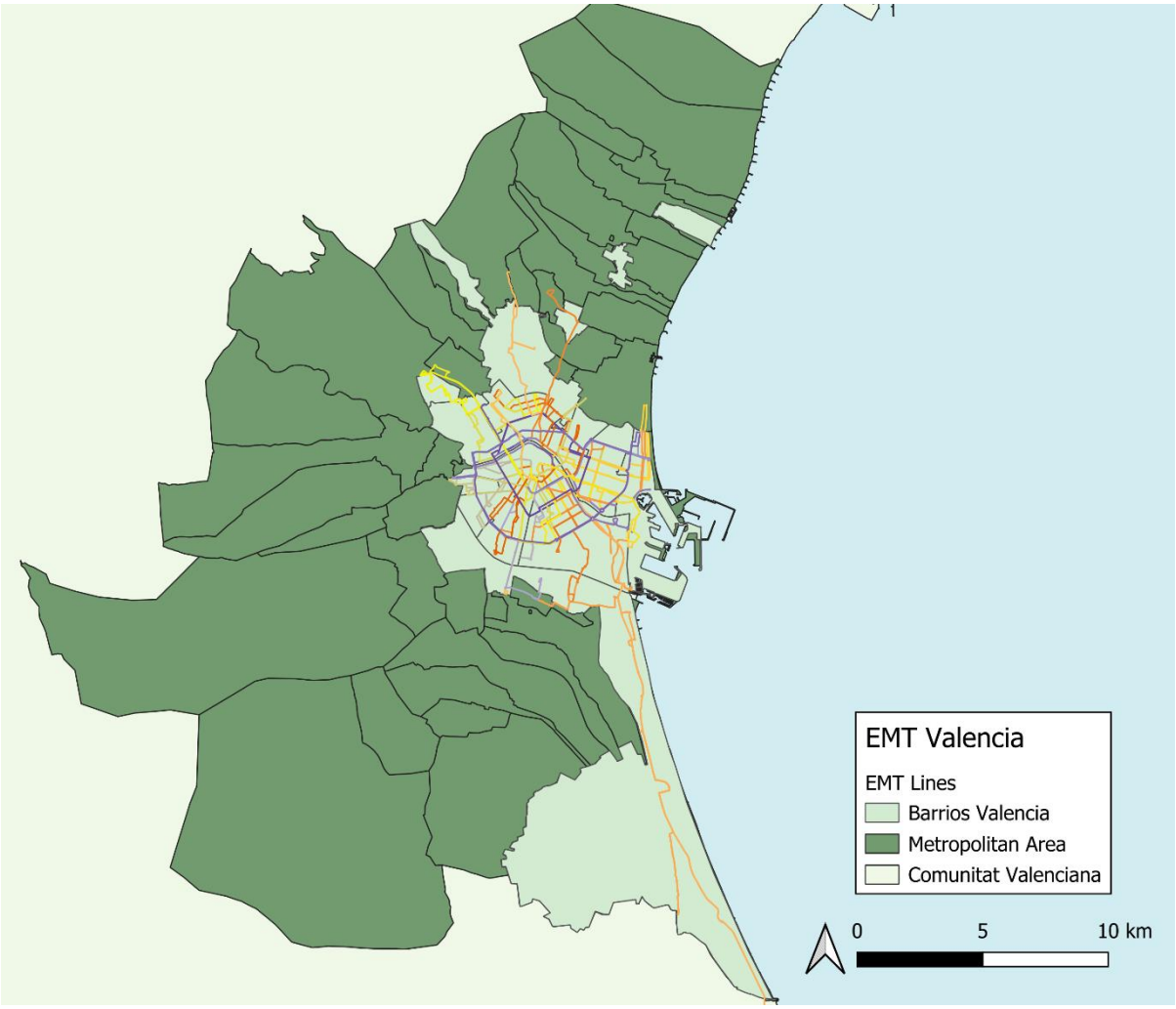

Figure 9 – EMT Valencia Lines

MetroValencia (Metro and Tram)

MetroValencia (usually just Metro) is the tram and metro company of the Generalitat Valenciana, managed by **Ferrocarrils de la Generalitat Valenciana** (FGC), a public company fully controlled by the GVA. FGC is responsible for the infrastructure, operations, and services of the metro and tram network across the AMV. Its network is composed by **6 metro lines and 4 light rail trams** running on surface. The metro lines operate mostly underground except outside the urbanised area when they transition to an above ground light rail. Line 10, the less developed and long, does not share a common station with any of the other lines although projects and solution to fix the issue are currently undergoing evaluation. Tram lines instead are **well integrated** having end of the line stations in Cabanyal to smoothly connect with the rest of the network. FGV serves **35 municipalities across the wider metropolitan area**, reaching Lliria and Castellò. The network (Figure 10) is crucial for connecting Valencia with major suburban employment and residential centres Llíria, Bétera and Torrent as well as being the main connection to the airport in Manises.

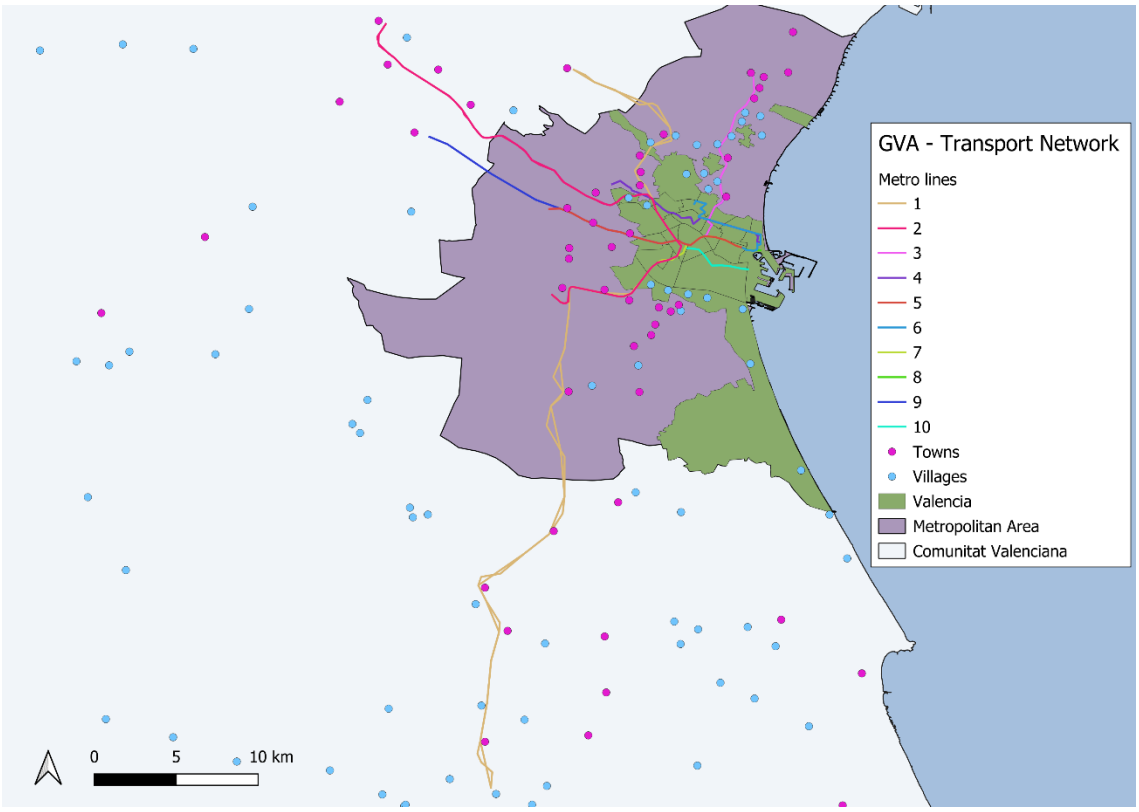

Figure 10 – Metro Network

MetroBus (Interurban Bus)

MetroBus is a brand and service network rather than a single operator. Its planning, routes, and overall service quality are managed and supervised by the ATMV. However, the operational services are provided by various **private concessionaires** (such as Fernanbús, Edetania Bus, and Autocares Herca) **under public contract**. This model allows for regional coordination while **leveraging private operational efficiency**. MetroBus provides the critical interurban bus service (Figure 11), connecting Valencia City with

over 40 municipalities in the metropolitan ring that lack Metro or Renfe access, serving key corridors like the Horta Nord, Oest, and Sud, and reaching as far as La Vall d'Uixó (North) and Sueca (South). The network is highly extensive, encompassing 64 routes and nearly 1000 bus stops across the AMV.

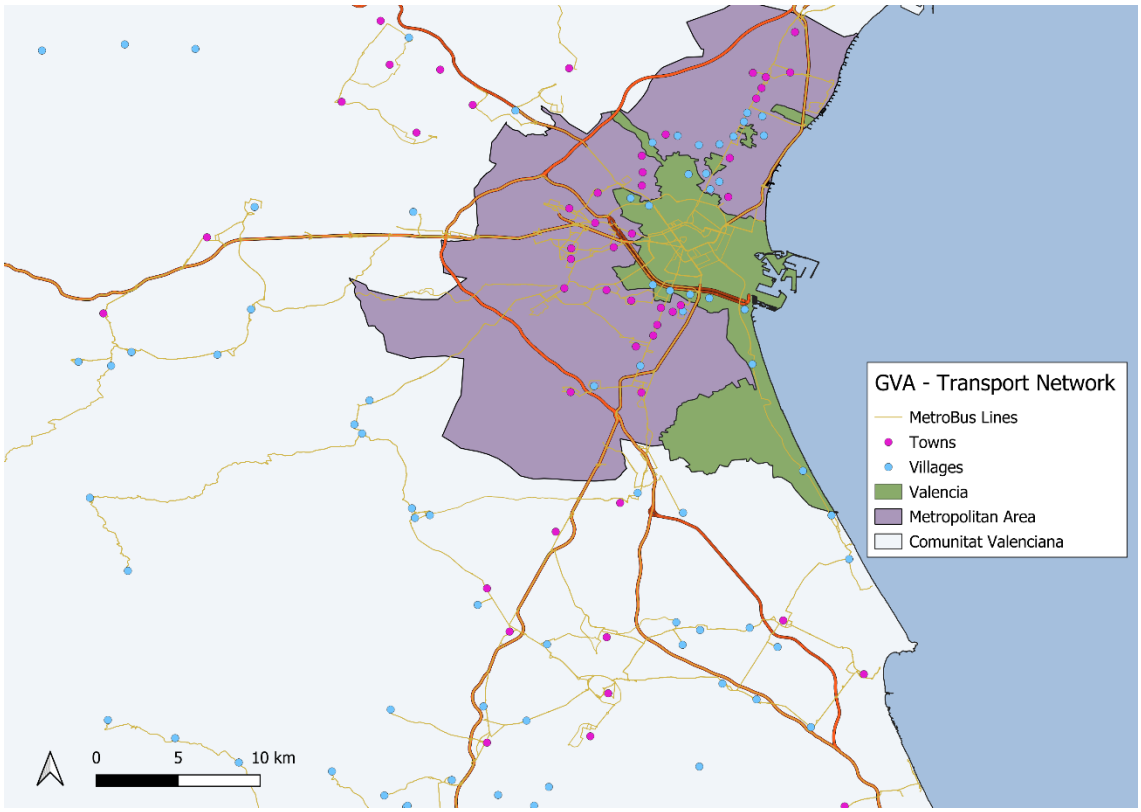

Figure 11 – MetroBus Lines

Renfe Cercanías (Commuter Rail)

The Cercanías network is managed by RENFE Operadora, which is the national public train operating company controlled by the central Spanish Government (Ministerio de Transportes y Movilidad Sostenible). The infrastructure is owned and maintained by **Administrador de Infraestructuras Ferroviarias** (ADIF), company controlled by the central government. Renfe provides the commuter rail service, offering long-distance connections that extend beyond the immediate AMV core into outer metropolitan and regional centers (e.g., Gandía, Xàtiva, Buñol/Utiel, and Castelló). It offers high-speed commuting capacity for residents of the broader influence zone (Figure 12). The network consists of 6 lines in total, the lines converge primarily on València Estació del Nord and València Sant Isidre. The network consists of 5 active lines, C-1 to C-6, although the C-4 line has been suppressed, connecting Valencia to distant regional centres like Gandía (C-1), Moixent (C-2), Utiel (C-3), Caudiel (C-5), and Castelló (C-6).

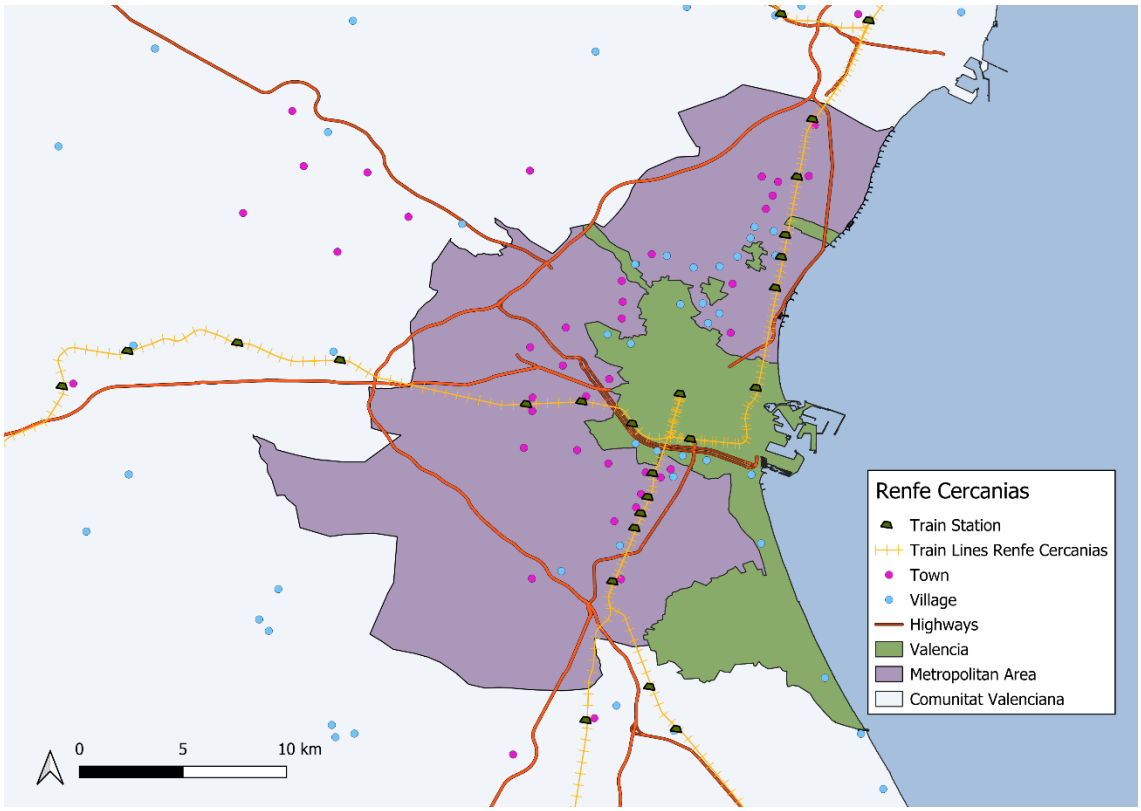

Figure 12 – Renfe Cercanias network

PaternaBus (Urban Bus)

PaternaBus is the urban public transport service active in the municipality of Paterna, one of the largest of the AMV. It is operated by Edetania Bus and managed by the Paterna city council. The 6 lines focuses on connecting the urban centre to the mobility hubs, Metro and Metrobus stops, and the surrounding industrial and technological area. PaternaBus is completely free for the possessors of the PaternaCard.

TorrentBus (Urban Bus)

TorrentBus is the urban public transport service in Torrent, the most populated city in AMV after Valencia. The service is run by FernanBus and it is subjected to the requests of the Municipality of Torrent. It is composed by 4 lines, one of them active only during summer. The focus of the lines is to connect the large municipality and integrating it with the Metro and Metrobus services.

Table 11 presents a summary of the characteristics of the public transport options available in the AMV highlighting their governance, operators and characteristics.

Table 11 – Public Transport Companies Characteristics

Name	Service Type	Governance	Operator	Ticketing	Key Characteristic
EMT Valencia	Autobus	Municipality of Valencia	EMT Valencia	Own system, SUMA card	Bus stops legally restricted to city territory; **high municipal decisional power**.
Metro	Metro and Tram	Generalitat Valenciana, ATMV, FGC	Ferrocarriles Generalitat Valenciana	SUMA card	Network is crucial for **major suburban centers** (Llíria, Bétera, Torrent) and the Airport.
MetroBus	Autobus	Generalitat Valenciana, ATMV	Multiple private operators	SUMA card	Service provided by **multiple private concessionaires** (e.g., Fernanbús, Edetania Bus) under ATMV control.
Renfe Cercanias	Trains	National Government, ADIF	ADIF (infrastructure) Renfe (service)	Own system, SUMA card	Provides high-speed capacity to distant regional centres (e.g., Gandía, Castelló).
PaternaBus	Autobus	Municipality of Paterna	Edetania Bus	Own system (Free with mandatory card)	Local urban service run by a private operator (Edetania Bus); acts as **local feeder** to Metro/MetroBus.
TorrentBus	Autobus	Municipality of Torrent	FernanBus	Own System	Local urban service run by a private operator (FernanBus); integrates with Metro/MetroBus.

4.2.3 Private Micro-mobility operators

Many private operators are active in AMV, although most of them operating only in Valencia. They offer a different set of options from bike and E-bike to mopeds and car-sharing. Electric scooter, on the other hand, are banned from the city and are an available option only as a private solution. It is important to notice how, outside the main international operators, a **relevant number of local shops offers bike sharing options** mostly dedicated to tourists with daily and hourly rents.

Acciona (Free-Floating Mopeds)

Acciona provides a shared electric moped service that competes directly with Cooltra and YeGo. Acciona, originally focused on infrastructure and electricity distribution, is utilizing a fleet of internally designed vehicles for its entire operation. The sharing operations serves also as advertisement for the mopeds as they are sold in Acciona's website. The operative area is within the border of the municipality of Valencia but it **does not fully cover the territory of the city** (Figure 13).

Figure 13 – Acciona Service area

Cooltra (Free-Floating E-Moped)

Cooltra is a major player in the free-floating micro-mobility space, offering rentals of electric mopeds through its mobile application. Cooltra, born in Barcellona in 2006 as a

mobility solution consulting group, is active in both **Business to Clients (B2C) and B2B** offering solution such as company's fleet and mobility packages for employee. Their services are **integrated within FreeNow and Cabify apps**. The service area is restricted to the most populated areas within the municipality of Valencia (Figure 14).

Figure 14 – Cooltra Service area

ValenbiSi (Docked Bikeshare)

ValenbiSi is the **docked bike sharing system** active in Valencia. The service is regulated by a **public tender** and is currently operated by J.C. Decaux. The system is not primarily based on an app, although one is available to handle subscription and emergencies, but on the **capillary number of stations providing the interface to use the bikes** (Image 15). The station's interface allows to unlock the bikes providing the user code as well as the access to information regarding the subscription and the activation of a new one. The service area is strictly limited to the Valencia City municipality, as it operates only between its fixed docking stations (Figure 15). There is no actual restriction however, in using the bike outside the required area as long as is returned to the stations. The subscription to ValenbiSi can be uploaded on the **MoviliS card**, the older system of subscription aggregation within the AMV for public transport dedicated to people under 30 years old. The Movilis now runs in parallel with SUMA cards.

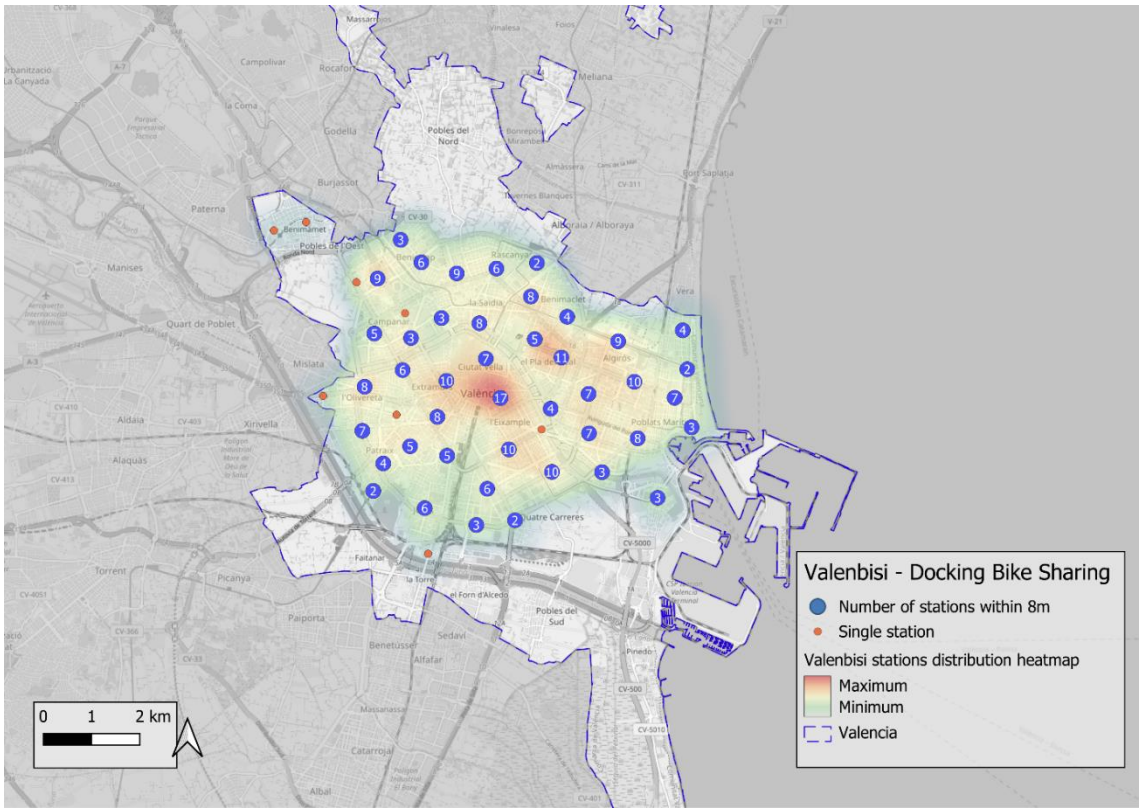

Figure 15 – ValenbiSi Station distribution

YeGo (Free-Floating E-Moped)

Similar to Cooltra, YeGo operates a fleet of free-floating electric mopeds. It functions as a direct competitor, using an app-based, pay-per-minute model. YeGo positions itself **pivoting on the quality and the style** of their mopeds. The company rents *Vespa-Inspired* mopeds **advertising them more for the experience than for the sustainability** or ease of use as for the competitors. The operational area covers Valencia City, similar to Cooltra and Acciona, ensuring presence only within the high density of the urban core (Figure 16).

Figure 16 – YeGo Service area

4.2.4 Ride Hailing, Taxi and VTC (Vehículos de Transporte con Conductor)

Taxi and VTC are **strictly regulated** in Spain, while they follow the same rules for the areas they are allowed to circulate in, the way they are allowed to interact with clients is very different. The fundamental difference between the traditional Taxi service and VTC, used by platforms like Uber and Cabify, is rooted in their **regulatory status** under Spain's *Ley de Ordenación de los Transportes Terrestres* (LOTT). Taxis operate as a **regulated public service**: their fares are governed by fixed, **official tariffs using a taximeter**, and they are legally authorised to accept riders who hail them **directly on the street or at designated ranks**. In the GVA, the fares are determined autonomously on a regional level. Conversely, VTC services are classified as a **private transport service** and must be **pre-contracted exclusively via a mobile application**; they are forbidden from accepting street hails. This pre-booking requirement allows VTC platforms to use a **dynamic, non-regulated pricing model** that calculates the final fare based on supply and demand before the journey begins, contrasting sharply with the fixed, metered rates of the Taxi sector. As in many other cities and countries, the tension between the two is high and the most recent decision of the Municipality of Valencia to allow for new VTC licences increased the resentment within taxi drivers[90]. Ride hailing systems are, in the regulatory framework of GVA, seen as a natural evolution of radio-taxi and call centres.

[90] Levante (2025) *Taxi demonstration against VTC*. News Article

Cabify (VTC, Free Floating E-Moped)

Cabify's core offering is its fleet of VTC vehicles and the E-moped rent. The rides are pre-booked via the app and operates with dynamic, non-regulated pricing, which fluctuate based on demand. As an **integration attempt** Cabify allows to choose between a **VTC or a taxi** when booking a ride. In Valencia it also offers the possibility to rent E-moped from **Cabify's own fleet and from Cooltra**. The area of availability of free-floating vehicles is strictly the urban core of the city (Figure 16). To maximise the use of its fleet, the company is currently **testing a delivery system in Valencia** for small packages and objects.

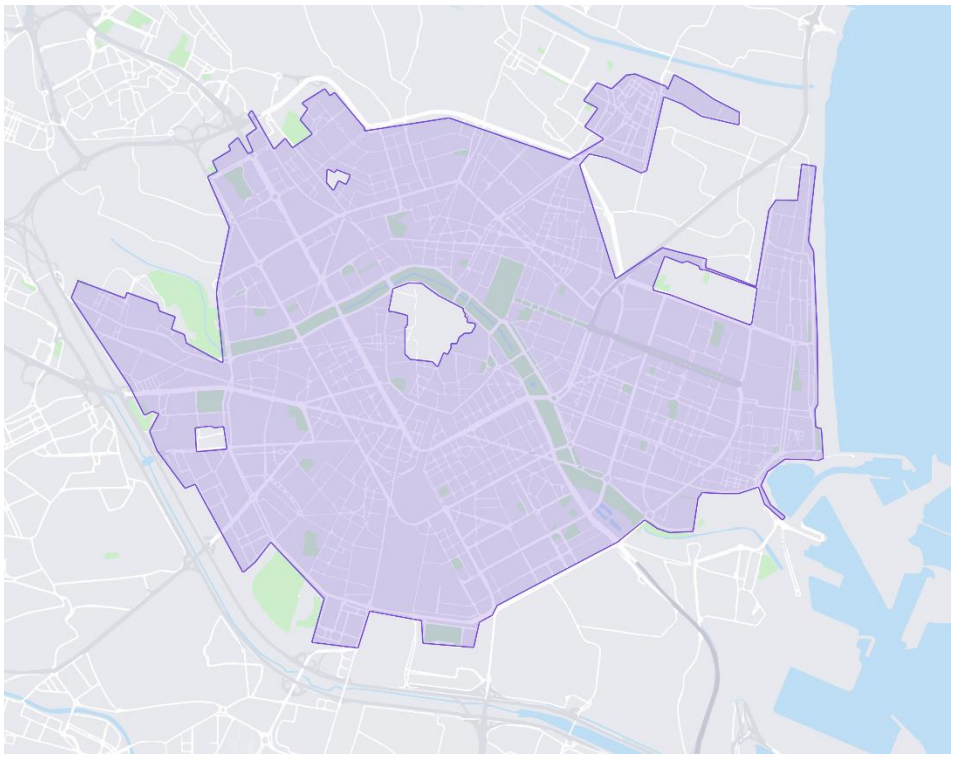

Figure 16 – Cabify Service area

Uber (VTC, Taxi)

Like Cabify, Uber's primary service is VTC ride-hailing, utilizing **dynamic pricing and pre-booking**.

Uber has a stronger global history of aiming for Mobility-as-a-Service (MaaS) integration. In Valencia, it allows users to book a **Taxi** ride directly through the app, acting as an aggregator for licensed cabs alongside its VTC fleet.

FreeNow (Taxi, Free Floating E-Moped, car rental)

FreeNow, formerly MyTaxi and part of Lyft company, operates primarily as an **aggregator for licensed, regulated Taxi services**. The **fares are calculated using the official metered tariffs set by the GVA**. The app collects service fare from both drivers and users. In Valencia in integrates within its app the service from Cooltra as well as car rental services from different companies (e.g. GoldCar and EuropCar).

PideTaxi (Taxi)

PideTaxi is a **cooperative national platform** dedicated exclusively to the dispatch of licensed, regulated Taxi services. It provides a centralised booking service for traditional taxi drivers. The **fares are calculated using the official metered tariffs set by the GVA**.

Table 12 presents a summary of the characteristics of the private options available in the AMV.

Table 12 – Private Transport Companies Characteristics

Operator	Service Category	Primary Operational Model	Operational Area (Focus)	Interoperability/Aggregation	Key feature
Acciona	E-Moped (Micro-Mobility)	App Based Free Floating	Valencia City (main urban core, incomplete coverage)	None	/
Cooltra	E-Moped (Micro-Mobility)	App Based Free Floating	Valencia City (main urban core, incomplete coverage)	Integrated into: Cabify and FreeNow	Major B2B provider with high integration capability
YeGo	E-Moped (Micro-Mobility)	App Based Free Floating	Valencia City (main urban core, incomplete coverage)	None	Positions itself based on the style (Vespa-inspired) of its mopeds.
Uber	VTC	App-Based Dynamic Pricing	Entire AMV	None	/
	Taxi Aggregator	App Based Regulated Taximeter			
Cabify	VTC	App-Based	Entire AMV	None	

		Dynamic Pricing			Pursuing MaaS Attempts to integrate various option
	Taxi Aggregator	App Based Regulated Taximeter			
	E-Moped (Micro-Mobility)	App Based Free Floating	Valencia City (main urban core, incomplete coverage)	Integrates Cooltra	
FreeNow	Taxi Aggregator	App Based Regulated Taximeter	Entire AMV	Integrate traditional car rental companies and Cooltra	Pursuing MaaS Attempts to integrate various option
	E-Moped (Micro-Mobility)	App Based Free Floating	Valencia City (main urban core, incomplete coverage)		
	Car Rental	Booking and information	Based on Car Rental company		
Pide Taxi	Taxi Aggregator	App Based Regulated Taximeter	Entire AMV	None	Cooperative, national platform focused exclusively on traditional taxi dispatch.

4.2.5 Ticketing, Fares and Integration

The following paragraphs illustrates the pricing and the possibilities of fares and ticket integration within the AMV.

The SUMA Card

In 2021 ATMV created, **after years of negotiations**, the SUMA system an integrated ticketing model for all the public transport operators working in the GVA: **Metro, MetroBus, EMT Valencia, Renfe Cercanias**. Before that, multimodal travel within the GVA would be impossible without handling multiple tickets and subscription. This **reduction of the redundancy** helped the lowered the load on commuters granting a new

and faster way to move. This integration grants the GVA to process a wider variety of data and allow for a better understanding of the mobility patterns in the GVA.

The system is structured into four zones that can be combined to better accommodate the users' needs (Figure 17).

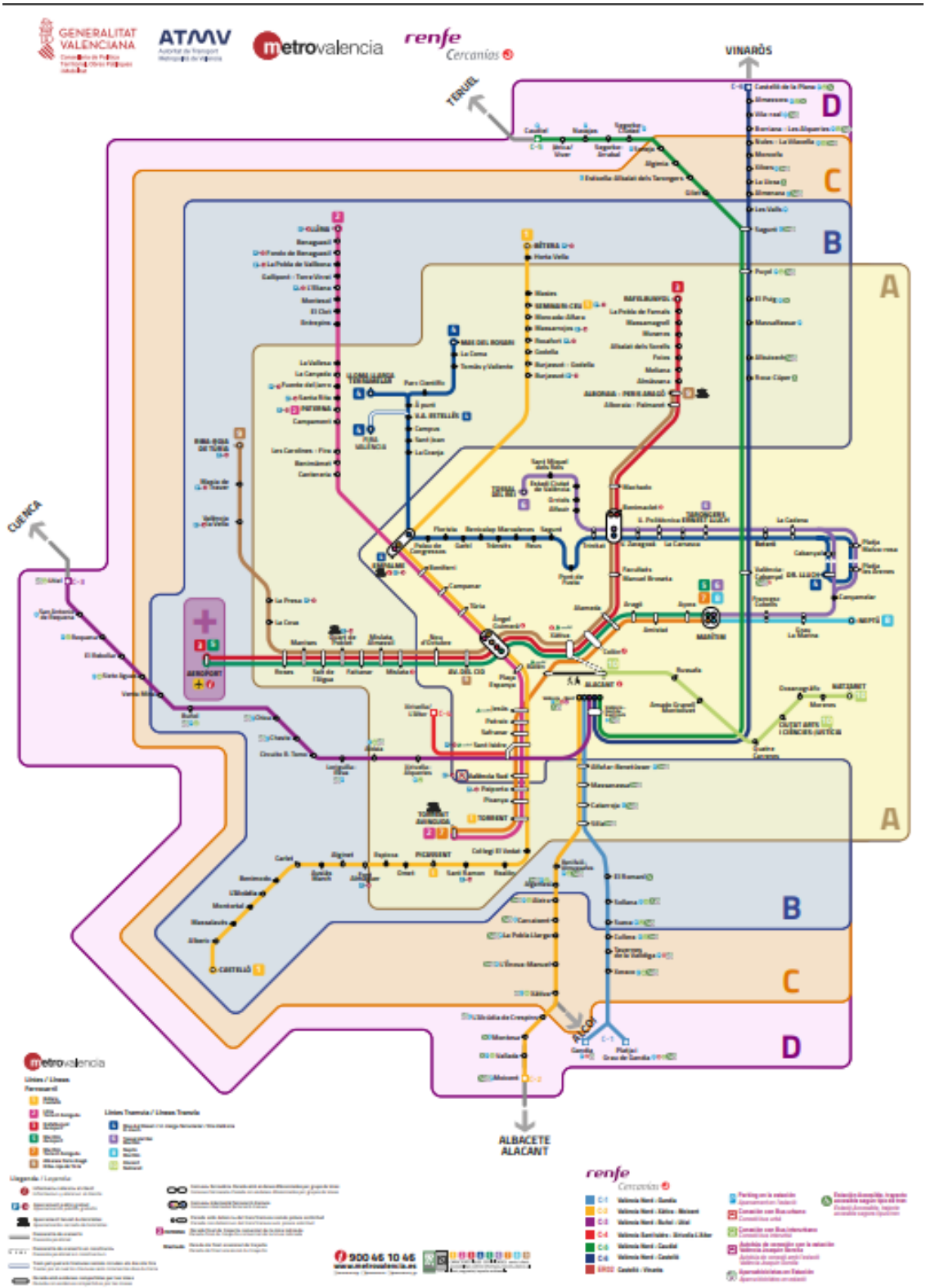

Figure 17 – SUMA Price Zoning

The current pricing structure is explained in the tables 14, 15, and 16; the costs in *italic* are subsidised by the GVA and Transport Department of the national government.

Table 13 – SUMA Monthly Prices

Ticket	Zone Combination						
	A, B+, C	D	AB+ or BC+	DC	ABC+	BCD+	ABCD+
Monthly	*21,00€*	35,00€	*31,80€*	53,00€	*52,80€*	88,00€	131,00€
Monthly under 30	*14,90€*	19,75€	*22,50€*	45,05€	*37,40€*	74,80€	111,35€

Table 14 – SUMA 10 Prices

Ticket	Zone combination										
	A/B/C	D	B+/AB/BC	CD	AB+/BC+	ABC	BCD	ABC+	BCD+	ABCD	ABCD+
Suma 10	5,40€	9,00€	7,50€	12,50€	12,60€	16,60€	21,00€	17,40€	29,00€	33,00€	41,00€

Table 15 – MetroBus Single ticket prices

Ticket	Zone Combination		
	A/B/C	AB/BC	A+/B+/AB+/BC+/ABC+
Single ticket MetroBus	2,00€	2,80€	4,80€

Table 16 – *Touristic* tickets prices

Ticket	Zone Combination	
	AB	AB+
T1 – 24H	4,50€	9,00€
T2 – 48H	7,50€	14,00€
T3 – 72H	11,00€	17,00€

EMT Ticket structure

Parallel to the SUMA, EMT Valencia, which fully falls under the **zone A** of the SUMA division, keeps its **own proprietary ticketing system** active. EMT, with the support of its municipality, is allowed to create different types of subsidized subscriptions directed not only to young adults but also towards senior citizens, families and refugees. It also allows for longer subscription offering yearly tickets to specific categories (Tab. 17).

Table 17 – EMT Tickets description and prices

Category	Ticket	Price (€)	Restrictions
BonoOro	Yearly ticket	20	Offered to seniors citizens over 65 years old
	9 Months	15	
	6 Months	10	
	3 Monthly	5	
Youth (under 30)	Monthly	25	Offered to citizens under 30 years old
ambTu	Yearly	10 per person	Offered to low income families for up to 60 trips per month in total
Infantil	Yearly	Free	Offered to kids under 14 years old
Refugees	Yearly	Free	Offered for refugees for up to one year with a maximum of 60 trips per month
MovimEMT	Monthly	Up to 21	Pay-as-you-go with a cap of 21€ per month, single ticket for 0,51€
Single ticket	One trip	2€	Valid for 60' over the EMT network
BonoBus	Ten trips	8,50€	Ten trips valid for for 60' each over the EMT network

ValenbiSi

Table 18 presents the subscriptions possibilities offered by ValenbiSi. The short term options adoption in 2025 steered a controversy within the municipality as private bike-rentals shop claimed it would generate an unfair advantage for the company[91]. The service is still structured to be more *commuting-oriented* as the subscription still charges for all the additional hours exceeding 30 minutes.

[91] El Levante, (2025) *Compromís pide acabar con el bono diario de Valenbisi que triunfa entre los turistas*. News Article

Table 18 – ValenbiSi tariffs

Type	Duration	Price	Offer
Short Term	24h	3,99€	First 30' free First hour 1,04€ Following hours 3,12€
	7 days	13,30€	First 30' free First hour 1,04€ Following hours 3,12€
Long Term	Yearly	29,21€	First 30' free First hour 0,52€ Following hours 2,08€
Unemployed	Yearly	20,00€	
Over 55	Yearly	26,00€	

Taxi

Table 19 presents the official rates established by the GVA for Taxi services.

Table 19 – Taxi fares for GVA

Time Slot	Urban Fee €	Interurban Fee €
Business day and daytime	Minimum Fare 1,85€ Per km 1,24€ Per h 22,89€	Minimum Fare 1,85€ Per km 1,37€ Per h 17,91€
Saturdays, holidays and at night	Minimum Fare 2,40€ Per km 1,35€ Per h 26,30€	Minimum Fare 2,40€ Per km 1,59€ Per h 20,17€
Surcharges		
Airport	5,40€	5,40€
Feria Valencia / Ship Docks	2,95€	2,95€
Minimum Charges		
7 am – 9 pm	9 pm – 7 am	Airport
4,50€	6,60€	12,50€
Minimum dead mile fare		
Business day and daytime	Saturdays, holidays and at night	
4,55€	7,40€	

Sharing Companies

Table 20 presents an overview and comparison of the fares and type of service of the sharing companies active in Valencia.

Table 20 – Sharing Companies Fares

Company	Acciona	Cabify	Cooltra	FreeNow
Click and Ride solutions	0,34€ /minute 0,50€ initial unlock	0,31€ per minute 0,35€ initial unlock	0,35€ per minute	0,35€ per minute (Via Cooltra
Longer Solutions	25€/day 0,50€ initial unlock	/	19,00€ per 8h	/
	140€/month 1000' included 0,14€ for the extra minutes		29,00€ per day	
			49,00€ per 48h	

VTC

It is not possible to show the prices of VTC services as they do not disclose the algorithms for dynamic prices.

4.2.6 Digital Applications Evaluation

All the transport operators active in the AMV have their own proprietary application.

EMT Valencia

The EMT Valencia ecosystem is divided into two distinct applications: EMT Valencia Ticket[92] and EMT Valencia[93].

The first one (EMT Valencia Ticket) is a dedicated **sales** tool that allows users to **purchase** and **validate** single tickets, as well as **recharge a virtual wallet** to facilitate cashless transactions. It is a **fast and intuitive** tool for sales but remains l**imited in its scope**, offering only **single-use tickets and carnets** while leaving other subscription options unavailable. A remarkable feature is the *Top Ticket* section on the opening page, which provides immediate access to the most frequently used tickets based on user activity. However, the app design is **basic** and shows a distinct lack of maintenance, evidenced by broken or outdated external hyperlinks.

The second application (EMT Valencia) serves as the **primary navigation tool**, providing **routing, fare information, and real-time transit updates**. Its standout feature is the routing system, although it lacks the ability to search by specific store or place names (Point of interest search or POI search), it offers **robust multimodal options** that **integrate the entire SUMA network** (Metro, MetroBus, and Renfe) alongside EMT buses. It allows users to bookmark favourite stops or trips for quick access to status updates. The app features a well-integrated map for navigating lines and stops, granting users the autonomy to decide how to move around the AMV, and includes a function to check both EMT and SUMA card balances. Despite its **high functional quality**, the app suffers from **critical technical flaws**. It relies entirely on the **separate ticketing app** for purchases, and since September 2025, a severe bug prevents it from loading via mobile data. This strictly limits usage to Wi-Fi connections, a major barrier as users are unlikely to have constant Wi-Fi access on the streets.

MetroValencia (Metro)

The official MetroValencia[94] application is designed to **manage travel on the subway and tram network**, offering a **route planner that calculates transfers between its own lines**. Its most advanced feature is the **NFC top-up capability**, which allows users to scan their physical plastic card (SUMA) against the back of the phone to check the balance or recharge it instantly without queuing at a machine. It also allows saving *Favourite* stations for quicker access to train schedules. However, the app suffers from **stability issues**; users

[92] https://play.google.com/store/apps/details?id=com.justride.emtvalencia
[93] https://play.google.com/store/apps/details?id=es.emtvalencia.emt
[94] https://play.google.com/store/apps/details?id=com.fgv.metrovalencia

frequently report *session expired* errors that require logging in repeatedly in the app stores reviews. Routing function is unstable and lack address searching capabilities (POI search), the app allows to search **only options involving Metro and Tram** with no integration within the SUMA system. Furthermore, the purchased digital tickets sometimes fail to scan at the turnstiles, forcing users to seek help from station staff, and the interface feels cluttered compared to more modern transit apps.

Renfe Cercanías

The application[95] is essential for train users providing **real-time schedules and platform information** for *Cercanías*. Its primary utility lies in the **purchase function**, which allows users to **buy tickets or monthly passes** directly on the phone, **generating a QR code** that opens the station turnstiles and **eliminating the need for paper tickets**. It also features a **push notification system** that can be configured to **alert users about delays or service disruptions** on their specific lines. Despite these features, the app is criticised in the app stores reviews for its **slow performance and a bug** where the timetable data sometimes does not match the actual train departures, leading to confusion during commutes.

MetroBus

The app[96] provides **schedule and route information** for lines connecting Valencia to its metropolitan towns. It offers a **map view of stops and static timetables for each route** and stop. It **lacks robust real-time tracking** for many lines; **the real-time arriva**l are often just **estimates based on the scheduled time** rather than GTFS-RT data. The **interface is dated** and often **confusing**, making it difficult to distinguish between different operators or direction of travel, which limits its reliability for spontaneous trip planning. It offers the possibility to save a favourite stop or line but, due to the high number of lines and stops, can generate confusion for first time or non-habitual users.

FreeNow

FreeNow app[97] functions as a **multimodal mobility aggregator**. While its core feature is **booking taxis**, it integrates other services like **car-rental and mopeds** into a single map. The app provides a **estimation of the cost** of the planned trip and the possibility to **pay upfront granting a cap to the actual price**. The app supports **in-app payment** and **real-time driver tracking**. A common issue is that during high-demand periods (like rain or festivals), the app may struggle to allocate a driver compared to traditional radio dispatch, and the **GPS pickup location can sometimes drift**, causing confusion between driver and passenger. On a **UX perspective the app is pleasant**, it allows personalisation and **fast and reliable loading speed**.

[95] https://play.google.com/store/apps/details?id=com.renfe.renfecercanias
[96] https://play.google.com/store/apps/details?id=com.softoursistemas.metgovalencia
[97] https://play.google.com/store/apps/details?id=taxi.android.client

Cabify

The app[98] interface allows users to **customise their journey preferences** and share their **trip progress live with trusted contacts** for safety. The key functionality is the **fixed-price model**, where the cost is **calculated and locked in before the ride begins**. It also includes a *Cabify Envíos* option for sending packages. The main downside is that both taxi and moped availability is geo-fenced, a practice that can result in errors; if a user tries to book a ride from the outskirts or certain beach areas, the app often shows *No cars available*, limiting its utility for trips outside the city centre.

Uber

The Uber app[99] offers a familiar, standardised interface for booking rides, with tiered service options ranging from *Uber Saver* to *Uber Green* (granting electric vehicles) and *Comfort*. It allows for **complex ride management**, such as adding multiple stops to a single trip or splitting the fare with fellow passengers directly in the app. It also features a *Reserve* function to book rides up to 30 days in advance. However, the app relies heavily on dynamic *surge* pricing; costs can double or triple during rush hour, making it significantly more expensive than regulated taxis during peak times.

PideTaxi

PideTaxi app[100] acts as the digital gateway to the official, regulated taxi fleet. Unlike VTC apps, it connects users to standard taxis with official rates, preventing surge pricing. It allows for **immediate requests or scheduled bookings** and ensures the user gets a licensed, professional driver. The app provides the driver's licence number and car model for security. However, the **user experience is less polished than its competitors**; the **map tracking can be laggy**, and the **payment process is slower**, with some drivers preferring cash or physical card terminals over the in-app payment system.

Valenbisi

The app[101] is the management tool for Valencia's docked bike-sharing system. Its most **critical function is the station map**, which displays real-time data on available bikes versus available parking spots, a crucial distinction for users needing to end their ride. It allows **unlocking via smartphone** code and **managing subscriptions**. A significant limitation of the app functionality is that it **does not update station status instantly**; a user might arrive at a station shown as *available* to find it full or empty. Additionally, the app requires an internet connection to unlock bikes, which can be a barrier for users without mobile data.

[98] https://play.google.com/store/apps/details?id=com.cabify.rider
[99] https://play.google.com/store/apps/details?id=com.ubercab
[100] https://play.google.com/store/apps/details?id=es.sooft.pidetaxi
[101] https://play.google.com/store/apps/details?id=es.sooft.pidetaxi

Acciona

Acciona's app[102] unlocks electric mopeds. Its unique software feature is the ability to **toggle between three driving modes** (e.g. Standard, Custom, Xtra) directly from the app, which adjusts the moped's speed limit (up to 100km/h) and price per minute. It allows for a *pause* mode to keep the rental active while parking briefly. The app is generally reliable, but the account verification process (uploading ID and licence) can be slow and buggy, sometimes rejecting valid documents and preventing new users from riding immediately.

Cooltra

The app[103] allows users to reserve a scooter for up to 15 minutes for free while walking to it. The *slide to unlock* interface is keyless and simple, and the map clearly outlines the **geo-fenced zone where parking is allowed**. A recurring technical issue is the *helmet sensor* bug; the app sometimes prevents the user from ending the ride because it falsely detects that the helmet has not been returned to the top case, forcing the user to contact support to close the rental and stop the billing.

YeGo

YeGo's app[104] offers a *pay-per-minute* system or prepaid discount packs. The app includes a *radar* feature to **notify users when a scooter becomes available nearby** and allows a 15-minute free reservation window. It also features a *pause* mode for short stops. A specific functionality requirement is the *end-of-ride photo*; the app require the user to take a picture of the parked scooter to prove it is parked correctly. While this ensures good behaviour, the photo upload can sometimes fail in areas with poor signal, preventing the user from ending the ride.

Table 21 summarises the main function and possibilities of the apps offering an overview of the state of the applications. What emerges is a key difference in User Experience (UX) and User Interface (UI) quality between public and private operators, with the exception of EMT Valencia app.

Table 21 – App Evaluation Comparison

App Name	Primary Function	Services Included	Routing Capability	Integration Level	Payment & Validation	Real-Time Data	UX/UI Maturity	Critical Issues
EMT Valencia Ticket	Ticket Sales and Validation	Bus EMT	None	None	In-App Wallet Credit /Debit card	None	Basic	Outdated Design Broken Hyperlinks No routing
EMT Valencia	Navigation and Planning	Bus EMT Metro Tram Train MetroBus	Multimodal (excellent)	High (Full SUMA integration)	None	Advanced (GTFS-RT)	High	Fails with mobile internet data

[102] https://play.google.com/store/apps/details?id=com.acciona.mobility.app
[103] https://play.google.com/store/apps/details?id=com.mobime.ecooltra
[104] https://play.google.com/store/apps/details?id=com.getyugo.app

App Name	Primary Function	Services Included	Routing Capability	Integration Level	Payment & Validation	Real-Time Data	UX/UI Maturity	Critical Issues
		Bike						No POI Search Fragmented Ecosystem
MetroValencia	Planning and Validation	Metro Tram FGV	Single mode (Metro and Tram)	Low (only FGV)	No payment Validation with NFC	Scheduled / Live Estimate (GTFS)	Medium	Frequent Session Expired errors NFC compatibility issues Crowded interface
MetroBus	Info and Schedules	Interurban Bus (Metrobus)	Single Mode (Bus)	Low (Basic information only)	None	Scheduled (GTFS)	Basic	Dated interface No real-time tracking Crowded interface
FreeNow	Booking (Aggregator)	Taxi Moped (Cooltra) Car Rental	Single trip (taxi only)	Medium (private options aggregator	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking (Taxi and Mopeds)	Advanced	GPS Drift around GeoFencing borders
Cabify	Booking (Aggregator)	Taxi VTC Moped (Own fleet and Cooltra) Parcels	Single trip (taxi and parcels)	Low (Private options aggregator)	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Advanced	GPS Drift around GeoFencing borders
Uber	Booking	Taxi VTC	Single Trip	Low (Private Options aggregator)	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Advanced	No major issue identified
PiDe Taxi	Booking	Taxi	Single Trip	Medium(coordination with radio taxi services)	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Basic	Outdated map interface Slow payment process
ValenbiSi	Bike Sharing unlocking Subscription management	Docked bike sharing	None	None	In-App payment	Real-time bike/dock availability	Medium	Delays in bike/dock availability

App Name	Primary Function	Services Included	Routing Capability	Integration Level	Payment & Validation	Real-Time Data	UX/UI Maturity	Critical Issues
Acciona	Moped Rental	Free FloatingMoped	None	None	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Advanced	No major issue identified
Cooltra	Moped Rental	Free Floating Moped	None	None	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Advanced	Helmet sensor bug (Difficulties to terminate the rental)
YeGo	Moped Rental	Free Floating Moped	None	None	In-app with credit/debit card PayPal Google/Apple pay	Live GPS Tracking	Advanced	Photo upload failures (Difficulties to terminate the rental)

4.2.7 Transit Accessibility and Connectivity Index

The results of the TACI index are shown in Figure 18 of the AMV. Each building is assigned its score based on the **accessibility and potential connectivity** of its public transport options.

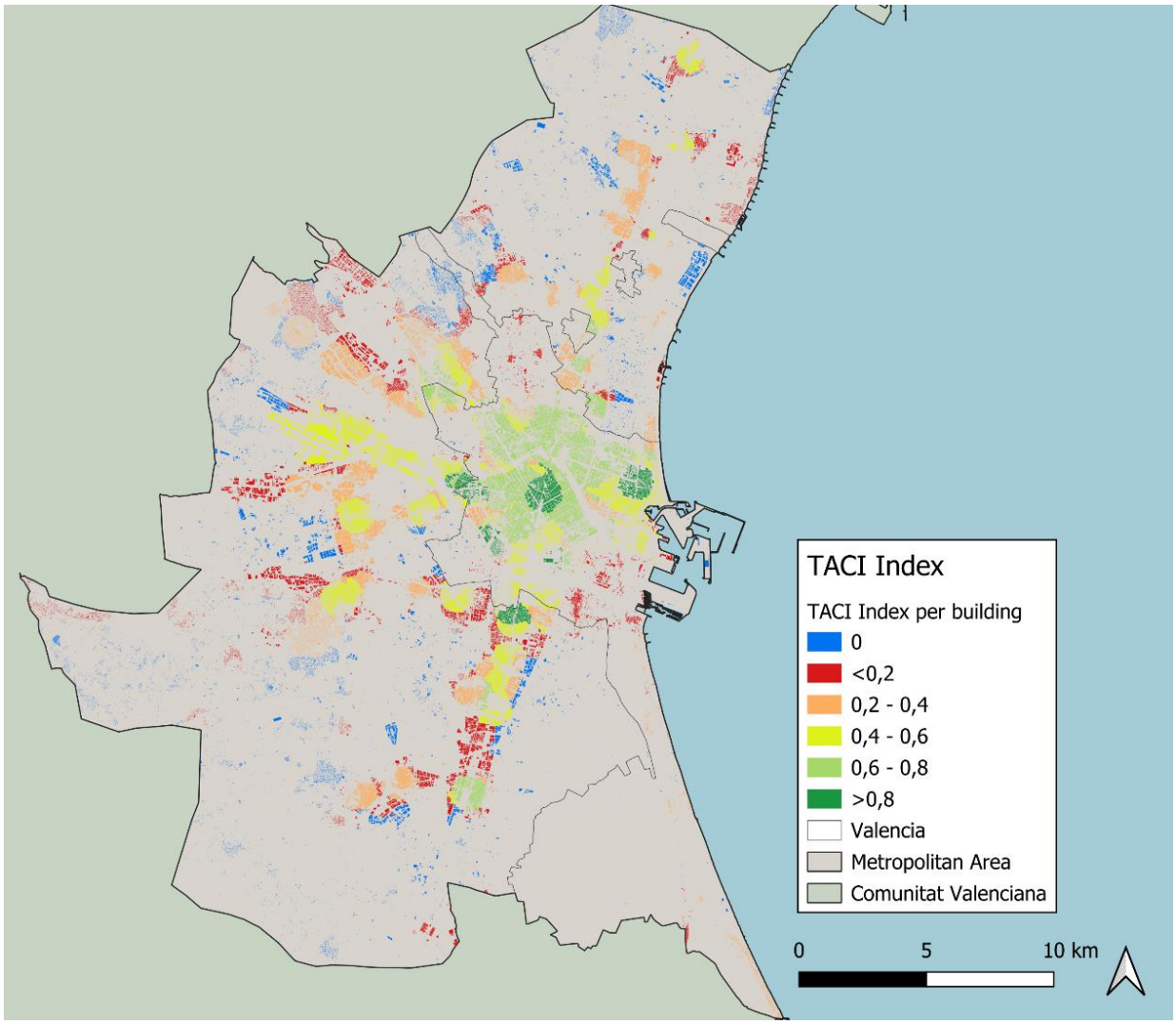

Figure 18 – Transit Accessibility and Connectivity Index map

Vast areas are uncovered; TACI is equal to zero, especially where the **density of buildings is low**, in south-west of the AMV, but also **alongside the main corridors both from south and from north-west**. The highest scores are registered where the number of options is high or the score is **boosted by the presence of Renfe** which offer **high capacity and good frequency**. Most of the core of Valencia city has an index between 0.6 and 0.8 which is improved only in the areas around the train station; the higher range of trains compared with the price, which is only slightly higher of a urban single ticket, grants these areas a full set of option. Within the Valencia municipality is possible to still notice many critically underserved areas, the **seaside area of Albufeira and La Malva-Rosa** which **transforms into critical nodes during summertime**. It is possible to notice how many areas, sitting just outside the **border of the municipality**, see their score **suddenly drop as a result of the absence of EMT options**. Alboraya, small town located

at north of Valencia, is one of the main examples as the town scores drops as the distance from the urban transport stops rises; in this case, EMT still reaches the edges of the city, using administrative loopholes, but **cannot reach the centre of the town leaving it partially underserved**. Same issues occur for Rocafort and Moncada, located along the north of the western corridor towards Madrid, which are reached only on the southern side by MetroBus (having stops over the highway), but **lack feeders** and leave large part of the towns drastically underserved. Metro and Renfe stations **generate a radius of higher scores in the metropolitan area of Horta South and North**. There is a **sharp decay in the index value** as we move away from the 650 m around train and metro station, **highlighting a last-mile connectivity problem**. Moreover, the areas only covered by MetroBus (west corridor) show **low scores** due to generally **low frequency and lower capacity** compared to rail infrastructure. Similar areas served by Renfe, for example in the south corridor, show higher scores due to better capacity and frequency.

The percentage of buildings per index in Table 22 shows that over **65% of the buildings have a score lower than 0.2**. This is due to **the different nature of the buildings** both in **size** and in their distribution. Within the city**, buildings are joint together into bigger blocks** while the units in rural areas and smaller urbanisation areas have a **smaller size as they represent single houses** and not a neighbourhood block.

Table 22 – Distribution of building per TACI range

Range	Count	Percentage
0	25384	38.15%
0.0 – 0.2	23240	34.92%
0.2 – 0.4	13511	20.30%
0.4 – 0.6	3045	4.58%
0.6 – 0.8	901	1.35%
0.8 – 1.0	463	0.70%

To have a better understanding of what each score can correspond to, Table 23 shows some examples for each range.

Table 23 – Examples of TACI scores available options, headway and reach

TACI Range	Real Score	Primary Option			Secondary Option			Tertiary Option		
		Mode	Headway [minute]	Reach [km]	Mode	Headway [minute]	Reach [km]	Mode	Headway [minute]	Reach [km]
0.0 - 0.2	0.130	METRO BUS	40.0	0.528	-	-	-	-	-	-
0.2 - 0.4	0.288	EMT	27.5	21.922	METRO BUS	80.0	0.754	-	-	-
0.4 - 0.6	0.487	EMT	15.0	32.759	METRO	20.0	12.894	-	-	-
0.6 - 0.8	0.678	EMT	15.0	28.655	METRO BUS	20.0	24.580	METRO	60.0	34.756
0.8 - 1.0	0.939	RENFE	9.0	29.200	EMT	11.0	34.506	METRO	20.0	11.255

The lowest scores, ranging 0.0–0.2 and 0.2–0.4, show reduced reaches, low frequency and less available options while higher scores show high frequency and long reach as well as a more diverse set of options.

Based on their scores we can define the different areas as:

- **0.0–0.2**: **Car dependent Zones**, mostly outer suburbs or rural areas. They are unserved or served only by MetroBus. They suffer from a **double penalty** of low capacity and low frequency raising the value of Generalised cost. Most likely to be very **card dependent**.
- **0.2–0.5**: **Commuter Belt**, mostly suburban towns served by Renfe Cercanias or end of Metro lines (e.g. Torrent, Paterna). Their score is driven by capacity and reach but is penalised by the frequency with headway between 30 and 60 minutes. Mobility is **schedule-dependent** and **spontaneous travel is difficult** without private vehicles.
- **0.5-0.7**: **Solid Urban Corridors**, mostly dense neighbourhoods served by strong Metro lines (e.g. Metro Lines 3 and 5) or high-frequency bus corridors (e.g. EMT Lines C3 and C2). High frequency is the main factor; reach is reduced as they are in a urban context but the two conditions compensate each other. Daily commute is possible and can **allow a car-free mobility**.
- **0.7-1.0**: **Transit rich hubs**, major interchanges and high mode-overlapping areas (e.g. Renfe and EMT, Metro and EMT, Metro and Renfe). Scores are driven high by **diversity of option and frequency** with little to no downsides from reach as these areas are often the middle or ending/starting point of major lanes. **Users are not schedule-reliant and are able to just turn-up-and-go**.

4.3 Stakeholder analysis and Citizen Engagement

Stakeholder analysis and Citizen Engagement provide the foundation for PEST and SWOT analyses as well as the roadmap for the future work.

4.3.1 Stakeholder Analysis and Power-Interest Matrix

The stakeholders in the AMV are numerous, especially the institutional ones (Table 24); for this reason the municipalities were reunited based their location into Municipalities of the Huerta North, South and West. Torrent and Paterna were accounted separately as they exceeds sixty thousand inhabitants.

Table 24 – Stakeholder Analysis

Stakeholder	Level	Typology	Resource	Specifics
ATMV	Regional	General Interest	Cognitive Resource	Central to all the initiatives for MaaS. Provide both expertise and infrastructure
GVA	Regional	Political Actor	Political Resource, Economic Resource	Fundamental to grant funding and longstanding support
Valencia Municipality	Local	Political Actor	Political Resource, Economic Resource	Fundamental negotiator for longstanding support
Transport Ministry	National	Political Actor	Economic Resource, Political Resource	Can provide support with funding and legal framework
Disputaciò de Valencia	Metropolitan	Bureaucratic Actor	Legal Resources	Foster agreement and collaborations
Paterna Municipality	Local	Political Actor	Political Resource	Fundamental negotiator for longstanding support
Torrent Municipality	Local	Political Actor	Political Resource	Fundamental negotiator for longstanding support

Stakeholder	Level	Typology	Resource	Specifics
Airport	National	Special Interests	Cognitive Resource	Central infrastructure
Port of Valencia	National	Special Interests	Cognitive Resource	Central infrastructure
FGV	Regional	Experts	Cognitive Resource	Fundamental technical actor
EMT Valencia	Local	Experts	Cognitive Resource	Operator central to the MaaS project with proven expertise
Taxi	Regional	Experts	Cognitive Resource	Strong and powerful group of interest
Aggregated municipalities Huerta North	Metropolitan	Political Actor	Political Resource	Fundamental negotiator for longstanding support
Aggregated municipalities Huerta South	Metropolitan	Political Actor	Political Resource	Fundamental negotiator for longstanding support
Aggregated municipalities Huerta West	Metropolitan	Political Actor	Political Resource	Fundamental negotiator for longstanding support
Associationes Veinal (Neighbourhood associations)	Local	General Interest	Cognitive Resource	Fundamental to understand the needs of the populations and of the areas involved

The aggregation of the southern, norther and western municipalities were aggregated in the **Power-Interest matrix** and ordinated based on their needs and accessibility levels (Figure 19)

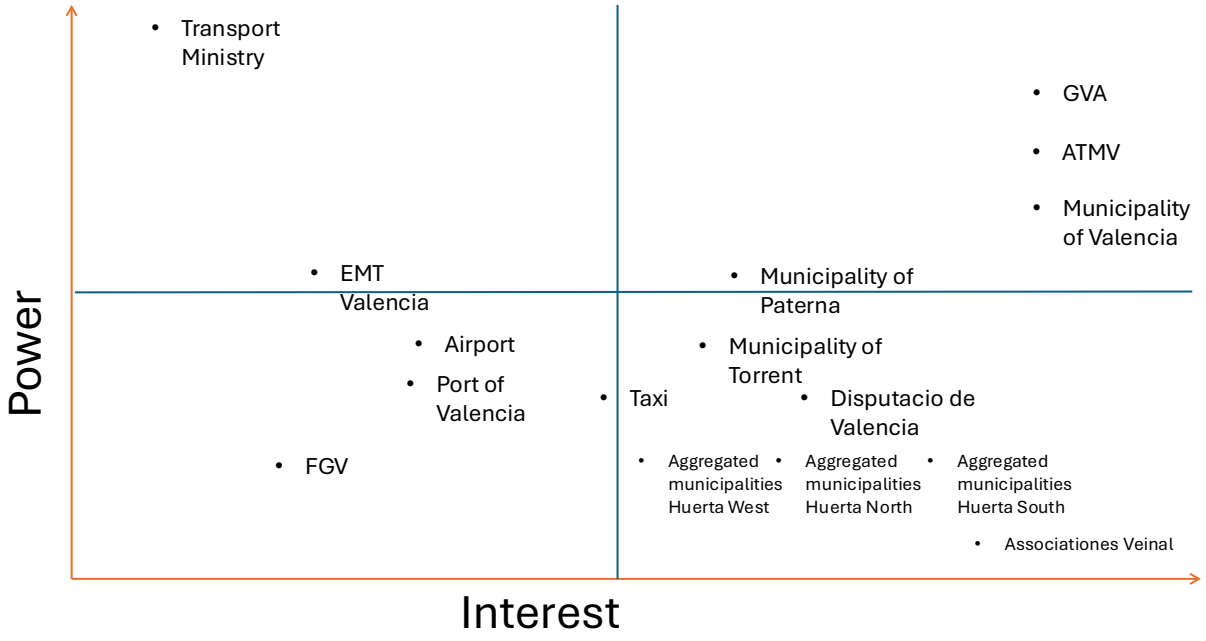

Figure 19 – Power Interest Matrix

4.3.3 Interviews Results

Below, an organised and synthetised structure of the results of the interviews is presented, dividing users by experts.

Users

The analysis ex-post of the users' interviews highlighted the presence of four categories steadily present in all of the conversations: Operational Quality and Reliability, Infrastructure and Intermodality, Governance and Planning, Equity accessibility and Discrimination.

The summary of the responses of the users is categorised in Table 25, it shows what the major focus of the users was and highlights the differences between them.

Table 25 – Users sensitiveness to the interview topic per interview

Interviewee	Operational Quality and Reliability	Infrastructure and Intermodality	Governance and Planning	Equity, Accessibility and discrimination	Total
Union 1	6	**8**	5	1	20
Union 2	3	0	2	**4**	9
Migrant defence association	4	3	0	**11**	18
Student Representative	**6**	**6**	1	0	13
Youth Council Representative	6	6	2	**11**	25
Total	**25**	**23**	**10**	**27**	85

What follows is the introduction of the users as well as the breakdown of each interview.

Union 1

Intersindical is one of the largest unions in Spain, it federates the unions of specific sectors from teachers to steel factory workers reuniting them under a single voice. The interview took place in the headquarters of the union in Valencia with Josep Codonyer, head of the Health and Mobility section of the union.

The interview focused heavily on intermodality and quality of service. The most interesting take regarded the absence of coherent and unified administrative vision that, in the opinion of the interviewee, is what currently holds back the sustainable mobility agenda in the AMV.

Table 26 – Interview Detail Union 1

Category	Frequency	Key Arguments
Operational Quality & Reliability	6	• Frequent skipped services lead to reduced frequency and overcrowding. Service is not reliable. • Amplitude of service hours is insufficient (e.g., trains non-existent after 11 PM) for workers. • The real-time information system is useless because unreliability is the core issue. • **Renfe Cercanías has good speed but poor frequency.**
Infrastructure & Intermodality	8	• Severe degradation of railway infrastructure. • **Intermodality is not supported: trains/interurban buses lack space for bicycles.** • Planning failures include train lines bypassing towns that need stations. • **Cycling infrastructure is not capillary enough (e.g., Anillo Verde lacks sufficient branches).** • Post-DANA closures led to insufficient alternative frequencies.
Governance & Planning	5	• **Lack of a cohesive administrative vision across the metropolitan area.** • Deficient planning (e.g., La Fe Hospital not effectively connected). • Political choices favoured private cars (e.g., widening car lanes and post-DANA incentives) over PT infrastructure.
Equity, Accessibility & Discrimination	1	• **Highlighted the gendered aspect of mobility: women are primary PT users for multi-destination journeys due to care work.** • Inefficient PT is linked to poor mental health.

Union 2

Confederación Sindical de Comisiones Obreras (CCOO) is one of the main unions in Spain with over one million members and it is by far the more represented in the country. The interview with Jose Antonio Garcia, head of Mobility for the union and former representative of EMT Valencia workers, was made through mail for incompatibility of schedule. For this reason, the total count of topic is reduced but provided insight, nonetheless.

The interview focused on accessibility and equality, highlighting the disproportionate attentions reserved to Valencia compared to the rest of AMV.

Table 27 – Interview Detail Union 2

Category	Frequency	Key Arguments
Operational Quality & Reliability	3	• Key problems are **low bus frequency**. • This is sometimes worsened by the **lack of monitoring of reserved bus lanes**. • There is a **lack of synchronization** in connections between public transport modes.
Infrastructure & Intermodality	/	
Governance & Planning	/	
Equity, Accessibility & Discrimination	4	• **Accessibility is much worse in suburban/metropolitan municipalities** than in the city, increasing **dependence on private vehicles**. • Shared mobility is unreliable as **vehicles/points are not available** when needed. • Costs of shared mobility are not sustainable for commuting workers

Migrant defence association

Resistencia Migrante disidiente is a migrant defence organization active in Valencia since 2018. It provides legal consult and daily support to individuals and families with migrant background. It is formed by both voluntaries and researchers that address the inequalities from a feminist and intersectional point of view. The interview was conducted in their headquarters in Valencia, the main contributor was Maria with the assistance of Silvia, an Italian member of the group who aided with the language and provided some key elements to the discussion.

The interview (Table 29) highlighted the bureaucratic pressure that migrants lives every day regarding transport and mobility. Services and procedures, as well as the digitalisation, can become a impenetrable barriers for some groups. The amount of paperwork to access to a single service, fare reduction or app, is disproportionally affecting the migrant population. This is, in the opinion of the interviewee, exacerbated by the discrimination operated during planning as the public transport is often less reliable in areas with high percentage of migrants residency despite the population density.

Table 28 – Interview Detail Migrants Defend Association

Category	Frequency	Key Arguments
Operational Quality & Reliability	4	• Transports are often **overcrowded**. • **Service hours are incompatible** with certain jobs (e.g., cleaning/tourism). • The system is **not reliable** enough even when accounting for longer commute time. • **Low taxi capillarity** and high costs are barriers for towns and neighbourhoods with traditionally high migrant presence (Orriols, Benicalap, Torrefiel).
Infrastructure & Intermodality	3	• **Valenbisi stations lack available bicycles in** neighbourhoods with traditionally high migrant presence. • Services are **not prepared for frequent flood events**, often shutting down without compensation. • The **loss of private vehicles** due to floods was not adequately compensated by PT.
Governance & Planning	0	/
Equity, Accessibility & Discrimination	11	• **Bureaucratization is a massive barrier** for migrants seeking subsidized fares. • **Shared mobility is inaccessible** due to document requirements (only NIE/DNI accepted, not passports). • There is **racial profiling** on public transport. • **Overcrowding and physical discomfort** are issues for people with non-conforming bodies. • The **end of free transport** created severe hardship for the poorer families. • Difficulty accessing **health services** due to unreliability of public transport.

Student representative

Valencia hosts two main universities: Universitat de Valencia and Universitat Politecnica de Valencia. Together, they have a student population of over 80 thousand people not including staff and professors. The interviewee, Ignacio, attended the UPV in the course of Landscape Architecture with a focus on agriculture. He is the student representative for its Course and sits on the student council of the university. The interview took place in the office of the student representatives at UPV main campus.

Infrastructure quality and service hours were the most important topic for the interviewee (Table 29), university schedule requires both early morning and late evening options that are often not provided for those living outside the core of the capital.

Table 29 – Interview Detail Student Representative

Category	Frequency	Key Arguments
Operational Quality & Reliability	6	• **Metro is unreliable** due to breakdowns. • **MetroBus speed is not reliable** as it depends entirely on car traffic. • **Public transport schedules are not suitable** for the 8:00 AM lecture, especially for students with longer commute. • The main transfer station for the university (**Benimaclet) is always overcrowded**. • Renfe is both overcrowded and not reliable due to constant breakdowns.
Infrastructure & Intermodality	6	• **Valenbisi parking is poorly managed within the university,** full in the morning, empty in the evening. There is a need for more capacity. • **Bikes and scooters are prohibited** on the Metro and buses, limiting flexibility and intermodality. • The **limited frequency at night** affects student social life. • The **TRAM and bike lanes** to the university are overall well-rated.
Governance & Planning	1	• The university's provision of **free car parking** incentivizes car use and undermines public transport.
Equity, Accessibility & Discrimination	0	/

Youth Council Representative

Valencia Youth City Council is a recognised institution within the city; it represents the interest of the younger citizens and take part to European initiatives as well as promoting participation within the communities. They host each year election and create a council with the same prerogatives as the Ayuntamiento. Maria Martinez, counsellor for Mobility and Sustainability, represented the council for the interview. The interview was held online via Zoom due to conflicting schedules.

The interview focused on the effect of urban and societal changes on the mobility of young residents. As highlighted in Table 30, the end of free transport for the Valencian youth was a major issue, many of them do not have a driving licence and were forced to get one as the conveniency of public transport would cease to exist.

Table 30 – Interview Detail Youth Association Representative

Category	Frequency	Key Arguments
Operational Quality & Reliability	6	• **Low frequencies** on key Metro lines. • **Semi-absence of night transport**. • **Information on delays is not timely** and uses unsuitable channels (social media). • The **end of free transport (for users under 30)** generated chaos and led to a **loss of users**.
Infrastructure & Intermodality	6	• **Frequencies collapsed** on the lines serving the south of AMV post-DANA. • **Valenbisi bikes are heavy and tiring, the service is good but not suitable for many occasions**. • The Albufera area is served by **two overcrowded EMT lines** in summer and underserved in winter. • **Intermodal connections are difficult** as Renfe/Metro do not allow bicycles/scooters. • **Valenbisi parking is unevenly distributed**.
Governance & Planning	2	• **Legislative barriers** prevent PT from providing ad hoc services for large employers leaving many working areas underserved (Paterna TechPark). • The system is **saturated** during major events (Fallas, football games, concerts).
Equity, Accessibility & Discrimination	11	• **Rising rents** expel the population to distant, poorly connected areas. • **Safety is low** at isolated metro stops due to poor lighting. • **Safety features (emergency buttons) are missing** on trains. • **Confusing tariffs** create barriers for subscriptions. • **Transport hours are incompatible with shift work**, causing job refusals in those that rely on PT. • **Difficult coexistence with tourism** on beach-bound lines during summertime.

Experts

The three experts' interviews highlighted different aspects and focused on different topics depending on the specific competence of the interviewee.

Consulting

The interviewee, from the consulting group Movea, is a civil engineer working in mobility. Movea provides training and mobility plans for both companies and public administration, the interview focused on the possibilities of MaaS to address the current issues of the AMV.

Below, the categories and the key arguments discussed are reported.

- MaaS Fundamentals and Structure
    - **Reliability Precedes Transformation:** The shift from ownership to shared mobility cannot happen until the survival/reliability of the service is certain.
    - **Proprietary App Essential:** A proprietary app is fundamental. It must include routing (address search equal to Google Maps), ticketing, and real-time information.
    - **DRT Role:** Demand-Responsive Transport (DRT) can favour MaaS but risks confining the concept to just that service.
- Relationship with Operators
    - **Cooperation Challenges:** The main challenges are linked to cooperation, specifically defining the role of EMT and building around the existing SUMA card system.
- **Data Transactions and Privacy**
    - **High Personalisation:** Routing requires a high level of personalisation and in-depth data. For example, bike routing must account for road types and conditions to guarantee safety.
- Incentives
    - **Targeting Non-Owners:** It is easier to target and disincentivise those who do not yet own a vehicle.
    - **Sustainable Mobility Laws:** Limited car-pooling experiments are currently being incentivised by sustainable mobility laws.
- **Infrastructure Reality**
    - **Industrial Hub Gaps:** Industrial and logistics areas are not internally served by sufficient public transport, creating a reliance on private operators or cars.
    - **Parking Saturation:** Industrial and technological hubs suffer from saturated parking which companies cannot always guarantee, acting as a *push* factor for alternative solutions.

Former MaaS start-up member

The interviewee is a former start up member of Miivo, a MaaS mobility platform designed in Valencia and active for four years. He currently works as head of Sales and Partnership for a carpooling platform. The interview was held online with a follow-up conversation via e-mail.

Below, the categories and the key arguments discussed are reported.

- MaaS Fundamentals and Structure
    - **Public Leadership is Mandatory:** The most promising MaaS must be led by transport authorities (like ATMV in Valencia) to regulate policies and manage public tenders, as they hold the largest budgets.
    - **Public Transport Centric:** Public transport is the fundamental backbone; without it, services like ride-hailing lack critical mass.
    - **Local Nature:** MaaS is strictly local due to Spain's marked regional differences (legislative and cultural), making a unified national system difficult.
    - **App Necessity:** While *Pay-as-you-go* is an intermediate step, an application is fundamental for the reservation component. Level 1 (information) is hard to monetise due to Google Maps' dominance.
    - **B2B Limitations:** MaaS for B2B is useful for transfers/business trips but is not scalable for daily commuting due to too many variables involved in its dynamics.
- Relationship with Operators
    - **Stick and Carrot Approach:** To convince companies to join, authorities need a *stick and carrot* approach—better-written tenders and guaranteed incentives for integration.
    - **Ride-hailing Integration:** Services like Uber or Cabify are attempting integration, but they serve a restricted population segment and face legislative opposition without public transport involvement.
    - **Political Instability:** Transport agencies struggle with long-term planning due to shifting political orientations.
- Data Transactions and Privacy
    - **Public Infrastructure Advantage:** Public transport already possesses the best structure for data management and payment infrastructure, with higher transaction volumes and better banking agreements.
    - **Privacy Plans:** It is crucial to create privacy plans for data shared between operators. Writing good quality tenders will help achieve this objective.
    - **Internal Use and Anonymity:** Data use should be guaranteed for internal purposes only. Companies receiving funding or participating for free must provide anonymised data regardless of the specific MaaS platform.
- Incentives
    - **Tender-based Subsidies:** The authority (ATMV) can manage subsidies and funding for companies participating via public tenders.

Administrations are already providing funding to value-added services like bike-sharing.
    - **B2B Market:** The business travel market is smaller but richer, offering quicker solutions, though it serves as an accreditation step rather than a long-term strategy.

ATMV Chief of Urban Mobility

Jose Maria Torner is the *Jefe del Servicio de Movilidad Urbana* for ATMV, one of the promoters of SUMA card. The interview focused on the role of the ATMV and the perspective regarding the implementation of MaaS. An unplanned part of the interview was dedicated to AI impact over mobility as it is a raising concern for the interviewee.

Below, the categories and the key arguments discussed are reported.

- Governance and Public Leadership
    - **Public Hegemony:** Private operators are explicitly **not the key** to MaaS take off; the starting point must be the public administration (ATMV) because it is the only having the necessary economies of scale.
    - **The Concession Model:** Integration into the public system (SUMA) is not a free market; it occurs via **public tenders**. The winning private provider gets fair remuneration for the value added but acts as a concessionaire, not an independent competitor.
    - **No Competition within the system:** In the public model, concessionaires do not overlap or compete on the same routes; the administration plans the network to avoid redundancy, similar to how bus concessions currently work. Same will happen for integrated operators, once the operator(s) are chosen with a public tender, the authorities should not admit other competitors.
    - **Tariff Integration is the key:** The success of the SUMA card proves that users want **simplicity** and economic benefits (one card, no penalties for transfers), which reduces *intellectual effort* more effectively than any app feature.
- Data Sovereignty and Digital Strategy
    - **App Sovereignty:** The public administration *must* develop its own app to retain customer loyalty. Relying on third parties risks losing the local market in favour of global giants like **Google, Moovit, or TomTom**.
    - **Data Destruction Clause:** A critical protective measure for privacy issues can provide that private concessionaires are allowed to use public data *only* to provide the specific service. Once the concession ends, they are **obligated to destroy** any data obtained from the ATMV database.
    - **Smart Data vs. Big Data:** Rejects the obsession with hoarding data. The future engineering skill is **summarising data** and eliminating bias, not just collecting massive amounts. The data generation from MaaS is set to be a discard product that need massive work to refine and use.

    - **Rejection of Hyper-personalisation:** He is uninterested in AI-driven hyper-personalisation for niche needs. The administration's goal is to provide **massive or quasi-massive services** for the general interest. Partially rejects the idea of B2B MaaS with ATMV involvement.
- Operational amd Infrastructure Reality
    - **Asset-Light Administration:** The public authority manages the service but **never owns the vehicles**. Just as ATMV does not own the buses, it will not buy shared cars or bikes; these must be provided by the private concessionaires.
    - **Bus over Rail (Fiscal Reality):** Due to Spain's specific vulnerability to high public deficits, expensive infrastructure projects (Metro/Tram) will likely be reconsidered or paused. The **bus** will become the priority mode due to flexibility and lower cost.
    - **Infrastructure Precedes Tech:** MaaS cannot succeed without physical investment. The government must invest in road networks, rail, and bike lanes first, because without **improving the supply**, demand cannot grow regardless of an app.
    - **Urban Scope:** The productivity of MaaS is in **urban and metropolitan** transport. Long-distance integration is a secondary phase for occasional travel and should be treated separately.
- The AI and Fiscal Paradoxes (Macro-Strategy)
    - **The Fiscal Erosion Paradox:** While AI makes MaaS technologically perfect, it threatens the financial base of the state. By increasing unemployment (via automation), AI reduces the tax revenue needed to subsidise public transport, which is the fundamental pillar of any MaaS system.
    - **The Leisure Paradox (Rush Hour Death):** Automation and remote work will flatten the *rush hour* curve. Without the urgency of daily congestion, the **political justification** for expensive transport subsidies weakens, while unpredictable leisure travel increases.

4.3.4 Survey Design

The survey was planned to be distributed digitally through social media channels and the network of associations and organisations established during the interview process. Although some groups were not ultimately interviewed, many expressed willingness to support dissemination among their members, including student unions, migrants' associations, and neighbourhood collectives. This participatory approach aimed to reach a diverse and representative sample of metropolitan residents, spanning different age groups, income levels, and residential locations.

Due to organisational and time constraints, as well as limited institutional support from the hosting entity, eventually the survey was not distributed. Nevertheless, its structure

and content were finalised and tested, making it ready for future deployment as part of an extended consultation phase.

It is expected that the survey would produce a well detailed map over the perception of users regarding the current mobility offer they access to. The section Use of Digital Mobility Applications will provide an important answer about the habits of the users to identify the main functions and the baseline for the quality of the developed product.

4.4 Results of PEST and SWOT Analysis

The results of the PEST and SWOT analysis are based on the previous findings and from the on-field evaluation conducted during the research.

4.4.1 PEST analysis

The PEST analysis relies heavily on the political aspects as, how highlighted in the Stakeholder Analysis, the political factor is the one that most importantly can contribute to a public-led MaaS success.

Each category (Political, Economic, Social, Technological) was addressed highlighting first the negative implication and secondly the positive aspects identified during the research. In the case of the political aspects, the analysis relied on news and articles from selected and trusted sources.

Political

Negative aspects

- Current leaders of both GVA and Municipality of Valencia comes from Partito Popular (PP), a traditionally conservative party **sceptical about both climate change** and fossil fuel disengagement[105]. In the Valencia city council, the PP, with the **external support of Vox**, alt-right party openly against climate transition and renewable energies[106], inverted many of the actions of the previous city council and it is implementing urban modifications to **increase the number of lanes** of major urban corridors and **eliminating dedicated lanes for public transport**[107] [108] [109]. The track record for PP and Vox shows a **regression towards more car-**

[105] Climate Scorecard. (2025, November 20). *Spain: The Politics of Climate Change. Climate Scorecard*. Press Release
[106] Undisciplined Environments. (2024, February 27). *The Inverted World of the Far Right and the Transformation of Nature: Vox's "Real Ecology" in Spain. Undisciplined Environments*. Press Release
[107] Valencia Plaza. (2023, July 5). *El Ayuntamiento de València suprimirá uno de los carriles bus de la calle Colón y recuperará el acceso desde Porta de la Mar. Valencia Plaza*. News Article
[108] La Vanguardia. (2024, August 7). *La calle Colón: la gran batalla de la legislatura sobre el modelo de movilidad de València. La Vanguardia*. News Article
[109] El Debate. (2023, December 11). *Todos los detalles de las nuevas rutas de la EMT en el centro de Valencia. El Debate*. News Article

centric solution in other municipalities they are in charge of with bike lanes removal and the abrogation of low emission zones[110] [111] [112] .

- Following the resignation of President Mazon in November 2025 the GVA is in a transition period. Inevitably its **interim leadership is weaker**, especially after the **loss of support of the population** testified by the numerous demonstrations against the regional government[113] [114] [115].
- Current leaders of GVA and Valencia city (PP) are **not politically aligned** with central government (PSOE); this can hinder the cooperation based on the **different views** and the **reluctance to accept and offer mutual help**.
- Under the perspective of the legislative framework, the **limitation imposed to EMT Valencia and MetroBus** can have a high impact on the project and on the efficiency of the system. EMT is prescribed not to serve areas outside the municipality of Valencia; this can result in an **inefficient use of vehicles** and spaces as the buses would be forced to not serve areas they already reach and that could benefit from their service. MetroBus and EMT cannot share stops, requiring independent movements from one to the other to complete a multimodal trip.

Positive aspects

- The dates of elections in both Valencia Municipality and the GVA are aligned, this can potentially grant a similar political view in the two most powerful stakeholders of the AMV. Their alignment can grant sufficient traction in the ATMV, where they hold 85% of votes, to implement any policy.
- The **national government is favouring innovative and sustainable mobility** with laws and funding. During September 2025, the parliament approved the new mobility law which **incentivise shared mobility** and car-dependency reduction policies[116] [117].

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[110] Diario Público. (2023, September 15). *Desmantelar carriles bici sale caro: PP, Vox y Foro Asturias se juegan perder hasta 14,5 millones de los fondos europeos. Público*. News Article

[111] Cadena SER. (2023, June 15). *El proyecto del PP y Vox de desmantelar carriles bici es una barbaridad para las arcas públicas. Cadena SER*. News Article

[112] El Confidencial Digital. (2025, November 19). *Valencia podría perder 115 millones de euros en ayudas por no tener una ordenanza de Zona de Bajas Emisiones. El Confidencial Digital*. News Article

[113] El País. (2024, November 9). *"Mazón dimisión" y "ni olvido ni perdón": los gritos de la manifestación en Valencia contra Carlos Mazón y la gestión de la dana. El País*. News Article

[114] Bono, F. (2025, October 25). *La calle mantiene la presión sobre Mazón: miles de valencianos se manifiestan un año después de la dana. El País*. News Article

[115] El País. (2025, November 3). *Mazón anuncia su dimisión un año después de la dana que mató a 229 personas. El País*. News Article

[116] Ministerio de Transportes y Movilidad Sostenible. (2023). *Ley de Movilidad Sostenible y financiación del transporte.* Gobierno de España. Press Release

[117] La Moncloa. (2025, October 8). *El Congreso da luz verde a la Ley de Movilidad Sostenible y remite la norma al Senado. Ministerio de Transportes y Movilidad Sostenible*. News Article

- Considering the European Level, the *Diesel Ban* set for 2035 can be a major ally to push for a **non-car-centric mobility** as the sales of diesel cars will have to cease[118].

Economic

Negative aspects

- Cost of living crisis is affecting Spain as much as other European countries but it is especially severe in the touristic areas. This process is **reducing the spending capabilities of families** as rent and housing costs are raising[119] [120].
- The growth of attention towards AI can direct investments away from mobility initiatives and public services.
- MaaS investments needs to be consistent throughout until it reaches a critical mass; recessions and reduced growth can dry up investments resulting in project's failure.

Positive aspects

- Spain is one of the few countries in Europe with a **consistent GDP growth**; this can possibly lead to **investments and expansive economic policies** benefitting transport and mobility[121] [122].
- European Union fundings for sustainable mobility initiative are raising and can be obtained; EMT Valencia has proven experience with European Union projects and can provide its knowledge and experience.
- Spain in general produce many start-ups in the mobility field. From Cooltra and TRIBBU[123] to the mobility consulting firm Factual, **Spain's mobility sector is in constant growth**.
- Tourism related growth has been exponential in many cities, with obvious downsides, but **generate revenues that can be exploited to improve the transport system**.

[118] European Parliament & Council of the European Union. (2023, April 19). Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles. *Official Journal of the European Union*. Report

[119] Universitat Politècnica de València. (2025, January). *Análisis oferta de alquiler - Informe Final 4T 2024*. Report

[120] Investropa. (2025, June). *What is the average rent in Valencia, Spain?* Investropa Market Reports.

[121] Eurostat. (2025, June 6). *GDP up by 0.6% and employment up by 0.2% in the euro area*. European Commission. Report

[122] European Parliamentary Research Service. (2024, December). *Spain's climate action strategy: Briefing*. European Parliament. Report

[123] https://www.tribbuapp.com/

Social

Negative aspects

- Cost of living crisis is pushing people out of the core and towards distant municipalities, **raising the distances to cover by public transport**.
- **Digital divide** both between generations and society layers can hinder the use of MaaS apps and systems, locking part of the population out of its benefits[124].
- **Privacy** is perceived far more as an issue with the raise of new processing technologies such as AI (Nie et al., 2025; Rohunen and Markkula, 2019)

Positive aspects

- The AMV has a **dense urban core** whose growth is creating a **urban continuum**. This smoother transition between the cities creates a favourable environment for more dense and frequent transport that will serve more users with the same distances covered.
- The gathered **data of MaaS can help optimise the system**, responding better to the needs of the population and **creating a positive loop**.

Technological

Negative aspects

- **Poorly performing apps on public side** are hard to repurpose for MaaS development
- Investments for **advanced security** from hacking is crucial and can slow down developing and **raise costs**

Positive aspects

- The SUMA system is already **integrated into all the PT operators** allowing for a smoother transition and relying on a well performing infrastructure
- Most of the fleet and stations allow direct credit card payment with *tap-and-go* systems
- The **excellent routing system of EMT Valencia app** already fully integrates all SUMA options and provides alternative routing with bike.
- **High quality and reliable GTFS-RT** available for both EMT, Metro and MetroBus
- Valencia Innovation Capital foundation offers a perfect environment to **test the application and the solution** before the release with its **SandBox project**[125] [126].

[124] Eurostat. (2023). *Skills for the digital age.* European Commission. Report
[125] Valencia Innovation Capital. (2025, September 29). *El Sandbox Urbano de València celebra su primer aniversario con 143 recursos disponibles.* Valencia Innovation Capital. Press Release
[126] Ayuntamiento de Valencia. (2024). *València ofrece más de 100 recursos municipales para implantar experiencias piloto innovadoras.* Valencia Innovation Capital. Press Release

- None of the major public transport companies share GTFS-RT with Google Maps thus reducing the competitive advantage of the app

4.4.2 SWOT Analysis

SWOT analysis is based on the evidences gained during the previous three phases. It grants the instruments to understand how to plan future actions.

Strengths

- **High Density multimodal Core**: The inner core of AMV, namely the city of Valencia (excluding the southern area of Albufeira) and the municipalities of Mislata, Xirivella and Quart De Poblet, has high variety of transport options. The overlap of EMT, MetroBus, Metro and Valenbisi with the private sharing operators creates a **dense network where MaaS** can offer a genuine added value through interoperability and payment integration.
- **Well established Interoperability**: The existing **SUMA integration** is a strong starting point, the AMV would not have to start from scratch to build the collaborations thanks to the **unified fare structure** and **data interoperability** between public operators.
- **Advanced routing system**: While user interface and capabilities may be lacking, the **routing system is strong**. EMT's app provides a **routing engine already able to calculate multimodal trips** effectively with three out of four options from SUMA (Renfe is not included in the routing) and with a separate bike routing option.
- **Data ownership**: The ATMV and EMT currently holds control over the higher quality real-time data for their network. This provides a competitive advantage over other real-time aggregators such as Moovit, CityMapper and Google Maps

Weaknesses

- **Jurisdictional fragmentation**: A structural rigidity where EMT mandate ends at the municipal border. This creates an artificial barrier for users **preventing buses from serving the natural metropolitan continuum** forcing users to inefficient transfers with MetroBus.
- **Digital Fragmentation**: Users currently face a **disjoined digital ecosystem**, requiring different apps for each different mode. This increases the cognitive load and drives users toward private cars or private aggregators (e.g. Moovit)
- **Radial Network Imbalance** (Centre vs. Periphery): As highlighted by TACI scores, **transport reliability drops quickly outside Valencia** city limits. The system is designed for radial access to the centre, making **suburb-to-suburb commuting (a growing need) difficult and time-consuming**.
- **Lack of Shared Infrastructure**: EMT and MetroBus **cannot share stops in many key locations**, preventing seamless physical transfers.
- **Service Gaps**: Insufficient capacity during peak hours and a **lack of night-time services** leave specific demographics (students, night-shift workers) underserved.

- **Cycling infrastructure**: The reduced amount of cycling path within the AMV reduces the possibilities for alternative mobility throughout the metropolitan area.

Opportunities

- **Flat Terrain**: The area is **well suited for bike lanes** due to its fairly flat terrain.
- **AI Effect**: AI promises to make code development cheaper, possibly reducing the initial investments cost for a MaaS platform
- **Legislative Push for Corporate Mobility** (B2B): The 2025 Sustainable Mobility Law requires large companies (>500 employees) to implement sustainable commuting plans. This creates a massive, legally mandated B2B market to sell the MaaS platform to major employers as a tool to manage employee transport.
- **The Valencia Sandbox Advantage:** The **Valencia Innovation Capital** sandbox allows for risk-free testing of the MaaS algorithm and UI in a real-world environment before full rollout, reducing the risk of a *failed launch*.
- **Geography as an Asset**: The AMV's flat terrain is ideal for low-cost micromobility integration (bikes/e-bikes) to solve the last-mile problem, which is cheaper to implement than new bus lines or Demand Responsive Transport (DRT) (Lee Robinson, 2021; Mageean and Nelson, 2003).
- **Technological Deflation**: Advances in AI-assisted coding are lowering the barrier to entry for developing complex software, potentially reducing the initial CAPEX (Capital Expenditure) required to build the MaaS platform.

Threats

- **Ruling parties' scepticism over sustainable mobility**: the current leading parties in GVA and Municipality of Valencia, Partido Popular and Vox as external support, have a proven **track record of opposing climate change mitigation policies** and can oppose action aiming to shift the modal use from cars to public transport and shared-mobility.
- **Urban Displacement**: The cost of living crisis is pushing residents further into the periphery. **Serving this dispersed population requires a different infrastructure**. The higher quality of mobility offer is currently within the core of Valencia; this shift would make the current network less efficient.
- **Leadership Vacuum**: The resignation of President Mazón creates an institutional power vacuum in the GVA, potentially stalling the cross-departmental agreements needed for metropolitan coordination.
- **Technological Debt**: The rapid pace of private-sector innovation creates a risk where the **public MaaS app becomes technologically obsolete** shortly after launch, as the public sector cannot match the update cycle of private competitors if the funding dries up immediately after the launch of the app.
- **AI Impact on Fundings opportunities**: AI sector is currently the most attractive for investments and can absorb much of the resources of the project. On a public side the **return of image** for an investment and implementation of AI can be higher than a MaaS one, shifting priorities and funding opportunities.

- **Distortion of Project Priorities** (AI vs. Utility): There is a high risk that the *AI gold rush* will distort the project's roadmap. To secure funding and political support, the MaaS platform may be forced to pivot towards complex AI predictive models (high cost, high PR value) before achieving basic operational reliability (low PR value). This focus on *return of image* rather than *return on utility* could lead to a sophisticated app that fails to solve the basic user need of seamless and reliable commuting.

Chapter 5 – Conclusions

The aim of this Thesis was to determine whether Valencia Metropolitan Area was suitable for a MaaS implementation. It used a four-stage analysis starting from highlighting the geographical and social characteristics of the AMV, moving to its transport network, identifying and engaging with the stakeholders and finally summarising the findings with PEST and SWOT analyses.

The analysis conducted on the **territory** highlighted that AMV is **inherently suitable for a Mobility as a Service** (MaaS) ecosystem but needs to take a step to solve some urgent problems. The **administrative boundaries are outdated** and do not respect anymore shape of the cities; municipalities such as Mislata, Quart de Poblet, or Torrent are now more functionally integrated into Valencia's structure than certain peripheral districts of the capital itself, namely Nazaret and Pobles del Sur. The urban density and proximity offer the ideal physical substrate for an integrated mobility solution; furthermore, the foundations for such integration are already present. The establishment of the Autoritat de Transport Metropolità de València (ATMV) and the implementation of the SUMA card demonstrate that the technical and institutional capabilities to coordinate **public transport operators** (EMT, Metrovalencia, MetroBus, Renfe) exist and are operational.

The study of the **transport network and demographics** shows a consolidated *urban continuum* in the transport offer. The barriers, represented by the **restriction preventing EMT from serving outside the city's border**, the restriction to share the same stops between EMT and MetroBus and the **strict geofencing of micro-mobility** sharing options, do not reflect the urban structure and mobility needs of the users. The evaluation of the application showed a **general low level of UX for the public mobility application**, with the exception of EMT Valencia. The quality of EMT app, threatened by some currently ongoing bugs and the lack of payment system, can be the starting point of the development of an integrated application first for the SUMA system and then for a MaaS project.

Stakeholder analysis pinpointed the responsibilities, power and interests over the MaaS implementation. While the integration is **especially needed in the areas of the Huerta, especially in the South and West** where the transit accessibility and connectivity index (TACI) is the lowest, the majority of the power is held by municipality of Valencia and the regional government as they have a firm control over the ATMV.

The interviews offered a different perspective; the **primary focus of the users** were **quality of service and accessibility** to transport. While the system is overall **well designed**, according to the experts opinions it is **currently underperforming**. Reduced service hours, especially in the later part of the days, as well as poor reliability were the most cited issues. The most interesting opinion came from the migrant defence association which **complained about structural bureaucratic issues** for the population they represent. **Poorer areas within the urban fabric tend to be underserved**, often because **official statistics do not reflect the actual population size**. Furthermore, access to existing services is **frequently hindered by excessive bureaucracy**. This discrepancy

creates a **cycle of exclusion and resentment**, key factors in understanding the vandalism and insecurity that affect both residents and transport facilities.

The experts shared an overview of the *dos and don'ts* of MaaS implementation as well as a roadmap for the work. The head of *Movilidad* at ATMV insisted on the use of **public tenders as an instrument to push MaaS** and the sustainable mobility agenda while warned on the **risks of disinvestment on the public transport** in favour of more hyped solutions (e.g. AI).

The **designed survey** can further validate the findings deepening the knowledge and understanding while providing a strong support for the political and administrative initiative.

Finally, the PEST and SWOT analysis synthesised the overall result: while the *backbone* is strong, the *nervous system* required for MaaS is incomplete. According to the PEST and SWOT analyses, the **region lacks a solid digital instrument** that can be upgraded to become the aggregating MaaS app and, more crucially, it lacks a **single directing body with the mandate to orchestrate private shared mobility** options (micromobility, car-sharing) **under the same public umbrella**. The GVA and the Ayuntamiento de Valencia have the economic strength to invest in MaaS but they **lack the political support** and are currently led by two parties with a proven track record of opposition to decarbonisation and sustainable mobility. Moreover, an implementation of MaaS in the Metropolitan area would leave out many municipalities of the GVA that would rightfully demand to be included; however, widening the implementation area would prove a more difficult task and would not change the services for the cities in the C or D zone of the current SUMA system.

Without bringing private actors into the integrated fold, the system remains a juxtaposition of services rather than a cohesive ecosystem. **This technological gap** is exacerbated by the current digital landscape, characterised by functional redundancy. A paradigmatic example is the operation of EMT Valencia, which currently forces users to navigate separate applications for routing and ticketing. This **fragmentation adds friction to the user experience**, directly contradicting the core promise of MaaS. Moreover, the sector is witnessing a strategic paradox driven by the rapid adoption of *pay-as-you-go* systems. While **direct bank card access improves accessibility**, it risks acting as a **disincentive for the development of a comprehensive MaaS platform**, as operators may perceive the *payment friction* as solved, ignoring the deeper value of bundling services and planning intermodal trips.

Critically, the engagement with stakeholders and users provided a reality check to the technological optimism often surrounding MaaS. The interviews clearly demonstrated that the **primary focus of the metropolitan population** is not on the availability of a new digital application, but on the **operational quality of the existing service**. Users consistently **prioritised reliability, frequency, and the physical ease of intermodal transfers** over digital aggregation. The demand is for a transport network that first functions seamlessly in the physical world; the **digital layer is seen as a facilitator**, **not**

a solution in itself. Consequently, any move toward MaaS must be preceded by, or at least concurrent with, tangible improvements in the service offer.

Despite the **territorial and transport network suitability**, the immediate **political and economic conditions for a full-scale, public-led MaaS implementation are not favourable**. The theoretical ambition of a Level 4 MaaS, which integrates societal goals such as decarbonisation, stands in **direct conflict with the current regional political agenda**, which prioritises the expansion of infrastructure for private vehicles. This *Policy Dissonance* undermines the credibility of any MaaS initiative. Furthermore, there is a tangible risk that **a market-driven MaaS could evolve into a premium service tailored for tourists and wealthy citizens**, ignoring the residential periphery. A public-led MaaS must instead be an act of ***Digital Sovereignty***, controlling the algorithms to prioritise public policy goals over commercial engagement and ensuring that the value generated by metropolitan mobility remains a public asset.

In light of these barriers, **a fast and disruptive implementation is inadvisable**. Instead, the path forward should rely on a strategy of **targeted experimentation and market leverage**. The Valencia Innovation Capital Sandbox offers the ideal *safe harbour* to test specific components, such as corporate mobility models or Demand-Responsive Transport[127] (DRT), without requiring massive upfront investment. This approach should be supported by a **participatory model** that leverages **Valencia's unique social capital**, actively involving the **dense network of neighbourhood associations** in the co-design of the system.

Finally, this study concludes that the **feasibility of a public-led MaaS in Valencia depends less on technological acquisition and more on political boldness**. The administration should **utilise the significant negotiating power** generated by the attractiveness of its market to launch more ambitious public tenders. **Access to the lucrative central mobility market** must be made **conditional upon meeting strict public service obligations**, mandating total data transparency and the expansion of service areas into the currently underserved metropolitan rings. This approach transforms MaaS from a **cost-heavy IT project** into a **regulatory standard**, offering the most pragmatic path to overcoming economic barriers and turning the market's own momentum into a driver for public good.

[127] Demand Responsive Transport https://www.interregeurope.eu/sites/default/files/2024-07/Policy%20brief%20on%20demand-responsive%20transport.pdf

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