Government operating systems and government as collective intelligence

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All governments depend on operating systems – a mix of techniques, processes and technologies that help them to do their tasks, from collecting taxes to catching criminals, educating children to building roads.

These can all be thought of as examples of the broader field of collective intelligence – concerned with how to mobilise multiple brains and technologies to help with the job of thinking.[1] To function well, governments need to observe, assess, plan, imagine, remember and judge, and during every era the structures and processes of government have been strongly shaped by the available technologies for doing these tasks of thinking.

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Roads to help communicate, rolls and tablets to record, councils to deliberate are all examples of this, and the great growth of government in the 19-20th centuries coincided with the spread of professions built around specialised knowledge; new tools like statistical surveys and technologies like the telegraph which all amplified governments' capacities to think and act.

Today's continuing revolutions in digital technologies are constantly changing the options for how government can be organised, with new tools ranging from sensors and machine learning, to predictive algorithms and crowdsourcing platforms. These technologies can amplify the intelligence of every aspect of government – from democratic deliberation to financial planning, disaster management to public health. They are contributing a denser informational aura around every activity – including traces, tracks and comments. Here I summarise a few of the possibilities for improving government collective intelligence over the next decade.

Possibilities for improving government collective intelligence

- **Greater awareness:** accurate observation of the world has always been a challenge for governments. How to know the numbers of people in towns and villages; the scale of economic activity; or conspiracies against the state. The answers have included statistics (like GDP); surveys; intelligence agencies and surveillance, all offering facts about the world to help governments decide on threats and opportunities, and the issues that deserve attention. Today a stream of innovations are improving observation: new forms of data; sensors enabling new forms of regulation (for example of air quality, emissions from factories); automated aggregation of data such as citizen movement patterns taken from mobile phones; citizen generated data; and web-scraping tools (for example to make sense of emerging economic activities).

    The biggest challenge now for governments is how to cope with the volume of possible inputs. Computing power helps governments to analyse patterns. Key tools include predictive algorithms, which have long been used in healthcare (to predict whether a patient will come to hospital) and criminal justice (how likely that a criminal will reoffend). Larger scale predictions have been a lot less reliable, and economic forecasting remains as problematic as ever. But it's possible that machine learning will help governments better plan for changing needs (for example, for healthcare). Other tools for analysis include ways of aggregating assessments, like Intellipedia which pulls together intelligence assessments from over a dozen US agencies.

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- **Better ways to mobilise finance for impact**: there was a burst of innovation around handling money 20-30 years ago, with the spread of new tools for raising money and managing it. Now there is a gap between the available tools and what's needed. Some of the likely innovations of the next few years may include better means of applying investment methods to government actions on people (in health and education etc), linking preventive action to long term returns; better tools for making money transparent, disaggregating to understand cost structures; and mobilising finance for critical tasks such as innovation, including stage-gate funding methods.

- **More feedback**: a series of innovations are being tested around the world to ensure better public engagement and feedback. Nesta's D-CENT platform is being used in Finland to help cities make decisions, with APIs to enable the public to track and contribute at every stage; in Spain political parties are using the same platform to involve the public in shaping their programmes. In Paris 5% of the budget has been opened up for a participatory budgeting process. And everywhere social media are being used to support richer feedback. The methods for handling these inputs are far from settled – and some of these are a lot more labour intensive than the more traditional top down communications methods of the past.

- **Accessing wider sources of expertise**: how to tap into a much wider range of sources of expertise - crowdsourcing platforms a rough first step towards more systematic use of experts, reputational devices. The Conversation – which now has over 20m hits a month – is a powerful way to tap the brainpower of academics to feed into current issues, and shows one route to answering this question. Platforms like Peer to Patent in the US which allows commentary on patent applications is another.

- **More empathy** : much of the 20th century states' growth involved roles in which empathy matters – doctors, nurses, teachers etc. This tends to be a blind spot for technologists and enthusiasts for new tools. But as Robert MacNamara – former head of Ford, the Pentagon and World Bank – pointed out, most of the mistakes states make derive from a lack of empathy.

  The idea of a relational state brings some of these ideas together – and points to governments paying more attention to the quality of relationships they have with citizens, and to the social networks that play crucial roles in everything from public health to the management of service delivery. Technologies can support this shift: tools like Social Network Analysis can reveal the reality of relationships – for example who helps who in a local policing system.[2]

- **More creativity** : governments need ideas, and better solutions. Here an array of new methods are being used to widen the range of sources, including: challenge and inducement prizes; crowdsourcing platforms; labs and teams; and accelerators. The craft of doing this well is still developing. But a common theme is the need to tap into citizen creativity.[3]

- **Better memory**: governments have always been built around archives, stores of past tax payments, treaties, laws, obligations. Digital technologies allow them to remember far more, with far easier access. 'What works' centres that bring together evidence on policy and practice are in part a way of organising memory more effectively. But overall the state of knowledge management within governments is low. Models like the Health Knowledge Commons point to a future where there is much more systematic orchestration of available knowledge – from very formal evidence to experience and citizen generated knowledge.

- **Smarter regulation**: new waves of technology will require different models of regulation, for example of drones, personal data, access to genomic data and driverless cars. New principles of consent may be needed, along with new rules to determine who has access to data, and who has rights to inspect algorithms (though it will be hard, even impossible, to make sense of complex learning technologies). New technologies will also transform how regulation can be organised.

  Much financial regulation is already automated, just as banks decisions are made by neural networks, albeit with powers for humans to intervene when markets get out of control, and many areas of environmental regulation may be revolutionised by the intelligent sensors offered by the Internet of Things.

- **More collaborative collective intelligence:** digital technologies in government have so far had most success in improving relatively simple transactions, automating tax payments, licenses, registrations, or enabling choice within services such as university applications. But technologies can also support larger scale collaborative problem solving, bringing together brain power across agencies and across sectors. Some existing models suggest the direction of travel. These include health collaboratives (used in the US and UK), orchestrating diagonal slices of particular fields, and combining attention to evidence, improvement and innovation within professions. The work on health knowledge commons suggests how these could evolve.4

  Local city collaboratives like the London Collaborative (which brought together the senior leadership, mobilised teams of officials and others to solve problems, and started to orchestrate academic and research expertise to contribute to public problem-solving) show how cities could think more effectively.5 At a micro level study circles within schools and hospitals; horizontal networks linking practitioners; and more formal learning systems like Project Oracle (for youth programmes in cities), suggest how intelligence can be organised more effectively.

Growing new cultures of government

New technologies have co-evolved with changing cultures of government, just as happened in the past, as print, telegraph, television and computers changed how governments thought. These are a few of the emerging cultures that may thrive and may be the necessary complement to new hardware and software, valuing:

- Visibility – of people, processes and results as the default.

- Precision – with data, quantification and exactness in all things.

- Quickness – moving to test and improve ideas in real world settings on a small scale rather than mainly paper processes for policy development and implementation of untested ideas on a large scale.

- Interactivity – from TVs to buildings to institutions, leaving people less satisfied with any service or institution which offers no ways to interact.

- Flows as the unit of action – digital technologies have evolved from the world of files, folders, desktops through the world of links and pages to the ubiquity of flows in the cloud, with intelligence as a cloud capability to be bought in.

- Access rather than ownership, with the public sector developing its versions of KindleUnlimited, Netflix and AirBnB for such things as transport, libraries and education.

- Authenticity, and walking the talk: officials trying out new methods on themselves.

Should there be more R&D for government itself?

Governments spend huge sums on R&D, often more than 1% of GDP. But they spend surprisingly little of this on their own needs. Half tends to go to the military and intelligence, and much of the rest is spent on projects defined by academics or business. But there have been few systematic R&D programmes directed to the types of function described above. Perhaps some more systematic R&D on the operating systems and technologies for government is long overdue, for example to test out what variants of machine learning are likely to be most useful and where. As preparation, a foresight exercise might look at maturing and emerging technologies and their most promising uses in the operations of government.

1. 'True Collective Intelligence: a sketch of a new field', Geoff Mulgan, Philosophy and Technology, 2014 27:122-133
2. This report from a few years ago showed how SNA could map the patterns of partnership in a town or city, revealing the human reality of cooperation. Transformers, Nesta, 2008 . These tools have yet to become widely used, but are relatively cheap and easy to implement.
3. See my paper on public sector innovation , and the recent Nesta/Bloomberg Philanthropy paper on innovation teams and visit www.theiteams.org
4. See Nesta's report on health knowledge commons
5. The City Collaborative

- See more at: http://www.nesta.org.uk/blog/government-operating-systems-and-government-collective-intelligence#sthash.chXZB3PB.dpuf

A new operating model for government

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[Paul Maltby](#)

Between five and ten years ago these ideas were at the fringes of conversations about how government could develop in the future. Now, while not exactly household terms, they are becoming increasingly mainstream. But what are the concepts and tools that will be seen as the new normal by 2020-25, and what should policy makers be doing now to get up to speed?

The Cabinet Office is supporting cross-government [horizon scanning work](#) that has included a focus on emerging technologies, and it is here that many of these new approaches to government seem likely to originate. Some of these – especially those related to [data science](#) – are already with us, and are increasingly being used in or near government. But in my view two areas that I think will feel more ingrained into how government thinks of itself within 5 years will be government as a platform and a new tech-led approach to regulation.

Government as a platform

We see platforms all around us, from the [Apple Store](#) to [Amazon](#), where companies open up their systems to allow others to sell products or applications through them. But US tech guru [Tim O'Reilly](#) was one of the first to probe what could mean for government back in 2010. An early practical example of government as a platform was the open data movement where external organisations and companies use freely available machine readable data to create businesses and aid accountability, and although there remains work to be done it is an area where the [UK leads the world](#). The Government Digital Service and digital and technology leaders from across departments are now taking platforms to a next level with development of common software that can be used across government and beyond. The new identification service [Verify](#) is an excellent example, and [this GDS video](#) helps explain how platforms will reshape digital services in coming years.

Platforms are about providing a (digital) framework within which others abide by rules, using data and a payment and regulatory ecosystem to unleash invention at scale. Could this notion not be applied to the wider face-to-face operation of government? Think of developments where innovative services like [Casserole Club](#) would be able to provide its amazing service in not just a handful of local authorities, but have the opportunity to develop at scale as needed by users UK wide. Consider how [NationBuilder](#) has developed a platform to organise social campaigns, and if the same organising principles were built in to the fabric of government what this could mean for democracy – particularly among a generation that expect to [collaborate and create content](#). This brings with it an opportunity to redefine the role of government, and even create a different relationship between state and public.

New generation regulation

A second area is how we approach regulation. Again, back to [Tim O'Reilly and a different article](#) presents a thought experiment about what happens to the idea of a generalised speed limit in a world of autonomous vehicles and network knowledge of road conditions, weather, condition of the car, and presence (or otherwise) of other vehicles. While your Maserati autonomous vehicle might zip along at 200mph where conditions allow, my rusty old wreck of an autonomous vehicle might be safer for everyone if limited to 50mph.

The use of sensors is already transforming the automotive industry and other areas of engineering. For example, [Rolls Royce](#) no longer replaces engine parts on a rolling timetable but now knows the condition of each part in each engine and replaces each part exactly when needed. Which begs question that in a world where [Tesla](#) can update software overnight to its cars if it finds a way to optimise ride height to improve fuel efficiency, does it still make sense to retain annual MOTs for all vehicles?

And not just MOTs. Many regulations and laws are about determining a sensible rule of thumb that on average is about right, even if risk-based regulation and inspection are increasingly evident. Where are the opportunities where when flooded with sensors we can do away with 'on average every x months' or 'every x times' style laws and regulation? Could this signal an opportunity to significantly ease the regulatory burden and increase more tailored experience of government?

Even more speculative is the potential for the technology that underpins Bitcoin to play a role in future state regulation. The blockchain is the digital mechanism that sits behind Bitcoin and records the history of each Bitcoin transaction in a form that is recorded in many places and which can be read by all. Based on new breakthroughs in cryptography, it creates integrity in the virtual currency without the need for central bank – for instance it prevents individual bitcoins being used at the same time by two separate people.

What is more, this same process can also be deployed to securely document other types of transaction that have nothing to do with Bitcoin; for example, a contract between two individuals can be verified without recourse to a government or company (and the costs and time associated with this type of verification). Technologists are starting to consider where else this technology could be used and regulation – eg in wider financial services – is one possible area.

A new operating model for government

Silicon Valley investor Marc Andreessen famously said in 2011 that software is eating the world, and a similar claim could now be made about data. These are disruptive and transformational technologies, as many big companies from Blockbusters to HMV have understood too late. Why do we expect government to be immune from the more radical impacts, just because we don't have the luxury of going out of business? It is not just a case of feeding modern digital tools into our existing policy processes (though that too), it is about recognising that these technologies have the potential to allow or even require a different operating model for government. There are clearly choices for whether or how we do this, but commentators like Cambridge University's Mark Thompson point to significant ramifications for the way in which government itself could be organised.

With Nesta , the Cabinet Office's Open Policy Team is inviting senior leaders in government to a workshop shortly to hear from leading figures where these emerging technologies are heading, and what they might mean for public services. So: data science, predictive analytics, artificial intelligence, sensors, applied programming interfaces, autonomous machines, and platforms. Will this be a roll-call of everyday government terms as we get ready to enter a new Parliament in 2020?

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- See more at: http://www.nesta.org.uk/blog/new-operating-model-government#sthash.F5jNR5W7.dpuf