Legal Aspects of Governing the Commons and Technical Challenges of Smart City Development

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Abstract

A modern city is considered a “system of systems”: a technological center that concentrates data of all objects and entities, especially citizens, influencing the condition of the city. The question to be asked is whether the idea of technological centralization must necessarily mean or inevitably lead to the centralization of legal sphere. This question also stands before national legislators and decision-makers at the EU level. The European Parliament noted in its 2014 and 2017 reports that a smart city is not only made up of technological solutions, but above all of people who should influence the city's development. Hence, among the goals to be met by an optimal smart city project, EU considers the growth of bottom-up initiatives. Proposed projects and ideas of smart city pose a number of questions in this respect: how to shape legal standards of mobile technology, IoT, etc., how to unify technical standards, and the most important, how to adjust the ownership structure of new technologies so as to meet the requirements of stable urban development, and to address the need for privacy and security that are exposed to greater risk in each integrated network. The paper will analyze legal solutions used in the past and those currently used that can facilitate engagement of citizens in developing smart city, and can influence a proper ownership model of smart technology which is decisive for privacy and security issues.

Introduction

Every evolution of technology has changed cities, their shape, size, transport system and ways of caring for safety. This happened during agricultural, industrial and technological revolutions – and this is the case today, in the era of rapid technological and digital evolutions. Technological development of cities was always accompanied by legal regulations which also served to modernize the city.

Law is a tool to facilitate social development – the economic one, and the technological one as well. Thus, proper application of innovations requires a good legal environment so as to fall neither into an unlimited technological rush, nor into a technological stagnation. The former will happen due to the lack of regulation, the latter because of harsh legal restrictions and overregulation. The question is how historical experience can help us in channeling dynamic digital and technological evolutions through legal regulation into a sustainable development of the city.

Problems which appear before lawyers have not changed very much. Time matters when we look at technology: history means there 10 years ago, 2 years ago, 1 month ago. New and better solutions are expected all the time. Legal principles, however, do not develop in a linear order. Law is synchronized with human nature and it takes into account what technology and logics of sciences must postpone. New solutions are not supposed to be better than old ones. National and cultural characteristics usually does not allow to use the same legal act everywhere – just translated into other languages. Hence, western legal tradition, the fundament for any modern legal concept is the only framework that enable us to judge different regulations and point to solution considered to be the most just or the most effective one.

1. London and Paris in the 19th century – Two Model Examples

We can take two historical examples to analyze what factors are important for reshaping the city, and thus what challenges can face smart city development nowadays. In Great Britain in 1844 the technical and sanitary requirements for buildings in London were defined. Metropolitan Buildings Act of 1844 specified minimum room dimensions, thickness of walls, correct fall of drains, and established types of buildings control. In 1852 in Paris the new expropriation law allowed urban planner Georges Haussmann to freely shape the city's architectural space. In both cases appeard problems with making both cities smarter.

In London it has been proved how important and difficult is to control and respect new technical rules. Moreover, it was not easy to meet the standards envisaged in the legal act, and new technological solutions had to be tested for a long period. This „London experience" underlines

how crucial is the cooperation between professional officials (appointed district surveyors), and private companies who invest in new solutions. Moreover, finally the most optimal construction standards for sanitary and emergency purposes were enforced through bylaws prepared by Local Government Board. In 1877 Local Government Board succeffuly based its legal claim on its own model bylaws. Many other local authoriteis follwed this example and by 1882 over 1500 of them had their own bylaws. However, even local standards were not implemented without cooperation with commercial and private agents. Many households owners started legal battles against new local rules. Connecting drainage and sewer sytem for 6000 household lasted 6 years. However, commercial agents were interested in new sanitary and emergency rules which promoted new technical solutions. All of them was at risk of being defective, and producers had to be able to predict fast enough what malfunction can happen. Competition between them so as to offer the products best fitted to legal rules step by step improved the standard of buildings in London area. London example show how many factors are involved in infrastructural risk managment: legal regulation, local rules, implementation, commercial market, and technical innovations.

Analyzing the example of Paris we can see how important for making a city smarter is the property law, and the structure of ownership when it comes to the development of the city. The law established in 1852 allowed Haussmann to expropriate entire blocks, and remade layout and infrastructure of the city. However, it produced harsh social and economical consequences both for the city, and its inhabitants. Haussmann tried to employ risky barganing on rocekting prices of private lands in order to keep the project economically viable. The reforms of Haussmann were challanged numerous times by private owners. In 1856 the Council of State confirmed illegality of certain expropriations. 1858 the same Council ordered to return the property not used directly for streets to private indivudals. In 1860 Constitutional Court allowed the private owners to seek compensation from the city and to base their claims on the upgraded value of the real estates. The improvement, and total change of the city structure, and infrastructure, led on the one hand to the enormous architectural success. Thus, Paris became a model city for other European and Western capitals. On the other hand the development of city caused an enormous debt of the city, and perturbances on the real estate market.

From these two historical examples we can abstract two types of issues which every project to make city smarter has to face. One deals with coordinating technical standards and legal norms. One should reflect on how to implement what technological progress requires, how to control it through legal tools, and how to shape the relation between technical and legal norms. The other issue deals with the influence which the development of city has on property rights. There appears the

problem who should introduce new technologies, how it interferes with private property, and how to deal with the ownership of new technology: should it be state owned, private owned, communal property or a public-private initiative.

2. Smart City Project in the European Union

The idea of smart city in the European Union as expressed in the Europe 2020 strategy is focused on three areas: 1) Digital single market and smart cities 2) Energy and smart cities, and 3) Sustainable transport for smart cities. Digital single marek is focused on allowing broad access to services which depends on IoT, and mobile solutions. One way is through technology: the extension of mobile connections and Internet access. The other is through legal regulations which enhance flow of goods between the countries, and in the case of a city – within the local community. Transport system in the smart city means more automated way of managing public transport, and private transport. It deals with facilitating flow of cars, services which enable leasing electric cars, bikes etc. It means as well an improvement of security system by introducing automated delivery of goods within the city center. Finally, another important aspect is the decentralization of transport services, and the openess to new solutions, and services like Uber etc. The third element of smart city project – energy in the smart city – is related to the idea of sustainablity, and distributed energy system. Sustainability is to be achieved through coordination of energy supply and demand by implementing smart power grids in every home. They will collect data, and enable the city to allocate and distribute energy in the most optimal way, so as to prevent huge losses of energy or black outs. Distributed generation means that smart city can become as a whole an energy producer and supplier at the same time. It deals with the idea of smart homes which can create a network of small scale producers of renewable energy which particpate in the whole power system. Homes can store and share energy producing capacities thanks to digitalization through power grids and connecting them with the power infrastructure as prosumers.

3. Coordination of Technical Standards and Legal Norms

Current challenges enlisted by European Commission to the development of smart city project in the EU resemble the historical experience. One have to coordinate technical standards and legal norms. When there is overregulation legal acts can be too static to acknolewdge the current state-of-the-art. When there is a lack of regulation the security of the project is diminished by no reference to standards.

1. low priority for open data projects;
2. complex procurement procedures;
3. changing national legal framework and standards;
4. national framework impeding local willingness;
5. no minimum standard from the national level;
6. confusing legal standards from different levels.

On the European Union level there were formulated some proposals how to overcome certain obstacles caused by governance and legal issues. As EU suggests one should look to other countries and find the best way to cope with. From another perspective legal regulation can enhance involvement in smart city project by giving a right to fail for pioneering projects, in order to diminish the liability for risk, and possible failure of the project. Right to experiment can unleash the creativity, and minimze the fear of economic loss. The right to experiment allows to go beyond national or regional regulation and take solutions from different legal orders. In France the state allows to go beyond the national regulatory framework to experiment (e.g. cascade funding – an EU legal obstacle). This helped for example to develop PV systems in France on the basis of German standards. However, coordination of technical standards and legal norms takes time. One proposal at the EU level is to promote investing in the smart city projects in a more flexible way through new public contract – so called „Innovation partnership". This specific type of procurement enables a city/public entity to establish a mixed contract. On the one hand the contract is directed towards creating an innovative solution, not available on the market. On the other hand it gives property rights to the innovative solution to the city. The main advantage is to give a city possibility to shape its own innovative solutions. It can be realized by several partners, and public authority has right to use cherry picking from different offers presented by the contractors. The contract is realized in several stages after one of which the contract can be terminated, and financing closed. There are eg. plannig stage, product testing etc. The disadvantage of the innovation partnership is the pace of the procedure. It is focused on negotiating the research process, the characteristics of innovative solutions, negotiating terms at every stage of the process. Thus, it takes time. On the other hand it makes the project more mature and supposedly more adapted to local needs and conditions. As for this moment it is not however used very often. It has been used mainly is France, e.g. to order new generation computer control rooms (to control railway traffic), intelligent parking management service, development of models for active management of bathing water. In Poland it was used by Enea Operator for the design, production and supply of electricity balancing meters.

4. Property Issues of the Smart City Project

Nowadays, in the EU strategy for smart city, one of the most important legal goals is to enhance public-private partnerships, and take advantage of opening city infrastructure to technologies developed by private companies. Without doubt the mix of public private projects can lead to the question of conflicting rights, especially property, or intellectual property rights.

Public-private sector partnerships in relation to information and data services will create conflicts between public and private sector data protection regimes, and may also confuse a public that believes it is dealing with government when in reality it is dealing with a hybrid of public and private sector actors.

In such cases, it becomes necessary to ask who "owns" any data that are the output of these relationships. For example, while there used to be no question that municipal transit authorities generated (and therefore owned whatever IP rights might subsist in) public transit data, the advent of real-time GPS data has raised issues about data ownership. Real-time GPS transit data are often collected by private sector companies under contract with municipalities to provide both the hardware and the software to generate and process this data. As these types of partnerships proliferate, cities will need to pay attention to issues of rights and ownership. Cities that seek to move away from unsatisfactory suppliers of smart city services may find themselves entangled in legal battles over rights to data already collected or analyzed by those suppliers. At the same time, municipal control over data is necessary to protect the right of public access to it both for innovation purposes and to ensure transparency and accountability in the delivery of municipal services. (Teresa Scassa, *Emerging Legal Issues in the Smart Cities Context*)

Problems highlighted by the European Commission are as follows:

1. privacy and security issues;
2. technical and legal access to data;
3. ownership of mobility stations;
4. fair distribution of space;
5. jurisdictional issues: regional-city level;
6. big energy companies are not willing to share data with public authorities even they are city owned;
7. no clear legal framework to allow operators/municipal owned companies to share data;
8. lack of ownership by citizens, passive citizens with high expectations towards city.

Thus, the second takeaway from current EU problems is the challange of management of property rights. Firstly, problems appear in regard to property rights to the smart city structure: citizens involvement, public property, or private/big companes property. Secondly, the issue is how to govern data which uncover privacy of inhabitants and entities operating in the city. This problem is related with the property of software used in smart techonology. Who created it, which software a city want to use, is it possible to have open-access software, or only a license to software created by private companies. Should it be a software developed from public funds, and on public order, or perhpas it can be a software created by the community itself: inhabitants, who offer their own tools, and innovations. The ownership of software leads to another problem – who has the right to manage the data collected by software: the software owner; the city; the inhabitants. How to protect privacy, and sensitive date? Is it possible to shape software so as not to collect such data – how to comply with new EU regulation of data privacy. The third issue is the property of energy sources: of power system infrastructure. When almost every home can be a part of distributed energy infrastructre the limits for state control should be imposed. Then appears the question how to protect, and maintain the decentralized power system in order to follow technical standards of effectiveness and security. There are some obstacles of decentralized power system which can have negative impact on the security of power system. Technical experts claim that decentralization and digitalization of power system can cause limited visibility of power system, limited control over private distributed energy units, limited predictability of demand and supply of energy, and limited coordination of numerous individuals and private energy units: mainly smart homes.

5. The Polish Example

In Poland, we are now in the moment of opening the power system infrastructure of the city to more players than public ones, or than individuals who share their energy capacity as prosumers. Polish legislator is on the way to extend the right to share energy capacities. One of the examples is the promotion of decentralization of energy production, and transmission which is referred to as distributed generation. In recently discussed draft of „Energy Policy of Poland until 2040" there is a proposal of development of distributed energy, energy clusters, and energy cooperatives. Moreover, in the recently amended Act on Renewable Energy Resources (OZE) in 2016 and in 2018 there has been added a new provision which defines energy cooperatives and set technical rules which liberates them from some formal duties, like seeking approval of tariffs, delivery of development plan, etc. (art. 2.33a; art. 38b OZE). In order to constitute a closed distribution system, and to have more

flexible mode of operation, an energy cooperative has to distribute energy only to its members, the number of which cannot amount to 1000, members have to be bound by „comprehensive agreement", and the distribution system cannot be connected with neighboring countries. Although energy cooperatives could have been established on the general principles of conducting a cooperative, there is only one successful example of it – „Nasza Energia" created in 2014 close to the city of Zamość. Now, legislator decided to introduce a specific regulation in the Act focused on renewable energy. Perhaps, it will encourage citizens to establish such cooperation particularly in rural areas. For sure, it is one of the elements of stable, legislative measures which are crucial for developing local energy market as it has been studied in recent comparative research. More developed decentralized energy generation has been already conducted via energy clusters which are still growing in Poland. These are the first steps to effective decentralization of energy sector. The second goal of the Draft of Polish energy policy is to enhance the importance of individuals in terms of consumers and prosumers. That is why, the Ministry of Energy plans to develop smart grid, and to encourage to invest in smart homes. Till 2026 ca. 80% of family units should have smart meters, and future legislative effort should be directed towards energy consumers. They will be engaged in generation, selling or DSR services not only as prosumers – which are already covered by energy policy, but also as local energy communities, like inhabitants of block of flats, etc. This direction has been recently confirmed, and one can expect that the OZE Act will be amended in order to extend the group of prosumers by adding to it small and large enterprises, as well as units of local government. From the point of view of legislator it will be a challenge to a centralized sector of energy. Acceptance of players on lower level of power system, like enterprises, cooperatives, local authorities has to be followed by more flexible way of managing power system and its units. Only this can make decentralization of power system effective and economically viable. When deregulation grows, more important will be the turn to technical standards and soft law recommendations which should be widely promoted, and controlled.

6. Historical Resembelness

It is not an anachronism of M. Assante, a director of the Sans Institute, a cybersecurity training organization, and former Chief of North American Electric Reliability Corp., the U.S. grid security monitor, and Vice President and Chief Security Officer for American Electric Power, one of the most biggest private energy companies, that he compared modern critical energy systems to Roman aqueducts. Thanks to them the ancient civilization was able to flourish. Assante used the example of Roman aqueducts so as to force the deceives political bodies to start protecting to a greater extent

service continuity of energy systems. European countries and European Union have started their common preventing program just less than 10 years ago. Moreover, the problem of cyberattacks is not only limited to the IT of power producers and transmitters, but also to any citizen who has been using so called smart grids. New EU legal policy has turned so as to promote smart energy solutions in every household. It has been implemented also in Poland. However, there are some doubts about both protection of personal data of users and about vulnerability of such a IT system to any cyberattack. In fact, the level of interconnectedness is moving the problem of security of energy infrastructure far beyond the group of producers or transmitters. It starts to has impact not only on big companies but also on individuals.

In Roman legal solutions towards water supply and aqueducts we see a more complex picture than one can imagine. It was not an obvious idea that water was a public property. In fact there were configurations of two approaches: private owners of water resources and state-owned public resources. Moreover, they were sometimes combined if the public water served only to manage private lands. The Quinctian Law, passed in 9 B.C., provided penalties for damage to aqueducts and is part of the basic legislation passed early in the period of imperial control. A fine amounted to 100,000 sesterces and was paid to the Treasury (Roman people). The sum was a substantive one – it was the value of the whole estates of the lower group of citizens. Moreover, „a person shall also repair, remake, restore, build or set up what he has destroyed and demolish what he has built and do all this in a proper manner" (lex Quinctia). However, Roman law knows even tougher penalties. As we know from the Codex Iustinianus, from the constitutions of several emperors, the punishment for negligence in taking care of the aqueduct located on the private land which resulted in its obstruction „shall be punished with the loss of their property, for the Treasury will obtain the land". It is also confirmed by the inscription, discovered at Jerusalem in 1925. There was even introduced capital punishment and the confiscation of property. The severe punishment was for person who sows or plants within fifteen feet of either side of an aqueduct. If anyone tried to do this, was punished. And there was even provided the standard for foot measure. In fact, the inscription is in accordance with other legal norms that were used so as to protect aqueducts from any damage caused by the lapse of time or by any natural reason. In that respect, the requirement of fifteen feet wide „security area" around any aqueduct is repeated. Emperor Constantine under the same punishment: the confiscation of the private land, ordered to „plant trees at intervals of fifteen feet on both sides of the aqueduct traversing premises; and it shall be the duty of the judge to see that these trees are cut down, if at any time they should sprout, to prevent their roots from injuring the aqueduct". One cannot overlook that the water supply issue interested many in the Roman Empire. When we look back to Roman experience

there is no doubt that the main protector of critical water systems was Emperor. The security system seemed to be a centralized one. In fact the picture is bigger than it seems. Interestingly enough, there was a variety of private law regulations that encouraged anyone to look after aqueducts, its reservoirs, conduits, pipes and uninterrupted flow of water. However, not only public or administrative orders were applied towards protection of aqueducts. Due to the coexistence of public and private aqueducts, and due to the necessity of conducting water supply mainly through private lands, the private law provided its own rules as well. One of them was the extension of delictual liability for allowing aqueducts to be ruined. The reimbursement was possible not only for damage caused by a direct action with direct intent but also for negligence and for damage which was caused by a mere failure to act. Moreover, the delictual liability based on lex Aquilia was extended not only to a possessor but also to a usufructuary of the said aqueduct. The importance of the water supply was so crucial that the most important official in case of legal matters, namely praetor was allowing to enter private lands on the basis of his approval called *interdictum* and make necessary repairs of aqueducts. It was possible for anyone, even without any special right to this land or to the person of owner. The jurist Venuleius gives us a flavour of social importance of aqueducts: „the repair of roads is not as necessary as that of aqueducts, for if the latter are not repaired, the entire use of the water will be stopped, and persons will be exposed to death by thirst. It is evident that water cannot be obtained without repairing aqueducts". In fact, all these situations dealt with private matters, with normal threats of daily life. Only in the mature Roman Empire we can find security of aqueducts a typical public matter. Care of aqueducts was considered by Hermogenianus an example of personal public duties. In the time of Emperor Valentinian it was said that all persons should work and assist united in the repair or construction of aqueducts. And even after him, Emperors Zeno and Leo burdened each consul with the duty to pay at the beginning of his office a hundred pounds of gold for the maintenance of the aqueduct of „great city" which referred to Constantinople [42]. We however could not find any hint that will lead us to the issue of military security and protection against an enemy attack. Legal regulations were concerned with maintaining critical systems within daily life and motivating citizens to take care of public matters which in case of aqueducts interfered to great extent with private property rights and interests of individuals.

Conclusions

From legal point of view the question is how far regulation can go in to control the distributed power system, and how much it has to protect privacy, and freedom of energy consumers and

prosumers. There are two important aspects: soft law and property rights. Soft law allows to promote technical standards and norms which facilitate effective application of smart technology, and smart infrastructure in the city. Property rights decides who bears the responsibility, and who has influence on smart city, and its technological development.

Legal, and technical approaches show that nothing is possible without cooperation, sharing data, and social and state control of smart city. Having this in mind, one should ask how in the era of smart city maintain local community, how to protect it even on the eve of digital centralization of the city, of the Big Data governance. How to promote cooperation, how to shape sanctions or economic penalties for non complying with smaty city requirements, how to avoid monopol, either one of the state, or this of the private players.

Within the presented projects of smart city or on the occasion of the introduced changes, there are numerous questions related to the increased risk in the integrated network. Among them are those which deals with creating legal standards, the possibility of unification of technical standards, the relationship between the ownership structure of new technologies, the requirements of sustainable urban development, and the need to protect privacy and security. The city looking for being a smart city usually is considered to be a "system of systems": a center that is supposed to serve for technological centralization, gathers data on the operation of all entities and objects affecting the city's condition. Thanks to this, a large automation can be achieved on the one hand, which will lead to gradual facilitation of everyday activities, and on the other hand to extraordinary efficiency and savings in the use of energy, water, cars etc.

The question to be asked is whether the idea of technological centralization must mean the social, political or legal centralization of the city or shall inevitably lead to it. This question also stands before national legislators and decision-makers at the EU level. After all, even the European Parliament noted in its report that a smart city does not consist only of technological solutions, but above all of people who should influence the development of the city, so that the project of its modernization would be effective. Hence, among the goals to be met by the optimal smart city project, it was pointed out, among others the effective support for bottom-up initiatives. If so, then one should ask what would be the role of local government in smart city? How should be shaped the relation between the state and the city, but also between the metropolis and the commune, or between the commune and districts, and finally between the city and its residents?

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