

DIGITAL TRANSFORMATION STRATEGY ZARAGOZA CITY COUNCIL

2024-2030

ZityVerse
Data & AI Strategy
for the City of Zaragoza

ECONOMY, DIGITAL TRANSFORMATION AND TRANSPARENCY DIVISION
DEPARTMENT OF TRANSPARENCY AND DIGITAL TRANSFORMATION



Zaragoza
AYUNTAMIENTO



Foreword

As Mayor of Zaragoza, my vision is to position our city as a beacon of innovation in the Smart Cities landscape. Since the beginning of my term in office, Zaragoza's city government has prioritised technological development and digital transformation, breathing life into the 'ZityVerse', our comprehensive strategy designed by people across all divisions of local government to turn Zaragoza into a model smart city on an international level.

The Covid-19 pandemic, which occurred during the 2019-2023 governmental term, was an unexpected catalyst; the state of emergency that we faced served to accelerate the processes that will carry us towards the Zaragoza of the future. Despite the many challenges we face, the Government of Zaragoza has been a leader in the digital modernisation of its city government, ensuring that technology serves our citizens.




Now, post-pandemic, we find ourselves at a crucial turning point. It is time to strengthen, expand and put our vision of a digitally-advanced Zaragoza out there. New digital technologies are the key to this transformation, and our city is perfectly positioned to lead this technological revolution thanks to our quality infrastructures, our talented staff and our strong business foundation.

Zaragoza is already a European leader for its initiatives in sustainable mobility, energy efficiency and the circular economy, aiming to achieve carbon neutrality by 2030. Digitalisation is driving this transformation, reducing emissions and raising citizens' quality of life.


Looking to the future, Zaragoza is putting itself forward as a leader in technological innovation, with advanced solutions for air quality, mobility, renewable energies, lighting, water management, tourism, circular economy and digital entertainment. The 'ZityVerse' is more than just a strategy; it's a model of urban renewal that promotes social innovation and improves public services, in partnership with industry and universities.

My promise is that, by 2030, Zaragoza will not only be an example of what a Smart City can achieve, but that it will be an inspiring leader in Europe and the world.

Natalia Chueca Muñoz
Mayor of Zaragoza



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Introduction

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Introduction

Zaragoza faces many challenges and opportunities in today's world, which is one of technological revolution and innovation. With a broad, deep industrial inheritance and exceptional cultural heritage, Zaragoza is in a unique position to take full advantage of digital technologies and lead the transformation, becoming a pioneering, smart and sustainable city capable of attracting industry and start-up talent.

In recent years, Zaragoza' technological development has advanced through the implementation of innovative projects. However, there are still significant opportunities to expand and consolidate the digital transformation in Zaragoza, making the most of the potential provided by digital technologies to boost the city's economic development, improve quality of life and promote sustainability.

For citizens, technology has created new expectations:

- They demand better-quality public services as taxpayers, as well as a high-quality and responsive experience.
- They are looking for more intuitive, personalised services that are perfectly tailored to their needs.
- They demand fast and efficient online services.
- They need an ecosystem of digital services for all that help build equity and quality while addressing their needs.

To use and adopt new digital services in the long term, citizens need to be confident that public entities will provide them with what they need.

To regain that trust, governments must ensure that services and infrastructure are properly provided, that data is secure, that processes run smoothly and that response times are adequate. Most importantly, governments need to facilitate access and service.

In the face of accelerating change, public-sector organisations must embrace innovation and transform rapidly to operate more intelligently, expanding and improving their services.

Today's workers are digital natives. That's why we must understand the new realities of remote working, reflecting on how it can support talent development and operating models to ensure workforce resilience. Establishing secure virtual workspaces has become a priority.

Adopting cloud technologies is a strategic move, helping municipal information systems develop towards efficient, flexible digital platforms. Incorporating cloud services ensures that public data can be used securely and efficiently from large data centres in compliance with current Data Protection regulations and the National Security Strategy (ENS).



1 Introduction

Inclusive services must be offered to citizens by establishing a new way of delivering services that is user-friendly, personalised and contactless. Virtualising citizen care and service channels can improve access, convenience and case resolution, ensuring that simplicity and inclusiveness are at the heart of all our services.

Administrative procedures need to be smart, combining people and technology to make administrative operations an innovation hub that delivers better experiences for citizens. One way to do this is to introduce intelligent automation, service and care platforms, and no/low-code development tools that can help public employees improve the way they work, becoming more agile as they respond to new needs.

Collection and payment processes, as well as legal compliance, must evolve, becoming digitally-enabled and compliance-oriented. We must also introduce digital payment platforms, security tools, artificial intelligence (AI) and machine learning to optimise payment processes.

AI and predictive analytics should be introduced to better understand citizens, predict their needs and anticipate service provision. This should be done without generating biases and always upholding equality of opportunity, as well as the principles and values established by the upcoming AI Act. We must also take advantage of analytics and data models to plan ahead.

Technology infrastructure is fundamental to the successful implementation of digital technologies in the city. This includes high-speed broadband connectivity across the city, the establishment of a sensor network for real-time data collection and the creation of a unified digital platform for data collection, analysis and visualisation.

For Zaragoza, the digital transformation strategy represents a comprehensive and ambitious approach to harnessing the potential of digital technologies for the benefit of its citizens and sustainable development. By focusing on technological infrastructure, digital governance, citizen participation and technological innovation, the strategy aims to set the necessary foundations to make Zaragoza a leader in the digital era, promoting equitable, sustainable and inclusive development.

This strategy not only represents an opportunity for Zaragoza, but also establishes a model that can be held up as an example for other cities in Spain and beyond that are looking to address the challenges and opportunities that digital transformation has to offer in a constantly-evolving urban environment.

2



Challenges Faced by the City

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2 Challenges Faced by the City

Cities are facing non-stop challenges in their attempts to keep up with technological advances to meet citizen demands.

Cities are rethinking how they serve citizens, how they manage their internal processes, how they design urban spaces and how they produce and consume energy and materials. To succeed, technology is our ally, an indispensable enabler and catalyst.

Digitisation has helped cities respond to growing challenges, as well as to new modes and uses of the city. Newer challenges have also emerged, such as digital rights and cybersecurity (protecting digital and physical assets from cyber-attacks). Moreover, climate change poses a looming threat on the horizon that adds urgency to our efforts to mitigate it and improve the city's resilience. Every decision must have a 'green' result; its proactive contribution to mitigating climate impacts must be taken into account.

The post-Covid era has also helped bring about a new way of life, whether at home, at work (hybrid working), shopping or leisure. Citizens expect their city to help them with all of this. There is fierce competition for talent (key to thriving and attracting investors), and cities must reinvent new models of investment and entrepreneurship to recover lost local economies (mainly local shops and service-sector enterprises such as hospitality and tourism) and attract investors, especially in new technologies (Lanvin & Monteiro, 2022). 'Cities are increasingly embracing innovation and new technologies and, thanks to the concentration of people, ideas and resources, are leading the way towards solutions to global challenges beyond their own borders' (EU Annual Report, 2023).

Faced with environmental, social and economic challenges, cities need to balance their investments and attention between social issues, such as preventing citizens from falling into inequality and inequity and overcoming the current economic crisis, and physical/environmental issues, including managing emissions, material consumption (water, energy), urban mobility, spaces (especially green spaces), and public safety (Amsterdam City Doughnut, 2020).

ENVIRONMENTAL SUSTAINABILITY

The fight for environmental sustainability is a challenge where improving our natural resource use (especially regarding water) and improving energy efficiency are the areas where cities can contribute most.

Cities generate around 70% of global greenhouse gas emissions; at the same time, they are particularly vulnerable to the impacts of climate change.

Decarbonisation is a goal, as is becoming one of the 100 cities of the EU Climate-Neutral Mission (EU, 2022), transport electrification and achieving zero waste (circular economy city) are the most prominent challenges addressed in this section.



2 Challenges Faced by the City

URBAN MOBILITY

Cities will increasingly apply new technologies and innovation to transport and mobility. Transport will need to become increasingly interoperable and integrated (multi-modal), sustainable/electric, shared and autonomous (Thompson, 2015).

Technologies are moving towards more efficient public transport systems, shared nearby mobility options for large cities and autonomous mobility (to reduce accidents - Vision Zero). Also on the rise are mobility as a service (MaaS), the improvement of traffic through new AI technologies and the beginning of urban air mobility, with new aircraft, vertiports and advances in the urban distribution of goods (and, in the future, passengers). Cities will have to design their urban airspace to enable this service.

ACCESSIBILITY

In addition, cities face the challenge of providing a combination of digital access options for all their inhabitants so that they can work or perform all kinds of activities from anywhere (depending on the nature of their work). The emergence of remote working has made digital life through 5G technology a right for all citizens.

At the same time, the physical accessibility of infrastructures, facilities and public and private services must be promoted in order to guarantee equal attention to all citizens, particularly the elderly, children and people with disabilities. This will foster a physical-digital (phydigital) service model by creating innovative, user-friendly and accessible urban ecosystems.

In this context, new technologies in AI and devices will help push forward even more integration possibilities for the most vulnerable groups, such as the elderly, children and people with disabilities.

The metaverse (Corporate) offers new possibilities for distributed and remote cooperative work, enabling virtual teams and facilitating access to services and information both internally and for the public at large.

CYBERSECURITY

Another key challenge is to ensure city cybersecurity. As cities become more interconnected and dependent on technology, they become more vulnerable to cyberattacks.



2 Challenges Faced by the City

Digital systems operate in an environment of constant threats, often orchestrated by organised crime, which compromise both citizens' information and municipal services, in many cases essential for daily urban life in our cities. Large-scale organised crime operations compromise the data and services of all types of entities in exchange for money (ransomware).

Ransomware and denial-of-service attacks, for example, pose a serious threat to city security and stability. Therefore, cities must implement robust measures to protect their systems and networks from potential threats, establishing advanced detection, protection and response measures, such as distributed electronic identification, blockchain technologies, confidential computing, new security models that seek to protect data while it is in use or the Zero Trust network security model, as well as complying with national and European regulations at all times.

TRAINING / RE-TRAINING

To drive social change, cities must embrace innovation and new technologies. To this end, re-training civil servants and the public itself is essential. A better-qualified city with a greater talent availability will attract more investment and skilled job creation (IDC, 2021).

Zaragoza has a powerful arsenal for talent competition, as it has a substantial edge in various areas, including environmental sustainability, mobility and cost of living.

A key part of economic recovery and business attraction, namely access to training in the latest technologies and creative disciplines, combined with the agility to carry out hiring campaigns, is the main challenge for public employment services (Parilla & Liu, 2019).

CHRONO-URBANISM. The value of Time.

The design of urban space accounting for travel times in order to minimise them is called 'chrono-urbanism'. This means taking less than 15 minutes (the '15-minute city') to get to the local shop or school on foot and to work by bicycle or public transport, and less than 1 minute to get to the park or kindergarten (Peters, 2021). Chrono-urbanism is starting to become a reality. Improving citizen health, reducing emissions and boosting the economy are some of the advantages of this strategy. At the same time, its most important aspect - and where Zaragoza stands out worldwide - is that when time is saved on travel, it can be spent on personal enjoyment.

Three-dimensional virtual city models as a general framework and platform for spatial data allow BIM data to be combined with GIS systems, municipal and public information databases and LIDAR technology. These, together with orthophotos, make up the new digital urban paradigm of SmartCities.



2 Challenges Faced by the City

In this way, we can manage spaces intelligently, redesigning services where they are most needed and building the ideal 15-minute city (15CITY, 2021), which is already a reality in Zaragoza.

CITIZEN EXPERIENCE

Cities' key priority is to provide an agile, efficient service that meets citizens' expectations. The citizen experience must go beyond the mere provision of online services, embracing technology to provide self-service platforms and data-driven insights to anticipate events. It is about transforming administrative procedures and tasks into experiences for citizens to streamline and improve service delivery, to provide them with information to facilitate their decisions, and to create physical-digital (phydigital) environments that improve their quality of life and enhance their well-being, health and happiness.

For this purpose, the most advanced cities aim to digitally design simple, people-centred processes and procedures, using artificial intelligence (AI) to manage these ever more simply through external assistants that help citizens access and use public services and infrastructures.

AI support is an essential tool in making all services universally accessible, and to ensure that all citizens have a full social life. It allows personalised attention to be offered, tailored to each individual and taking advantage of the knowledge that is already available. The most vulnerable groups should be the priority users of these new phydigital services tailored to them.

E-TOURISM

We are witnessing a tourism renaissance, returning to and even surpassing pre-pandemic levels. E-Tourism includes the virtualisation of all processes and the tourism value chain, bringing all tourism stakeholders (hoteliers, guests, tourism-related governmental entities, travel agents, etc.) into a network in order to offer a combined physical-digital (phydigital) experience to the tourist.

Challenges in this sector include AI through virtual assistants, big data, augmented and virtual reality, mobile technology through 5G, biometrics for faster and more secure identification, voice technology and using the blockchain to offer secure and transparent transactions. In particular, augmented reality makes it possible to offer advanced AI-based services associated with an experience, location, cultural activity or physical tour, which enhances the attractiveness of a specific place to tourists by enriching it with data and virtual experiences.



2 Challenges Faced by the City

RESILIENCE AND SIMULATION

Cities are evolving, and today's challenges take into account concepts such as the healthy city, urban design suitable for an ageing population, children and the disabled, more affordable, liveable and environmentally friendly urban areas by giving a greater role to city-dwellers and an intended humanisation of public space (sentient city).

This city, semi-automated through the intensive use of IoT (Internet of Things) devices, makes it possible to achieve incredible levels of efficiency, remote management and security. The information these devices provide is used to generate virtual models of the city. These 3D city models (digital twins) have become crucial for better urban management and can be used for a wide variety of purposes, such as disaster management, monitoring, tax management, energy-saving calculations, mobility plans and planning simulations of any kind (water, energy, pollution, safety, security, environment, traffic and mobility, as well as any issue that can be geo-referenced).

Digital twins are not just visual models, but rather indispensable tools that can also be used for thematic queries and analysis with the help of semantic data. They are essential tools for urban planning and resource optimisation. In the context of smart cities, digital twins continuously collect information from the environment through sensors, drones and mobile devices, as well as from vehicles, buildings, infrastructures or people, analysing this with the help of AI. They allow simulation models to be created and alternatives to any physical problem or issue to be tested or tried out. For example, given a pollution problem in a city plaza, various alternative traffic changes can be tested in the simulation model, saving time and resources by not requiring any road works or disturbing the local residents.

With all these tools comes the concept of 'resilient cities': cities that have the capacity to absorb, recover and prepare for future crises (economic, environmental, health-related, social and institutional). Resilient cities promote sustainable development, well-being and inclusive growth (Cassim et al, 2020). These tools make it possible to test - and therefore learn ahead of time - which elements of the city's infrastructure will be impacted the most or are at their weakest in the face of potential adversity and can therefore be strengthened ahead of time in order to minimise the impacts of different hazards.

GOVERNMENT FOR AND WITH CITIZENS

Advanced cities use and activate available data to learn more about their citizens (preferences, patterns, vulnerable situations, etc.) with the utmost respect and compliance with data protection regulations, in order to be able to offer personalised services, anticipate citizens' needs or respond to situations of otherwise-imperceptible inequality or inequity.



2 Challenges Faced by the City

Better awareness of the current situation of dependent or disadvantaged groups allows for informed, correct and fair decision-making. Given the ageing of the population, it is particularly important that new technologies applied in remote care allow for excellent, respectful and non-intrusive monitoring of elderly people with varying degrees of independence. Likewise, new technologies make it possible to provide greater safety and security to people with disabilities, women, minors and other groups, avoiding gender-related abuse and other such problems.

Cities use all new social communication channels and collaborative, participatory activities to listen to and continuously test the quantity and quality of services offered in order to adapt them to the needs and preferences of citizens. This allows us to help develop co-creation mechanisms and involve citizens in the design of new services and benefits.

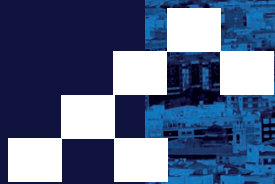
METACITY / CITYVERSE

The metacity is an emerging trend that takes advantage of the latest technologies in virtual world design and Web3 to generate a virtual environment in which we can host city resources that will be used by citizens, entrepreneurs and more. It's a novel way of interacting with the city that facilitates urban co-creation.

A gamified virtual city can bring multiple benefits for citizens' livelihoods, services and infrastructure. Supported by digital twins and using the data provided by the IoT (Internet of Things), a meta-city or cityverse space makes it possible to generate an exceptional virtual experience for our relationship with citizens and resource use.

As a conclusion to all these challenges, technology is what enables a city to compete successfully in a global environment of talent retention and attraction. A city with data-driven management, regulated by AI (personalisation, simulation, anticipation), is able to offer top-tier public service that is inclusive, efficient and sustainable.

3



Current
Status

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3 Current Status

ZARAGOZA

LAND AREA 967.065.449 m ²	POPULATION 694.109 residents	DENSITY 722 res/km ²
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MEN 48% 332.389	44 years average age		WOMEN 52% 361.720	47 years average age
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SPANISH 86% 596.230		NATIONALS FOREIGNERS  14% 97.879
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STATISTICAL INDICATORS

Dependency rate:	54%	Maternity index:	17%
Ageing rate:	166%	Trend index:	79%
Superannuation rate:	17%	Replacement rate:	74%
Youth index:	60%	Childhood index:	13%

Source: DEMOGRAPHIC DATA FROM THE MUNICIPAL RESIDENTS REGISTER OBTAINED AS AT 01-01-2023

Access to internet and communications equipment at primary households: 2023.

Unit: No. of households and percentages

	Aragon	Spain
Total number of primary households with members aged 16-74 years	477.926	17.207.962
Primary households with a computer	84,1%	82,6%
Primary households with internet access	97,2%	96,4%
Primary households with internet access to broadband	96,4%	96,4%
Primary households with mobile phones	100%	99,5%
Primary households with a landline	66,0%	57,5%

Source: INSTITUTO ARAGONÉS DE ESTADÍSTICA



3 Current Status

Some of the activities hosted on zaragoza.es (official website) in 2023 can be seen in the following data:



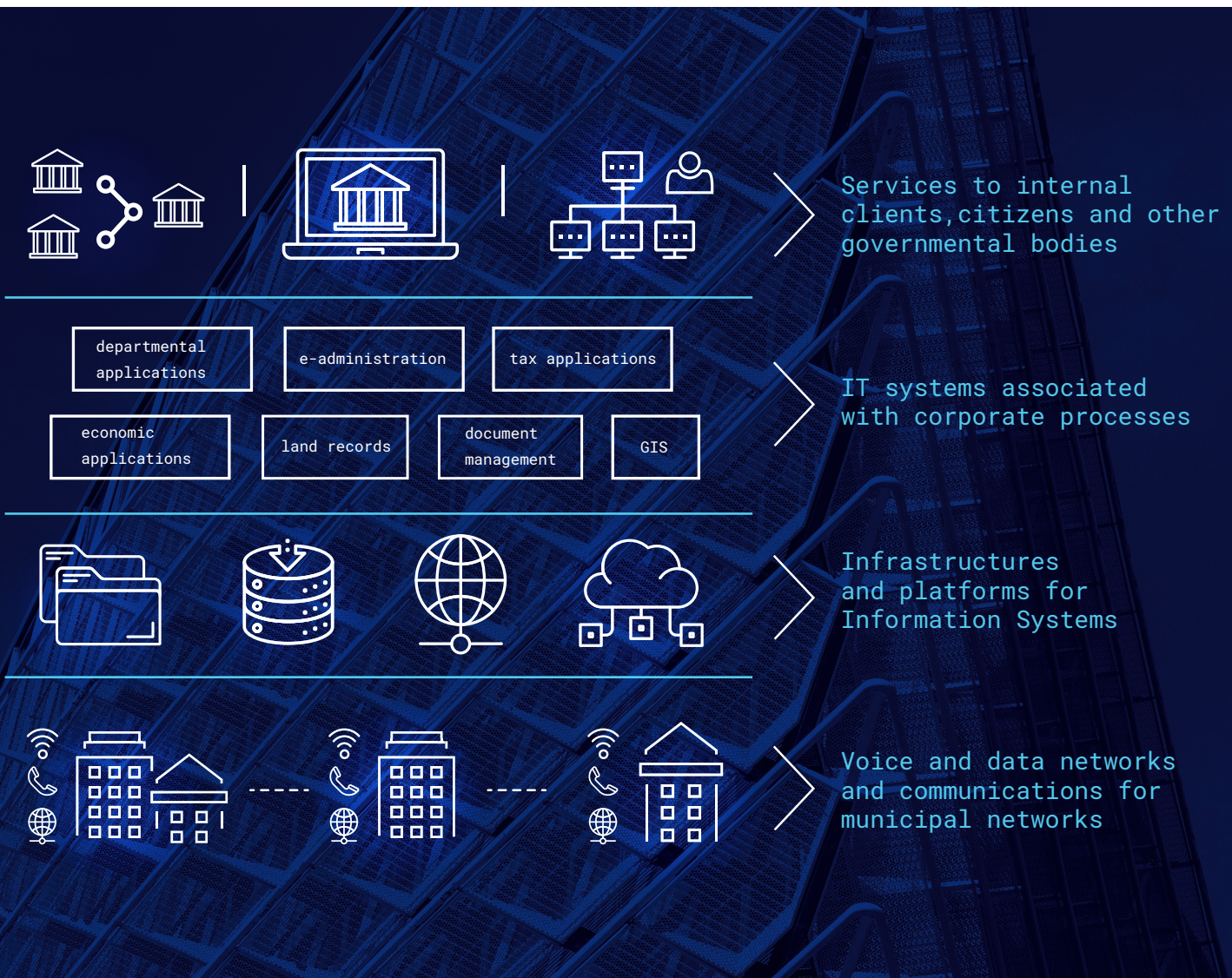


3 Current Status

CORPORATE ICT SYSTEMS MANAGEMENT

These activities - and all the services that the city government provides to citizens, from administrative management to police and fire services, town planning management and water cycle management - are supported by Information and Communications Technology (ICT) systems.

The management of the Zaragoza city government's ICT services requires us to take on tasks in a wide variety of areas:





3 Current Status

In order to respond to the needs of city government, the service is organised into different teams:

- **Workstation Teams:** responsible for the design, preparation and installation of corporate workstations and for providing direct support to users in city government.
- **Development Teams for: e-Administration** - provide support for e-Administration tools and cross-departmental tools like the Municipal Register. **Departmental Applications** - in charge of supporting projects in different departments, such as Human Resources, Accounting and Public Services. **Fiscal IT** - supports the Municipal Tax Management and Collection processes.
- **Systems and Platform Teams:** responsible for supporting the storage and server systems and software platforms (servers and databases) that operate the main Corporate applications and processes.
- **Communications Teams:** responsible for the connectivity (voice and data) of local government infrastructures and buildings, and for managing and supervising network services such as internet access and e-mail.

DATA INFRASTRUCTURE AND GOVERNANCE

Data are a public good for the city, and proper data collection, processing, cleaning and management are key to achieving digital transformation and helping to improve the management and provision of public services.

The presence of a corporate data space is meant to facilitate exchanges between the different parts and divisions of city government, and between the City and related/dependent entities.

Data are essential in the development of disruptive technologies such as AI, digital twins and services and applications that aim to be useful and easy to use, based on a clear, consensual and harmonised way of working.

The official website has a series of services and applications that, with proper data infrastructure, allow data to be shared with sovereignty, trust and security, established through integrated governance and interoperability mechanisms.



3 Current Status

SERVICES AND APPLICATIONS



TRANSPARENCY



COMPLAINTS AND SUGGESTIONS



DISCOVER AND EXPLORE ZARAGOZA



CITY PROCUREMENT



URBAN PLANNING



USAGE/ GREEN DATA



PROCEDURES AND SERVICES

DATA INFRASTRUCTURE

DATALAKE

AI

IDEZAR

API ZARAGOZA

DATA CATALOGUE

SENSOR

GOBIERNO DEL DATO

TECHNOLOGICAL INFRASTRUCTURE

DATA SETS

ESTABLISHED VOCABULARIES AND MODELS

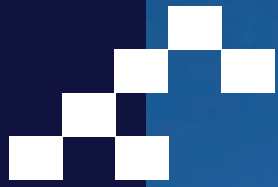
DATA MANAGERS/ DATA PROCESSING

INFORMATION MAP

REGULATIONS

Official Website www.zaragoza.es

4



Digital Transformation Pillars

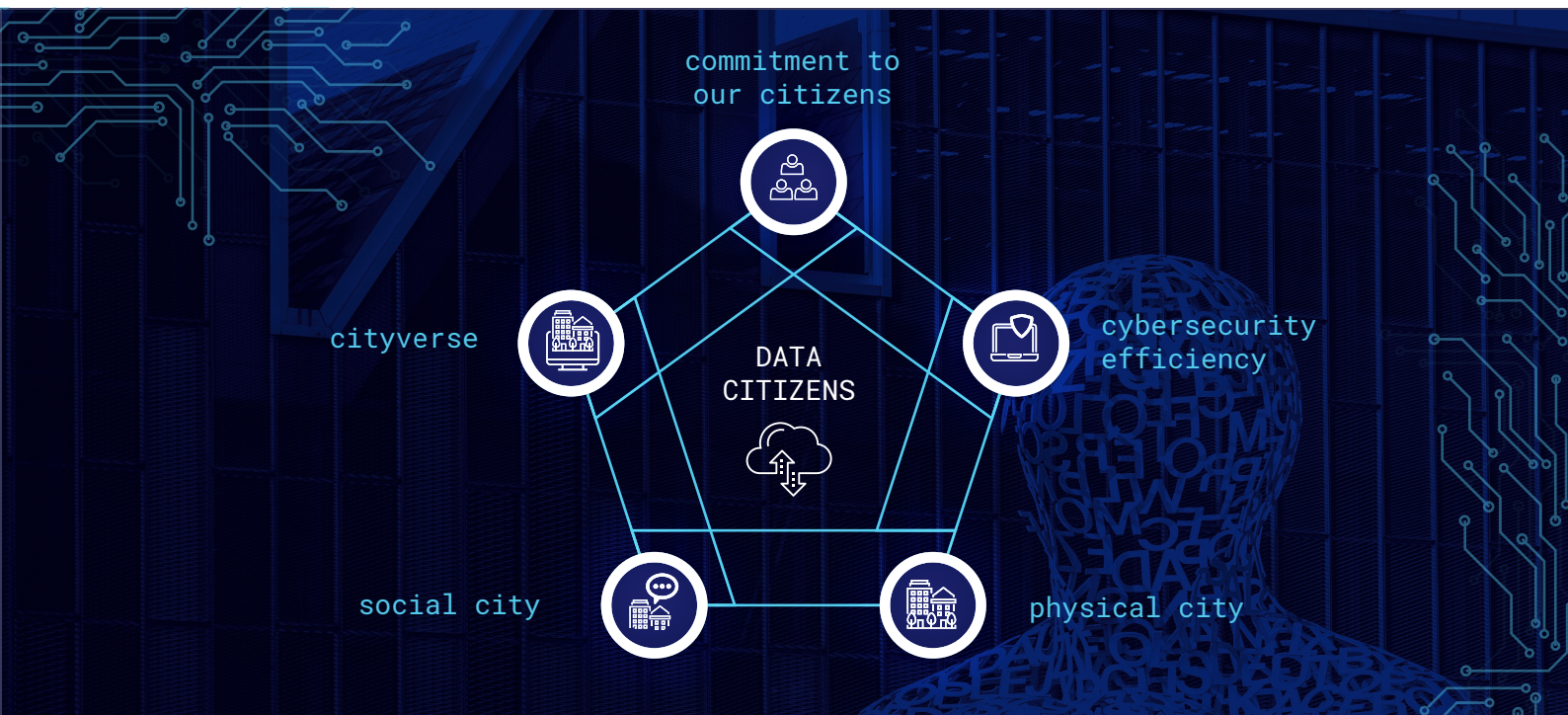




4 Digital Transformation Pillars

This plan, aligned with the available budget and human resources, seeks to maximise the positive impact of digital transformation in Zaragoza's city government, improving internal efficiency, the quality of life of its citizens and its attractiveness to talent, as well as its social, economic and environmental development.

Data-driven, AI-managed, 5G-connected, cloud-managed, with decisions made by a digital twin.



FIVE PILLARS:

- Commitment to serving citizens through generative AI, advanced personalised services and virtual assistance.
- Efficient work and cybersecurity with the assistance of AI and automation of routine tasks with high levels of security.
- Smart Physical City Management with an inventory of the environment, as well as its application through digital twins in different areas such as urban planning, mobility, finance, security, energy and water.
- Analysis and awareness of the Social City to make it healthier, with an urban design suitable for the ageing population, creating more affordable, liveable and environmentally-friendly urban areas.
- The Metacity concept, in which the city and its virtual world coexist to offer more possibilities to citizens and visitors.



4 Digital Transformation Pillars

1. COMMITMENT TO OUR CITIZENS

WHY?

Citizens are increasingly comfortable in the digital world, so they expect the same quality of digital services from local government as they receive from the private sector. Citizens demand fast, seamless and integrated digital public services that match both their everyday use of technology and their retail experiences.

We must put people at the centre of every process.

Therefore, in addition to efficiency and effectiveness in service delivery, we must focus on the citizen's experience, anticipate their needs, and ensure that services are as accessible and transparent as possible. Citizens expect a personalised service that, based on all available information about that person or their current situation in life, provides them with a unique experience, with the services they need integrated and delivered through the most popular digital communication tools.

We must make life easier for citizens, using automation to ensure that public services are reliable and simple, saving time and reducing errors.

HOW / WHAT?

Focus on the citizen. Innovating doesn't just mean getting new IT equipment for local government or moving to the cloud. These should be results of the transformation, not its goal.

Redefinition of the 'services' provided to citizens. User experience should be prioritised over bureaucratic procedure. There is a need to move from 'using digital tools' to 'providing a complete digital service experience'.

Transparency, ethical use of data and AI. We must promote the dissemination of technologies that allow these to be used and shared in an open, secure and transparent manner, as well as encouraging the use of machine learning and AI tech.

Cloud Computing as a sustainable enabler of innovation in government.

The solution should use advanced technologies. Virtual Agents enable Self Service, AI-powered tools equip agents with the right information and help them resolve cases. These virtual assistants help citizens carry out procedures such as requesting proof-of-address certificates, downloading bills, paying taxes, direct debiting, making general requests, booking appointments online and filling out forms for the Citizen's Affairs Office, filing complaints or appeals or any other local government procedure, as well as accessing all the information available on the extensive range of services and activities on offer.



4 Digital Transformation Pillars

The application of Generative Artificial Intelligence (GenAI) to the comprehensive management of citizen relations and service delivery represents a dramatic advance in the quality of public service (McKinsey, 2023). In this area, multilingual and NLP (natural language processing)-based chatbots or virtual assistants are becoming a popular option to provide citizens with information about all sorts of policies and regulations, the cultural calendar, and critical messages about disaster response, health and social services.

In addition, this technology is crucial in modern call centre management, helping the operator understand the citizen's voice, identify the citizen, connect them to relevant information, reduce response time and improve the citizen experience.

GOALS

- Z-Digital. Integrated Digital Platform. Better services, omni-channel, user-friendly and personalised to the needs of the citizen who receives help from them. Brings all apps together on one intuitive, easy-to-use platform.
- Use of Generative Artificial Intelligence through a virtual assistant. Overcoming red tape in the citizen's relationship with local government, effective user experience, less and less productive time expended on accessing services. Improved efficiency and quality of life.
- Civil and social commitment. Special attention to women and the elderly. Reducing the CO2 footprint of public services, optimising resource use, addressing economic, social and environmental sustainability issues through the use of cloud computing.
- Providing an integrated and personalised citizen experience, based on life factors that require public services and avoiding the need to look into different data/service silos by developing a flexible environment capable of hosting agile innovation in the long term.
- Gaining citizens' trust in service delivery, increasing digital usage (and thus reducing operational costs), and encouraging citizen participation and co-creation of new services.



4 Digital Transformation Pillars

2. USER EFFICIENCY AND CYBERSECURITY

WHY?

Information Technology (IT) strategies are evolving. Generally speaking, environments are more complex than before. The digitisation and constant evolution of municipal services means the emergence of a complex ecosystem of hardware, software and telecommunications. The presence of older applications and hardware equipment from different generations results in truly heterogeneous and diverse environments at most organisations.

The capacity and scope of IT systems have also increased over time, so that there are now higher levels of interaction between software, information and people.

Trends and developments such as cloud computing and new work organisation models are introducing enormous flexibility within organisations, while at the same time placing higher demands on IT departments. These can be summarised as follows:

- Achieving more with fewer resources.
- Improving personal productivity.
- Enabling new ways of working, any time, anywhere.

Law 39/2015, of 1 October, on the Common Administrative Procedure of Public Administrations and Law 40/2015, of 1 October, on the Legal Regime of the Public Sector, laid the foundations for the implementation of e-Government as a standard mechanism for governments in their relations with citizens, with other governments and in their internal management needs.

The new technologies provided by the Digital Transformation will drastically increase the efficiency of administrative processes and the integrated management of the information managed.

Apps and management systems are constantly evolving to offer added functionality to users in a primarily web-based environment, establishing increasingly complex and interlinked mechanisms for accessing tightly integrated information sources.

Likewise, governments need to:

- Establish detection, protection and response measures, in compliance with the principles of the National Security Strategy.
- Develop digital identity and rights protection according to EU Directives (eIDAS 2), in addition to the General Data Protection Regulation (GDPR) and the future European AI Act.
- Continuous service that is always active, reliable and secure.



4 Digital Transformation Pillars

HOW / WHAT?

Both the city government's own employees and citizens must have the best possible means and tools to carry out their work and access information.

The goal is to improve efficiency while always upholding a policy of reliable security and transparency, based on implementable IT improvements that involve improving functionality and performance.

This goal should apply to the scope of employee workstations, corporate applications, the digital platforms that support them and the telecommunications networks that facilitate interconnection between all these elements.

The goal is to modernise the mechanisms of interaction with the citizen in all digital areas, improving interface tools through the implementation of natural language processing and AI technologies at all points of interaction with the citizen.

It should also enable access to the city government's administrative systems in an efficient and secure way, bringing them to more mobile devices by merging apps.

The use of Generative Artificial Intelligence (Gen AI) improves the productivity of municipal staff. This type of technology will multiply productivity in document management, document classification and interpretation, form generation, development of internal training tools, assistance with applicable internal policies and generation of new documentation.

Simplifying administrative procedures is paramount in the eGovernment app ecosystem. To this end, we must implement Process Robotisation technologies for administrative procedure file processing, with the aim of reducing waiting times, inefficiencies, errors and costs associated with the processes.

At the same time, Intelligent Document Processing technologies must be implemented not just for internal management, but also for exchanging documents received by citizens and exchanging documents with other entities and governments, reducing the time and costs associated with document management, eliminating errors and improving accuracy in the extraction of relevant information.

All of the above is supported through the management of Infrastructures that cover all the tasks related to the physical and digital pieces that support the city government's IT services: physical infrastructures, communications, network services and application and information services platforms.

Cybersecurity is a basic requirement in the establishment of all processes, and appropriate mechanisms must be put in place to ensure compliance with current regulations.



4 Digital Transformation Pillars

Cities need to organise a specialised response to manage security. We need to be able to trust externally managed systems, leading Cloud providers that ensure the necessary data protection and security and advanced AI-based tools that protect end-user operations, devices, tools for general systems and data centres. Backup systems and decentralised (cloud) servers for redundancy are needed to protect the city against disruptions.

GOALS

- Efficient and accessible e-Government, business process automation (BPA), Intelligent Document Management that solves the complexity associated with massive document assets (classification, taxonomy, extraction, summarisation, related documents, rewriting/paraphrasing (multilingual, inclusive), metadata, etc.).
- Information manager to assist public officials on internal policies, applicable laws, search for related documents internally and to help keep the information up to date. Automatic processing of forms and applications, reducing the need for manual processing and improving efficiency by optimising the appropriate response time.
- Immediate optimisation when it is not possible to transform processes to improve their efficiency, reduce citizen response times and errors, ensuring better services for users and the active participation of public employees in our evolution towards a fully digital local government with proper security coverage.
- Multiply productivity and stimulate creativity through AI support.
- Establish Cybersecurity Protection, Detection and Response measures suitable for a growing environment. Eliminate the risk associated with the use of SaaS and IT applications installed by users and not managed by the IT department (Shadow IT), leading to issues with maintenance and future updates. Classify and protect the organisation's data to understand its criticality and establish access and privacy policies.
- Collaborate / Cooperate / Work in virtual teams. Enable remote working where necessary. Improve productivity with applications built on team working or Enterprise Metaverse platforms. Develop and create internal training tools and resources, such as online courses or gamified training. Produce guidelines, procedures, etc.



4 Digital Transformation Pillars

3. PHYSICAL CITY

WHY?

The era of the Internet of Things (IoT) has brought with it an ever-increasing range of sensors and IoT platforms. Many have made their way into the smart cities sector. In many ways, IoT technology holds the most promise for providing unification and context to the vast array of data generated by smart cities and turning this data into actionable, contextualised information that can be used to reduce energy consumption and operational costs while improving safety and quality of life for citizens.

In the digital age, an inventory of all the elements that make up the urban environment is essential. This inventory cannot be based on manual processes or personal inspection. We must use new AI-based technologies to automatically recognise, manage, and inventory all the elements found in the city.

The management of the modern city, its spaces, its elements and its dimensions requires the use of simulation models, or Digital Twins.

We must be able to test out different alternatives to solve a problem in the city virtually, without having to bother citizens or invest public money in physical tests. To this end, the use of virtual models such as Digital Twins represents a huge step forward in decision-making and in the optimised resolution of the city's main challenges.

HOW / WHAT?

SmartCities platforms perform many functions, such as analytics, remote asset monitoring, performance management, decision support and/or presentation elements. At a minimum, the functionality of a smart city platform should include data visualisation, app enabling and data management.

An advanced, high-precision dynamic imaging system is needed for each location in the city. These images must be processed with AI algorithms to find and assess all the elements found in the city. Each element must be identified, categorised and integrated with the rest of the components. We must learn about what elements exist, as well as their condition, quality, deterioration or absence. We must also know the dimensions of each of these elements, as well as their exact location.

Real-time 3D models of the built environment of cities allows for scenario analysis.



4 Digital Transformation Pillars

By bringing together a wide range of information sources into a complete Digital Twin, including CAD data, real-world scans and photometrics, IoT sensor data, weather sources and more, we can revolutionise the way infrastructure projects are planned, built and operated.

A digital twin is a virtual 3D representation of the physical city. This technology started in the industrial world, where it was associated with a specific device, machine or system to be remotely monitored and managed. By extending its uses, we can associate it with each and every one of the physical elements that make up a city. Each is embodied as an identity defined by a standard of metadata, properties and inter-element relationships. Through these relationships, we can develop AI applications and algorithms that allow us to learn from existing data and generate predictive behavioural models. The digital twin is therefore a part of the metaverse that requires real IoT sensor data. It allows real-time monitoring and can help us develop simulations. Looked at from one perspective, a digital twin is a metaverse that is entirely faithful to reality. A digital twin therefore brings enormous advantages in three specific areas:

1. For one, it allows us to integrate data of many different kinds, such as traffic, climate, infrastructure and other resources, to innovate in areas such as urban mobility, emergency management and energy use. This allows us to experiment with the details of the physical city without having to change it in reality.
2. The second area is innovation. We can test the benefits that new structural elements, engineering, urban planning and other infrastructure possibilities would bring. This offers us the opportunity to accelerate and multiply inspiration, ingenuity and tenacity in the management of our city.
3. Finally, and most importantly, it allows for simulation. We can test different solutions to a problem, eliminating the need for physical experimentation, saving the costs associated with the use of physical elements and public works, and avoiding inconveniencing local residents. These simulation techniques allow us to make the best decisions without the costs associated with testing, providing a guarantee that the predictive model of the city tells us that they will be the most appropriate (Deblaere, Eitel-Porter, Krüger and Purdy, 2002).

For example, say there is a pollution problem in a city square. There are various options available to us, such as closing some adjacent streets, pedestrianising others or diverting vehicles down alternate routes. We can test them all and make a determination about which is optimal, without having to cause any disruption to the normal life of the city. We can also assess the consequences of each solution on other parameters in the city, such as traffic, noise, etc. Many cities are now using these advanced technologies to address their main challenges, such as Helsinki for energy, Gothenburg for resilience and urban planning, Porto for water management, Antwerp for joint traffic and pollution management, and many others (Bentley, 2020).



4 Digital Transformation Pillars

GOALS

- Holistic smart city development (rather than a specific application). A mindset that citizens come first and technological developments must be useful and used, or they become meaningless no matter how advanced they are.
- Alignment with government initiatives. Long-term vision. Sustainability as a top priority.
- Semi-automation of processes in the city. Efficiency without compromising safety or reliability. Open databases and platforms for the whole city. Increasing the efficiency of public services. Reduced costs in the inspection of urban space and the environment.
- Control and monitoring of the physical environment. Alert management. Knowledge about the actual use (proper or abusive) of public spaces.
- Basis for the management of advanced systems such as Digital Twins. Integrating data on traffic, weather, infrastructure and other resources to innovate in areas such as urban mobility, emergency planning, energy and water use. AI as a key tool for urban simulation.
- Simulation to analyse performance, quickly test solutions and make adjustments in real time, helping innovate in both production and services.
- Smart urban planning of the city (15-Minute City). Advance the PostCar city concept, offering less space-, energy- and pollution-intensive alternatives. Assess green spaces for the Climate-Neutral and Smart Cities 2030 target analysis.



4 Digital Transformation Pillars

4. SOCIAL CITY

WHY?

Governments barely use and analyse the data they have on citizens.

Social realities remain shrouded in mystery, and there is not enough information on citizens' main concerns, their happiness, desires and future motivations.

We must bring together all available information about citizens in order to make the right decisions based on their exact needs and to predict future demands.

There is a lack of analytical capacity, processing and predictive algorithms to handle the enormous amount of information available and to derive knowledge and conclusions for well-informed decision making.

Urban Data Platforms (UDPs) are needed to improve city performance, better inform decision-making, drive innovation and new services, and improve environmental sustainability.

HOW / WHAT?

We must develop a comprehensive data platform that combines all the available information on citizens, properties and businesses with available information on the physical environment, public services and other additional elements.

It is worth noting that a city uses only 9% of its data in its daily operations. The remaining 91% is historical data that is not analysed; in many cases, how to access or integrate it is unknown. Modern multi-platform database systems make it possible to integrate all these different data sources or silos to get the information we need.

At the same time, advanced cooperative and confidential analysis systems ensure anonymity and GDPR compliance to extract aggregated information while treating citizens' sensitive data with the necessary respect. Initiatives such as SmartCities4All (2015) seek to fortify the assistance we need provide systems, tools and services that can be used, accessed and operated by all, making the city inclusive from the point of view of new technologies and services. Again, as noted above, cities must be human-centred.

Advanced data analysis tools are used to preserve the confidentiality of sensitive citizen information. These tools, together with AI algorithms, will allow us to develop predictive systems that provide us with the knowledge we need about citizens, such as their vital status, vulnerability, dependence, economic situation, and social and health conditions.



4 Digital Transformation Pillars

Once again, AI allows us to analyse available information and turn it into knowledge about our citizens. In this chapter, we can begin to detect patterns, anomalies and observable trends by analysing the enormous amount of documents that a city possesses. In addition to building a knowledge base, we can perform predictive analytics, anticipating risks and improving forecasts. We can also implement fraud detection engines and many other tools to support decision-making. These analyses will allow us to get to know our citizens better and to personalise the service we offer them. We must analyse historical citizen data to be able to predict the need for aid or subsidies for economic and social recovery and prioritise these by areas and neighbourhoods, as well as creating specific and detailed information on families.

There is an urgent need to activate and analyse available historical citizen data to determine the different levels of economic and social vulnerability at which they find themselves, mapped by districts. In this way, city managers can balance budgets and prioritise care for those most in need.

Each city can find different approaches to this situation and analyse it from different angles. In addition, special prominence should be given to groups with greater social fragility or vulnerability that are at higher potential risk: the elderly, children, women at risk of gender-based violence, homeless people, immigrants, and so on, as outlined in EU Social Challenges in Cities (Mulvik et al, 2022). More general analyses can also be carried out to identify levels of poverty, happiness, vitality and mental health (which has been greatly affected by the pandemic). This geo-referenced social analysis is very useful to build the ideal 15-minute city, identifying the services needed by distance.

Visualisation tools and digital twins will be used to map, analyse and predict changes in different social criteria. They will also be used to carry out simulations for possible alternatives and measure the impacts and consequences.

GOALS

- To get to know citizens' actual status and social and economic situation in order to prioritise aid and subsidies (long-term unemployed, elderly, social services, dependency, child welfare, youth care, etc.).
- Predict the demand for social services and adequately provide them (housing, youth, mobility, etc.).
- Learn about the real impact of the pandemic on households and small businesses. Prioritise recovery actions by sector and by district.
- Discover possible situations of vulnerability and/or social discrimination (unwanted loneliness, persons with visual impairment, homeless people, happiness, other special groups, etc.).
- Learn about the situations and risk groups for which the city needs to improve accessibility and inclusion (fuel poverty, digital inclusion, pregnant women, etc.).



4 Digital Transformation Pillars

5. CITYVERSE

WHY?

Cities are the places where people live, love, work and play. Human connection is one of the most critical components of everyday life. During the pandemic, people quickly learned how to connect with each other and access services virtually.

Technologists and science-fiction writers have been exploring various ideas around virtual reality and the metaverse for decades, whether through video games, online spaces like Second Life or stories like Ready Player One.

The future of cities and their residents will include a virtual world where people can immerse themselves in a simulation of everyday life.

The metaverse is the next evolution of the Internet, with a focus on the integration of physical and digital experiences.

It is a shift in the way people interact with their world, using technologies such as 3D computing, augmented reality (AR), virtual reality (VR) and blockchain technology to have experiences in a new, immersive virtual world that has the potential to overlay digital information on top of our physical world.

While the metaverse is still in its early stages, the continued development of innovations, user adoption, use at large corporations, technological advances and integrations, and increasing valuations of associated digital assets are indicative of the continued growth of the metaverse and the likely trajectory towards its destiny as the next three-dimensional, immersive, third-generation Internet, the Web3 (Diamandis & Kotler, 2020).

This enormous opportunity for human development has its advantages and disadvantages, but it seems to be establishing itself as a future innovation with which we will all live. The parallel between the metaverse and the possible literary worlds suggests that the former is assimilated to a virtual city: the MetaCity. This concept represents a revolution in the way public services are operated and delivered in the city, social relationships among its citizens and in their leisure activities.

Our city thus incorporates a virtual fifth dimension. It is also a new challenge and a new opportunity to improve the attractiveness of our city in the global competition to attract talent (in this case, from a virtual dimension). Imagine for a moment the scene in Avatar where the main character connects his hair to the mother tree, uniting them into a single communal consciousness. Seeing the parallel development of neurotechnology, could we dream of something like Jane's hive city (Jacobs, 1961), of which we are all co-creators, all enjoying its benefits by connecting our minds to the MetaCity? Cities such as Doha, Seoul or Singapore already offer their MetaCities to attract virtual talent.



4 Digital Transformation Pillars

Will we have two cities? A physical one taking care of my body, and a virtual one where I develop my creativity and career, building wealth? We have time to reflect on this in the coming years.

HOW / WHAT?

The metaverse is about experiences. From games and social interactions to shopping, theatre and e-sports, a true metaverse can transform a variety of human experiences with its immersive, real-time nature.

The possibilities are endless in the metaverse, and they can help people interact with online public services. Instead of having to go to the town hall to submit paper documents, citizens can simply log into the metaverse and manage their digital procedures there. In the same way, it can help citizens model scenarios using a digital twin, allowing municipal decision-makers to evaluate changes through prototyping and determine their impacts before implementing them in the physical world.

The city can host live cultural events in the metaverse so that people from all over the world can attend. This makes events more accessible to people in the city and even to citizens who may have mobility limitations or time constraints due to childcare responsibilities or caring for the elderly. In this way, city residents can feel more connected. This can also help make the city more attractive to external visitors; they can then visit the city to spend time and money in the real world.

Information about the city and its services is more accessible through the metaverse. There, citizens will be able to interact with virtual advisors who can help them or point them in the right direction.

People with mobility or time constraints due to childcare or fixed working hours will no longer need to travel to access city services. There may be increased access to services outside municipal staff's working hours. It is a city on the move.

The city can host live cultural events in the metaverse so that people from all over the world can attend. This makes events more accessible.

The metaverse can create a new digital economy. Content creators and entrepreneurs will find almost unlimited opportunities to thrive in it.

The new paradigm of eTourism (phydigital) is fundamentally based on virtual/mixed reality, where the real physical experience is enriched with data, images or other superimposed realities that achieve a spectacular experience. For example, imagine virtually visiting the Titanic from the (now semi-abandoned) shipyard in Belfast where it was built.



4 Digital Transformation Pillars

The metaverse can generate income for residents, entrepreneurs and the city, opening up a more accessible virtual economy and providing new goods and services.

GOALS

- Mixed Reality using IoT and digital twins to offer different citizen experiences and possibilities to add value and create a city.
- Adapting urban planning to real needs and creating smart buildings.
- Tokenisation through the use of citizen services via Web3.
- Virtualisation of spaces such as Volveremos for commercial zones or Zaragoza Minecraft for children and usable in education.
- New forms of eTourism associated with a physical experience, place, dining, shopping space, combined with a virtual experience supported by AI (AR/VR, Mixed).
- Virtual area for Zaragoza Deporte Inteligente (Zaragoza Smart Sport) and virtual Zaragoza Goya.

5



Governance



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5 Governance

ZityVerse set out the roadmap for progress on the digital transformation of Zaragoza's city government for 2024-2030.

It includes the actions taken by different areas of government in accordance with the goals of established avenues of action. The body responsible for implementation will be the Regional Ministry of Economy and Digital Transformation and Transparency, through the Department of Digital Transformation and Transparency.

The Ministry will establish the monitoring and control mechanisms and will proceed to regularly review the implementation of the strategy; if needed, it will propose any necessary modifications that may arise from the general strategy of the city government.

Likewise, city government will promote the dissemination and publication of the Strategy through its official website and in the relevant forums in which it participates as a city.

6



Budgetary Framework

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6 Budgetary Framework

In order to achieve these goals and reach the expected results in terms of digital transformation, we must boost investment in the city of Zaragoza.

These future activities must be funded through an efficient distribution of effort and stable commitments from various sources of funding, both public and private, national and international.

The creation of a favourable environment will make it easier to implement measures that encourage innovative companies, especially tech companies, to come and do business in the city and serve to attract and retain talent.

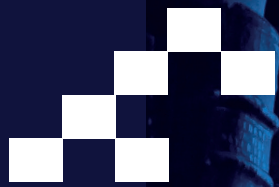
In order to optimise the available financial resources and increase their impact on the city, public-private collaboration instruments will be implemented to increase the participation of private funding aimed at carrying out joint activities with the city government.

The planned investment in the city's budget for 2024-2030 dedicated to digital transformation will amount to approximately 70 million euros. This is not counting the private investments that will result from the actions taken by the city government to help Zaragoza position itself as a leader and pioneer in transformation projects.

The targets for the annual evaluation of the strategy will focus on the following dimensions: relevance, pertinence, consistency, coherence, effectiveness and efficiency.

> **€70 million**

7



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Digital Transformation Strategy

Zaragoza city government
2024-2030