STRATEGIC FOCUS FOR CHANGING PATH TO DIGITAL TRANSFORMATION IN ROMANIA – CASE STUDY GIS OPEN E-GOVERNANCE SYSTEM APPLICATIONS

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Abstract. *In a time of disruptive innovations, the public services cannot remain untouched. The old political slogan "do more for less" seems to be more real than ever. In this context, digital transformation becomes a change path with huge dynamics from the stage of Digitization, over the E-Government stage towards the Digital Government one. The organization of future will benefit from a DevOps flexibility and capability in a geo-informatics system (GIS) which will offer an environment open to innovation, open to new solutions by storing, processing and analyzing different kind of data, including the spatial data. Our main contribution, based on the new policies streams on the background of digital disruptive technologies is that Romania's transformative process toward digital governance has to take in consideration the location intelligence and develop also the local e-governance using spatial data.*

Keywords: *Digital transformation; local e-governance; disruptive innovations; GIS; DevOps.*

Introduction

Diverse and disruptive economic, social and environmental challenges request innovative policies and strategies for action. Digital transformation becomes a changing path with vast dynamics from the Digitization stage, over the E-Government stage towards the Digital Government one (OECD, 2016b, p.57). The Digital Government is focused on openness, transparency, engagement with and trust in government based on new strategies to create public value (OECD, 2016b, p.57).

Software development allows the freedom to choose and the flexibility to implement the right tool for any organization, from the project management in Agile solutions (a specific software development methodology) to a broader spectrum, covering the entire organization, like in DevOps software development method (RedHat, 2018). The activities of modern organizations are based on communication, collaboration, continuous feedback, experimentation and integration, the result being a new work environment provided by the partnership between software developers and IT professionals.

Ubaldi (2013) defines the Open Government Data (OGD) as a philosophy - and increasingly set of policies - that promotes transparency, accountability and values creation by making government data available to all. Brokx (Geospatial World Magazine, 2018, President Imagem Benelux) points out that technologies, people and governments merge in the location intelligence: "location intelligence merges with multi-source data and with other IT systems in order to produce concise and streamlined solutions. It is no longer considered to be used only in geospatial domain; rather it is used as a building block to solutions". Both time and location are the ubiquitous characteristics of any data. All new technologies IoT, deep machine learning, robotics, and Artificial Intelligence depend on data. Alla (Geospatial World Magazine, 2018) estimates that geospatial is the future backbone of the "smart habitat". The Research Institute for Environmental Systems (ESRI, 2015) found that since 1980, even if the technologies and the formats have been changed over the years, the data categories have been and still are significant: administrative areas, cadaster, street networks, utility networks and environment. Crampton (2004, p.49) found that GIS is part of governmental rationality, while "the human distributions across a territory are particularly central to politics". Barr (2006) sees that e-government involves GIS because the relationship between the government and the citizen is frequently geographically based. Lieven (2017) points out that much of the success with GIS does not originate in technology implementation, but in the ability of building a location capability. In this line, Hernando & Olmedo (2015) present Pere IV as an old industrial axis in the city of Barcelona, transformed in a smart city using collaborative technologies – community governance.

In this context, we try to investigate the challenges and opportunities regarding Romania's transformative process towards digital governance taking into consideration the location intelligence and also developing the local e-governance using spatial data. We try to highlight the need to a digital transformative path for e-government local services and to assess the leap we can do to transform our public services using new technologies in order to provide better information, better solutions customized to the client at his location.

The dynamics of the Romanian e-government services

In 2016, OECD (2016a, p.18) concluded that Romania's performance is "more closely aligned to the European average in terms of digital government development", but "the tendency since 2010 has been negative, not because Romania has stopped progressing, but mostly because other countries progress at a faster pace and in a more sustainable way." (OECD, 2016a, p.19)

Didraga and Brandas (2015, p.74), Didranga (2015, p.28) conclude that e-government 2.0 projects in Romania need to increase their impact and efficiency. Filip and Stoica

(2008) signal the lack of computer and Internet usage abilities, fact confirmed by Stoica and Filip pointing out that "the public service interactions via Internet is negligible". Gatman (2011) points out that e-Government success in Romania is conditioned by three equally important and complementary dimensions: financial, human resources and policy. Matei and Gaita (2015, p.983) found that the feature of the management process of public services in Romania is the functional hierarchical subordination. Matei and Iordache (2016) found it important to increase local autonomy, indicating that the e-Government at local level is not a priority yet. Vaduva (2016) considers that the success of the public administration reform in Romania is conditioned by the curbing of corruption and by the generation of economic prosperity. Vrabie emphasizes the paradox for Romania: pioneer initiator of e-service projects (Virtual Payment Office www.ghiseul.ro since 2006, e-voting method testing since 2003, e-Procurement system (www.elicitatie.ro) since 2002, e-guvernare.ro launched in 2003), but having a population not connected, mainly because of two barriers, workplace and organizational inflexibility along with digital divides and choices.

Connecting policies to reality and more precisely to spatial reality, in a research employing GIS analytics, Lincaru, Pîrciog, Grigorescu and Tudose (2018) show that "both Digital Agenda 2020 and the Administration strategy are strongly correlated together, but they are not harmonized with the high human capital policy, even if there are objectives strongly dependent on this category. The acquisition of digital skills for the tertiary employees in public administration is a priority." Also, another result of this research shows that "in public administration the high human capital is clustered in a few innovative hubs, which in the absence of a functional and interconnected national administration IT system makes impossible the democratic governance act, especially in the context of regional decentralization." Another interesting insight of this research is the solution proposed to develop "remote intelligent public services in a customized way, tailored for the local problems". There is a visible spatial correlation between the Low-Low (LL) high human capital clusters and marginalized location as well as low or absent broadband infrastructure coverage.

In this context, the level of development for the local e-government reform and the digital transformation of the traditional public services are questionable and the building of a new paradigm of thinking is needed.

Building a new approach of the local e-government services

The need for spatial data and location

"E-government, as a new administration model, aims at increasing government performance and efficiency by using the latest technologies in the transaction of information, science and goods among government agencies, citizens and private sector." (Geymen & Yomralioglu, 2008). To this definition we add the transaction level that can be: national, regional and local. The e-government services are based on the digitization of public services. In general, e-government applications use non-spatial data, while only a few applications using spatial data (web based GIS) are related to the Government agencies in Romania. GIS applications will become more and more developed in the future because agencies use more and more spatial data. According to the same above mentioned authors, there are two types of GIS applications for spatial data on which e-government applications using internet are based. The first type is

online and interactive maps using spatial query, address search, route analysis, buffering, and overlaying analysis. The second type of web based GIS application is transmitting the spatial documents of various agencies (cadastral administrations, local governments and forestry, mining, water managing agencies etc.) to their clients over the web.

As Barr (2002) said, when a citizen accesses government services via internet, it creates a separation between the place and the public service. In this view, we need tools to re-establish that connection. These involve frameworks to identify individuals and places. Such geographical referencing framework is GIS. In order to reduce inequalities and to offer democratic e-public services to all people, considering that social exclusion is both an individual and a geographical phenomenon, we highlight the geospatial dimension in the treatment of any kind of data. In general, deprived areas accumulate more economic and social problems which are a characteristic to certain groups of people and places. The process of creating the spatial data must be regulated in order to ensure consistency, non-duplication and timeliness. In fact, we can involve GIS in e-government services because the relationship between the government and the citizen is in many cases geographically based (as we mentioned above). Barr (2002) found that "geographical information is a vector of e-government information resources and its application contributes to integrating government information and to promoting public service."

Challenges to successful digital transformation of public services

In many countries, the initiatives of the local government are only in the initial stages of the development of e-government services and they face some challenges concerning their ability to provide high level of e-government services. In a study of Chen & Gant (2001), an inadequate IT infrastructure, the shortage of IT workers and the lack of financial resources are the main relevant barriers to e-government.

In fact, most of these challenges relate to human dimension and concerns about the privacy and security of personal data. The challenges for decision makers regarding the stages of the digitization projects relate to practical issues such as funding, design, development, testing, implementation and assessment. Another challenge is to accept that in practice the speed of advancement in technologies exceeds the speed with which the potential benefits can be obtained in the provision of public services (OECD, 2016b).

The same OECD study emphasizes that the new steady integration of new technologies (such as cloud computing, social media, mobile technology) into people's everyday lives, businesses and governments is challenging and gives rise to an ecosystem of public engagement and relationships that are beyond public, private and social spheres. The same conclusion is sustained by Garson (2006), who mentioned that through e-governance, government services are provided to citizens in a convenient, efficient and transparent manner, although there are three groups interested (government, citizens and businesses/interest groups) there do not have distinct boundaries.

The new digital environment offers opportunities to rethink and to reposition the relationships among stakeholders (citizens, business and nongovernmental organizations), counting on collaboration, reshaping political priorities, participating in the design of public services in order to deliver coherent and integrated solutions for

these complex challenges. The governance approaches are changed and it is necessary to shift from government-centered services, anticipating citizens and business needs (user or citizen-centered approaches) to the last stage in which citizens and businesses determine their own needs and address them in partnership with governments (people or citizen-driven approaches) (OECD, 2016b). In this context, the local dimension of digital government services is very relevant, as it is in the center of digital transformation.

Internalize the process for the digital transformation of public services

The actual e-government services are not able to satisfy at high quality and standards the needs of the State – administrative services or of the public – direct personal services (Eurostat) either. The Romanian e-government organization needs to be (re)constructed. For this purpose, the current Romanian public organization has to go through a process of digital transformation. E-government is not just about websites or email and SMS. It is about how business organizations change in relation to public services and vice versa. That means to develop two stages in transformation. The first stage means greater use by governments of digital technologies in order to improve data management, obtaining more efficiency and productivity of end-user delivery. Digitization of public services means new delivery methods to reduce costs, both for administrative service or directly, by standardization of personal services. Administrative services are those functions delivered to governments and Direct personal services are services delivered to collective or individual users addressing needs (to the public services) of well-being and of social and economic development. The final objective or stage of the digital transformation path is "Digital Government", "enabling governments to create increased public value using more and more openness, transparency, engagement with and trust in government through the integration of digital technologies and user preferences in service design and delivery of direct personal services and in shaping public policy outcomes, while also achieving efficiency and productivity gains" (OECD, 2016b).

E-government delivery models can fall into the following categories: as Saugata and Masud (2007) said, "e-governance is the application of information and communication technology (ICT) for delivering government services, exchanging information, communication transactions, integration of various stand-alone systems and services among government-to-citizen (G2C), government-to-business (G2B), government-to-government (G2G), government-to-employees (G2E) as well as back office processes and interactions within the entire government framework."

The disruptive technologies and local e-government services

Disruptive innovations are related to new business models that break traditional practices. Such models typically combine a disruptive idea with a technology that pushes the innovation forward to unexpected capabilities. Disruptive innovation offers a "proven path to accomplish this goal" and can be a good leader in the transformation process of public services (Deloitte, 2012).

But how can a traditional public service organization be penetrated by disruptive technologies? At first stage, we must develop a hypothesis by exploring the dominant clichés in the area in question and then inverting or denying them (Williams, 2011, p.17).

Disruptive innovations generated by digital technologies not only generate competitive advantages, but they create organizational capital, they create new business models (Anderson, 2014). In the second stage, we must protect the whole environment created from the regulatory and the ancient rules and procedures, if these new disruptive technologies begin to penetrate the organization, in order to protect them.

Now, a question occurs: how important is "location" for disruptive technologies? The location is analyzed by means of Geo Informatics System (GIS) - an informatics system delivering Demographic Analysis, Emergency Preparedness, Land Management and others. If "everything" and "everyone" is "somewhere", does GIS not become critical to the new business models? What if location stopped being an add-on, but rather became central to new paradigm of thinking?

In this context, we already have the components of a system and each of these components has high capabilities and flexibility and the next step is to (re)build the public organization, so that we can provide local e-government services at best quality and highest standards no matter where the location is.

The need to (re)build the local e-public organization - emergence of DevOps in GeoInformatics

In operational terms, Romania has to achieve the construction of the e-government network, launch e-government-oriented geographic information technology service and advance the construction of the e-government geographic information platform.

To transform the public organization means to rebuild its culture, so that this transformation should be sustainable. This change must be made by considering three components of the IT system: development, operations (DevOps) and GIS. The geographic information application significantly advances the technological progress of the government administration offices. According to Meng et al. (2014), "the informatics achievements can be submitted via unified geographic information platform in order to meet business management needs and with a view to forming a multi-sector and a multi-system collaborative service prospect."

The most important dimensions in this digital transformation are:

Philosophy: DevOps is a culture that unites all the layers of the IT organization, people, process, operations and technology. It shortened the version of the term development and operations. DevOps is not an IT solution. It is about a holistic approach of the technology and management and it means it is used as it develops. DevOps is appropriate and harmonizes with the whole concept of local e-government. Local e-governance is related more to the open source. Open-source code is meant to be a collaborative effort, where programmers can improve the original design and share the changes within the community. Enterprise Culture: DevOps encourages feedback from users and the products can be re-evaluated in real time

Management: Workflow optimization and automation take place to the highest possible extent by standardizing processes and documents. Communication and collaboration are a huge priority and the cross-communication, constant learning and improvement-centered approach as well. DevOps are related to open source that assures the flexibility

to implement the right tool for your organization. Also, Dev-Ops allows incremental iterative approach leading to efficiency. DevOps includes all the manners of better learning.

The effective cooperation among different in-house departments of the local administration, by integrating and interconnecting services and processes that take part in common transactions (Koussouris et al., 2007).

Funding: In the long run, DevOps helps organizations save money by using technology that is typically expensive. Another important aspect is the value of open-source information that is essentially free.

Resources: In the DevOps concept, the teams are not so distinct; the cross-communication is beyond the organizational structure. In DevOps they bring together the development engineers and the professionals in the organization. DevOps allows government to deliver cutting-edge platforms and services to the public faster than ever before (Redhat, 2018).

Building and configuring technology architecture: The applications using integrated platforms are capable of unlatching disruptive forces in the development of the business system and especially in the traditional manner for solving issues in these business models. Taking configured and built re-development as major developing mode can rapidly build diversified application systems in GIS field. (Meng et al., 2014). Another important resource is the cloud model (Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) which offers its own specific features and functionalities and it is crucial for the organization to understand the differences. Cost reduction is one of the main reasons for moving to the cloud, but it can be achieved having the right plan.

Large cloud data centers are able to provide huge savings to companies; for instance, the cost of storage at a medium sized data center is $2.20 per gigabyte (GB) per month (Pawlish & Varde, 2018).

Emergence of DevOps in GeoInformatics: A significant trend in the DevOps is the rise in modular approaches to system building. It is better today to work with small and agile teams to manage customized applications instead of monolithic and big applications where huge teams work. Pawlish & Varde (2018) emphasize as an important advantage that smaller teams can "develop the software and operate in the external environment simultaneously".

New type of relationship between the public organizations: e-public services are forming architecture and it will be a need for sharing information across vertical and horizontal boundaries of government organizations and for a balance between centralized and decentralized information sharing (Yang, Pardo & Wu, 2014).

Public services, in general, are less open to changes, but the digitization stream, the magnitude and the penetration rate of the new technologies put pressure on the public services to accept the digital transformation and the others changes that are about to come.

Addressing challenges to providing local e-government services - e-government IT outsourcing

If DevOps requests a significant cultural shift, e-government IT outsourcing may be another way to help local governments overcome barriers such as shortage of skilled IT personnel, limited financial resources and poor IT infrastructure. At first, local governments must choose an e-government IT outsourcing model. According to Chen and Gant (2001), there are some conditions that favor the decision to use this service and are related to management support, promise of large efficiency gains, enough IT capability, less burdensome outsourcing rules and procedures and a variety of high quality and reliable outsourcing IT public services. These application services respond to the level of government involvement at local level. Small local governments of cities have a few employees working in their IT department. In this case, an outsourcing e-service provides a source of IT talent pool for the development and maintenance of high-performance e-government applications that can serve a lot of small local governments. These kinds of services have a lot of staff, pay competitive salaries and provide strong IT infrastructure needed to support e-government. The use of the outsourcing IT e-services is beneficial because they take advantage of the economies of scale.

Using this kind of e-government services could represent the first stage of the digital transformation, but that depends on the local government strategies and on the decisions of the local authorities.

The increasing role of social media

In the latest years, the increasing of social networks such as Facebook and Twitter proved that the citizens are now much more involved in decision-making processes. This kind of involvement can contribute to the development of the local e-government services. The social media analysis helps understanding e-government services in different development stages and in different locations. This kind of engagement by citizens improves the transparency and the trust in governments. By providing empirical evidence, Song and Lee (2015) demonstrate that social media is effective means for government to improve citizens' trust in government by enhancing their perceptions of government transparency.

Conclusions

In the digital agenda in Romania we can adopt a new stage of e-government development and draw up the most courageous policies and actions based on a new approach of the local e-government services that can help us overcome the actual state of things using some best practices in domain. In the digital transformation of Romanian local e-government organizations it is appropriate to adopt the Dev-Ops in a Geoinformatics system (GIS) approach, which allows incremental iterative approach leading to efficiency and provides flexibility of resources and local capabilities delivering high quality public services.

Another way to step forward is to adopt an E-government IT outsourcing model which helps local governments overcome barriers such as shortage of skilled IT staff, limited financial resources and poor IT infrastructure. This idea is sustained by Lincaru et al.

(2018) research proposing to develop "remote intelligent public services in a customized way, tailored for the local problems".

At first stage in the digital transformation, using intelligent hypothesis and making from location a central public service approach connected to open source, we can transform the Romanian local e-governance into one that is efficient, transparent, trustful for clients and able to provide high quality public services.

Failures in implementing local e-government services occur, but they have nothing to do with the technology or with the applications of technological innovation themselves, rather the organizational and social aspects that are still missing in the design, implementation and adoption of those services. (Chen & Gant, 2001). In the context of new and penetrating technologies and of a diversity of public demands, it is a need for a culture of flexibility and a strong public organization management to deal with dynamics, with imbalances and with non-linear process, with initial resistance, with workplace and organizational inflexibility in order to be able to ensure the cross-communication and cooperation within an ecosystem of public engagement and relationships that are beyond public, private and social spheres. In this case, in Romanian public service organization this challenge will be a huge one.

As social media becomes ubiquitous, Romanian local public services can exploit the resources of social media by developing and monitoring the different stages of the local e-governments digital transformation and development strategy.

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