

European Strategies for e-Governance to 2020 and Beyond

Jeremy Millard

Abstract This chapter examines both academic and grey literature on the transitions and developments in e-government towards notions of open government and open governance. This is viewed through the prism of European level strategies, the EU's research and innovation programmes, as well as common strategies like the European E-Government Action Plan agreed to by all EU Member States. The three strands of the proposed European open governance setting, consisting of open data, open service and open process, are examined, as is the conceptualization of government as an open source service platform as well as a broader platform for collaboration between all societal actors. The purpose is to support societal-wide innovation for tackling pressing societal challenges where the role of ICT is seen more broadly than has traditionally been the case, i.e. as a general purpose technology. In this context, the chapter also examines emerging technologies likely to impact government in the short as well as longer-term, such as big data, artificial intelligence, drones and blockchain.

Introduction and Context

From Electronic Government to Open Government: Responding to Market Changes

This chapter derives from both the academic and grey literature of e-government and similar developments by examining the main conceptual paradigms which have had real impact on how Information and Communication Technology (ICT) is used by, and impacts, government over the last 20 years in Europe. Drawing on a review by Millard (2015), the notion of electronic (e)-government, starting in the late 1990s, was explicitly linked to the 'New Public Management' philosophy which emphasised *inter alia* how ICT could make the public sector much more efficient by adopting private sector management disciplines which had already shown how to

J. Millard (✉)
Danish Technological Institute, Taastrup, Denmark
e-mail: Jeremy.millard@3mg.org

maximise efficiency (Hood 1991).¹ This typically meant focusing on measurement, target setting and the outsourcing of some government functions to the private sector which was deemed to be more efficient in fulfilling them. In the 2000s, critics of this approach included Dunleavy and Margetts (2006) as well as Stoker (2006) in his proposals for Public Value Management² which linked the changes seen or required in the public sector to networked government and the need for open systems to ensure that ICT was not only used to improve efficiency but also the effectiveness and reach of public services.

Other literature extended and nuanced these debates, notably work on the role of strategic management in government (Moore 1995) and on the embeddedness of public sector innovation in the politico-administrative system (Niehaves 2007). A focus on public value in the context of ICT enabled public sector reforms started to emerge (for example as crystallised by Cordella and Bonina 2012), and was seen as contributing to making government processes, not only more efficient and effective but also more transparent and accountable through transformational (t)-government and business process reengineering (Weerakkody and Dhillon 2008; Van Veenstra and Janssen 2012). Since the financial crisis of 2007–2008, the focus has shifted again towards lean (l)-government, doing “more for less” and platform-based governance which is seen as a new wave emphasising the orchestration role of government where innovation, experimentation and user requirements are key factors (Janssen and Estevez 2013).

In the last few years there has also been a new attempt to bring these threads together through the lens of open (o)-government. For example, McDermott (2012) looked at President Obama’s ‘Open Government Directive’ in early 2009³ and the launch of the global Open Government Partnership⁴ aimed to establish a system of transparency, public participation and collaboration, whilst Lee and Kwak (2012) proposed a five-level open government maturity model for social media-based public engagement in response to Obama’s directive. Harrison et al. (2012) examined the concept of open government from an ecosystem perspective as interdependent social systems of actors, organisations, material infrastructures and symbolic resources, and suggested that policy makers need to engage in such strategic ecosystem thinking. More recently, Gascó-Hernández (2014) edited a wide-ranging collection of papers on open government and the opportunities and challenges for

¹The terms ‘public sector’ and ‘government’ are in practice used interchangeably in this paper as in many others. The term ‘governance’ refers to public governance as “the role of governments, working alongside other actors, in building, facilitating and overseeing political, social and economic development. Irrespective of any intrinsic value it might have, public governance is therefore a crucial means to desired development outcomes.” (Bevir 2013)

²There are many established definitions of ‘public value’, for example “public value refers to the value created by government through services, laws, regulation and other actions” (Kelly et al. 2002). For the present purpose it can be also thought of as similar to the older notions of ‘public goods’ and ‘good governance’.

³https://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment/ (accessed 10 May 2015).

⁴<http://www.opengovpartnership.org> (accessed 10 May 2015).

public governance. These included papers proposing open government models, their contextual and cultural underpinnings, the development and dynamics of open data and big data for public governance, open government collaboration, and how open government is developing in different countries and in smart cities. Millard (2015) attempted to summarise and bring many of these strands together through an overarching concept of open governance systems – see also below.

In a nutshell, it might be argued that these successive developments reflect changing perceptions and uses of ICT by government. Whereas e-government simply took ICT, largely from the private sector, into an existing system making it more efficient but without much change to its structures and *modus operandi*, the subsequent notion of t-government stressed how ICT could be used alongside other drivers to transform these characteristics of government so that it became not only more efficient but also more effective. In turn, l-government has been a dramatic response to the financial and economic crisis in the aftermath of 2007–2008, whilst today o-government is starting to form a cohesive conceptual framework, body of evidence and policy programme to return the attention of government to the burgeoning long-term global challenges the world is facing in close collaboration with non-public actors. Indeed, some of these challenges have resulted directly from the financial crisis itself and many governments' immediate response to it.

From Open Government to Open Governance: Responding to Global Challenges

Some clear conclusions emerge from the development of o-government. The operations of the public sector, public policy and public services are seen as needing to become more open and innovative as well as efficient and effective. Indeed it is argued in this chapter that these attributes are complementary, especially if seen over the medium to longer term, but also that the public sector cannot successfully tackle the global challenges on its own. The chapter goes further and argues that an understanding of open government within an open governance system cannot simply look at what is taking place inside the public sector, but must also examine wider developments in society and the manner in which other societal actors are changing their roles and ways of operating. Government, as an actor, needs to collaborate, and a powerful tool in this context is ICT. This is the basic message of this chapter which examines a new approach to public sector innovation based around the notion of 'open governance systems', and which attempts to unpick its main components as we can presently see them (Millard 2013, 2015).

The global financial crisis of 2007–2008 tended to mask the fact that there are longer term and deeper rooted global societal challenges which preceded it, many of which have since become even more acute. These include climate change, increasing inequalities within countries, poverty, corruption, energy and job shortages, health and education under pressure, rapidly changing demographics (ageing,

migration, urbanisation), and governance deficits at all levels. As a result public services are under severe strain and trust is being lost in governments' ability to collect taxes and provide good regulation. Indeed, Klein (2014) argues that the financial crisis was both caused by underlying societal system failures alongside these other global challenges but that it is also itself a cause of exacerbating them. Many of the proposed solutions to these challenges are today being influenced by new bottom-up forms of open innovation and new open business models (Chesbrough 2003). They focus on societal goals and societal as well as technological means in which new actors directly participate, especially the direct beneficiaries of such innovations themselves. In Europe as elsewhere, these new trends are today often termed 'social innovation' defined "as new approaches to addressing social needs. They are social in their means and in their ends. They engage and mobilise the beneficiaries and help to transform social relations by improving beneficiaries' access to power and resources." (Tepsie 2014). Critical to such approaches is the need for innovations to actually meet real social needs and to do so in a way that involves the whole value chain, and specifically the beneficiaries of the innovation. This provides both challenges and opportunities for the public sector in its traditional role in addressing societal needs, as well as how it relates to other societal actors in meeting these. It is this issue that this chapter addresses, and in particular looks at the critical role played by ICT.

The Need for a Societal Level Perspective and a New Open Governance Framework

As sketched above, the discourse and most literature to date have focused on responses to the crisis which envisage the public sector, enabled and perhaps driven by ICT, as becoming transformed, for example through business process reengineering, as well as shrinking in size and becoming 'lean' in order to "do more with less". As also noted, these trends are well documented by Janssen and Estevez (2013). The present chapter argues that the next step, and certainly a complementary perspective, is a notion of open government which is itself embedded in broader open governance systems encompassing all of society's actors. In this context, the public sector needs to adapt its roles and relationships with these others actors. But, according to Millard (2015) these adaptations do not insist that the public sector necessarily reduces in size or becomes 'lean', although indeed that may happen in some manifestations of the open governance system. Downsizing the public sector is not a given nor is it always efficacious, but where it happens it is a politico-economic response to specific situations and may not always be relevant, although of course it can be so. Assuming that a smaller leaner government is always the answer to every challenge or context is a very fundamentalist approach.

The open governance system, just as in lean government, orchestrates networks of actors to tackle society's needs, but unlike in lean government, the public sector

does not thereby always need to become smaller. Instead it leverages and coordinates unrealised and untapped assets and resources which otherwise lie dormant or need catalysing and are thus in effect ‘wasted’. The public sector does this both internally and across society, so it may need to remain the same size or in some instances even grow larger depending on the context and the challenge. The public sector might flexibly decrease or increase or otherwise transform in size, influence and role in different sectors and localities at different times for different purposes in a constant ‘dance’ with other actors to maximise public as well as private value across the whole of society. Becoming a lean government is just one option along this continuum, even though the driving features of lean as efficiency and productivity always remain important. Instead, such features need to be seen as interlinked between actors across the whole of society and not just confined to the government. Thus, efficiencies and productivity improvements are conceptualised at the societal level over at least the medium-term where trade-offs and interactions are present between actors, not only at the individual actor level.

According to Millard (2015), this is a very important observation. A lean government might indeed save some money in a narrow context over the short-term, but this could lead to overall loss of public value and thus additional costs on society, especially in the longer term, if other actors or actor configurations are not able to produce the value needed in the context of a shrunken public sector. Examples include environmental degradation, social and economic inequalities and in mainstream services like health, care and education, and these would be false economies indeed.⁵ As shown below, such a flexible response to address the global challenges is now possible in the context of ICT, although of course political, governance and other issues are also critical. This is not an argument against lean government which may often be relevant, but an argument for flexibility in the context of open governance systems made possible for the first time by ICT.

The current, but admittedly still tentative, move from ‘l-government’ to ‘o-government’ is illustrated in Fig. 1, whilst emphasising that the four waves are not mutually exclusive but instead complementary even though a clear progression is envisaged. Open government (o-government) is the *sine qua non* for ICT-enabled public sector innovation which is today one of the main policy agendas in Europe and elsewhere (for example European Commission 2013a and 2013b, deriving from European Commission 2010, and European Commission 2016, as well as the OECD⁶).

⁵A recent example is the Danish tax system which has for many years been driven by an NPM approach leading to downsizing, outsourcing and seeing hastily developed IT systems as a panacea. In 2016, it became clear that this has strongly contributed to losses amounting to billions of Euros of tax revenue, both internationally and domestically. In August 2016, the tax minister announced a reversal of these policies with massive re-investment in the tax system, the re-employment of dismissed tax personnel, and employment of thousands of new personnel, and in much better IT. This is a clear example where political decisions leading to cutting and blind over-optimistic faith in untested IT can lead to massive inefficiencies and losses.

⁶See the OECD’s Observatory of Public Sector Innovation: <https://www.oecd.org/governance/observatory-public-sector-innovation/events/>

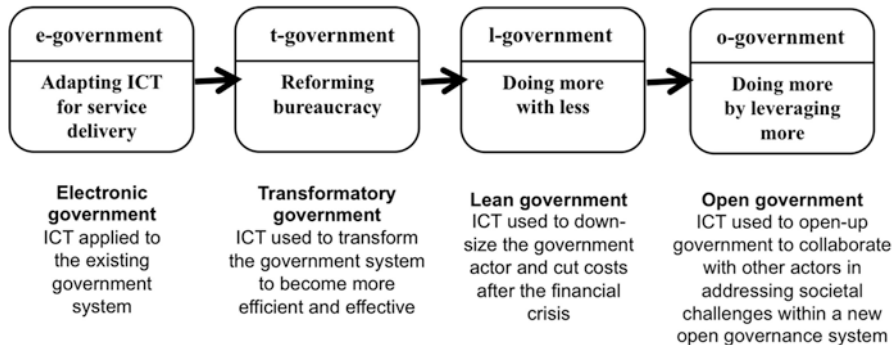


Fig. 1 Four waves of e-government evolution (Source: Millard (2015), adapted from Janssen and Estevez (2013))

Open government (o-government) is the *sine qua non* for ICT-enabled public sector innovation which is today one of the main policy agendas in Europe and elsewhere (for example European Commission 2013a and 2013b, deriving from European Commission 2010, and European Commission 2016, as well as the OECD⁷).

European Policy and Research

Although in a European Union context, the 28 Member States have full powers over their own policies and strategies for the public sector and electronic government, they have for many years participated in different types of mutually beneficial collaboration around the latter in particular. Since the early 2000s, one of the main frameworks for this has been the regular five-yearly eGovernment Action Plans, which, by the end of the eGovernment Action Plan 2011–2015, have assisted Member States in putting many eGovernment enablers in place, both technical and non-technical.

The rationale for the new 2016–2020 European eGovernment Action Plan (European Commission 2016) is to promote efficient and effective digital public services as important components of the EU's Digital Single Market,⁸ and which together enable cross-border public services. To achieve this, the underlying vision is threefold:

- By 2020, public administrations and public institutions in the European Union should be open, efficient and inclusive, providing borderless, personalised, user-friendly, end-to-end digital public services to all citizens and businesses in the EU.

⁷See the OECD's Observatory of Public Sector Innovation: <https://www.oecd.org/governance/observatory-public-sector-innovation/events/>

⁸http://ec.europa.eu/priorities/digital-single-market_en

- Innovative approaches should be used to design and deliver better services in line with the needs and demands of citizens and businesses.
- Public administrations should use the opportunities offered by the new digital environment to facilitate their interactions with stakeholders.

The 2016–2020 Action Plan further stipulates that the following underlying principles should be observed:

- Digital by default
- Once only principle
- Administrative burden reduction
- Inclusiveness and accessibility
- Openness and transparency
- Cross-border by default
- Interoperability by default
- Trustworthiness and Security

The policy framework for the Action Plan rests on the goal of opening up the public sector between public administrations, across Member States and between public administrations and other stakeholders. Three policy priorities make up the framework of pillars:

- Pillar 1: Modernising public administration with ICT, using key digital enablers
- Pillar 2: Enabling cross-border mobility with interoperable digital public services
- Pillar 3: Facilitating digital interaction between administrations and citizens/businesses for high-quality public services, for example which are modular for re-use, user-friendly and personalised, as well as for better policies based on opening up.

The 2016–2020 Action Plan contains some new features compared with previous plans.⁹ In order to remain relevant, up-to-date and to reflect as closely as possible an evolving Europe, flexibility is being built-in to accommodate adjustments over the next 5 years. The Action Plan is thus seen as a platform and catalyst where new ideas, both for actions in the Action Plan itself as well as elsewhere, can be proposed by Member States or other actors. A monitoring framework is being introduced to track progress both on individual actions as well as overall using an appropriate mix of indicators. In support of the dynamic nature of the Action Plan, a stakeholder engagement plan is also being put in place, one aim of which is to engage citizen and business interest groups through visits by the European Commission to Member States. It relies on the use of multipliers, for example the support of other Directorates General through inter-service collaboration and the Regional and Structural Funds.

⁹Parts of this text are derived from the author's participation in an Expert Consultation Workshop on eGovernment in the Horizon 2020 Work Programme for 2018–2020, held on 27 April 2016 in Brussels.

To back-up the eGovernment Action Plan, research and innovation funding provides complementary support designed to involve a wide range of actors from the public, private and civil sectors, as well as from academia. The main vehicle for this is the Horizon 2020 Research and Innovation Programme, 2014–2020,¹⁰ with a rolling schedule of work programmes, which up to 2017 have been designed around the conceptualisation of an ‘open governance framework’, as illustrated in Fig. 2. This is made up of three components which are open by default, i.e. open data, open service and open process, at the confluence of which is ‘joined-up government’. The focus of the Public Services Unit in the European Commission, which supports these activities, is on modelling the public administration in the context of the impact of ICT and other emerging technologies. The unit does not itself develop new technology but has a strong interest in emerging technologies including those developed in other areas that can be used in the public sector.

New European Strategies for 2020 and Beyond

In a European context, on-going strategies to 2020 and beyond require continuing focus and effort on back-office arrangements and on enablers in order to meet and support on-going European and national policies. However, these should be seen as a means to the ends of societal impact and the overall European strategic goals, so there is need to shift emphasis more towards digital services, front-office arrangements and impacts on society, in order to meet the goals of the Europe 2020 Strategy (European Commission 2010) in tackling its major societal challenges. The innovative use of ICT, and particularly the emerging technologies underpinned by ICT, constitute important game changers in addressing these challenges. Indeed this is inherent in the ‘open governance framework’ depicted in Fig. 2 which continues to be the overarching conceptual and operational approach of European policy, but re-orientated to take account of new challenges, perspectives and technologies to 2020 and beyond.

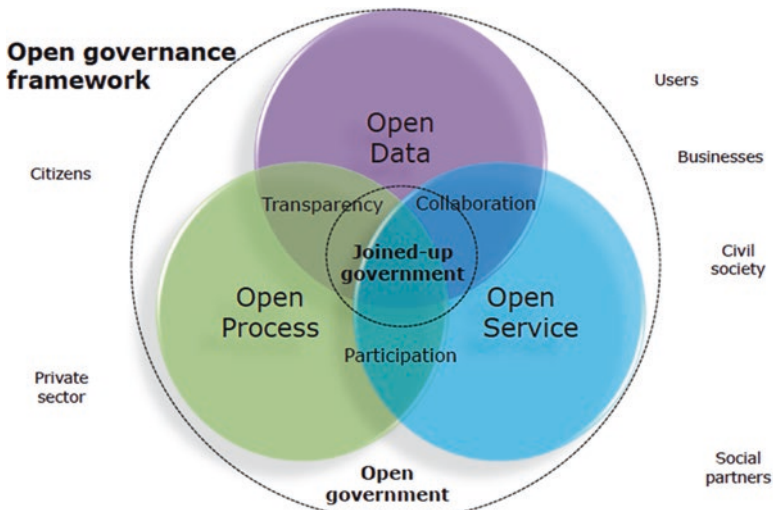
Taking account of this, three areas and strands of development are proposed by the European Commission.¹¹ First, the further development of the open governance setting; second, the concept of government as a platform deriving from this; and third in this context, the potential transformational implications of new and emerging technologies.

¹⁰ <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

¹¹ Expert Consultation Workshop on eGovernment in the Horizon 2020 Work Programme for 2018–2020, held on 27 April 2016 in Brussels.

Open Governance Setting

As depicted in Fig. 2, the open government setting examines open data, open service and open process, within an overarching open governance framework, where each of these three components is open by default. It recognises that, given that government cannot address societal problems on its own, it needs to collaborate openly, transparently and participatively using ICT, both within and across the public sector and with all legitimate external actors. We need greater understanding of how shared services (across government and with non-government actors) can be developed through co-creation, and rolled out in order to improve take-up, personalisation and impact. Standards are required for this, open by default, not only in technical terms such as semantic interoperability, but also to support quality of service standards to ensure universality and cross-border applicability where appropriate, for example through procurement, planning and decision-making. It is not immediately clear how these objectives can be achieved and what specific roles the government should play as compared to the other actors, particularly in the digital context. How to ensure that privacy and security issues are adequately taken into account also needs careful consideration.



Source of diagram: <http://www.govloop.com/profiles/blogs/three-dimensions-of-open-government>

Fig. 2 Open governance framework (“Open, Innovative and Collaborative Government: towards a new action plan”, 1 July 2015: https://joinup.ec.europa.eu/sites/default/files/open_and_collaborative_government.pdf)

Open Data

Open data is seen as essential for facilitating collaboration, co-creation and policy making, but the barrier is that for many users this is a blackbox requiring new capacities, skills and incentives, so government needs to provide much more support and many more incentives. Some countries are starting to make much of their data available publically as so-called open government data (OGD). To date there is still only a limited number of governments which have substantially embarked down this path, and even fewer local and regional governments where the benefits are likely to be greater. In order to maximise the benefits of OGD, it normally needs to be suitably aggregated so individual persons or organisations cannot be identified, and to make this available in machine readable linked datasets which can also be searched, analysed and mashed with other data. Standards for data, quality, licensing, structuring, linking, searching, etc., need to be developed as well as standard tool modules for compiling, analysing and visualisation. Appropriate cloud and other systems to provide the underlying infrastructure and services both across government and between different actors are also necessary.

Apart from OGD made available by the public sector, citizens also collectively generate an enormous amount of economically valuable data through interactions with companies and government. Such data is a public sector asset, but the value created does not always go to the benefit of the individual, particularly when third parties (whether governments, businesses or civil organisations) collect and keep it closed. Smart disclosure is a tool that helps provide people with greater access to the information they need to make their own informed choices, for example in health care, education, employment, etc. In comparison, traditional OGD focuses on transparency, accountability and decreasing corruption in government.

The smart disclosure approach is a step on from this and starts from the premise that people, when given access to data and useful decision tools built for example by governments, can use both their own personal data disclosed by them together with other appropriate data. Smart disclosure could be a useful way forward so needs much greater emphasis as it strives to enable the user to mash their own personal and private data together with those of one or more service providers, including commercial services from the private sector. This is starting to be an important feature in both the USA and UK, for example in the utilities sector, such as energy, water and gas, as well as mobile phone usage. In both countries, the government provides an appropriate regulatory framework and works with the service providers (which can be other parts of government) to make it as easy as possible for users to see their own consumption patterns, for example via a personal dashboard, and thereby adjust future consumption. The aim is to assist users in reducing waste or over-use and to take account of often highly complex tariffs and service charges from typically multiple potential providers. Users need as much support and advice as possible, but although most examples are still only pilots, they seem to hold much potential for users to take more control of their service use. In this context, however, there are serious issues around transparency in terms of who is seeing and using whose data and whether or not the data owners can correct it? For example, can technical solutions be developed which incorporate privacy by design?

Open Service

An important strategy should be to focus strongly on accelerating the development of highly personalised services rather than one-size-fits-all common services. The use of alerts, invitations, prompts, as well as typical life events, user profiles and locations, are all steps towards full personalisation. New forms of interaction need to be devised which draw the user into a co-creative and collaborative relationship, for example in specially designed public spaces and hubs, as well as by deploying living labs methods. Personalisation means departing from the average, so it must be accompanied by minimum, but still high, quality standards. Many services also need to be universally available to all in the target group, given that government cannot say no to a legitimate user, unlike a commercial service provider. This may cause problems when services are outsourced to commercial and other non-public providers, so marketization and who pays also become issues (Millard 2011).

The challenges of open service are however immense, technically, organisationally and legally. For example, shared services will only fully work with semantic interoperability across silos, between levels, cross-border and between service providers whether or not from the public sector. What is the extent to which state-of-the-art solutions from elsewhere should be used, how much should be developed and tailored in-house (which can be much more expensive), and how can governments at the same time prepare for the impact of emerging technologies? As with open data, there is also a demand-side weakness challenging open services with their generally low or weak take-up, so again incentives, user-friendliness and high impact need to be prioritised.

Another main driver of open service is the incorporation of behavioural approaches and design thinking into creating, delivering and using both traditional and e-services by using a holistic approach that attempts to understand the 'full architecture of a problem' from end-to-end. It is an evolving and experiential practice pushing the boundaries, learning, experimenting and applying successful approaches as it develops. A number of practitioners see design thinking as a paradigm shift away from traditional top-down, expert- and often technology-driven service design traditions. Instead it deploys a growing repertoire of techniques, including those borrowed from the ethnographic and anthropological traditions, observation, contextual dialogue and creative ideation processes (Bason 2010). Related to these developments is the so-called 'nudge' approach which recognises that, although traditional attempts to change behaviour by regulation are of course important, they just as often fail and may even provoke opposite responses (Thaler and Sunstein 2008). Nudge theory focuses on changing peoples' behaviour without binding regulation or legislation, for example using the insight that a very powerful influence on an individual's behaviour is linking this to what other people are doing through social networks and social norms in behavior patterns.

Open Process

Open process is an important component of the open governance framework in which all legitimate actors are able to participate in the policies, decisions and arrangements of the public sector as long as this participation is itself open and enhances public value. Open process goes much further than traditional e-participation of enhancing the democratic process using ICT, but although this is a very important element, on its own it is a restrictive view of involving people in government. Experiments in e-participation have so far provided mixed and mainly disappointing results overall given original expectations. This has tended to lead to reduced interest in e-participation at the very time that technology advances in areas like social media and mobile have started to overcome the obstacles which enable a much wider vision of open process. Apart from e-participation in public decision making, it can increasingly encompass inputs to the processes, workings and arrangements of the public sector and public governance more widely; planning and development issues (for example through participative budgeting and where scarce resources are allocated); dispute and conflict resolution; and in managing societal assets, including data, land and buildings.

Given that open process, especially as enabled by ICT, is a relatively new concept, a good approach for the public sector is to undertake many small experiments with existing tools. This is likely to be much more successful than focusing on a small number of ‘big-bang’ initiatives which experience shows are prone to high failure rates leading to a waste of resources and reduced motivation. A bottom-up, user-driven engagement process is more likely to succeed which takes account of the drivers and incentives for citizens to engage in open process. At present, as with open data and open service, there is a demand side deficit that needs to be addressed by incentives, simplification and personalisation. There are also issues of the sustainability and adaptability of open processes and economies of scale and scope to ensure that it is efficient as well as effective. Involving all citizens in determining public spending, for example through participatory budgeting, is often a useful approach.

Another main driver of open service is the incorporation of behavioural approaches and design thinking into creating, delivering and using both traditional and e-services, as a holistic approach that attempts to understand the ‘full architecture of a problem’ from end-to-end. It is an evolving and experiential practice pushing the boundaries, learning, experimenting and applying successful approaches as it develops. A number of practitioners see design thinking as a paradigm shift away from traditional top-down, expert- and often technology-driven service design traditions, and instead deploying a growing repertoire of techniques is evolving and being applied in practice, including those borrowed from the ethnographic and anthropological traditions, observation, contextual dialogue and creative ideation processes (Bason, 2010). Related to these developments is the so-called ‘nudge’ approach which recognises that, although traditional attempts to change behaviour by regulation are of course important, they just as often fail and may even provoke

opposite responses (Thaler and Sunstein 2008). Nudge theory focuses on changing peoples' behaviour without binding regulation or legislation, for example using the insight that a very powerful influence on an individual's behaviour is linking this to what other people are doing through social networks and social norms in behavior patterns.

Government as a Platform

Conceiving of government as a platform arises directly out of the open governance approach. In one manifestation, this might be an open source service platform in the cloud providing government services, data and enablers as building blocks which promise significant increases in both efficiency and effectiveness. There is a need to examine both digital and non-digital platforms, as well as their inter-relationships, to support the creation of public value through co-creation with other actors, so better understanding is needed as to how government can adapt its roles as facilitator and orchestrator, to provide appropriate tools and supports including big open and linked data, to better manage assets, and to ensure sustainability and balanced public value. Experience has shown that it is often at city level that governments are successfully experimenting with these new roles especially enabled by ICT, so better understanding is required of how such practices can become more widespread at a variety of governance levels and across different national, political and cultural contexts.

Government as a platform can support a range of actors to collaborate with each other, as well as with government itself, to generate public value. Using ICT, citizens, communities, civil groups, as well as businesses, are no longer simply passive consumers of data and knowledge but increasingly become active producers. For example, citizens share more and more with each other on social media platforms and tend to consult other citizens, rather than the government for advice – they increasingly use the 'social signal' and 'social search' to organise and improve their lives. A similar trend is now also being seen in the physical world, where the rapidly growing 'makers movement' sees people exchanging, adapting and personalising digital designs for the fabrication of physical objects, often as unique bespoke products for highly specialised purposes, using 3D-printers and related equipment (Anderson 2012). Government thus needs to recognise the value of collaboration and crowdsourcing which citizens and others can contribute as 'co-creators'. Although government should mobilise its own resources and talent better, there is always more relevant talent outside any organisation (including government) than inside.

The public sector as a platform facilitating public value creation in the most efficient and effective way possible will support an ecosystem of actors with changing roles and relationships. There are already numerous examples, including where other actors have 'usurped' the erstwhile role of government using ICT. For example, noise measurement around Amsterdam Airport in the Netherlands undertaken

by residents in the flight path¹²; Microsoft's 'health vault' storing citizens' health records in the cloud¹³; 'Fix-My-Street' in the UK developed by the civil society organisation MySociety not by government¹⁴; and the website 'Patients know best' which is a service provided by a social enterprise enabling patients to control their own medical data when negotiating with public health authorities about their treatment.¹⁵ An example from the 'makers' world uses digital technologies to open new perspectives for locally manufactured and very cheap products for people who otherwise have no chance of being helped. For example, in the health sector, using the Internet to send algorithms for 3D printed prosthetic limbs designed for war victims in developing countries for local production and use.¹⁶ These are examples where ordinary citizens, civil organisations and many other actors have seen holes in what government is doing and stepped in without always being invited to do so.

For the 'government as a platform' approach to succeed, Millard (2015) proposes that at least four types of role and relationship changes are needed, and some are already starting to be seen, as outlined below.

Government as Facilitator and Orchestrator

When government sets up collaboration platforms at many levels, its role changes to become coordinator, facilitator and enabler, as well as regulator and arbiter for the activities others undertake in delivering public value. Government's role is to ensure that public value is created by the most appropriate means in terms of what works best in a given context and for given needs. As described earlier, this could involve government having either a minor or major role in creating public value, but even in the latter case government needs to be a facilitator and orchestrator to ensure that it does.

Government as Provider of Tools, Guidance and Incentives for Co-creation

The second new role for government is to provide tools, guidance and incentives for collaboration. Although, the bottom-up, participatory co-creation of services can lead to more effective and personalised experiences, doing so can increase the burden placed on citizens and other actors to participate. The adoption of e-government

¹²<http://www.sensornet.nl/english>

¹³<https://www.healthvault.com>

¹⁴<https://www.fixmystreet.com>

¹⁵<https://www.patientsknowbest.com>

¹⁶<http://3dprintingindustry.com/2014/12/08/3d-life-print-3d-printing-prosthetics/>

services often results in government outsourcing some of the work it has previously done itself to the user. Co-created, or even fully user created, services take this step much further. Developing more cost-effective and efficient public services should mean more than assuming citizens will contribute time and other resources to create their own services. To counter this, governments should provide structured guidance within which service co-creation with service users can take place. ‘Guided’ support for co-creation should also be designed to reduce the burden on service users of participating in this way, whilst optimising benefits for both public administrations and citizens. In addition, governments should provide incentives by highlighting the benefits service users can derive from the co-creation process, giving them more power to make decisions about their services in adapting them to their own needs, and supporting them with relevant data and other resources.

Government as Manager of Societal Assets

Third, government has an increasing role in managing the assets society has. Especially in the context of Europe’s pressing global challenges, there is a need to identify and deploy all society’s available assets and resources but which are often under-used or not at all. These available assets, including government’s own, for example, could encompass people’s time and expertise, finance, organisational structures and competences, data, knowledge, content, networks, capacity, infrastructures, service building blocks, things, places, buildings, spaces, vehicles, etc. The role of government in using the power of ICT, particularly in collaboration with other actors, is to identify, match, orchestrate, broker and coordinate assets which can be shared and converted into public value impacts, instead of, if unused, going to waste. Already many non-government actors are launching typically bottom-up and small scale examples of ICT-based platforms that have such a role, for example as part of the so-called sharing and collaborative economies, such as for example the civil society organisation *Shareable* based in the USA¹⁷ (Gansky 2010). Government has in many cases, however, greater power and scope to do this by linking between actors as well as sharing its own assets internally, and this is both a growing challenge as well as a huge opportunity. This would involve widening the scope of ICT-based content management systems to become asset management systems.

¹⁷ www.shareable.net

Government as Guarantor of Public Value over the Longer Term

Fourth, as outlined above, seeing the public sector as a platform ensures that public value is appropriately created and deployed. It is important to recognise, however, that even when government collaborates with other actors in producing public value, this does not necessarily imply that government becomes just one actor amongst many, given that it still needs to fulfil roles that other actors normally cannot. Such roles include being responsible for overall quality standards and mechanisms for asset sharing, quality and legal frameworks, even in situations when these are formally delegated to other actors. Accountability for services and performance, and responsibility especially if things go wrong, is a critical issue. Other such roles include data protection and security.

It is important to recognise that innovation and change in the public sector is not the same as in the private sector. Government cannot pick and choose its customers and government services cannot afford to 'fail' in the same way as in the private sector. Because government is the only institution democratically accountable to society as a whole, only it can ensure sustainable and balanced public value where all parts of society derive benefit and where trade-offs are seen as proportionate and fair. This shows how the overall sustainability of the governance system is important. Governments provide longer term stability and continuity which other actors are not able to do, and this is needed so that people and communities are able to live stable lives, as well as so the market can have confidence that unpredictable governance changes will not upset their investment and innovation strategies. Governance systems with short-term horizons encourage short-termism in business and an unstable society. Instead of always the sole actor, the public sector is becoming one player amongst many, albeit with unique responsibilities in new forms of open and collaborative governance.

The Role of the Citizen and the Reconfiguration of Transparency, Participation and Collaboration

As described and exemplified above, open governance gives critical roles to the whole range of non-government actors, and especially citizens. At the same time that government is changing and needs to change much more, citizens are also increasing their awareness and leverage on government but it is not yet clear whether their future partnership with government will be a positive one. Although they need strong support from a pro-active government as examined above, citizens should be ready take more responsibility and become more constructively critical and productive in their own right, but this is in many ways the biggest challenge of all. Members of the upcoming 'net generation' are already acting in this way in their private and working lives enabled by digital technology, and are starting to demand that their relationships and dealings with the public sector should take place on the same basis

(Tapscott 2009). The challenge is whether government can and will respond to these demands, and this depends a lot on the adoption of appropriate policies, structures and mindsets, as well as the education and incentives for citizens to support this. Critically, it depends on government changing its roles in the ways described above.

Since President Obama launched the open government movement in early 2009 with his focus on transparency, participation and collaboration, making the USA the first country to explicitly do so, there have been clear developments in how these three pillars are perceived and are playing out in practice, particularly vis à vis citizens. First, transparency has increasingly become the *sine qua non* of the successful development of open governance systems but is also becoming better understood. It is clear that total transparency is not the goal given that citizens, public employees and politicians all have areas of legitimate privacy, the former in terms of the protection of their personal data and the latter two as they need confidential spaces for dialogue and brainstorming as long as decisions themselves, as well as the evidence and rationales for them, are transparent. Limits to transparency also need to be set by legitimate interests, the potential for the misuse of information, slander, disrespect, etc., but the nature of such limits and their definitions need to be clear and open to debate. However, robust transparency is clearly necessary as this is the basis for accountability and for tackling corruption in government as well as in the rest of society (European Commission 2014; OECD 2014).

Second, the understanding of participation in open governance is moving towards a broader notion of engagement in open process. The latter sees citizens and other actors being invited to engage in all legitimate aspects of public sector activities, not just decision making which, in Europe at least, has tended to be the focus of e-participation. In some ways therefore, participation perceived like this only requires a re-active citizen, whilst engagement is more mixed and can—through transparency and accountability—imply that citizens are more pro-active and take into their own hands activities which traditionally have been purely public sector responsibilities.

Third, collaboration is starting to be exemplified through co-creation and innovation, as discussed above, and especially in the context of new forms of open, social and inclusive innovation. The current governance and market systems are becoming extremely good at ‘sweating’ assets on the supply side, so that both public and private producers become incentivized to squeeze their financial, human and other assets to the maximum extent, and thereby increase their performance and productivity. However, on the demand and consumption side, there is often massive asset waste, resulting from the widespread practice of exclusive asset ownership. This has started to be challenged in the last decade by a new sharing economy growing from a small base, in which organisations, companies and individuals share with each other an increasing range of their assets. These include skills, competences, time, spaces, vehicles, tools, buildings, facilities of all types, organisational capacities and even financial resources. Much of this sharing is enabled by ICT developments like crowdsourcing and crowdfunding.

The sharing economy is starting to supplement exclusive asset ownership with new forms of common, collective and collaborative ownership. The sharing

movement started as mainly non-profit activities but is now spreading to the entrepreneurial and profit sector with examples like ZipCar, Uber and Airbnb for renting out shared cars and accommodation space respectively, and which have since grown into global market leaders. In turn, this is threatening incumbent market and public actors, current legal and regulatory systems as well as the frameworks of trust and ethics we wish to maintain and build. In addition to the sharing of existing under-used assets, a new important trend is their use for the collaborative creation, innovation and production of new products, services and other assets. This collaborative economy is already underway starting with ‘pro-sumers’ (individuals who are both producers and consumers) mainly in the digital sector, but is now rapidly expanding into the collaborative innovation of physical goods and services, as discussed above. (See also Rifkin 2014).

An important underpinning of both the sharing and collaboration economy is the trend towards co-creation, originally conceived as a business strategy for identifying new forms of customer engagement, it is being increasingly applied in other environments including in the public sector and by non-profits and citizen groups. Co-creation is understood as the active flow and exchange of ideas, information, components and products across society which allows for a better understanding of, as well as participation, engagement and empowerment in, policy development, creating and improving services and tackling societal challenges. Co-creation encompasses co-innovation, co-configuration, and co-production of products, services and content through modularisation and digitisation, the role of social entrepreneurs in these new processes, and creating platforms for creative organisations, for example around ‘standard toolboxes’ for niche needs or markets.

Emerging Technologies Likely to Impact Government

As noted earlier in this chapter, government is typically one of the largest single users of ICT and other new technologies, but also is often the most hesitant. There are arguably understandable explanations for this, but it is also clear that, sooner or later, governments will wish or need to avail of new and emerging technologies. This is not least in order to save resources and become more efficient, but also because the demands on governments for new and better services of all types is growing, including from the Internet generation.

However, it is also important to recognise that ICT has become a general purpose technology (Perez 2009) underpinning most if not all technological innovation and development. This means that examining ‘digital’ government purely in the traditional arrow sense, of back-office and process re-engineering and front-office online services, no longer makes much sense. Many of the main emerging technologies which are having, and are likely to have in the future, significant impacts on the way governments are organised and operated, as well as on how governments are perceived and used, are arising out of the so-called Fourth Industrial Revolution (World Economic Forum 2016): “*The First Industrial Revolution used water and steam*

power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres”.

Many of these emerging technologies have potentially profound implications for the way governance for both the near and longer-term future is configured and experienced, as outlined in the following.

Big Data and the Internet of Things

The value and role of big data, and specifically big open linked data (BOLD), has, as noted above, rapidly become an essential asset for developing and delivering both commercial and public services, as well as helping to determine and design public policy. For example, for public sector resource planning and real time management based on real time and archived data, for use by the police, hospitals, fire services, the selection of politicians, staff recruitment by algorithm, etc. Big data is increasingly derived, not only from archived information, but from real time sources through the Internet of Things (IoT) as the network of physical objects and devices, vehicles, buildings and other items that are embedded with electronics, software, sensors, and network connectivity enabling them to collect and exchange data and thereby also to interoperate. The IoT can optimise the use of physical objects, constructs and systems, such as buildings, electricity grids and utility systems, ensuring efficient performance and reducing the carbon footprint through environmental monitoring, disaster forecasting and management. IoT can enable the public sector to better control and deploy its assets in real-time, such as vehicle fleets, buildings, supplies and equipment, as well as for example manage and direct traffic flows and other unfolding situations. In addition, geo-enabled service delivery and geo-related information, for example on ownership, activities, functions and history, can be used for tourism, cultural and business development.

Artificial Intelligence

Artificial intelligence (AI) and machine learning is the intelligence exhibited by a machine as a flexible rational agent that perceives its environment and takes action to maximize its chance of success in achieving a specific goal. Big data is typically a major input mediated by advanced algorithms. According to the World Economic Forum, WEF (2016), AI systems are now able to make many decisions, both routine and complex, which should improve the efficiency and quality of decisions in the public sector, but thereby also threaten middle management and even senior jobs.

For example, Benedikt Frey and Osborne (2013) estimate that 47% of US jobs will be at risk from automation, whilst the WEF (2016) suggest that by 2025, “robots could jeopardise between 40m and 75m jobs worldwide”. The WEF also estimates that “65% of children entering school today will end up working in jobs that currently do not exist.” There is little doubt that this will dramatically alter the lives of most people employed in the public sector.

Virtual and Augmented Reality

Virtual reality (VR) is a computer technology that uses software-generated realistic images, sounds and other sensations to replicate a real environment or an imaginary setting, and simulates a user’s physical presence in this environment to enable the user to interact with it as well as with other people at another location. A person using VR equipment is typically able to “look around” the artificial world, move about in it and interact with features or items that are depicted. Virtual realities artificially create sensory experiences, which can include sight, touch, hearing, and, less commonly, smell. Related to VR is Augmented Reality (AR) whereby people are still acting in the real physical world but augment this by being given access to relevant content of different types so that such action becomes more effective or meaningful. There are huge potential implication for both VR and AR in the public sector, as well as in society more broadly, such as in education, training, meetings, negotiations and remote interventions.

Robotics

Robotics are automating much physical work across all sectors. In the public sector, this includes, for example, routine maintenance, fabricating spare parts or specialised components for machines, as well as accessing difficult and dangerous environments (as in disasters, fires and floods). Robots are also starting to be deployed in human-interface situations, such as in caring and supporting older, disabled or ill people, although such use is proving controversial in some contexts and also raises potential ethical issues. In the public sector context, robotics can thus have immense impacts on care, health, elderly and frail people, cleaning and maintenance, as well as component assembly (including components from digital fabrication).

Drones

Drones are unmanned aerial vehicles (UAVs) utilised to transport packages, food or other goods, as well as to provide real-time surveillance of unfolding situations. They can be used in the public sector to facilitate the delivery or collection of small

items, such as post, medical equipment and spare parts. Drones are highly flexible and manoeuvrable vehicles that are indispensable for low-height monitoring of natural disasters and dangerous situations, as well as for example in traffic and security related incidents. Thus, drones have huge potential for postal services, surveillance, climatic and environmental monitoring, the delivery of equipment and supplies, etc.

Digital and Biological Fabrication

Digital fabrication is the use of 3D printers, laser cutters and sinterers and other equipment, to fabricate one-off or small production runs of unique, typically relatively small objects using specifically designed algorithms. A variety of materials is used, including metals, ceramics, plastics, glass, and increasingly organic matter such as food and living tissue. This enables the public sector, for example, to drastically reduce its stock of equipment and components, given that these can be cheaply fabricated only when required to highly precise and individual designs. Applications in the health sector which are already significant include the decentralised fabrication of personalised prosthetic limbs as well as of dental replacements and implants, and in the care sector of customised meals for people in hospitals or care homes who have specific dietary needs. Further, and often more ethically controversial, implications include the development of genetically modified organisms (GMOs), especially in the context of rapidly advancing gene editing techniques such as CRISPR, in sectors such as health, agriculture and food.

Blockchain Technology

Blockchain technology is a relative new, and still largely unknown, concept, particularly in the public sector, given that its main applications to date are in financial technologies, for example as the basis of the ‘Bitcoin’. Blockchains are basically decentralised databases that could be used, for example, for legitimisation purposes, registers, participatory decision-making, automatic taxation, social security, countering fraud and corruption, fighting crime, etc. The impact of blockchain technology in particular on governance systems could thus be profound and lead to the end of governance as we have known it for millennia to be replaced by, in effect, an autonomous and independent system which everyone can contribute to and benefit from, but which no one controls. There might be immense ‘democratic’ benefits arising from such a scenario, but also dangers inherent in the fact that blockchains are, in effect, an impenetrable black box.¹⁸

¹⁸This brief analysis is partially based on the Wikipedia entry for blockchains (accessed 24–4–16) and the Nesta blog of 24–3–16 “Why you should care about blockchains: the non-financial uses of

A blockchain is a distributed database that maintains a continuously growing list of data records hardened against tampering and revision. It consists of data structure blocks holding data exclusively in initial blockchain implementations, as well as both data and programmes in some of the more recent implementations, with each block holding batches of individual transactions and the results of any blockchain actions. Each block contains a timestamp and information linking it to a previous block. The blockchain is seen as the main technical innovation of Bitcoin, where it serves as the public ledger of all Bitcoin transactions. Bitcoin is peer-to-peer, so every user is allowed to connect to the network, send new transactions to it, verify transactions, and create new blocks, which is why it is called ‘permissionless’. This original design has been the inspiration for other cryptocurrencies and distributed databases.

In essence, therefore, blockchain technology can be seen as a programmable distributed trust infrastructure. Transactions are the content which is stored in the blockchain. Blocks timestamp, record and confirm when and in what sequence transactions enter and are logged. Blocks are created by users known as ‘miners’ who use specialized software or equipment designed specifically to create blocks. Every user in the decentralised system has a copy of the complete blockchain. This avoids the need to have a centralised database managed or controlled by any party. Thus, blockchains can be summarised as distributed databases but they exhibit new and significant properties, including:

- Autonomous: no one person, group or organisation is in charge
- Permanent: no one can delete or tamper with the data
- Secure and cryptographically auditable: security has never been broken and it is claimed that it is mathematically certain that entries cannot be forged. This property signals a shift in thinking about security from one based on closed systems to one based on security through transparency.
- Open: anyone can develop services and products on blockchains, control their own data and audit the code.
- Whole and complete, i.e. blockchains cannot be fragmented or divided up: fragmentation is open to fraud.
- Trustworthy: the above properties and the fact that blockchains are open source means they are also ‘trustless’, i.e. not reliant on any human agency but instead on the consensus of the whole network.

In terms of applications, apart from financial such as in Bitcoin, blockchain technology can enable both the Internet of Things and supply chains to function efficiently, effectively and securely, as well as ensure highly secure identity. In the public sector and governance context, blockchains could, for example, protect critical infrastructures, register and protect assets (such as intellectual property, health, pension and other data), tackle tax and benefit fraud, and ensure that public spending is transparent and traceable.

blockchain technology” related to public (permissionless) blockchain: <http://www.nesta.org.uk/blog/why-you-should-care-about-blockchains-non-financial-uses-blockchain-technology>

Conclusion and Reflection

Moving from electronic government to a broader vision of open governance, in which the government is also perceived as a platform for the wider innovation and support of society as a whole and in tackling pressing societal challenges and where the role of ICT is seen more broadly than has traditionally been the case as a general purpose technology, is likely to characterise much European strategy to 2020 and beyond. This vision of open collaborative governance enabled by ICT refers to the ability of the public sector, as appropriate to its mandate and resources, to become more innovative and responsive to society's needs in the way it operates. It encompasses open data, open service and open process. It involves breaking down, or at least cooperation between, silos across different administrations, levels and locations, through sharing infrastructures, processes, data, assets, resources, content and tools. It implies forms of federation and coordination which balance centralisation and decentralisation as well as top-down and bottom-up approaches. This involves huge challenges technically, politically, legally, organisationally and in terms of working cultures. The vision is a 'whole-of-government' approach in which the public sector acts as one entity, especially in its interactions with other actors including citizens and businesses.

In changing and adapting the roles of government and other actors in these ways, however, there are also real concerns that such changes will result in new types of risk, for example related to loss of control and blurred accountability of services (by whom to whom?). Quality standards are more difficult to determine and maintain with many active designers and suppliers of services, and not least new digital divides as the already better endowed and more competent segments of society are able to reap the benefits of openness and of ICT more readily than others. There are also dangers in putting too much faith in using OGD, and indeed big data in general, as issues like its representative, mis-use or even corruption are ever present, as is the need to apply a common sense test to algorithm-driven decisions and policies. Data should always be put in the context of 'soft data' like values, ethics and responsibility.

The side effects, risks, shortcomings, unanticipated and even negative consequences of emerging technologies also need to be examined, including social impacts, ethical concerns, uncertainty and lack of transparency of what is happening and who is in control, etc. Trust and transparency are thus important implications as algorithms can become impenetrable blackboxes. Careful and comprehensive technology impact assessments will need to be undertaken concerning such effects, including in relation to security and crime.

Despite these caveats, however, government as the only institution backed by democratic accountability, is best placed to address these risks. It will need to retain basic roles including setting overall quality standards, providing mechanisms for resource sharing, and determining legal frameworks.

References

- Anderson C (2012) *Makers: the new industrial revolution*. Random House, New York
- Bason C (2010) *Leading public sector innovation: co-creating for a better society*. Policy Press, Bristol, UK
- Benedikt Frey C, Osborne MA (2013) *The future of employment: how susceptible are jobs to computerization?* Oxford University Press, Oxford
- Bevir M (2013) *A theory of governance*. University of California Press
- Chesbrough HW (2003) *Open innovation: the new imperative for creating and profiting from technology*. Harvard Business School Press, Boston
- Cordella A, Bonina CM (2012) A public value perspective for ICT enabled public sector reforms: a theoretical reflection. *Gov Inf Q* 29:512–520
- Dunleavy, P and Margetts H "New public management is dead: long live digital era governance", *J Public Adm Res Theory*, July 2006
- European Commission (2010) A European strategy for smart, sustainable and inclusive growth, 2010–2010. <http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%2007%20-%20Europe%202020%20-%20EN%20version.pdf>
- European Commission (2013a) A vision for public services. Prepared by DG CONNECT after an expert workshop and open public consultation. <http://ec.europa.eu/digital-agenda/en/news/vision-public-services>
- European Commission (2013b) *Powering European Public Sector Innovation: towards a new architecture*. Report of the Expert Group on Public Sector Innovation, Directorate-General for Research and Innovation Innovation Union
- European Commission (2014) EU anti-corruption report. Report from the Commission to the Council and the European Parliament, Brussels, 3.2.2014 COM(2014) 38 final. http://ec.europa.eu/dgs/home-affairs/e-library/documents/policies/organized-crime-and-human-trafficking/corruption/docs/acr_2014_en.pdf
- European Commission (2016) Communication on EU eGovernment Action Plan 2016–2020 – accelerating the digital transformation of government. 19 April 2016: <https://ec.europa.eu/digital-single-market/en/news/communication-eu-egovernment-action-plan-2016-2020-accelerating-digital-transformation>
- Gansky L (2010) *The mesh – why the future of business is sharing*. Penguin Group, New York
- Gascó-Hernández (2014) *Open government: opportunities and challenges for public governance*. Springer Science + Business Media, New York
- Harrison TM, Pardo TA, Cook M (2012) Creating open government ecosystems: a research and development agenda. *Future Internet* 4(4):900–928
- Hood C (1991) A public management for all seasons. *Public Adm* 69(Spring):3–19
- Janssen M, Estevez E (2013) Lean government and platform-based governance: doing more with less. *Gov Inf Q* 30 Suppl 1:S1–S8
- Klein N (2014) *This changes everything*. Penguin, Random House UK
- Lee G, Kwak YH (2012) An open government maturity model for social media-based public engagement. *Gov Inf Q* 29(4):492–503
- McDermott P (2012) Building open government. *Gov Inf Q* 27(4):401–413
- Millard J (2011) Are you being served? Transforming e-government through service personalization. *Int J Electron Govern Res* 7(4)
- Millard J (2013) ICT-enabled public sector innovation: trends and prospects. Published in the proceedings of the 7th international conference on the Theory and Practice of Electronic Governance (ICEGOV2012), Seoul, 22–25 Octo 2013, the ACM Press
- Millard J (2015) Open governance systems: doing ore with less. *Gov Inf Q*. doi:10.1016/j.giq.2015.08.003
- Moore MH (1995) *Creating public value: strategic management in government*. Harvard University Press, Cambridge, MA

- Niehaves B (2007) Innovation processes in the public sector – new vistas for an interdisciplinary perspective on e-government research? *Electron Gov*, vol. LCNS 4656. Springer, pp 23–34
- OECD (2014) OECD Foreign Bribery Report: an analysis of the crime of Bribery of Foreign Public Officials. <http://www.oecd.org/corruption/oecd-foreign-bribery-report-9789264226616-en.htm>
- Perez C (2009) Technological revolutions and techno-economic paradigms. TOC/TUT working paper No. 20, 2009
- Rifkin J (2014) *The zero-marginal cost society: the internet of things, the collaborative commons and the eclipse of capitalism*. Palgrave Macmillan, New York
- Stoker G (2006) Public value management: a new narrative for networked governance? *Am Rev Public Adm* 3(1):41–57
- Tapscott D (2009) *Grown up digital: how the net generation is changing your world*. McGraw-Hill, New York
- Tepsie (2014) Research Programme Synthesis Report: final reports for practitioners, researchers, and policymakers. A deliverable of the project: “The theoretical, empirical and policy foundations for building social innovation in Europe” (TEPSIE), European Commission – 7th Framework, Brussels: European Commission, DG Research. <http://www.tepsie.eu>. Accessed 30 Jan 2015
- Thaler RH, Sunstein CR (2008) *Nudge: improving decisions about health, wealth, and happiness*. Yale University Press
- Van Veenstra AF, Janssen M (2012) Investigating out-comes of t-government using a public value management approach. In Scholl HJ et al (eds) *IFIP EGOV 2012*, Springer LNCS 7443, Kristiansand, pp 187–197
- Weerakkody V, Dhillon G (2008) Moving from e-government to t-government: a study of process re-engineering challenges in a UK local authority perspective. *Int J Electron Gov Res* 4(4):1–16
- World Economic Forum (2016) *The fourth industrial revolution: what it means and how to respond*. <http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond>

Jeremy Millard is Director of the consultancy Third Millennium Governance, as well as having senior research positions at the Danish Technological Institute in Denmark and Bradford University in the UK. He has over forty years’ global experience on issues ranging from governance, ICT, open and social innovation, participation, sustainable and socio-economic development, tackling poverty and exclusion, the new economy, urbanization and nature-based solutions for growth, and has published extensively in these and related fields. His many clients include governments, the European Commission, United Nations, OECD and World Bank, as well as many non-profits and companies around the world. Recent assignments in the area of e-government include on-going support to both the United Nations regarding their biennial eGovernment Survey, and the European Commission regarding e-government research and innovation, as well as a survey on back-office developments in support of user-centred e-government strategies for the OECD. He has also worked with the UN on ICT and governance issues for the 2030 sustainable development agenda, and with ESCWA on integrated service delivery across the Arab Region.