

# **Expert workshop report: research and innovation at EU level under Horizon 2020 in support of ICT-driven public sector innovation**

11 February 2013

## **Contents**

<b>1</b>	<b>Introduction .....</b>	<b>2</b>
<b>2</b>	<b>Open government requires open governance .....</b>	<b>2</b>
<b>3</b>	<b>Government as a broad platform for public value creation .....</b>	<b>3</b>
<b>4</b>	<b>The changing roles of the public sector .....</b>	<b>4</b>
<b>5</b>	<b>Basic technology enablers.....</b>	<b>6</b>
<b>6</b>	<b>Open data and big data.....</b>	<b>9</b>
<b>7</b>	<b>Policy modelling and making .....</b>	<b>11</b>
<b>8</b>	<b>Open services and new service approaches.....</b>	<b>12</b>
<b>9</b>	<b>Open participation and open engagement.....</b>	<b>14</b>
<b>10</b>	<b>Location .....</b>	<b>15</b>
<b>11</b>	<b>New public sector ‘business models’ enabling bottom-up innovation .....</b>	<b>16</b>
<b>12</b>	<b>Measurement and monitoring .....</b>	<b>17</b>
<b>13</b>	<b>Civil servants and working practices.....</b>	<b>19</b>
<b>14</b>	<b>Scientific theories, concepts, methods and tools .....</b>	<b>20</b>
<b>15</b>	<b>A research vision for ICT-driven public sector innovation .....</b>	<b>20</b>

## 1 Introduction

This document reports on the consultation workshop of experts held in Brussels on 31 January 2013, as well as additional documentation and feedback provided by the experts. This workshop report will provide material for a forthcoming online public consultation. The final outcome of this consultation will provide an input into the design of the 2014-15 work programme for research and innovation, at EU level under Horizon 2020, on ICT-driven public sector innovation.

The report is structured around thirteen major topics emerging from the initial briefing paper, the expert workshop and other expert inputs. Please note, the terms ‘public sector’ and ‘government’ are in practice interchangeable in most contexts in the following.

## 2 Open government requires open governance

Open government is one of the main pillars of ICT-driven public sector innovation, based on open data, open services and open participation (see below). However, for this to be realised, a broader open governance framework is also necessary, which both reaches across many parts and levels of the public sector as well to other appropriate actors outside government. In many contexts, open governance is about linking and integrating the worlds inside government, as well as linking and integrating these with the worlds outside government for the specific purpose of creating public value.<sup>1</sup> ICT is a key enabler in making this possible.<sup>2</sup>

Open collaborative governance encompasses open structures, open organisations and open processes. 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 embedded in and interacting with the reality of society as a whole. In terms of academic paradigms which have had real impact on public sector transformation over the last fifteen years in Europe, this would involve moving beyond the useful but limited agenda of 1990s New Public Management to one driven by a proposed ‘Open Governance Management’ strategy going forward to 2020 (see section 3 below). Such a strategy would attempt to develop the policies and tools to put into practice the open governance vision, underpinned by appropriate research.

The public sector can become much more efficient and effective if all parts of it share and pool the assets, resources, data, etc., which each needs. For example, public administrations could share data and employ data analytics to compare and identify similar locations, user groups and/or services through analysing socio-demographics and service use and impact. Government clouds, whether public, private or hybrid, could facilitate this. This will enable each public administration, or groups of them, to take an evolutionary approach to learning and building good practices, what works and what doesn’t through shared policy modelling. They will be able to compare, rank and simulate between similar contexts and/or through similar strategies. This might also cover common service lists, common processes and interactions, shared

---

<sup>1</sup> Although there are many erudite definitions of ‘public value’, for the present purposes it can be thought of as similar to the older notions of ‘public goods’ and ‘good governance’. However, it goes further in the present context and means value for individuals, communities/groups or society as a whole that other actors (including individuals themselves, civil organisations or the private sector) cannot or will not provide, or cannot provide as efficiently or effectively as the public sector. Debates about how far this goes and what the boundaries are with other types of value are outwith the objective of this report.

<sup>2</sup> Some of the content of this report is adapted from a paper submitted to DG CONNECT by Jeremy Millard and Maria Wimmer in August 2012 reviewing future ICT for governance and policy modelling research challenges.

metadata standards, shared business models, etc. Different parts of the public sector will also be able to collaborate in presenting a common and joined-up face to users and other external actors. Some countries are beginning to do this and are reaping the benefits of massive cost savings and efficiencies, as well as of greatly improved user services.<sup>3</sup>

However, there are two main types of barrier to developing an open governance framework and the sharing and openness this implies. First, lack of technical, semantic and organizational interoperability between government organisations, so that it is not possible operationally to share or exchange data. Second, management tends to be reluctant to share data and other resources as this may be considered as risky and giving up control, and where the necessary individual as well as organisational skills, awareness and attitudes are not in place. There are also real concerns that sharing assets can result in loss of knowledge and thereby loss of value, such as for example when investments made in one part of the public sector result in benefits appearing mainly elsewhere, which can only be mitigated by establishing a transparent, federated and coordinated governance framework.

### **3 Government as a broad platform for public value creation**

Although the public sector can in principle create public value on its own, its potential to do so is greatly enhanced and extended by direct cooperation with other actors, or by facilitating public value creation by other actors on their own. In other words, the public sector does not have a monopoly on public value creation, but it does have in most situations the prime role in ensuring that public value is created. Existing and new ICT is transforming the ability of government to act in these ways.

An important new role and business model for government in some of its functions is to act as a broad open participation platform supported by ICT. In this context a 'platform' means an open environment and ecosystem with clear frameworks, guidelines, resources and supports which invites all actors to collaborate in producing public value as well as value which directly benefits the actors themselves. These actors include companies, SMEs, civil society organisations, communities, groups and individuals, as well as hackers, designers and artists. Resources government should provide itself, as well as elicit from other actors, include data, applications, knowledge, content, capacity and service building blocks. To enable this collaboration to happen, the government should develop shared infrastructures and processes. It should encourage collaborative use through hackathons, discussion fora, blogs, consultation, support and advice, brokerage, good practices, arbitration, workshops, events, etc. It should provide standardised modules for basic functionalities which are cross institutional so that external actors do not have to contend with unnecessary differences, but which can easily be used, re-used and combined in new ways to address specific needs.

By providing this enabling platform, government can enable a range of actors to collaborate with each other, as well as with government itself, to generate public value. It is clear that today and in the foreseeable future, complex societal problems can no longer be solved by the state alone (the visible hand), or by the market alone (the invisible hand); now also all and any partnerships and groups (many hands) are needed. Using ICT, groups can easily and freely form, cooperate, act and dissolve: the platforms are free and the costs are essentially zero<sup>4</sup>. Citizens, communities, civil groups, as well as businesses, are themselves changing from passive consumers of data, content and knowledge to 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. Government thus needs to recognise the value of collaboration and crowdsourcing. Although government should better mobilise its own resources and talent, there is always more relevant talent outside any organisation (including

---

<sup>3</sup> For example Denmark, the UK, Australia and Singapore, as well as at the smaller scale local and city level where the barriers are often easier to overcome.

<sup>4</sup> Although there can be costs involved, for example in open source software.

government) than inside. Just as a new vision in business sees everyone as (in part) an enterprise, part of the new vision in government sees everyone potentially as a resource with assets to contribute in creating public value.

Government 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. This is already happening in a number of countries, and indeed has been presaged by numerous examples where other actors have usurped government's role using ICT<sup>5</sup>. On the other hand, more formal collaboration between government and other actors has more potential as well as being more challenging because of similar barriers to those mentioned above.<sup>6</sup> In Europe there are bottom-up examples where local governments collaborate with other actors as well as each other to develop local services in a pan-European context by developing templates and standards that promote applications and services that can be easily adapted to local conditions rather than a 'one-size fits all' approach<sup>7</sup>.

It is difficult to predict which type of public services are most suitable for these different approaches as this depends on specific circumstances, the openness of a given government and the ability and willingness of other actors to collaborate, which may also depend on the incentives they are offered. However, some possibilities are sketched in the section below on 'open services and new service approaches'.

For many years, there has been a trend towards outsourcing and privatisation of e-government activities, including services, as part of the New Public Management<sup>8</sup> vision of government. This has led to many challenges arising from new types of dis-integration and 'siloesation' between the many actors which mitigate the benefits of sharing and joining-up systems. The new Open Governance Management vision sketched here instead emphasises collaboration, sharing and transparency between actors with complementary role specialisation moving towards a value network and ecosystem approach to government. Here, the role of government is more likely to be concerned with coordination, integration and the orchestration of public value adding activities on the platform.

#### **4 The changing roles of the public sector**

It is clear that the above trends and visions concerning an open governance framework and government collaborating with other actors in fulfilling functions it previously fulfilled on its own, imply that governments in many (though certainly not all) areas are starting to re-think their role. By establishing collaboration platforms at many levels, government's role changes to one of enabler and facilitator, as well as arbiter, coordinator, and regulator for the activities of others in delivering public value. In this context, there are perhaps three main types of changing role: first, providing guidance and incentives for collaboration and co-creation; second, managing assets; and third, ensuring sustainable and balanced public value.

---

<sup>5</sup> for example 'Fix-My-Street' in the UK developed by civil society, noise measurement around Amsterdam Airport in the Netherlands undertaken by residents in the flight path, and Microsoft's 'health vault' storing citizens' health records in the cloud. These are examples where other actors have seen gaps in what government is doing and stepped in without invitation.

<sup>6</sup> Examples do exist, however, notably in the UK at national level with the new e-government portal recently launched after going through both alpha and beta versions in cooperation with former hackers. The best examples are at local and especially city level, for example in San Francisco with its open data and outreach initiatives involving all relevant actors.

<sup>7</sup> [www.citadelonthemove.eu](http://www.citadelonthemove.eu) and [www.esd.org.uk](http://www.esd.org.uk).

<sup>8</sup> New Public Management is an approach to the public sector adopted in the 1990s by many governments in Europe and elsewhere, in which *inter alia* a strong emphasis was placed on the large scale adoption of private sector management disciplines related to measurement, target setting and the often wholesale outsourcing of government functions to the private sector which was deemed to be more efficient in fulfilling them.

In relation to providing guidance and incentives for collaboration, it is clear that although the participatory, bottom-up co-creation of services can create more effective, personalised experiences, the process can increase the burden on citizens to participate. Making more efficient, cost-effective public services must mean more than assuming citizens will contribute time and other resources to create their own services. Instead, government should provide structured guidance within which service co-creation can happen. 'Guided' service co-creation will reduce the burden on citizens of participating in this way whilst maximising the return for public administrations and citizens alike. Government should also provide incentives by highlighting the benefits citizens will derive from the co-creation process, giving them more power to make decisions about these services in adapting them to their needs, and supporting them with relevant data and other resources. Given that the most successful innovations like this happen at the local level, but that here there is huge diversity in local authority resources and competences with 'smart cities' often in the vanguard, the latter should assist the smaller (often more rural) communities to help drive public sector innovation across Europe as a whole, rather than just in the metropolitan hubs. Beyond co-created public services, government should also support the many people contributing their time and expertise to the 'digital commons' such as Wikipedia, teaching children how to program ([www.codecademy.com](http://www.codecademy.com)), participate in hackathons to create apps for Random Hacks of Kindness, open data hackathons, apps for democracy competitions, etc. The role government plays in this might go wider than the traditional public sector areas of interest?

Second, government has an increasing role in managing societal assets. Especially in the context of Europe's pressing societal challenges, there is a need to identify and deploy all the assets and resources available in society but which are often not used or are under-used. Such existing assets, including government's own, include finance, people's time and expertise, organisational structures and competences, networks, data, things, places, buildings, spaces, vehicles, etc. The role of government in using the power of ICT, perhaps in collaboration with other actors, is to identify, broker, match, orchestrate and coordinate assets which can be shared and which would otherwise go to waste, converting them into public value impacts. There are already many non-government actors launching mainly bottom-up and small scale examples of ICT-based platforms which undertake such a role<sup>9</sup>, but government has greater power and scope to do this linking across other actors as well as sharing its own assets internally<sup>10</sup>. In order to ensure that no actors are disadvantaged or excluded from such benefits, governments should adopt this role. This would involve moving from ICT-based content management systems to asset management systems.

Third, because government collaborates increasingly with other actors in producing public value, this does not necessarily imply that government becomes just one actor amongst many as it still needs to fulfil roles which other actors normally cannot. These include taking responsibility for overall quality standards and mechanisms for resource sharing and legal frameworks, even when these are statutorily delegated to other actors. Accountability for services and performance, and responsibility especially if things go wrong, is a critical issue. Others are likely to include data protection and security (see below). In this context, it should also be remembered that innovation and change in the public sector is not the same as in the private sector, as government cannot pick and choose its customers and government services cannot afford to 'fail' in the same way as in the private sector. Given that government is the only institution democratically accountable to the whole of society, it alone can ensure sustainable and balanced public value where all segments of society benefit and where trade-offs are seen as fair and proportionate. This means that the general sustainability of the governance system is important. Government provides longer term stability and continuity which other actors cannot, and this is necessary to enable people and communities to live stable lives, as well as for the market to have confidence that governance changes will not upset their

---

<sup>9</sup> For example, Shareable based in the USA: [www.shareable.net](http://www.shareable.net).

<sup>10</sup> For example the estimated worth of the UK's so-called sharing economy was €26 billion in 2012, illustrating the economic as well as societal value of asset sharing.

own innovation and investment decisions. A governance system with a short-term horizon encourages short-termism in business and an unstable society.

It is not only the role of government and other actors which is changing but also of individuals in these organisations. For example, the distinctions between professional, politician, practitioner, civil servant, expert, consumer and citizen, are blurring dramatically. These roles are still important but the (power) relationships between them are changing and any given individual is increasingly taking two or more of them. In relation to government, this means that many actors can and are becoming involved in areas of competence previously the preserve of the public sector or specific agencies alone. The public sector is becoming, instead of always the sole actor, just one player albeit with unique responsibilities in new forms of open and collaborative governance.

## **5 Basic technology enablers**

In order to enable the above trends and visions, ICT needs to enable governments to engage the world outside and well as link up inside in order to create public value. These are big technology challenges which are only now being solved in the private sector and from which the public sector can draw both lessons and solutions, notwithstanding that its needs are crucially different in many areas (as described above). Technology solutions, as well as the methods and practices by which they are deployed, need to evolve away from traditional monolithic ICT applications on client servers in a closed environment of a business or government department, as these do not transfer to the open governance frameworks needed in future. The two basic issues are infrastructures and processes.<sup>11</sup>

New types of infrastructure are needed in an environment which is connected to, and driven by, the world outside government and its internal firewalled ICT systems. In this new environment, public value is created by the ability to share, interact and collaborate between actors using an 'infrastructure' created by many new technologies in addition to just 'the cloud'. The core enabler to almost every aspect has been the development of a new generation of personal, enterprise and global use of a common 'infrastructure' started by the development of the internet and web. Whether it's the digital enterprise or digital government creating new value through new ways of working, transformation is dependent on the enabling capabilities of a new generation of infrastructure. The focus is on interactions between people, contextual information and experiences that drive optimised actions in a flexibly organised business model. The current ICT infrastructure does not support these needs though it must adapt and align to them, neither is it possible to allow the current ad-hoc initiatives to continue and grow, as the loss of coherent control in governance operations is as unacceptable as the loss of integrity in auditable government processes.

Exactly how will a government simultaneously establish coherent 'end to end' processes to meet the needs of good management, auditable governance and legal compliance, whilst retaining the ability to move rapidly in decentralised operations to act to seize the opportunistic 'insights' discovered in 'big data'? This question covers more than the extension of the existing back-office ICT environment. The entire digital transformation to 'online governance' is only made possible because of the radically different nature of business technology using browser cloud architecture, rather than the traditional client-server architecture. The rapid and agile responses by small teams seizing opportunities must be supported by the collective leverage of knowledge and resources across the whole of government and its collaborating non-government actors. The true digital government will be one that is cohesively enabled to manage a coherent thread of governance integrity in its processes from informal unstructured first engagement with a user through to a compliant recorded governance transaction in its existing ICT systems. New types of specific Government Enterprise Architecture Management (GEAM) approaches are required to achieve this, but this also poses multiple challenges to software, processes and

---

<sup>11</sup> The next two paragraphs are adapted from two unpublished white papers submitted by Andy Mulholland.

systems in order to deliver these demanding, and in many ways contradictory, requirements. In particular it focuses on a new cross-government and multi-actor architecture, the integration of big data with its vital 'insights' into actions and tasks, and the role of social tools in driving people-centric actions and other supporting technologies including mobility and cloud. This requires the emergence of 'big processes' and the 'middle office' as important new capabilities, as well as the direct requirement for new methodologies to produce and deploy software.

These new infrastructures and processes need to be developed around architectures, models and tools for decentralisation, subsidiarity, tailoring, scaling and replicability. For example, technology models are needed to produce rules for user entitlements. Technology is also required to address two strong organisational trends which perfectly interplay to produce both economic and public value: the trend towards self-managed performance cells in organisations, and the trend towards loosely-coupled multi-organisational collaboration networks. These trends offer huge innovation potential for government. They will eventually result in distributed government process execution across many organisational units inside and outside government. However, the mastery of these new forms of both autonomy and big processes creates many severe challenges because of heterogeneous ontologies, organisational structures, technologies, legacy systems, unclear governance in highly distributed systems, etc. Technology is needed which enables the dynamic creation of big cross-organisational processes in the real world of government, which is often characterised by low organisational and technological maturity compared to the private sector.

An open governance framework clearly requires more focus on interoperability (also of legacy systems), open standards, and cloud computing. In terms of web evolution, this is mainly a web 3.0 development, only just starting to be implemented in a few places, related to the machine integration of data, knowledge and applications to make the web a more meaningful and collaborative platform. According to Tim Berners-Lee,<sup>12</sup> we are indeed on the verge of the age of ubiquitous embedded computing and the semantic web which exploits the internet of data rather than the internet of documents we now have. This is built on a new RDF (Resource Description Framework) standard for metadata in the same way as most document standards currently use HTML or XML. This enables intelligent uses of the internet like asking questions rather than simply searching for key words, as well as more automatic data exchanges between databases, data mining, etc. Many of these new knowledge-based approaches involve a focus on semantic-based technologies, including semantic web and support for cognitive interfaces, which encode ontologies, or taxonomies of meanings, separately from data, content files and application codes. This enables machines as well as people to understand, share and reason during application execution time, and thus also allows adding, changing and implementing new relationships or interconnecting programmes in new and different ways.

With regards to interoperability, the integration of building blocks to deliver workable solutions ('platforms') is important, and needs to embrace developments in social networking, the requirements of big data and related IoT (Internet of Things)<sup>13</sup> developments, as well as increasing software and service intelligence, and the proliferation of devices as well as apps. Interoperability-by-design may well be replaced by interoperability-on-the-fly. The virtualisation of resources, services and platforms (also known as cloud computing) need to be explored. Migration from web services and advanced form of technological infrastructure, like SOA (Service Oriented Architecture) may become necessary over the longer term.

There is considerable ongoing research on the IoT (Internet of Things), and a key issue for public services is that the user may no longer be citizens or businesses, but 'things' which are already acquiring their own identity, which can change according to context, as well as their own intelligence and even autonomy. In other words, the physical and the virtual are becoming

---

<sup>12</sup> The so-called father of the World Wide Web.

<sup>13</sup> IoT, the Internet of Things, in which increasingly objects like cars, household appliances, buildings, etc., have their own internet address and can automatically communicate with each other and with persons.

increasingly interlinked and even merged, with data and services flowing seamlessly between the physical world and the virtual world through mediated, intelligent agents. It is unclear whether and how the many technical, commercial and legal/regulatory issues currently investigated in relative isolation under IoT may impact on public sector service provision and delivery, and service access and consumption by the end-user. What seems clear is that 'sensors' (as a generic term) and actuators can greatly facilitate the collection of public data, and intelligent things are already becoming a mediator between public administrations and citizens. The advent of IoT may well render obsolete some existing public services and introduce the need for new public services. The IoT opportunity and potential impact for the public sector and public services should be explored.

Regarding next-generation software services and tools, apps and apps paradigms are proliferating while also creating silos (also known as 'walled gardens'). Many are or can be repurposed for public services, and public service oriented apps, including data mashup and even apps mashups, are worth exploring. An ecosystem of apps needs to be accompanied by the appropriate tools for apps creation, categorisation, registration and management. There is no doubt that the apps paradigm will change, while software tools become even more lightweight, agile and intelligent, and the relationship between the development of apps and social networking should be explored.

In relation to front-office applications, the impact of two major developments over the last five years still has not had big impact in the public sector, but is likely to do so up to 2020, i.e. social media and mobile. Innovation, both government internal and in collaboration with outside actors, needs to focus much more on using social media and other web 2.0 applications. Social media enables users to also contribute data as well as exercise some control over these data. Web 2.0 sites typically have an 'architecture of participation' that encourages users to add value to the application as they use it. A web 2.0 site, like Facebook, Twitter and YouTube, gives its users the choice to interact or collaborate with other users as well as service providers in a social media dialogue around user-generated content in a virtual community. This is in contrast to Web 1.0 websites where users are limited to the active viewing of content created and controlled by others. As a source of opinion, sentiment and feedback, social media are widely accepted as a method to crowdsource data. A major research effort is needed into how social networks can be used for decision- and policy-making, with particular focus on the use and value of the social signal and social search.

There is also a need to explore the link between existing social media platforms as well as developing new hybrids that can be used to address societal challenges. Related to this is ICT-supported gamification, i.e. the use of game concepts and design techniques, game thinking and game mechanics, to enhance innovation in non-game contexts. Typically gamification can be applied to non-game applications and processes in order to encourage participation and adoption, for example on social media platforms. Gamification works by making technology more engaging and fun, as well as potentially educational, especially for younger people, by showing a path to mastery and autonomy, by helping to solve problems, and by taking advantage of the human psychological predisposition to play games. The technique can be used in many contexts including story telling, learning, knowledge sharing, co-creation, collaboration, role play and simulation, and should be integrated into the public sector innovation process.

Mobile is also potentially transformatory because it can add where, when and who I am, to online services, content and data, both automatically and on request, via GPS (Global Positioning Satellite) networks and GIS (Geographical Information Systems) databases. Mobile can be said to have threefold power, i.e. the *power of pull* being always on, accessible, carried everywhere and able to access precise content and services; the *power of push* being used mainly by individuals or families who can be offered personalised services and content by providers, as well as enabling users themselves to push their own content to others; and the *power of reach* being already more ubiquitous than fixed computers or even laptops. These characteristics enhance flexibility through mobility for all types of user. Mobile telephony has



taken a step up in the last five years by the burgeoning popularity of the smartphone and the smart tablet, both of which offer much more advanced computing ability and connectivity than earlier 'dumb' phones.

In support of all these technology developments, including big processes and big data, much more rigorous and coordinated research is needed to develop common methods and tools for cyber security, data protection, identity management and privacy in the open governance and public sector context. It can be difficult achieving the right balance between transparency and privacy not just for citizens but also for politicians and civil servants who do need private spaces for open thinking and speculation before full publication of information. There needs to be specific focus on data traceability, quality and accountability, including organisational and regulatory aspects. Robust cyber security research for open governance is of fundamental importance for cross-administration, cross-border and cross-actor integration and collaboration, none of which can otherwise be successfully exploited. It is also essential for building and maintaining trust.

Overall, in the context of ICT-driven public sector innovation, hard technology research and soft research (for example concerning organisational and people changes) need to be combined in often new ways to address Europe's societal challenges – it is not tenable to keep them separate. The public sector often needs to combine and build on top of basic technology elements developed elsewhere, so this requires distinguishing the technology research already done from new research needed. In many cases the basic technology already exists but has to be technically adapted and integrated for public sector use, which is itself a major technology research challenge. Although the public sector needs to be aware of the leading edge technology research, it is often better to implement tried and tested technology in the context of specific public sector needs.

## **6 Open data and big data**

A transformatory new resource is open public data, suitably aggregated so individual persons or organisations cannot normally be identified, and making this available in machine readable linked datasets which can also be searched and manipulated. 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. Standards for data, quality, structuring, linking, searching, etc., need to be developed as well as standard tool modules for compiling, analysis and visualisation, with appropriate cloud and other systems to provide the underlying infrastructure and services both across government and between different actors.

At least five sources of big data (whether real time or archived) can be discerned which can be mixed and mashed by governments and other actors to create public value:

- data routinely collected by the public sector, whether for administrative, service or public policy purposes (i.e. PSI: Public Sector Information)
- physical environmental data, for example from sensors and actuators
- data from social networks, such as Facebook: interactions and the social signals and advice which people pass to each other
- co-production platforms, such as Wikipedia: with the specific purpose of co-producing new knowledge and content
- crowdsourced data: human input data of different types, including facts, evidence, preferences, opinions, sentiment analysis and on the physical environment, which can be used in multiple ways.

Businesses can also be sources of potentially valuable big data for public value, and there can be benefits in mixing such data together and adding data contributed by communities and individuals (through for example crowdsourcing), as well as data 'scraped' from the web (i.e. automatic extraction of data from websites), or even from controversial sources like WikiLeaks.

Citizens generate an enormous amount of economically valuable data through interactions with companies and government. Such personal 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 it and separate people from their own personal data. Smart disclosure is a new 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. Traditional open government data 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 (disclosed) data together with other appropriate data. This can be used to make decisions about their own lives, as well as to self-regulate and stand on a more level playing field with governments or companies who might otherwise seek to obfuscate or control.

Many governments, especially at regional and local level, are still struggling to come to terms with the meaning and value of opening their data, let alone how best to do so. This problem will be dramatically compounded in the years ahead as we move from the Internet of Things (IoT) to the Internet of People (where every individual has an internet address) and perhaps to the Internet of Everything where all these internets merge. Efforts are needed to ensure that public sector innovation does not become overwhelmed (or indeed left behind altogether) by an impending ‘data tsunami.’

Issues around big data include:

- Data gathering – How can the public sector effectively tap into the ‘data tsunami’ about to hit due to the explosion of social media and introduction of new low cost data gathering tools that effectively make every citizen with a smart phone a data source? What new data gathering trends are most likely to impact public services? What types of tools, standards and formats should the public sector use to access this data and, in turn, make it easily available and accessible?
- Data usage -- How can the public sector facilitate use of this data by citizens in the co-creation of new public services? What new tools, procedures and skills are needed by public administrators and citizens alike? How should the public sector handle data management issues, i.e. government as a trusted data broker?
- Data mash-ups – How can the public sector derive added value from data by linking differing data sets, for example from the different sources above? What types of formats, standards and procedures are needed?
- Data ownership – Who owns the new services that are created from big data? How to manage/govern usage and IPR issues?
- Data registration, certification and licensing – which standards, protocols and templates are needed to ensure data interoperability within the public sector and with other relevant actors?
- Data quality, compliance, predictability, durability, persistence and archiving – Are neutral trusted parties needed and are public administrations able themselves to fulfil this role, or should trusted third parties be set up under statutory license? Should such trusted (third) parties display a quality label? When data is used for public services what are the security and privacy issues, and how will quality of service (QoS) be agreed, guaranteed and reflected in service level agreements (SLAs)?

In comparison with the private sector, the public sector may have specific requirements and responsibility in relation to the provenance, integrity, auditability, authenticity and transparency of the data. There are always issues about data quality and representativeness (for example some crowdsourced data may lead to spurious analytics unless it is balanced by accessing inputs on a sufficient scale and representativeness across the target population), and deliberate or accidental data mis-use can occur in the same way as statistics can be mis-used. On the other hand, releasing incomplete and/or inaccurate data is also a way of improving its quality as users can

both correct and enhance it. Over ambitious focus on data completeness and quality should not be used as an excuse not to release public data, as long as this is accompanied by full openness about provenance, methods of collection and guidance about use.

As described above, different parts of the public sector possess different resources and competences, for example between ‘smart cities’ and the smaller (often more rural) communities, so support and sharing become important. Similarly, different roles can be played by different levels of government to exploit top-down and bottom-up synergies through federated arrangements for data and knowledge. For example, the top (both at national and European level) should provide federated meta data, registries, standards for sharing and linking, common licensing, shared vocabularies, etc. The bottom (regional and local authorities) should create, maintain and exploit data sets and act as an ‘authentic source’ which is also responsible for the maintenance needed to sustain the data set.

## **7 Policy modelling and making**

It is important to build on and continue the FP7 research on ICT for governance and policy modelling already undertaken since 2009. Common public sector tool boxes for big data analytics are required to address complex societal problems using evidence-based iteration and feedback, including crowdsourcing and other sources of data, to model and develop appropriate decisions and policies, as well as implement and monitor them. New web 3.0 as well as web 2.0 tools will be needed in this context focusing on the machine integration of data, knowledge and apps to make the web a more meaningful and collaborative platform. For example, socio-economic simulations can use the increasing set of scientific forecast models applied to big data. However, there are still no tools to support a broad use of models and data in a social or political context. There are so far only stand-alone and hard-to-use tools for scientists and experts and which have little impact on policy making or on any forms of social collaboration. Applied research and piloting is needed to make such models and methods available for broader public and non-expert use. However, this is a big challenge as such innovations often face resistance from civil servants, citizens and companies, so focus should be on simplicity, visualisation (for example through intuitive dashboards) and practical applications. Social media and other web 2.0 tools, which have largely overcome such resistance barriers, can be used in this context.

It will also be important to work with industry which often leads in the development of tools and methods for data mining, data analytics and data visualisation to produce ‘business intelligence’, which in the public sector context can become policy modelling, simulation and testing. Some of the tools already in successful use in the private sector include the use of a) descriptive techniques, such as statistics, to understand past and current situations, b) predictive techniques to simulate how the current situation and trends will project into the future if unchanged, and c) prescriptive techniques to simulate and test ‘what if’ scenarios if specific decisions are taken or policies implemented. This will allow policy trade-offs and choices to become more evidence-based and analytical both by government itself as well as in collaboration with the involved actors.

A few caveats are also necessary, however. In order to improve the public value of big data analytics it is also likely that they will need contextualising with ‘soft data’ or ‘soft knowledge’, for example using qualitative survey techniques, ethnographic surveys, etc. A need is thus foreseen for both big quantitative data crunching to provide explicit codified evidence, on the one hand, and more qualitative soft data to contextualise these ‘hard data’ to provide the necessary implicit and un-codified evidence. The use of big data analytics and scientific modelling and experimentation should always be undertaken using open and scientifically rigorous and transparent methods. In this context, it needs to be remembered that is not possible to measure or obtain data on everything of value, and there is also a need to appreciate that correlation does not equal causality. The results of these techniques should only be used as some evidence, alongside other types, for consideration by decision- and policy-makers.

However powerful results are, they should not automatically determine policies or make decisions effecting humans, either as individuals or in groups. Ultimately there is always a need for a reality and common sense check in relation to human values and ethics. Cooperation with social scientists and others, as well as open and social innovation approaches, will be needed to make this successful.

## 8 Open services and new service approaches

Public services delivered or enabled by ICT need to focus increasingly on user empowerment and creating public value for the user as well as the wider society. One of the main drivers is the notion of ‘universal personalisation’<sup>14</sup> which can result in three types of service.

First, ICT can enable government to observe and analyse societal developments right down to individual behaviour using the vast amount of data available to it. In this way, a benign government can provide much higher quality and valuable services for users, especially to those who may be disadvantaged in some way or unable themselves to get involved in selecting or creating their own services. Many of these services are ‘administrative’ services, i.e. necessary for government to function, such as collecting taxes, imposing legal requirements, making decisions, etc., and are the result of statutory requirements. These services are data-driven and can mostly be delivered online. They represent most existing e-government services in Europe and only need to be infrequently used, such as paying taxes once a year or applying for building permission, resulting in relatively low usage of online public services to date. However, other types of these top-down services are related to general statutory service provision in areas like health, social care, education, employment, etc., which are traditionally delivered in ‘one-size-fits-all’ mode but where data can be used to personalise service offerings. For example, such services can be life-event driven, and services can be orchestrated by government using the ‘field of application approach, i.e. what is the ‘perfect’ solution for the user. Many of these services can also be described as pro-active which makes the government ‘invisible’<sup>15</sup>. There are obvious threats in such developments. These include reductions in personal privacy as well as the possibility that government may not always be benign, and, even more likely, that government may not always be competent. This, in turn, relates to the extent to which users can trust government, particularly when it comes to using their data responsibly and wisely.

Second, citizens or businesses, either individually or in communities, groups and localities, as well as through intermediaries of various types, can be empowered to select and create their own services. Users are likely to be expert in what their problems are as only they possess the fine grained knowledge about what they really need. The above government- and data-driven approach, however well-meaning and intelligent, is likely to miss this latent, tacit knowledge possessed by users which is largely kept dormant and suppressed by the top-down delivery approach to services in which professionals are largely in control and assumed to have all the knowledge, thereby cajoling users to become largely passive.

This more bottom-up, user-driven and co-creation approach to services can exploit the growth of public services in the cloud, where service components, apps and content/data can be made interoperable and mashable. These components do not need to be provided by governments, but are also likely to be contributed by a large number of different actors. This approach sees users dynamically composing services from existing service components, for example on the basis of the user’s own profile or life events. Users can also use automatic web-service discovery of the components they need. An example of a possible future approach in this context is users managing their interaction with the public sector through individual, online dashboards. Accessible through a web-browser or mobile device after secure authentication (which may

---

<sup>14</sup> In principle, every service, facility, piece of content, etc., can be personalised to precisely suit all types of recipient, whether individuals, groups, places, etc.

<sup>15</sup> Invisible in the sense that government is not noticed even though it is providing a service or some other function. ‘Invisible’ can also refer to the fact that boundaries between government and ‘third parties’ are blurring so it may not be clear whether the service offered is actually offered by government or not.

include biometrics) the user would prepare, present and modify/delete the data that he/she is required (or wishes) to share with the public entity. These would be push-mode (top-down) services but controlled and modified by the user. There is clearly a need for single-sign-on and one-time shared data (such as key fields of identity, address, status, etc.). Multinational aspects for Europe's mobile population can be catered for based on interoperability and mutually recognised authentication schemes (now in pilot testing). This notion builds on existing 'MyPage' approaches already in use at in some countries, for example Denmark and Norway, and illustrates user self-monitoring and control through a single point of contact created by the administration or by the citizen/business, or both in cooperation.

The dangers of this second, bottom-up approach to services are, however, also manifold, including issues of exclusion related to the digital as well as wider societal divides and inequalities. This might mean that more personalised, higher quality and useful services could become the preserve of the better off and more competent segments of society, and not least the already more prosperous localities with more resources to draw on. Also, can governments (and thereby the tax-payer) trust users to behave responsibly when enabled through greater choice and empowerment to directly access public resources, and what should be the extent of restraint or monitoring in order to minimise this danger? This shows that trust is a double-edged sword – it is not only a question of 'can users trust their government', but also 'can government trust users'. Further, there are important issues related to the role of government and the public sector more generally when data, tools and opportunities are given to other actors (not just users but also civil and commercial actors) to create public services. This starts to question what is meant by a 'public service', who owns it, who is responsible for it and who is accountable if something goes wrong.

The third type of service approach enabled by ICT is the emergence of 'everyday' and location-driven services, based largely on mobile smart phones using GPS, although web-based services are also relevant. Such services are offered or created depending on where users are, as well as who they are and what they are doing. These services are also data-driven but largely in a local context where users are given a lot more choice and control. They can include local services related to health, education, care, transport, infrastructures, utilities, parking, accidents, clean and safe environments, congestion and pollution watch, culture, amenities, leisure, sports, security, crime watch, weather, participation, engagement, etc. New types of service, like conflict resolution, can also be envisaged. It is also much easier for users themselves or their intermediaries to participate in constructing and designing their own services at local level where knowledge and resources are often more relevant, closer to hand and more amenable.

An important issue arising from these different types of public sector service possibilities is the differences between statutory and non-statutory services, and, especially in the latter case, whether and how government should regulate, for example in terms of quality and accountability.

Users are also changing their behaviour when accessing and using e-services. The evolutionary approach to making such services available has been the abandonment of 'many stops' and a move to the 'one stop shop' (typically rather complex) navigation portal, which now dominates. However, studies show that people are increasingly finding and accessing services (whether commercial, personal or public) by sophisticated online search and hardly using expensive government portals. In response, a few governments (most noticeably the UK through first an alpha and now a beta version of their new sophisticated search portal, [www.gov.uk](http://www.gov.uk)) are now moving to the concept of personalised push/pull services in and from the cloud. These are delivered direct to the individual user and/or pulled by him or her, based on a 'whoever, wherever, whenever you are' approach, using both mobile and stationary ICT tools. Research is needed to support these moves as well as on the organizational and back-office implications, as well as to ascertain the user benefits and the impact on take-up.

## 9 Open participation and open engagement

Open participation and open engagement are important pillars of an open governance framework in which all legitimate actors are invited to engage in the activities of government as long as this engagement is itself open and enhances public value. Most e-participation research and practice over the last ten years has focused on the use of ICT for citizen involvement in political decisions and public policy making at both local and national levels. This is a rather narrow view of e-participation, mainly related to e-democracy, i.e. enhancing the democratic process using ICT. Results have so far been mixed and perhaps disappointing overall given the high expectations of even just five years ago. Ironically, this has perhaps led to reduced enthusiasm for e-participation funding at the very time that technology advances in areas like social media and mobile started to overcome the obstacles. It is also now more apparent that the ICT-driven public sector allows a much wider vision of open participation as open engagement, and this is making significant impact through diverse experiences around the world, particularly but not exclusively at local and regional level. Open participation should no longer be conceived as a silo focused only on politics and policies, although these remain important. Instead open engagement needs to be firmly embedded within, and part of, wider governance changes across all public sector activities, processes and structures. Although ICT is not the cause of these changes, it is certainly a key enabler and driver of them, especially social media and mobile applications. In addition to participation in service design and delivery, for example through co-creation, this means that citizens and other legitimate actors are able to establish a broad engagement and empowering relationship with government in terms of:

- the workings and arrangements of the public sector and public governance more widely (for example through participative budgeting and where scarce resources are allocated)
- community building
- dispute and conflict resolution
- management of societal assets, including land, buildings, etc.
- broader public policy and decision making as part of the overall democratic process.

An increasing amount of good practice demonstrates that an open engagement relationship between government and citizens is most successful when applied in a joined-up manner across some or all of the above areas and government functions (education, health, transport, law and order, care, environment, etc.), and when intimately integrated with and complementary to non-digital engagement methods. Although most success is still mainly at local and regional level, the evidence shows that open engagement works best when it becomes a seamless part of a government's broader policy of openness, transparency and collaboration. It should be continuously woven into a citizen's experience of the public sector, built into the fabric of all aspects of the way in which he or she interacts with the authority. It needs to be a natural and fundamental way in which the government conducts all its business, whether in what is traditionally termed either the back- or front-office so that this distinction becomes misleading – all is now 'front-office' in the sense all should now be open, transparent and visible by default, unless there are sound reasons to the contrary. Open engagement thus touches the lives of citizens in a comprehensive way; it builds on traditional open participation but with a new and perhaps transformatory dimension.

Today, with the explosion of new means for citizen engagement the focus is much more around how to tap into existing citizen conversations and make effective use of the wealth of citizen generated feedback. ICT can help reconnect citizens, who are constantly talking online amongst themselves, to political and other public sector issues both formally and informally. It is also helping to connect politicians and civil servants, who often feel overwhelmed by emails and data. For example, ICT can support:

- Federated identity – Using citizens' existing presence/networks online instead of requiring them to create new identities or go to new platforms. There is a need to ensure that governments go where citizens already are, whether mobile, wireless or multichannel.

- Large scale data analytics – Mining ongoing discussions across social media channels about policy and other public sector topics in a manner that provides data that is tailored and relevant for decision makers, e.g. politicians receiving data about their local constituencies.
- Linked data – Combing and combining across silo and actor data in a manner that helps citizens better understand issues and helps politicians make better decisions.
- Data visualisation – Using new tools to make information more accessible to citizens and politicians – i.e. quick snapshots of public opinion rather than mining through hundreds of emails, identification of variations by regions and constituencies, etc.

Recent examples include crowdsourcing legislation such as the new Icelandic constitution; the city of Hamburg's transparency law created by citizens/civil initiatives using a public wiki and then adopted by government; and the BundesGIT where all federal laws in Germany are being made available on an open source (code) platform in machine readable format so they can be widely developed by experts as well as citizens leading to legal amendments and new versions. The issue here is does such crowdsourced legislation really lead to better law as well as higher acceptance? Does it improve trust and support anti-corruption and better accountability?

Because open engagement is new, especially driven by ICT, a good approach is to make many small experiments with existing tools. This is much better than a few big initiatives which if they fail waste resources and reduce motivation. This is an opposite approach compared to the Large Scale Pilots, but is legitimate as it relates to the need for bottom-up, user-driven engagement. For example, what are the drivers and incentives for citizens to engage? Immediate feedback from government might be an incentive but there are likely to be others. Experimentation should be done in a variety of ways; e.g. a recent data collection study in a specific context made by the World Wide Web Foundation<sup>16</sup> showed that paying people for responding to surveys made the results slightly better, but that what it really improved them was human interaction instead of people filling an online form.

## 10 Location

The locality is where ICT-driven public sector innovation can become more meaningful for a much larger number of people and help address societal challenges where they often matter most, in the everyday lives of people. Especially in the larger European countries, open governance is becoming more important at the regional, local and especially city level. Local is where people lead their everyday lives and require public services which are tailored to their location-specific needs. For example, location has an important role in collaborative and open service production based on open data made available by local authorities and other local actors. The creation of these new services could be either driven by citizens but also by public administrations, i.e. services for citizens as well as services for public administrations.

As described in the 'open services and new service approaches' chapter above, the traditional, top-down administrative e-services (like tax, benefits, licenses, applications, registrations, etc.) are fully rolled out in most European countries and, although absolutely essential, are by nature infrequently used so the take-up of e-government remains limited. On the other hand, more everyday location-based services, through mobile, PC as well as web 2.0 social media, enable many new types of public service to be offered. This trend, together with dissolving silos, open data, big data analytics and widespread collaboration, are the basis for the important trend to, for example, smart city governance. The smart use of advanced ICT enables these geographic units to exploit their position at the 'sweet spot' between centralised and de-centralised governance models. Cities are typically large enough to have real power and impact, but also small enough to be close to the lives of real people where governance makes most sense and can have greatest immediate impact.

---

<sup>16</sup> [www.webfoundation.org](http://www.webfoundation.org)

There are already good examples, like the ESD (Effective Service Delivery) network<sup>17</sup> which has a membership of over 23,000 local agencies and authorities in the UK and has developed a range of toolkits and shared services for collaborative working and for evidence-based improvements of locally delivered services. ESD is a hosted, secure, online resource that enables all local authorities to record their public facing services against a comprehensive list of services, processes and interactions, and to compare and monitor them against the characteristics and performance of other participating local authorities based on shared metadata standards. It now has partners across Europe and is fast becoming a new standard for local e-government business models. The ESD network enables local authorities to develop locally relevant services whilst sharing building blocks of functionalities and service types with each other where there are common needs, thereby saving effort and resources.

Further, in October 2010, a bottom-up initiative by a number of European local governments launched a pan-European ‘Call to Action’ - known as The Citadel Statement, designed to help local government deliver on the key objectives of the Malmö 2009 Declaration. The statement covers<sup>18</sup>: common architecture, shared services and standards; open data, transparency and personal rights; citizen participation and involvement; privacy and identification of individuals; and rural inclusion.

## **11 New public sector ‘business models’ enabling bottom-up innovation**

The most widespread current ‘business model’ in governance is a top-down centralised institutional approach, typically based around administrative silos and with little collaboration with other actors. Current approaches to governance also fail to exploit the benefits of collaboration and engagement, especially at the local level where people experience their daily lives for which new types of governance business model are needed which:

- are often bottom-up ad-hoc processes which exploits existing and often under-used assets
- contextualise the implementation of ICT – starting from the needs of the citizen (perhaps mediated by people or organisations closest to them) rather than government
- enable leadership, ownership and accountability at the grassroots
- usher in new (power) relationships between professionals and citizens
- build widespread skills and competencies amongst the population
- because they start from the bottom, address not just the direct service needs of citizens but also helps give them self-fulfilment and esteem
- re-use and mash existing public sector data and other resources
- typically involve much less finance, have much shorter development cycles, and include a whole range of actors compared to traditional top-down initiatives.

Research is needed into new business models for the public sector enabled by ICT in which innovation is more open, bottom-up, evidence and impact led. These forms recognise that everybody and every group are potential innovators but this needs to be better enabled and coordinated in order to have maximum effect. Overall the focus should be on solving complex societal problems through collaboration and open governance. There are close similarities here with ‘social innovation’ where a number of actors, which can include communities, civil society, companies and the public sector, collaborate to tackle unmet social needs whilst also ensuring that the capacity of the different actors to innovate over the longer term is enhanced.<sup>19</sup>

These bottom-up and social innovation approaches are often compared to biological evolution in which the most successful innovations seem to occur when choices, ideas and innovations

---

<sup>17</sup> [www.esd.org.uk](http://www.esd.org.uk)

<sup>18</sup> [www.citadelonthemove.eu](http://www.citadelonthemove.eu).

<sup>19</sup> [www.siresearch.eu](http://www.siresearch.eu)



occur ‘randomly’ in an enabling environment, and then selected through trial and error.<sup>20</sup> With this analogy, the two rules for successful, especially open and social, innovation underpinned by ICT networks are the need for:

- first, variation: large number of experiments on a scale where failure is small and early, and thus survivable (unlike in the financial sector where failure was huge and late thereby causing huge and damaging disruptions)
- second, selection: citizens, organisations, businesses, governments, will themselves select from this trial and error process what works or is useful for them – for bottom-up innovation this is not a governance role, though government must provide support and ensure the right enabling conditions.

The public sector cannot be innovative in the same way as highly agile SMEs, corporates or social entrepreneurs. Governments have highly complex and often contradictory evidence to deal with and decisions to make, must attempt to reconcile competing interests, make policy trade-offs, and recognise that both social and business cohesion relies on governments to ensure basic stability and continuity, whilst at the same time being transparent and democratic and serving all parts of society. However, the public sector can still be highly innovative across all its functions, and ICT is a major tool.

Specific methods and tools supported or enabled by ICT, which government can adopt more widely to support experimentation and bottom-up innovation, include living labs and perhaps making these more like open public labs; and hackathons in which a range of actors solve specific local problems using big data as well as local insight from people, designers and artists who own the problem and who can devise elegant solutions. Also relevant is public social policy experimentation<sup>21</sup> building on the governance and policy modelling research in FP7 which also considers using new tools and methods, for example randomised controlled trials<sup>22</sup>.

These tools and approaches should directly support collaboration around solving complex societal problems, particularly adopting social innovation goals and techniques. Social innovations are new solutions (products, services, models, markets, processes, etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and better use of assets and resources. In other words, social innovations are both good for society and enhance society’s capacity to act. Government is a prime actor in meeting social needs, but needs to be better in doing this and in enhancing society’s overall capacity to act, by close cooperation with the other main actors: the private commercial and profit-seeking sector, the non-profit formal civil organisation sectors, and the informal sector consisting of individuals, households and communities.

## 12 Measurement and monitoring

ICT data and tools enable measurement and monitoring of the public sector and its performance to be dramatically improved and rethought. Questions which need to be addressed include are money and resources being deployed efficiently and effectively, how can we link this to outcomes and impacts, and even is the money being spent on measurement commensurate with the benefits of measurement?

Over the last few years three trends in measurement and monitoring supported by ICT have emerged. First, moving up the value chain so that measurement moves away from only focusing on the traditional inputs and outputs (like back-office process re-engineering, service

---

<sup>20</sup> Ormerod, P. (2012) “Positive linking: how networks can revolutionise the world”, Faber and Faber Ltd., London; and Harford, T. (2011) “Adapt: why success always starts with failure”, Little Brown, London.

<sup>21</sup> For example currently being supported by DG Employment, Social Affairs & Inclusion.

<sup>22</sup> For example in the UK “Test, learn, adapt: developing public policy with randomised controlled trials”: <http://www.cabinetoffice.gov.uk/resource-library/test-learn-adapt-developing-public-policy-randomised-controlled-trials>

availability and sophistication, access, money spent, number of cases dealt with, etc.) towards outcomes and impacts (such as successful service use, administrative burden reduction, user satisfaction and fulfilment, and even competitiveness, growth, jobs, social cohesion, inclusion and democracy). A good example is the Web Index, designed and produced by the World Wide Web Foundation<sup>23</sup>, the world's first multi-dimensional measure of the Web's growth, utility and impact on people and nations. It covers 61 developed and developing countries, incorporating indicators that assess the political, economic and social impact of the Web, as well as indicators of Web connectivity and infrastructure.

Second, moving down the government hierarchy away from a focus only on central government's administrative functions, policies and macro targets, and more towards local measurement, the frontline and user engagement (such as local design and setting of standards and outcomes, with local targets, the performance of staff and user-centric measures in care, housing, education, crime, transport, etc.). Third, moving out of the government institution, recognising that everyone and every group can potentially measure and monitor the public sector, including businesses, non-profits, social entrepreneurs, universities, the social partners, communities, citizens and hackers, and that this can be done either in collaboration with government or independently.

These developments can strengthen accountability and ownership, for example, if public services are to be useful for and accountable to users, they should not only be measured by government. This implies much greater risk for government as it decreases its control, but it also spreads risk to more actors and thereby also spreads accountability. Measurement can also be more immediate and real time, i.e. there is no longer a need to wait 'forever for the decisive evidence', instead measurement can be applied 'as you go along' and thus respond more quickly and precisely through learning and exchanging experiences in real time.

ICT also provides new measurement and monitoring tools, such as:

- Website metrics, including usage data, traffic, visitors and transactions
- Aggregation, contextualising and comparing performance data
- Comparable evaluation methods and tools
- Capturing user experience – social media analytics and crowdsourcing
- Listening and monitoring tools, e.g. sentiment analysis, opinion mining, relative sentiment, high level affinity analytics like hot words, hot spots, etc.

New software powered evaluation tools are also becoming available, such as first generation eAccessibility tools (already widely rolled out like the World Wide Web Consortium's tools), but also second generation web-crawlers which can for example automatically assess online service availability (already in use in Norway). These developments typically involve two approaches. First, the deterministic programmatic detection of features, e.g. RSS feeds, links to Facebook, etc. Second, the use of learning algorithms for features not formally defined or programmed, for example learning how to recognise a help page based on manually selected examples using the incidence of words like 'help', 'question', 'FAQ', etc.

Measurement and monitoring can also be assisted by smart data visualisation, for example:

- Display in open visual and mashable formats, like maps, data tables, comparison graphs, European benchmarking progress measures, etc.
- Using a measurement platform or 'dashboard' which can be personalised to suit the needs of the person or organisation undertaking measurement
- Supplementing the standard data with additional specialist data from countries, localities, cities, industry, NGOs, etc.

Overall, new forms for smart measurement and monitoring can be enabled by ICT which permit:

---

<sup>23</sup> [www.thewebindex.org](http://www.thewebindex.org).

- The comparison of indicators and indices across many agencies collected through multiple sources
- Integrated and self-service measurement and assessment, for example reflecting city, national, regional policies, needs and stage of development
- Highly personalised and tailored measurement
- The addition of specialised add-on tools
- Agencies to select what is best for them and to make comparisons against other agencies because of similarity, desired development path, etc.
- Visualisation on a measurement platform (dashboard) to which other data and content can be added
- A clear focus on policy performance and impact.

The above shows a move towards ‘open monitoring and assessment’ in which everyone can in principle participate in, for example, cost-benefit analyses, impact assessments and evidence based evaluations focusing on what works and what doesn’t. Such transparency helps to reduce the risk of performance failure and ensures better value for money, especially through continuous monitoring. For example, the impacts of an open data portal in different contexts, and providing evidence through feedback and experience make better judgements about what makes an open data (or open government) initiative successful. See also, however, the caveats in the policy modelling and making section above.

### **13 Civil servants and working practices**

Equally important to empowering citizens is to empower public sector staff. Applications and processes are needed which enable civil servants, many of whom are frontline professionals and decision-makers, to themselves participate in ensuring government is open and engaging, for example by being equipped with the necessary skills, tools and support. Many civil servants see the real time performance and impact of public services and public policies on citizens, and would be able to generate appropriate data and other inputs which could improve live service experience if they were given the data, tools and incentives to do so, for example by being permitted to participate in a professional capacity in citizens’ social networks to offer advice and knowledge. Moreover, many civil servants also see a blurring of their personal and professional lives in terms of the tools they use, and both can be improved through the exchange of experience and skills. Sensible structures are needed to ensure that civil servants empowered in this way are also able to retain impartiality and a position of trust both from the government itself as well as from citizens.

One of the biggest challenges to ICT-driven public sector innovation is legacy ways of working and of administrative cultures, and the often embedded resistance to change. The entrenchment of a ‘risk adverse culture’ and ‘business as usual procedures’ remains strong within government at all levels, creating an inherent obstacle to the introduction of new processes, products, services and methods that ICT enables. The importance of empowering civil servants cannot, therefore, be underestimated. Apart from providing appropriate tools and training for civil servants, leadership from both the top and the middle of government organisations, including the Commission, is critical to ensure that open governance and services evolve at the right speed. Rather than attempt to keep pace with technological change (which is impossible given the current pace of ICT innovation), government leaders should promote the principles of ‘open innovation’ amongst civil servants, ensuring a cultural mindset that is flexible, adaptable and responsive to user feedback.

Although some ‘bureaucracy’ is necessary, for example to ensure decisions are made according to statutory and other rules, greater discretion is also needed based on big data, user feedback and open engagement, as long as this takes place transparently and openly and subject to reasonable challenge and scrutiny by society at large. This includes new attitudes to, and acceptance of, ‘whistle blowers’ both within and outside the public sector. Much of this needs to be based on ‘freedom of information’ legislation which also allows questions to be asked and

responses provided within a specified time period. Although such freedoms can be mis-used, they contribute directly to trust in government as well as to better governance in the longer term. Thus, there is a need to achieve a balance between transparency and privacy not just for citizens but also for politicians and civil servants who do need private spaces for open thinking and speculation before the full publication of information.

## **14 Scientific theories, concepts, methods and tools**

Research into ICT-driven public sector innovation in many of the areas outlined above must also be conducted using an approach based on the rigorous development and testing of scientific theories, concepts, methods and tools. A strong grounding of research in innovative public services using scientific theories and concepts to explain data and complex systems is needed. The overall aim should be to help address Europe's complex societal problems through theory building and testing, hypothesis testing, empirical research, the development of taxonomies and new models, etc. This is important both to help support public sector innovation as well as build Europe's scientific base and community.

In this context, international collaboration with partners outside Europe, especially in comparable countries, is needed both to establish fruitful long term synergies as well as because their challenges are comparable with Europe's. Similarly, research support and collaboration is important with the emerging and developing economies as part of Europe's global development agenda and due to the high importance of good governance and institution building in these countries.

## **15 A research vision for ICT-driven public sector innovation**

A vision of open collaborative governance driven by ICT encompasses open structures, open organisations and open processes. 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 in many ways acts as one entity, especially in its interactions with other actors including citizens and businesses.

This vision also implies that government should create a platform for collaboration as an open environment and ecosystem with clear frameworks, guidelines, resources and supports which invite all actors to collaborate in producing public value. This would also encompass the notion that, just as a new vision in business sees everyone as (in part) an enterprise, part of the new vision in government sees everyone as a resource with assets to potentially contribute.

In changing and adapting the roles of government in this way, there are also real concerns that such changes will result in new types of risk, for example:

- loss of control and blurred accountability of services (by whom to whom?)
- quality standards are more difficult to determine and maintain with many designers and suppliers
- privacy and data security
- danger of data and content mis-use
- digital elite formation – new digital divides?
- information and data overload – or is this more a filter failure?

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