Digital Governance for Sustainable Development

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Abstract. This lecture discusses the impact of digital transformation of governance mechanisms as a tool to promote sustainable development and more inclusive societies, in the spirit of the United Nations 2030 Agenda. Three main challenges are addressed: the pursuit of *inclusiveness*, *trustworthiness* of software infrastructures, and the mechanisms to enforce more transparent and *accountable* public institutions.

1 Introduction

The answer is yes, but would you mind to repeat the question? This excited reply verbalised in a scene of a famous Woody Allen's movie from the Eighties, sums up quite precisely the way societies, States and citizens face the tide of digitization with its ever-growing spectrum of applications and possibilities.

Actually, governments cannot ignore the huge potential of digital technologies and of their progressive integration with unsuspected social dynamics. In particular, new tecnologies provide innovative tools to enhance communication, coordination, and participation in social and political life [8]: their effective harnessing will indeed shape the future of governance and democracy in the years to come.

On the other hand, the global spread of digital technologies has often increased inequality, and the poorest and most marginalised have frequently failed to benefit from it. For example, the absence of a reliable internet infrastructure can further entrench inequality and exclusion, as it is increasingly difficult for people to participate in the digital economy and new forms of civic engagement without proper internet connection, and, of course, without the corresponding literacy.

The Sustainable Development Goal 16 of the United Nations 2030 Agenda calls for effective, accountable and inclusive institutions at all levels in the framework of peaceful and inclusive societies [14]. We believe that digital transformation of governance processes and procedures has a role to play in achieving such a goal. After reviewing what *electronic governance* (EGOV) means in the current context, and highlighting some characteristics of digitization in sections 2 and 3, this lecture opens the discussion on digital transformation as a tool to promote sustainable development and more inclusive societies. Three main challenges are discussed in section 4: the pursuit of *inclusiveness*, the *trustworthiness* of software infrastructures, and the mechanisms to enforce *accountability* of public institutions.

Although the views expressed below are strictly personal, they are based on empirical evidence collected from our current work within UNU-EGOV, the new United Nations University unit on *Policy-Driven Electronic Governance*[1], established in Guimarães, Portugal, in 2014. As part of the 'research branch' of the United Nations, the Unit aims at transforming the mechanisms of governance through the strategic application of digital technologies, and building effective capabilities for technology-enabled governance at the global, national and local levels. It takes an integrative, holistic view of governance networks focused on articulating macro-level development policies with micro-level, bottom-up participation.

2 EGOV: From electronic government to digital governance

The reader is certainly familiar with standard definitions of EGOV: for the World Bank it refers to *the use of information and communication technologies by government agencies that have the power to transform the relations of citizens, businesses and other government sectors*; for the European Union it focuses on the use of such technologies *in public administrations combined with organizational change and new skills to improve public services, democratic processes and increase support for public policy*.

In practice, EGOV is a main component in the process of strengthening the performance of government and public administration [16]. Traditionally associated with the (digital) provision of public services, it also relates directly to questions of democracy, leveraging new information, consultation, or communication possibilities, for example, in regard to proposed legislation or in planning processes. Actually, its impact on the reorganization of public services and participation processes cannot be underestimated. For example, the separation between *fron*t and *back* offices, a typically favoured EGOV service structure, not only requires a readjustment of working processes, but leads to numerous institutional changes. In particular, this makes possible to reduce or eliminate the institutional fragmentation of public administration, giving citizens access to public services from a single location and interface.

Over the past two decades, EGOV both as an application area and a research domain, evolved from a straight use of technology in public administration, to a multidisciplinary understanding of governance, and an integrative, holistic view of administrative processes. Its initial focus on establishing and maintaining a technological environment in government quickly evolved into the use of technology to transform its internal working and organization, and later expanded to also cover transformation of the relationships between government and citizens, businesses and other non-state actors [7]. New designations such as *digital governance* or *policy-driven electronic governance* are currently used to highlight its broad scope, encompassing the impact of emerging technologies, in the former case, or to emphasise that investment into technology is expected, not only to transform the working of government, but also to directly support public policy goals in specific contexts, in the latter.

[1] `egov.unu.edu`

At the verge of such new development, EGOV becomes a catalyst for change with the public administration and its relationships with the civil society [20], raising the overall efficiency, effectiveness, and legitimization of administrative structures and decision-making processes.

3 The rise of everyware

At different levels, governance and public administration, and consequently EGOV processes, are facing the huge impact of ever new digital technologies and the progressive integration of digital, physical and biologial systems [10, 5, 11]. The rise of *everyware*, an expression capturing the fact that our devices are increasingly part of our personal ecosystem, is leading not only to flexible production schemes, customization of products and highly competitive markets operating via digital platforms [19], but also to a huge manancial of data, as well as new ways of living [4], heterogenous societies, and better informed citizens, increasingly demanding in their expectations.

In particular, as noticed in [12], digitization is removing from the State the information monopoly, which was once one of its main sources of power. At the same time it acts as a catalyst of change in the nature of the relationships between the civil society and the State, enforcing their evolution from a hierarchical to a network structure. The impact of social media [1], defining new, unsuspected forms of socio-interaction at all levels of society, should not be underestimated. In such a context, in an increasing number of countries, governments are regarded as public-service centers, and evaluated on their abilities to deliver through the most efficient and individualized channels.

The governance function and, consequently, EGOV processes, need to follow or, better still, to anticipate such moves to be able to harness digital technology to address really complex problems and permanently assess and control its side-effects.

Clearly, such technologies are a source of empowerment for citizens, providing new ways to voice their opinions, coordinate efforts, and possibly circumvent governmental supervision. As for the reverse of the coin, new surveillance systems and data mining, if uncontrolled, may give rise to all-too-powerful public authorities.

Yet a more precise example is given by the blockchain technology, which enables a network of computers to jointly verify a transaction before it can be recorded and approved. As such, blockchain has the potential to create trust between independent, non familiar actors which become entitled to collaborate without requiring any kind of central authority. Currently its most common use is on recording financial transactions made with digital currencies. However, if blockchain-based, descentralised payment systems can lead to easier and more transparent transactions, they could also hinder the ability for public authorities to trace their origin and destination. Notice, in passing, that other application areas for blockchain are emerging, namely in the EGOV domain, to record different sorts of administrative transactions, such us certificates of birth, academic degrees or ownership.

Indeed, when essential public functions and data migrate to digital platforms, clear regulatory frameworks need to be enforced to guarantee reliability, trustworthiness and, in general, the defence of public interest. The process, however, is never linear: most of the time new policies are triggered by the rapid pace of change and the dynamics of societies[2].

4 Challenges

In a changing world, no *one-fits-all* recipe [6] can be suggested to strengthen EGOV processes and ensure their articulation with more general societal aims of sustainable development. Digitization itself has different faces and impacts in different regions of the world. This section discusses three challenges which are, from our perspective, critical for the future.

4.1 EGOV for Inclusiveness

We do not live in inclusive societies nor in an inclusive world. The statistical evidence is overwhelming: Half of all assets around the world are controlled by the richest 1% of the global population, while the lower half own less of 1% of global wealth. Extreme poverty places a challenge to the way governance is conceptualized: good governance should provide for the basic human needs of everyone, in particular to people and communities extremely vulnerable to poverty. And yet digital transformations may be a net contributer to meet the sustainable development goals. Thus the challenge to EGOV systems and policies is to pursue a rights-based approach to service delivery and universal access [16, 13].

In the developing world this means first of all the ability to set up processes and services supporting the State activity and society dynamics under the rule of law. However, it also means to harness technology to facilitate access to public services over rent, distance, and literacy rates. The use of mobile channels in regions whose first, and often unique, contact with the Internet is precisely the mobile phone is a classical example. Mobile devices acting over a reliable, extensive and, of course, affordable communications infrastructure help marginalised communities build stronger networks, open new opportunities, and eventually find their way out of economic hardship. For example, mobile banking, providing mobile money for 'unbanked' people[3], can foster new localised services to e.g. facilitate family remits or micro-credit which is consensually an important catalyst in alleviating poverty. A specific, associated technology, that of voice recognition as a certification device, has been successfully and widely implemented in

[2] An illustrative example is provided by the fragmented emergence of data protection laws in most countries, somehow pushed by the growing digital, global economy.

[3] People who lack bank services in their communities or even fail have a home address or other documents required to open an account.

rural areas in India, allowing to overcome low literacy rates still dominant in several regions of the planet.

Designing EGOV for inclusiveness also means a progressive involvement of communities in the construction of relevant EGOV processes to improve access to sustainable livelihoods, entrepreneurial opportunities and information resources. For example, our experience in Africa shows the relevance of digital platforms for land registration and price alerts for framers, as well as for promoting bottom-up participation in community-level development plans.

4.2 Trustworthy infrastructures

The existence of a reliable and effective communications infrastructure is a precondition to any EGOV development project, namely within the developing world where cost is the biggest obstacle to access digital technologies and the internet. Actually, broadband access must be viewed as the most critical resource within an ecosystem that touches all aspects of life (devices, skills, infrastructure).

But technological infrastructures, to begin with the EGOV platforms at national, regional and local levels, also need to operate in a reliable, trustworthy mode. This concerns general issues on the top of the mediatic agenda, such as security and data privacy, but goes beyond. Puting it simple, the software underlying EGOV processes and platforms cannot fail and should ally simplicity of use with reliable operation.

In Computer Science this calls for software design and development methodologies in which the correctness of a system, i.e. its strict conformance with the specification of the intended behaviour, is established and checked in a rigorous way by mathematical reasoning. This is an area of research, going back to the Seventies, suggestively entitled *formal methods* [9, 2]. There is nothing surprising here: the engineering of a complex software system requires the same level of rigour necessary to build a bridge or establish an electric network.

Indeed, the use of precise and mathematically sound techniques to design and engineer software is advantageous for a variety of reasons. A well-defined notation allows an expression of requirements in a manner that is both clear and comprehensive, resulting in a formal specification. A model of the system can then be developed and checked for correctness with respect to it. This is achieved by a variety of means. One approach is to use theorem-proving where logical axioms and inference rules are used to construct a proof, usually in a semi-automatic procedure. Another approach is to use model-checking whereby an exhaustive search of all possible states of the system is performed to demonstrate whether it is correct; one advantage of this approach is that in case the system is flawed then a counter-example is produced, which can be helpful in determining where the flaw is in the system. Of interest here is not only correctness, but also (usually intricate) properties of the system that need to be established. For example, system designers are often interested to check whether a concurrent system is deadlock-free. Such questions have to be answered before a system is implemented and

operational, and, in most cases, this can only be done if the system is modelled and designed formally.

As a research agenda, trustworthy development of software is at the centre of a debate which is no longer a technical one. Actually, for ICT industry correctness is not only emerging as a key concern: it is simply becoming part of the business. Companies are becoming aware of the essential role played by proofs and formal reasoning in this process. At present, at least in what concerns safety-critical systems, *proofs pay the rent*: they are no more an academic activity or an exotic detail.

The same applies to State run information systems which more and more can be regarded as critical infrastructures providing resilient platforms for connecting the State and citizens, public administration and the private sector.

4.3 Accountable institutions

It was already mentioned in the Introduction that Sustainable Development Goal 16 of the United Nations 2030 Agenda calls for effective, accountable and inclusive institutions at all levels. Actually, it marks the recognition that institution-building for sustainable development is critical for realizing the Agenda's underlying vision.

The impact of digitization at this level should be made clear. There are, of course, direct benefits in terms of efficiency of service delivery and the potential to increase transparency at all levels of administration. To be effective, however, an objective and intentional course of action is required to enforce the necessary re-organization of procedures and processes, and build on the move to develop a new institutional culture. Digitization can make public administrations more responsive through new participation channels. Citizen participation, for example in city-level budgetary decisions or the development of land-use plans, also contributes to *legitimization* of political decisions and adds credibility to public institutions.

The digitization of service processes in public administration also requires a degree of formalization, which may may act as a mechanism to impose a certain level of *formalization* upon the work of State institutions. In countries where informal, poorly controlled administrative behaviours are one of the essential problems, this sort of EGOV 'side-effect' becomes particularly important. A specific relevant example comes from the introduction of electronic procurement, which is not only a way of combining purchases, thereby reducing expenditures, but has also the potencial of reducing the possibility for corruption in the tendering process.

In general, as recent research at UNU-EGOV has shown [17], EGOV offers a particular potential to improve financial and taxation systems. The introduction of integrated tax systems not only allows to control expenditures, but also to better supervise taxpayers, increasing internal revenues, dramatically reducing the shadow economy, and better monitoring financial flows within the State.

Nevertheless, technology, as such, has a limited direct impact upon the organization change towards more transparent and accountable institutions. It has all the potential,

but real impact depends on the way it is introduced and managed by political actors whose ways of thinking often reflect power interests (e.g. neopatrimonial leadership styles, rent-seeking behaviours, etc). Some experience reports on EGOV remark that *although process transparency and reducing the autonomy of offices which deal directly with citizens could reduce corruption, new channels of corruption could also arise, in particular through the delegation of front office functions to third parties.* [18].

A low-performance, rigid, and centralised public administration with correspondingly low resources is a typical problem in several developing countries. Within a proper environment, EGOV development may contribute to its development and democratization, which is a necessary prerequisite for economic and social development. A word of caution makes sense here: digital technology cannot compensate for weakly developed administrative and management capacities, unmotivated, poorly-trained staff or for a poor democratic culture.

5 Conclusions

In a famous, lucid essay, Ha-Joon Chang, a Korean economist, argues that in relative terms, digitization has not yet proved as revolutionary as what happened in the late nineteenth century with wired telegraphy and later with the emergence of household appliances, as well as electricity, piped water and piped gas, which *totally transformed the way women, and consequently men, live* [3]. This is certainly a most interesting debate, but clearly, in pragmatic terms digitization opens the opportunity to 'do government better' and, if correctly planned, contributes to achieving the sustainable development agenda which is crucial in the years to come [15]. In particular, it can put more power in the hands of citizens and communities, starting with so simple things like allowing people to rate their health or educational services, as well as building a direct, suitably formalised relationship with the State.

The State itself is becoming less uniform, with a diversity of internal organizations, dynamics and culture. Local administration, namely at city level, is increasingly determinant, as the proportion of the world's population living in urban areas has grown from 14 to 50 percent in about a century. As always, their best regulators are the citizens themselves. We have already illustrated this by mentioning the potential of EGOV in procurement to promote accountable procedures. But it also helps to increase supplier diversity so that local suppliers can be provided with business opportunities and communities actively involved.

On the other hand, and although digitization is a global phenomenon, simply transferring EGOV solutions from developed to developing countries seems inappropriate. Actually, the different initial institutional, cultural, and wider administrative contexts must be considered to avoid unintended effects. In particular, the development potential of digitization in public administration can only be realized in the presence of certain preconditions, and may therefore require longer implementation periods for pilot projects and a stronger focus on capacity building. In any case, almost irrespective of geography,

it requires strong political initiative and a serious debate on the different roles the State may play and the corresponding understandings of governance.

We believe that the retreat of governments from many areas where they used to play a major role in the past, and their redefinition as enablers of private initiatives, may limit their impact on leading a sustainable development agenda and supporting the poorest segments of the population. Digital technologies may bring new instruments to this arena, catalysing new alliances within societies, reinventing the State roles and helping us formulate new answers to old, pressing problems, such as development, environmental sustainability, and the eradication of poverty.

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References

1. Ayman Alarabiat, Delfina Sá Soares, and Elsa Estevez. Electronic participation with a special reference to social media - A literature review. In Efthimios Tambouris et al., editor, *Electronic Participation - 8th IFIP WG 8.5 International Conference, ePart 2016, Guimarães, Portugal, September 5-8, 2016, Proceedings*, volume 9821 of *Lecture Notes in Computer Science*, pages 41–52. Springer, 2016.
2. Dines Bjørner and Klaus Havelund. 40 years of formal methods - some obstacles and some possibilities? In Cliff B. Jones, Pekka Pihlajasaari, and Jun Sun, editors, *FM 2014: Formal Methods - 19th International Symposium, Singapore, May 12-16, 2014. Proceedings*, volume 8442 of *Lecture Notes in Computer Science*, pages 42–61. Springer, 2014.
3. Ha-Joon Chang. *23 Things They Don't Tell You About Capitalism*. Bloomsbury Press, 2010.
4. Tyler Cowen. *Average is over: powering America beyond the age of the great stagnation*. Penguin, 2013.
5. Jayavardhana Gubbi, Rajkumar Buyya, Slaven Marusic, and Marimuthu Palaniswami. Internet of things: A vision, architectural elements, and future directions. *Future Generation Comp. Syst.*, 29(7):1645–1660, 2013.
6. Hermann Hill, Tino Schuppan, and Katrin Walter. Rethinking e-government from below: new skills for the working level? In John Carlo Bertot, Luis F. Luna-Reyes, and Sehl Mellouli, editors, *13th Annual International Conference on Digital Government Research, dg.o 2012, College Park, MD, USA, June 4-7, 2012*, pages 264–265. ACM, 2012.
7. Tomasz Janowski. Digital government evolution: From transformation to contextualization. *Government Information Quarterly*, 32(3):221–236, 2015.
8. Marijn Janssen and Elsa Estevez. Lean government and platform-based governance - doing more with less. *Government Information Quarterly*, 30(Supplement-1):S1–S8, 2013.
9. Cliff B. Jones, Peter W. O'Hearn, and Jim Woodcock. Verified software: A grand challenge. *IEEE Computer*, 39(4):93–95, 2006.
10. Kyoung-Dae Kim and P. R. Kumar. Cyber-physical systems: A perspective at the centennial. *Proceedings of the IEEE*, 100(Centennial-Issue):1287–1308, 2012.
11. Edward A. Lee. The past, present and future of cyber-physical systems: A focus on models. *Sensors*, 15(3):4837–4869, 2015.

12. J. Mickelthwait and A. Wooldridge. *The Fourth Revolutions: The global race to reinvent the state*. New York: The Penguin Press, 2014.
13. Arnold Picot and Joseph Lorenz (eds). *ICT for the Next Five Billion People*. Springer, 2010.
14. United Nations Development Programme. *Building Inclusive Societies and Sustaining Peace through Democratic Governance and Conflict Prevention*. United Nations Development Programme, 2016.
15. United Nations Development Programme. *Final Report on illustrative work to pilot governance in the context of the SDGs*. United Nations Development Programme, 2016.
16. United Nations Development Programme. *UN E-Government Survey; E-Government in Support of Sustainable Development*. United Nations Department of Economic and Social Affairs, 2016.
17. Ibrahim Rohman and Linda Veiga. Against the shadow: the role of e-government. In *18th Annual International Conference on Digital Government Research*, pages 319–328. ACM, 2017.
18. Tino Schuppan. E-government in developing countries: Experiences from sub-saharan africa. *Government Information Quarterly*, 26(1):118–127, 2009.
19. Klaus Schwab. *The Fourth Industrial Revolution*. World Economic Forum, 2016.
20. Linda Veiga, Tomasz Janowski, and Luís Soares Barbosa. Digital government and administrative burden reduction. In John Carlo Bertot, Elsa Estevez, and Sehl Mellouli, editors, *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance, ICEGOV 2016, Montevideo, Uruguay, March 1-3, 2016*, pages 323–326. ACM, 2016.