Gender, data protection & the smart city: Exploring the role of DPIA in achieving equality goals

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Abstract

When reflecting upon the role of law as an instrument influencing urban planning and shaping urban environments, the most immediate link is to environmental and urban legislation. Nevertheless, data protection law is increasingly expected to affect the future development of urban realities in the European Union (EU). Being actual "data cities", current smart cities have been significantly affected by the entry into force of the General Data Protection Regulation (GDPR). In particular, the Data Protection Impact Assessment (DPIA) is increasingly portraited as a solution to address the countless fundamental rights challenges arising from the personal data processing operations occurring in the context of smart cities, inter alia due to its participatory element. However, is DPIA a suitable approach to making smart cities more inclusive, and specifically to empower women of diverse races, backgrounds, sexual orientations and abilities? Enquiry into the ways in which smart cities, where urban and data protection challenges merge, might exacerbate dynamics of oppression against women, and how European data protection law could address these challenges, is still lacking. The objective of this article is to begin such a discussion.

Introduction

Cities have a twofold connotation for women, being at the same time places of "opportunity, liberation, and reinvention" and sites of "fear, danger, and violence" (Baskaradas and Reilly, 2019). As women are not a homogeneous group, factors other than their gender, such as their race, age, social status, ability or sexual orientation, shape their identities and impact how they experience the city and the technologies deployed therein (Chamallas, 2014; Crenshaw, 1989). Since the last decade of the 20th century, cities have been developing strategies to promote

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equality between women and men and to combat discrimination. Despite these efforts and the existence of anti-discrimination laws and policies at a European, national, and even local level, urban environments still tend to reflect mostly the one-sided perspective of able-bodied, cisgender, heterosexual (and, at least in Europe, white) men, and therefore tend to perpetuate and reinforce gender and other inequalities (Baskaradas and Reilly, 2019; Kern, 2020; Sangiuliano, 2018; World Bank Group, 2020). For instance, the separation of commercial/industrial zones from residential areas is not only rooted in concern for protection of health, but also in a strict distinction between public and private spheres. Likewise, basing public transportation schemes predominately on commuting patterns between residential and commercial/industrial areas, to the detriment of different travel needs, is not a neutral choice. Nor is privileging fast mobility solutions (i.e., cars) instead of others (e.g., foot or bike) in road design. They are the legacy of traditional sex-based divisions of labour that prioritise the needs of men as breadwinners who actively engage in the public sphere downtown and whose transportation needs are considered the norm, all to the detriment of women, who are considered mainly as caregivers to be secluded in private spaces in suburbs, whose mobility constraints (e.g., impossibility of affording a car or need for a widespread public transportation scheme) can be overlooked (Hayden, 1980). Despite gender roles nowadays being less sharply defined as in the past, these planning choices still impact the lives of women, and more generally persons on lower incomes, with reduced mobility or with caregiving tasks.

At the same time, since the 1980s, cities have allegedly become "smart", their traditional material infrastructures (e.g., public transport, water, sewage) having been complemented by digital networks (Glasmeier and Christopherson, 2015). Nowadays, smart cities rely so much on the processing of data, usually produced by individuals (Picon, 2019), to the extent that they can be considered "data cities" (Powell, 2014). Consequently, smart cities in the European Union (EU) have been significantly affected by the entry into force of the General Data Protection Regulation (GDPR). The cornerstone of European personal data protection law, the GDPR replaced the former Data Protection Directive 95/46/EC in 2016, becoming fully applicable in 2018. With the economy becoming more and more digital and data-driven, the old patchwork of national data protection rules had to be harmonised to facilitate the free flow of personal data across borders while protecting the rights and freedoms of the individuals (or data subjects, in data protection jargon) to whom the information refers (European Union Agency For Fundamental Rights, European Court of Human Rights, and European Data Protection Supervisor, 2018). The GDPR qualifies the entities engaging in personal data processing operations mainly as controllers, when they determine how and why personal data are processed (Article 4(7) GDPR), or processors, when they simply process data on behalf of the controllers, following their instructions (Article 4(8) GDPR) (Jasmontaite-Zaniewicz et al., 2021). The Regulation introduced many novelties in the EU data protection

law landscape, like new rights for data subjects (e.g., data portability) and new obligations, especially for controllers. Among them, the duty under Article 35 GDPR to perform a Data Protection Impact Assessment (DPIA), when engaging in personal data processing operations "likely to result in a high risk to the rights and freedoms of natural persons". These DPIAs entail a "risk assessment [*of the envisaged processing operations*] bearing in mind the different nature of the rights and after conducting a balancing test [*of the different rights at stake*]" (Mantelero, forthcoming).

Accordingly, smart city actors (e.g., citizens, municipalities, governmental authorities, IT and telecommunication companies, industries, community groups) (Lea, 2017) can be qualified either as controllers, processors or data subjects. And, specifically, when engaging in highly risky processing operations (for instance, those entailing systematic monitoring of a publicly accessible area on a large scale) as data controllers, they are now legally required to perform a DPIA.

Studies on how urban environments, including their design and planning, can affect women's lives in various aspects, ranging from safety to career-related choices and use of publicly available spaces, have multiplied (Hayden, 1980; Huning, 2020; Kern, 2020; Wekerle, 1984). Interest in data protection scholarship in the smart city is growing (Breuer et al., 2019; Christofi, 2020; Christofi and Verdoodt, 2019; Edwards, 2016; Goodman and Powles, 2019), as well as works incorporating a feminist perspective into data protection (Theilen et al., 2021). Yet, investigation is still lacking on how smart cities, where urban and data protection challenges merge, could exacerbate dynamics of oppression against women (of diverse races, backgrounds, sexual orientations or abilities), and how European data protection law could address these challenges. The objective of this article is to open the discussion, drawing on an interdisciplinary desk analysis of (feminist) legal and urban studies and geography literature, as well as policy documents and legal sources.

After providing an overview of the state of the art in terms of gender mainstreaming in European cities, I will demonstrate how the smart city context is prone to exacerbate oppression against women. I will then suggest how to use the DPIA under the GDPR as a means to shape smart city initiatives, projects and technologies in order to achieve equality goals.

The emergence and evolution of the concept of gender mainstreaming in cities

Whereas space planning had already started to be analysed through feminist lenses by the end of the 1970s (Hayden, 1980; Wekerle, 1984), it is only from the last decade of the 20th century that cities have been incorporating gender mainstreaming strategies in urban planning (Huning, 2020). Generally speaking, gender mainstreaming is the integration of a gender "perspective into the preparation, design, implementation, monitoring, and evaluation of

policies, regulatory measures, and spending programmes, to promote equality between women and men and combating discrimination" (European Institute for Gender Equality, n.d.-a). This gender mainstreaming approach at a local level fits into the broader international and European debate on gender mainstreaming, whose most important milestones include the 3rd United Nations World Conference on Women in Nairobi (1985), the 4th United Nations World Conference on Women in Beijing (1995) and the entry into force of the Treaty of Amsterdam (1999) (GenderKompetenzZentrum, 2010). In Europe, the city of Vienna has been a pioneer of gender mainstreaming applied at spatial planning (or gender planning). Starting from the late 1990s, based on the collection of disaggregated information as to how male and female citizens were using public transportation, and boys and girls were enjoying urban parks, decision-makers shaped urban design, policies, and planning (Criado Pérez, 2019; Damyanovic et al., 2013; Huning, 2020; Kern, 2020). In the following years, other cities, including Berlin, Barcelona, Stockholm and Brussels, followed Vienna's example (Ajuntament de Barcelona, 2021; Région de Bruxelles-Capitale, 2021; The Innovation in Politics Institute, 2021; Women's Advisory Committee of the Senate Department for Urban Development, 2011). Even at a global level, international organisations urged cities to mainstream the gender dimension in urban planning and design (Alber, 2015; Puri, 2015; World Bank Group, 2020).

In the last few years, gender mainstreaming has evolved towards a more intersectional perspective (Crenshaw, 1989; Lutz, 2015; Région de Bruxelles-Capitale, 2021; World Bank Group, 2020). Indeed, the sole "gender" perspective, other than building upon the binarism "male/female", neglects the differences, for instance in terms of race, age, social status, ability, sexual orientation, within the group "women". Conversely, an intersectional approach allows for "studying, understanding and responding to the ways in which sex and gender intersect with other personal characteristics/identities, and how these intersections contribute to unique experiences of oppression and privilege" (Symington, 2004, p. 1).

Regrettably, notwithstanding the greater attention demonstrated at the EU level towards the inclusivity of smart cities (EIP-SCC Action Clusters on Citizen Focus and Integrated Planning Policy & Regulation, ERRIN (European Regions Research and Innovation Network), and ICLEI (Local Governments for Sustainability) 2016), not all urban environments in the EU and globally are proceeding at the same pace. In many instances, gender planning has been reduced to a mere *attempt* to incorporate diverse needs in the planning, instead of challenging the deeper structural questions of inclusion and exclusion (Huning, 2020). This attitude undermines not only the effective exercise of human rights of certain vulnerable categories of people, but also the overall achievement of the sustainable development goals enshrined in the 2030 Agenda for Sustainable development (United Nations General Assembly, 2015). Indeed, to be sustainable from a social point of view, smart cities initiatives need to contribute, *inter alia*, to equity, empowerment, and participation of all their citizens (Buckingham, 2016; Mensah, 2019).

Smart cities: beyond data protection concerns

Being aware that multiple conflicting definitions of "smart city" exist, in this article, I understand "smart cities" as those urban realities whose digital infrastructure builds upon the large-scale deployment of sensors, embedded in Internet of Things (IoTs) devices, extensive use of big data analytics and cloud computing (Edwards, 2016; Woo, 2017).

In smart cities, the right to personal data protection acquires a collective dimension, considering the impact that data processing has on the public (Mantelero, 2016). For instance, the large-scale deployment of potentially very intrusive technologies in smart cities (e.g., CCTV cameras embedded with facial recognition functionalities) could determine a chilling effect and thus deter the exercise of other fundamental rights (e.g., right to assembly) (Christofi and Verdoodt, 2019; Degli Esposti, 2014; Finch and Tene, 2014).

As mentioned above, in data protection jargon smart city actors can be grouped into the three main categories: controllers, processors and data subjects. Whereas citizens are essentially data subjects, defining the role of other smart cities actors regarding data processing is not so straightforward. Often, municipalities and tech providers are both controllers and processors, processing data for joint or own purposes (Breuer et al., 2019). Their roles can change depending on the type of data or on the processing operations, too. This is crucial because controllers have additional data protection duties compared with processors (like addressing data subjects requests or performing a DPIA). Therefore, uncertainty over controllership poses problems of legal compliance obligations, jeopardising the overall effectiveness of the data protection legal framework. In parallel, uncertainty undermines citizens' empowerment insofar as citizens, as data subjects, may not know against whom they ought to bring their claims (Calvi, 2021; Christofi and Verdoodt, 2019; Goodman and Powles, 2019).

At the same time, the GDPR attributes the final responsibility to controllers, implying that they are in the most powerful position within the processing (Van Alsenoy, 2017). However, this is not necessarily true in a smart city (Breuer et al., 2019). In the urban context, public entities need data to make policy decisions and provide services but often lack the resources to develop their tools and perform analytics. That is why they rely on private entities for these activities. Yet, in this way, private entities are in the position to influence policymaking, especially by having a say on the technologies to be deployed, and even by limiting access to the raw information they process or to the models used for that processing. This practice can hinder the detection of bias, deriving for instance from input data or the model itself, and thus mislead policymakers towards the adoption of discriminatory policies (Kaminski and Malgieri, 2021; Weber, 2015). Thus, private entities may formally qualify as processors, whilst being in the position of substantially influencing the choices of public entities formally qualified as data controllers. Citizens, who produce data and whose interest should be put at the centre of urban design and planning, are *de facto* in the most vulnerable

position (Breuer et al., 2019; Christofi, 2020; Delcroix, 2017; Goodman and Powles, 2019). Considering that in order to be democratic from a substantive point of view local governments must promote the common welfare of people (Bühlmann and Kriesi, 2013), the fact that neither local governments nor citizens can fully control the information undermines democracy in a smart city context.

Therefore, extensive (personal) data processing could undermine the social sustainability of a city, too. Albeit the link between sustainability and (personal) data protection has started to be explored at an academic level (Ben-Shahar, 2019; Gellert, 2015; Malgieri and van Der Linden, 2020), practitioners and international organisations often underestimate it. For example, the key performance indicators (KPIs) on smart sustainable cities elaborated by the International Telecommunication Union (ITU) (Smiciklas et al., 2017) deal with privacy issues very marginally and do not even mention the right to personal data protection.

Addressing the fundamental rights challenges in smart cities: the DPIA

Considering that the rationale behind the right to personal data protection is to address the power imbalances between individuals and public and private entities who collect their data by promoting transparency and accountability (De Hert and Gutwirth, 2006), data protection law could be used to remedy the structural inequalities and power imbalances existing in the smart city context. As mentioned above, for this contribution I will focus on a specific tool introduced by the GDPR, namely the Data Protection Impact Assessment (DPIA).

Under Article 35 GDPR, data controllers are now requested to perform a risk appraisal of the processing operations they are envisaging, when these entail high risk for the rights and freedoms of natural persons, together with an assessment of their necessity and proportionality. While doing so, they shall also consult data subjects, where appropriate. The legal obligation to conduct a prior DPIA represents a novelty in the EU data protection law landscape as introduced by the GDPR (Kloza et al., 2019). Because of this, the academic literature is very limited (Kloza et al., 2017, 2019, 2020; Kosta, 2020; Mantelero, forthcoming), as well as case law (CMS.Law, n.d.; Kosta, 2020). Conversely, more practical guidance on (certain aspects of) DPIA has been issued by EU data protection regulators, such as the European Data Protection Board (former Article 29 Working Party) and the European Data Protection Supervisor, as well as national Data Protection Authorities (DPAs) (Kloza et al., 2020).

Admittedly, the DPIA has significant drawbacks. In practice, it has been considered mainly as a compliance exercise, focused on data security risks and issues related to the control over personal information, rather than on the broader social and ethical challenges arising from the processing operations that are particularly relevant in the smart cities context

(Koops, 2014; Mantelero 2018, forthcoming). The DPIA has also been criticised for leading to excessive bureaucratisation, high costs and delays in decision making (Kloza et al., 2017). Academics have also noted that the model of controllers assessing their own risk could incentivise deliberate risk underestimation, to avoid the adoption of burdensome risk mitigation measures and ultimately the scrutiny of a DPA, mandatory under Article 36 GDPR when a DPIA suggests the existence of residual high risk (Binns, 2017; Mantelero, forthcoming). In addition, the capacity for sufficient independent scrutiny for DPIA-related violations by DPAs has been put into question, as well as the sufficiency of the formulation of Article 35(9) GDPR in terms of the consultation of data subjects (Binns, 2017). Finally, GDPR safeguards do not apply when the data processed are not personal (Van Brakel, 2021), as it can be argued for certain information processed by smart city technologies.

Despite this, scholars and regulators are still optimistic about the potentiality of DPIA to address the fundamental rights challenges arising from the personal data processing operations occurring in the context of smart cities (Autoriteit Persoongegevens, 2020, 2021; Christofi, 2020; Edwards, 2016). It has been noted that DPIA represents not only a form of "monitored self-regulation" for data controllers but also a tool for the protection of individual rights whose potential is still underexplored (Kaminski and Malgieri, 2021). Furthermore, contrary to other forms of impact assessment (e.g., Gender Impact Assessment, Privacy Impact Assessment), the DPIA is legally binding, and failing to perform one could result in high sanctions under Article 83(4) GDPR (Kloza et al., 2019).

How smart cities can exacerbate dynamics of oppression against women

Twofold oppression for women in the smart city, as females and as data subjects

Feminism is concerned with the differences of power between men and women, arguing that inequalities experienced by women are rooted in social institutions that defend and perpetuate this subordination relation (Levit and Verchick, 2006; MacKinnon, 1983, 1991). The smart city, like other social institutions, embeds power imbalances, in which gender and other factors play a role. As mentioned above, in a smart city context the most powerful actors are in general the private companies that develop technologies or perform big data analytics, and that therefore have control of (raw) information, together with the municipalities and governmental authorities who are formally the decision-makers.

Yet, in both tech sectors and politics, women are underrepresented. On the one hand, in Europe the tech sector is still predominantly male, white, cisgender, and this lack of diversity affects the development of technologies under several profiles (Mulyaningrum et al., 2007). On the other, a report from the European Institute for Gender Equality (EIGE) pointed out that women accounted for 34.1% of members of local assemblies across the EU, and 17.2% of mayors or council leaders (European Institute for Gender Equality, 2021), while

information concerning the race, sexual orientation or ability of these politicians were not available. Among the reasons for this underrepresentation is the fact that due to existing sexism women still face more difficulties in being included in election lists, struggle to fund their electoral campaigns, tend to be disproportionately burdened with care-giving tasks, all of which deprive them of the time to dedicate to politics alongside their jobs (European Women's Lobby, 2021). For women belonging to minority groups, women with disabilities, lesbians or transgender women, the challenges multiply, because in addition to having to deal with sexism, they need to deal with forms of racism, ableism, homophobia and transphobia.

Therefore, although women represent 51% of the entire EU population (Eurostat, 2022), their stereotypical role in the smart city is just "regular" citizens (data subjects) rather than decision-makers or entities in control of information (Christofi and Verdoodt, 2019). Compared with their male counterparts, female citizens are thus more oppressed owing to their double condition as "female" and as "data subject". In addition, their sense of fear and need for safety mean that women can be coerced to accept enhanced forms of surveillance (e.g., agree to live in areas with extensive deployment of CCTV cameras, download localisation apps on their mobile phone to be constantly tracked by a trusted person) (Abu-Laban, 2015; Kovacs, 2017). Admittedly, this claim represents a simplification, gender not being the only criterion to be taken into consideration in analysing the dynamics of oppression. For example, surveillance technologies deployed in smart cities, when implemented in "ghetto" neighbourhoods, may equally affect women and men belonging to certain ethnic communities or experiencing homelessness, and not being a concern for other, wealthier, women living in gentrified areas (Kern, 2020; Woo, 2017). Thus, depending on the situation, certain women (e.g., wealthy, belonging to majority groups) can even turn into oppressors against other women and men (e.g., not wealthy, belonging to minority groups) (Kern, 2020). Indeed, the categories of oppressors and oppressed are fluid (Chamallas, 2014; Kern, 2020), and the vulnerability of individuals depends on the context and circumstances (Luna, 2009; Malgieri and González Fuster, 2021).

Aggregation and data gap

Paradoxically, although smart cities build extensively upon data processing, women are very often victims of data gaps (Criado Pérez, 2019). Data informing urban design, planning and policy often aggregates gender and other factors, which makes it extremely difficult to detect hidden schemes of oppression that prejudice certain categories of people in local policies (Sangiuliano, 2018). Despite the example of Vienna demonstrating the importance of having gender-disaggregated data for more inclusive planning and design choices (for instance, to boost public transportation schemes and arrange playgrounds in a way to respond to the needs of women and girls), the practice of collecting such information is not that widespread among European cities (Criado Pérez, 2019; D'Ignazio and Klein, 2020c; Kern, 2020). Such

reluctance may derive from the fact that, historically, population data systems have been exploited to perpetuate severe human rights abuses (for example, in certain countries, the persecution against minorities was facilitated by meticulously collected census information) (Selzer and Anderson, 2001). Furthermore, the practice of aggregation may appear more privacy-friendly, even endorsed by the recent data protection reform. In particular, the processing of special categories of data listed in Article 9 and 10 GDPR (categories that to a certain extent overlap with the information that should be disaggregated in accordance with the intersectionality principle, because they include for instance racial or ethnic origin, genetic data, data concerning health or data concerning a natural person's sex life or sexual orientation) is generally forbidden, unless one of the exceptions foreseen in Article 9(2) and 10 GDPR applies. That is why it may appear more privacy-friendly, or at least less burdensome for legal compliance, to avoid processing this information. Yet, scholars have demonstrated that even aggregation could lead to human rights violations, noting how sensitive information needs to be used when decision models are built to ensure that they are not discriminatory (Žliobaitė and Custers, 2016).

Thus, in a smart city, women are, the same way as men, individuals that produce data, and whose privacy and personal data protection rights are limited, ostensibly to achieve the "common good". Indeed, privacy and personal data protection are fundamental but not absolute rights, meaning that "[e]specially in the context of smart cities, the right to the protection of personal data that individuals enjoy must be balanced with the several, and often important utility benefits for the city's collective good that are pursued by the processing" (Christofi and Verdoodt, 2019, p. 65). Article 52(1) Charter of Fundamental Rights of the European Union foresees that "[a]ny limitation on the exercise of the rights and freedoms recognised by this Charter must be provided for by law and respect the essence of those rights and freedoms. Subject to the principle of proportionality, limitations may be made only if they are necessary and genuinely meet objectives of general interest recognised by the Union or the need to protect the rights and freedoms of others". However, studies demonstrated that, when information is not disaggregated, women do not benefit from data processing - and therefore from limitations of their rights to privacy and personal data protection - as much as able-bodied, cisgender, heterosexual, white men do (Criado Pérez, 2019). Initiatives aimed at empowering women and girls were made possible only when data and statistics (for instance, on commuting patterns and use of public spaces) started to be disaggregated based on gender and age (Wotha, 2016). Similarly, for truly inclusive urban planning, able to identify hidden oppression schemes in otherwise apparently neutral initiatives, disaggregation should occur based on other grounds (e.g., abilities, sexual orientation, race). When processing is not based on disaggregated information, the "collective good" allegedly pursued in a smart city may not be actually collective, but rather invisibilise concerns of marginalised groups and perpetuate

existing oppression dynamics. Being aware of these risks is crucial insofar as they affect the premises and the outcomes of the exercise of balancing fundamental rights.

Lack of representation in technology development

In the past, certain feminist scholars adopted an anti-technology approach. This may have been because, to a certain extent, technology represents an expression of human control over nature, mirroring the domination of men on women reported by ecofeminists in the 1970s (Levit and Verchick, 2006). Regardless of the key role that scientists such as Ada Lovelace played in paving the way to programming and computation, the male domination of the tech sector contributed to legitimise this approach (D'Ignazio and Klein, 2020b; Hicks, 2017; Rodriguez Martinez and Gaubert, 2020). Nevertheless, this attitude was overturned with the rise of cyberfeminism (Mulyaningrum et al., 2007). Cyberfeminism takes feminism as its starting point and then focuses upon critically evaluating the impacts, positive and negative, of new technologies on the lives of women, exploring the intersection between gender identity, culture and technology (Mulyaningrum et al., 2007). Even at a European policy level, it is nowadays acknowledged that the digital revolution could simultaneously be an enabler for gender equality and a means to perpetuate new forms of cyber-violence against women (Prpic et al., 2019).

The smart city imaginary is based on the faith in technology to achieve the "common" good (Cugurullo, 2018). Yet, contrary to this rhetoric, technology is not *per se* positive, nor even neutral, as it embeds the values of a society and/or of its developers (Whelchel, 1986). Therefore, it can be used either to empower or oppress certain individuals and communities, wittingly or unwittingly. Thus, smart city technologies can also be used to empower or to oppress certain categories of citizens. For example, the increasing reliance on platform operators for several aspects of urban life (e.g., car-sharing, supply of care work), often showcased as a means to increase efficiency, accessibility and quality of life, can conversely reiterate oppression dynamics (Bauriedl and Strüver, 2020). An apparently neutral smart city initiative or technology, such as a public transportation scheme relying exclusively on smartphone applications, may cut off a portion of citizens who may need public transportation but who lack digital literacy, internet access, or who cannot afford a smartphone or simply wish to remain offline (Ranchordas, 2018, 2020, 2021; Woo, 2017). Digital literacy, internet access, and smartphone ownership are affected by factors such as gender, race, education and age, although making an estimation is impossible, considering that official EU statistics do not disaggregate information in that respect (Eurostat, 2021). Furthermore, the design of the technology itself could be non-inclusive. For example, when a smartphone application is not optimised for persons with a visual impairment or other forms of disability. Moreover, the rationale behind a technology could be non-inclusive. For example, producing technologies claiming to infer gender from facial features (e.g., to provide targeted advertising, or access to

certain services) would necessarily produce unfair outcomes towards transgender and non-binary people (Keyes, 2019). Other forms of gendering algorithms (e.g., attributing gender based on speech detection, interests analysis on social media) risk reinforcing stereotypes and, again, discriminate against non-binary users (Fosch-Villaronga et al., 2021).

Problems of inclusivity arise, *inter alia*, due to the lack of diversity among technology developers. Such lack of diversity is particularly problematic in the context of artificial intelligence (AI)-based solutions, that risk embedding and amplify bias. Bias can be defined as "outcomes which are systematically less favourable to individuals within a particular group and where there is no relevant difference between groups that justifies such harms" (Turner Lee et al., 2021, p. 5). Bias, or, to adopt a more critical intersectional terminology, oppression, may manifest in different phases of the development of technologies. For instance, at the in-processing stage, when the algorithm/model is itself biased, at the post-processing stage, when the outputs of the algorithm/model are biased, and at the pre-processing stage (Pitoura et al., 2021) where the data used to train an algorithm/model are either incomplete or unrepresentative (data gap) or conversely disproportionately abundant (data overload) (Buolamwini and Gebru, 2018; D'Ignazio and Klein, 2020a; Turner Lee et al., 2021). For instance, when facial recognition technologies are trained and tested predominantly on white males, they do not function adequately on women of colour (Buolamwini and Gebru, 2018). Similarly, when masculine voice patterns are used as training data, voice detectors do not recognise women's speech (Criado Pérez, 2019). Furthermore, the analysis of (big) data and their interpretation is an extremely complex activity, which may lead to inaccurate (and biased) results especially when the sources of data and the raw information are not widely accessible, and therefore not subject to external scrutiny, or the data suggest non-existent correlations (Voigt and Bright, 2016). For example, such a correlation might suggest that the suitability of a person to perform a job depends on her gender or race, or - more pertinent to the smart city context - that persons belonging to certain communities are prone to commit crimes, to legitimise the deployment of police patrols in urban areas where these persons live. Predictive policing systems, often portrayed as solutions to tackle the lack of resources of law enforcement authorities, have been extensively criticised because of the bias in the historical data (e.g., on arrests) used to train them. Indeed, considering the same (petty) crimes, persons belonging to minority groups, especially with a low income, are more likely to be reported than individuals belonging to majority groups with higher income (Finch and Tene, 2018).

The ability to detect hidden oppression schemes in historical data collected by smart city technologies, and to correctly interpret the data, is fundamental, considering that both the provision of services and urban design and planning, as well as urban policies in different sectors, increasingly build upon them. To facilitate that, other than using disaggregated information, it is necessary to ensure diversity among technology developers and designers (Turner Lee et al., 2021). Yet, still nowadays, women - of diverse races, backgrounds, sexual

orientations, abilities - are underrepresented in the EU tech sector, which constitutes a major obstacle to achieving equality goals and preventing the development and deployment of discriminatory technologies (European Institute for Gender Equality, n.d.-b; Mulyaningrum et al., 2007).

How can DPIA help achieve equality goals?

DPIA as a means for the empowerment of data subjects

Being European data protection law about addressing power imbalances between individuals and public and private entities who collect their data, it could be used to remedy the structural inequalities and power imbalances existing in a smart city context depending on gender and other factors (Theilen et al., 2021). Consequently, also the DPIA. As mentioned above, although the DPIA has been considered by practitioners as a matter of mere legal compliance, it could, and should, be used instead as a means to protect human rights in general, and not only for personal data protection (Mantelero, forthcoming). In effect, building upon an *ex ante* risk-based approach, the DPIA would be a suitable means of informing decision-making and shaping the development of a smart city project, initiative or technology in a way that minimises negative and unintended consequences arising from the processing before they occur (e.g., prevent algorithmic bias (Kaminski and Malgieri, 2021)). The GDPR and the Article 29 Working Party (now European Data Protection Board) expressly state that the risks to which DPIA refers are not business risks of controllers, but threats to rights and freedoms of individuals whose data are being processed (Article 29 Data Protection Working Party 2017). Furthermore, the participatory potential embedded in Article 35(9) GDPR (data controllers are indeed requested to consult data subjects (citizens, in the context of smart cities), where appropriate) may contribute to the empowerment of the less represented persons. Citizens' participation is indeed considered a key element for making smart cities more just and democratic (Iaione, 2019), especially when the majority of smart city projects, initiatives and technologies still build upon top-down approaches (Albino et al., 2015).

However, the GDPR only requires that a DPIA includes a systematic description of the envisaged processing operations and their purposes, an assessment of their necessity and proportionality, an assessment of the risks to the rights and freedoms of data subjects arising therefrom, and the measures envisaged to address these risks (Article 35(7) GDPR). Therefore, the suitability of a DPIA to protect fundamental rights, and achieve equality goals, depends on how the process is carried out practically, or, in other words, on the method followed for the DPIA process (Kloza et al., 2019). Scholars have already identified certain best practices that could turn DPIA into an instrument of empowerment for data subjects. These include: making publicly available (at least part of) the DPIA report to allow individuals and organisations, as well as regulators, to scrutinise the process (Autoriteit Persoongegevens, 2021; Kaminski and

Malgieri, 2021; Kloza et al., 2017); broadly interpreting the notion of "appropriateness" for the involvement of data subjects in the process, and not to consider this activity as exceptional (Autoriteit Persoongegevens, 2021; Kloza et al., 2019); assessing in the DPIA the effects of data processing on various fundamental rights and principles, like non-discrimination or freedom of assembly. (Mantelero, 2018). Although these best practices are aimed at empowering data subjects in general, they are not specifically focused on empowering women of diverse races, backgrounds, sexual orientations or abilities.

DPIA as a means for the empowerment of women and other marginalised groups

To be an instrument to effectively address inequality and enhance inclusiveness, I argue that the DPIA process needs to incorporate feminist legal methods and intersectionality. Like other areas of law, a "feminist thinking" in data protection law (and in data processing) builds upon certain moves, namely the "suspicion of sex-based distinctions and generalisations" to identify and address formal inequalities, the "uncovering [of] implicit male bias in neutral legal standards" to identify and address substantive inequalities, and the "placing [of] a high value on women's experience", in order to uncover new oppression schemes worthy of legal protections (Chamallas, 1997; Crawford et al., 2018). Feminist legal methods have consistently been conceptualised and used by both legal scholars and practitioners, and judges in particular, to demonstrate what feminist lenses could add to law-making and interpretation (Hunter, 2014). Indeed, trying to challenge power structures by relying exclusively on the same (legal) methods defining what counts within them would create a short-circuit (Bartlett, 1990). The proposal to use these legal methods builds upon the fact that during the DPIA data controllers' activities are quasi-judicial, especially when they are required to evaluate the necessity and proportionality of processing operations (Kloza et al., 2020). Furthermore, adhering to these legal methods could help data controllers with motivating their choices in the DPIA process more thoroughly, allowing them to build a better defence if their decisions are challenged in front of a DPA or a court. Thus, despite controllers not being in the position to question the DPIA *per se* through feminist intersectional lenses, they can still adopt that approach *within* the DPIA process. Compared with more traditional legal reasoning (based on deduction, induction, analogy, etc.), feminist legal methods allow revealing features the others overlook (Bartlett, 1990). In parallel, an intersectional approach allows broadening the analysis beyond the sole category of gender to reflect on the other factors (e.g., race, age, sexual orientation, abilities) shaping the identity of a person or community (Chamallas, 2014; Lutz, 2015).

Feminist legal methods include "asking the woman question" or, more intersectionally, the "other" question (Matsuda, 1991). In practice, posing the "women/other questions" entails asking about the gender and other (such as race-related, sexual orientations-related, ability-

related) implications of a social practice or a rule, evaluating if women or other marginalised groups have been left out of consideration, and addressing this omission to achieve a more inclusive result (Bartlett, 1990). Another possibility is asking the more radical "science question in feminism", that is "how a science apparently so deeply involved in distinctively masculine projects can possibly be used for emancipatory ends" (Wajcman, 2010, p. 146). Other feminist legal methods are feminist practical (or contextual) reasoning and consciousness-raising (Bartlett, 1990). Feminist practical reasoning entails not blindly adhering to past rules, created by the dominant community to ensure legal certainty (and defend the *status quo*), but rather to consider new perspectives generated by new contexts when adjudicating a case (Bartlett, 1990). Consciousness-raising is an interactive and collaborative process based on exploring women's (or others) individual experiences to derive collective significance (Bartlett, 1990).

A feminist approach to the DPIA process in the smart city would enable us, first, to put into question the very same idea of deploying a technology in a smart city, and, second, to shape the functionalities of this technology more inclusively. Amid the silence of the GDPR, methods such as intersectionality, consciousness-raising and valuing women's (and others') experience could help to identify key categories of experts and data subjects/citizens that need to be consulted before the deployment of a smart city project, initiative or technology, and the practical ways of involving them to make sure their voices are heard (e.g., creating focus groups, performing interviews). The involvement of marginalised groups in the DPIA process would provide a broader picture of the initiative to be deployed, supporting a better identification of the risks to rights and freedoms arising from the processing operations envisaged in a smart city environment, and the measures required to address them. Using feminist legal methods in the assessment of necessity and proportionality of the processing operations would enable a more inclusive analysis by facilitating more nuanced reasoning (Samuels, 2013), allowing to better balance among the fundamental rights that are at stake, in order to achieve a truly "collective" good.

Imagine a situation that would require a DPIA, namely a municipality envisaging developing an app to allow women to flag and share areas where they have been victims of harassment or violence with the end goal of mapping zones in which to deploy more CCTV cameras. *Prima facie*, such an initiative seems to facilitate women's empowerment, being aimed at tackling violence and harassment by building on consciousness-raising and by placing a high value on women's (unfortunate) experiences in the streets. However, considered more closely, such a project exhibits many flaws. For example, it may push women to accept enhanced forms of surveillance when these are not necessary to increase their safety. It may limit the possibility of sharing and accessing the produced safety information to smartphone owners (assuming too that they are sufficiently skilled to use such an app). It may neglect that modalities of harassment and violence against women are affected by the background of the

victim (e.g., age, race, sexual orientation, abilities), meaning that areas marked as safe for certain women may not be safe for others. It may even turn into an instrument to further oppress marginalised groups (e.g., persons experiencing homelessness, with a migration background, sex workers) whose mere presence in an area in a city could be a source of anxiety for certain app users.

On the one hand, a feminist intersectional approach to DPIA in this context could support a better overall deployment of such an initiative. For instance, by acknowledging that the deployment of CCTV cameras could have a disproportionate impact on certain groups, the DPIA could suggest that means other than CCTV cameras (e.g., increased lighting) would enhance safety, without increasing surveillance. By acknowledging that not all women victims of violence and harassment may have sufficient economic resources to use the app, the DPIA could suggest alternative ways to report harassment and violence, as well as to access the information it provides. On the other hand, a feminist intersectional approach to DPIA would shape the functionalities of the app and data processing from the outset. For example, it could recommend disaggregating information concerning age, race, abilities or sexual orientation of the app users, to understand how harassment and violence are perceived by different women. It could suggest accessibility features for persons with disabilities. It could give the user the possibility to describe the episode that they qualify as harassment or violence, both to avoid invisibilising new forms of harassment and violence and to ensure that a flag is not motivated by prejudice.

Still, the DPIA has also important drawbacks from an intersectional gendered perspective. Leaving aside broader considerations as to the approach of the entire GDPR towards gender issues (Malgieri and González Fuster, 2021), the DPIA process is the responsibility of the data controllers, which normally are either municipalities and tech providers, where women of diverse races, backgrounds, sexual orientations and abilities are underrepresented. While the stereotypical role of women in the smart city is as data subjects, it is not mandatory to consult data subjects under the GDPR. These factors, coupled with the absence of an individual or collective right for data subjects to demand that a data controller performs a DPIA, and the lack of an obligation to publish DPIA reports, render the detection of GDPR infringements related to DPIA more difficult, which in turn undermines citizen empowerment. Considering that recent years have witnessed a rise across Europe of right-wing, anti-feminist, populist movements (The Gunda-Werner-Institute, 2021), municipalities may deliberately refuse to perform inclusive DPIA processes or to engage with private actors who are willing to do so. Even without any open hostility towards inclusivity policies, the operationalisation of feminist legal methods and intersectionality could be challenging, especially due to the lack of resources, competencies or even interest from data controllers and/or assessors in charge of the DPIA process. Due to the lack of detailed guidance in the GDPR, the case-law of national courts, Data Protection Regulators, and the Court of Justice of

the European Union will shape the DPIA process, and in that light it has been noted how courts refrain from applying feminist legal method (Crawford et al., 2018).

Ensuring a proper representation of marginalised groups among the most powerful smart cities actors, as well as a revision of EU data protection law and a change of mindset in courts, will require many years. However, a very first step for municipalities willing to use DPIA to leverage equality goals would be to avoid considering it as a matter merely of technical and legal compliance. Conversely, smart cities project managers shall ask for advice from their Data Protection Officers (DPOs) as required under Article 35(2) GDPR, and should ensure the involvement of multiple municipality offices (e.g., dealing with equality policies, citizens' engagement, procurement, legal matters, innovation) and NGOs and citizens associations representing marginalised groups in the DPIA process. Other than participating in the DPIA process, NGOs and citizens association, together with academic institutions, might also provide *ad hoc* training (for example, about DPIA, how to do intersectionality in practice, how to meaningfully involve citizens, understanding and addressing bias in AI), if expertise cannot be found in-house. In parallel, data protection scholarship should advocate for the incorporation of intersectionality and feminist legal method in the DPIA process, particularly toward data protection regulators, policymakers and courts. Hands-on guidance to support practitioners in the operationalisation and incorporation of these methods in the DPIA process ought also to be developed.

Conclusion

One can conclude that, in the smart city context at least, women are generally in a more vulnerable position as compared with their male counterparts. This flows from their lack of representation within the most powerful smart city actors, namely public authorities and tech providers, as well as from the data gap of which they are often victims. Although such data gap may depend on the ostensibly more privacy-friendly practice of collecting aggregated information, privacy and personal data protection rights should never be considered to be stand-alone. Rather, they are required to facilitate "practical and effective" protection of individuals and other fundamental rights (Hildebrandt, 2021). The lack of representation of women in the tech sector also affects the deployment of smart city technologies, which risk being discriminatory by design, or risk leading to discriminatory outcomes.

The DPIA has the potential to become an effective tool for the protection of fundamental rights, and it could be a direct means of empowering women of diverse races, backgrounds, sexual orientation, abilities, etc. when feminist legal methods and intersectionality are integrated within the process. They could support data controllers and assessors to more comprehensively identify the risks to rights and freedoms of natural persons that arise from the processing operations envisaged in a smart city environment, to identify

measures to address them, to better assess the necessity and proportionality of the processing operations by supporting a more nuanced analysis of the fundamental rights that are at stake, and to identify more detailed categories of data subjects to consult and the approaches necessary to ensure their involvement. How to practically incorporate them in the DPIA process in a viable manner requires further research. However, the DPIA should not be accepted uncritically insofar as its effectiveness as a means for achieving inclusivity goals is at present left largely to the goodwill of data controllers and to the development of case law.

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