Digitalization and smartening public governance of the European high north regions[1]

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Abstract

Balancing technological evolution, protection of the environment and social communities well-being has never been a simple task. However, while everything changes at an incredible fast-pace, public authorities, private entities and even civil society must accompany that movement. It is, therefore, crucial that primarily public officials and legislators build their activities on solid information, especially in places where a harsh climatic condition, sparse population distribution and longer distances make public involvement more difficult. The European high north is an example of a region where the recent phenomena of big data, certainly represents challenges because of its yet to fully developed infrastructure, but also opportunities for improving, people's lives, and enhancing sustainable development, through smart mechanisms. In fact, digitalisation and new technologies can cause negative and/or positive consequences in the life of certain communities, depending on the means and purposes they are used for. This article intends to demonstrate how an adaptive, in other words smart governance approach (digitalized governance approach) – based on open, flexible and participatory tools – could improve the life of human beings in the territories of the European High North (EHN), preparing the region and its inhabitants for the challenges of sustainable development.

1. Introducing the theme

Technologies are changing and developing at every moment all over the world. At the same time, social communities change and evolve as with the transformations taken place in territories as well as in ecosystems where people live. Social communities tend to develop their activities and integrate them with technological innovation both in public and private sphere. The European high north (EHN) region is an example with all its specific natural and social characteristics what concerns all these phenomena. The region is located in the northern parts of Finland, Norway and Sweden – sometimes referred to as Nordic Arctic. It is a sparsely populated region with rich cultural and natural bio-diversity. Today, the region faces many challenges, climate change being unquestionably one of the most relevant themes of debate for last few decades in the region. The need for balancing the protection of ecosystems and natural resources with human practices, technological innovations and improved infrastructures, in and between vast distances

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within the region, provides with improved quality of life of the citizens. The EHN region is characterized as sparsely populated having significant number of indigenous Sámi population and increasing number of ageing population living under an extremely strict, and fragile, climatic condition. The population of the region suffers from multiple vulnerabilities in relation to environmental threats. It is of importance to promote sustainable development for assuring well-being to the communities living within the territories located in the northern parts of Finland, Sweden and Norway.

While entering the so-called "Anthropocene" era (see Purdy, 2015), decision makers are, more than ever, concerned in managing services and infrastructures in the territory in the most efficient ways. The managing services in regard to the use of resources, energy spending, greenhouse gas (GHG) emissions becomes one of the primary target to ensure the well-being of citizens by reducing the effects of climate change, and by promoting sustainable development, in the region. From the experiences of "smart cities" to those of "smart agriculture", territorial intelligence and analytics have in themselves the aims of efficiently guaranteeing quality of life to those who dwell, work or visit those of the managed or governed places in the territories, such as the EHN, facing the challenges of environmental transformation and economic globalization.

After a period of dematerialization of administrative internal processes for more efficiency and agility in the way of interacting with citizens, public authorities are now trying to digitalise that same interaction with citizens through internet solutions, reducing the old needs of shifts to public front-offices. With these new solutions, it is now possible to making available forms, the use of communications by email or even electronic applications. However, today, with all the new available technological solutions and devices (for example smartphones), it is also possible to "sensorise" the environment, weather, transports, road traffic, as well as the movements of citizens and their input for better public management (Trilles et al., 2017).

The example of open data, unleashed by public (and even private) entities may lever more development and also open new opportunities for entrepreneurs to create innovative products and services, or even to make local and traditional products and services available for the whole world.

At this point, the internet of things (IoT) and connectivity, which are growing at an incredible pace (D'Angelo et al., 2017), will play an essential role for improving the management of the territories and fostering well-being within local communities. With sensors, everything can be connected, enabling public authorities to "feel" territory and communities and answer, in real-time (Ding et al., 2017), to the needs of people and ecosystems.

The governance of the territory is considered "smart" when technological developments and solutions are integrated as with the changes taking place in socio-cultural, economic and environmental settings in a given region. The smart governance approach must, therefore, be prepared for accumulating digital transformation. This article intends to demonstrate that an adaptive (or "smart") approach integrating technological innovation

for more open, flexible and participatory governance contributes to improve human life in the EHN. Hence, the more technological innovation adapted to the sustainable and efficient use of the existing management services, the more local communities mobilize themselves to competently tackle the present and future challenges prevailing in their own context. The article therefore promotes the argument that the sustainable existence of the communities in their own natural environment calls from reflexive management of public services by smartening the governance approach.

2. Digitalising climate justice and sustainable development

The movement of digitalisation towards the so-called "smarter territories and communities" is creating a myriad of opportunities for improving people's lives – bearing in mind the wellness of present and future generations – and, at the same time, enabling more efficiency in the use of resources. A smart territory refers to regional developmental model where people integrated in their everyday life the benefits arising out of innovations from the ICT infrastructures, which is considered as enablers of intelligent regions (Giovannella, 2014). Broadly, smart territory is inclusive of smart economy, smart mobility, smart environment, smart people, smart living and smart governance (Giovannella, 2014). Today, from urban to rural areas, enhancing economic development, fairness and sustainability in different human settlements are more and more a common design. Designing services this way, aligns local and national governance with the goals of the international community respecting common concerns, such as, climate change, protection of the environment and human rights, with a view to promoting, for example, Sustainable Development Goals (SDGs) adopted by the United Nations.

Today, climate change threat resulted from the emission of GHG at the atmosphere attracted a great deal of analyses concerning the relationship between technological innovation and the environment focusing the goal to attain for sustainable development. Technological innovation also profoundly influences social and economic activities. Hence, such innovation contributes to make a balance by erasing detrimental threats resulting from the effect of climate change, and on natural environment. At the same time, technological innovation also plays a significant role as driving force towards a smart and sustainable territorial development (Auci and Mundula, n.d). In fact, sustainable development has been playing an extremely relevant role amongst the issues that are currently dealt with by international, national and local politicians or legislators, public officials and other professionals when assessing problems that affect the day-to-day lives of different populations in the world. As a result, our argument here lies in the fact that the goal of achieving sustainable development is contingent on the integration of smart technological innovation in public governance where human wellbeing can be secured in the best possible ways by smartly tackling the prevailing challenges in socio-cultural and environmental context.

In what regards sustainable development, the publication of *Our Common Future* – widely known as the report of the Brundtland Commission – should be emphasised as the paramount document that popularized the concept as the "(…) development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It also explained that the definition:

"[.].. contains within it [has] two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (World Commission on Environment and Development, 1987).

A paramount attempt to codify the relation between human beings and environmental protection was already introduced by the Stockholm Declaration in 1972 pointing out that "Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations" (Principle 1) (UNCHE 1972). Twenty years later, the Rio Declaration on Environment and Development (13 June 1992) proclaimed in its Principle 1, that "[h]uman beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature." In the same year, the United Nations Framework Convention on Climate Change (UNFCCC) set in its article 3, clause 1, the principle that "[t]he Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities."

More recently, the United Nations Human Rights Council approved the *Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment* (Knox, 2012), concluding (among other ideas) that:

"Clarification of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment is necessary in order for States and others to better understand what those obligations require and ensure that they are fully met, at every level from the local to the global." [par. 58] and "States should continue to take account of all of the decisions and recommendations from the many other forums, from international conferences to special procedures to regional human rights tribunals, which are actively developing and implementing the human rights norms relevant to environmental protection" [par. 62].

Finally, one of the most important current instruments at an international level is, the UN Resolution 70/1 – *Transforming our world: the 2030 Agenda for Sustainable Development*, adopted by the General Assembly on 25 September 2015 sets a New Agenda on sustainable development, as well as already earlier referred to 17 SDGs and targets (see Bell et al., 2013). These goals and targets included a set of objectives to promote quality of human lives and sustainable human wellbeing. While each of these goals and targets are interconnected, a number of them directly contribute to smart governance approach, which include: building of resilient infrastructure and sustainable industrialization and fostering innovation (Goal 9); making of cities and human settlements inclusive, safe, resilient and sustainable (Goal 11); taking of urgent action to combat climate change and its impacts (Goal 13); and promoting peaceful and inclusive

societies for sustainable development, providing access to justice for all and building effective, accountable and inclusive institutions at all levels (Goal 16) etc. The recognition of these goals, as they relate to the promotion of quality of human lives, is also found in the Paris Agreement, under the UNFCCC, which acknowledged in its preamble that:

"(…) climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity (…)"(UNFCCC 2015).

At this point, the preoccupation with the dignity and wellness of present and future generations assumes the weight of an effective responsibility, as an ethical principle, which is clearly visible in the doctrine of Hans Jonas, with a special basis on the so-called "heuristics of fear" (*die Heuristik der Furcht*) (Jonas, 1979) and with a strong connection to the precautionary and the prevention principles that are usually invoked in environmental law In this context, John Rawls considers that "[t]he present generation cannot do as it pleases but is bound by the principles that would be chosen in the original position to define justice between persons at different moments of time" (Rawls, 1999; on this theme, see also Gosseries, 2004).

This perspective means that, when dealing with human and fundamental rights as well as with environment and climate change, the governance approach including legislation at all levels, international, regional, national and local, must be able to foster resilience. Given that "people and environment are peer components of a co-evolutionary eco-systems" (Giovannella, 2014), it is important for any needed capacity of adaptatio to external disturbances of social-ecological systems, along with the changes in technological innovation and human behaviour. Today, we, all of us, are becoming used to live with change and uncertainty. This perspective demonstrates that, as Alan Boyle would state, "the response of human rights law (…) needs to be in global terms, treating the global environment and climate as the common concern of humanity" (Boyle, 2015).

One best way of addressing such common concerns is to receive benefit from the utilization of new and innovative technology for greater sustainable development. Today, politicians, legislators, judges, academics and lawyers have been making use of the best available digital technologies in their capacity, in order to combat and/or mitigate the impacts of this global reality and its repercussions in the well-being of human communities. The use of technology covers from the most rudimentary use of information and communication technologies (ICTs) to excellent levels of dematerialized administrative processes. Public administrations have been implementing various measures to combine absolute reductions in natural resource use with continued efficiency and economic growth (Heiskanen, 2001). Modern governance tries to look for legal and policy mechanisms for a more efficient economy (and simultaneously decarbonised), fostering a general spirit of human well-being, side-by-side with different

traditions and cultures, nature and biodiversity (SEPA webpage). This means that the process of digitalising governance for climate justice and sustainable development has already started, but there is still a long way to walk, particularly in what regards the always-new technological solutions of analytics applied to territories, where decision-making processes will play a relevant role in all this movement.

3. Smart cities and smartening territories

The idea hereby presented of smart territories originates from the term "smart cities", which is widely considered as broadly inclusive. It encompasses "almost any form of technology-based innovation in the planning, development, and operation of cities" (Harrison and Abbott Donnelly, 2011; See also Townsend, 2013). Within the European Union (EU) the term "smart city" almost has an official status, with the European Parliament having issued a study ranking cities based on their performance in governance, human flourishing, liveability, mobility, economy, and environment, assuming that:"the idea of Smart Cities is rooted in the creation and connection of human capital, social capital and information and Communication technology (ICT) infrastructure in order to generate greater and more sustainable economic development and a better quality of life" (European Parliament, 2014).

According to the study referred to, the European Parliament adopted the following working definition for "smart city": "a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership" (European Parliament, 2014). Therefore, the same tools and criteria can be applied to the rest of territories, beyond the borders of cities, for a definition of "smart territories".

Nonetheless, other suggestions have been presented, such as the idea that a city is smart when the use of information and communications technology (ICT) makes:

"the critical infrastructure components and services of a city – which include city administration, education, healthcare, public safety, real estate, transportation, and utilities – more intelligent, interconnected, and efficient" (Washburn and Sindhu, 2010), as well as the approach "that cities are systems of systems, and that there are emerging opportunities to introduce digital nervous systems, intelligent responsiveness, and optimization at every level of system integration" (Massachusetts Institute of Technology, 2013).

Other interesting definition is based on the idea that a city may be called "smart" when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure are used to "fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" (Schaffers et al., 2011; Caragliu et al., 2009).

As a matter of fact, according to the possible definitions presented herein, the inclusion of urban fairness or inclusiveness, (Oomen et al., 2016) public participation and sustainability is absolutely accepted to be included in the term, "smart city", if the so-called intelligence that is present in the city (from ICTs to open data) is used for

improving those indicators through innovative, open and analytical solutions, which are available for all.

Therefore, the movement of smartening territories consists of applying these same ICT tools that have been used from urban areas to a broader reality of territories, from rural lands to natural protected areas, on a vast range of issues, such as food security or ecosystem services (Louman et. al., 2015). Following the interpretation of Garcia-Ayllon and Miralles, evolving the concept of smart city is "extending it to a more comprehensive framework such as the Smart Territory. This concept of Smart Territory is more consistent with the very purpose of sustainability and efficiency" (Garcia-Ayllon and Miralles, 2015). As a result, both national and local governments (and especially those that develop their activities at a more local level) have now the opportunity of looking at their territories as "living organisms" where a vast collection of intersecting, interacting, and overlapping networks exist. These networks bind people, infrastructures and the environment as closely as possible (Uribe-Pérez and Pous, 2017).

The EHN, as it is being more and more modernized with the expansion of the usage of ICTs despite its distance and sparse population distribution, can be considered as an example where the territory calls for smart governance in order to promote quality of lives of region's population. A large number of technologically based initiatives are being implemented in the region. While these initiatives are often influenced by economic and financial purposes, they also increasingly meet the needs of the communities at this peripheral region specially relevant because of its socio-cultural, demographic and environmental conditions. The region's population are generally subject to multiple vulnerabilities, because of the challenges posed by the effect of climate change, and societal transformation, such as losing of livelihood activities traditional held, lack of available jobs and services, out-migration of young population, social isolation of communities inhabiting the region etc. (Schweitzer et al., 2014). Although it may be argued that effect of smartening in principle could close people, often resulting in reducing proximity to personal relations within social communities, and transforming people into mere objects or sensors with no protection in what regards their personal data, but in reality for communities' *in-situ* survival is increasingly dependent on efficient and smart governance to be in place. Hence smartening the territories of the EHN provides with incentives for continued presence of sustainable and secure *in-situ* human communities.

4. Smartening governance for sustainable development

In order to face public management of day-to-day problems (in a vast array of issues), national and local authorities need to permanently look for new mechanisms for involving people in the decision-making processes that may affect their present and future lives, namely in what regards their personal and economic or professional activities, but also respecting their privacy rights, their cultural traditions and their capacity to live in community, as well as in harmony with nature and natural surroundings.

It is worth highlighting the role that local public officials (namely those who are elected, but also professional civil servants) in order to comply with the UN SDGs, as well as

those principles and norms that law, policy and strategy set out for them to govern and manage their territories. Such role will improve people's lives, economic growth, and eventually will offer a balanced environmental condition for the greater wellbeing of communities (IIED, 2009). Hence, public scrutiny of the actions taken is important. For example, the selection process of local mayors and representatives, the degree of powers and competences they are entitled to, specific services and rights local governments provide and secure (transport, water, electricity, waste collection, etc.), are only some of the characteristics that may differ from one place to another, *albeit*, depending on historical, cultural or social factors. Administrative procedures, commercial, industrial or environmental licensing, planning and land use managements are examples of what city mayors, for example, and their officials must deal with, while being, simultaneously, subject to public scrutiny.

With the advancement of ICTs, as referred to above, people have more and more access to information. People understand the existence of different realities they face when compared with that of the other countries and other territories around the world. Consequently, it is easier to compare, measure and benchmark governance models and economic well-being or sustainability indexes.

The existing literature available sets out a large number of criteria to evaluate governance structures in urban, metropolitan areas and other territories, from economic efficiency to fiscal capacity, regional coordination, land use planning or access and accountability (Slack and Côté, 2014; Bahl, 2010; Slack, 2007). However, in recent times the fields of access and accountability turned to be more and more essential in what regards the relation between public officials and the people.

In effect, basing their ideas on the challenging theme of resilience, authors from different latitudes, such as Craig Anthony Arnold (Arnold and Gunderson, 2014) or Jonas Ebbesson (Ebbesson, 2010), have been trying to suggest new solutions and methodologies, at legal and governance levels, in order to enhance the so-called social-ecological resilience, which could be briefly defined as the capacity of a system to withstand a disturbance and maintain the same basic processes and structures, dealing with change and continue to develop (see Holling, 1973). It is not more than giving the systems a possibility of evolving over time, keeping their identity and original characteristics (see Lefebvre, 1968; Harvey, 2008). Consequently, from a social-ecological perspective, it should be possible to give inhabitants the chance (or the right, as expressly foreseen, for example, in the Aarhus Convention) of participating in different processes, such as planning decisions and law-policy making processes in cooperation with government authorities.

The capacity of the territories to build social-ecological resilience depends, at least in part, on the legal system and frameworks that shape those territories. In this regard, Arnold suggests a new paradigm (see also Ruhl, 2011), which he calls "adaptive law", to replace features of the legal system that are usually seen as rigid. According to him, adaptive law system includes policy-centric, multimodal, and integrationist structure, and is based on flexibility, discretion and the context (Arnold, 2015). He also argues that

adaptive law replaces a legal system, which ignores interrelationships among social and ecological systems, and which is generally ill-equipped to adapt to rapid, unexpected change (Arnold, 2014). Such an approach goes hand in hand with governance reflexive of pertinent challenges in a given context. The proposition of the implementation of new mechanisms of governance, following the same characteristics of adaptive planning suggest:

 "[.].. an iterative and evolving process of identifying goals and making decisions for future action that are flexible, contemplate uncertainty and multiple possible scenarios, include feedback loops for frequent modification to plans and their implementation, and build planning and management capacity to adapt to change. It is planning that seeks to adapt to the complexity of systems and actors, conditions of uncertainty and unpredictability, and the dynamism of environments characterized by instability and rapid nonlinear changes" (Arnold, 2010).

As consequence of the suggestions above presented, these flexible, adaptive and open mechanisms are, in fact, essential characteristics that a governance structure must have if intending to play a relevant role in the construction of smarter territories. The construction of smarter territories is expected to provide the communities with access to new dynamic mechanisms, and to a revolutionary reality, of adaptive or even (why could it not be said?) "smarter" governance (Decker, 2015). Such a governance framework should all be about protecting people's rights, where government's accountability is developed based on the relation between public officials and citizens.

That is why open data policies have been gaining so much followers in some groups of city mayors and their communities. But, still in what regards people's rights, this new stream in public governance has to be better shaped when faced with difficulties caused by privacy and data protection. On this issue, EU law has been an interesting example in respect to developing relevant efforts to assure privacy and data protection, as reflected in EU institutions´ recent approval of a new General Data Protection Regulation (GDPR), through the Regulation (EU) 2016/679. This regulation intends to strengthen and unify data protection regulation for individuals within the EU (and applicable to the EHN), which will enter into force in 2018. This new EU regulation clearly demonstrates that it is possible to balance the development of ICTs and their application to territories and communities with the protection of the most fundamental rights of the citizens.

5. Smart governance and the European high north

Today, the path is being gradually made, not only by governments (at national or local level) but also (and maybe primarily) by corporations continuously investing in innovation and competition. The EHN region is geographically vast, but structurally sparsely populated. Considering the special needs of those of the people and communities, the region is progressively being developed with better digital infrastructure, making the territory, as well as the practices (in the sense of use of modern technological devises) held by the communities, smarter. There is a significant number of examples of public (and also private) efforts for smartening territories and their communities as exemplified below.

5.1. The six city strategy (6Aika)

The six largest cities in Finland – Helsinki, Espoo, Tampere, Vantaa, Oulu and Turku – decided to implement a common cooperation strategy in order to join forces to tackle their mutual urban challenges. The Six City Strategy (*6Aika*) is developed with cooperative projects which enable the involved cities to experiment in a larger context than just one city. An important aim of this initiative is to engage the whole urban community to create smarter and more viable cities (see official webpage of Six City Strategy). Approved by the Finnish Ministry of Employment and the Economy on 9 June 2014, the strategy sets out three focus areas of implementation (Focus area 1: Open Innovation Platforms; Focus area 2: Open Data and Interfaces; and Focus area 3: Open Participation and Customership). Under the primary objective of strengthening Finland's competitiveness by using the country's six largest cities as innovation development and experimentation environments, with the aim of creating new know-how, business and jobs. The *6Aika* intends to enable companies to develop scalable operating models, with the help of which the services can be adapted to local conditions. At the same time, the cities' data stores open up new data that companies can use to fuel innovations.

The strategy has interesting characteristic of development needs and partnership, based on the customer needs resulting in the creation of correctly allocated cost-effective services and service innovations. The strategy demonstrates to be more focused on sharing innovation, expertise, efficiency and economic growth. While apparently, its goal is city-centric, but the services designed do have larger implications in remote rural regions, especially outside of the cities.

5.2. Innovative Cities Programme INKA

Another Finnish project, partly replacing the Centre of Expertise Programme OSKE (2007-2013), focused regional resources and activities on fields of national importance (nanotech & materials, forestry, health, maritime, food). Operating through 13 national clusters of expertise and 21 regional centres of expertise, *The Innovative Cities Programme INKA - Innovatiiviset kaupungit* has been helping urban regions to focus on their strengths, encouraging them to select new types of focus areas, and at the same time intensify cooperation between the public and private sectors. While traditionally urban development in Finland has been technology or line-of-business based, *INKA* advocates demand-based, diverse thematic choices combining several areas of expertise, *e.g.* combining ICTs with design, business competence, mechanical technology, and sustainable development (see website of European Commision).

The main goal of the programme has been to generate jobs, by creating new businesses and remoulding business activities through new development environments, pioneering markets, and national and international cooperation. Projects under this programme seek local solutions for development environments that may include demonstration and testing platforms for new technologies and services, and new operating models for competence-based entrepreneurship. In order to avoid fragmentation, *INKA* has adopted a selective approach, operating through five clusters, each coordinated by a single city region: Future health (Oulu), Bio economy (Joensuu), Sustainable Energy solutions (Vaasa), Intelligent City and renewing industry (Tampere) and Cyber Security (Jyväskylä). In order to bring

forth stronger synergies INKA is administered by the Finnish Funding Agency for Technology and Innovation Tekes, which coordinates other innovation policy instruments. Having set out a mission of accelerating new innovation-based businesses by promoting development platforms and lead market initiatives, *INKA* seems to represent an initiative, which combines economic development and broader social well-being. Although *NIKA* refers to innovative "cities", once such innovations are implemented in cities, their benefits travel to the other part of the territory, such as the Finnish part of the EHN.

5.3. E8 – Aurora & Borealis

Developed by the Finnish Transport Agency in close collaboration with Borealis test ecosystem managed by the Norwegian Public Road Administration, Aurora test ecosystem is designed for verifying and validating new information technology services (ITS) solutions and innovations in real extreme weather conditions (see website of FTA and NRA).

Situated above the Arctic circle, and within the EHN region, Aurora and Borealis offer test location for validation, marketing and assessment of impacts and performances of intelligent transport automation. Test sections of Aurora and Borealis share the E8 corridor, one of the corridors of European Union for cross-border testing of connected and automated driving. With problems regarding snow drifting and accidents involving reindeers, these initiatives are focused on providing efficient, safe and environmentally friendly transport, facilitating increased export industry, as well as promoting in the future autonomous driving. Therefore, these projects implement Arctic testing for intelligent transport automation; digital transport infrastructure and connected cars; intelligent infrastructure asset management; and mobility as a service. This transboundary project intends to improve quality and safety in road movements between Finland and Norway, supporting innovation for better transportation. The project thus contributes to smarten the road and transportation safety system as part of regional infrastructural development.

5.4. Smart City Sweden

In Sweden, a best practices platform for smart cities was launched by IVL Swedish Environmental Research Institute, which was founded jointly by the Swedish government and the Swedish business sector in 1966. It is Sweden's first and oldest environmental research institute, being now a limited company, owned by SIVL Foundation for IVL (see website of Smart City Sweden). The *Smart City Sweden* initiative is funded, partly by the Swedish Government through the Ministry of Enterprise and Innovation and the Swedish Energy Agency, and partly by the industry and business. The aim is to promote networks, and develop its activities under the following focus areas: (i) recycling; (ii) bio energy; (iii) waste to energy; (iv) water; (v) biogas; (vi) transport solutions; and (vii) air quality.

In addition to being dedicated to cities, and not to broader territorial areas, the initiative demonstrates to more focus on exporting the "smart experiences" and tools created, and implemented, by Swedish public and private entities. However, it does not itself implement new tools within the local population. By transporting the experiences, the

Smart City Sweden platform plays an important role on smartening territories by sharing best practices with public authorities, including in the Swedish EHN region.

6. A smarter future for the European high north

When analysing the reality of the EHN, it is essential to consider the specific characteristics of this northern region of the European continent, at territorial as well as at environmental, sociocultural and economic level. From the sparsity of its population to the severe weather or the different customs influenced by cultural diversity and the occurrence of indigenous peoples, the EHN is a territorial and social reality of special complexity.

One particular example of the need to implement more comprehensive reflexive governance framework is the specific social and cultural reality of the indigenous communities in the EHN, who are more vulnerable to the possible impacts from the viewpoint of both their right to environment and right to development (Hossain, 2011). Implementing more flexibility in social systems as well as in institutions, to deal with social, environmental and technological changes, require providing for broad participation of local communities (O'Connell, 2009) at all levels. For example, the reindeer herding practice, which is considered as Sámi emblem, and which presents Sámi identity, is being modernized with technological innovation. In herding practice, today the Sámi use GPS tracking methods. GPS-collars are placed with reindeer so that owners can track their animals' movement. In addition, as referred to, various land use planning in the region accepts the technological innovations, the living environment becomes visible with the help of GPS technology (Eilertsen, 2014). Digital infrastructure also facilitates both social and political participation in decision-making, which fosters effectiveness of multilevel and multi-actor governance, and helps social structures to promote learning and adaptability without limiting the options for future development. Such inclusion appears to be the best way of conducting the development of these territories with the support of more adaptive and "smarter" legislation, strategy and policy developments (see Ruhl and Fischman, 2010).

It is, therefore, most conceivable to assume that the use of new solutions based on ICTs, such as open data, monitoring and public participation (*e.g.* through online tools) (Afzalan et al., 2017), is an inevitable opportunity for creating smart territories in the EHN for communities' improved sustenance. Sustainable communities are capable of combating or mitigating the challenges, and impacts of climate change, with the use of technology from urban to rural or natural protected areas. Consequently, the governance systems must integrate the process of innovation including broader digitalized infrastructure conforming the different social-ecological characteristics of each territory in response to changes and uncertainty. Nevertheless, new smart and adaptive mechanisms must assimilate the paramount need of catalysing and respecting the wide range of idiosyncratic elements of each social community. Therefore, the smart governance is not only for the development of the territories but also for ensuring the well-being of the populations by improving conditions for the promotion of human security (Hossain, 2016) and, ultimately, for the protection of their most fundamental rights (Cartaxo, 2017), including right to access to digital developments. The right to

access to digital developments is interlinked with most basic human rights, especially in the context of the EHN where infrastructures are built supportive of human needs, and services are being increasingly delivered through digitalized form, and in digitalized infrastructure. These and the other examples presented in the previous section suggest that the more the promotion of infrastructure (and services) adaptive to technological innovation are integrated into the governance structure the more a region become smart. This is a process that the EHN embraces gradually, not only for its regional infrastructural development, but also for sustainable development, and for a sustainable EHN community to continue to exist, despite various challenges facing the region.

7. Conclusions

Being smart means being adaptive in line with the changes occurred in everyday situations. It is about developing better response mechanisms against changes and uncertainty with the support of pertinent technological innovation. It is about learning to live with the reality in a sustainable manner. Today, legislators, decision makers and other stakeholders including relevant human communities at local level are more aware than ever of the reality of, for example, "big data", social media and the continuous changes of a fast-moving society, and an extremely uncertain environment. This is because people who live in different territories all over the world are always willing for faster, and more precise, responses to their daily questions, problems or needs. Smart governance approach provides with best possible answers in the event of uncertainty by apprehending flexible, and participatory mechanism, and by integrating technological innovation. The increasingly digitalized governance model in the EHN is expected to grow further to evolve, and to adapt to changes and uncertainty – from energy and microgrids, to interwebs, local service delivery and participation of citizens in planning and decision-making. Being smart, flexible, open, multileveled and capable to learn with the so-called feedback loops of nature, and people's active contributions (through their always new technological devices) (Aguilera et al., 2017), is the secret for public officials to better respond to the needs of the populations and providing them with the best quality of services and granting them the maximum level of well-being, which all human beings deserve (Cartaxo et al., 2017).

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