



# Can government stop losing its mind?

How network  
thinking can help  
us record, find and  
use what we need

Gavin Starks

April 2018

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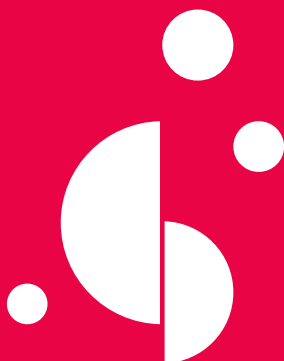
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# Foreword

## Fighting memory loss

Can government remember? Is it condemned to repeat mistakes? Or does it remember too much and so see too many reasons why anything new is bound to fail?

The case for a permanent civil service is that it organises its memory well, and is certainly better than governing systems which periodically purge their top tiers. So when there is a natural disaster, a recurring policy task like reforming curriculum or local government finance or building hundreds of thousands of new homes, comprehensive bodies of knowledge can be tapped into to guide today's decision-makers and save them the trouble of reinventing wheels.

Such is the theory. Unfortunately anyone with close experience of government realises that the truth is rather different. When I worked in government I regularly found myself the only person in meetings who had been at the equivalent meetings five or so years before or could recall the previous discussions. I had become the corporate memory. Some of the reasons for this poor memory include very high turnover; rigid silos which make it hard to access information across departmental boundaries; and the lack of even rudimentary knowledge management systems. These are made worse by traditions like the prohibition on giving ministers access to the advice given to predecessors from a different party. The net result is that government forgets as much as it remembers.

In an age of search engines this might look like a problem that has gone away. But if anything things have got worse. Government websites used to carry extensive previous analyses and policies; these have largely disappeared now. A recent study of government's own commissioned research showed that it has mainly been lost or hidden. There's no shortage of examples of forgetfulness. A current example is rough sleeping. This was a problem that was largely solved in the 2000s through a subtle, energetic

and comprehensive set of policies, but has now re-appeared with a vengeance. There is very little sign that either government or opposition is even dimly aware of what was done. None of this has been helped by the reinforcement of silos in recent years as the various attempts at joined-up government were quietly dismantled in favour of more traditional structures and processes.

In this paper Gavin Starks suggests that although this is an old problem there may be new solutions. He emphasises the technology-based solutions – new ways of organising data, documents and works in progress. These are powerful ideas that could transform the everyday work of governments. He also acknowledges that they need to sit alongside complementary measures. At Nesta we have been closely involved in some of these – like setting up What Works Centres that effectively organise the collective memory of a field such as policing or teaching, and the broader movement to open up public data. Others concern shifting cultures to reinforce sharing of information and a shared commitment to solving problems rather than defending the departmental walls.

There are innumerable complexities involved in government memory – some has to be extremely secret; and some has to be highly sensitive to personal privacy. But the defaults are now in the wrong place, and we all suffer from the poorer policies and programmes that result.

At Nesta we've said in the past that elected politicians have every right to ignore the facts and evidence but no right to be ignorant of them. In the same way they have every right to ignore what's remembered. But they've no right to be ignorant of it. Here's a way to bring the best of what we now take for granted on the internet into the everyday work of the state.

**Geoff Mulgan, CEO Nesta**

*"In our network age everyone is a data stakeholder"*

## Summary and recommendations

This report sets out how the public sector could benefit from a federated, data-driven approach: one that provides greater power to its leaders, benefits its participants and users and improves performance through better use of, and structured access to, data.

It recognises that knowledge is both formal (codified) and informal (held in people's brains) and that the greatest value comes from combining these. Its recommendations combine externalisation: building on what works, research, public records and data, private sector records and data, and new internal methods for managing processes of policy design, implementation and learning. It covers areas including data archiving and verification, as well as shared rules for identity management and authentication, drawing on lessons from fields that have taken this most seriously, including the military and medicine.

A decisive role can be played by technology – but the full benefits will only be reaped if combined with human processes and a cultural shift that reflects our global shift to a networked society.

The report highlights next steps that can be made within government, and how the UK can build up comparative advantage in govtech using these new tools.

What information does COBRA need when considering an emergency or incident? What does a policy review (e.g. of children's care) need to know about past experiences? How can people working on a new problem find prior work and connect with researchers, decision-making bodies and others working on similar projects, or those searching for similar information? This information will be spread across many different organisations.

Governments are surprisingly bad at remembering what they've done, what they learned, what worked and what didn't. They are storing and have access to more information than at any point in history and while they may appear to have everything at their fingertips through search engines, email and databases, they are struggling use it. At the same time they are combining human- and machine-knowledge into new systems.

While we are at the beginnings of a data revolution, we are also at a point where the deluge of data is creating the potential for an 'information collapse' in complex administrations: structured information and knowledge is lost in the noise or, worse, misinformation rises as fact.

Our present systems are far from perfect. Even though a permanent civil service is essential to preserve a common memory, interviews with senior figure across government confirm many challenges. One said that *"Government appears to have everything at their fingertips but are as bad as ever as knowing what exists, has been done before"*, another that *"there is barely any institutional memory in government that can be written down: it exists in people's heads. Hardly anyone is interested in writing it down"*. Another still that *"there are 'files' on specific topics, sometimes you can get them from store, but often not. When you can get them, they can be wonderful, but finding meta-information about which file to get from store can be tricky and time consuming."*

The failure to find and use relevant knowledge leads to inefficiencies that can be measured in billions of pounds, to mistakes, to direct waste, to a failure to learn or to capture new opportunities. The problems are particularly visible during crises when there's an urgent need to gather relevant information from many sources.

There are many reasons: the technical design of their systems; turnover of people; contracting out. Information is stored in silos and often guarded jealously. Cultural and process issues lead to poor use of technologies.

Some of the answers involve new internal methods for managing processes of policy design, implementation and learning, with an emphasis on sharing, searchability, archiving and systematic tagging of information. The other set of answers involve externalising the memory through public records, open data and initiatives (e.g. What Works Centres).

A decisive role can be played by technologies that enable open and federated sharing (e.g. the web), but the full benefits will only be reaped if these are combined with human processes and a cultural shift.

For example, the most successful information architecture of all time, the web, was catalysed by the creation of intranets. Organisations saw the benefits of the technology and the approach. Over time the 'firewall' has become more permeable. There are equivalent evolutionary processes to be explored here: the utilisation of tools at a local level (e.g. a Google document shared with one colleague) to helping to create user-engagement in wider communities (e.g. a Google document shared with 150 internal and external collaborators).

Much can be learned from high-end medical or military-grade practices, particularly on how to combine highly structured information with the need to be operationally agile and operationally sustainable (both in terms of process and cost). We can learn further from news and media organisations to collate, store, assimilate and continuously disseminate content across multiple platforms.

The report describes good examples which can be built on. It also warns that the effectiveness of government's memory may be deteriorating rather than improving.

We highlight next steps that can be made within government, and how the UK can build up comparative advantage in govtech using new approaches. The premise is that more open, federated and structured systems for handling data will make that data more valuable for government, for the economy and society as a whole.

Specifically the report recommends:

- 1. Design for open; build for search.**
- 2. Build reciprocity into data supply chains.**
- 3. Develop data ethics standards that can evolve at pace.**
- 4. Create a Digital Audit Office.**
- 5. Develop and value a culture of network thinking.**

These recommendations can be supported through specific actions, to:

- Make data available in machine- and human-usable forms.
- Define common language and use it.
- Use data to tell stories, tell stories to help people learn, including recurring storytelling to prompt memory recall.
- Get diverse input when evaluating data users' needs.
- Digitise all media (e.g. policy, data, algorithms, infographics, emails, conference calls).
- Use shared documentation systems, not isolationist 'need to know' systems; use shared tools such as wikis, Intellipedia, Google Docs, Github, Trello and exploit open APIs to extract, archive and repurpose data.
- Engage internal and external actors in service development, innovation and in peer review.
- Work with institutions of accountability (e.g. National Archives, National Audit Office, Information Commissioner's Office and HMSO).
- Make machine collaborators accountable: use procurement to enforce open APIs, open licensing, open access (including escrow if relevant).

To shorten the path between innovation and policy in a way that is repeatable and scalable, we recommend six areas of focus be considered in any implementation design.

### **1. Policy**

Providing strategic leadership and governance; framing and analysing economic, legal and regulatory impacts (e.g. GDPR, data ethics, security) and highlighting opportunities and threats.

### **2. Culture**

Creating compelling peer, press and public communication and engagement that both addresses concerns and inspires people to engage in the solutions.

### **3. Making**

Commissioning startups, running innovation competitions and programmes to create practice-based evidence that illustrates the challenges and business opportunities.

### **4. Learning**

Creating training materials that aid implementation and defining evidence-based sustainable business models that are anchored around user-needs.

### **5. Standards**

Defining common human and machine processes that enable both repeatability and scale within commercial and non-commercial environments.

### **6. Infrastructure**

Defining and framing how people and machines will use data, algorithms and open APIs to create sustainable impact.

If the memory of government is to be improved, the principles and approaches set out here must be put into practice within individual departments, agencies or local authorities. There also needs to be a push from the centre to establish the key principles and encourage learning-by-making. This may be hard while the system is so focused on the short-term pressures of Brexit. But modest, cost-effective steps now will create substantial returns in the long term.



# A short history of institutional memory in the UK

The importance of memory to government has been recognised for centuries, as evidenced by institutions such as HMSO (founded 1786) and the Public Record Office (founded 1838), both now effectively subsumed by The National Archives. The Public Record Act 1958 established the statutory requirement for government to select and preserve records and for the archive to be made accessible to the public after 30 years (now reducing to 20).

UK Government has paid increasing attention in recent years to the argument for preserving institutional memory for reference and reuse within shorter timescales. There is a Knowledge & Information Management (KIM) Profession within the civil service and in 2008 the Knowledge Council<sup>1</sup> published a strategy document, *Information matters: building government's capability in managing knowledge and information* (illustratively now all but impossible to find on any official website). More recently the senior KIM groups have drawn up a set of Information Principles and Knowledge Principles to provide guidance to government departments and agencies.

It's also become more widely understood that the right orchestration of public memory has a big impact on the economy and society. In Market Assessment of Public Sector Information (commissioned by the Department for Business Innovation and Skills in 2013), the value of public sector information to consumers, businesses and the public sector itself in 2011-2012 was estimated to be approximately £1.8 billion (in 2011 prices).<sup>2</sup>

It's also better understood that data is now an infrastructure,<sup>3</sup> part of the social and economic infrastructure of the country—equivalent to road, buildings and power. This is one of the reasons why the economic case for open data is strong,<sup>4</sup>

with estimates that the value of open data from the public sector alone is between 0.4 per cent and 1.5 per cent of an economy's GDP.<sup>5</sup>

Some recent attempts have been made to improve the organisation of memory. Recognising that the move from a 30 year to a 20 year rule would focus attention on the early years of public sector email and word processing, a Review of government digital records was undertaken by Sir Alex Allan for the Cabinet Office. After a year's work by the Cabinet Office, The National Archives and the Government Digital Service, the response to the recommendations was set out in *Better Information for Better Government* (which unfortunately only focuses on documents). The need to preserve an institutional memory that includes a rich mixed-media content (including data and code, algorithms, programs, infographics, visualisations) is also recognised in The National Archives' (TNA) digital strategy.<sup>6</sup>

In some fields the drive to open data has transformed the relationship between what used to be internal information and whole sectors. One example of this is the relationship between Transport for London (TfL), TransportAPI and thousands of app and solutions developers. TfL supplies the raw data, TransportAPI, makes it market-ready and enables it to be combined with other sources, and the app developers meet specific end-user needs. All parties benefit from data feedback loops that show utilisation. The net impact is a more efficient transport network.

But although all the projects described above have value they have done little to improve the working memory of government, which by some measures has deteriorated, as shown in the 2016 report Missing Evidence, on government's own research which is often lost, impossible to find online and remembered only in the minds of officials.

# The new principles for a federated, usable and efficient institutional memory

Our physical infrastructure enables our physical economy (e.g. roads). Our digital infrastructure enables our digital economy (e.g. broadband). Our data infrastructure enables our knowledge economy (e.g. the web).

A dynamic knowledge economy depends on the quantity and quality of data, and so does government. Indeed, as machine-learning tools are applied to policy, data gaps will lead to incomplete models. So the challenge for policy is to simultaneously push for more comprehensive, reliable and open data; to raise standards and ethics; and to shift cultures away from the norms of being 'closed by default'.

## 1 Design for open; build for search

The first priority for government is to capture what is already at hand: without good capture nothing else will work. Government should mandate processes for open access and data sharing. The next step is to make data available in machine- and human-usable forms: making it discoverable, retrievable and usable.

As we include machine learning and artificial intelligence in our knowledge supply chain they become integral to our institutional knowledge. If we are to empower people to benefit from these systems they must be effective, useful and ethical. Ensuring that data and people/skills are easily searchable will reduce long-term costs and increase reuse.

**Design for open** means creating open systems (e.g. open APIs). It does not mandate that all data is licensed openly: codified policy can be used to restrict usage to relevant stakeholders. Capturing institutional knowledge in a **machine-readable** form is critical. Open systems that facilitate access to machine-readable data will enable federated distribution, scalability and search.

These principles must be applied to government itself and to its suppliers, who need clear incentives to share relevant data.

We define three principles for data management:

### A. All relevant data is captured from humans

Data gaps will lead to material errors: inference from 'light' data that is captured vs from 'rich' data that isn't captured about material issues. Data must include dialogue between the state, commercial and citizen actors (e.g. internal conversation and discussion, emails and conference calls with external vendors, citizens expressing specific needs).

## B. All relevant data is captured from machines

Machine collaborators (machine-learning, insight engines, artificial intelligence) need to be accountable. Their data, algorithms, processes and knowledge engines must be able to explain themselves. Given that these services will, likely, be outsourced, this creates a mandate that procurement must insist on either escrow copies of relevant source code, algorithms and related data, and/or that suppliers themselves operate open-source policies.

## C. All data is made available in machine- and human-usable forms

All data must be discoverable, retrievable and usable. Designing for open, building for search must be a pervasive principle of institutional machine-memory.

Each of these principles needs to be grounded in a strong data ethics framework that embraces how data is generated, recorded and shared as well as the ethics of algorithms and practice.<sup>7</sup>

Deciding which data will be relevant to capture to create coherence and efficacy will be context-dependent. Network learning must address both usage and informed user consent: bringing together user needs, policy, technology and ethics. We propose investigation into the role of institutional machine-memory. Storage gets easier and easier; discovery does not.

## 2 Build reciprocity into data supply chains

Data increases in value the more it is connected: increasing supply does not diminish the original asset. Open data licensing, open APIs and open access are the easiest ways to reduce effort and friction in making data connections. Equally, ongoing operational usage will drive sustainable engagement—for example creating demand from internal departmental users for data provided by another part of the same department on a continuous basis.

We encourage developing economic models that support such knowledge supply chains: user-demand creating resilient pressure on data supply. Demand can be internal (same team or department), external (different department) or third-party (citizens, press, commercial company, NGO or startup). Governments must enable data-reciprocity to create data supply and demand: from data registries for the everyday work of government, to using shared tools as a default (e.g. Google Docs) that can encourage collaboration between individuals, departments and external actors (both human and machine), with a clear audit trail.

Government is already data-porous: much of its data is remembered, used or generated in the private sector. This creates opportunities, value and risks. Addressing open and shared data licensing and federated approaches to distribution are part of the architecture for the web of data: 'broadcast' is a legacy model and simply 'publishing' is not sufficient to unlock network potential.

For example, philanthropic investors are now mandating<sup>8</sup> the delivery of open data outputs as part of grant awards. This is an excellent step forward as much knowledge is lost at the end of grant periods. However, unless there are clear incentives for day-to-day teams to collect data, its impact will be minimal: creating a historical report without good quality data collection diminishes the quality of output.

High quality data will not be captured if there is insufficient value in collecting and reporting it. Data has value when it is used operationally in decisions, not just in retrospective analysis: an operational target must be to reduce the latency between theory, testing, analysis and adaptation. To address this there has to be a clear link, and accountability to, data users who will rely on the data to inform their own knowledge and decisions.

This value exchange enables data-as-a-service economic models that can both preserve the underlying licensing conditions (closed, shared, open) as well as deliver mechanisms to distribute costs proportionally to value against user-needs.

### 3 Develop data ethics standards that can evolve at pace

For more information and data sharing to be legitimate, scalable and responsive to risk, government's ethical approach must address uses of data and code (e.g. algorithms, AI). It must be responsive and adaptive to the pace of global innovation and ensure there is clear responsibility and accountability for both data usage and software—including internal and external peer review and immutable audit capabilities.

Addressing the ethics of the use of data and algorithms requires processes to define and address responsibilities and accountabilities covering:

- a. Which laws and regulations apply.
- b. The methods of collection and processes.
- c. The purpose data are being collected and used for.
- d. Use-cases.
- e. Who will be impacted and how.
- f. What sources are being used.
- g. What licensing conditions apply.

Tools such as the ODI Data Ethics Canvas<sup>9</sup> and the development of a Data Science Oath<sup>10</sup> are useful starting points for development. Robust dispute resolution processes must be defined around the collection, application and usage of both data and algorithms.

### 4 Create a Digital Audit Office

**What actors should our digital systems of record contain?**

External accountability and information symmetry aids accountability and knowledge persistence. Our political system's resilience relies, for many reasons, on multiple actors (e.g. Parliament, the Judiciary, the Civil Service and many public authorities including Local Government) and federated data capture with explicit intervention. For example, the record of what is said in Parliament is recorded and 'corrected' by HMSO. The National Archives play a critical role in maintaining our record of history.

Building on digital archiving principles, we propose exploring processes whereby a policy discussion is not considered complete until it has satisfied a set of data archiving criteria, and that such criteria and verification design include external actors (e.g. verification could be mandated as 'that which is digitally signed by an authorised external institution'). In this context, process or policy would only be considered complete when it is archived in a machine-readable, accessible system. Building on existing work carried out by GDS,<sup>11</sup> we support federated approaches to identity management and shared authentication keys: information sharing can be authorised on a distributed network, rather than individual organisation basis. We propose further investigation to examine if there is structural need for such a system (technologies such as distributed ledgers may, or may not, be applicable).

To address data interoperability, algorithmic accountability, ethics and transparency, government needs to work with the institutions of accountability: National Archives, National Audit Office, Information Commissioner's Office and HMSO, which play vital roles in organising the memory of government. A 'Digital Audit Office' would ensure the policies for federated knowledge are being followed. Governments could also strengthen the emerging ecosystem of 'What Works Centres whose job is to orchestrate the collective memory'.

## 5 Develop and value a culture of network thinking to drive innovation

We recognise that an embedded culture outlasts particular technology implementation or organisational change. Akin to design thinking, **network thinking** mandates that networked humans and machines are incorporated into strategic planning. Technological changes need to be matched by a commitment to learning and sharing; systematic 'lessons learned' exercises; embedding data sharing into appraisals, promotions and performance targets.

Government must also create clear and common language that helps everyone understand what is happening, how they will benefit and how they can engage. Commonly understood references and training can reduce the scope for confusion and increase the scope for collaboration.

To ensure better use of information and less waste, government should embrace the use of collaborative working tools (e.g. Google Docs) on all tasks of analysis and policy design to ensure a more transparent, machine addressable, less wasteful and less hierarchical approach. Nearly all work in government is teamwork and here technology can make this explicit, minimising waste and duplication. For the same reasons other areas of government could develop tools for shared intelligence (e.g. Intellipedia type tools for pooling analysis across fields like economic or education policy).

Leadership must be underpinned with strong incentives and actions. We recommend embedding network thinking into change management strategies and operational delivery, building sharing into performance targets.

Today, all media is social media; a clear vision, common language and shared stories will reinforce confidence. In a connected society, documenting stories, their impacts and outcomes are of increasing importance.

In the current political and media climate there is an opportunity (if not a necessity) to rebuild trust in our decision-making processes, around the nature and perception of facts, and to use transparency as a tool for reaffirming the principles of an open democracy: it is not sufficient to apply only the lens of tabloids and there is potential to reconnect at a more granular and personal level.

Encouraging many diverse participants to engage in communications outputs can both de-risk development and help innovation. Communications must span digital and physical, linear and nonlinear media, public and private spaces, internally and externally. Given the radical increase of channels and complexity, we propose exploring communications itself as something to be addressed with open APIs and open data.

In terms of modal delivery, recurring storytelling formats such as 'spaced memory retrieval' can aid memory recall (it is proven to improve memory in dementia) and is applicable at the institutional level. This can remind us of today, last week, last month, last year, 20 years ago, etc., across media types to highlight relevant stories.

A relevant area for investigation in trying to understand user needs, and how to communicate them, is to compare approaches with that of a commercial vendor properly balance (e.g. Amazon, Co-op, Facebook). This requires addressing specific audience personae (e.g. internal, external, users, press, suppliers, sectors) with succinct value statements that link to deeper provenance, narratives, evidence, methods, citations and raw data.

Throughout this report we are proposing a federated approach to the continuous improvement of services. Given the diversity of media, and that people are more invested in something they have made themselves, including everyone in communications strategy is important. Communicating the contribution of people into mission-based, impact stories will help drive ongoing engagement.

*"Every datum has an unanticipated use case"*

## Case studies, examples and trends

The ideas set out here are already beginning to be put into practice in parts of the public and private sectors. Here we describe examples that could be built upon.

### Open Data Institute (ODI)

The ODI mandated the creation of shared Google documents. The sending of attachments was banned internally. The guiding principles were:

1. Create document.
2. Name document with keywords relevant to a later search (e.g. date, topic, themes, place, hashtag equivalents).
3. Share with everyone in the company (org-wide).
4. Reduce sharing to a named list if required (e.g. for HR or legal reasons).
5. Start writing.

This applied to all meetings (internal and external), as well as all operational documents, research, proposals, HR, budget, financial reporting, sales planning and reports, project plans, performance metrics, board reports, compliance reporting, legal and accounting documents.

Induction documents and guides were provided for all staff on the process, naming conventions (e.g. date formats in ISO format), how to add keywords to document titles to aid searchability, security and privacy guidelines. Design for search was a guiding principle.

This approach supported the generation of tens of thousands of documents within three years. Upon leaving, all leaver documents were reassigned ownership to relevant management, to minimise raw copying, preserve discoverability and reduced linkrot.

The process also covered ODI franchises, investors, external clients and suppliers.

Proposals were developed openly with third parties. For example, during its investor round with Omidyar, all investor questions were copied from their email into a company-wide shared document. Individual questions were then allocated across the whole team and explicit permission given (from the CEO) to both answer openly and link to supporting evidence. This document was shared openly with the investor.

The outcome was that the investor fed back that it was *"the most transparent process they had ever seen and, unlike many investments where there are 'hidden surprises', everything was open and clear"*. They subsequently recommended the process for the rest of their portfolio. This archive, including all the comment threads, were left available and were mineable for future reference.

These five point principles were applied to co-create proposals with clients. The outcome was that the client could both input directly, engage in the internal Q&A about scope and budget, and shape the outputs, timing and costs. This improved the team's relationships with clients.

The principles were used to create the ODI franchise network. To build trust with new organisations in countries around the world, they created a draft franchise contract and shared it openly. During conference calls with prospective franchisees (typically three to five countries per call) there was a repeatable transformation: when call participants realised they were seeing all the information, could see unfiltered questions from other participants, and could comment/edit directly, trust was established (typically in under one hour).

The shared institutional memory for the follow-on franchisees was that they could see all the Q&A, concerns and changes that others had made. Similarly in reporting, all franchises reported against target into shared Google spreadsheets, the contents of which were used directly (via an auditable database) to power the public-facing performance dashboards on the ODI HQ website. The outcome was to generate 13 ODI franchises within two months, and 30 (on target) within three years.

The approach was used to incubate over 40 startup companies across several countries. Outcomes ranged from accelerated learning on how to pitch through shared investor decks, to real-time reporting on financial impact: each startup reported its financial successes (investment, efficiencies and commercial contracts) into a shared document, which then fed live dashboards giving the total economic impact of the cohort both in the ODI office screens and publicly via the website.

The approach enabled search-led discovery at scale, years later. For example, the CEO could find all documents related to any meetings with the French government, or healthcare, or a specific startup, or individual, within a few minutes, or even during meetings.

In addition, many operational documents were codified and made public on GitHub, for example the franchise charter, licensing and IP policies, procurement rules and other relevant documents.

Example: [github.com/theodi/ODI/blob/master/charter/standards.md](https://github.com/theodi/ODI/blob/master/charter/standards.md)

As the ODI Labs team expressed, *"At the Open Data Institute, we build all our technology in the open. This may seem terrifying, but it's probably one of the most powerful things we do. By using open tools and practices, we communicate better as a team, engage with our community, avoid cutting corners, and at the end of the day, produce better results."*

All software development, without exception, was openly licensed using Github. An integration between Google Docs and Github would have enabled full version control

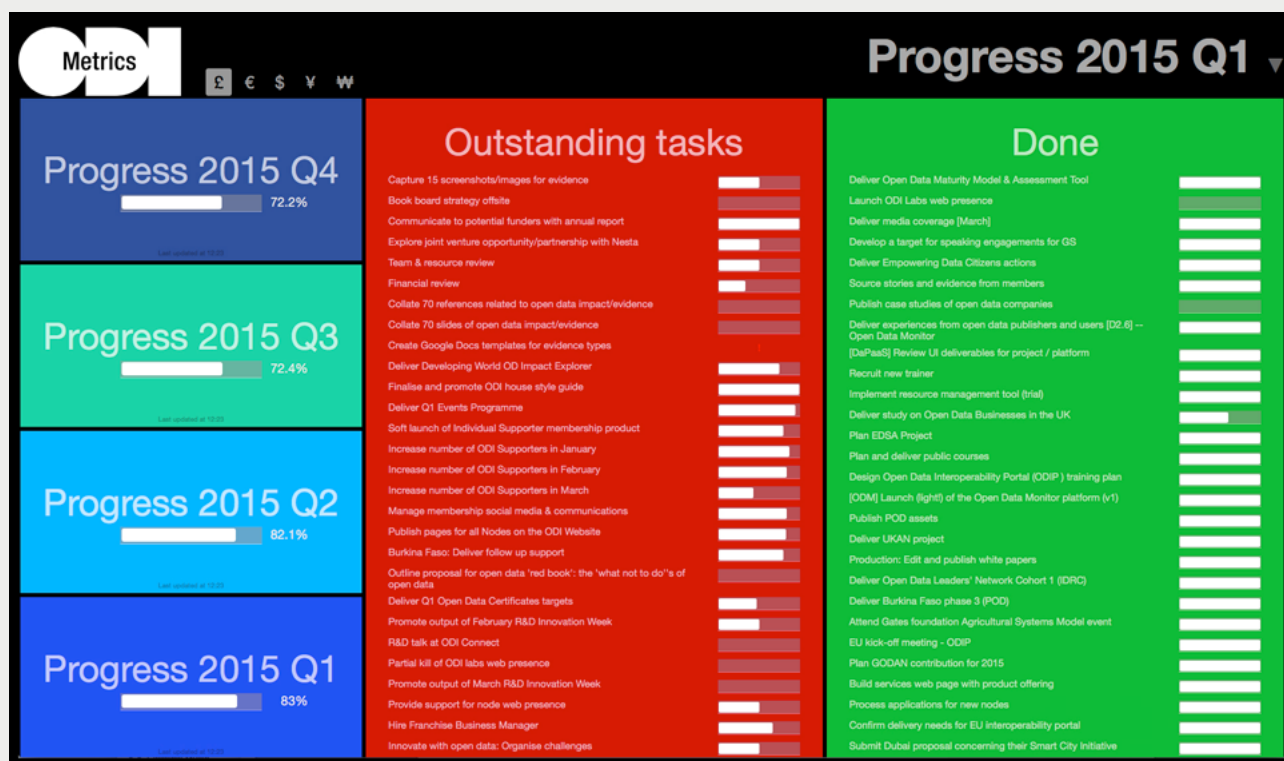


change and visibility via the Github platform, however the user experience of Github is a blocker to non-technical users. The user experience of Google was good enough that the entire organisation was able to actively engage at an acceptable level.

The ODI effectively replaced entire knowledge management systems (from accounting to HR to CRM) with Google and Github with very minimal training, support and integration costs compared with any 'enterprise system' that exists on the market today.

In addition it integrated with third-party systems where open APIs existed (e.g. formal accounting packages, HR compliance tools, project management), invested heavily in face-to-face meetings, events, collaborative calls, and other media to ensure key cultural learnings were understood and disseminated. Custom dashboards, build on top of project management tools and Trello enabled the publishing of its entire organisational plans - and its progress against targets - in the public domain, without breaching security of confidentiality. The online documents therefore represented both the living memory of the organisation, and its archive.

For example: [dashboards.theodi.org/progress/2015/q1](http://dashboards.theodi.org/progress/2015/q1)



The ODI's institutional memory is also externalised: all media assets were distributed via external platforms including (but not limited to) Flickr, Vimeo, YouTube, Slideshare, Scribd, social media channels (Twitter, Facebook, LinkedIn) and apps for both iOS and Android devices. For speed, an in-house platform (based around a raspberry Pi) was used for raw photographic and video material archiving.

The ODI rigorously tested and demonstrated-by-doing radical approaches to institutional transparency. Substantial investment was made in brand and communications to reach and disseminate to new audiences. For example, its print-based annual report won the UK award for 'Best Annual Report' for its clear content, innovative design and is unusual in that it required multiple reprints to satisfy demand.

From building a strong brand to developing international franchises, every activity of the business was considered from a systemic, strategic perspective to both codify, externalise and distribute its institutional memory.

Internally, this approach enabled discoverability at a whole-organisation participatory level, leading to increased 'noticing': individuals could find (through search) related work, and understand and engage in communication without it being intrusive. As machine learning systems improve, such potential will become mainstream.

Adding screens around the office with dashboards, KPIs, keywords, images and tasks both enabled anyone in the organisation to make their efforts visible, and provided 'glancing' as a mode of absorbing ambient information. This effort was borne out when key information was used in team meetings which had only been presented via the screens.

A significant cultural impact was that team members were engaged in thinking differently about how they would communicate the outputs, outcomes and impact of their work — and learning from their peers about both their work and how it could be communicated.

## The Open Banking Standard

To stimulate innovation in the consumer banking sector and to meet emerging needs around data utilisation and data protection, HM Treasury helped convene an Open Banking Working Group (OBWG). This group convened 150 individuals across incumbent banks, startups, regulators, trade bodies, consumer rights, and related organisations.

The culture of the OBWG was established from the beginning with a statement of values: Open. Expert. Collaborative. And articulated a clear mission to:

- Unlock the potential of open banking to stimulate innovation, deliver efficiencies and improve products and services for both customers and suppliers.
- Develop a clear, impactful and detailed living standard that enables government, banks, businesses, consumers and third-party developers to deliver the potential of Open Banking.

The OBWG was structured with a Secretariat, a Steering Committee, and the six sub-groups, again each with Co-Chairs, centered around User Reference, Governance, Data, Security and Authentication, Standards and Design, and Regulation and Legal.

Working at pace, the groups created a first phase Standard<sup>12</sup> within three months. To enable the co-creation of common standards and consolidate innovation and learning, and Open Banking Implementation Entity<sup>13</sup> (OBIE) was created to co-develop both technical standards and policy. Similarly, it convened participants from the various organisations to ensure the benefits, learnings, policy and technologies were aligned. The Standard was subsequently regulated and came into force in January 2018.

The outcomes of the Standard include:

- Standardised open APIs to enable interoperability between institutions.
- Standardised open data to enable publishing of specific data as open data.
- A regulated environment to ensure legal, liability, policy and process issues are addressed.
- A framework around which to galvanise action and engagement.

The impact of the standard in this sector will be significant, is being replicated in other countries, and creates design patterns which could be replicated across other sectors.

## Ministry of Justice

The Ministry of Justice (MoJ) has created a Data, Evidence and Science Board (DESB) to help improve policymaking across the Department. Its mission is to 'be a data-driven department' and it has announced five main areas of exploration:

### 1. Open data and performance

The MoJ is using data and evidence to drive reforms to prisons and courts; to create a self-improving and accountable system with advanced performance measurements, including visible impact indicators that generate real-time, automated information for all to see. It expects to release more data, to open data standards, and publish its own performance tools.

### 2. Unblocking data flows in the justice system

The Department recognises that data sharing is challenging:

- Data does not flow easily between the different bodies involved.
- Data is often duplicated or mistranslated.
- Prescribing technical standards are not the key issue.
- The rules must properly balance privacy and public good.

The range of relevant data is also broad: from general data about charging decisions, convictions or sentences, to specialised information like offender risk assessments, to video from body-worn cameras.

It has engaged across organisations including police forces, government departments and the Crown Prosecution Service data stewardship principles, and is testing if there should be a duty on the creator of data to look after it on behalf of the entire system.

A key task is defining simple agreements on the 'terms of trade' to enable new platforms to be built with confidence, blockages identified and attended to.

### 3. Data good, evidence better

There is no single place responsible for collecting evidence on themes such as race, or domestic violence – research and studies tend to be disconnected. The MoJ aims to bring the 'what works' approach to their ecosystem. For example, research, population and performance data, and longitudinal studies should be available to practitioners and decision-makers.

#### 4. Predictive analytics

The MoJ recognises that new techniques will improve the delivery of public services, and help shape policy advice. However, they identify the critical need to define the right ethical framework: the application of analysis (using algorithmic, AI or related techniques) will often be based on highly sensitive personal data.

#### 5. Being open to open data

A key driver of the DESB is to challenge the MoJ to go further, or faster, or in a different direction.

Its approach is underpinned by the development of a culture to nurture positive attitudes to transparency and openness, and a practical relationship with risk. It puts listening to users (and critics) at the heart of development and recognises that while neither performance nor data will ever be perfect or complete, the more that is published, the better the department will become.

In addition, embracing network thinking, the department is looking to grow a vibrant community of entrepreneurs, charities, and funders who bring new ideas and technology to their practices across the MoJ.

## BBC Archives

*"Nothing is accessible without indexes and catalogues, and in the future we will value them as much as the archived object"*

Bill Thompson

The BBC sits on one of most valuable media stores - story storages - of any public organisation on Earth. It has had to learn and adapt to seismic shifts in both technology, user behaviours and reach. How it has attempted to evolve contains important stories about some the challenges and opportunities.

It continues to bridging different formats and uses over generations. How it has attempted, succeeded and failed to address these shifts in technology, institutional needs, industry evolution and consumer behaviour are informative to our understanding of large, multi-faceted archives. How these data may be indexed, recalled and linked has often been challenged as being either core to, or in conflict with, its public service remit.

For example, whether defined or undefined, legacy licensing arrangements create material challenges to the utilisation of archival data. Whether in license, commercial model or remit, the complexity of the environment has stifled innovation during the rapid evolution of the web.

Over the last decade an ambitious project has helped make its media searchable by anyone for any purpose. Its creation acknowledges the challenges in archiving cohesively across variations in format, and formulation. The ways it uses archives has shifted with electronic collections as the sheer volume of available data increases exponentially.

A key lesson in the BBC's archival process is in its narrative consistency. There is an ideology that permeates it - its contents were largely decided upon by the sort of people who work for the BBC - which researchers and users must note as they pass among the shelves

and search the catalogues. While perhaps not always so apparent, we know that every collection was shaped in some way, and the story of that shaping must be part of our understanding and assessment of the authority of the finished product.

When the journalist Joan Didion wrote 'we tell ourselves stories in order to live' (in *The White Album*, 1979) she was expressing a deep truth about how we construct meaning in our lives. Many of our stories come from those relics of the past that live in our archives, libraries and galleries. Some are newly minted; others retell and reframe the past to better understand the present. And the archive too is a story: whether creative fiction, careful scholarship or news journalism, any exploration of an archive must grapple with questions surrounding the collection itself – why and how was this material preserved? Is this all – or is there missing work that will change my perspective? How can this selection of past material have authority?

The curatorial ways we use archives to tell our stories has shifted with electronic collections, as the sheer volume of available data increases exponentially along with the capacity of our drives and tapes.

The choices made as we add metadata will embody the beliefs of the archivists as much as the choice of items to preserve, and we must remember this and expose it, as we tell stories on the backs of these new collections. We have told ourselves stories in order to live: we can use a greater understanding of the choices that shape an archive to build ourselves catalogues that will help us thrive.

The challenges faced by the archive are illustrative of many institutions: how records are stored, how metadata are attached, how individual privacy is managed, how copyright and commercial models are addressed, and how content may be recalled continuously for specific output in different formats and different outcomes.

How archives are designed for search and linked together in both analogue and digital domains over generations, and in the national interest, are at the heart of this service's development.

## NHS Blood and Transplant

Streamlining how information is gathered on organ donors has turned an NHS archive into a living resource. Better data management has created a step change in knowledge-sharing and blending human and machine processes.

Until recently, getting permission to use life-support patients' organs posthumously required manually filing a 70-page long questionnaire. Nurses were obliged to ask next-of-kin questions that were indelicate and inappropriate at a time of extreme emotional stress.

The introduction of an iPad app reduced the time spent in interview by automatically cutting out irrelevant questions for more sensitive and expedient exchanges. More significantly, instantly digitising donor information means there is a flexible, collated database for staff reference. Nurses can easily search for information on donor care.

Previously, advice was typically shared in person, limiting resources to geographical proximity. Now nurses consult each other across institutions. Feedback emphasises that this is a significant improvement: nurses are better able to support each other for better care support. They benefit from seeing the collective, collated knowledge and can call each other for help based on the historical data, in situ.

Collecting data in a more humane and efficient way has improved the donor archive's efficacy. The technology supports better human interaction, which adds medical value both in situ and over the long term. The technology provides **additional human interaction** that adds value to the interaction.

Creating human value in archival processes early on (e.g. prioritising user experiences, connecting people, noting the benefits therein) makes for a dynamic, relevant archival resource and helps everyone go the extra mile. No one wants to go back to old methods.

This can be seen as a more granular applied application of a cancer registry, which systematically collects data about diseases and can create a complete summary of patient history, diagnosis, treatment, and status.

## Defence Science and Technology Laboratory

The Defence Science and Technology Laboratory (Dstl) is a core contributor to the defence and security of the UK. It is responsible for over half a billion pounds' worth of research per annum, and its records go back over a century: they are the basis of life and death decisions. It is thus vitally important that its data, information and knowledge are well-managed.

In improving the management of its data, information and knowledge, Dstl has moved away from a more traditional security-orientated, 'need-to-know' approach, to archiving in a collaborative, wiki-based system where 'smart listening' is key.

Starting in 2012, Dstl undertook a programme of activities to place a strategic priority on its 'Knowledge Management'. The case for investing time and resources is made explicitly on factors relevant to the organisation:

- **Effectiveness** - ensure research output is informed by access to and application of knowledge, so reducing the risk of poor advice or wrong decisions.
- **Efficiency** - avoid re-work/duplication of effort.
- **Innovation** - the novel application of existing knowledge.

Dstl identified two significant problems:

1. **The silo problem:** project teams and organisational groups tended to operate independently, even in isolation. Tight permission rules on shared folders and SharePoint sites created demarcation boundaries.
2. **Informal systems:** much of the potentially valuable information was in informal systems – often just email. This was difficult to search or explore – even the originators struggled to refer back to it after a while, and it was almost impossible for others to make use of it or discover content of value to them. The systems, although complicated, were little more than digitised paper.

They designed a corporate change programme to radically reform their approach and won the necessary executive support to implement it. The main focus was on a combination of modern collaborative technology and the behaviours needed to promote and maximise adoption and exploitation. In part this focus represented an understanding that collaboration – which requires knowledge to be reflected into information for communication to others – is a more effective way of capturing knowledge than simply asking individuals to record what they know.

One of the cornerstones was an implementation of MediaWiki with the semantic extension which enabled a powerful internal encyclopaedic knowledge base to be built. The other main component was the implementation of JIVE, an Enterprise Social Network (ESN). Adopting these 'Enterprise 2.0 tools'<sup>14</sup> – bringing the Web 2.0 model of user-generated content inside the firewall – was a radical decision in a conservative civil service organisation with a strong focus on security.

Around 3,500 people were affected by the project: implementing procedural and behavioural change was critical. As well as getting people to 'work out loud', they were helped to develop their own approaches to 'smart listening'. This meant **learning to take responsibility for deciding what information streams to consume**, to ensure that the new systems were positive, productive additions to their working practice. Substantial work was undertaken to embed attitudes and behaviours that allowed demonstrable compliance within security, privacy and transparency frameworks.

The adoption and usage of both the wiki and the JIVE instance exceeded forecasts. Within a year the wiki had over 6,000 pages, over 100,000 edits and nearly a million page views. The social network was even more successful. After a four-month pilot followed by a six month phased roll-out, memorable feedback included a scientist who threatened "*I'll chain myself to the data centre if they try to take it away*". Over 75 per cent of the organisation adopted the platform, with over half of these responding to or creating content.

A few months later at the Civil Service TW3 (The Way We Work) awards in January 2015, the project was runner-up in the Technology category, with the judges also citing the work on cultural change as a contributory factor to Dstl's win in Corporate Leadership. In an end of year message to all staff, the CEO wrote: "*I have been delighted to see the way that this has transformed interaction and communication across our whole workforce over the last year*". He subsequently said, to a visiting senior US/NATO official, that it had "*changed the way Dstl thinks, connects and acts*".

The experience of successfully implementing an internal social network emboldened the team to establish a partner-oriented system for collaboration with academia and industry. Different approaches were required to protect intellectual property and overcome commercial concerns, but the fundamental principle of encouraging people to be open with their knowledge and information, within an appropriately protected environment and boundary, has flourished. The organisation has become better connected across its boundaries: it has become porous without undermining its security.

The value of designing approaches which directly support people operationally was proven, while, inevitably, a minority of the workforce will take longer to adapt. As the collaborative tools are useful they are welcomed, rather than being seen as an additional knowledge-recording burden and sidelined. They also offer advantages for distributed and asynchronous working.

Future initiatives include the use of automated keyword identification from documents to enhance search and discoverability: offering a route to develop a managed service providing terms from a controlled vocabulary, improving the quality of metadata, and taking advantage of advances in information science (such as semantic web technology and natural language processing).

Notwithstanding budget pressures there is a need for sustained effort and continuous improvement to maintain the ability to capture and exploit institutional memory.

## Ministry of Defence

The UK's Ministry of Defence is addressing its archival culture to better "[mainstream] history into the way we make strategy".<sup>15</sup> Assessing how history is stored in different defence institutions suggests that archival tools and processes should be cohesively applied across working parts, to gain the insights therein.

Noting significant scope for improvement, its emphasis has also shifted from employees lodging information, to learning its import.

In his foreword to *United Kingdom Defence Doctrine (UKDD)*<sup>16</sup> the Chief of Defence Staff describes how "Professions are defined in part by their bodies of professional knowledge and UKDD is part of ours... Doctrine draws on the lessons of history, upon original thinking and from experiences gained from training and operations". Operating at a tempo best characterised in years (rather than months or decades) the 'doctrine machinery' is generally well-regarded and effective. The doctrine handbook states that to be fully effective, doctrine should be:

1. Intellectually rigorous.
2. Written clearly.
3. Based on the evidence gained through operational experience and lessons identified.
4. Demonstrably relevant.
5. Reflect the views of the UK and NATO Defence communities.<sup>17</sup>

Yet the Commons Defence Select Committee recently observed an apparent lack of historical analysis in strategy formation, with one witness stating "*when our forces went to Iraq in 2003 and asked for the Lessons Learned report and the deep analysis of the Gulf War in 1991, they went to the Army Historical Branch [...] and found that the work had not been done.*"<sup>18</sup>

The committee observed more general shortfalls:

*Professor Cornish argued that there was an enormous amount more that could be done to gather the lessons of history and that the Army Historical Branch was not doing all that it could. ... We understand that since the Second World War only two campaign histories have been published (on Korea and the Falklands) and there have been no official accounts of*



*military operations associated with other campaigns including Northern Ireland, the First Gulf War (1990-91) or the Balkans (1992 onwards), nor has anything been published on the 'grand strategy' associated with these conflicts and campaigns. Thus there is an enormous deficit of official historical research and analysis that contrasts poorly with the huge efforts made after the Second World War to document both the civilian and military contributions to the overall war effort, and to capture the principal strategic lessons learned.*<sup>19</sup>

Other organisations have a broader remit and century-long provenance, covering defence policy and management issues as well as major operations. As an example, a review of Royal Navy recruitment and retention strategy a few years ago was informed by a Naval Historical Branch paper on the problems of manning the Navy over the previous century.

Operating at short ('real time') timescales and dealing with niche tactical issues are 'lessons' organisations deal with: as 'lessons learned' or 'lessons identified' or, in the case of the British Army, 'Lessons Exploitation'. These tend to use classified databases with titles such as the *Defence Lessons Identified Management System* (UK Joint) and *Navy Lessons Learned Information System* (US Navy).

Over recent long-term campaigns in Iraq and Afghanistan, these approaches have been shown to have considerable value as the **currency of operational focus drives resources and effort**. It is not clear how well this is being followed up with the longer-term analysis to inform doctrine and provide the basis to prepare forces for future operations. 'Lessons' organisations are, interestingly, not easily referenced but tend to appear in House of Commons committee evidence and obscure sections of various websites.

The overall picture is of significant effort being expended but in a variety of approaches with a somewhat inconsistent impact on the overall defence institutional memory. In the UK this was, in 2014, acknowledged as an area for improvement, with the MOD announcing the development of the Defence Organisational Learning Strategy (DOLS) to the Defence Select Committee.<sup>20</sup>

*Defence has identified the need for a more effective overall approach to learning, so that at the operational and strategic levels we critically learn from history, training, education, operations and strategic events, and routinely apply what has been learnt to future activity. To do this we are developing a Defence Organisational Learning Strategy (DOLS). The DOLS involves **developing the right behaviours, processes and tools across Defence to achieve lasting improvements, so that we systematically apply the acquisition, analysis and use of knowledge to our full range of activities.** This initiative is, therefore, not primarily about learning the lessons of a specific operation, but instilling a culture of learning across Defence.*

The initiative identified a common root cause: the [low] *"value placed upon learning"*. To address this they see it as necessary to make learning widely perceived as a chain of command responsibility. The strategy's end-state is that *"Defence is a 'learning organisation', where knowledge and experience are readily accessible, and passing on learning becomes routine"*.

The implementation effort seeks to enable this by a combination of:

- A learning culture where leaders routinely enable and role model critical applied learning, ensuring our people do the same.
- Structures and processes that capture, analyse and exploit knowledge across all Defence activities.
- Tools that our people can access as part of their routine working practice, to locate and exploit this knowledge and expertise.

The success, or failure, of a programme of this scale will not be clear for some years but the focus on attempting to influence organisational culture, rather seeking 'quick wins', is encouraging.

A further positive signal of the MOD's intent is the recent appointment of a senior civil servant to head up the Chilcot Team to assess the implications of the Iraq Inquiry Report. It is reported that *"The MOD is also contributing to the wider cross-Government response to the report, which will look at the central Government decision-making structures and processes. It will also consider how we share information across Government and learn from best practice"*.

How the MOD addresses the pervasive impact of technology in its operational and Department of State functions will be insightful to follow: challenges are already apparent in non-text based exchange of vital information such as (often ephemeral) operational overlays in geographic information systems, command video teleconferences and informal chat rooms on classified systems. A recent Innovation Fund challenge sought to *"revolutionise the human information relationship for Defence"*, with reference to machine learning, artificial intelligence and human-machine teaming. The focus is, unsurprisingly, on the use of these technology for 'real-time' military advantage.

To learn from operations in future the MOD will need to consider how to capture the 'experience' of people, computers and human-machine teams. It will also need to consider how to support such a mix of agents with access to its institutional memory.

# Areas for investigation and development

This report sets out a direction for travel. There are many aspects of this that need more investigation, experiment and development. These include:

## Economic modelling

Develop economic models to support knowledge supply chains. Establish a credible, well-understood value proposition for investing in preserving institutional memory and making knowledge sharing an operational imperative. Explore the impact of Brexit on intellectual property.

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## Supply-chain architecture

Develop experiments to explore the creation of a robust, federated knowledge economy; a persistent knowledge supply chain which is resilient to system shocks.

Explore the development of a 'Data Audit Office' function that, working with the Accounting Officer function, acts as a catalyst for data integrity.

With Cabinet Office and GDS explore the development of a cross-Government focus and programme to enable federation across departments and agencies (in particular an approach to abstracting metadata and enhancing search).

Explore how to address issues of both commercial supplier and contractor information leakage.

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## Culture

Proactively incentivise collaborative behaviours, including the promotion of connect vs. compete models of engagement.

Run regular data labs to provide structured learning, including both internal and external (cross-government and outside-government) actors, to ensure efforts are closely aligned with how people, and the systems they use, work.

Use 'demo' or 'deploy' as the primary development process: learn by doing (and deploy or die). Build upon the Internet Engineering Task Force 'rough consensus'<sup>21</sup> approach to achieve 'rough consensus and indexed data'.

Invest in shared communication and stories that help everyone understand what is learned, the risks and rewards.

## Process design

Create information design principles that optimise for search and discovery. Include processes for capture, archive and recall that involves both internal and external stakeholders.

Define common language and ensure its development and usage.

Define unique identification and codification of specific policies. Apply open data principles to data about data, so that we learn to remember and remember how we remember.

Define what needs to be remembered, what needs to be stored, and what needs to be active in memory.

Define what is to be actively forgotten: things we won't keep and things that we will not take into account for the moment but may have to be recalled in future.

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## Tools

We recommend an approach that focuses on addressing specific challenges rather than technology-led projects. For example, learning from what works online, it could be useful to explore the development of specific tools such as:

1. An equivalent to Github for policy.
2. An equivalent to MIT's 'Scratch' for policy data analytics in partnership with third-party actors.
3. Email-mining and predictive-search tools that can provide 'has this been done before' input while writing an email or document.
4. A computable rating system for suppliers (ranging from compliance with data standards, such as the Open Data Certificate,<sup>22</sup> to vendor-rating similar to popular web services such as Amazon).
5. Whether distributed ledgers may aid the tracking of knowledge transactions.

We highlight that this is not a technology-first approach, it is a cultural approach to deliver open innovation. It aims to situate the potential of both existing and new technologies in a coherent governance framework that delivers, in a timely manner, greater parity between regulatory and legal requirements, open standards and business needs, data infrastructure, startup innovation, literacy and skills. Ensuring that knowledge and understanding is evenly distributed, usable and may be contributed to, is key to engagement. Shortening the path between innovation and policy is a key outcome.

One starting point to consider is the co-creation of a common reference document that would address frameworks for governance, legal, policy, technical issues as well as defining user needs, business cases, literacy, communications and guiding principles for development.

# Appendix

## 1 Definitions

Over the last quarter-century the web has had a profound impact on society and culture. Yet we are still only at the beginning. Technology-facilitated change is altering the way we behave. We have yet to work out even the common language through which we may adequately communicate and understand the risks and rewards. Organisations such as the Web Science Institute are at the forefront of trying to progress our understanding of this field, including understanding the 'social machine'.<sup>23</sup> For the purposes of this report, we define:

**Data infrastructure:** Data infrastructure consists of data assets, the organisations that operate and maintain them and guides describing how to use and manage the data. Trustworthy data infrastructure is sustainably funded and has oversight that provides direction to maximise data use and value by meeting the needs of society. Data infrastructure includes technology, processes and organisation.<sup>24</sup>

**Data spectrum:**<sup>25</sup> The range of ways data can be licensed for usage, including closed, shared and open.

**Porous organisation:** One which has open interfaces (e.g. such as open APIs and open data) that enable data to flow both externally and internally. Such data can be licensed as open data or shared data.

**Network thinking:** Embracing collaboration and distributed networks to create value faster. Reducing transactional friction in systems: ranging from greater understanding of intellectual property around sharing to collaborative document management to search-centric information design. Defining social-contracts and legal frameworks that enable the development of a culture of open innovation.

**Knowledge economy:** Here framed as a multi-actor, federated knowledge economy.

**Institutional data:** That which can be digitised including, but not limited to, raw data, information, evidence, analytics and insights.

**Institutional knowledge:** That which is gained by organisations translating historical institutional data into useful knowledge and wisdom. Memory depends upon the preservation of institutional data and also the analytical skills necessary for its effective use within the organisation

**Impact of technology:** Outcomes from the use of technology by both people and machines.

## 2 Questions to help data infrastructure development

Data is infrastructure<sup>26</sup> and a government's institutional memory is part of its country's national data infrastructure. It is part of the social and economic infrastructure of the country. Similar to roads, buildings and power, it has become a basic component needed for our operation. Data now underpins transparency, accountability, public services, business innovation and civil society. Making data easy to use operationally is therefore essential.

We propose that the institutional memory of government is part of our country's living data infrastructure as well as part of its national heritage. The more open our data infrastructure, the more value it will create. Data registries can be regarded as foundational components and, in a network-context, can be effectively, robustly and scalably delivered using federated networks. Data infrastructure applies broadly across all sectors, and is best discussed by choosing a specific application or user need. Challenge questions include:

**What machine-readable data should be available via an open public service?**

- What data must and should be captured to enable this?
  - What external actors could be engaged in creating a knowledge supply chain that will act to form (a) supply and demand networks and (b) add resilience to the network?
- 

**What machine-readable data should be available via an 'internal' government service?**

- What data must and should be captured to enable this?
  - What external actors could be engaged in creating a knowledge supply chain that will act to form (a) supply and demand networks and (b) add resilience to the network?
- 

**How does network thinking transform from now to five years (assume Moore's Law)?**

- What policy, training, labs, communications and related engagement needs to exist to enable innovation in this area?
  - Which actors should be engaged in the design, build and operation of incentives and accountability levers?
- 

**What knowledge exists that is not codified?**

- What mapping exercise could exist that takes a longitudinal view, maps the knowledge assets of an institution, their roles and the mechanisms and interfaces that could support them?
  - What external actors could be engaged in this design process?
- 

**Additional questions include**

- Should an authoritative register exist for this data asset and, if so, which entity should maintain it?
- Who owns the data and its derivatives, where does it sit on the Data Spectrum and what licenses apply?
- What economic and social incentives exist to kick-start supply-chain activity?
- What historic data sets should be digitised, ingested and indexed, and at what cost?

### 3 Threats, instabilities and shocks to institutional knowledge

We must embrace a new scale and diversity of risks to enable continuous improvement in a network age. Technology is ubiquitous: it has impact both within direct implementations and more broadly in its interface with organisational culture.

The application of technologies to capture, manage and deliver incremental value to institutions is, therefore, highly dependent on systems resilience. Threats to resilience include, but are not limited to:

- Increasing systems complexity (and pressures to reduce it).
- Shortening of periods of technological stability.
- Technology-enabled passive-aggression.
- Failure to adapt - caused by inertia, fear of change or fear of failure.
- Failure to care enough to preserve/deploy data.
- Lock-in to either closed systems or specific vendors
- Increasingly inaccessible paper-based filing.
- Outsourcing creating asynchronous externalised value.
- Outsourcing (commercial and contractor/freelance) creating asynchronous skills.
- Capturing communication with external organisations.
- Declining marginal returns on investment in complexity.
- Weak leadership.
- Staff churn: incentivisation that promotes regular job progressions of generalists.
- Political and leadership changes (e.g. Brexit).
- Budget changes.
- Recurring strategic reviews, closure/mergers and long-term cultural rewards.
- Whether desired or not, it is possible to discern information through third parties, data shadows, or data gaps.
- Data security and privacy issues.

Mitigation depends on creating systems and cultures that have a degree of autonomy to such system shocks. They must also be able to degrade gracefully when necessary.

The open web, in both its technology and its culture, embodies an architecture that can address resilience. Implementation requires strong leadership and the usage of both carrot and stick incentives.

#### 4 Background on institutional knowledge management and policy

Knowledge Management was established as a social science discipline in the early 1990s, with Ikujiro Nonaka's 1991 *The Knowledge-Creating Company* in the *Harvard Business Review* and the premier academic journal, the *Journal of Knowledge Management*, launched in 1997. The core components fall into three areas: technology, people/culture and processes/structures. Over the last decade, the utility of KM academic research has been questioned and there is an increasing focus on action research and translating academic findings into organisational practice.

There are active networks of organisations devoted to developing and sharing best practice, for example (in the UK): the Henley Forum and the Knowledge and Innovation Network both of which have significant public sector membership. There are many resources and services available from respected specialist consultancies, websites and blogs.

Long-term consideration of the UK national institutional memory goes back centuries, as evidenced by institutions such as HMSO (founded 1786) and the Public Record Office (founded 1838), both now effectively subsumed by The National Archives. The Public Record Act 1958 established the statutory requirement for government to select and preserve records and for the archive to be made accessible to the public after 30 years (now reducing to 20).

UK Government has paid increasing attention in recent years to the argument for preserving institutional memory for reference and reuse within shorter timescales. There is a Knowledge and Information Management (KIM) Profession within the civil service. In 2008 the Knowledge Council<sup>27</sup> published a 24-page strategy document, *Information matters: building government's capability in managing knowledge and information* (illustratively now all but impossible to find on any official website). More recently the senior KIM groups have drawn up a set of Information Principles and Knowledge Principles to provide guidance to government departments and agencies.

In *Market Assessment of Public Sector Information* (commissioned by the Department for Business Innovation and Skills in 2013), the value of public sector information to consumers, businesses and the public sector itself in 2011-2012 was estimated to be approximately £1.8 billion (in 2011 prices).<sup>28</sup>

Recognising that the move from a 30 year to a 20 year rule would rapidly bring focus to the early years of public sector email and word processing, a Review of government digital records was undertaken by Sir Alex Allan for the Cabinet Office. After a year's work by the Cabinet Office, The National Archives and the Government Digital Service, the response to the recommendations was set out in *Better Information for Better Government*. Critically this recognises and emphasises that a major benefit of effective institutional memory is in the short to medium term. Disappointingly, however, the approach is still rooted in the document-centric mindset of the past.

The need in future to preserve an institutional memory that includes a rich mixed-media content (including data and code, algorithms, programs, infographics, visualisations) is, however, recognised in The National Archives' (TNA) digital strategy.<sup>29</sup> In order to deliver on this TNA will need to work with departments and their agencies, providing hope for the potential prize of a forward-leaning, technologically-enabled, approach to preserving and exploiting the institutional memory of the public sector.



## 5 Quotes of interest

*"Government appears to have everything at their fingertips but they are as bad as ever as knowing what exists, has been done before."*

*"There is barely any institutional memory in government that can be written down: it exists in people's heads. Hardly anyone is interested in writing it down."*

*"Seek out older people close to or recently retired and ask them to document learning."*

*"Create a 'territorial civil service' that can be called back when needed."*

*"There are 'files' on specific topics, sometimes you can get them from store, but often not. When you can get them, they can be wonderful, but finding meta information about which file to get from store can be tricky and time consuming."*

*"The repeated mistake each incoming No.10 team makes in kicking out the old lot team and thinking it can do the job with a few bright people who are their mates. This leads to an underpowered No.10 for the first 18 months until they realise they have got it wrong and desperately try and recruit people."*

*"Digital is both good and bad: it can lead to poor record keeping as the habit of filing drops away when you can find it in your email. But also stuff can be found in emails, as long as they aren't deleted when the account holder leaves."*

*"Notes are often 'we spoke' rather than capturing useful detail such as 'we agree on condition x,y,z'. Technology often enables passive-aggressive avoidance."*

*"The last thing some perm secs want is a record. Your report will be useful to some as a way of working out what they need to avoid doing next."*

## 6 Open survey

We conducted an open survey to solicit unfiltered feedback and views from those in the community. The responses are included below, anonymous and unedited.

### What do you see as the main issues around institutional memory in government today?

1. Budget and being able to document the truth of a story.
2. Outsourcing.
3. Government is not very good at learning, which is the active process of constructing the memories in the first place, and then re-enacting them frequently in diverse new contexts to keep those memories fresh and relevant.
4. Staff churn - moving roles frequently; silo working; encouraging older experienced workers to retire early; trusting private sector expertise over public sector; poor information management by staff - allowing personal whims to override corporate interest; lack of context; people don't give credence to the work of predecessors - they prefer to start from scratch.
5. Lack of a widely understood value proposition - what's in it for (my part of) government and what's in it for me? Institutional silo (organisationally and temporally) thinking - little willingness to be open across Departments (and often within Departments across teams) and also little interest in revisiting previous work on a problem. Failure to 'manage information as a valued asset' which results in the institutional memory not being preserved - and as importantly, not being used and exploited.
6. Civil servants staff churn. Recruitment by 'competences' rather than by actually knowing how to do the job.

### How do you see technology impacting this?

1. Access to judicial cases by institutional memory institutions.
2. While in theory technology should help with 'knowledge capture', outsourcing means that more of the experience/direct knowledge is held outside the parent organisation.
3. The mechanistic metaphor of memory arising from 20th century computing is that of an inert store, ('data warehouse' 'knowledge bank'). This obscures and obstructs the active, human re-performances of learning which are how memories are really created and sustained. Maybe the next generation of computing can give us a more helpful set of metaphors.
4. It helps but it is not the only answer.
5. At the moment signs are negatively: Increasing divergence between 'digitised paper' systems (documents, file shares, EDMS etc.) and Enterprise 2.0 social/collaborative tools (Slack, Trello, JIVE, Yammer, Basecamp, GitHub etc.). More information will end up in systems designed for short-term management and exploitation. Also potential for solo reinforcement with different Departments using different systems.

6. Deccipedia in DECC is a wiki created by the central engineering team to store advice they give to policy teams so that they don't have to keep repeating themselves. It also makes a nice interface to a coherent set of documents (per subject) in the department document management system - which is unwieldy.

#### What is the potential opportunity?

1. Automated interactions between systems.
2. Better knowledge sharing.
3. To make government more learningful at all levels - not just policy, strategy and analysis as 'the brain' that thinks while everyone else is 'the body' that performs. Push critical skills and shared intent to people on the frontline and in communities so they have to create and recreate the memories that institutions lack.
4. Increasing ability to do better at enterprise search, including use of text analytics, REGX and NLP for entity extraction together with semantic graphing of results. Leading eventually to a Wolfram Alpha style ability to 'ask questions of the information Government knows'. Also potential for much better system-assisted identification of expertise.
5. Every project, or policy revision, should work online with OneNote as a policy-specific corporate memory. The UK TIMES modelling team uses this and it's brilliant. Shame policy staff don't know how to do this sort of thing.

#### What are the risks/threats?

1. Privacy.
2. Commercial interests and systems inertia.
3. The scourge of discontinuous change and the myth of accelerationism. Change can be a good thing, driving memory formation and recall, but only if we embrace it humanely, continuously and controllably. To claim that previous experience is worthless because of some big disruption or exponential change is disempowering and demotivating to the people who hold the memories.
4. Politics - big 'p' and little 'p'. The politicians set the goals and senior management implement them by whatever means. It's about people and their behaviour.
5. Continued 'paper-based' thinking. Talking a good story about information management whilst actually locking information inside documents and doing just document management - preventing full exploitation of the information. Lack of thinking about federated and interoperable Enterprise 2.0 systems. Wholesale loss of information sources as major changes (e.g. a Department shifting to Google Docs) take place without thought as to how to manage the legacy information. Lack of thinking about the crossover between personal knowledge management and institutional memory - especially relevant as folk take shorter posts and use of contractors remains/increases.
6. None. Just use the tools we have, for chrissake.

### What actions would you take/like to see explored?

1. Policy.
2. Needs development of suitable skill sets within organisations to understand their own world.
3. Some starting suggestions based on the premise that this is basically a social problem that could be supported by technology:
  - Learn by doing - set people in all parts of the system frequent, non-obvious challenges which force them to retrieve their own memories and seek out new ones - underpinned by a web-like profusion of knowledge and data in many forms.
  - Create a culture of spaced retrieval of memory in the form of stories, questions and prompts to all participants in the process of government - what did we learn today? Remember that thing we did last month - is it still relevant to our situation today? Tell those stories and recall them in the open where possible; in safe, private spaces where necessary.
  - Diversify the teams and organisations of government so the old interact more frequently with the young. If lifelong careers in the civil service are less likely than in the past, create a porous interface between those inside and outside of organisations so that people can be 'of the government' while working elsewhere or even long into retirement.
  - Resist any one person or group being mono-culturally focused on one kind of knowledge or data. Public health epidemiologists in the Treasury and artists in the Land Registry!
  - Review all the memories a little and often. No once-in-a-generation reforms or governments sweeping away the stuff their predecessor's work, but rolling green and white papers that summarise the latest current thinking about each policy area.
4. Proper Cabinet Office led review of the problem space (the recent report [www.gov.uk/government/publications/better-information-for-better-government](http://www.gov.uk/government/publications/better-information-for-better-government) was a start, but could have gone much further). GDS invited to think about information, as well as current focus on data. Better linkage of systems across Government Departments. Better articulation of the value proposition.
5. Obligatory training in Outlook Tasks, OneNote and department-specific wikis (not SharePoint ideally).

# Endnotes

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