The digital emergency

The challenge of achieving an inclusive digital transformation
across Barcelona and the metropolitan area

Digital
Future Society

About
Digital Future Society

Digital Future Society is a non-profit transnational initiative that engages policymakers, civic society organisations, academic experts and entrepreneurs from around the world to explore, experiment and explain how technologies can be designed, used and governed in ways that create the conditions for a more inclusive and equitable society.

Our aim is to help policymakers identify, understand and prioritise key challenges and opportunities now and in the next ten years in the areas of public innovation, digital trust and equitable growth.

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A programme of:

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Urbanisation and digitalisation are unstoppable waves.

A. The global urbanisation rate has risen from 29.1% in 1950 to an expected 60.8% in 2030.

29%   61%

1950   **2030**
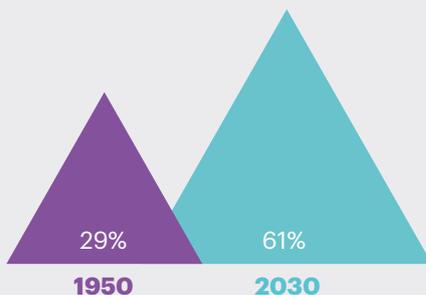
B. This is linked to the 4th Industrial Revolution, which is characterised by a rise in digital technologies and automation.

4ᵗʰ Industrial Rev.
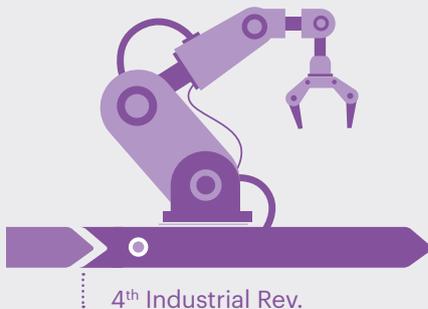
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In progressively urban, digitalised societies, the risk of digital exclusion is greater. The Covid-19 pandemic has worsened existing structural inequalities, as in the case of the feminisation of poverty.

Covid-19

3

The digital emergency requires action to ensure a balanced, fair digitalisation.

4

The theory of intersectionality provides the framework needed to manage the digital emergency. It explains that social identities and their associated inequalities come together in the same individual.

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The digital emergency analysed in this paper goes beyond accessibility, encapsulating six new forms of digital exclusion that are highly visible in large metropolitan regions. These are:

A. Digital divides
B. Digitalisation of the public and private sectors
C. Cybersecurity and data protection
D. Disinformation and fake news
E. New ways of working
F. Climate justice

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There is political will to make Barcelona the leading capital of technological humanism, that is, to put technology at the service of people. However, there is still a long way to go.
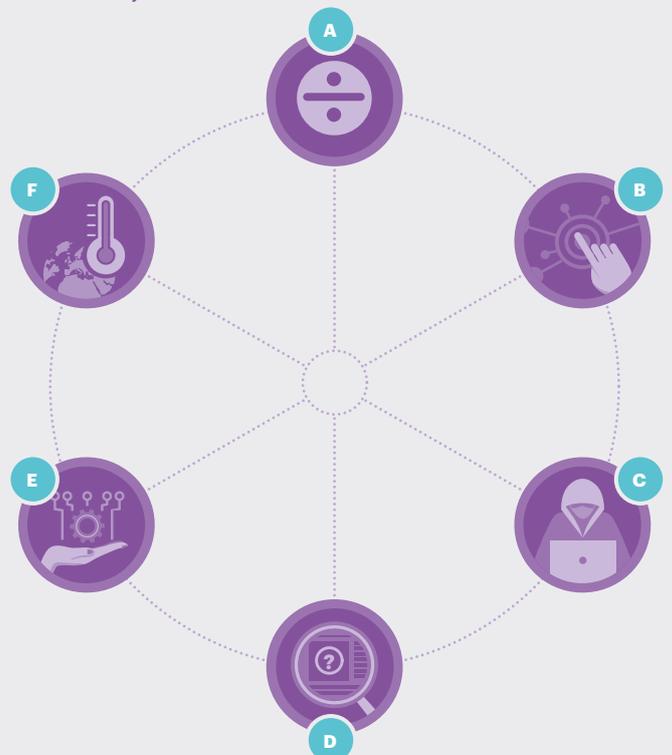
Introduction

⊙ We are facing a digital emergency

In recent years, digital transformation has impacted all aspects of our life. It has led to changes in the way we communicate and revolutionised the world of education and work. It has even affected the privacy of our personal information. The outbreak of the global Covid-19 pandemic in 2020 made video calls and video conferences indispensable as the main channel for communicating with family, friends and professional colleagues. This clearly showed that technology makes peoples' lives easier. However, it also demonstrated that technology further expands the divides that exist between the most privileged and most vulnerable groups, making the risk of social exclusion increasingly evident (Estaràs Ferragut 2020).

According to the Global Competitiveness Report, Spain is ranked 7th best in the world for its preparedness for economic transformation through its transport and communication infrastructure and is the European Union country with the highest penetration rate of fibre to the home (FTTH) (Schwab and Zahidi 2020; ICEX 2020). Therefore, the digital exclusion challenge in Spain is not focused on access to digital infrastructure and the internet, which has traditionally been called the digital divide in the singular. We are faced with a more complex challenge, made even clearer by the pandemic and its consequences. A challenge that includes the need to address several areas beyond access to and quality of connection to the internet. Therefore, the priority is digital divides in the plural.

Evidently, the Covid-19 pandemic has added another emergency to the existing climate crisis. The effects of this pandemic and extreme climate change have had and continue to have a clear negative social and economic impact that is a source of great concern for citizens and institutions. Now we must consider another new emergency in addition to those that have come before: the digital emergency, as explained by Cristina Colom, Director of Digital Future Society (Colom 2021):

> The use of technology is accelerating and growing in an unbalanced manner, in other words, we are experiencing a digital emergency. How should we respond? [...] We must address the current digital emergency with a social, humanist, inclusive and sustainable vision to ensure a digital transition that in no way violates human rights and instead reinforces them. In turn, this perspective puts trust in public institutions and the private sector to the test: only by taking this path together can we ensure a fair and equitable future for the new digital society."

An increasing number of European agents in all spheres — government, social, business — are joining forces to address the challenge of the climate emergency. Examples include the United Nations Paris Agreement to cut greenhouse gas (GHG) emissions, the European Green Deal and the commitment to achieve Agenda 2030. Likewise, as indicated by the Organisation for Economic Cooperation and Development (OECD) and other institutions, the digital emergency requires action to ensure a balanced, fair and inclusive digital transformation, with coordinated strategies to help build the resilience we need in this new, post-Covid era before it is too late (OECD 2020).

In the same way, the right management of the digital emergency could provide an opportunity to reduce the negative impacts of the other emergencies. For example, technologies could be used to reduce our environmental footprint or for the diagnosis, treatment and monitoring of Covid-19 cases.

Government agents are starting to democratise the digital area and to seek solutions so that nobody is left behind in this new normal. According to the European Economic and Social Committee (EESC): "Leaving no one behind entails re-empowering people as active citizens, maximising transparency and the inclusion of people, groups and regions in the transition process" (Schmidt 2020). At the European level, this process is associated with the desire to ensure that this decade, from now to 2030, is Europe's Digital Decade (European Commission 2021a). The idea is for this period to also contribute towards the bid to achieve a climate-neutral Europe by 2050.

Similarly, the NextGenerationEU European funds, that aim to address the economic and health crises related to Covid-19, are based on sustainable growth focused on the green and digital economy (European Commission 2020). In line with European agendas, the Spanish Government has approved the *Plan España Digital 2025* (2025 Digital Spain Plan) and the Catalan Government has several measures focused on digitalisation such as the *Plan de Educación Digital* (Digital Education Plan) (Gobierno de España 2020; Generalitat de Catalunya 2020).

> " Now it is more important than ever for digitalisation to be a cross-cutting task. This requires the coordination of many agents, particularly within government. We are trying to ensure that families have access to information and communication technologies (ICTs) and knowledge of how to use them. As well as our department, the Education and Employment departments are also addressing digital inclusion. Here is where cross-cutting coordination is key, if we do not coordinate well we will be talking to the same people from different departments."
>
> **Mónica Acebo Pérez**, Technical Officer of the Directorate-General for the Digital Society, Government of Catalonia

However, these measures only represent the start of a long path, as acting to achieve an inclusive digital transformation is not an easy task. It is even harder in large, highly complex urban areas such as Barcelona and the metropolitan area. The complexity lies in the density and diversity of cities, which is further complicated by historically unplanned growth. Consequently, this unplanned growth is due to the fact that the development of basic infrastructure has not followed an existing consolidated plan and is instead focused on adapting to growth (World Bank 2020). This means Barcelona and its surrounding region are an ideal setting for understanding this complexity and, accordingly, how to manage the digital emergency.

> "Government bodies are making a great effort to digitalise, but we should not forget that there are communities that can be left out of the process, often for cultural reasons or because they are socially marginalised. For example, today, many older people are left without local branches of their banks close to where they live, and the administration they once did in person must now be done online. These older people who were previously independent are now dependent, they depend on their children. This is the great paradox of the current model. And what happens if you do not have any relatives? We must actively move towards digitisation but with the guarantee of not leaving anyone behind."

José Muñoz Luque, Social Welfare Services Manager, Barcelona Provincial Council

The Digital Future Society Think Tank's work has analysed the social impact of digital technologies and explores the challenges and opportunities that come through their use and governance. Similarly, this white paper, which is based on interviews with local agents and desk research, aims to describe the social challenges that come with the digital economy in complex metropolitan areas. It gives examples of how the digital emergency has been worsened by the implementation of incorrect digitalisation strategies (that have been too modest, with indicators too far removed from the social and digital reality of the area) and as a result of the pandemic.

At the same time, this white paper aims to highlight the importance of certain projects already taking place in Barcelona and the metropolitan area that aim to counter the digital emergency. To achieve this, it explores six highly complex, interrelated aspects of the emergency that contribute to the current imbalanced situation.

To address the digital emergency, civil society, governments and the private sector need to address the **digital divides** (a) as a complex phenomenon that goes beyond access and infrastructure as they are deeply rooted in society's structural inequalities. In order to bridge these divides, the **digitalisation of the public and private sectors** (b) is key, given that they represent the main barriers and drivers of digital uptake. Furthermore, to ensure inclusive digital participation, digital trust is essential and therefore it is necessary that these actors guarantee a safe and secure online experience through **cybersecurity and data protection** (c). And, just as important, they play a critical role in the fight against (d) **disinformation and fake news**. As digitisation has enabled **new ways of working** (e), the new digital economy must be an opportunity for all to participate. And finally, the way we address the digital emergency must go hand-in-hand with the fight for (f) **climate justice**, as the ecological cost of technology must be minimised to ensure a green and digital future.

Digital exclusion, the new risk for urban areas

In recent decades, we have been immersed in two unstoppable, interrelated processes: urbanisation and digitalisation. On the one hand, the global rate of urban development has risen from 29.1% in 1950 to an expected 60.8% by 2030 (Gutiérrez Urbano 2010). On the other, we are in a new era called the 4th Industrial Revolution. This is characterised by an exponential rise in technology, with highly sophisticated computer systems and algorithms, online platforms, and technologies such as blockchain or the internet of things (IoT). In short, an endless number of digital innovations are transforming human relations, geopolitics and business strategies. These innovations have also affected cities' urban development processes (Qureshi 2021).

Digitalisation only has the potential to design fairer, more inclusive societies if it is implemented as a tool to understand and better respond to urban challenges, which require social and economic solutions. This generates opportunities to improve service provision, detect risks associated with health and the environment, and increase the efficiency and transparency of resources and their management. However, the use of technology has associated risks, as in the case of techno-solutionism, the idea that social problems have a technological fix. This is a central concept of the smart city, which posits that applying technology to cities will be intrinsically positive. The assumption is that monitoring resources, for example, would inevitably be an improvement, without considering democratic logic or existing governance (CCCB LAB 2013).

Smart Toronto

An example of techno-solutionism can be seen in Canada with urban innovation company Sidewalk Labs' plans for the Quayside neighbourhood of Toronto. The Alphabet Inc. subsidiary wanted to convert the neighbourhood into an automated, monitored area in 2022. There was talk of sensors to determine water and electricity consumption and systems for detecting people's identity when they accessed services, among other factors, to achieve an efficient, sustainable neighbourhood (Porras Ferreyra 2018).

The proposal had an exclusively technological focus but was rejected after a debate on the confidentiality of the data that would be generated by the city's management. It was also rejected due to the imbalance of power that would result from a large technology company starting to manage a city without having won any democratic elections. In short, the project threatened people's privacy, civil governance and democracy.

" Digital technologies are increasingly important in a city's daily life, from the perspective of governance, the economy and the environment. They cause changes that happen very fast, yet it takes longer to understand them and we need time to grasp the magnitude of these transformations. Sometimes, when we talk about the smart city, we see universal solutions developed by the Global North or also now by China. The idea of the smart city is to apply technological, standard solutions. However, technologies alone cannot solve a social or economic problem. We should consider a more contextualised, thoughtful and innovative smart city that includes diversity. There are many ways of developing technology and implementing it, and we must be critical to understand how best to do this."

Ramon Ribera Fumaz, Director of the Urban Transformation and Global Change Laboratory of the Internet Interdisciplinary Institute (IN3), Open University of Catalonia (UOC)

One of the main reasons for focusing on urban areas is their high density and complexity, as they are where most of the population of Europe resides. In Spain, 80% of the population lives in urban areas. This is an increase of 48% since 1900 (Gobierno de España 2021a). According to the United Nations, 33% of the Spanish population will live in the five largest cities in Spain — Barcelona, Madrid, Valencia, Zaragoza and Seville — by 2035 (Remacha and Ordaz 2019).

Secondly, urban areas are very diverse. This means their challenges in terms of health, education, mobility, waste management, inequality, poverty and other areas are much harder to manage. Finally, cities are the ideal setting for innovation and for encouraging sustainable development, as they are drivers of the economy and act as catalysts of creativity (UN-Habitat 2020; European Commission 2021c). Therefore, cities are vital for ensuring inclusive digitalisation and fair growth, as foreseen in Agenda 2030.

The challenge is that urban areas, due to their density and diversity, are those with the greatest concentration of unemployment, poverty and inequalities. Accordingly, Barcelona has some of the greatest socioeconomic contrasts between neighbourhoods of all Catalan cities. The neighbourhood with the highest average income per capita, Les Tres Torres, in the Sarrià-Sant Gervasi district, is three times wealthier than the neighbourhood with the lowest, Ciutat Meridiana, in the Nou Barris district. These figures range from an average of 38,500 EUR to 10,500 EUR respectively (Barcelona City Council 2021g).

"The pandemic and lockdown have been an important turning point in the digital strategy of the city of L'Hospitalet de Llobregat. Before the health crisis, we had identified various places and groups within the city where a digital divide existed. This divide has become wider and clearer with the pandemic.

During the pandemic, we focused on putting out fires. We had to distribute, with the help of volunteers, 500 data SIM cards and provide devices for a few schools. Now we face the city's digital transformation with a transversal strategy.

One of the main factors needed to address the digital emergency is the political will to allocate resources and efforts to this area. That is how L'Hospitalet 6.0 came about. L'Hospitalet does not have as big a budget as Barcelona, but things can be achieved by collaborating with the private sector and turning to institutions and foundations."

Cristina Salida Cabo, Director of Digitalisation,
L'Hospitalet de Llobregat City Council

Similarly, there are many municipalities in the Barcelona Metropolitan Area where the average income per person is generally below 10,000 EUR a year, for example, L'Hospitalet de Llobregat or Santa Coloma de Gramenet. In comparison, some municipalities have an average income of over 25,000 EUR a year, such as Sant Just Desvern, Sant Cugat del Vallès or part of Castelldefels (Ruiz-Almar and Marco 2021).

Figure 1. **Territorial divisions by income in Barcelona and the metropolitan area.**
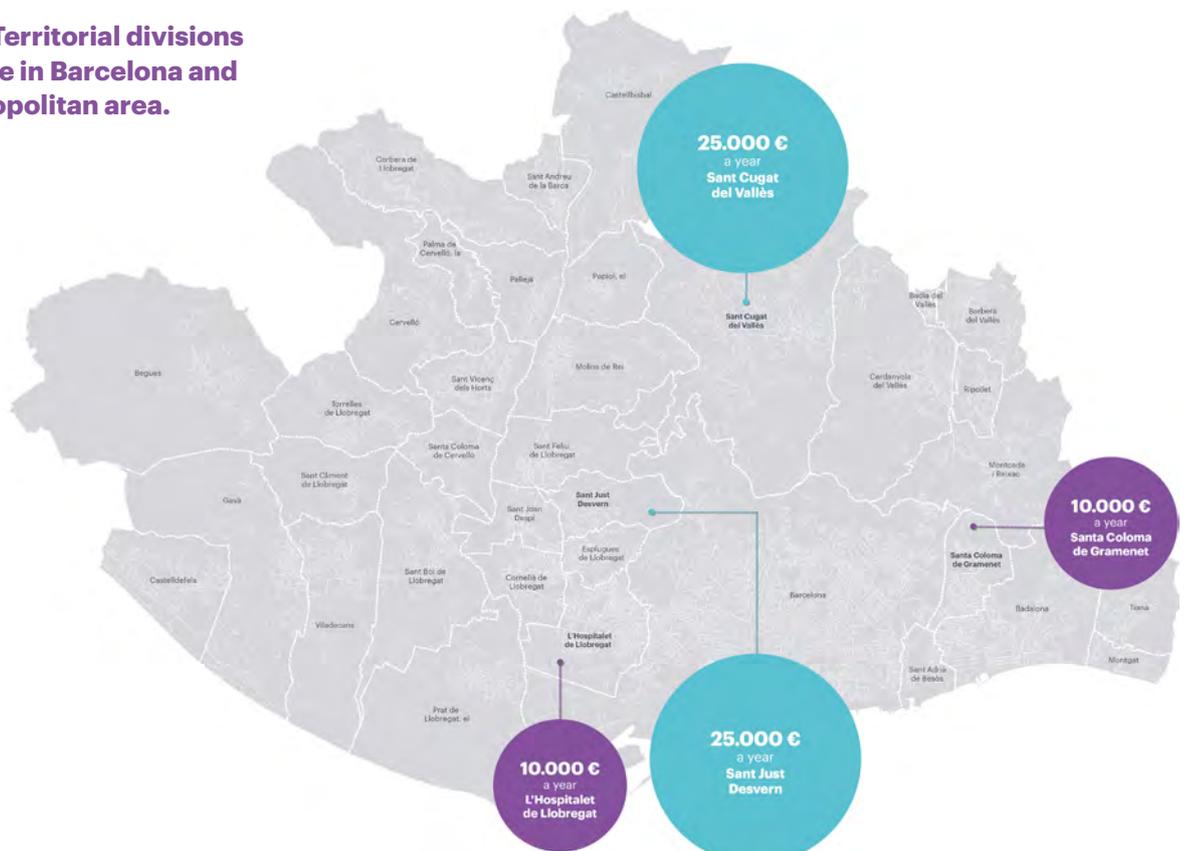

Image source: Digital Future Society.
Data source: Barcelona City Council 2021f; Ruiz-Almar and Marco 2021

This inequality has a clear impact on digital inclusion. As indicated in the Data Poverty report by Nesta, people who are part of disadvantaged groups have fewer opportunities to participate in the virtual world (Lucas et al. 2020). Those who do not have a broadband connection or mobile data to access their basic needs, such as education, welfare, health and work, are considered data-poor. In Scotland and Wales, for example, it has been shown that groups in the lowest income brackets, who do not have sufficient resources to meet all their needs, regularly face difficult decisions in which they have to choose between health or an internet connection.

Data poverty is a global phenomenon that is also observed in Catalonia. As explained in a study commissioned by *Taula d'entitats del Tercer Sector Social de Catalunya* (Committee of third sector entities of Catalonia), "those who have less income are less likely to access the internet from their home and more likely to access it from public facilities, internet cafes and public spaces with free wi-fi" (Gómez and Panadero 2021).

> With restrictions on movement, we have noted to a greater extent the existing digital divide in terms of internet data, devices and literacy. Many of the people we attend to have not recovered from the impact of the 2008 recession. The pandemic has been a severe blow and for various reasons, many people could not apply for social assistance.
>
> Through several internal evaluations, we have seen that they are aware of the need to digitalise. They top up to get more data and take courses using public Wi-Fi. They are aware and make the effort because they know that if they are unconnected they will be left out. Everyone can have a mobile phone, but this does not mean that they have a constant internet connection, the skills or the know-how necessary to use less common applications.

Dessirée García Ruiz, Head of the training and employment programme, Cáritas Barcelona

Therefore, to develop inclusive digitalised societies, it is vital to recognise that factors of digital exclusion exist. Far from being isolated, these are rooted in society's existing structural inequalities (Zheng and Walsham 2021). Factors such as income, social class, education, age, or physical and mental health affect digital inclusion.

Let's take a closer look at the data. In Spain, those with the most advanced computer skills, and therefore a competitive advantage digitally, tend to be young people from 16 to 24 years old (75.7%), with a university education (70.2%), and an income of 3,000 EUR a month or more (73%) (Zheng and Walsham 2021; Red.es and Ontsi 2020). The group with the lowest levels of computer skills is that of middle-aged women, with little or no formal education and with limited income (Ayuntamiento de Barcelona 2021f). According to social services, in Barcelona, this group is the most at risk of social exclusion in the city (Iborra 2017). These data clearly show the feminisation of poverty and therefore the feminisation of digital exclusion.

Digital exclusion is therefore a complex, multidimensional phenomenon in which several variables intersect, including age, gender, ethnicity and education. The theory of intersectionality, described below, states that identities and the multiple discriminations attached to them cross over, are simultaneous, and cannot be addressed as if they were separable. It is crucial to understand this context to manage digital inclusion and the interrelation between factors appropriately. If the theory of intersectionality is not applied, socially marginalised groups could be even more excluded under the asymmetrical logic of the digital economy (Digital Future Society 2020c).

Figure 2.
Intersectionality
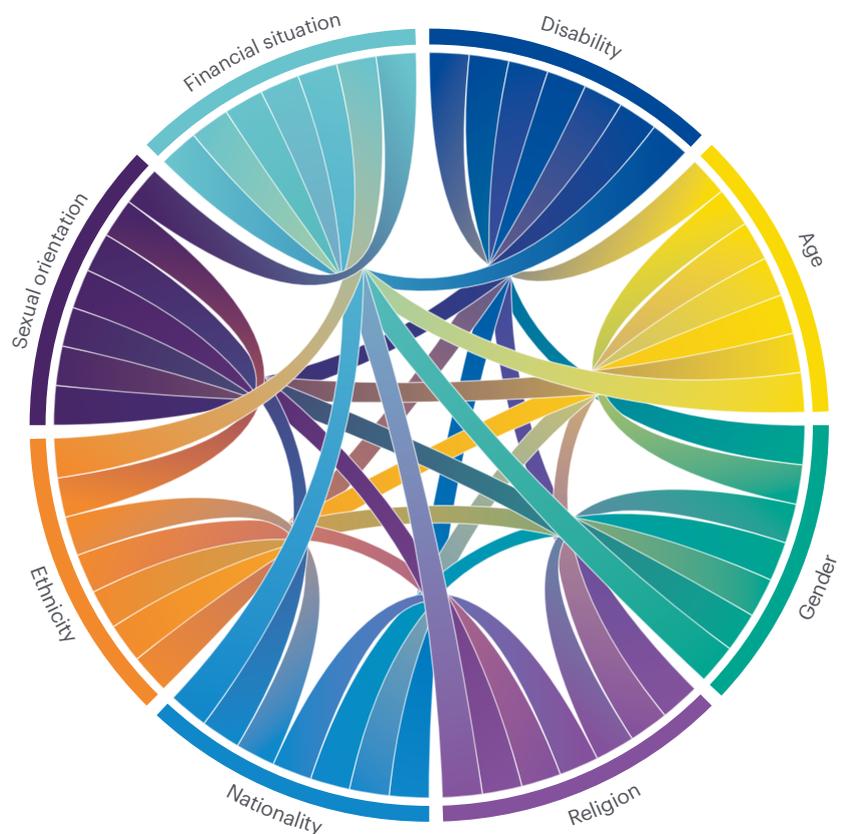
Image source: Digital Future Society 2022

On intersectionality

The term intersectionality was introduced in 1989 by African American lawyer Kimberlé Crenshaw, to create legal categories and increase the visibility of the multiple dimensions of oppression, sexism and racism, experienced by black employees of the US company General Motors (Crenshaw 1991). Everybody is classified in several social categories, such as gender, ethnicity and social class.

These factors put us in a certain social position that influences the accessibility of resources and our personal life experiences in general. The interaction of these many dimensions when they lead to a disadvantage is what defines discrimination.

The emergence of the global Covid-19 pandemic in 2020 has accelerated digital transformation, as the digitalisation of broad sectors of society and the economy has been a crucial tool for dealing with the crisis. In Spain, according to the *Instituto Nacional de Estadística, INE* (National Statistics Institute), 30% of employed people worked from their homes during the strictest lockdown periods, a figure that is much higher than the 4.8% who did in 2019 (INE 2020). Similarly, education and training shifted online during the worst moments of the crisis. Also, governments were able to continue their services because of digitalisation. As Christine Lagarde, president of the European Central Bank (ECB), stated: "a new wave of globalisation is expected based on web services" (Annual Meetings 2020).

> Up to now, it was considered that the digital divide was due to age and would disappear over time. However, if we look at the digital divide by social class, we can see that the more vulnerable somebody is, the more difficult it is to achieve digital integration.
>
> It is vital to know how many people are experiencing a real digital divide that prevents them from exercising their rights. We have an optimism bias, and the pandemic has shown that we need more information to determine the real skills of the population.
>
> We must continue to stress the opportunities of digitalisation. If we have a dual system, we will always have one group outside the system. In the long-term, we will cause social and professional exclusion. We must focus our efforts on motivating people to use digital tools, through social aid and training."
>
> **Lluís Torrens Mèlich**, Director of Social Innovation, Area of Social Rights, Global Justice, Feminism and LGTBI, Barcelona City Council

Consequently, a greater need for the use of technologies has accelerated digitalisation. At the same time, it has worsened the digital exclusion of those with fewer resources and who are less likely to take advantage of ICT-related opportunities. Covid-19 has worsened and deepened existing structural inequalities. Teleworking during the lockdown, for example, has been more challenging for women with children, as they are the ones who traditionally bear the weight of care responsibilities at home (Instituto de la Mujer 2020).

Global estimates show that women are at a 19% greater risk of losing their job in comparison with their male counterparts. Even more so with the onset of the pandemic as 72% of domestic employees were negatively impacted by Covid-19, 80% of which were women (Costopulos and Lal 2020). Therefore, it is essential to understand digital imbalances from an intersectional perspective to avoid worsening existing inequalities.

Along the same line, an inclusive approach should be taken that puts technology at the service of people, improving their quality of life and democratising the digital sphere while seeking solutions that ensure nobody is left behind in this new virtual normality. The approach should be led not by the technology but by the role of active citizenship, with technology that enables the reappropriation of the city, and its public spaces and services (Gutiérrez-Rubí 2016). At the same time, the need to manage diversity and the intersection of discrimination mentioned above needs to be addressed.

According to Laia Bonet, Barcelona City Council's deputy mayor for Agenda 2030, Digital Transition, Sports, and Territorial and Metropolitan Coordination, the capital of Catalonia has the political will to lead the implementation of technological humanism and has the characteristics required to achieve this, as described below.

First, Barcelona is a technological hub, as it is considered the third most preferred European city to create a start-up and the fifth in terms of digital talent. In addition, it is believed to have the second-best European strategy for attracting financial investments in the technological area, second only to London (Salvador 2019).

Second, the city has improved its technological infrastructure converting an industrial district into a centre for new companies and innovation, called 22@. However, some of the residents have reservations as they believe the project threatens the social fabric of the neighbourhood (Coll 2021).

Third, Barcelona has big data infrastructure such as the Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC-CNS), which manages Marenostrum, one of the most powerful supercomputers in Europe. The city also houses the ALBA synchrotron, the most important complex of electron accelerators in the south of Europe. Furthermore, the city has 5G network facilities.

Finally, the Catalan capital shows a great desire to lead internationally in the area of digitalisation and has various spaces for reflection and discussion (Círculo de Economía 2020). However, although the city council is committed to making Barcelona the capital of technological humanism, inequalities in the city are a reality and there is still a long way to go to narrow these gaps (Ayuntamiento de Barcelona 2020a; Digital Future Society 2022).

Different aspects of the digital emergency in Barcelona and the metropolitan area

Traditionally, the problem of inequality in the virtual world has been studied from the limited conception of the singular digital divide. In other words, it has focused on connection and access. This approach dates back to the end of the 1990s, when, due to the spread of the internet, the concept of digital inclusion emerged in the political debate for the first time (Digital Future Society 2020d). International initiatives such as the International Telecommunication Union's (ITU's) ICT Development Index (IDI) or the Global Competitiveness Index (GCI) of the World Economic Forum (WEF), among others, measure digital inclusion by putting a strong emphasis on access, followed by skills and use of the internet (Ibid.).

However, the current digital emergency shows that digital inclusion should focus on traditionally marginalised groups as well as those that are underrepresented in the digital environment in terms of ICT access and use. In other words, digital inclusion should focus on groups that can be characterised by their geographic location, age, gender, level of education, type of professional activity and income. Therefore, indicators of digital inclusion should go beyond mere access and quality of connection to the internet and include an intersectional framework that addresses digital divides in the plural (Ibid.). This white paper focuses on six areas of the digital emergency that were identified by the Digital Future Society Think Tank team as the main areas to understand the process of digitalisation in metropolitan areas. They are:

Digital divides
Digitalisation of the public and private sectors
Cybersecurity and data protection
Disinformation and fake news
New ways of working
Climate justice

Below, the white paper covers examples of measures and actions mainly being carried out by public agents from Barcelona and the metropolitan area to combat the digital emergency from each of these different perspectives. In addition, specific projects, coordinated to reduce the inequalities caused by the digital transformation, are also described.
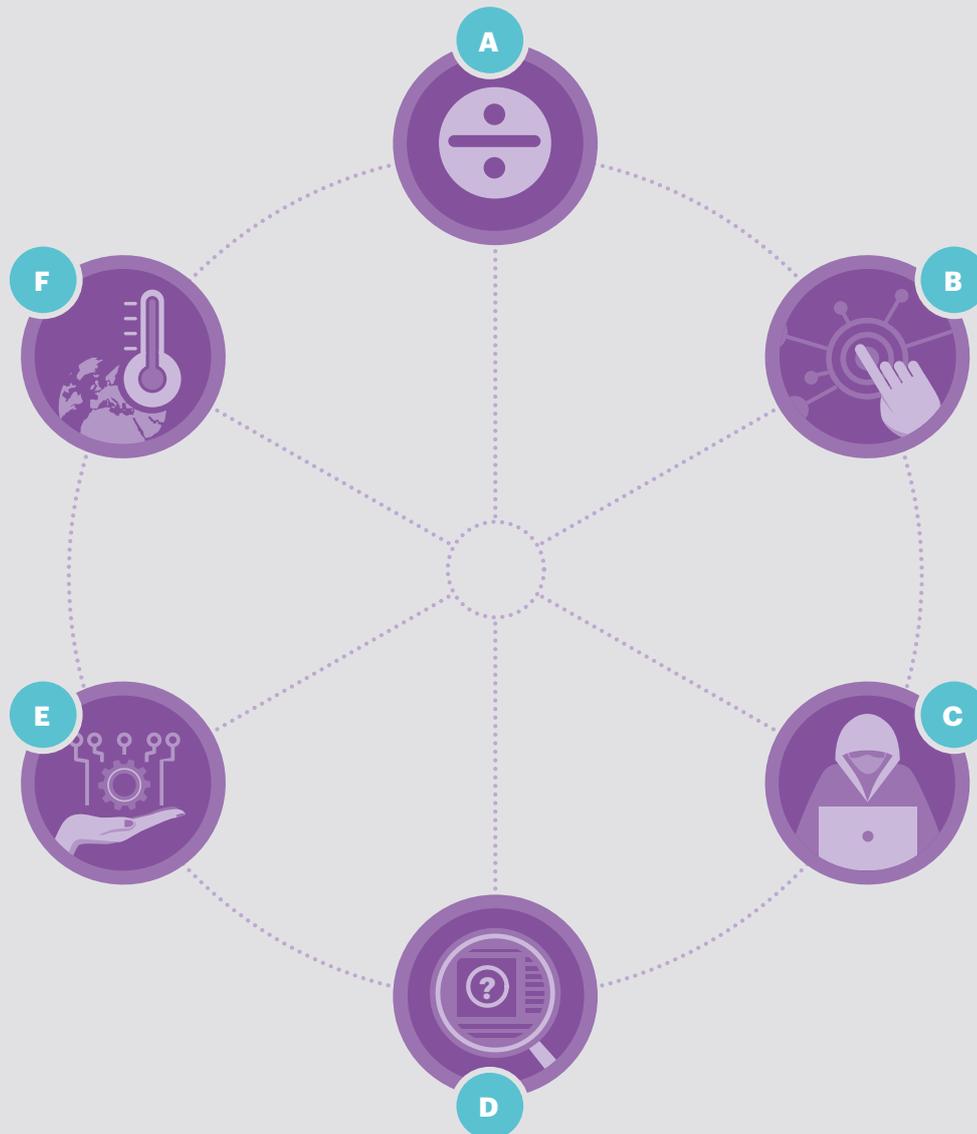
A. Digital divides
B. Digitalisation of the public and private sectors
C. Cybersecurity and data protection
D. Disinformation and fake news
E. New ways of working
F. Climate justice

A. Digital divides

Digital divides

Differences in access to and ability to use information and communication technologies (ICTs) contribute to the digital divides.

Internet access

Household broadband internet connection

The populations of **Spain, Catalonia and Barcelona** have good access to these technologies

92%
in Barcelona

97%
in Catalonia

95%
in Spain
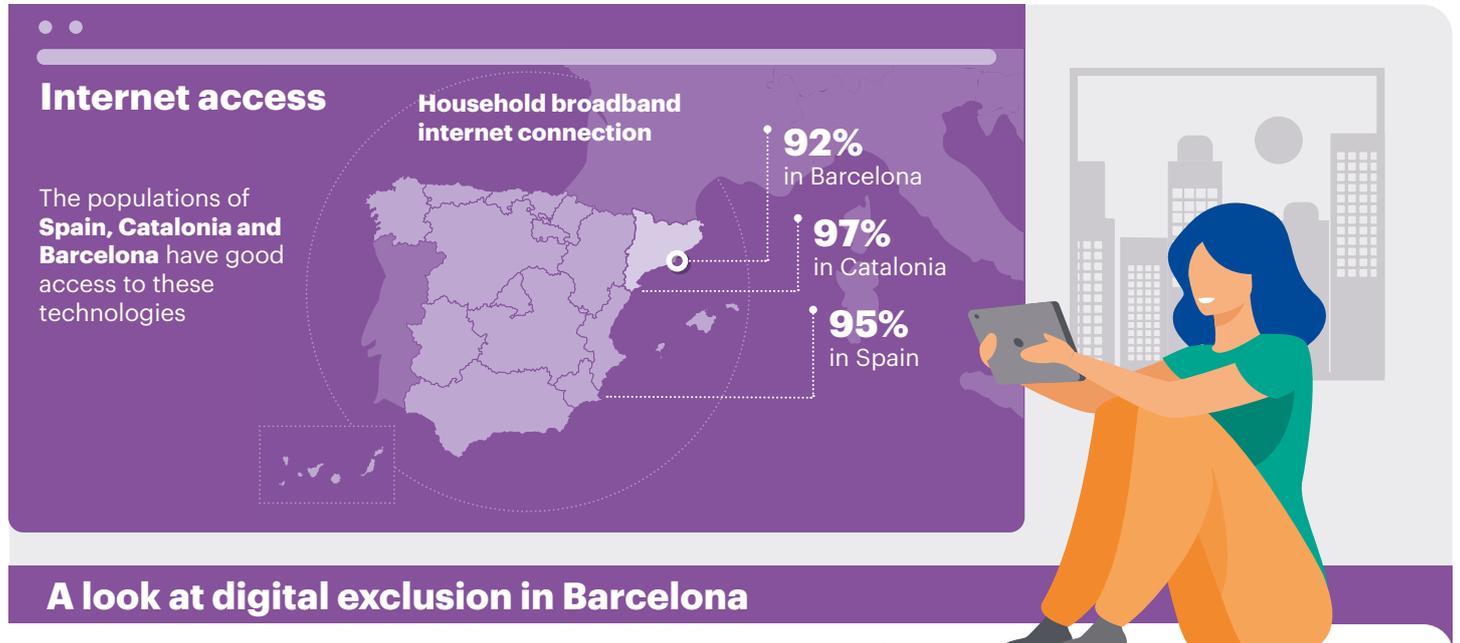
A look at digital exclusion in Barcelona

DIVIDE

Age
75 years +
Sex
Women
Education
Income
Retired
Employment situation
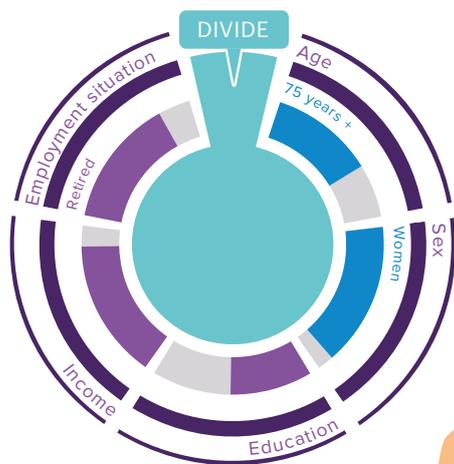
Percentage of home internet connection across society

Age
66%
75 years +

99%
16-24

Level of education
51%
No education

97%
University degree

Sex
90%
Women

95%
Men

Income
87%
Low income

96%
High income

43%
of people without internet access at home **are women over 75 years old**

Employment situation
80%
Retired

99%
Student
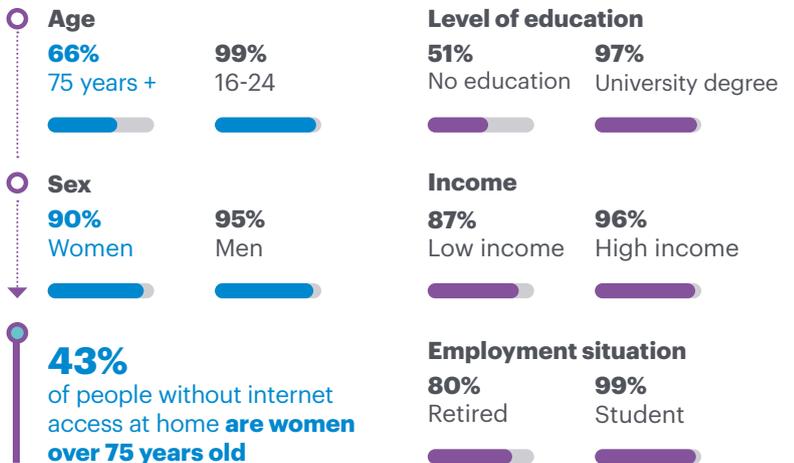
The divide as a cause of social exclusion
The pandemic worsens existing divides

27%
of the school-age population of Barcelona could not continue with their studies online when schools were shut

Of these, **56%** were from **low-income households** and the reasons for the interruption in their education were:

21% did not have adequate devices

18% did not have a good connection

10% did not have the required training

The digital divides, among other things, are made up of differences in access and skills in the use of ICTs. To overcome these inequalities it is crucial to assess whether people have access to electricity, the internet and electronic devices, and the quality of this access; computer skills and traditional literacy; a command of ICTs and the internet; and favourable conditions including affordability, legally valid identification, financial inclusion, and trust and security (Digital Future Society 2020d).

If we focus on Spain and Catalonia, access to technologies is a strength as almost all households in both territories have access to broadband (95% and 97% respectively) (Instituto de Estadística de Cataluña 2021). The percentage is similar if we focus on Barcelona, where 8.1% of households do not have an internet connection. This situation is influenced by socioeconomic and demographic factors, such as income level, age, education, and gender, as we will see below.

According to the second edition of the 2021 report, *La bretxa digital a la ciutat de Barcelona* (The digital divide in the city of Barcelona) by Barcelona City Council, the proportion of households without an internet connection rises to 12.7% in low-income areas of the city and drops to 4.5% in high-income areas. Also, of the 8.1% of households mentioned above, 55% are homes with people over 74 years old (Ayuntamiento de Barcelona 2021f).

Furthermore, the level of internet connection is greater among people with a university education (97.3%) than among those who have not completed compulsory education (50.6%). It is also higher among men than among women (94.6% and 89.5%, respectively). In terms of the intersection between gender and age, 42.5% of people without internet access at home are women who are over 75 years old (Ibid.).

This data again makes it clear that it is essential to address digital divides from an intersectional perspective that identifies profiles in which vulnerabilities coincide. In addition, it should be stressed that a gender divide in the digital environment is widespread throughout the world, as women are 15% less likely to use mobile internet than men. This is due to sociocultural patterns such as traditional gender roles (GSMA 2021). Finally, in terms of skills, 43% of Spanish citizens and 37% of Catalans do not have the basic computer skills required today (European Commission 2021b; OBSAE 2021).

The Covid-19 pandemic has made it clear that digital divides are direct factors of social exclusion. A clear example is that 26.8% of Barcelona's school-age population could not continue their studies online during the period in which schools were closed. Out of this segment of students, over half (55.8%) were from low-income families. This percentage of students was excluded from learning for reasons such as a lack of access to digital devices (20.9%), insufficient internet connection (17.5%) or a lack of necessary training (9.6%). In contrast, the remaining 44.2% belonged to the middle and upper classes and could not continue with their schooling during this period mainly because their school did not offer online education (Ayuntamiento de Barcelona 2021f).

In the same vein, a lack of digital skills was the main reason for the lag in vaccination, as half of the population did not have the necessary skills to make an appointment online (Rodríguez and Oliveres 2021). In this context, government bodies are working to improve digital access and skills. One example is Barcelona City Council's *Plan de Choque para la Inclusión Digital* (Emergency Plan on Digital Inclusion) (Ayuntamiento de Barcelona 2020b).

"
The pandemic made us realise that the digital transformation of governments, which was accelerated to respond to the needs of the health crisis, created barriers and caused concerns among the most vulnerable groups. Applying for the minimum living wage or carrying out other procedures became much more difficult. The trade union set up a space to help people with procedures and paperwork. We have seen the complexity of the digital skills issue, not only in groups that are traditionally associated with lower digitalisation but also among young people: they also found it hard to understand the digital bureaucracy."

Carmen Juares Palma, Secretary of New Forms of Employment and Precariousness, Workers' Commission (CCOO)

PROJECTS TO BRIDGE THE DIGITAL DIVIDES

Connectem Barcelona

This is a digital inclusion pilot project that Barcelona City Council designed for 2021-2022. In the pilot, four hundred vulnerable households in the city's Trinitat Nova neighbourhood receive electronic devices and a quality internet connection, and they are offered training programmes in computing to get the most out of said connection. (Ayuntamiento de Barcelona 2021c).

Agents TIC

This initiative is part of Barcelona City Council's Emergency Plan for Digital Inclusion. It has a team of qualified people who advise and support citizens who do not generally use ICT (TIC in Catalan) for administrative procedures such as requesting aid or accessing services. The agents are located in neighbourhood community centres where they seek to identify vulnerable groups. They work in Raval, Besòs i el Maresme, Trinitat Vella, Zona Nord (Vallbona, Torre Baró and Ciutat Meridiana), Roquetes and Trinitat Nova (BIT Habitat 2021).

Social support centres

Terrassa City Council has introduced nine social support centres in the city, to help people who need to carry out a specific online procedure but do not have the resources and/or the computer skills required to do so (El Periódico 2020).

B. Digitalisation of the public and private sectors

Digitalisation of the public and private sectors

Government bodies are transforming the way their services reach the population. They are opting for **digital channels**, while **small- and medium-sized enterprises (SMEs)** also face various challenges in this field.

Government bodies

90%

of Spanish public authorities have opted for corporate digitalisation projects, although they need to improve in co-creation and innovation projects
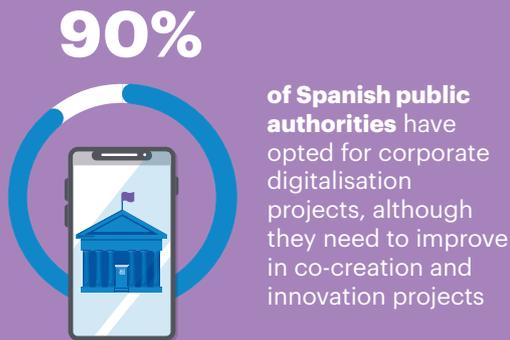
PROJECTS

Government of Spain
The *Plan de Digitalización las Administraciones Públicas* (Government Digitalisation Plan) aims to implement a model of digital identity.

Government of Catalonia and Barcelona City Council They are working to implement a new model of digital government services.

Employers' organisation for the digital industry (Ametic)
The *plan de Desarrollo de Talento Digital* (Plan for the Development of Digital Talent) will train 2.3 million people.

Companies

COMPANIES IN SPAIN

99.8%
of Spanish companies are SMEs

0.2%
are large companies

SMEs

SMEs

100%

6%

94%
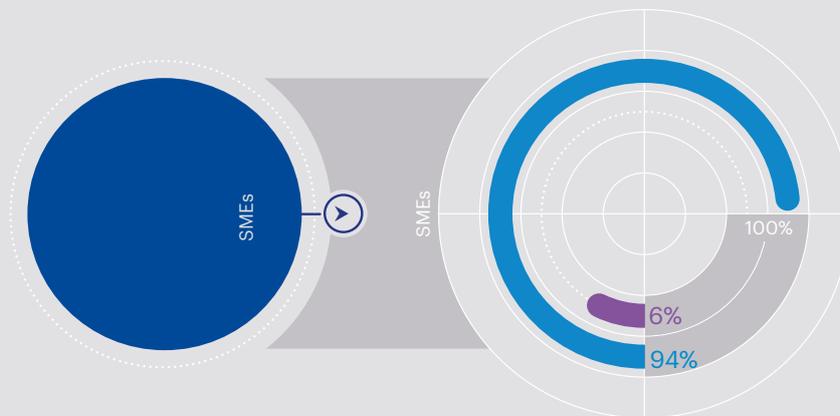
94% are micro-enterprises
Freelancers and companies with fewer than 10 employees

6% are small- and medium-sized companies
10-249 employees

DIGITALISATION IN SMEs

micro-enterprises

small- and medium-sized companies

Buy through e-commerce
18%
32%

Sell through e-commerce
10%
27%

Use social media
35%
67%

Have internet connection and a website
28%
78%
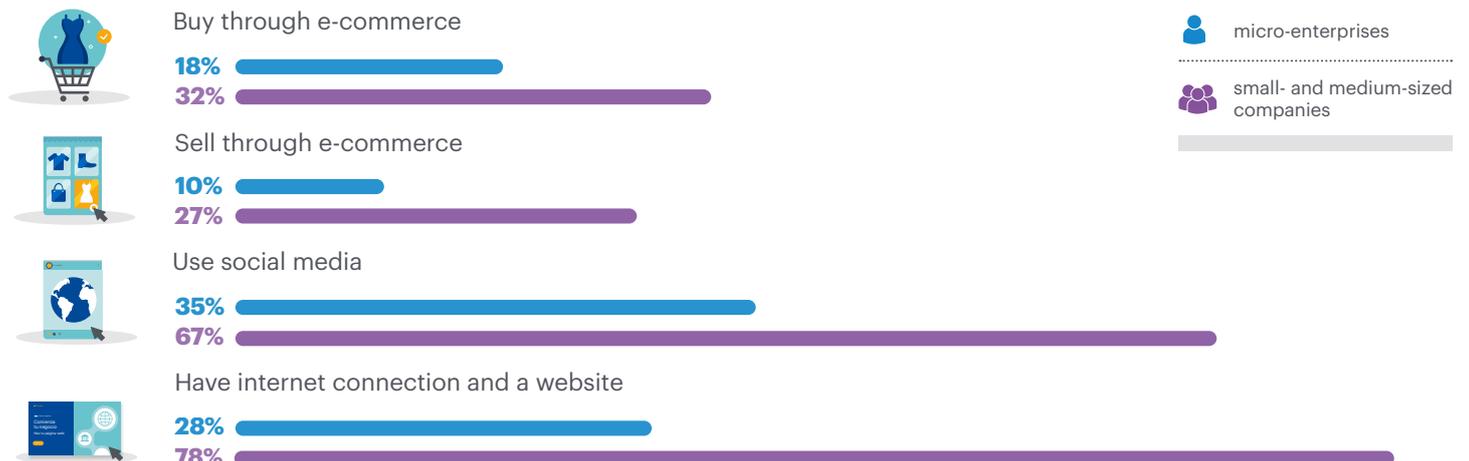
As a result of new social and virtual dynamics, government bodies are experiencing a change associated with the demand for public services. Now the idea is to ensure that services are flexible, transparent and efficient for citizens and businesses alike (Solé 2021). In this context, over 90% of Spanish public authorities have recently introduced corporate digitalisation projects (OBSAE 2021). Currently, the priority is the transformation of the service provision model and the introduction of personalised services based on innovation and co-creation (Gobierno de España 2021b).

The digitalisation of the public sector is not an easy task. Rapid implementation during Covid-19 times has shed light on the weaknesses and challenges associated with digitalising bureaucratic processes. One example is the collapse in the issuing of Covid-19 vaccination certificates on the *La Meva Salut* (My Health) platform (Cia and Moncloa Allison 2021). Digital transformation of the public sector requires an organisational and structural change that, due to its scale and the diversity of the citizens it serves, cannot easily adapt to advances seen in private sector applications, nor the expectations of some citizens who regularly use such applications.

Notably, the digital talent present in government bodies is not consistent with the sophisticated technologies that are planned to be applied. The employers' organisation for the digital industry, Ametic, will implement the *Plan de Desarrollo de Talento Digital en la Administración Pública* (Plan for the Development of Digital Talent in Government Bodies) to train a total of 2.3 million employees (Refojos 2021). Likewise, the Government of Catalonia and Barcelona City Council are working to develop the skills they need to offer digital public services (Generalitat de Catalunya 2021; Ayuntamiento de Barcelona 2017a)

As large companies become increasingly digitalised, there is a divide between small- and medium-sized Spanish companies (with 10 to 249 employees) and micro-enterprises (fewer than 10 employees). According to INE, only 28% of micro-enterprises have an internet connection and website compared to 78.32% of small and medium-sized companies. The same pattern is found in social media use, with figures of 35.3% and 66.5%, respectively. Considering that 93.8% of all businesses are micro-enterprises, the challenge of digitalisation is an urgent issue for them. Online commerce is also a weak point for SMEs, as 81% of them do not sell online. The percentage is the same for Catalan SMEs (OBSAE 2021).

In other words, although the Covid-19 pandemic has driven the adoption of new technologies, there is still a long way to go before SMEs are competitive in this aspect. There remains an imbalance between large companies and SMEs in the private sector and also between the private and public sectors (Digital Future Society 2021).

"Town and city councils are the frontline of government bodies. In many cases, unless those with decision-making power do not; for personal, political or technical reasons; prioritise digitalisation, it will continue to advance but without a sense of urgency. In the smallest municipalities, other projects are selected in the short-term, in response to residents' demands. The municipal strategy does not always consider this need for digitalisation. At Localret, our aim is to raise awareness and communicate the importance of advancing along this path. As agents who act in the super-municipal area, we must generate common platforms so that everyone can access tools and solutions to offer equivalent digital services. In this way, work is done to reduce the divide between large and small municipalities."

Andreu Francisco Roger, General Director, Localret

DIGITAL TRANSFORMATION PROJECTS FOR THE PUBLIC SECTOR AND SMES

Health application
La Meva Salut

The Catalan Health Service (CatSalut) is using the application *La Meva Salut*, which is a personal space for health matters that enables citizens to consult their medical reports, diagnoses and results; request primary health care appointments; access medication plans to collect drugs directly from pharmacies and access various remote health care services such as e-consultations, among other procedures. This application has been crucial in the management of Covid-19 vaccination appointments, as it has enabled more flexible, faster management of the vaccination programme (CatSalut 2021).

DIGITAL TRANSFORMATION PROJECTS FOR THE PUBLIC SECTOR AND SMES

Re-connectant programme

> This is a Barcelona City Council project, in collaboration with Endesa and Barcelona Comerç, that supports the digitalisation of the city's local businesses. Four hundred shops will receive advice on implementing digitalisation plans that will help them to adapt to e-commerce in the post-pandemic context. In addition, the programme will promote digitalisation agents, with two objectives: to advise companies in this process and to promote young talent in the sector. Endesa will finance the initiative with 500,000 EUR and Barcelona Comerç will be responsible for coordinating the 20 professionals who will act as digital agents (Ayuntamiento de Barcelona 2021e).

La Guaita digitalisation service

> This is a Castelldefels City Council initiative that is supported by the Barcelona Provincial Council. It offers a free service of attention and individualised advice to support small companies or freelancers in the process of defining their digitalisation strategy. The service focuses on helping them understand digital management tools, online sales, the presence of companies on the internet, online communication and marketing (La Guaita 2021).

Dades x Comerç project

> This is an initiative organised by Open Data BCN and winner of the call for grant applications for urban innovation, managed by BIT Habitat. The project aims to co-create computer tools with local commerce and the objective is to make innovative resources such as useful and easy to access data available to local shops (Dades x Comerç 2021).

c. Cybersecurity and data protection

Cybersecurity and data protection

In a hyperconnected society, the importance of **security in cyberspace** is a central factor that has a considerable impact on **citizens, companies and government bodies**.

Cybersecurity

According to the Global Cybersecurity Index (GCI) 2020, **Spain was in 4th place globally.**

However, Spain was not prepared for the forced digitalisation brought on by Covid-19 that saw **the number of cases more than double**:

2019 2020

In **2019**, a total of

3,172
cyber incidents were recorded

In **2020**, almost

7,000
highly dangerous cyber incidents were recorded

Public sector (Catalonia)

ATTACK !

In **2020**, there were

620
occasions when the Catalan Government's records were accessed through cyberattacks, most of which involved phishing*

In **2021**, a total of

650,000
files were compromised in an attack on the Autonomous University of Barcelona (UAB)

* A technique of identity theft in which someone pretends they are a reputable company or public entity to steal personal information from users, such as their bank details.

Private sector

2/3
Spanish companies, particularly SMEs, lack mechanisms to combat cyber threats

In **2019**

23%
of large companies experienced a security incident

12%
of SMEs experienced a security incident

In **2020**

99%
of companies stated they had suffered an attack

43%
of attacks were aimed at SMEs

Citizens

In **2019** a total of

153,010
victims of cybercrime were recorded

In **2020** a total of

215,500
victims of cybercrime were recorded

Data protection

Online privacy

2/5
people have little or no trust in the internet

1/3
people do not know how to protect their privacy online

66%
of the population know that cookies track their movements in the virtual environment

29%
act to limit their use

In a hyperconnected society, the importance of online security is a central factor that has a considerable impact on citizens, companies and government bodies. According to the Global Cybersecurity Index (GCI) 2020, Spain was in 4th place globally in terms of cybersecurity. Nevertheless, it was not prepared for the forced digitalisation that occurred due to Covid-19. The pandemic presented an opportunity for hostile agents, and there has been a global increase in cyberattacks. In Spain, for example, in 2020 there were almost 7,000 highly dangerous cyber incidents, which is more than double the number detected in 2019 (3,172) (Centro Criptológico Nacional 2021).

In Catalonia, the Cybersecurity Agency detected 800 million cyberattacks, although only 1,000 of these cases required the agency's intervention (Ara 2021). One of the most prominent attacks affected the Government of Catalonia. In the first six months of 2020, the Catalan government counted 620 occasions when its records were accessed through cyberattacks. Most of them involved phishing, a technique of identity theft in which someone pretends they are a reputable company or public entity to steal personal information from users, such as their bank details (Pueyo Busquets 2020). Other examples from 2021 include the attack on the Autonomous University of Barcelona in October, from which the university is still recovering, which saw over 650,000 files compromised, and the attack on CatSalut's website for vaccination against Covid-19, which threatened to expose patients' identification data (Higuera 2021; El Periódico 2021). Given this situation, the Government of Spain approved in 2021 the *Plan de Choque de Ciberseguridad* (Cybersecurity Emergency Plan), to address cyber threats (Gobierno de España 2021c).

In the private sector, two-thirds of Spanish companies lack the resources and know-how needed to fight cyber threats. SMEs are the main target of these attacks (The Cocktail Analysis 2020). Cyber incidents in the Spanish private sector have also increased dramatically: 99% of companies admit that they suffered from an attack in 2020. A total of 43% of these attacks were aimed at SMEs. This is in contrast to 2019 when only 23% of large companies and 12% of SMEs suffered from a cyber incident. The push towards the digitalisation of companies and the use of the cloud requires stronger cybersecurity. Unfortunately, in many cases, security controls are pushed into the background because of other business needs.

Private citizens have also become more vulnerable. A rise in teleworking and students learning from home increases the probability of attacks while people are online. Attackers take advantage of the poor security measures and weak privacy policies. The number of recorded victims of cybercrime rose 30% from 2019 to 2020 (Centro Criptológico Nacional 2021; López Gutiérrez et al. 2020). Therefore, cybersecurity is a phenomenon that needs urgent attention, especially in SMEs and government bodies, but also in the private sphere.

As we have seen, the effects of the pandemic have highlighted the need to achieve a safer, more reliable cyberspace. Two out of every five Spanish citizens have little or no trust in the internet. Although 66% of the population know that cookies track their movements in the virtual environment, only 29% act to limit their use (Barcelonadot 2021). This comes from a lack of knowledge about data rights and who has access to user data, which in turn has a direct impact on privacy. Consequently, one out of every three people (32.3%) does not know how to protect their privacy online (Cuadernos de Seguridad 2020). This clearly shows the need for more transparent, responsible policies on data use, to reclaim data governance in the digital era.

PROJECTS TO PROMOTE CYBERSECURITY AND DATA PROTECTION

CityOS

> Barcelona City Council has designed infrastructure based on big data technology in open code so that it serves as a one-stop-shop to access and manage internal data (Ayuntamiento 2021b). This enables better data governance and creates the opportunity to make decisions about the city in an informed, data-driven way (Cuadernos de Seguridad 2020).

Education centres with open software

> This is a project by Xnet, an entity that specialises in rights in the digital environment, with the support of Barcelona City Council. The project emerged in response to a demand from a group of families who did not authorise their children to use Google tools in their school. The project is currently in the pilot phase. The project participants are five primary and secondary schools that have digitalised using alternative internet software to that provided by Google. The aim is to ensure privacy and recover data sovereignty (Xnet 2019).

Cybersecurity training

> Through Barcelona Activa, the Barcelona City Council offers a free online security training course aimed mainly at companies. The course reflects the need to consider risks in the digital environment, their scope and protection mechanisms (Cibernàrium 2016).

D. Disinformation and fake news

Disinformation and fake news

The current infodemic* is a breeding ground for **disinformation**.
Disinformation could lead to distrust in democratic institutions.
Moreover, the overwhelming amount of information could lead to general **disinterest**.

Digital Future Society

Disinformation

An "infodemic" has developed in the context of the Covid-19 pandemic.

*Excess of information on a topic, much of which is fake news or rumours, that makes it difficult for people to find reliable sources and guidance when they need it

In **2020**,

The foundation Maldita.es recorded **799** items of Covid-19 related disinformation

41% of fake news stories about Covid-19 were recorded in the first two months

Concerns about credibility increase with age:

56% 18-24 years old

74% 55-64 years old

67% of people in Spain are **concerned about disinformation**

42% believe disinformation about the pandemic comes from the **government or politicians**

Distrust

According to the Reuters' Digital News Report, in a comparison of 46 countries, **Spain** was one of the countries **exhibiting the least trust in the news**:

In Spain, **36%** of people trust in the news
In Finland, **65%** of people trust in the news

In Spain, **there is more trust in news media** than in other channels:

42% trust the news media
24% trust social networks
30% trust search engines
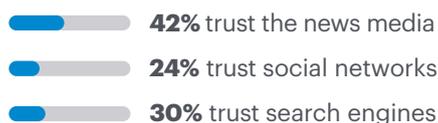
Most people who feel **disinterest and distrust are young people** and people with a low level of education

Disinterest

Increasing disinterest is a huge challenge for the media, as digital platforms are based on the "attention economy"

In Spain, public interest in the news has fallen in recent years:

84% of the general population interested in the news

67% of the general population interested in the news

53% of young people interested in the news in 2021
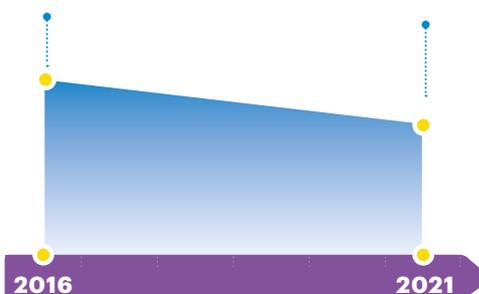
2016

2021

Disinformation adds a layer of complexity to the health emergency, which does not affect everyone in the same way. Disinformation **"feeds on poverty, inequality, anger and despair"**.

- **Carina Lopes,** Head of Digital Future Society Think Tank
- **Fabro Steibel,** executive director of the Institute for Technology and Society of Río de Janeiro

Rapid digitalisation and the presence of new technologies have expanded
and accelerated the circulation of information making it impossible to access
everything that is published on a topic and even less possible to process
and assimilate it. This overabundance of information, which is increasingly
present due to the increase in the use of mobile devices and social networks,
contributes to disinformation, that is, the spread of false or fake information.
Disinformation in the digital era has increased social polarisation and the
polarisation of information. It is a great risk for institutions and governments
as it questions their credibility and legitimacy, which in turn threatens
democracy.

According to the United Nations and the World Health Organisation, an infodemic has
developed in the context of the Covid-19 pandemic. The Fundéu RAE defines this term as the
"excess of information on a topic, much of which is fake news or rumours that make it difficult
for people to find reliable sources and guidance when they need it" (Fundéu RAE 2020).
Maldita.es, another Spanish foundation that is dedicated to verifying information published
on the internet, recorded 799 items of disinformation on Covid-19 throughout 2020. In the
first two months following the declaration of the pandemic, 40.5% of all fake news was about
the health crisis. According to Reuters's latest Digital News Report, 42% of Spanish people
believe that the origin of disinformation on the pandemic is the government or political
parties (Newman et al. 2021).

In 2020, there was an increasing trend in the consumption of online media, which overtook
the consumption of traditional print media. Given this increasingly digital consumption, one
of the main concerns about disinformation is how it threatens trust in the media. According to
the Reuters report, in a comparison of 46 countries, Spain was one of the countries exhibiting
the least trust in the news (36%). Finland is the country with the highest level of trust (65%)
and the United States is the country with the lowest level at 29%. In any case, many Spaniards
continue to trust the news media (42%) more than information on social networks (24.4%) or
search engines (30.4%) (Ibid.).

However, the Reuters survey shows that there is great concern about disinformation (67%).
In addition, it seems that the health crisis has had a positive impact on digital skills. It has
affected the verification of information and the consultation of verification websites (Victoria-
Mas 2020). According to an INE survey, over half of Spaniards question the credibility of
internet content, and 58.7% of those surveyed mentioned that they had found dubious
information in the months prior to the survey. In this group, 51.7% checked the veracity of the
information and 48.3% did not. Among those who did not check the veracity, 35.4% stated
that this was because of a lack of skills (INE 2021).

However, not everybody is as concerned about disinformation. Among the young (18–24 years
old), only 56% were concerned about the veracity of news, while for people aged between 55
and 64 years old the percentage rose to 74%.

Disinterest and distrust in the news are intrinsically associated and present challenges for the fight against disinformation in Spain. Here, the infodemic plays an important role. The overload of information has also increased public disinterest in the news. In Spain, interest dropped from 84% in 2016 to 67% in 2021, and this affects younger people more (53%). The increased disinterest is a great challenge for traditional media, as digital platforms are based on the "attention economy". If the media resorts to more sensationalist news to attract attention, it could lead to an increase in distrust (Newman et al. 2021).

It is the youngest people who show the most disinterest and most distrust in the news. This group represents 25% of those surveyed by Reuters, and mainly includes young people with a low level of education. According to the survey, one of the reasons for this disinterest and distrust is because of a belief "the way they are being covered is inaccurate" (Ibid.).

As Carina Lopes, head of the Digital Future Society Think Tank, and Fabro Steibel, executive director of the Institute for Technology and Society of Rio de Janeiro, explain, disinformation adds a layer of complexity to the health emergency, which does not affect everyone in the same way: "it feeds on poverty, inequality, anger, and despair" (Digital Future Society 2020a). As mentioned previously, disinterest and distrust serve as fuel for disinformation and increase the consumption of alternative news media.

> "Disinformation affects us all but not in the same way. The way disinformation influences us depends on our personal experiences and our social position, those who are more vulnerable are more exposed to disinformation. For example, young people, who still do not have the maturity to assimilate content, or people who do not have digital skills or media literacy are more affected by disinformation. It is important for a range of agents to act on all fronts. There should be a real commitment to raising awareness and systematically disseminating information to this end. Right now, the fight against disinformation is in the hands of families and school administrations. Clearly, we have a challenge as there are two components. There is false information that also fuels hate meaning we have to work on the ethical implications and values, as social networks increase polarisation."

Nereida Carrillo, Director, Learn to Check

PROJECTS TO REDUCE DISINFORMATION

Catalan Audiovisual Council (CAC)

To fight against disinformation in the context of the Covid-19 lockdown, the CAC started a campaign with four videos and radio commercials broadcast on TV3, Catalunya Ràdio and social networks. The aim was to transmit to the population the need to verify information on this topic by consulting official communications (Consell de l'Audiovisual de Catalunya 2020).

Inkan

This is a free application developed by a start-up in Barcelona to authenticate images through blockchain technology. Every time a photograph is taken using the camera of an electronic device, an identification code is generated for the image that is unique and unforgeable. This is called the fingerprint and it is stored in a blockchain node that cannot be eliminated or changed. Therefore, each image is associated with a place, a date, a time and a device that verifies the content and confirms it is the original (Inkan 2021).

Verificat

This is the first verification platform in Catalonia. It aims to publish contextualised information and debunk false references to Catalan current affairs through traditional fact-checking, investigative journalism and data transparency. The first challenges were the municipal elections in Barcelona and the protests resulting from the ruling on the events of 1 October 2017, which were significant moments for Catalan politics (Verificat 2021). Barcelona City Council, in collaboration with the platform *Verificat*, offers a workshop of two one-and-a-half-hour sessions in the city's municipal libraries to help citizens who are over 55 identify fake news on the internet and learn how to combat it (Ayuntamiento de Barcelona 2021d).

Learn to Check

This is a disinformation educational project created by journalists and university professors. The aims are to empower people so that they reflect on disinformation, and to bring digital verification to citizens. They offer workshops and courses for different groups. Currently, among other projects, they are working to include their training in secondary school textbooks.

E. New ways of working
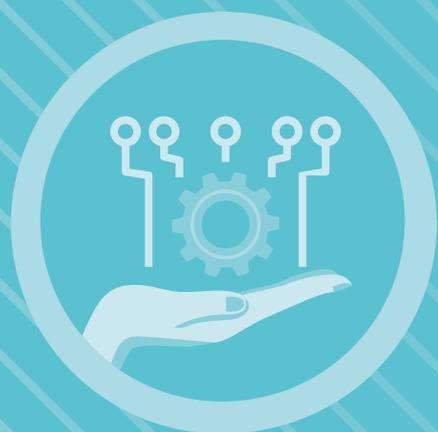
New ways of working

Globalisation, outsourcing and market liberalisation, added to the rise of the internet, the use of big data, the development of the **gig economy and automation**, among other factors, have changed the nature of labour markets.

The gig economy

increases job insecurity and makes it more common, as it generates new forms of employment that are considered atypical

A clear example of atypical employment is platform work. In Spain:

2.6% of the active population is habitually employed through digital labour platforms

15% of the active population is sporadically employed through digital labour platforms
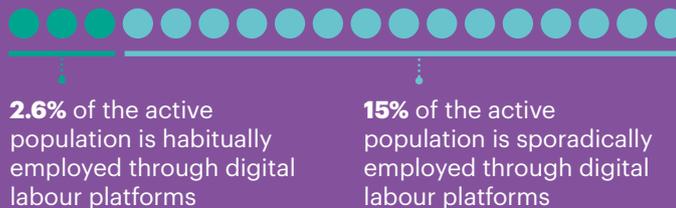
Therefore, a total of **18%** of employees in Spain work through platforms

Automation and talent

According to a report by the *Observatorio de la Industria* (Industry Observatory) in Catalonia, the 4th Industrial Revolution could dramatically affect the current labour market

40% of the European job market **will have to gain new skills**

35% of jobs have a high probability of automation

*11% of jobs occupied **by women** and **9%** of jobs occupied **by men** have a high **risk of automation**
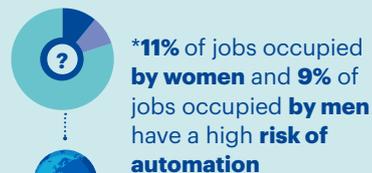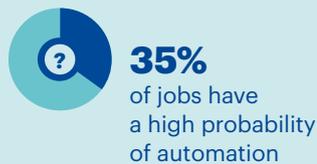
*According to the IMF

The new skilled, digitalised jobs that will be developed to adapt to the new digital economy will be reserved for those with the required **computer skills and training**.

A **Basic computer skills**
In Spain and Catalonia, there is a proportion of the population that still do not have these skills

B **Advanced/ professional skills**
The number of people employed in ICT in Spain and Catalonia is below average

● **43%** Spain
● **37%** Catalonia

● **3%** Spain
● **4%** Catalonia
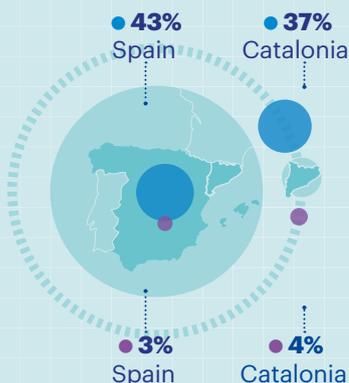
Gender difference in employment in the ICT sector:

Spanish men **are paid 8.9% more** than women for equivalent jobs

2% of women are employed in the sector

5.7% of men are employed in the sector

The very nature of the labour market has changed due to global factors such as globalisation, professional outsourcing, market liberalisation, the rise of the internet, the use of big data, the development of the gig economy and automation, among others. These changes favour the production dynamics of global companies, as they have access to a broader, more diverse and more qualified set of employees.

However, this transformation also contributes to and increases job insecurity, as it generates new forms of employment considered to be atypical. Far from previous forms of employment and sometimes unregulated, these new types of jobs leave their workers without protection. This new reality, leaves workers unprotected, more at risk of work related injuries and left out of social security schemes (Grisolia 2020).

A clear case of atypical employment is working through platforms. In Spain, it is estimated that 2.6% of the active population is employed through digital labour platforms, a percentage that rises to 18% if we include people that participate in these platforms sporadically. This means Spain is the country with the highest number of platform workers in Europe (Digital Future Society 2020b).

According to a report by the *Observatorio de la Industria* (Industry Observatory) in Catalonia, the 4th Industrial Revolution could dramatically affect the current labour market, as 35% of jobs have a high probability of automation and a further 35% have an average probability. However, the observatory report notes that jobs are not going to disappear. Instead, they will change. The same trend was found by McKinsey in Europe, which explained that 40% of the European job market would have to gain new skills to be able to adopt the changes caused by digitalisation (Smit et al. 2020).

Therefore, the new skilled, digitalised jobs that will be developed to adapt to the new digital reality will be reserved for those with the required computer skills and training. However, as mentioned before, in Spain and Catalonia there are still high proportions of citizens (43% and 37%, respectively) who do not have basic computer skills.

Regarding advanced and professional skills, the number of people employed in the ICT sector is below average in Spain, at 3.2% of the population, and the percentage in Catalonia is slightly higher at 4.3% (OBSAE 2021; DESI 2021). In addition, although a gender digital divide is not evident in access or basic ICT skills in Spain, according to Digital Economy and Society Index (DESI) data there is a large difference between the number of women employed in the sector (2%) and the number of men (5.7%). The gender wage gap persists in this sector, as Spanish men get paid 8.9% more than women in an equivalent job (DESI 2021). This difference is even more marked in Catalonia, where women occupy only 8% of technical and specialised jobs in the sector (Generalitat de Catalunya 2020).

Therefore, the urgency of the gender perspective should be stressed in the area of employment, and beyond women's access to training in the ICT sector. Given that having the same access to ICTs does not mean that everyone can benefit from them in the same way; an intersectional approach is important. For example, the impact of gender should be considered in relation to automation. The International Monetary Fund (IMF) estimates that 11% of jobs occupied by women have a high risk of automation, compared to 9% of jobs occupied by men (Sainz et al. 2020)

In this context, the Government of Catalonia approved the Digital Education Plan of Catalonia 2020–2023. Its main objective is to shape the curriculum to focus on improving computer skills in the new generations and reduce gender differences in the tech and computing industry (Generalitat de Catalunya 2020).

> Society and industry are undergoing a transformation towards more sustainable and digitised models. This transition should be fair and consider the negative impact such a change could have socially and in labour markets. The objective of digitisation cannot centre on maximising benefits through better processes. Instead, it should seek to understand and anticipate social impact and establish ways of working in which innovation can guarantee equity in the system. When we consider digitisation's impact on the labour market, we must acknowledge the need for new professionals and lifelong learning for those already in the workforce, so that they may adapt to new realities. Public aid destined for the digitisation of businesses, must take this into account and should evaluate this impact. If this evaluation is not a requirement for aid, the digital divide will widen and will exclude many people from all sectors of the economy.
> ....
> **José Antonio Pasadas**, Secretary of Sector Policies and a Fair Transition, General Union of Workers of Catalonia

> According to our research, digital/computer skills are not the most valued for finding a job. More importance is given to non-cognitive skills and technical skills. There is still a lot to understand about how digitalisation will change employment and which skills will be required. We already know that training someone more does not mean that they are going to have more or better opportunities. Here there is an important challenge for second opportunity programmes, by which are joining this wave of training in digital skills. It still needs to be defined which jobs they are suitable for. A digital job does not necessarily require high digital skills. However, more training may provide opportunities for promotion within a company.
> ....
> **Rafael Merino Pareja**, Contracted Professor and Doctor of Sociology, Autonomous University of Barcelona

PROJECTS TO IMPROVE CITIZENS' DIGITAL SKILLS

**Training in
digital skills**

> During the summer of 2021, Barcelona City Council, through Barcelona Activa, offered over 800 computer skills courses to the population to enhance employability and digital talent. This offer has been increased and diversified to meet the city's new needs for economic reactivation (Ayuntamiento de Barcelona 2021a).

**BCN Inclusive
Coding initiative**

> Mobile World Capital, through the Barcelona Digital Talent Programme, has promoted this computer skills training and professional reorientation initiative. It is aimed at people in vulnerable situations such as women in precarious positions, young people without qualifications, long-term unemployed or people who have applied for asylum or international protection. The aim is to help their entry into the job market (Barcelona Digital Talent 2021).

*Escola 42
Barcelona*

> This initiative is a training space to provide the ICT sector with employees qualified in new technological capabilities such as cybersecurity, big data, artificial intelligence and blockchain. The project arose from a partnership between the Fundación Telefónica, Barcelona City Council and the Government of Catalonia. The Government of Catalonia has invested 1.2 million EUR into the project, which consists of free training, for an average of three years for people over 18 (42 Barcelona 2021).

F. Climate justice

Climate justice

Climate change is a great threat to public health. Leading experts confirm that human activities have warmed the land, ocean and atmosphere.

Climate change in the world

The causes and consequences of the current climate crisis do not affect everyone equally. There are differences between countries ➤

Emergency measures

The Glasgow Climate Change Conference (COP26), held in November 2021, concluded with some commitments made by the nearly 200 participating countries:

- Limit the increase in global temperature to 1.5ºC by the end of the century
- Gradually reduce the use of fossil fuels such as coal

1/6th of the global population lives in high-income countries. They **emit 44 times more CO² and consume 10 times more resources**

5/6ths of the global population lives in low-income countries and have worse living conditions and fewer mechanisms to adapt to climate change

Resources

CO²
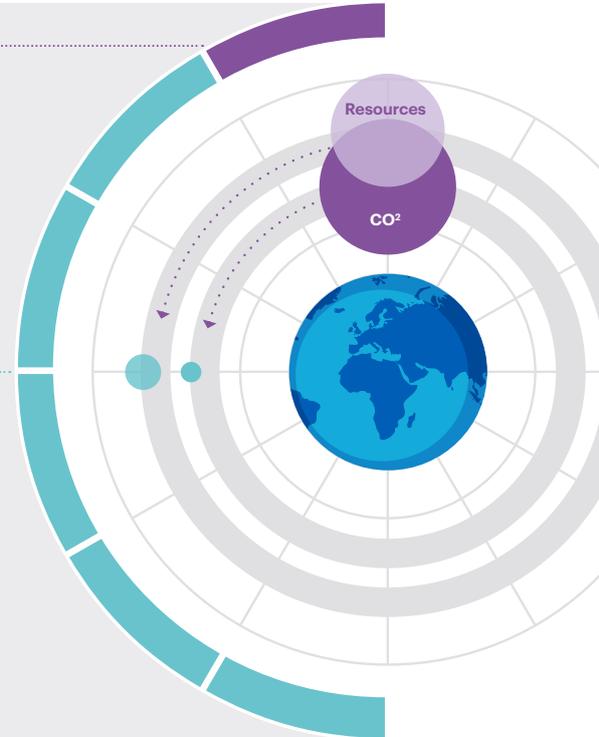
Climate change in cities

70% of carbon emissions come from cities, so actions focused on urban areas are crucial to reducing the risks of global warming

C40

Barcelona has been chosen to lead C40, a global network of cities that want to confront the climate emergency, in Europe. The city is committed to a digital, inclusive, sustainable future.

Barcelona City Council has approved the following plans and objectives:

Barcelona Climate Plan 2018-2030

40% reduction in greenhouse gas emissions
1.6 km² increase in green spaces

Barcelona in action

A total of **627,000 EUR** allocated to 11 projects to respond to urban challenges and improve urban sustainability

Emerging technologies **are a double-edged sword** because of their carbon footprint, the ICT sector represents:

2% of greenhouse gas emissions (GHG)

Emerging technologies could accelerate global warming:

- Consumption of energy by data centres and in cloud services
- Generation of electronic waste

In turn, they could contribute to cutting emissions:

- Construction of smart buildings and transport
- Early detection of emergencies or monitoring of infrastructure

Climate change is described as this century's greatest threat to public health. The last report of the Intergovernmental Panel on Climate Change (IPCC) confirmed that human activities have warmed the land, ocean and atmosphere (IPCC 2021). This reality affects all of us, particularly the thousands of people worldwide who die prematurely from pollution (Rodríguez 2021).

Even so, the responsibilities and consequences of climate change do not affect everyone in the same way. Only 1/6th of the global population lives in high-income countries. However, these countries emit 44 times more CO_2 and consume on average 10 times more resources than low-income countries (OXFAM Intermón 2019). In contrast, developing countries have worse initial conditions and fewer resources to adapt to these new situations (Borràs Pentinat 2013).

Therefore, we are in an emergency situation in which, as António Guterres, Secretary-General of the United Nations, said "our fragile planet is hanging by a thread" (Associated Press 2021). In this context, the Glasgow Climate Change Conference (COP26), held while this white paper was being written, concluded with commitments made by the nearly 200 participating countries to limit the increase in global temperature to 1.5°C by the end of the century and to gradually reduce the use of fossil fuels such as coal (UN Climate Change 2021). Many considered the conclusions insufficient, given the need for immediate action.

The urgency of acting in the face of the climate emergency is shared by Ada Colau, the mayor of the city of Barcelona. She has been chosen to lead C40 in Europe, which is a global network of cities that want to confront the climate emergency (C40 Cities 2021).

Cities are responsible for 70% of carbon emissions. Consequently, actions aimed at urban areas are crucial to reducing the risks of global warming (United Nations 2019). Emerging technologies could contribute to these actions, as they offer more efficient ways of managing cities, for example with smart buildings or transport. Similarly, they can help to improve communities' resilience through early warning systems for extreme weather events or monitoring infrastructure (Digital Future Society 2020f). However, emerging technologies are a double-edged sword. Although they offer these benefits, the carbon footprint of the ICT sector is a source of considerable debate as it is estimated to produce around 2% of all greenhouse gases (Ibid.).

As mentioned previously, the health emergency has been a driver for digital transformation. Consequently, we will see an increase in demand for data centres, cloud services and connectivity. Although ICTs have become increasingly efficient, global emissions have continued to increase. Emerging technologies play a complex role in the climate crisis and there is no guarantee that the future will be greener the more we connect (Freitag et al. 2021).

To achieve a green digital transformation, actions are required for "measuring and minimising the climate impact of emerging technologies from energy consumption, GHG emissions and e-waste generation" (DFS 2020e). The Wireless Networks Research Lab (WiNe) at the Open University of Catalonia has designed EFC, a tool to assess cloud computing energy use. EFC shows the real use of resources on the cloud and calculates its energy consumption (DFS 2020d).

In this context, Barcelona City Council has approved the Barcelona Climate Plan 2018–2030, through which it is committed to reducing greenhouse gas emissions by 40% and increasing the cities green spaces by 1.6 km^2 by 2030 (Ayuntamiento de Barcelona 2017b). At the same time, Barcelona Metropolitan Area, with its Climate Emergency Declaration, is committed to 100% renewable energy and is working towards energy transition, sustainable mobility, a green and circular economy, improved citizen health and well-being, a culture of sustainability, the transition to a circular food system, and climate justice.

These plans show how crucial the role of cities is in the fight against climate change. One action introduced after the lockdown that shows a commitment to this digital, inclusive, sustainable future is *La ciudad proactiva: Barcelona en acción* (The proactive city: Barcelona in action). This is a call for grant applications for urban innovation projects (Digital Future Society 2020e). The second edition was held In November 2021, and 627,000 EUR were allocated to 11 projects designed to respond to urban challenges and improve urban sustainability (Ayuntamiento de Barcelona 2021h).

" When we talk about a digital and green transition, we need to be aware of the socio-environmental trade-offs that operate at different geographic scales. To give a simple example, electric cars embody current aspirations for the green transition at an urban scale, which can solve local pollution problems, but also transfer the problem to other regions, such as areas where lithium is mined for the batteries or where electricity is produced to sustain that "green" transition. Comparably, digitalisation may help improve certain aspects of environmental governance, but it's not the same as the dematerialisation of the economy. Digitalising our lives has a material cost because CO_2 emissions from data centres and computing is a reality. And there are always some groups that are negatively affected. So, when thinking about this green and digital transition, let's ask ourselves: "What for? Who for? At what cost and who will I affect?"
....

Hug March Corbella, Researcher. Urban Transformation and Global Change Laboratory, Internet Interdisciplinary Institute (IN3), Open University of Catalonia

PROJECTS TO ADVANCE TOWARDS CLIMATE JUSTICE

Network of climate shelters ▸ The feminist urbanism group Punt 6 and the BCNUEJ Lab of the Autonomous University of Barcelona have set up a network of climate shelters, that is, open spaces where citizens can shelter during the hottest hours of the day. The aim is also to create a community space for women of colour and migrants. A pilot is currently being carried out in the Prosperitat neighbourhood of Barcelona (Ayuntamiento de Barcelona 2020c).

Vulnerable homes initiative ▸ This project forms part of the Barcelona Metropolitan Area's *Plan Metropolitano de Apoyo a las Políticas Sociales Municipales 2020–2030* (Metropolitan Plan to Support Municipal Social Policies 2020–2030). The aim is to establish municipal actions to help with lack of resource situations such as non-payment of water and energy supply bills and to address the housing emergency. In short, the aim is to combat energy poverty (AMB 2020).

Conclusions

Social inclusion depends on many factors. However, in a hyperconnected society such as ours, digital divides in the plural are clear inequality factors that reproduce and even amplify existing structural inequalities. Consequently, the risk of digital exclusion is increasingly relevant. Metropolises are an ideal setting to manage and reduce this situation to ensure equitable, fair digitalisation.

To achieve this, public actors must take on an inclusive approach with an intersectional perspective. Far from considering technology an intrinsically positive tool, this approach focuses on putting it at the service of people and considers the many intersections of existing inequalities.

The need for inclusive digitalisation is now on the political and social agenda. As a result, agents are working to reduce related situations of inequality. This white paper describes some of the projects that are being carried out in Barcelona and the metropolitan area in this regard. However, many of the projects that were identified have only been created recently and therefore have still not been fully consolidated. Consequently, their development, duration and real impact need to be monitored.

Furthermore, actions to reduce inequalities are often decontextualised and do not address the root of the problem. One clear example is the distribution of computers to ensure students without the resources to buy ICT equipment could continue with their education. Even though this ensured these students could take their classes, they remain in a different position from other students due to their social class.

Most projects and initiatives being carried out to reduce the digital divides are undertaken in the capital of Catalonia. This concentration of resources creates a disparity between the city and the metropolitan area. As a result, the digital emergency and its characteristics raise questions about the current model of management of metropolitan areas such as that of Barcelona. It is vital to expand projects in the capital to adjacent cities or to focus on decentralising actions to enhance their development in the metropolitan area. Only this way will the risk of digital exclusion and thus social exclusion be addressed fairly.

Barcelona has the political will to become a leading capital in technological humanism and to put technology at the service of people. However, there is still a long way to go. First, because the capital is not without inequalities, and second because becoming a technology hub does not eliminate social and economic tensions such as those that have emerged in Poblenou's 22@ neighbourhood.

The need to address the digital emergency appropriately is therefore clear. Good management of the digital transformation so that it is fair and inclusive and has an intersectional perspective could help to reduce existing structural inequalities. In contrast, a lack of action or bad management would increase these inequalities.

Was a global pandemic and weeks of lockdown necessary for society and public managers to become aware of the growing inequality that digitalisation is creating? The digital emergency is an urgent matter of social justice and there is a pressing need to closely follow and manage it to ensure increasing digitalisation is a contributing factor to the well-being of every citizen.

42 Barcelona (2021) Home. [online] Available at: https://www.42barcelona.com/es/ (Accessed: 7 December 2021)

AMB (2020) Pobreza energética. [online] Available at: https://www.amb.cat/s/es/web/desenvolupament-socioeconomic/politiques-socials/pobresa-energetica.html (Accessed: 7 December 2021)

Annual Meetings (2020) Governor Talk: Structural Transformation After the Pandemic – We Have a Choice! [online] Available at: https://www.imfconnect.org/content/imf/en/annual-meetings/calendar/open/2020/10/12/governor_talk_structuraltransformationafterthepandemicwehaveacho_155089.html (Accessed: 7 December 2021)

Ara (2021) La Generalitat da por controlado el ciberataque. Ara. [online] Available at: https://es.ara.cat/politica/generalitat-da-controlado-ciberataque_1_4203413.html (Accessed: 30 December 2021)

Associated Press (2021) "Nuestro frágil planeta pende de un hilo": con acuerdo de última hora concluye la COP26. Telemundo Yakima Tri-Cities. [online] Available at: https://telemundoyakimatricities.com/nuestro-fragil-planeta-pende-de-un-hilo-con-acuerdo-de-ultima-hora-concluye-la-cop26/ (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2017a) Barcelona City Council Digital Plan. [PDF] Available at: https://ajuntament.barcelona.cat/digital/sites/default/files/LE_MesuradeGovern_EN_9en.pdf (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2017b) Barcelona Climate Plan 2018–2030. [online] Available at: https://www.barcelona.cat/barcelona-pel-clima/sites/default/files/documents/climate_plan_maig.pdf (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2020a) Laia Bonet destaca el compromiso de Barcelona con el humanismo tecnológico en jornada internacional "Inteligencia Artificial y Derechos Humanos". [online] Available at: https://ajuntament.barcelona.cat/relacionsinternacionalsicooperacio/es/noticia/laia-bonet-destaca-el-compromiso-de-barcelona-con-el-humanismo-tecnologico-en-jornada-internacional-inteligencia-artificial-y-derechos-humanos_924662 (Accessed: 30 December 2021)

Ayuntamiento de Barcelona (2020b) More resources to combat the digital divide. Info Barcelona. [online] Available at: https://www.barcelona.cat/infobarcelona/en/more-resources-to-combat-the-digital-divide_979064.html (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2020c) A project on climate shelters and care wins the Maria Aurèlia Capmany – 8 March Award. [online] Available at: https://ajuntament.barcelona.cat/ecologiaurbana/en/noticia/a-project-on-climate-shelters-and-care-wins-the-maria-aurelia-capmany-8-march-award_924477 (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021a) Barcelona Activa ofereix més de 800 cursos durant l'estiu per millorar competències digitals i d'ocupabilitat. [online] Available at: https://ajuntament.barcelona.cat/premsa/2021/07/02/barcelona-activa-ofereix-mes-de-800-cursos-durant-lestiu-per-millorar-competencies-digitals-i-docupabilitat/ (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021b) CityOS. [online] Available at: https://ajuntament.barcelona.cat/digital/es/transformacion-digital/city-data-commons/cityos (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021c) Connecting Barcelona to reduce the digital divide. Info Barcelona. [online] Available at: https://www.barcelona.cat/infobarcelona/en/connecting-barcelona-to-reduce-the-digital-divide_1087014.html (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021d) En las bibliotecas os ayudamos a combatir la desinformación. [online] Available at: https://ajuntament.barcelona.cat/biblioteques/es/noticia/a-las-bibliotecas-os-ayudamos-a-combatir-la-desinformacion-3_1100662 (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021e) L'Ajuntament de Barcelona, Endesa i Barcelona Comerç digitalitzen els establiments de proximitat de la ciutat amb el programa "re-connectant". [online] Available at: https://ajuntament.barcelona.cat/premsa/2021/06/08/lajuntament-de-barcelona-endesa-i-barcelona-comerc-digitalitzen-els-establiments-de-proximitat-de-la-ciutat-amb-el-programa-re-connectant/ (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021f) La bretxa digital a la ciutat de Barcelona 2020. [PDF] Available at: https://ajuntament.barcelona.cat/premsa/wp-content/uploads/2021/01/BretxaDigitalBarcelona_2020_cat.pdf (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021g) La renda de les llars a Barcelona: Distribució per districtes, barris i seccions censals 2018. [PDF] Available at: https://ajuntament.barcelona.cat/premsa/wp-content/uploads/2021/07/LA-RENDA-DE-LES-LLARS_2018_def.pdf (Accessed: 7 December 2021)

Ayuntamiento de Barcelona (2021h) Eleven projects to ensure a fair and inclusive digital transition and improve urban sustainability. [online] Available at: https://www.barcelona.cat/infobarcelona/en/eleven-projects-to-ensure-a-fair-and-inclusive-digital-transition-and-improve-urban-sustainability_1119622.html (Accessed: 30 December 2021)

Barcelona Digital Talent (2021) Impulsamos BCN Inclusive Coding para promover la inclusión social. [online] Available at: https://barcelonadigitaltalent.com/bcn-inclusive-coding/ (Accessed: 7 December 2021)

Barcelonadot (2021) Informe sobre la confianza y ciberseguridad en España y en la Unión Europea / ObservaCiber. Barcelonadot. [online] Available at: https://www.barcelonadot.com/informe-sobre-la-confianza-y-ciberseguridad-en-espana-y-en-la-union-europea-observaciber/ (Accessed: 7 December 2021)

BIT Habitat (2021) Agents TIC. [online] Available at: https://bithabitat.barcelona/projectes/agents-tic-2/ (Accessed: 7 December 2021)

Borràs Pentinat, S. (2013) La justicia climática: entre la tutela y la fiscalización de las responsabilidades. Anuario Mexicano de Derecho Internacional, 13. [online] Available at: https://www.sciencedirect.com/science/article/pii/S1870465413710389 (Accessed: 7 December 2021)

C40 Cities (2021) Mayor Ada Colau. [online] Available at: https://www.c40.org/steering-committee/mayor-ada-colau/ (Accessed: 7 December 2021)

CatSalut (2021) La Meva Salut. [online] Available at: https://catsalut.gencat.cat/ca/serveis-sanitaris/la-meva-salut/ (Accessed: 7 December 2021)

CCCB LAB (2013) From Smart City to SmartCitizens. [online] Available at: https://lab.cccb.org/en/from-smart-city-to-smartcitizens/ (Accessed: 7 December 2021)

Centro Criptológico Nacional. CCN-CERT (2021) Ciberamenazas y Tendencias Edición 2021. CCN-CERT. [PDF] Available at: https://www.ccn-cert.cni.es/informes/informes-ccn-cert-publicos/6338-ccn-cert-ia-13-21-ciberamenazas-y-tendencias-edicion-2021-1/file.htm (Accessed: 30 December 2021)

Cia, B. and Moncloa Allison, G. (2021) La Generalitat suspende el certificado covid en bares y gimnasios por el colapso de la web como mínimo hasta el lunes. [online] Available at: https://elpais.com/espana/catalunya/2021-11-26/colapso-en-la-web-de-la-generalitat-para-descargar-el-certificado-covid-durante-las-primeras-horas-de-su-aplicacion.html (Accessed: 30 December 2021)

Cibernàrium (2016) Curso online – Seguridad en la red. [online] Available at: https://cibernarium.barcelonactiva.cat/es/ficha-actividad?activityId=1070228 (Accessed: 7 December 2021)

Círculo de Economía (2020) Barcelona capital global de l'humanisme tecnològic: Un nou relat de ciutat. [Video] Available at: https://www.youtube.com/watch?v=vmNsdNOdCao&t=671s (Accessed: 7 December 2021)

Coll, B. (2021) Poblenou inicia su propio referéndum para frenar el proyecto del barrio 22@. El País. [online] Available at: https://elpais.com/espana/catalunya/2021-06-19/poblenou-inicia-su-propio-referendum-para-frenar-el-proyecto-del-barrio-22.html (Accessed: 7 December 2021)

Colom, C. (2021) El (necesario) paso al frente del humanismo tecnológico. Ethic. [online] Available at: https://ethic.es/2021/12/el-necesario-paso-al-frente-del-humanismo-tecnologico/ (Accessed: 30 December 2021)

Consell de l'Audiovisual de Catalunya (2020) CAC launches campaign to combat misinformation and encourage responsible screen use during lockdown. [online] Available at: https://www.cac.cat/en/actualitat/cac-launches-campaign-combat-misinformation-and-encourage-responsible-screen-use-during (Accessed: 7 December 2021)

Costopulos, G. and Lal, A. (2020) The overlooked toll of Covid-19: 47 million more women face poverty. LSE. [online] Available at: https://blogs.lse.ac.uk/covid19/2020/12/03/the-overlooked-toll-of-covid-19-47-million-more-women-face-poverty/ (Accessed: 7 December 2021)

Crenshaw, K. (1991) Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color. Stanford Law Review, 43(6). [online] Available at: https://doi.org/10.2307/1229039 (Accessed: 7 December 2021)

Cuadernos de Seguridad (2020) La privacidad, la gran olvidada en plena era digital. Cuadernos de seguridad. [online] Available at: https://cuadernosdeseguridad.com/2020/02/privacidad-total-usuario-seguridad/ (Accessed: 7 December 2021)

Dades x Comerç (2021) [online] Available at: https://dadesxcomerc.cat/ (Accessed: 7 December 2021)

DESI (2021) Evolución DESI Catalunya 2019-2020. [online] Available at: https://desi.cat/es/2020/evolucion-desi-catalunya-2019-2020.php (Accessed: 7 December 2021)

Digital Future Society (2020a) Dealing with disinformation: Strategies for digital citizen empowerment. Barcelona, Spain. [PDF] Available at: https://digitalfuturesociety.com/report/dealing-with-disinformation/ (Accessed: 9 February 2022)

Digital Future Society (2020b) Digital platform work in Spain: what do we know? [PDF] Available at: https://digitalfuturesociety.com/report/digital-platform-work-in-spain-what-do-we-know/ (Accessed: 7 December 2021)

Digital Future Society (2020c) Gender bias in data: Towards gender equality in digital welfare. [PDF] Available at: https://digitalfuturesociety.com/report/hacia-la-igualdad-de-genero-en-el-estado-de-bienestar-digital/ (Accessed: 7 December 2021)

Digital Future Society (2020d) Measuring the margins: Improving global digital inclusion metrics. [PDF] Available at: https://digitalfuturesociety.com/report/un-marco-para-medir-la-inclusion-digital-a-nivel-mundial/ (Accessed: 7 December 2021)

Digital Future Society (2020e) Policy brief: emerging technologies, a lever to tackle urban challenges in the climate decade. [online] Available at: https://digitalfuturesociety.com/report/policy-brief-emerging-technologies-a-lever-to-tackle-urban-challenges-in-the-climate-decade/ (Accessed: 30 December 2021)

Digital Future Society (2020f) Risks and opportunities of emerging tech in the climate decade. [PDF] Available at: https://digitalfuturesociety.com/report/risks-and-opportunities-of-emerging-tech-in-the-climate-decade/ (Accessed: 30 December 2021)

Digital Future Society (2021) Platform-to-business regulation. [PDF] Available at: https://digitalfuturesociety.com/report/platform-to-business-regulation/ (Accessed: 7 December 2021)

Digital Future Society (2022) Reflections on what it means to be the capital of technological humanism. [To be published]

El Periódico (2020) Terrassa pone en marcha nueve puntos de orientación social para hacer frente a la brecha digital. El Periódico. [online] Available at: https://www.elperiodico.com/es/terrassa/20201112/terrasa-pone-en-marcha-nueve-puntos-de-orientacion-social-para-hacer-frente-a-la-brecha-digital-8200265 (Accessed: 7 December 2021)

El Periódico (2021) Una brecha en la web de vacunación de Catalunya expone los datos personales de los ciudadanos. El Periódico. [online] Available at: https://www.elperiodico.com/es/sanidad/20210712/web-vacuna-covid-catalunya-ciberataque-11904648 (Accessed: 7 December 2021)

Estaràs Ferragut, R. (2020) COVID-19 and digitalisation. European Parliament, Parliamentary questions. [online] Available at: https://www.europarl.europa.eu/doceo/document/E-9-2020-006272_EN.html (Accessed: 7 December 2021)

European Commission (2020) Recovery plan for Europe. [online] Available at: https://ec.europa.eu/info/strategy/recovery-plan-europe_en (Accessed: 7 December 2021)

European Commission (2021a) Europe's Digital Decade: digital targets for 2030. [online] Available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en (Accessed: 7 December 2021)

European Commission (2021b) The Digital Economy and Society Index (DESI). [online] Available at: https://digital-strategy.ec.europa.eu/en/policies/desi (Accessed: 7 December 2021)

European Commission (2021c) Urban development. [online] Available at: https://ec.europa.eu/regional_policy/en/policy/themes/urban-development/ (Accessed: 7 December 2021)

Freitag, C., Betners-Lee, M., Widdicks, K., Knowles, B., Blair, G. and Friday, A. (2021) The real climate and transformative impact of ICT: A critique of estimates, trends and regulations. Patterns. [online] Available at: https://www.sciencedirect.com/science/article/pii/S2666389921001884 (Accessed: 30 December 2021)

Fundéu RAE (2020) infodemia, neologismo válido. [online] Available at: https://www.fundeu.es/recomendacion/infodemia/ (Accessed: 30 December 2021)

Generalitat de Catalunya (2020) Pla d'educació digital de Catalunya 2020–2023. [PDF] Available at: https://educacio.gencat.cat/web/.content/home/departament/publicacions/colleccions/pla-educacio-digital/pla-educacio-digital-catalunya/pla-educacio-digital.pdf (Accessed: 7 December 2021)

Generalitat de Catalunya (2021) La transformación digital en la Administración de la Generalitat. [PDF] Available at: https://administraciodigital.gencat.cat/web/.content/ambit/administracio-digital/que-es-administracio-digital/La-transformacion-digital-en-la-Administracion-de-la-Generalitat.pdf (Accessed: 7 December 2021)

GICC (2021) Climate change 2021: The physical science basis. [PDF] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf (Accessed: 7 December 2021)

Gobierno de España (2020) Plan España Digital 2025: Conectándonos al futuro. [PDF] Available at: https://www.lamoncloa.gob.es/presidente/actividades/Documents/2020/230720-Espa%C3%B1aDigital_2025.pdf (Accessed: 7 December 2021)

Gobierno de España (2021a) España 2050: Fundamentos y propuestas para una Estrategia Nacional de Largo Plazo. [PDF] Available at: https://www.lamoncloa.gob.es/presidente/actividades/Documents/2021/200521-Estrategia_Espana_2050.pdf (Accessed: 7 December 2021)

Gobierno de España (2021b) Plan de Digitalización de las Administraciones *Públicas 2021–2025*. [PDF] Available at: https://portal.mineco.gob.es/RecursosArticulo/mineco/ministerio/ficheros/210127_plan_digitalizacion_administraciones_publicas.pdf (Accessed: 7 December 2021)

Gobierno de España (2021c) El Gobierno aprueba el 'Plan de choque de ciberseguridad' en el marco de un nuevo paquete de medidas ante las ciberamenazas. [online] Available at: https://portal.mineco.gob.es/es-es/comunicacion/Paginas/210525_np_ciberseguridad.aspx (Accessed: 7 December 2021)

Gómez, S. and Panadero, H., (2021) La bretxa digital en les persones ateses per entitats socials. Taula del Tercer Social de Catalunya y Fundació Ferrer i Guàrdia. [online] Available at: https://www.tercersector.cat/documents/la-bretxa-digital-en-les-persones-ateses-les-entitats-socials (Accessed: 30 December 2021)

Grisolia, J. (2020) La revolución digital y el futuro del trabajo. Ideides, 55. [online] Available at: http://revista-ideides.com/la-revolucion-digital-y-el-futuro-del-trabajo/ (Accessed: 7 December 2021)

GSMA. (2021) The Mobile Gender Gap: Report 2021. [PDF] Available at: https://www.gsma.com/r/wp-content/uploads/2021/06/The-Mobile-Gender-Gap-Report-2021.pdf (Accessed: 7 December 2021)

Gutiérrez-Rubí, A. (2016) El peligro de ciudades demasiado inteligentes y poco humanas. El País. [online] Available at: https://elpais.com/elpais/2016/04/13/planeta_futuro/1460545060_075298.html (Accessed: 7 December 2021)

Gutiérrez Urbano, J. (2010) La urbanización del mundo. Papeles de relaciones ecosociales y cambio global, 111, 41-55. [PDF] Available at: https://www.fuhem.es/papeles_articulo/la-urbanizacion-del-mundo/ (Accessed: 7 December 2021)

Higuera, A. (2021) La gravedad del ciberataque a la Universidad Autónoma de Barcelona: Hay más de 650.000 archivos comprometidos. 20 Minutos. [online] Available at: https://www.20minutos.es/tecnologia/ciberseguridad/la-gravedad-del-ciberataque-a-la-universidad-autonoma-de-barcelona-hay-mas-de-650-000-archivos-comprometidos-4866682/ (Accessed: 7 December 2021)

Iborra, Y. (2017) Mujer de mediana edad y sin estudios, el usuario tipo de los servicios sociales de Barcelona. elDiario.es. [online] Available at: https://www.eldiario.es/catalunya/barcelona/mujer-estudios-servicios-sociales-barcelona_1_3519323.html (Accessed: 30 December 2021)

ICEX. (2020) Las infraestructuras de España ocupan el puesto 7 mundial. Investin Spain. [online] Available at: https://www.investinspain.org/es/por-que-espana/infraestructuras (Accessed: 7 December 2021)

Inkan. (2021) Home. [online] Available at: https://inkan.media/es/home-espanol (Accessed: 7 December 2021)

Instituto de Estadística de Cataluña (2021) Households with access to Internet. [online] Available at: https://www.idescat.cat/indicadors/?id=ue&n=10144&lang=en (Accessed: 30 December 2021)

Instituto de la Mujer (2020). Covid y tecnología en clave de género: Seminario en línea. [online] Available at: https://www.inmujeres.gob.es/areasTematicas/SocInfo/SeminariosEncuentros/docs/Covid_Tecnologia_clave_Genero/PROGRAMA.pdf (Accessed: 7 December 2021)

Instituto Nacional de Estadística (2020) El teletrabajo en España y la UE antes de la Covid-19. Cifras INE. [online] Available at: https://www.ine.es/ss/Satellite?L=es_ES&c=INECifrasINE_C&cid=1259952649680&p=1254735116567&pagename=ProductosYServicios%2FINECifrasINE_C%2FPYSDetalleCifrasINE (Accessed: 7 December 2021)

Instituto Nacional de Estadística (2021) Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. [PDF] Available at: https://www.ine.es/prensa/tich_2021.pdf (Accessed: 30 December 2021)

La Guaita (2021) Servicio de digitalización para comercios de Castelldefels. [online] Available at: https://laguaita.org/servicio-digitalizacion-comercios-castelldefels/ (Accessed: 7 December 2021)

López Gutiérrez, J., Sánchez Jiménez, F., Herrera Sánchez, D., Martínez Moreno, F., Rubio García, M., Gil Pérez, V., Santiago Orozco, A. and Gómez Martín, M. (2020) Estudio Sobre la Cibercriminalidad en España. Dirección General de Coordinación y Estudios Secretaría de Estado de Seguridad. [PDF] Available at: http://www.interior.gob.es/documents/10180/11389243/Estudio+sobre+la+Cibercriminalidad+en+Espa%C3%B1a+2020.pdf/ed85b525-e67d-4058-9957-ea99ca9813c3 (Accessed: 30 December 2021)

Lucas, P. J., Robinson, R. and Treacy, L. (2020) What is Data Poverty? Nesta and YLab. [PDF] Available at: https://media.nesta.org.uk/documents/What_is_Data_Poverty.pdf (Accessed: 7 December 2021)

Merino, R., Sánches-Gelabert, A. and Yepes, L. (2021) Informe: Indicadores de Competencias Digitales y Empleabilidad. Observatorio de Competencias Digitales y Empleabilidad. [PDF] Available at: https://imancorpfoundation.org/wp-content/uploads/2015/12/INFORME-Indicadores-de-competencias-digitales-y-empleabilidad.pdf (Accessed: 30 December 2021)

Newman, N., Fletcher, R., Schulz, A., Andi, S. and Nielsen, R. (2020) Reuters Institute Digital News Report 2020. Instituto Reuters. [PDF] Available at: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2020-06/DNR_2020_FINAL.pdf (Accessed: 30 December 2021)

Newman, N., Fletcher, R., Schulz, A., Andi, S., Robertson, C. and Nielsen, R. (2021) Reuters Institute Digital News Report 2021. Instituto Reuters. [online] Available at: https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2021 (Accessed: 30 December 2021)

OBSAE (2021) Índice de Economía y Sociedad Digital (DESI). [online] Available at: https://administracionelectronica.gob.es/pae_Home/pae_OBSAE/Posicionamiento-Internacional/Comision_Europea_OBSAE/Indice-de-Economia-y-Sociedad-Digital-DESI-.html#.YYF6BxzOFPY (Accessed: 7 December 2021)

Observaciber (2021) Indicadores sobre confianza digital y ciberseguridad en España y la Unión Europea. Observaciber. [PDF] Available at: https://observaciber.es/sites/observaciber/files/media/documents/indicadoresconfianzadigitalyciberseguridadespa%C3%B1ayue_octubre2021.pdf (Accessed: 30 December 2021)

OECD (2020) Digital Transformation in the Age of COVID-19: Building Resilience and Bridging Divides. Digital Economy Outlook 2020 Supplement. [PDF] Available at: https://www.oecd.org/digital/digital-economy-outlook-covid.pdf (Accessed: 7 December 2021)

OXFAM Intermón (2019) Los hogares más ricos de España contaminan dos veces más que los más pobres. [online] Available at: https://www.oxfamintermon.org/es/nota-de-prensa/hogares-mas-ricos-espana-contaminan-dos-veces-mas-pobres (Accessed: 7 December 2021)

Porras Ferreyra, J. (2018) Un 'gran hermano' de Google en un barrio de Toronto. El País. [online] Available at: https://elpais.com/tecnologia/2018/07/23/actualidad/1532333647_806472.html (Accessed: 7 December 2021)

Pueyo Busquets, J. (2020) La Generalitat detecta 620 accesos en seis meses a sus sistemas a través de ciberataques. El País. [online] Available at: https://elpais.com/espana/catalunya/2020-07-17/la-generalitat-detecta-620-accesos-a-sus-sistemas-por-ciberataque.html (Accessed: 7 December 2021)

Qureshi, Z. (2021) Technology, growth, and inequality. Changing dynamics in the digital era. Global Economy and Development at Brookings. [PDF] Available at: https://www.brookings.edu/research/technology-growth-and-inequality-changing-dynamics-in-the-digital-era/ (Accessed: 7 December 2021)

Red.es and Ontsi (2020) Competencias digitales de los internautas: Análisis de datos INE 2020. [PDF] Available at: https://www.ontsi.es/sites/ontsi/files/2021-10/competenciasdigitalesinternautas2020.pdf (Accessed: 7 December 2021)

Refojos, M. (2021) El plan del sector TIC para digitalizar a 6 millones de españoles cuesta 900 millones. El Periódico. [online] Available at: https://www.elperiodico.com/es/activos/20210423/plan-sector-tic-digitalizar-6-11676724 (Accessed: 30 December 2021)

Remacha, B. and Ordaz, A. (2019) Casi un tercio de la población española vivirá concentrada en Madrid y Barcelona dentro de 15 años. elDiario.es. [online] Available at: https://www.eldiario.es/sociedad/espana-vaciada-poblacion-madrid-barcelona_1_1677170.html (Accessed: 7 December 2021)

Rodríguez, E. (2021) La transición energética no se logrará porque la gente se haga ambientalista, sino porque es más barata, limpia y justa. Heraldo. [online] Available at: https://www.heraldo.es/noticias/sociedad/2021/11/03/la-transicion-energetica-no-se-lograra-porque-la-gente-se-haga-ambientalista-sino-porque-es-mas-barata-limpia-y-justa-pep-canadell-cambio-climatico-1530974.html?autoref=true (Accessed: 7 December 2021)

Rodríguez, P. and Oliveres, V. (2021) La vacunación también va por barrios: El mapa de Barcelona que muestra diferencias entre ricos y pobres. elDiario.es. [online] Available at: https://www.eldiario.es/catalunya/vacunacion-barrios-mapa-barcelona-muestra-diferencias-ricos-pobres_1_7953642.html (Accessed: 7 December 2021)

Ruiz-Almar, E. and Marco, C. (2021) Característiques de la renda a l'Àrea Metropolitana de Barcelona. [online] Available at: https://www.researchgate.net/publication/351747871_Caracteristiques_de_la_renda_a_l%27Area_Metropolitana_de_Barcelona_2018 (Accessed: 7 December 2021)

Sainz, M., Arroyo, L. and Castaño C. (2020) Mujeres y digitalización. De las brechas a los algoritmos. Instituto de la Mujer. [PDF] Available at: https://www.inmujeres.gob.es/diseno/novedades/M_MUJERES_Y_DIGITALIZACION_DE_LAS_BRECHAS_A_LOS_ALGORITMOS_04.pdf (Accessed: 30 December 2021)

Salvador, R. (2019) Barcelona, la tercera ciudad europea preferida para crear una 'start-up'. La Vanguardia. [online] Available at: https://www.lavanguardia.com/economia/20191122/471782741103/barcelona-crear-starup-ciudades-europa-ranking.html (Accessed: 7 December 2021)

Schmidt, P. (2020) Opinion of the European Economic and Social Committee on Leaving no one behind when implementing the 2030 Sustainable Development Agenda. Official Journal of the European Union, C 47/30. [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019IE2446 (Accessed: 7 December 2021)

Schwab, K. and Zahidi, S. (2020) The Global Competitiveness Report. How Countries are Performing on the Road to Recovery. World Economic Forum. [PDF] Available at: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2020.pdf (Accessed: 7 December 2021)

Smit, S., Tacke, T., Lund, S., Manyika, J. and Thiel, L. (2020). The future of work in Europe. McKinsey Global Institute. [PDF] Available at: https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organisations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf (Accessed: 30 December 2021)

Solé, M. (2021) Administración digital: Hacia la digitalización del sector público. Captio. [online] Available at: https://www.captio.net/blog/digitalizacion-administracion-publica (Accessed: 7 December 2021)

The Cocktail Analysis (2020) Panorama actual de la ciberseguridad en España. [PDF] Available at: https://www.ospi.es/export/sites/ospi/documents/documentos/Seguridad-y-privacidad/Google_Panorama-actual-de-la-ciberseguridad-en-Espana.pdf (Accessed: 7 December 2021)

UN Climate Change (2021) Glasgow climate change conference – October–November 2021. [online] Available at: https://unfccc.int/es/node/307746 (Accessed: 7 December 2021)

UN-Habitat (2020) World Cities Report 2020: The Value of Sustainable Urbanisation. [PDF] Available at: https://unhabitat.org/sites/default/files/2020/10/wcr_2020_report.pdf (Accessed: 7 December 2021)

United Nations (2019) Cities: a 'cause of and solution to' climate change. UN News. [online] Available at: https://news.un.org/en/story/2019/09/1046662 (Accessed: 7 December 2021)

Verificat (2021) Home. [online] Available at: https://www.verificat.cat/es (Accessed: 7 December 2021)

Victoria-Mas, M. (2020) Factsheet: News consumption patterns and misinformation perceptions during the Covid-19 crisis in Spain. Charlemagne Prize Academy. [online] Available at: https://www.charlemagneprizeacademy.com/en/publications/factsheet-news-consumption-patterns-and-misinformation-perceptions-during-the-covid-19-crisis-in-spain (Accessed: 30 December 2021)

World Bank (2020) Urban Development. [online] Available at: https://www.worldbank.org/en/topic/urbandevelopment (Accessed: 7 December 2021)

Xnet (2019) Educación: Para la excelencia en la privacidad de datos y la digitalización democrática. [online] Available at: https://xnet-x.net/es/privacidad-datos-digitalizacion-democratica-educacion-sin-google/ (Accessed: 7 December 2021)

Zheng, Y. and Walsham, G. (2021) Inequality of what? An intersectional approach to digital inequality under Covid-19. Information and Organisation, 31(1). [online] Available at: https://www.sciencedirect.com/science/article/pii/S1471772721000075 (Accessed: 7 December 2021)

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