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PROCUREMENT AND SMART CITIES:

EXPLORING EXAMPLES ON BOTH SIDES OF THE ATLANTIC

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1. INTRODUCTION

Smart cities are the new Eldorado for companies in developed countries[1]. They create new opportunities in the already saturated market of old infrastructure: booming innovations trigger new services and new demands, connected devices call for replacement of a lot of existing goods, virtual services produce tons of data, fueling a new market. Stakes and expectations are high in an area where there seems to be no limits for innovation. Across the Internet, consulting firms and startups advertise about their knowledge and expertise in the making of smart cities. Established or incumbent service providers prospect local officials, proposing smart "turnkey" projects.

But current smart cities initiatives around the world remain heterogeneous, scattered, and still in their infancy, exploring several business models. Smart cities projects are developed at different speed, based on different legal arrangements, and contractual options. While countries in Europe, Asia and elsewhere took the first steps in promoting the concept of smart cities, the effort to develop smart cities has gained momentum in the U.S. in recent years. This chapter discusses smart city efforts in France and in the U.S., in particular, the early success in the city of Philadelphia in developing smart city initiatives, and its move toward a more comprehensive smart city program. The smart city concept, as applied in the U.S., is consistent with its application in other parts of the globe. For example, in a 2016 report, the National League of Cities (NLC), which was founded in 1924 as a national organization to strengthen local governments, notes that:

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[1] See L.G. ANTHOPOULOS, *Understanding Smart Cities: A Tool for Smart Government or an Industrial Trick?* Springer, 2017.

Smart city initiatives involve three components: information and communication technologies (ICTs) that generate and aggregate data; analytical tools which convert that data into usable information; and organizational structures that encourage collaboration, innovation, and the application of that information to solve public problems.

For many countries, green and sustainable development is also an essential objective embedded in smart cities projects. However, as things are evolving rapidly in this field, smart cities projects may vary. Traditional legal framework shall be adapted for smart cities as they require several ad hoc regulations such as IP regulation, transparency and data regulation, energy regulation, environmental regulation, or dedicated sources of financing. In this context, the question of the choice of the legal framework and of the optimal contractual mode takes all its dimension, seemingly only practical but in fact highly theoretical. In today's transparent environment with public decisions prepared under the scrutiny of citizens, classical questions about privatization, or public ownership, free negotiations or competition, performance monitoring and public service obligations, are becoming more sensitive at the local level. Where experiments are mushrooming, public contracts are considered as tools that can be mobilized for building and operating smart cities. Flexible for their scope to a certain extent but sometimes rigid during their formation process, they may offer an interesting legal answer in the area of "smart cities". One can indeed identify trends: (1) a variety of services surpassing the single goal which characterized traditional procurement contracts; (2) questioning the traditional public procurement procedures; (3) a call for collaborative innovation between the public and the private sectors; (4) the need for smart public and private financing; and (5) an integrated, decentralized, and evolving delivery of material and immaterial services calling for specific contractual clauses. Each of these elements raises legal issues, with exponential difficulties, only mentioned by this modest chapter exploring, through several examples, how public contracts could be vectors for innovation in smart cities.

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2. PUBLIC POLICY AS MAIN DRIVER FOR SMART CITIES' INNOVATION

Smart cities projects are usually promoted by public champions. In September 2015, the Obama Administration announced a smart cities initiative that sought to: [I]nvest over $160 million in federal research and leverage more than 25 new technology collaborations to help local communities tackle key challenges such as reducing traffic congestion, fighting crime, fostering economic growth, managing the effects of a changing climate, and improving the delivery of city services[2].

In a related effort, initiated in December 2015, the U.S. Department of Transportation (DOT) issued a Smart City Challenge that asked mid-sized cities across America to develop ideas for an integrated, first-of-its-kind smart transportation system that would use data, applications, and technology to help people and goods move more quickly, cheaply, and efficiently[3]. DOT received 78 responses and chose 7 finalists to work with DOT to further develop their ideas[4]. In addition to efforts at the federal level, organizations such as the Smart Cities Council are actively involved in promoting smart city development by bringing together public sector leaders, experts and other stakeholders to raise awareness about smart technologies[5]. Thus, as these examples indicate, the U.S. smart city effort has involved a range of local, national and federal initiatives. In addition to Philadelphia, the U.S. cities involved in the early smart city efforts included: New York, San Francisco,

[2] See https://obamawhitehouse.archives.gov/the-press-office/2015/09/14/fact-sheet-administration-announces-new-smart-cities-initiative-help.

[3] See https://www.transportation.gov/smartcity.

[4] https://www.transportation.gov/smartcity, o.p. cit., 3.

[5] See http://smartcitiescouncil.com/.

Boston, Seattle and San Jose. As of 2017, many more U.S. cities are pursuing smart city initiatives.

Philadelphia's smart city effort was initiated during Michael Nutter's tenure as mayor of the City, from 2008 through 2016. Prior to his election as mayor, Nutter was a member of the Philadelphia city council for 15 years. This breadth of experience in gave Nutter insights into the dynamics of municipal government. As mayor, Nutter recognized the importance of analyzing data as it relates to a city's activities, and also understood that in terms of data collection, Philadelphia needed a more complete sense of measurement[6]. Nutter found that, as in many municipalities, there was a lack of coordination between departments[7]. In addition, Nutter found that the recession highlighted the need for greater collaboration[8]. Nutter also observed how data was being used in other cities, such as New York, and recognized that although the City possessed large amounts of data, it was not being used to maximum advantage[9].

The current European policy goals are reflected in the EU 2020 Strategy[10] without mentioning smart cities which were not a main concern when the agenda was prepared in 2014. However, the later Investment Plan for Europe, also called Junker Plan, it has proved

[6] S. GOLDSMITH, *Infusing Government with a Data-Driven Culture, Philadelphia's former mayor explains the steps his city took to make effective use of data*, May 2016.

[7] S. GOLDSMITH, *Infusing Government with a Data-Driven Culture, Philadelphia's former mayor explains the steps his city took to make effective use of data*, o.p. cit., 6.

[8] S. GOLDSMITH, *Infusing Government with a Data-Driven Culture, Philadelphia's former mayor explains the steps his city took to make effective use of data*, o.p. cit., 6.

[9] S. GOLDSMITH, *Infusing Government with a Data-Driven Culture, Philadelphia's former mayor explains the steps his city took to make effective use of data*, o.p. cit., 6.

[10] European Council June 2014, EUCO 79/14, http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2079%202014%20INIT#page=15.

useful in triggering €164bn in its first 18 months for smart cities development, "but it is not addressing regional inequality" said Markku Markkula, the President of the European Committee of the Regions[11]. The EU is trying to better coordinate EU regulations and national regulations and improve knowledge sharing regarding smart cities through the Urban agenda for the EU[12]. In the course of Horizon 2020, the EU Framework Programme for Research and innovation, the European "Sharing cities" initiative is monitoring the deployment of new services in 3 cities (London, Milan, and Lisbon) and 3 more are joining (Bordeaux, Warsaw, and Burgas) such as integrated smart lighting with other smart service infrastructures (eV charge, smart parking, traffic sensing, flow data, Wifi etc.), interconnected initiatives supporting the shift to low carbon shared mobility solutions (specifically eV Car-Sharing, e-Bikes, eV Charging, Smart Parking, eLogistics), Integrated Energy Management System, and Urban Sharing Platform (USP) – which manages data from a wide range of sources including sensors as well as traditional statistics; built using common principles, open technologies and standards. In turn, these new virtual services may later on disseminate idiosyncratic digital services, an exponential movement raising concerns about its legal framing.

As an EU member State, France, has prepared several instruments which frame its policy regarding smart cities with successive national plans for digital development, and a dedicated Ministry on digitization since 2014. It has launched, since 2016, a network of public and private actors for the sustainable city ("Vivapolis") who brainstorm about the

[11] Pan European Network, *Smart cities, Go Green, Go Smart*, May 2017, http://www.paneuropeannetworkspublications.com/SC1/files/assets/common/downloads/publication.pdf.

[12] https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/urban-agenda-eu The urban themes (such as air quality, circular economy, climate adaptation, digital transition, innovative and responsible public procurement, urban mobility, and urban poverty) were set forth in the Pact of Amsterdam, ratified by urban-policy ministers from the EU member countries in May 2016. https://ec.europa.eu/futurium/en/urban-agenda Recommendations for innovation in public procurement were elaborated: https://ec.europa.eu/futurium/en/system/files/ged/orientation_paper_public_procurement_0.pdf.

modernization of traditional utilities and creation of new activities within the ambit of the sustainable policy goal. Several grants and labels have been designed at the national but also European and international levels to boost local endeavors (French Tech, Eurocities Network, UNESCO network of Creative cities). However, smart cities projects are more bottom based, usually driven by proactive municipalities with a smart city champion. According to TACTIS (2015 study), 60% of these municipalities have elaborated dedicated strategies, even updated ones based on lessons learned. From a legal perspective, French towns are keen to take on such proactive approaches as they are responsible for providing local public services for citizens, at least the traditional ones such as utilities and beyond: water, sanitation, roads, cemeteries, firefighting, public transportation, public schools, civil registry, local public archives, socio and health services, etc. Presently, there is no legal framework regarding new services, including virtual, to be displayed by smart cities. According to the French Law (Code on Local Governments)[13] and administrative case law, beyond the mandatory local public services, it is up to the competent public authority, the State or a local authority, to assess whether a collective need justifies the institution or maintenance of a public service. In addition, a local government may entrust the management of a local public service to a private company. In this case, EU competition law defines the legal framework opposable to both the public authority and the private companies in charge of the management of local public services as regards the objectives they can pursue, such as the method of management and the conditions of their financing.

[13] *Code Général des Collectivités Territoriales*, accessible at https://www.legifrance.gouv.fr/.

While some private consulting firms advocate for a reduced public involvement with a "Government as versatile facilitator,"[14] it is worth remembering that Smart cities projects pertain to urban planning decisions, or at least affect such policy area. While the city of Philadelphia was taking its initial steps in creating a smart city, it was also updating the comprehensive plan of the City, which identifies its present and planned physical development. Philadelphia's home rule charter requires the City Planning Commission to "prepare and adopt, from time to time modify, and have custody of a comprehensive plan of the City showing its present and planned physical development. The comprehensive plan shall … provide for the improvement of the City and its future growth and development and afford adequate facilities for the housing, transportation, distribution, health and welfare of its population."[15] The plan "envisions a city with an expanded transportation network that better connects home and workplace; ensures convenient access to sources of healthy food; supports the productive reuse of vacant land; provides modern municipal facilities that serve as the anchors of strong neighborhoods."[16] In France as well, Urban Law is the prime concerned legal field when it comes to carry on smart cities projects including physical infrastructure.

[14] Quote from the PwC NL website: "Within this approach, municipal authorities transform from individual entities to a whole network, and will no longer be the sole service provider – they will act as a versatile facilitator or supply chain manager for the various involved parties. Bonds can be reinforced using new technologies and 'open' and 'big' data, which will help to improve measurability and predictability. These parties can then work together to resolve social problems and generate value for the public." https://www.pwc.nl/en/industries/public-sector/themes/smart-city-regions.html.

[15] *Philadelphia Home Rule Charter*, Section 4-600.

[16] Cover letter from Mayor Michael A. NUTTER accompanying the Citywide Vision document for Philadelphia2035, dated June 2, 2011.

2.1. First Steps - Operational Changes

The NLC report notes that while the technologies for a smart city are essential for smart development, technology alone is insufficient. A key challenge lies in establishing the organizational components and administrative structure to effectively utilize the technology[17]. Thus, appropriate policies and administrative departments capable of implementing them are needed to facilitate smart city development. In 2012, subsequent to the creation of the OIT, Philadelphia established the Mayor's Office of New Urban Mechanics (MONUM), which was modeled after a similar effort by the city of Boston. MONUM's mission was to "develop and promote innovative and entrepreneurial approaches to and processes for solving complex civic problems[18]. In a press release, NUTTER stated MONUM: "will have the flexibility to experiment, the ability to re-invent public-private partnerships and the strategic vision to create real change for Philadelphia. I am excited to establish the Office of New Urban Mechanics as a civic innovation tool for urban transformation."[19] The creation of OIT and MONUM thus offer tools for greater collaboration within the City's departments, as well as with the private sector in identifying innovative solutions to the City's needs.

Most of the time, the initiative of creating or upgrading existing city/neighbor ("smarter cities") depends on public authorities (Nice or Montpellier in the South of France have launched such projects already 7 years ago while other municipalities have more

[17] Cover letter from Mayor Michael A. NUTTER accompanying the Citywide Vision document for Philadelphia2035, cit., 16, 11.

[18] Executive Order No. 5-12 at Section 2. The Order, at Section 2, further states the MONUM" "shall work to encourage the region's entrepreneurial, startup, and business incubator communities to solve civic problems and shall promote those solutions in partnership with the Office of Innovation & Technology, the Office of the Deputy Mayor for Planning and Economic Development, and other City departments and offices as well as outside partners."

[19] *Philadelphia Mayor Formally Creates Office of New Urban Mechanics*, Govtech.com, December 11, 2012.

recently joined the movement: Mulhouse, Chartres, Roubaix), although some of them may actually try to harmonize and scale up spontaneous private or citizens initiatives (Grenoble, Toulouse, Paris or Rennes in Britany)[20].

Development of smart cities projects may vary according to the size of the city. Big cities such as Paris, or state capitals in the U.S. have sufficient leverage for conducting their smart initiative on their own, where small towns tend to combine forces. In France, where the decentralization process has reached an incredible level with more than 36 000 cities and villages for a population of only 67 million, administrative superstructures are needed. Dedicated public bodies (EPCI[21]) pooling traditional services such as water distribution, public transportation, or waste management, are already in place. A 2017 Report on smart cities prepared by a Member of Parliament[22] recommends using this administrative layer as the bedrock of the smart cities, to equip each EPCI with new competences on data, and economics, enabling it to support territorial innovations, promote common sharing among communities, and finally, increase training so that all the decisions surrounding the digitization of local public services can be made in an informed way. It is fair to say that smart cities effort may induce a re-centralization process for the smallest towns, but it can also accompany rebirth of rural territories[23]. In middle-size towns, a

[20] Ministère de l'Environnement, de l'Energie et de la Mer – Commissariat Général au développement durable, *Villes intelligentes, smart, agiles: Enjeux et stratégies de collectivités françaises*," 2016, 4.

[21] The acronym EPCI stands for "Etablissement public de cooperation intercommunal," which could translate as Public body for intercities cooperation.

[22] R.M.L. BELOT, *sur les smart cities, De la smart city au territoire d'intelligence(s) - l'avenir de la smart city*, 19 avril 2017, http://www.gouvernement.fr/sites/default/files/document/document/2017/04/rapport_smart_city_luc_belot_avril_2017_definitif.pdf.

[23] Groupe Caisse des Dépôts, *Guide Smart city vs. Stupid village?* Sept. 2016 (in French), available at https://www.adcf.org/files/Public--publications/Guide_Smart_Cities.pdf.

specific status of "metropolis" allow them to centralize services for the whole agglomeration including suburban cities[24] as in Toulouse[25].

2.2. Building on public needs

Smart cities create new demands from citizens, asking for new local services that should be driven by public policies. The NLC report also suggests that smart city initiatives should focus on the desired outcomes before seeking solutions from the marketplace. Cities should "find out what their residents and local businesses want to see happen, and turn those desires into clearly defined objectives before proceeding with smart initiatives."[26]

Initial public initiative led to questions pertaining to governance. Not only these new activities bring the light on public actors taking responsibilities for the new public services to be deployed but they also raise the bar about civil society's expectations. New tools based on Internet technology will also offer new monitoring powers to citizens who want to take direct part. In Paris, a first strategy on a smart and sustainable city was published in 2015 but since the deployment of new services and connected goods, the Committee of Partners (City's regrouping representatives businesses, and socio-economics actors) initially divided in working groups covering topics such as energetic transition, mobility, urban logistic, waste, etc., had to reposition their role upfront in the design of the projects and their objectives[27], experimenting a co-construction movement relying on a

[24] Enacted on August 7, 2015, the law on the *New Territorial Organization of the Republic* (NOTRe) entrusts new powers to the regions and clearly redefines the competences attributed to each territorial collectivity. This is the third part of the reform of the territories, after the law of modernization of territorial public action and affirmation of metropolises and the law on the delimitation of regions.

[25] http://www.toulouse-metropole.fr/projets/smart-city.

[26] http://www.toulouse-metropole.fr/projets/smart-city, o.p. cit., 25.

[27] *Rapport Villes Intelligentes*, 2016, 33.

bottom-up approach. How this movement could be reflected in the definition of the needs prior to a bidding process raises new questions.

2.3. Smarts cities require combined operation of traditional services and e-services.

The public will behind innovation in cities explains why this movement usually begins by focusing on new governance tools, bringing direct participation and legitimacy. These soft public services cost far less than physical infrastructure with an immediate and effective impact of citizen's life. For such set of virtual services, outsourcing may not be needed, minus the required IT technical skills. Like many U.S. cities, Philadelphia seeks to "manage urban growth during an era of tight budgets and often conflicting priorities."[28] In addition to its high urban density, the City also has a significant poverty rate of more than 25 percent[29]. Issued in June 2011, Citywide Vision for Philadelphia2035 is the City's current development plan for the next 25 years. Among the initial projects undertaken by MONUM's was a pilot program known as Textizen. Textizen is a tool for gathering real time feedback using cell phone text messaging[30]. The City sought a method to address: (1) the difficulty for prospective participants to attend public meetings at the scheduled time and location and (2) the desire of some citizens to provide feedback anonymously[31]. In addition, the City also sought to maximize engagement of low-income populations, which comprise approximately 37% of households in Philadelphia[32]. The creation of Textizen by MONUM highlights the benefits of sharing ideas between smart cities, given that MONUM

[28] *Rapport Villes Intelligentes*, o.p. cit., 27.

[29] *Trends in Smart City Development: Case Studies and Recommendations*, o.p. cit., 22.

[30] *Textizen Philadelphia*, available at http://participedia.net/en/cases/textizen-philadelphia.

[31] *Textizen Philadelphia*, o.p. cit., 30.

[32] *Textizen Philadelphia*, o.p. cit., 30.

was modeled after an effort in Boston. Textizen also represented a successful test of a fundamental element of smart cities - the use of technology to connect directly with citizens in developing policy.

Virtual service may be an autonomous activity (ex: restricted opening of public facilities' doors) requiring its specific rules and monitoring, but most of the time these new services are (or will be) interconnected through platforms offering a panel of services. Such tools greatly improve governance and transparency in local governments, offering tangible successful results for the citizens. One of Philadelphia's earliest and most successful smart city initiatives, Philly311, is essentially a non-emergency contact program, providing the public a direct way to request services, submit a complaint, and provide feedback to the City. Philly311 was modeled after a program in Baltimore where that city sought to reduce the number of non-emergency calls being made to 911 emergency call centers. Similarly, Philadelphia sought to reduce the call volume to 911 by offering citizens an alternative for non-urgent matters. Philly311 offers various ways to contact the City: telephone, mobile application, web application, email, and social media. By offering citizens distinct options for urgent (911) and non-urgent (311) requests, the City has been able to fulfill a key objective that allowing agencies and departments to focus on their core mission and manage their workload efficiently[33]. Philly311 has also provided additional data to City officials to assist in their decision making and it is used to monitor and track operational performance[34]. The data obtained from the 311 system identifies "hot spots" around the city that need attention. For example, the 311 data have changed the way the City prioritizes street light replacement. Clusters of call from a particular area indicate that an issue, such as replacing a street light, need to be addressed[35].

[33] T.A. PARDO, *Transforming City Government: A Case Study of Philly 311*, Taewoo NAM, 2012.

[34] T.A. PARDO, *Transforming City Government: A Case Study of Philly 311*, o.p. cit., 33.

[35] T.A. PARDO, *Transforming City Government: A Case Study of Philly 311*, o.p. cit., 33.

Another important benefit of Philly311 has been to promote transparency and integrity within the City government processes. City officials discussed with Tam and Pardo that, prior to Philly311, many citizens did not know where to request a service. Some sought out a member of the City council as a representative of their community. Because of a lack of understanding of the process, many citizens believed they needed to know someone within government to obtain a service. Philly311 has shed a light on how the process works and citizens have a better understanding of their government, thereby reducing the need to seek "favors" from someone within government. Thus, Philly311 become an anticorruption strategy, as since its launch, citizens can see more clearly how their government works, reducing the need to seek to influence city officials to obtain services[36].

Traditional or physical networks may also evolve. In energy distribution, the development of smart grids is one key element for smart cities. Digital technologies make it possible to better control the electricity consumption of office buildings, dwellings, or public lighting, which may represent up to 40% of the electrical costs for a town. In France, the IssyGrid project was initiated in 2011, created by the city of Issy-les-Moulineaux (located in the south-west suburbs of Paris). This laboratory initiative intended to build a whole new business neighborhood while achieving savings and reducing the carbon footprint by optimizing consumption and pooling resources between offices, homes and businesses[37]. It relies on the production of renewable energies (photovoltaic panels, cogeneration, micro-wind, etc.), the energy consumption of dwellings, offices and shops, and the storage of the electricity produced. In 2016, IssyGrid became operational with three photovoltaic production facilities, one of which is connected to IssyGrid via a network, an intelligent public distribution station that can be remotely controlled from the ERDF regional management agency and that optimizes exchanges between consumption,

[36] T.A. PARDO, *Transforming City Government: A Case Study of Philly 311*, o.p. cit., 33.

[37] Communiqué de Presse, *Premier smart grid de quartier opérationnel en France*, 26 Sept. 2013.

production and storage, two energy storage systems, a system for forecasting photovoltaic energy, fourteen interconnected information systems, and an energy monitoring dashboard able to provide the data in open data.

Traditional services will also be linked to virtual services (ex. a garbage collection service will be operated when an electronic sensor is indicating that the trash container is full). What is genuinely new in Smart cities, is the transversality[38] of services: infrastructure providing for utilities, can also deliver immaterial or virtual services. The NLC report, mentioned above, adds that: "a smart city is a city that has developed some technological infrastructure that enables it to collect, aggregate, and analyze real-time data and has made a concerted effort to use that data to improve the lives of its residents,"[39] to perform analytics and develop software applications. In France, the water distribution is so far the more connected network with 20% of small cities with remote systems for monitoring individual consumption and station control[40], followed by waste management with, for example, connected goods such as weighting trash cans which allows for tariff incentive or geolocated garbage-trucks to optimize the collects. Sound public lighting is also popular as a source of energy savings with, for example, connected furniture and energy recovery pavers on the roads. The Internet of things open up a vast range of services that have just begin to be explored[41].

[38] Fr. RICHARD, *Des solutions au service de la ville intelligente*, Synthèse des travaux 16 nov. 2017, available at http://chairgovreg.fondation-dauphine.fr/sites/chairgovreg.fondation-dauphine.fr/files/attachments/171116_synthese.pdf.

[39] *Textizen Philadelphia*, available at http://*participedia.net/en/cases/textizen-philadelphia*.

[40] *CDC* Guide on Smart city vs. Stupid Village, 2016, 16.

[41] World Bank Group, Internet of Things: *The New Government-to-Business Platform*, 2017.

As noted by the 2017 CNIL Report on smart cities[42], the arrival of major digital players in urban services (Sidewalk City Lab, Waze Connected Citizen of Alphabet / Google, Uber or Facebook) raises the question of the real rewards required from individuals and public actors for services presented as free. Furthermore, creativity on platforms, and artificial intelligence development also multiply services among citizens such as goods' rentals (apartments, gardens, cars, tools, manpower, etc.). These trends illustrate one major characteristic of the smart city concept: collective services will also be customized to each individual needs.

3. SMART CITIES NEED INNOVATIVE PROCUREMENT TECHNIQUES

Traditional procurement methods do not fit with the requirements of these kind of projects: off-the-shelf answers are out of purpose, since with all their incremental and experimental needs, smart cities call for smart design and engineering while large competition requires standardization of the technical elements. Indeed, the design of the procurement procedure itself may have a strong implication on innovation. As mentioned by the OECD Report on Public Procurement for innovation[43]. "The use of public procurement for innovation is defined as any kind of public procurement practice (pre-commercial or commercial) that is intended to stimulate innovation through research and development and the market uptake of innovative products and services". On its side, the EU 2020 has also promoted demand-side innovation policies support public procurement beside other action tools (legislation increasing consumer confidence in innovative

[42] CNIL, La plateforme d'une vill, Les données personnelles au cœur de la fabrique de la smart city https://www.cnil.fr/fr/smart-city-et-donnees-personnelles-quels-enjeux-de-politiques-publiques-et-de-vie-privee.

[43] OECD, *Report on Public Procurement for innovation - Good practices and strategies*, 2017, 18.

products, safety regulations, standards)[44]. However, designing standards in the context of smart cities open a new issue, recently addressed by the World Standard day[45].

3.1. Needs assessments

Considering the variety of solutions and services, it is crucial to evaluate the needs of the future city or neighborhood. A pre-assessment of all the costs, externalities and expected gains, coupled with a financial analysis is a pre-requisite, recommended by the BELOT Report[46] in France. Such analysis shall ensure that digital infrastructure will be both flexible and evolutive through the time. However at least two rows of public contracts may actually be necessary to conduct a smart cities project. If the first set will be service contracts helping the City task force to conceive its future smart city policy, relying on the expertise of consulting firms, the second set will be directly in charge of creating and operating new infrastructure and/or services. In July 2016, the Office of Innovation and Technology (OIT) in Philadelphia issued a Request for Ideas (RFI) on how the city can utilize assets for new technological purposes to improve operations while generating revenue at the same time[47]. The RFI indicated that the information obtained would be used by the City as a basis for further discussion and the development of an RFP. Among the topics listed in the RFI were: meter reading, street lighting controls, gunshot detection,

[44] http://ec.europa.eu/growth/industry/innovation/policy/demand-side-policies.

[45] 2017 World Standards Day, Standards make cities smarter. https://www.worldstandardscooperation.org/world-standards-day/world-standards-day-2017/ See also, the EU General Directorate GROW Conference, Cities set standards to become smarter and more sustainable, 19 October 2017.

[46] L. BELOT, *Député, Rapport au premier ministre sur l'avenir des smart cities - De la smart city au territoire d'intelligence(s)* - l'avenir de la smart city, 19/04/2017, http://www.gouvernement.fr/partage/9140-rapport-de-m-luc-belot-sur-les-smart-cities

[47] See Request for Ideas: *Using Technology to Create a Smart City, City of Philadelphia Office of Innovation and Technology*, July 12, 2016

transportation analytics, infrastructure monitoring, public safety surveillance, free, high-speed public wi-fi, and sensor technology.

3.2. Procurement design

Regarding the design of its procurement processes, smart cities require a sequential approach through progressive steps combined with a comprehensive framework. After reviewing over 100 RFI responses, Philadelphia determined that to best support Internet of Things (IoT) solutions, it first needed a strategic plan to guide the City through a process of identifying how to make IoT possible in Philadelphia in a way that reflects the needs of its citizens and business communities. Subsequently, on April 28, 2017, OIT issued a Request for Proposals (RFP) seeking a vendor to develop a comprehensive and strategic Smart City roadmap[48]. The RFP stated that:

The City desires to enhance its ability to deliver quality services for the residents and businesses of Philadelphia through the development and use of secure interconnected information, communication, and sensor technology and Internet of Things (IoT) solutions. This roadmap will guide the City in realizing its vision to become a Smart City[49].

Therefore, after a number of pilot projects and focused smart city initiatives, Philadelphia is poised to pursue a more comprehensive approach to becoming a smart city. RFP issued by the City in April 2017, seeking a vendor to develop a comprehensive and strategic Smart City roadmap, while not providing much detail, indicates a recognition of the issues of privacy and cybersecurity. The RFP states that the City seeks a vendor familiar

[48] *See Request For Proposals: Consulting Services to Develop a Smart City Roadmap For The City of Philadelphia, City of Philadelphia Office of Innovation and Technology*, April 28, 2017.

[49] *Request For Proposals: Consulting Services to Develop a Smart City Roadmap For The City of Philadelphia, City of Philadelphia Office of Innovation and Technology*, o.p. cit. 38, 1.

with best practices and regulations around IoT security and privacy[50]. In addition, the RFP identifies as a Tangible Work Product - A security framework to ensure safe development of IoT solutions and provides continued assessment of risk moving forward and create transparent policies around privacy and protection of sensitive information and protected data[51].

In France, while numerous and innovative projects are mushrooming, difficulties remain with the current set of procurement procedures, which are not customized for the special needs of smart cities projects. In particular, local actors are complaining about the remaining complexity, lack of fluidity and issues faced by small businesses and start-ups to participate in public biddings. Negotiations or dialogue procedures, such as the competitive dialog or the competitive negotiations, could be more accurate than the call for tenders, in this context. Prior to the bidding process, and through a pre-commercial analysis, the procurement team should explore the market and available solutions. This could also justify the call for variants and/or for contract divided in tranches, allowing the public entity to sequence the project in a risk-averse approach[52].

Through the implementation of the 2014 EU Directives, local governments have been tempted to experiment the Innovative Partnership (Dir. 2014/24, art 31). However, the initial feedback is not positive[53], specifically in the ambit of smart cities projects: the

[50] *Request For Proposals: Consulting Services to Develop a Smart City Roadmap For The City of Philadelphia*, o.p. cit., 38, 2.

[51] *Request For Proposals: Consulting Services to Develop a Smart City Roadmap For The City of Philadelphia, City of Philadelphia Office of Innovation and Technology*, o.p. cit., 38, 7.

[52] This last solution is advised by the Député (Representant) L. BÉLOT in his 2017 Report, 74.

[53] No one single contract after two years: see P.A. MOGENIER, Deux ans après son adoption, retour sur le Partenariat d'innovation, 1 March 2016, https://www.village-justice.com/articles/Deux-ans-apres-son-adoption-retour,21591.html.

procedure tends to be too narrow defined for a specific product or service while smart cities are often looking for comprehensive, collaborative, and exploratory services such as the ones designed after « hackathons »[54]. Indeed, the use of innovative partnership, as a R&D tool, is only allowed[55] when there is no other solution available on the market whilst such rule can reduce potential use of this new contract. While for smart cities, local buyers may look for existing services but they are in need of an ad-hoc architecture. Moreover, this innovative partnership may be more suitable for manufacturing or developing on single product or service when the smart city initiative calls for a "bouquet" of services. Fear of using the wrong procedure that may lead to a criminal conviction of favoritism (unfair advantage), French procurement staff and local representatives either prefer to choose the traditional methods of procurement which are not tailored for such innovative solutions, or they opt for a genuine "experiment" outside the procurement rules, such as the Issy Grid project[56]. In the context of the Internet of Things, few initiatives have been launched[57], addressing interoperability, and most are coming from the private sector. However, experimentations are not viable schemes for companies since they are looking for perennial

[54] Report of the Ministère de l'environnement, 2016, 47.

[55] Decree 25 mars 2016 on public procurement contracts, art. 93: « The purpose of the innovation partnership is to research and develop innovative products, services or works within the meaning of 2 ° of II of Article 25 as well as the acquisition of products, services or works resulting therefrom need that can not be satisfied by the acquisition of products, services or works already available on the market. The buyer may decide to set up an innovation partnership with one or more economic operators who perform the services separately under individual contracts. This decision is indicated in the contract notice or in another document of the consultation".

[56] BELOT Report, 67 to 78, available at http://www.gouvernement.fr/sites/default/files/document/document/2017/04/rapport_smart_city_luc_belot_avril_2017_definitif.pdf

[57] Listed by the World Bank Report on IoT, 2017, RAMI 4.0 (Led by the German federal Ministries of Economic Affairs and Energy and of Education and Research, and with stakeholders); IIC (Industrial IOT Consortium; OFC (Open Connectivity Foundation) and Project Haystack.

activities that could be standardized and reproduced[58]. Precise technical specifications may not be the most adapted to an evolving environment: functional requirements with performance criteria would better reflect the potential services reconfiguration that may take place later on.

Thus, Smart cities project can also trigger procurement reform. The FastFWD program in Philadelphia promoted additional procurement innovation for the City, which has worked with Citymart, an organization that focuses on problem-based procurement methods and practices[59]. Citymart trains city officials to use problem-solving and problem-based procurement methods and has worked with the City's Office of Innovation Management to reach out to city departments, train workers on how to rethink the way they approach problems[60]. This training includes guidance on preparing a clearly defined solicitation (tender) to maximize competition. [61]

In France, and in Europe, one may think about introducing procedures for unsolicited proposals, at least in the context of smart cities and digital services, as local governments are particularly solicited by Start-ups and innovative companies looking for new market and sources of data. Contracts can be a way for developing new activities and services. Germany considers reforms like the relaxation of government procurement requirements[62].

[58] BELOT Report, o.p. cit., 56, 76.

[59] See http://www.citymart.com/

[60] R.P. SHEPELAVY, Solving…Not Buying, March 18, 2016.

[61] R.P. SHEPELAVY, Solving…Not Buying, o.p. cit. 60.

[62] Federal Government of Germany, Digitale Agenda 2014-2017, August 2014.

Finally, positioning the sustainability goal at the core of the smart cities initiative must have a direct impact on the procurement policy. Therefore, procurement criteria must look for energy production from renewable sources, energy efficiency and waste management. In this area, the recent procurement concept of life cost cycling analysis may be the most persuasive tool. IssyGrid, presented above, makes it possible to smooth peaks of consumption and to ensure the general balance of the network while reducing the carbon footprint of the neighborhood.

4. GOING BEYOND PUBLIC PROCUREMENT CONTRACTS: SMART PUBLIC-PRIVATE COLLABORATION

The Building advanced broadband technologies networks requires heavy infrastructure investments for the moment only financed by public authorities. In France, the Government is conducting a national plan for the equipment of all remote areas, a plan that will benefit to smart cities local projects as well. In other contexts, cities may have to find their own solutions. The British city of Bristol, and Mississauga in Canada "are trying to overcome such challenges by constructing their own infrastructure and offering them to businesses for use."[63] In the US, national or federal initiatives in R&D public procurement trigger change in IT and subsequent development at the local level. However, given the magnitude of the smart cities projects, their necessary exploratory dimension, the potential arising of technical or legal issues, the contractual arrangement should channel a true collaboration between public and private partners. Since public services cannot fulfill all needs, private and public services, managed by public and private bodies, are here, more than ever, complementary.

After the great fire of 1666, which destroyed 1/6 of its houses, the city of London was reorganized around "squares", or "garden squares", whose pieces of land were distributed for free by the King to constructors who invested in building new houses to be

[63] World Bank Report on IoT, 2017, o.p. cit., 41, 14.

rented by tenants. This first modern town planning was indeed based on what one would call today Public-Private Partnerships (PPP). However, the partnership can range from a simple collaboration to a strong legal relation built on a contract. Based on several topic examples around the world, a 2017 World Bank report on the Internet of Things recommends a tripartite collaboration including the Academia, through "public-private-academic partnerships and platforms". However, the PPP reference there should not be mistaken with its contractual version: in this report it is only a way to underline the collaboration that has to be put in place. A "coordinator" office may reinforce the missions conducted through these "PPAP" which "cover both infrastructure and non technical aspects, including policy assessments and implications, public perception and awareness, data stewardship, financial models, business value propositions, competency and skill requirements".

In the Netherlands, the Dutch experience is enlightening in that it leaves a large part to innovation, not only technological but also organizational and legal[64]. The predominant approach is that of consultation, on a given territory and involving different stakeholders. There is a range of legal support: initiative directly piloted by municipalities, experimentation in the form of public-private partnerships between a public entity and a company, sometimes without competition, or using a concession contract in the transport sector. Indeed, Dutch authorities have transposed a conventional approach between several private and public parties which had been developed in the circular economy to create green deals. After recommending a "safe standardized digital infrastructure", the national strategy for smart cities[65] points at the necessity of relying on "Public-private partnership

[64] *See The Smart City Embassy website*, founded by Amsterdam Smart City, Connekt and the Ministry of Infrastructure and Water.

[65] With a bottom-up approach, a large number of Dutch cities, companies and scientists have contributed to the preparation of the National Smart City Strategy, presented in January 2017 to Prime Minister Mark RUTTE, who had requested a consolidated Smart City Vision. Report in English: https://gsc3.city/wp-content/uploads/NL_Smart_City_Strategie_EN_LR.pdf

with room to experiment", calling for the creation of a new business model. Social cost-benefit analysis (SCBA) and Overview of Effects of Infrastructure (OEI) already used by the Dutch Government for several public projects shall be the reference tools for accessing costs, while exploring innovative procurement methods could be backed by a fund established to inspire confidence to the local governments[66].

The French legal system offers a range of contractual solutions that may be relevant for smart cities projects, with some caveats. The town may pick a type of global public procurement contract, the solution recently retained by the town of Dijon and a regrouping of 24 municipalities, with the signature of a 12 year-contract. The consortium of several French companies such as Bouygues, Capgemini, Citelum and Suez, will be in charge of the design, construction, operation and maintenance of connected urban centers piloting of several public services through connected goods such as (sensors on public vehicles, lighting, traffic lights, access terminals in downtown, video-protection or, still, security and BWM of the buildings of the communities), under the monitoring of a unique control center for a total cost of 105 million euros[67]. Half of these costs will be covered by the City of Dijon and Dijon metropolis - the city is also betting on the savings that may result from better management of the public lighting service. They also expect that the data collected, some of which should be made available to citizens free of charge, may be partly monetized.

French local governments are also familiar with certain PPP arrangements, such as "service concession contracts" where the initial investment is financed by the private party

[66] https://gsc3.city/wp-content/uploads/NL_Smart_City_Strategie_EN_LR.pdf, o.p. cit., 65, 48-49.

[67] G. GAMBERINI, *Smart City*: Dijon Métropole se positionne en pionnière, La Tribune, 7 Sept. 2017, https://www.latribune.fr/entreprises-finance/industrie/energie-environnement/smart-city-dijon-metropole-se-positionne-en-pionniere-749440.html; F. MAILLET, *Comment Dijon veut devenir la première smart city française*, 13 sept. 2017, https://www.lemoniteur.fr/article/comment-dijon-veut-devenir-la-premiere-smart-city-francaise-34804831.

who will be operating the infrastructure and its related (public) service for a long duration, bearing the demand risks, and paid by users' fees. France has a long history with "concessions" as being long term contracts entered into by a public body (such as a city) and a company in order to build an infrastructure or a network and to operate the (public/utilities) service attached to it (ex: water sanitation in a city, electrical power or a gymnasium for sports). Although these contracts may encompass large projects, they were usually specialized in providing one type of service (ex: water access, electricity, or sports facilities) which could be referred to as "mono-service". What is new in smart cities is that they require a bunch of infrastructures built and operated simultaneously for delivering "combined services". Opportunely, the French Administrative Supreme Court, the Conseil d'Etat, held in 2016[68] that separate services could be bundled under one contract, with two temperaments: the perimeter does not have to be grossly excessive and the contract cannot bring together services that would otherwise be clearly unrelated to each other.

French local governments may also rely on the "Marché de Partenariat" which is a sort of B.O.T., although a more recent form of PPP in the French legal system, where the public entity is renting the facility or service delivered by the private investor, owner of the infrastructure until the end of this long-term contract. However, it is fair to say that if French local governments are used to work with companies for the delivery of traditional services, they are less prone to deal with new digital actors. If not yet well developed, creating an ad-hoc company may also be considered, with public entities as shareholders coupled with private investors.

In France, local authorities and their groupings may also create local public development companies (SPLA), of which they hold the entire capital (Article L. 327-1 of the Urban planning Code), authorized to carry out any development operation within the meaning of the Code (Article L. 300-1) exclusively on behalf of their shareholders and on their territory. These SPLAs are under control of the local authorities that create them. The

[68] CE 21 September 2016, req. n° 399656.

latter are therefore not obliged to apply the competition rules relating, as the case may be, to concession contracts or procurement contracts (in-house) when they use these SPLAs. As regards the contracts entered into by these SPLA for their purchases, it should be verified in each case whether the company concerned should be regarded as a buyer within the meaning of the provisions of Article 9 of the Ordinance of 23 July 2015 on public procurement.

5. CONTRACTS FOR SMART CITIES NEED TO FIND SMART FINANCING

Investors in smart cities need stability, durability and profitability for their money. Risk allocation in a highly versatile environment is one of the many challenges the legal framework for smart cities should address. Thus, public contracts need to provide for a flexible and secure environment. These goals mandate long term arrangement balancing real estate rights, use of eminent/public domain for infrastructure, as well as rights for creating and developing new services that will provide direct sources of income for the entity in charge. The economical context of smart cities' contracts resonates with specific issues. As noted by J. EDLER and L. GEORGHIOU[69], "the more radical an innovation, the higher the entry and switching costs. This relates to transaction and learning costs, to adoption of complementary equipment and to lock in and path dependency effects. Those problems of high entry costs are especially virulent in areas in which network effects occur".

Initial public financing may be the optimal solution for stimulating innovation. The U.S. federal government has made grant funds available for cities to pursue smart city projects. In addition, a number of other sources have provided smart city grant funding,

[69] J. EDLER & L. GEORGHIOU, *Public procurement and innovation—Resurrecting the demand side*, ScienceDirect, Research Policy 36, 2007, 949–963, 956, available at http://dimetic.dime-eu.org/dimetic_files/EdlerGeorghiou2007.pdf.

often via challenge or competition between cities to encourage the development of new ideas applicable to smart cities. In 2013, Philadelphia was awarded a $1 million grant by the Bloomberg Philanthropies Mayors Challenge to implement their winning idea, FastFWD, which sought to engage entrepreneurs in offering solutions to the City's public problems while also promoting reform of the procurement system to encourage innovation[70]. Under FastFWD, the City gathered data across departments on a problem and then described it in a manner suited to creative solutions.

Under FastFWD in Philadelphia, an initial effort was designed to attract new companies/small businesses, with innovative ideas, along with private sources of funding. Working with new businesses and relying on private sources of funding is part of the promise and challenge of the program. Once a need was identified, a multi-phase process followed, with an initial request for solutions to the identified need[71]. The top proposals were selected to enter into a business accelerator program that refined those ideas through business development strategies, mentorship, and collaboration with city employees[72]. The city then selected two or three pilot projects to implement, evaluate, and refine[73]. After the accelerator process pilot projects and/or contracts may be awarded.

More than 70% of smart cities in France are publicly financed[74], either through local, national or European funds. On this matter, European institutions have decided to finance several digital initiatives through various schemes for both sectoral and global

[70] *Procuring Innovation - Philadelphia's Bold New Model,* Harvard Kennedy School Ash Center Mayors Challenge Research Team, February 26, 2014.

[71] See http://fast-fwd.org/program/; http://icic.org/philadelphias-fastfwd/.

[72] http://fast-fwd.org/program/, o.p. cit., 71.

[73] http://fast-fwd.org/program/, o.p. cit., 71.

[74] TACTIS, 2015.

projects: “Connecting Europe Facilities for Transport”, the “LIFE Program”, including Financial Instrument for the Environment and Horizon 2020 with smart cities and communities program. The European Fund for Strategic Investments and the ERDF can also support smart cities projects. Thus, the project design at the local level might depend on external financing, being as well impacted by the European rules and constraints. At the French level, the Caisse des Dépôts et Consignations (CDC) a public financing institution created in 1816, is dedicated to support public projects, through the deployment of Telecom infrastructures since 2000, and digital services. It is now expanding its activities to become a “smartcity conceptor” providing support and financing. However, municipalities tend to rely more on traditional grants, neglecting new financing such as bonds and shares in institutional public private partnership or special purpose vehicle. Looking for new sources of financing, smart cities could mobilize green bonds. According to the EU’s 2030 climate and energy objectives, there is huge potential for further emission of sovereign green bonds.

Moreover, given the size of the project (a neighborhood or an entire new city), their integrative dimension, private financing should also be mobilized. In the French IssyGrid project, mobilization of private funding took another direction: the entire initiative is carried on by a consortium conducted by Bouygues Immobilier with other private companies who bring together all the strategic and technical skills of the smart grid: Alstom, Bouygues Energies and Services, Bouygues Telecom, EDF, ERDF, Microsoft, Schneider Electric, Steria and Total. Among this group some have created a joint-venture (EMBIX) in charge of launching the information system. The 10 companies of the consortium have invested 250,000 euros each, without subsidies or public funding. The 2.5 million euros collected finance the purchase of equipment, works and services by third-party companies. Innovative start-ups also bring their expertise in energy management for eco-neighborhood projects, in participatory energy management, in interactive presentation of data (as part of Microsoft's BizSpark program, which supports digital start-ups), and also in connecting objects that IssyGrid can now host. The town’s website proclaims that the consortium has created an “economic model of the smart grid, based on the deployment of a software layer and sensors dimensioned to the fair, to provide monitoring services, steering and verification of the performance of eco-districts”. However, one may consider

that is not a sustainable model: companies are only willing to initially invest in such a pilot project if they can further build on this expertise to obtain future commercial projects. Having demonstrated that they can create smart grids for a controlled cost, they are keen to mobilize these new skills in future bidding opportunities. Who is going to pay on a long-term perspective? If the experimental period benefits from the peering of public and private partners, the smart city concept has to find a sustainable financing model, such as inventing combinations of sources that are not today considered in traditional procurement.

6. SPECIAL CLAUSES FOR CONTRACTS IN SMART CITIES

Designing these public contracts will have to take into consideration their two main characteristics: the issues related with data collection, protection and dissemination, and their special need for evolution. Satisfactory performance of such contracts will rely on a careful crafted design of contractual clauses dealing with the data topic, including IP rights.

6.1. Data collection

Indeed, the new services and activities attached to smart cities process rely on massive data production. As mentioned by JB AUBY in Chapter 2, Part II of this book[75], data are the "fuel" of smart cities. Indeed, in a circular approach, these data constitute the baseline for all virtual services and they also are their main products. As such, their identification as private or public data, their collection, diffusion and also potential selling raise several legal issues that will definitely impact public contracts design in the context of smart cities. Thus, the recognition that effective collection and use of data could enhance the effectiveness of Philadelphia departments led to its first steps in becoming a smart city. In 2011, Mayor NUTTER issued an executive order establishing of Office of Innovation

[75] J.-B. AUBY, *Public Contracts and Smart Cities, C. Yukins – G. Racca, eds., Public Contracting and Innovation*: Lessons Across Borders, Bruylant, 2019.

and Technology (OIT)[76]. Philadelphia's OIT has five components[77]: IT Governance; Innovation; Infrastructure; Communications and Applications. IT Governance seeks to ensure that "information technology is structured and employs a well thought-out, comprehensive strategy across all City entities that includes risk management, performance, and security[78]." Innovation focuses on "[d]eveloping and sustaining innovative technology practices within the City through engaging and empowering citizens, improving business processes, working collaboratively and constantly searching for new opportunities."[79] Infrastructure provides services across multiple technical platforms, systems, and general technical services[80]. Applications is involved with "[b]uilding applications to enhance distribution of information, add convenience and automation to transactions, and increase access to city services."[81] Each component has sub-units that focus on specific goals of the component[82]. The OIT was established as part of the effort to change the culture of the City's operations to emphasize innovation[83]. Philly311 has also promoted a data-driven, customer oriented culture across the city government, which is an essential objective of a smart city. To promote its continued success, upgrades were made to the Philly311 system

[76] See Executive Order No. 12-11, Innovation and Technology.

[77] See http://www.phila.gov/it/aboutus/Pages/default.aspx; Trends in Smart City Development: Case Studies and Recommendations, 22.

[78] See http://www.phila.gov/it/Pages/default.aspx.

[79] http://www.phila.gov/it/Pages/default.aspx, o.p. cit., 78.

[80] http://www.phila.gov/it/Pages/default.aspx, o.p. cit., 78.

[81] http://www.phila.gov/it/Pages/default.aspx, o.p. cit., 78.

[82] http://www.phila.gov/it/Pages/default.aspx, o.p. cit., 78.

[83] P. THAKURIAH, N. TILAHUN, M. ZELLNER. *Cities Through Big Data: Research, Methods and Applications in Urban Informatics*, , Eds., Springer, 2017, 537.

in 2014 to improve request submission and data tracking[84] The 2016 NLC report notes that the creation of the OIT has enabled city leaders to have a more hands-on approach to ICT initiatives in the city[85]. With the establishment of the OIT, Philadelphia possesses an essential tool to pursue its smart city efforts through greater integration of its infrastructures and services to improve efficiencies[86].

Data collection being central to any local innovation, effective implementation of data metrics to transform the way the City conducts business requires the buy-in from all actors[87]. But data are not only collected, and stored in the cloud under specific contracts, they are also produced by the new interconnected services. NUTTER in Philadelphia underscored the importance of openness and transparency in a data-driven smart city to engage both the general public and businesses: "There have been other very positive outcomes -- entrepreneurs and the startup community are using some of that data and creating apps or new businesses."[88] Then a smart grid can contribute in open data, accommodating contributions from individuals, head offices, operators, charging stations for electric vehicles, energy network operators, businesses, etc., who can, if they wish,

[84] Philly 311: Innovation that was worth the wait, GCN, Derek Major, Oct. 15, 2015.

[85] Trends in Smart City Development: Case Studies and Recommendations, o.p. cit., 77, 10. Trends in Smart City Development: Case Studies and Recommendations, o.p. cit., 77, 10.

[86] As noted in a white paper of the International Electrotechnical Commission (IEC): "[t]echnology integration helps cities to improve efficiency, enhance their economic potential, reduce costs, open the door to new business and services, and improve the living conditions of its citizens." Orchestrating infrastructure for sustainable Smart Cities, International Electrotechnical Commission, White Paper at 4.

[87] Including public employees. As NUTTER put it about Philadelphia: "We made it clear we were going to start measuring employees on how well they are implementing these systems in the government."

[88] *Trends in Smart City Development: Case Studies and Recommendations*, o.p. cit., 85.

make these data accessible in open data, provided that the interoperability (with standards?) of the data collection is made mandatory.

6.2. Data release policy

The very nature of the data, and the way their collection and use in the smart city environment is conducted, appear to render many existing laws, regulations and policies on data protection, outdated. The US report, Open Data Privacy: A risk-benefit, process-oriented approach to sharing and protecting municipal data, notes that the sharing of smart city data: "comes with inherent risks to individual privacy: released data can reveal information about individuals that would otherwise not be public knowledge. In recent years, open data such as taxi trips, voter registration files, and police records have revealed information that many believe should not be released."[89] The authors cite a 2014 report of the President's Council of Advisors on Science and Technology (PCAST), highlighting challenges such as "data mining and other kinds of analytics" and that "one can never know what information may later be extracted from any particular collection of big data."[90] The authors further note that "while ensuring legal compliance is a natural starting point for crafting data release policies, cities must look beyond legal compliance when crafting data release procedures and strategies[91]. Finally, the authors state that public support is an

[89] B. GREEN - G. CUNNINGHAM - A. EKBLAW - P. KOMINERS - A. LINZER - S. CRAWFORD, *Open Data Privacy: A risk-benefit, process-oriented approach to sharing and protecting municipal data*, Berkman Klein Center For Internet and Society at Harvard University, 2017.

[90] *Open Data Privacy at Executive Summary, citing: President's Council of Advisors on Science and Technology, Big Data and Privacy*: A Technological Perspective, 2014. https://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_big_data_and_privacy_-_may_2014.pdf.

[91] *Open Data Privacy* at Executive Summary. Therefore, to promote the full and effective use of smart city data, the authors make four recommendations: "Conduct risk-benefit analyses to inform the design and implementation of open data programs; Consider privacy at each stage of the data lifecycle: collect, maintain, release, delete;

essential element of successful open data programs[92]. Engaging the public in the development of policies and practices builds critical support and will drive open data forward.[93] In the French IssyGrid project, a platform makes the neighborhood energy data available to the public free of charge.

In France, the enactment of the Loi pour la République Numérique, (Law on the digital Republic) in 2016, has created a framework for data dissemination which resonates with smart cities. The law creates a concept of "public data", coupled with a new "Public service of data", through datasets, i.e. for data with the greatest economic and social impact, available for reuse, so that companies can reuse them for their activities. In addition, Government data, i.e., administrative documents that are of economic, social, health or environmental interest, will be published. Two decrees have been issued which specify the threshold above which a public body must implement this requirement, and which fix the list of licenses for the provision of public data. Another decree requires the publication of the essential data related to contracts allocating public grants. The aforementioned law also creates a concept of "data of general interest", which impacts public contracts, since its article 17 has amended the rules regarding concession contracts by creating a new obligation for the concessionaire on mandatory data transmission. Through amendments of the Energy Code, these same data will also have to be made available by the entities in charge of electricity service, or of the distribution of natural gas (utilities). From a contractual standpoint, clauses about data transfer to the public entity will have to be drafted, such as the ones sometimes mentioned in French concession (DSP) contracts.

Develop operational structures and processes that codify privacy management widely throughout the City; Emphasize public engagement and public priorities as essential aspects of data management programs."

[92] Open Data Privacy, o.p. cit., 90, 67.

[93] Open Data Privacy, o.p. cit., 91.

Regulation of private data has also been enacted. Since 1978, with the Law "Informatiques et Libertés" (on IT and Freedom), France has created an independent agency in charge of supervising data collection, the CNIL (Commission Nationale de l'Informatique et des Libertés). It has recently underscored the vigilance commanded by the development of Artificial Intelligence in need of massive data collection. Overall, France will have to comply with the new EU's General Data Protection Regulation (GDPR), which is entering into force on 25 May 2018, reinforcing the former 1995 EU Directive. According to this EU mandatory regulation, all companies, either established in or outside the EU, which are processing personal data of individuals based in the EU, shall comply with the EU data protection rules. On the matter of personal data protection in the ambit of public contracts, the GDPR states, in its recital 78:"

"The protection of the rights and freedoms of natural persons with regard to the processing of personal data require that appropriate technical and organizational measures be taken (…) Such measures could consist, inter alia, of minimizing the processing of personal data, pseudonymising personal data as soon as possible, transparency with regard to the functions and processing of personal data, enabling the data subject to monitor the data processing, enabling the controller to create and improve security features. When developing, designing, selecting and using applications, services and products that are based on the processing of personal data or process personal data to fulfill their task, producers of the products, services and applications should be encouraged to take into account the right to data protection when developing and designing such products, services and applications and, with due regard to the state of the art, to make sure that controllers and processors are able to fulfill their data protection obligations. The principles of data protection by design and by default should also be taken into consideration in the context of public tenders."

According to the new EU Regulation and its implementing rules, while Public authorities must designate a Data Protection Officer (DPO), companies are only required to create such position when collecting personal data is their core activity - monitor individuals systematically, or process special categories of personal data - on a large scale.

Other companies are encouraged on a voluntary basis to hire a DPO or to rely on DPO consultant.

As things go, public and private data collection and dissemination are now an essential part of any smart cities projects. In collaboration with the CNIL, the French IssyGrid has led to the development of a procedure for collecting housing consumption data while respecting the privacy of residents. For example, IssyGrid now receives hour-by-hour consumption data for lighting, heating, water and electrical outlets building by building without knowing the detail per dwelling.

As noted by the 2017 World Bank report on IoT: "Data are central to IoT, but there is inconsistent understanding of data's value and management" (p. 13). Stating free access to public data and protecting private data is a policy decision taken by the French Government in the debate about the recognized "data market". The free dissemination of public data is not only meant to implement the transparency and governance goals, but it is expected to stimulate the economy, allowing starts up and companies to create new services based on the data available. Under such scheme, only private data, under several constraints, could be considered as goods. First, data-driven experiments can be an economic asset for local governments, triggering cost savings. Second, the potential monetization of these private data is now on the table, since it will clearly affect the profitability of private investments deployed under smart cities projects. This could even jeopardize some existing endeavors which have been designed, and balanced with the prospect of fees and revenues produced by the collected data (ex in the French town of Dijon). If these constraints and limitations over the use of collected data may be acceptable under a public procurement arrangement, because it is based on direct public financing, such limitations will obviously be one of the main concerns of any private investor before considering to participate in a public-private partnerships related to smart cities. Whatever the solution, in contracts related to smart cities projects, data recovery clauses should be introduced.

6.3. Data protection

Advocates for cybersecurity and privacy in smart city development, sometimes referring to the concept of SmartPrivacy[94], note the importance of adopting protection measures early in the process, as they may be more difficult to introduce once the smart city systems have been established:

"Smart city privacy concerns will not be going away soon, but the real risk is that the really smart city arrives before the law catches up to it or we realize how powerful the data collection and processing has become. It would be much smarter and better to develop a set of comprehensive privacy rules to govern the advent of smart cities and to limit municipal collection, use and disclosure of user information before it is too late."[95]

As of this writing, Philadelphia's approach to privacy and cybersecurity, like its overall smart city effort, remains a work in progress. The issues of privacy and cybersecurity were discussed in a smart city planning workshop held in October 2017, as part of the effort to develop the City's smart city strategic plan. City officials acknowledged that concerns over privacy are mentioned frequently in public forums, particularly with

[94] The concept of "smartprivacy", noted above, introduced by authors CAVNOUKIAN, POLONETSKY and WOLF, identifies a set of tools to promote the proper use and protection of smart city data. Much like the compliance mechanisms in a procurement system, "smartprivacy" is a multi-faceted approach using familiar elements such as laws, regulations, independent oversight, transparency and accountability to promote the appropriate use and safeguarding of PII. A. CAVOUKIAN, J. POLONETSKY, C. WOLF, *SmartPrivacy for the Smart Grid: embedding privacy into the design of electricity conservation, Identity in the Information Society*, Aug. 2010, Vol. 3, Issue 2, 275–294.

[95] A. GIDARI, *"Smart Cities" Are Too Smart for Your Privacy*, February 20, 2017, http://cyberlaw.stanford.edu/blog/2017/02/smart-cities-are-too-smart-your-privacy

regard to how the information collected will be used. As one City official stated, the privacy issue is a great concern to the City and will be addressed in its strategic plan[96].

7. DESIGNING CONTRACTS FOR SMART CITIES

7.1. Global contract for smart cities

Smart cities may actually require a web of contracts, with one main operator in charge of the whole project and several subcontracts and related contracts with companies, including startups, energy provider, plus other contracts signed with groups of citizens/users involved in local services. All of these contracts will need to be coordinated, with monitoring of private data collected.

The French Government has just released a new bill which, if voted by the Parliament, will offer new tools for smart cities development, although its scope is more about housing. Its drafted article 1 creates a new contract, the "partnership development project" (PPA) in order to support a new partnership adapted to the different territories in which the State and the intercommunality concerned or the metropolis of Lyon or Paris, can make their reciprocal commitments in favor of carrying out complex project. If its first aim is to conduct large local development projects with different financing, private and different public entities (including the State, the region, the public body, public local companies, all mentioned above in this chapter but which would be able to join forces).

Furthermore, the traditional commercial relation between supplying companies and public buyers may become outdated in certain sectors such as the energy network with new schemes where a private operator (ex. a community of residents) can also produce its own electricity and sell it to neighbors. For this sector, the European Parliament, the Commission and the Council are finalizing the development of a new regulation and a new

[96] *Philadelphia Kicks Off Smart City Planning Workshop*, Government Technology.com, Skip Descant, October 19, 2017.

directive on the organization of the electricity market, including the obligation to oblige Member States to Dynamic Pricing Contracts, which, through Linky smart meters, will allow consumers to choose to buy and resell electricity in real time, at market prices updated every 15 minutes[97].

7.2. Specific clauses on technical adaptation are needed

Regarding the performance phase of the contracts needed by smart cities' projects, the need for change and evolution is striking. In the first place, public contracts will have to adapt to the speed of change in the "smart city" environment. Procurement procedures are lengthy in terms particularly in the areas of public procurement, concessions and partnership contracts. However, the smart city wants to be innovative and dynamic, considering the speed of innovation in this area of connected services and connected goods, the adaptability of the main contract (and its subcontracts) will be crucial. In its 2018 Report, the European Court of Auditors deplores that most of the six ICT projects audited were hardly compatible with long-term contracts as they were exposed to rapidly evolving technologies.

Traditional contracts may be too rigid, although French procurement contracts, as the US federal contracts, allow for unilateral change if it is required by the public interest and if its negative financial impact on the private party is compensated. French concessions use to be very adaptable, in compliance with the continuity principle of the public service

[97] Commission's proposal for a directive to the Parliament defining the energy community: "a legal entity based on voluntary and open participation, effectively controlled by shareholders or members who are natural persons, local authorities, including municipalities or small businesses and microenterprises. The primary goal of an energy community is to provide environmental, economic or social benefits to its members or local areas where it operates rather than financial benefits. An energy community can be engaged in electricity generation, distribution and supply, consumption, aggregation, storage or energy efficiency services, renewable electricity generation or other energy services to its shareholders or members. "

they are in charge of. However, the new EU package of 2014, in order to ensure competition and prevent any essential modification, has created rules and limitations on contracts' modification that may render technological (for example) evolution more difficult for smart cities. For them, it could be interesting to think about substantial innovation as being a case for unilateral change or termination.

One solution could be to integrate the inherent mutability of the "smart city" model without requiring any changes to the contractual provisions. This would enable sustainable and mutable public contracts for the smart city. The price revision clauses for certain public contracts over periods longer than 3 months in reference to official world price indices to adapt the contract to economic fluctuations may serve as an existing inspiration. Mechanisms of unforeseen hardship are another way of making the public contract viable

8. CONCLUSION

All the examples mentioned above, far from being exhaustive, considering the exponential speed of innovation without mentioning the new prospects open by artificial intelligence and smart contracts, force us to reconsider how public contracts could safely convey the smart cities movement. Smart cities may today require new form of public contracts, transparent and allowing for performance oversight mechanisms conducted by third parties such as citizens. At this early stage, it could be argued that regulation and public contracts, comprising public procurement contracts but also more complex public-private arrangements developing new public service obligations to better serve the citizens (such as clear rules on data use), are still the best adaptable legal bedrocks for supporting the smart cities revolution.