Governance in the Age of Social Machines
The Web Observatory

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Introduction

The World Wide Web has provided unprecedented access to information; as humans and machines increasingly interact with it they provide more and more data. The challenge is how to analyse and interpret this data within the context that it was created, and to present it in a way that both researchers and practitioners can more easily make sense of.

The first step is to have access to open and interoperable data sets, which Governments around the world are increasingly subscribing to. But having 'open' data is just the beginning and does not necessarily lead to better decision making or policy development. This is because data do not provide the answers – they need to be analysed, interpreted and understood within the context of their creation, and the business imperative of the organisation using them. The major corporate entities, such as Google, Amazon, Microsoft, Apple and Facebook, have the capabilities to do this, but are driven by their own commercial imperatives, and their data are largely siloed and held within 'walled gardens' of information. All too often governments and non-profit groups lack these capabilities, and are driven by very different mandates. In addition they have far more complex community relationships, and must abide by regulatory constraints which dictate how they can use the data they hold. As such they struggle to maximise the value of this emerging 'digital currency' and are therefore largely beholden to commercial vendors. What has emerged is a public-private data ecosystem that has huge policy implications (including the twin challenges of privacy and security). Many within the public sector lack the skills to address these challenges because they lack the literacy required within the digital context.

This project seeks to address some of these problems by bringing together a safe and secure Australian-based data platform (facilitating the sharing of data, analytics and visualisation) with policy analysis and governance expertise in order to create a collaborative working model of a 'Government Web Observatory'. This neutral space, hosted by an Australian university, can serve as a powerful complement to existing Open Data initiatives in Australia, and enable research and education to combine to support the development of a more digitally literate public service.

The project aims to explore where, and in which contexts, people, things, data and the Internet meet and result in evolving observable phenomena which can inform better government policy development and service delivery.

Context

The World Wide Web is, quite simply, the largest information construct ever created by humanity.[1]

Since its inception in 1989 the Web has quietly begun to underpin almost all aspects of modern commerce, governance and, with the evolution and growth of 'social' technologies, everyday personal lives. However, as a social phenomenon, we are only just beginning to understand how it actually works, what impacts it is having on modern society and social norms, and what broader implications there might be for the future.

In response to this the discipline of Web Science was formally launched in November 2006[2] with a view to

> *"…understanding the scientific, technical and social challenges underlying the growth of the Web".*

- Web Science focuses on:
- The emergent properties of the Web and possible ways to both understand and anticipate them;
- Interconnected networks and small worlds, encompassing sociology and community;
- Collective intelligence and human participation eco-systems of humans and machinery jointly solving problems that neither could solve independently;
- Issues of Governance;
- Social behaviours and networks; and finally,
- The experiential Web linking the physical and digital worlds as network sensors and the sensor/data Web matures with the 'Internet of Things'.[3]

The discipline of Web Science has taken on the task of

> *"…modeling the structure of the Web as a so-called "socio-technical" environment comprising both human interaction and technological aspects within which the underlying architectural tools have fuelled phenomenal growth, as well as unprecedented and unforeseen human interactions and changing social conventions" (Shadbolt and Berners-Lee 2008).*

As this thinking has evolved a new term has emerged to describe what The Web, and the other emergent environments which sit on the Internet and are driven by data, actually are. They are 'Social Machines'[4] and thus Web Science is the study and science of Social Machines.

1 http://webscience.org/web-science/about-web-science/
2 http://web.mit.edu/newsoffice/2006/wsri.html
3 http://royalsociety.org/events/2010/web-science/
4 http://sociam.org/ and https://www.youtube.com/watch?v=8Iz7ZqSOJGU#t=65

The Social Machine

The idea of the Social Machine was first introduced by Tim Berners-Lee in *Weaving the Web* where he describes the "co-evolution of the site and the community".

> *"Real life is, and must be, full of all kinds of social constraint – the very processes from which society arises. Computers can help if we use them to create abstract Social Machines on the Web: processes in which the people do the creative work and the machine does the administration. … The stage is set for an evolutionary growth of new social engines. The ability to create new forms of social process would be given to the world at large, and development would be rapid" (Berners-Lee 1999).*

Social Machines are rapidly evolving, and are much more than simply websites and mobile applications. As the Internet of Things (IoT)[5] develops, many technology companies are betting their futures on the combination of data from the physical and digital worlds in order to facilitate human focused outcomes.[6]

But this is only the tip of the iceberg. Other key information technologies are rapidly maturing and beginning to change the information environment, including Machine Learning,[7] Natural Language Processing,[8] Robotics,[9] Blockchain,[10] and Quantum Computing.[11] They will ultimately converge with the IoT[12] and as they do the inter-relationship between humans and machines will pose unprecedented challenges for human societies, and how they are governed.

The Social Machine model is simple – the more people use Social Machines the more potential benefits they receive. The more benefits they receive, the more applications are developed, which leads to an increase in use, and the more the Social Machine evolves (Hendler and Berners-Lee 2009; Hendler et al. 2010). The 'fuel' driving the machine is data, often expressed as conversations – between people and people, people and machines, and machines and machines.

The problem is that most of these data are held within 'data silos' which are closed and have limited interoperability and each can be considered to be a 'Web Observatory' – a platform within which to bring together data for the purpose of analysis and interrogation. Governments produce a wealth of public data which they house within their own Web Observatories (such as www.data.gov, www.data.gov.uk and www.data.gov.au) and these are increasingly being made open and available for public and commercial use.[13] But just observing one dataset only provides a narrow view to any problem or issue. The real value comes from having a broader perspective and context, and that usually comes about through bringing together multiple datasets around a specific question or issue, from a range of sources.

One of the challenges with the opening up of data of all kinds is 'trust': with Government Open Data initiatives all too often there is a suspicion that they will be used for compliance or enforcement

5 See a simple explanation from McKinsey http://www.mckinsey.com/insights/high_tech_telecoms_internet/the_internet_of_things

6 IBM are investing $3b in a single business division - http://www.zdnet.com/article/ibm-creates-internet-of-things-division/. And Amazon have developed Dash - https://www.amazon.com/oc/dash-replenishment-service - which is a 'replacement' service in the home, and http://www.fitcoins.net/ brings together fitness and finance.

7 http://en.wikipedia.org/wiki/Machine_learning

8 http://en.wikipedia.org/wiki/Natural_language_programming

9 http://www.abc.net.au/news/2014-05-28/robots-could-cost-australian-economy-5-million-jobs-expert-says/5484740

10 https://medium.com/backchannel/how-bitcoins-blockchain-could-power-an-alternate-internet-bb501855af67

11 http://singularityhub.com/2015/05/11/quantum-computing-is-about-to-overturn-cybersecuritys-balance-of-power/

12 http://www.mckinsey.com/insights/high_tech_telecoms_internet/charting_technologys_new_directions_a_conversation_with_mits_erik_brynjolfsson

13 See the Open Data Initiative, http://theodi.org/

activities; with Commercial Open Data initiatives the suspicion is that companies tend to want to corral their data for commercial advantage. As we have seen with the NSA and the revelations of Edward Snowden and Wikileaks, this is often the case, but the reality is that data in isolation are of limited value. It is when public and private datasets are combined that the potential value is significantly amplified. This is where the Web Observatory comes in, as a platform upon which to view public, private, open and closed datasets with a view to solving a problem or answering a question, but also to providing a far greater transparency as to how data are actually being used.

The Era of 'Open'

The nation state has always been a product of information through the vast amounts of data that governments collect relating to the behaviours of all citizens, organisations and businesses. However, with the ubiquity of digital technologies coupled with increasingly user-friendly interfaces and access, citizens from all walks of life are demanding more. Not only do they expect to vote in fair and free elections, they also want access to government data, and expect greater openness and transparency in how governments go about the business of governing. This is evidenced by the movement towards greater Freedom of Information,[14] but also the current trend towards 'opening up' government itself.

In the early days of the Obama Administration the concept of 'Open Government' was founded on three fundamental principles:

Transparency. *In a well-functioning democratic society citizens need to know what their government is doing. To do that, they must be able freely to access government data and information and to share that information with other citizens. Transparency isn't just about access it is also about sharing and reuse — often, to understand material it needs to be analysed and visualized and this requires that the material be open so that it can be freely used and reused.*

Collaboration - releasing social and commercial value. *In a digital age, data is a key resource for social and commercial activities. By opening up data, government can help drive the creation of innovative business and services that deliver social and commercial value through partnerships.*

Participatory Governance. *Much of the time citizens are only able to engage with their own governance sporadically — maybe just at an election every 4 or 5 years. By opening up data, citizens are enabled to be much more directly informed and involved in decision-making. This is more than transparency: it's about making a full "read/write" society, not just about knowing what is happening in the governance process but being able to contribute to it.* [15]

These three principles have led governments worldwide to open up datasets. The Knight Commission on Information deemed that Communities need to be informed through:

- Maximizing the availability of relevant and credible information to communities.
- Strengthening the capacity of individuals to engage with information.
- Promoting individual engagement with information and the public life of the community.[16]

14 http://www.citizensinformation.ie/categories/moving-country/moving-abroad/freedom-of-movement-within-the-eu/freedom-of-movement-in-the-eu and http://www.freedominfo.org/

15 Orszag, P. (2009). "Memorandum for the Heads of Executive Departments and Agencies", Executive Office of the President of the United States, December 8.

16 http://www.knightcomm.org/category/opengovernment/

In Australia this has resulted in the creation of numerous open government data portals, ranging from those on the national level (e.g. www.data.gov.au; http://abs.gov.au/websitedbs/censushome.nsf/home/data?opendocument&navpos=200) to those in each state jurisdiction (e.g. http://data.nsw.gov.au; sa.gov.au). In addition there are various not-for-profit organisations that are seeking to use open data, either to facilitate commercial innovation and entrepreneurship (theodi.org and http://odiqueensland.org.au) or to promote greater research (http://ands.org.au). Perhaps the most ambitious to data is that created by NICTA,[17] which seeks to bring together a range of public datasets overlaid on one geographic map (http://nationalmap.nicta.com.au).

Each of these enables people to upload and share data, and each could be described as a Web Observatory in its own right, with certain limitations and constraints. One of the main limitations is that of data provenance (control over publication, and control of data once published) because most of the data sets are openly published with little control resting with the publisher. The second limitation is that unless the data are published in such a way that they can be openly accessed and shared by other Web Observatories, they remain siloed with their value diminished.[18] In addition, most of these datasets are just that – sets of data – without any additional way to contextualise or visualise them.

What is really required is to create not just one Web Observatory, but a 'Web of Observatories', which will enable the sharing of data, analytics and visualisations across datasets, across jurisdictions and between organisations. This is what will yield true insight and enable much greater transparency as to how the Web is developing, both within Australia and around the world.

The Web Observatory and Web of Observatories[19]

In the physical world physicists developed Observatories to observe and study the Universe.

The digital world is different – what is unique about the Web, and the digital eco-system within which it is nested, is the sheer scale and pervasive nature of the data that can be obtained in almost real time, relating not only the state of information on the Web, but also the manner in which humans are interacting with that information. These data can captured, stored and be manipulated as never before.

Thus, in order to observe the Web we need to create a virtual real-time worldwide network of linked, distributed, but interoperable Web Observatories which, like each telescope in the square kilometre array,[20] can focus on a particular topic of region of knowledge, but then contribute to a global network of resources contributing towards a more holistic view.

The Web Observatory aims

> *"to create a distributed archive of data on the Web and its activity, and, at the same time, mechanisms and tools that will be able to explore its development in the past, to examine its present condition and to establish potential developments in the future."*

17 National ICT Australia, the largest organisation dedicated to ICT research: http://www.nicta.com.au/about-nicta/
18 The Web Observatory seeks to publish data in a format that is open and interoperable using http://www.schema.org/
19 Thanassis Tiropanis, http://webscience.org/web-observatory/
20 The Square Kilometre Array is designed to combine the signals received from thousands of small antennas spread over a vast distance to simulate a single giant radio telescope capable of extremely high sensitivity and angular resolution: http://en.wikipedia.org/wiki/Square_Kilometre_Array

It is underpinned by two fundamental principles:

1. To conduct live monitoring of the state of portions of the Web in terms of topologies, resources, links and activity. This includes Web resources (data and documents), relationships among these resources, and activity in the context of social networks, business and government; and
2. To create visualisations, analytics and simulations of the state of the Web at specific points in time, and then analyse how and why the structure and state of the Web interacts with social processes and behaviours over time.[21]

The objective is to more fully understand how socio-technical effects operate at Web scale, but the challenge lies in how to observe the complexity of the vast and constantly changing Web and the huge range of interactions.

The figures below give an overview of the Web Observatory as a concept. Figure 1 is a schematic of the Web Observatory as a concept; Figure 2 gives an outline of its component parts; and Figure 3 describes the Web Observatory in real time with streaming data.

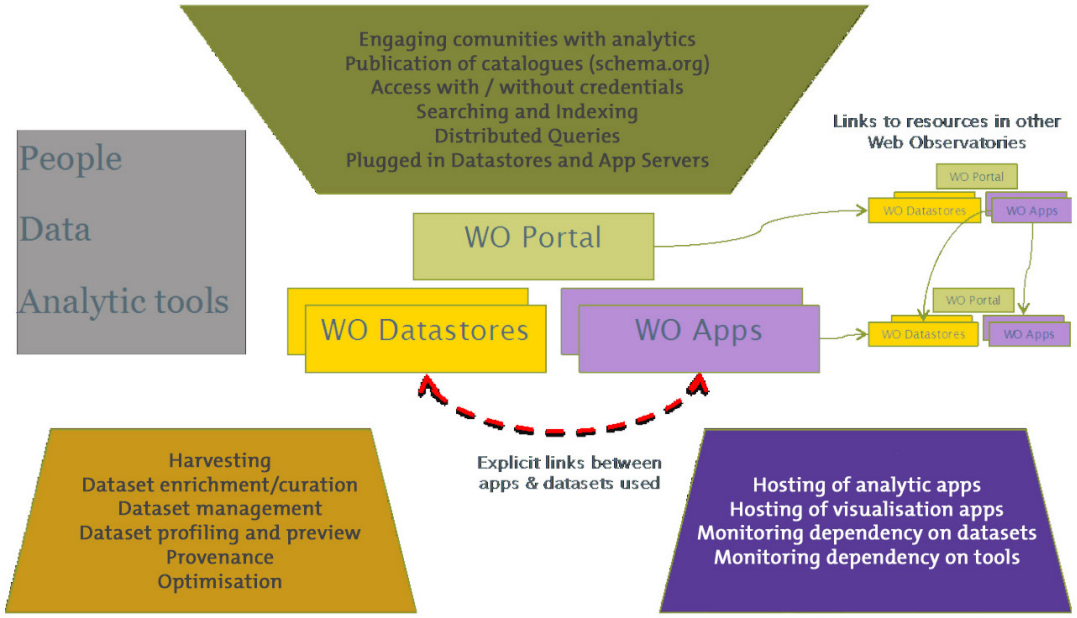

Figure 1. Tiropanis, 2014 – The Web Observatory Concept

21 http://webscience.org/a-definition-of-the-web-observatory/

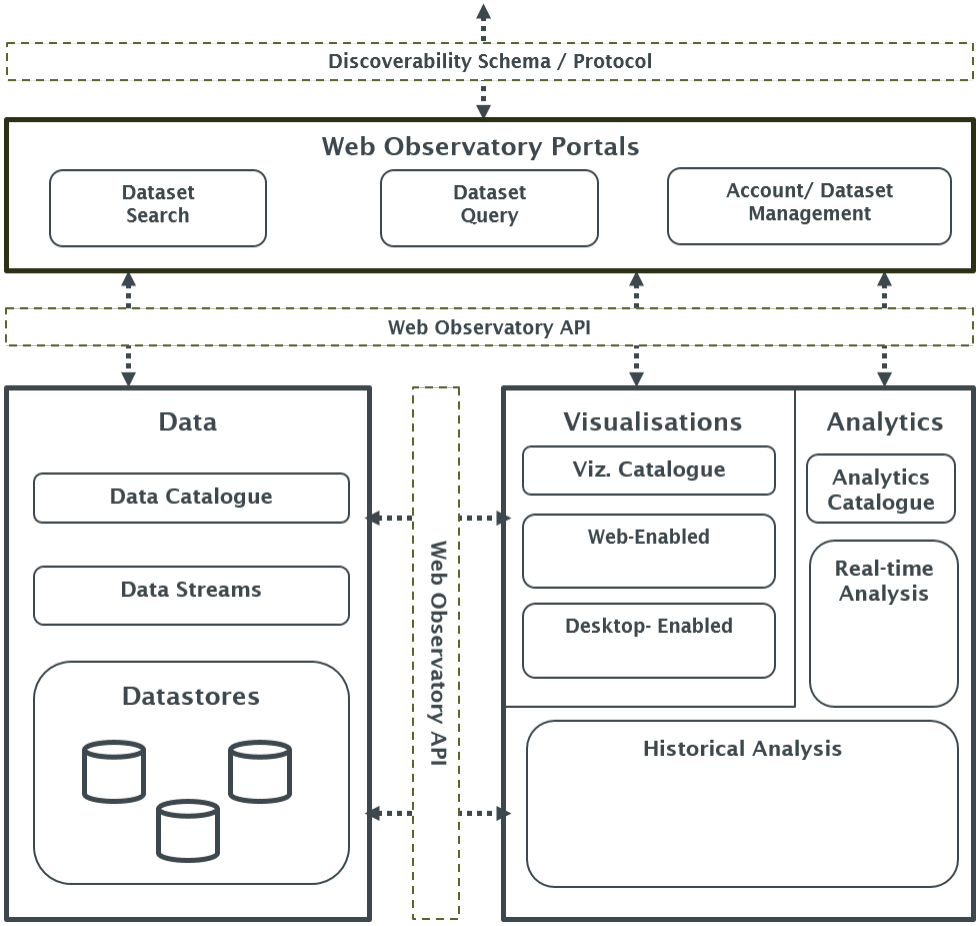

Figure 2. Hall et al, 2014 – The Web Observatory components

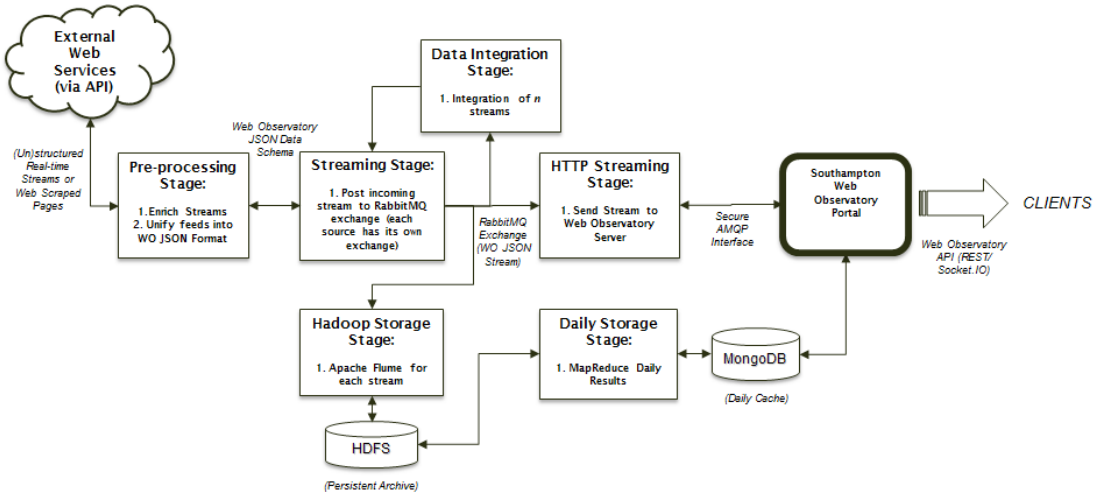

Figure 3. Tinati et al, 2015 – The Streaming Real-Time Web Observatory

The Web of Observatories creates a virtual ecosystem within which datasets, the interactions of those datasets, and the analytics and visualisation tools can be shared in order to pose research and policy questions.

At present the following nodes exist within the Web of Observatories[22] globally:

- Southampton Web Observatory (UK) [23]
- EINS - EINS-Internet Science Evidence Base (EU) [24]
- IIIT Bangalore (India) [25]
- Rensselaer Tetherless World Constellation (USA) [26]
- Collaborative Online Social Media Observatory (COSMOS) (UK) [27]
- Indiana University Truthy (USA) [28]
- National University of Singapore NeXT Observatory (Singapore) [29]

This ANZSOG research project has built a Web Observatory housed within Australia at the University of Adelaide, primarily for use by Government public policy practitioners and those undertaking research into public policy.

The Australian Government Web Observatory is at http://observatory.unisa.edu.au.

Governance in the age of the Social Machine

If a Social machine is a socio-technical system then it could be said that Governments are themselves Social Machines, and they certainly operate within a 'Social Machine ecosystem'.[30] Governments have always used technology to both govern and interact with citizens. As they adopt smart digital information technologies and open data, governments around the world are rapidly becoming much more complex socio-technical constructs that are increasingly interconnected with, and responsive to, the needs and demands of their citizens.

In the early days of the Web 2.0 the writer and publisher Tim O'Reilly (2010) wrote that

> *"Government is, at bottom, a mechanism for collective action. We band together, make laws, pay taxes, and build the institutions of government to manage problems that are too large for us individually and whose solution is in our common interest."*

In market terms if we envisage government as a 'manager of the marketplace' rather than a 'vending machine' (Raymond 2000) then the socio-technological equivalent of a thriving bazaar is the Web, a Social Machine.

22 Web Observatories - http://wstweb1.ecs.soton.ac.uk/web-observatory/list-of-web-observatories/
23 http://webobservatory.soton.ac.uk
24 http://evidence.internet-science.eu
25 http://webobservatory.iiitb.ac.in
26 http://tw.rpi.edu/web/web_observatory
27 http://www.cs.cf.ac.uk/cosmos/
28 http://truthy.indiana.edu
29 http://137.132.145.151
30 For example the UK government is considering using social media as proof of identity, http://www.guardian.co.uk/technology/2012/oct/04/facebook-social-media-identity-proof

In our first ANZSOG research project[31] we posed three questions:

1. How does Government acting (or viewing) itself as a Social Machine change the way that it interacts with citizens?
2. What key challenges are revealed as a result of this perspective?
3. How are Government agencies addressing these challenges?

From these we used a framework based on the three key aspects of government reform in order to frame our findings within the parameters of:

1. **Transformation** - technology embodied by the Social Machine as a tool for democracy;
2. **Effectiveness** - technology embodied by the Social Machine as a tool for communication; and
3. **Efficiency** - technology embodied by the Social Machine as a tool for customer satisfaction.

We framed the social machine environment and evolution of Government in the digital space, and then in our second report identified a number of Social Machines which were emerging.[32] This enabled us to work more closely with the Web Science Institute at the University of Southampton, the University of South Australia, and the Government of South Australia, and launched our second ANZSOG research project to build a Social Machine to observe the Social Machines – a Web Observatory.

An Australian Government Web Observatory

The main objective of this project is to bring research to practice, to leverage the work done by the University of Southampton and others in the SOCIAM project,[33] and to complement, support and expand the benefits of open data initiatives both around Australia and globally.

What we needed was to bring together the expertise of Southampton with that of the University of South Australia to create the technology platform, and from there to identify a public policy issue that could provide a specific policy domain to explore.

In a nutshell this project seeks to explore where, and in which contexts, people, things, data and the Internet meet and result in evolving observable phenomena which can inform better government policy development and service delivery.

Project objectives and achievements

The project sought to achieve the following objectives with the following results:

1. To develop the data publishing and governance structures to enable the SA Government to publish its data on the Observatory.

The Australian Web Observatory is now up and running, and the data publishing and governance structures rely on those demonstrated elsewhere, particularly in the University of Southampton Web Observatory. When presented at workshops in Australia these were deemed to be both appropriate and attractive for public sector managers wanting to publish data.

31 This report can be found at http://intersticia.com.au/government-as-a-social-machine-first-report/
32 This second report can be found at http://intersticia.com.au/social-machines-in-action-second-anzsog-report/
33 See SOCIAM website www.sociam.org

2. To develop a methodology to use that data to inform policy making.

The inter-relationship between data and policy is something that is only just beginning to be understood. As we found when we tested this in Adelaide there is no one methodology, but what is required is a greater understanding of 'data literacy', i.e. how data are captured, analysed and presented, so that the limitations can be more fully understood, but also how the data themselves can interrogate and challenge policy formulation.

3. To develop cases which underpin a 'digital literacy' education program to be developed by ANZSOG together with the SA Government for delivery to other jurisdictions.

Our initial case was around ageing and the question of building Smart Cities. This proved instructive in bringing the perspective and experience of policy developers to bear on data and their use, and these insights are now being integrated with ongoing work towards developing offerings to promote digital literacy.

The Project Journey

As with all research exercises, and particularly those within the technical environment, things change as projects evolve. Initially our aim was to build the Web Observatory and then use it as a way to analyse policy issues.

We found that when the idea was presented to public sector policy practitioners there was an enthusiastic response, because they could see that a resource such as the Web Observatory would help them in their daily work. Most non-technical people find that working with data directly is both daunting and confusing, and so a simple environment with easy to use tools is seen as of great benefit. However, within the technical (Computer Science) environment the benefits aren't immediately apparent because the links to real-world outcomes might be a bit more obscure, and because the value of the Web Observatory does not lie in the technology itself, but in the way that people use it, as a Social Machine.

The main challenge was not in actually building the Web Observatory, as we were able to install an 'instance' of the Southampton model on servers at the University of South Australia. The challenge was bringing people on the Web Science journey with us and demonstrating the value of the Web Observatory as both a research and educational resource.

With this in mind we decided to focus on one key policy area as a way of demonstrating the link between data and policy, supported by analytics and visualisation tools. Through this we hope to drive further development and use of the Web Observatory.

At Professor Dame Wendy Hall's address in Adelaide in November 2014 the project team met Ania Karzek from Southern Cross Aged Care.[34] As a result of conversations with Aron Hausler (Government of South Australia), we determined that aged care provided a perfect initial 'use case' with which to demonstrate the power of the Web Observatory because of the following reasons:

- Ageing has bipartisan government and community interest and support globally;
- There are numerous sources of data of all types available;

34 http://www.southerncrosscare.org.au/

- Much of those data could be less problematic than for other demographics due to the focus on ageing as an important policy issue;
- There are immediate policy and financial benefits and outcomes; and
- There are a range of sponsors from all sectors.

Ania suggested that we consider developing a framework that could address the question "Is Adelaide an Aged-Friendly city?" from the key recommendations of the 2013 Kalache Report.[35] Guided by this, the research team explored the relationships between a number of the recommendations and the types of data that would be required, asking:

- is there some data (open, closed, public, private) that we can find to gauge the extent to which this recommendation could be measured?
- where could we get the data from?
- how could we link those data with data from another Observatory?
- what policy questions would arise from what this evidence tells us?
- what digital literacy lessons can we learn from this? i.e. where are the data failing what we need, and what could we do about it?

Ania's comments as an end user individual seeking to use data to inform better public policy and service delivery were useful in these deliberations:

> *"From an 'ageing' policy perspective (noting that age-friendly cities are actually good for all ages), the question might be more openly articulated as measuring where we do well, where we do not do well and how might we lift our performance to excel.*
>
> *Kalache's recommendations would be measured by qualitative rather than quantitative data – is this likely to be problematic? If so, we could focus on one of the aspects of the Active Ageing Policy Framework that lends itself to a greater proportion of quantitative data (i.e., health activities and how urban planning decisions support health outcomes) and deep-dive into that aspect, rather than attempting to analyse everything at once.*
>
> *A secondary result from this exercise might be that as part of our analysis of whether we are meeting the recommendations, we are also 'testing' the package of recommendations itself – i.e., what if our analysis shows that we are meeting all recommendations to a high degree, would anyone claim that we are actually an age-friendly city? (Anyone tried walking to their local supermarket lately or tried catching public transport? Anyone tried to access health services without a car? Anyone tried to work out how much it costs to access aged care services without having their brain fried? How easy is it to locate a public toilet in an unfamiliar area? How easy is it to connect with people you might get along with if you don't belong to interest groups/clubs? How do you find out what policy changes are currently on the cards that you might be interested in commenting on?)*
>
> *If by default we 'test' the framework/recommendations, the process we follow might become a useful tool for other policy areas to use and could help to refine/redefine the policy development process itself."*

We used this framework to both target a specific audience, and to begin to demonstrate the links between data and policy.

35 Kalache Report "The Longevity Challenge", http://www.thinkers.sa.gov.au/Thinkers/Kalache/report.aspx

The Policy-Data conundrum

Ania's insightful words, from a policy rather than a technical/data perspective, guided us in framing the workshops we held to demonstrate the power of the Web Observatory. They also helped us understand how the Web Observatory might inform both policy discussions and educational offerings relating to the provenance and limitations of data driven policy.

We decided to structure the workshop discussions using the Strategic Triangle (a key model for ANZSOG teaching, developed by Moore 1995) and the Principles of Persuasion asking:

- Ethos - what should we do? (We believe in …) linked to Public Value
- Logos - what can we do? (We reason that …) linked to Capability
- Pathos - what may we do? (People are driven by …) linked to Authorising Environment

When it comes to the relationship between policy and outcomes, evidenced through services or measurable deliverables, the Principles of Persuasion must be linked to the Principles of Execution and thus we also asked:

- What should we do? Guided by data as evidence of public sentiment and values (evidenced by financial, social, economic data)
- What can we do? Guided by data as evidence of capability and resources (evidenced by resources data)
- What may we do? Guided by data as evidence of authority and the role of the State (evidenced by legislative data, polling data etc)

The biggest challenge with data is understanding how and what to use, and what not to use. In addition the data are part of a larger, and more complex ecosystem – the Web itself – and the digital interaction technologies, or connected devices, that feed it through human use.

The model below demonstrates some of the challenges faced by public sector managers in the opening up of data within the public policy environment.

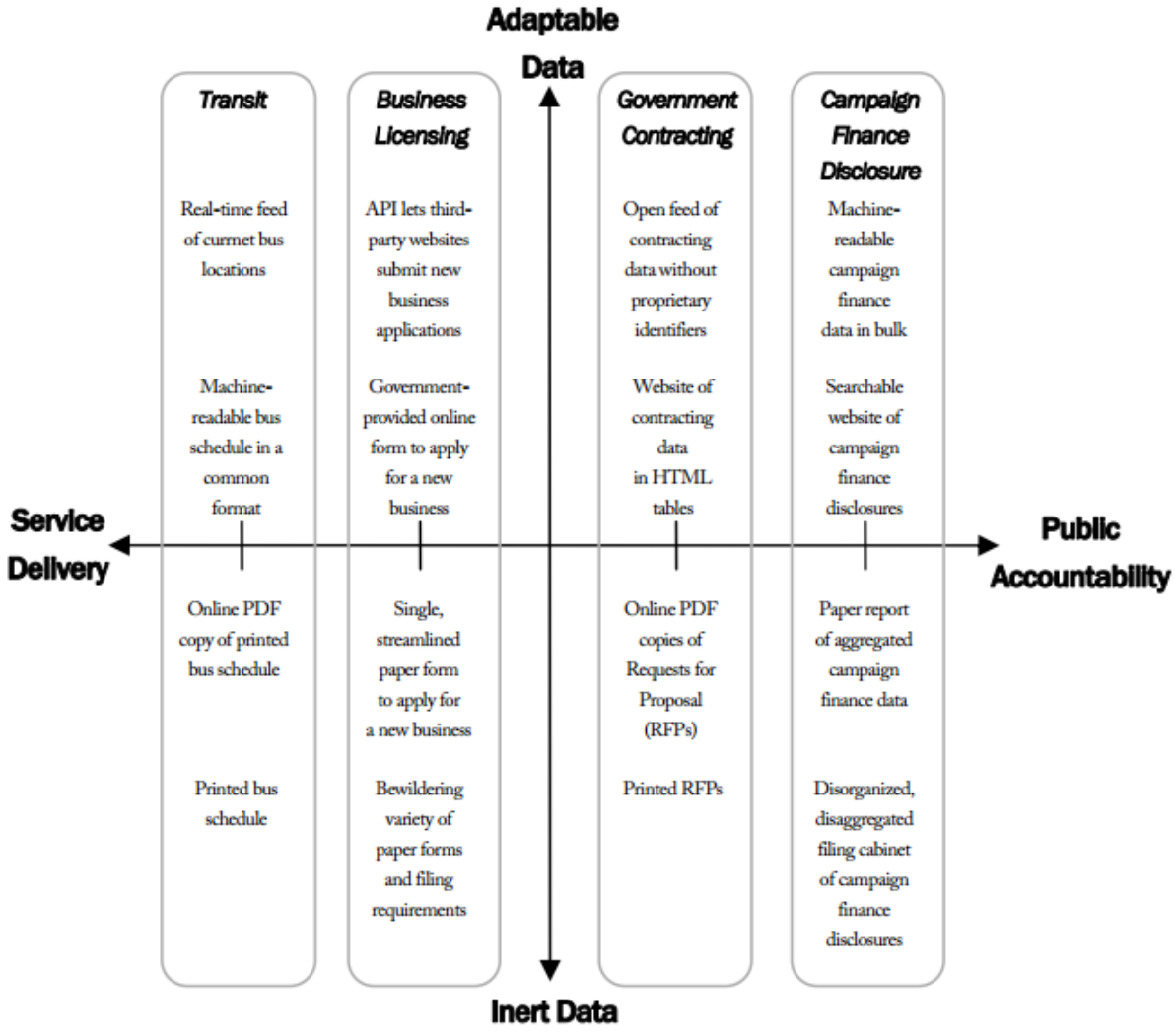

Figure 4. Yu and Robinson, 2012, The Open Data Challenge in Government

One of the major capabilities of the Web Observatory is in the area of data provenance, in that the publishers of datasets can have control over what and how data are published, accessed, shared and curated.

The screenshot below from the Southampton Web Observatory illustrates this.[36]

As a user of the Web Observatory the process of accessing data is the following:

1. Creation of a user identity.
2. Browsing of datasets.
3. If datasets are open and public they can be directly downloaded.
4. If datasets are closed or private then permission is requested for download and use.
5. The data owner has transparency over who is using the data and how, and control over whether or not to continue to allow that dataset to be used.
6. Datasets can be either static or dynamic, and again, the data owner has control over access and use.

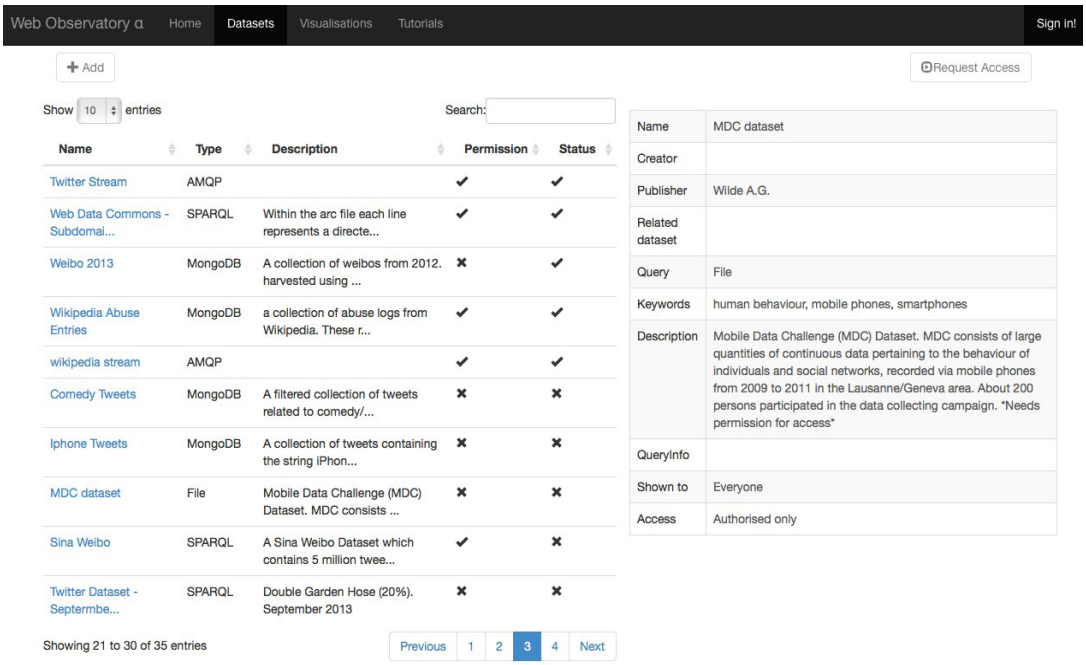

Figure 5. Southampton Web Observatory Data Sets

36 https://webobservatory.soton.ac.uk/wo/dataset

In addition to the sharing of datasets the Web Observatory enables the sharing of both the analytics and subsequent visualisations to render the data in a visual format. Many of the visualisations on the Southampton Web Observatory are open and publicly available, for instance this UK Crime Heatmap for the Southampton area.

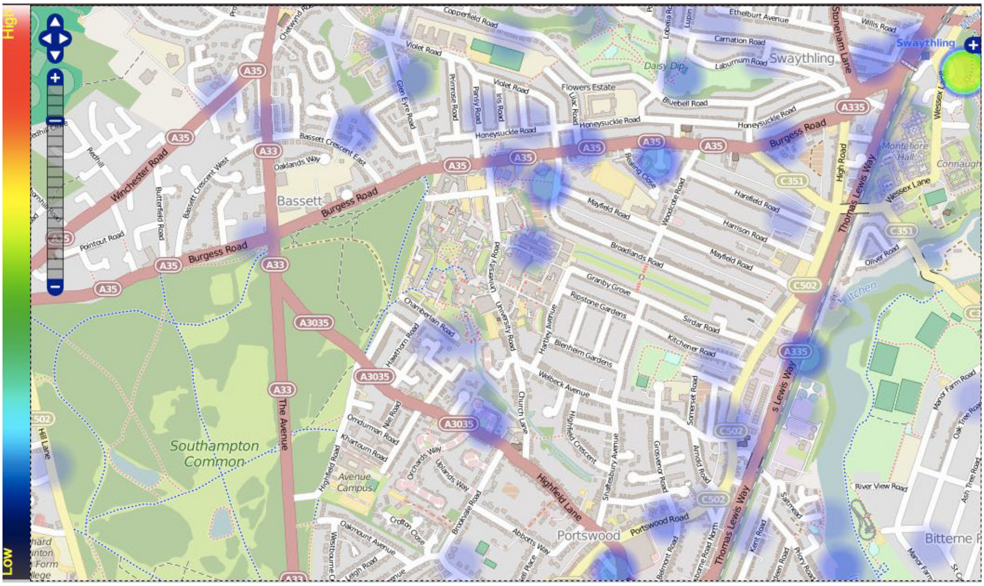

Figure 6. UK Crime Heat Map for SO17 1BJ [37]

The South Australian Web Observatory has some initial visualisations that the team are developing, and as more people use it and contribute data, more visualisations will be created and published.

It is early days for the network of Observatories. As with the World Wide Web, the Web Observatory's success and value will be driven by two things:

1. the fact that it is a free resource available to all for use, and
2. the network of people who use it to create shared value.

We see the benefits of the Web Observatory as falling in two areas: as a platform for research and as a resource for teaching.

The Web Observatory as a research platform

The aim of our Adelaide workshop held on 27 April 2015 was to explore the link between data and policy. As described earlier, we determined to focus on the aged care sector as an example of how the link between data and policy could be illustrated and explored, with specific reference to the 2013 Kalache Report *The Longevity Challenge*.[38]

The Adelaide workshop attracted a mix of people from the South Australian government, the aged care sector, local government, and some independent consultants, and we considered two of the Kalache Recommendations from a data perspective as part of a broader question "is Adelaide an Aged-Friendly city?"

37 http://crimeview.psi.enakting.org/ taken from http://www.enakting.org
38 The Longevity Challenge, http://www.thinkers.sa.gov.au/Thinkers/Kalache/report.aspx

The recommendations below provide a high-level overview of the analysis that was conducted. Recommendation One demonstrates that a fairly limited dataset can be useful in helping to frame some public policy questions to which there are some relatively easy answers and solutions. Recommendation Two provides an example of a more complex situation, where with more specific data (mainly private) could be very useful in linking public services and resources to specific demographic and community needs.

Kalache Recommendations - Example One:

Improve transport and mobility options for older people in metropolitan and rural areas so that they can:

- *more easily walk, cycle and use public transport for both essential needs and leisure;*
- *develop para-transport systems to complement public transport.*

The types of datasets that can inform such a recommendation include:

- Geographic data
- Adelaide neighbourhoods
- Locations
- Points of interest
- Parks
- Equipment (gym, or other)
- Walking trails
- Demographic information
- Population

A lot of these data are publicly available and the recommendation can be addressed as a public service with some specific outcomes if we ask:

- Where are the parks? Where can citizens hire bikes?
- What is the closest public transport stop to get to bikes/parks?
- How can we create a fitness app based on walking trails and seats?
- How can we make it all social by integrating activity with social networks?
- We can also address this recommendation by comparing demographic data with availability/ location of public resources to ask questions such as:
- Are public resources appropriately distributed?
- Do the public facilities suit the age of the population in a given Council area?
- Do the available services fall within the Council areas which have the highest amount of older residents?
- What services are available to the different areas in Adelaide?

This is obviously just a starting point but it gives an idea of how the data that are available can be used to inform the specific recommendation, and what the current data limitations are.

If we take the second recommendation the data required are more complicated.

Kalache Recommendations - Example Two:

> *Actively protect the rights of frail elderly people living at home, especially those who are living alone, in metropolitan and regional areas:*
>
> – *Maintain and where possible, improve, the health, wellbeing and social connection of the frail older person;*
>
> – *Develop training and reporting/response mechanisms for in-home workers to identify an older person at risk of, or suffering, abuse of any kind, including emotional and financial abuse*

The types of datasets that can inform such a recommendation include:

- Demographic information by division/area
- Age, sex, race
- State of health (well-being data)
- Geographic data
- Locations of metropolitan and rural areas
- Property Register
- Resident information of tenants/home owners
- Social data
- Online networks

Most of this is available except for that which is governed by privacy, in particular the Property Register and resident information, but some of these data could be obtained by working with the South Australian Department of Aged Care and conducting an opt-in pilot, or crowdsourcing some of the data gathering.

The Web Observatory as a teaching tool for digital literacy

The Sydney workshop held on 30 April 2015 had a broader focus and followed on from workshops held in November 2014 in Brisbane, Sydney, Melbourne, Canberra and Adelaide. Primarily its purpose was to explore the potential of using the Web Observatory as an effective and persuasive educational tool.

In his speech to open CeBIT 2015 NSW Finance Minister Dominic Perrottet stated that

> *"Research shows that Millennials [those aged those born between around 1980 to 2000] are unattached to organised religion, unaffiliated with political parties, overburdened by debt and distrustful of institutions. They are sceptical of big government, and more likely to be social entrepreneurs than public servants.*

By 2025, just ten years from now, they will make up almost 75 per cent of the workforce, a shift I believe that will have profound implications for government and the use of technology." [39]

Quite bluntly, he argued that "this generation will not tolerate governments who still inhabit an analog world".

If nothing else this is a crucial reason for governments to embrace digital services, but in order to do better we must enhance the digital leadership of our public sector professionals. This message was reinforced by Chief Information Officer of the Reserve Bank of Australia Sarv Girn at the 2015 Economic Development of Australia (CEDA) forum.

Girn believes that digital leadership manifests in two dimensions:

1. The first is the 'hardwiring' that ropes in "policies, regulation and rules that govern a society or organisation and enables it to succeed. In a society or community sense, this is about leadership in laws and rules that encourage start-ups to flourish without inhibitors, and allowing their home presence to be retained as they become successful".
2. The second is the 'softwiring' which "refers to the behaviours and attitudes necessary for dealing with the digital era in a societal or organisational sense."[40]

At our workshops we discussed the link between data and policy and it became evident that the lack of digital skills within the public sector broadly is an impediment to the publication, use and harnessing of data of all kinds in order to better design and deliver policy and services – and to measure the effectiveness of the public sector in doing so.

With the recent launch of Australia's Digital Transformation Office,[41] based on the UK's Government Digital Service,[42] the Australian Public Service now has a mission to "improve the customer experience for citizens and businesses when dealing with government" – but that requires public servants to be equipped to deal with citizens as customers in the digital world.

At CeBIT 2015, Australian Communications Minister Malcolm Turnbull argued that

"Government needs to embrace change and adapt in-line with the expectations of its customers.

While government isn't exposed to competition in the traditional sense - it has a monopoly on many of the services it delivers - if it seeks to remain relevant to people's everyday lives then it must be flexible and nimble, capable of embracing new technologies to disrupt the way it delivers public services."

And if public servants are to remain relevant they need to be equipped with the best education that can be provided, that of learning to become digital leaders, and to lead from the front, not try to keep up from behind.

The Web of Observatories is a powerful complement to Government Open Data initiatives around the world, and the Australian instance now allows Australian government agencies to participate in that conversation.

39 http://www.dominicperrottet.com.au/the-rise-of-the-millennials/
40 http://www.governmentnews.com.au/2015/05/rba-tech-chief-calls-for-better-digital-leadership/
41 www.dto.gov.au
42 https://gds.blog.gov.uk/

Research Questions and findings

From the outset this project sought to address three questions:

1. How do we build a Social Machine to better observe the workings of government?
2. How can this Government Web Observatory better inform the creation of public policy?
3. What are some of the key challenges, which governments will face as a result of being armed with a Web Observatory?

In addressing these questions at our workshops it became obvious that the Web Observatory itself made the second research question iterative because one feeds the other. By enabling data to be more transparent and accessible the Web Observatory makes the Social Machine of Government more transparent, and through that reveals the explicit nature of the relationship between data and policy.

As we argued in our first ANZSOG research project, in many ways Government can be viewed as a Social Machine itself. It is a socio-technical system; it continually relies on people and technologies to go about its business; and as the sophistication of these human-machine interactions increase, so do the challenges faced by Government in determining its role in society.

There are numerous instances of Social Machines where citizens have taken it upon themselves to gather information that leads to better service delivery (crisis management is a case in point, but also systems such as those developed by FutureGov[43] such as Casserole and Patchwork). Some Governments are partnering with Social Enterprise in order to develop public-private partnerships harnessing data as a key currency – people provide the data, the Social Enterprise provides the technological Social Machine platform, Government assists through mainly getting out of the way and only intervening where necessary.

A platform such as the Web Observatory can better inform public policy by encouraging people from all levels of government, particularly at State and Local levels, to contribute data from these types of initiatives, either by directly uploading it on the Australian Web Observatory itself, or by publishing their data in whatever form is most appropriate for them through their own websites, and then enabling others to access or at least view it. As we found in our workshops, the true value comes in bringing together various datasets to gain greater visibility on a specific policy issue or question. This requires not just having the technical skills to publish the data, but more importantly, the digital literacy to understand the broader value of doing so, and therefore *championing and supporting such initiatives from higher levels of management.*

This means that there need to be people within government who can appreciate the value of what the Web Observatory can provide, at all levels, and are literate in the information and knowledge that it can provide.

43 wearefuturegov.com. Both Casserole and Patchwork are now being rolled out in Australia through partnerships with Local Government authorities. See http://wearefuturegov.com/tag/australia/

Next steps

Despite demonstrating early leadership with the launch of the Gov 2.0 Task Force[44] and the Declaration of Open Government,[45] Australia is now considered to be a 'Stall Out' when it comes to building digital capacity (see Figure 7 below). A number of other early leaders in the digital space are also struggling to maintain momentum as the low-hanging fruit of digitising government services is picked and the much harder work of real digital transformation throughout both the public sector and society more generally begins to take place.

The best way for the Stall Outs to regain momentum is to emulate what the 'Stand Out' countries are doing, which is primarily to develop a highly skilled talent pool within all sectors, and to embark upon digital literacy programmes for citizens at a young age. Countries such as Estonia are already doing this, as are the US and UK with their coding initiatives in schools.

Countries are building digital capacity at uneven rates. A group of 50 countries reveals four main areas of digital readiness.

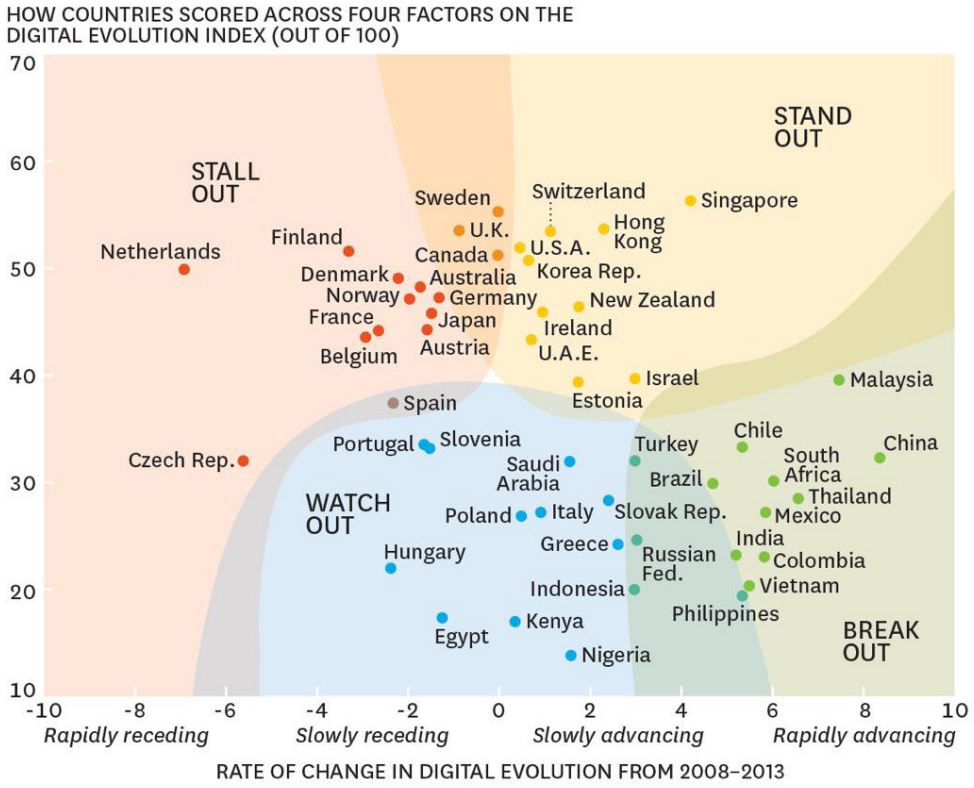

Figure 7. The Digital Evolution Index, The Fletcher School at Tufts University [46]

44 http://www.gov2.net.au/
45 http://www.finance.gov.au/e-government/strategy-and-governance/gov2/declaration-of-open-government.html
46 http://fletcher.tufts.edu/eBiz/Index

As a complement to this, organisations such as ANZSOG need to develop skills in digital literacy within their faculties, and to integrate these skills in all programs that are offered, because *all* Governments now operate within Social Machine ecosystems. In addition, there is real value in bringing the fruits of academic research to bear upon public policy practice as quickly as possible because the world is moving at a pace where the time to market is shortening; research needs to demonstrate practical real-world outcomes and benefits in order to justify ongoing funding and support.

The ANZSOG/UniSA Web Observatory is a key resource for the benefit of all public sector researchers and practitioners in Australia, and already it can provide a window to initial datasets as well as to those which sit within other Web Observatories in the Web Science ecosystem. The 'Live Observatory Crawl'[47] developed by the Web Science Research Centre at RPI gives an idea of the Web Observatories that are linking into the network, and this is rapidly expanding as nodes are connected linking to the United Nations, the UK Government, the US Government, the Singapore Government and others.

The benefits will come from the 'network effect'[48] and as such we would recommend that the Observatory become a key resource offered by ANZSOG to all researchers, academics and students within Australia and internationally. To that end we would recommend that ANZSOG hold workshops to demonstrate the Web Observatory in action, and where possible facilitate some tutorials with the University of South Australia and University of Southampton developers.

As the Observatory develops there is the potential to collaborate with and support some of the SOCIAM partners,[49] to expand the work and investigate similar policy questions, such as ageing, policing and healthcare,[50] with other governments such as China, Singapore, India and the UK.

Secondly, the Web Observatory is an educational tool with which to teach digital literacy to non-technical people through the practical investigation of policy questions linked to data and information.

Ramine Tinati (2013) stressed that

> *"…the development and acceptance of a technology is part of a complex socio-technical process at the micro and macro level. It involves the interplay between humans, policies, governance, politics, and economies, and what is typically engineered in the micro (controlled lab environment) becomes something wildly different at the macro (uncontrolled network of humans and other technologies)."*

Understanding this interplay is a core component of digital literacy, and the Web Observatory can be used as a powerful teaching platform to make this both explicit and more easily comprehensible. Practical training programs are already provided by established organisations such as Decoded[51] (who have recently launched in Australia) and the Open Data Institute[52] (now in Queensland) who are working to provide basic skills training in the digital literacy space.

In addition ANZSOG can develop its own digital literacy programs by bringing together research and practice within the Web Observatory ecosystem.

47 http://webscience.org/web-observatory/list-of-observatory-projects/
48 http://en.wikipedia.org/wiki/Network_effect
49 See SOCIAM partner list at http://sociam.org/partners
50 SOCIAM Social Machines http://sociam.org/social-machines
51 Decoded can be found at http://decoded.com/uk/
52 ODI UK courses can be found at http://theodi.org/courses and the ODI Queensland at http://www.odiqueensland.org.au/courses

Conclusion

Government is reinventing itself in the digital age, and is using Social Machines to both renegotiate its relationship with citizens as well as harness technologies to produce greater efficiencies and productivity.[53] It is opening up public data for reuse in order to encourage and facilitate innovation, but it still has a long way to go in educating people how to properly use those data.

The opportunities and benefits offered by digital interaction technologies to enable Governments to truly serve communities more effectively are enormous, but so too are the social and policy challenges that accompany them.

Governments need to lead in this discussion, and educate, empower and enable their employees at all levels to confidently navigate the digital world and create a better future for all citizens.

In Australia the Digital Transformation Office[54] is the latest manifestation of this, but without the necessary digital skills to develop policy and understand what Government as a Social Machine really means, the ability to strategically plan for a digital future is limited. Goverment would then continue to be reactive, rather than proactive, when it comes to making policy within a digital information environment.[55]

To quote James Riley from his recent article on the Digital Transformation Office:

> *"The ambitions for the DTO are huge, as they should be. But this is a long game. Start small, move fast. Get some early wins. Use the power of example."*

ANZSOG should follow this lead, using the Web Observatory as a key asset in the road to teaching digital leadership in Australia and other jurisdictions.

53 Government is shrinking by using technology: http://readwrite.com/2015/04/06/technology-shrinks-government?utm_source=ReadWrite%2BNewsletters&utm_medium=email&utm_campaign=6ca197d0b2-RWWDailyNewsletter&utm_term=0_9fbeb5d667-6ca197d0b2-201252445

54 https://www.dto.gov.au

55 http://www.businessspectator.com.au/article/2015/4/2/technology/coalitions-digital-agenda-long-opportunity-short-detail?utm_source=exact&utm_medium=email&utm_content=1269080&utm_campaign=ts_daily&modapt

Appendix One – The Project Team

ANZSOG, Intersticia and The Web Science Trust

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In addition we would like to thank Ania Karzek (http://au.linkedin.com/pub/ania-karzek/4/636/322) from National Projects at Southern Cross Care Australia, who gave us her wonderful insights and common sense responses.

Appendix Two – The Project outcomes

The Australian Web Observatory
http://observatory.unisa.edu.au/

The Web Observatory at the University of South Australia is the first truly government focused node within the global network of Web Observatories, and links Australia in with research happening around the world. It now makes available datasets and related analytic services to authorised researchers, government agencies, and members of the general public.

The University of South Australia is provisioning and operating two virtual machines hosting a web server and a backend database, respectively.

The configuration of the virtual machines is as follows:

- Web Server: 2 CPU cores, 8GB RAM, 128GB disk storage, RHEL6 Server
- Database Server: 4 CPU cores, 16GB RAM, and 500GB disk storage, RHEL6 Server
- Both VMs will be backed up daily.
- There is to be 100GB data transfer to/from non-AARNet networks.

The University of Southampton has installed the Web Observatory software (data infrastructure, analytics and visualisation tools) on these machines and the University of South Australia continues to host and maintain this software.

The main characteristics of the Southampton Web Observatory are:

- Data curation – informed by curation models in other Web Observatory nodes.
- Data control – owners of data can determine what level of publication is appropriate whether it is Open, Closed, Public or Private.
- Data access - in the case of Closed or Private datasets those requesting access can apply for it through the Web Observatory process.
- Data interoperability – the fundamental premise of the Web Observatory is to see what other datasets have been published, and then to draw on them to provide additional context.
- Analysis – the Web Observatory includes shared analytics tools.
- Visualisation – the Web Observatory includes shared visualisation tools.

Key meetings, workshops and presentations

Dr Thanassis Tiropanis visited Australia in November 2014 and attended the following events:

- Presentation to Office of Fair Work Ombudsman, Sydney
- Presentation at ‘BiiG Ideas’ Event, Digital Economy, Government of Queensland, Brisbane
- Presentation to University of Queensland
- Meeting with Griffith University

- Meeting with TAFE Queensland
- Meeting with Open Data Institute Queensland
- Meeting with UTS, Sydney
- Meeting with Fuji Xerox Australia, Canberra
- Meeting with Web Science Australia, Canberra
- Presentation at NICTA/CSIRO, Canberra
- Presentation to Commonwealth Public Sector Agencies, hosted by FWO, Melbourne. Attendees included FWO, ATO, FWC, Austrac, ASQA, ACCC.
- Meeting with Australia Post
- Presentation to Government of South Australia audience, Adelaide,
- Meeting with Information Science, University of South Australia
- Presentation to Open Data Day, Adelaide
- Presentation to Australian Government Leadership Network, Adelaide
- Meeting with University of Sydney, Sydney

Professor Dame Wendy Hall visited Australia in November 2014 and attended the following events:

- Meeting with CIO Office, Government of South Australia
- Presentation on “Future of the Web”, Government of South Australia
- Meeting with South Australian Minister for Education, Child Development and the Public Sector The Hon Susan Close
- Meeting with University of South Australia

Dr Markus Stumptner and Dr Wolfgang Mayer visited Singapore in December 2014 and attended the following events:

- Participation in Web Observatory Workshop, National University of Singapore
- Meeting with Government Digital Office, Government of Singapore

Dr Ramine Tinati and Dr Xin Wang visited Adelaide and Sydney in April 2015 and attended the following events:

- Development and installation of Web Observatory at University of Adelaide
- Workshop hosted by University of Adelaide and Government of South Australia, Adelaide
- Workshop hosted by Fair Work Ombudsman, Sydney

Publication outputs

The Project team have submitted papers for the Web Science Conference, the World Wide Web Conference (Web Observatory and Web Science Tracks) together with journal articles in various other publications.

Appendix Three – The Research Partners

ANZSOG

www.anzsog.edu.au

ANZSOG was established as a not-for-profit company in 2002 with the vision of creating a world-leading educational institution that teaches strategic management and high-level policy to public sector leaders.

Formed by a consortium of governments, universities and business schools from Australia and New Zealand, the School is also home to a substantial research program that aims to deepen government, community and academic understanding of public administration, policy and management.

The initial vision for the School is now a reality and ANZSOG is developing a broader role as a trusted facilitator that helps governments find solutions to real-world public issues.

Fair Work Ombudsman

www.fwo.gov.au

The Fair Work Ombudsman promotes harmonious, productive and cooperative workplaces. They help employees, employers, contractors and the community to understand and comply with Australia's workplace laws. They provide information and advice, investigate workplace complaints and enforce Commonwealth workplace laws.

The Government of South Australia

www.sa.gov.au

South Australia is one of six states and two territories in Australia. The state government has responsibility for laws relating to matters of state interest such as schools and hospitals, roads and railways, utilities such as electricity and water supply, mining and agriculture.

Intersticia

www.intersticia.com

The concept of 'Intersticia' has always been based on dynamism and change, operating in the interstice between the potential of ideas and reality of execution. Our goal is to work with the imagination.

The company was formed in 1997 as a mixed agricultural farming operation which also worked with indigenous artists in northern New South Wales. Since then it has evolved to become a research and consulting business based around the development and delivery of strategies for developing leadership, managing change and creating authentic communications as people, groups and organisations learn to operate within the digital information society.

Intersticia exists as a platform upon which to bring people, ideas, knowledge and experience together through conversation for the benefit of all.

The School of Information Technology and Mathematical Sciences, University of South Australia

http://www.unisa.edu.au/IT-Engineering-and-the-Environment/Information-Technology-and-Mathematical-Sciences/

The School of Information Technology & Mathematical Sciences is the largest information and communications technology provider in South Australia, and is regarded as one of the leading applied mathematics departments in Australia. It is home to three research centres: The Advanced Computing Research Centre, The Centre for Industrial and Applied Mathematics and The Phenomics and Bioinformatics Research Centre.

SOCIAM

www.sociam.org

More than 65 years after the first 'Turing Machine' was described by Alan Turing as a "simple yet abstract computational device that enabled investigation of what can be computed", we are now witnessing and embracing new kinds of systems. These are governed not purely by computational processes, but also by collective, harnessed and focused social interaction between humans using our computing milieu.

These Social Machines are the focus of "SOCIAM - the theory and practice of Social Machines". SOCIAM is a partnership between researchers from Southampton, Oxford and Edinburgh Universities who have embarked on a five-year (2012-2017) research programme.

The ultimate ambition of SOCIAM is to enable us to understand how the Social Machines evolve in the wild and what factors influence their success and evolution. Its aim is to develop both theory and practice so that we can create the next generation of Social Machines.

Web Science Australia

www.webscienceaustralia.org

Web Science Australia seeks to bring a holistic perspective to the challenge of information management by promote understanding and the cross-fertilisation of ideas between researchers and practitioners from disparate and often disconnected communities. Part of its role is to connect people within Australasia to others working within the Web Science network.

Web Science Australia seeks to promote and help develop a body of research and knowledge linking the core themes around Web Science, in particular relating to the future of the Web and the role it plays in societal evolution and change.

It seeks to achieve this aim by pursuing four key objectives:

1. To support and encourage the development and delivery of Web Science education within academic institutions in the Asia-Pacific region;
2. To bring together emerging research and knowledge with information management practitioners in all sectors (public, private and non-profit) in order to assist in further understanding human activities on the Web;

3. To enable Information Management practitioners to more fully understand, develop and utilize Social Machines for better information management and governance; and
4. To bring the knowledge gained through research and practice to the public through access to educational material and resources.

The Web Science Institute, University of Southampton

http://www.southampton.ac.uk/wsi/

The Web Science Institute brings together world-leading multidisciplinary expertise to tackle the most pressing global challenges facing the World Wide Web and wider society today. It is necessarily interdisciplinary, as much about social and organisational behaviour, as about the underpinning technology.

The Web Science Trust

www.webscience.org

The Web Science Trust (WST) is a charitable body with the aim of supporting the global development of Web Science. It is hosted by the University of Southampton.

The origins of the Web Science Trust can be found in the Web Science Research Initiative (WSRI) which was established in 2006. WSRI was originally set up as the result of a Memorandum of Understanding between MIT CSAIL and University of Southampton, ECS, with the ambition of coordinating and supporting the study of the World Wide Web. Since the launch of this Initiative the concept of Web Science has been widely disseminated and is establishing itself as an important area of activity.

WSRI's activities focused on

- Articulating a research agenda for the broader scientific community
- Coordinating the development of Web Science educational material and curricula
- Engaging in thought leadership for this emerging field.

In order to continue with these activities the Directors of WSRI established a charitable body – the Web Science Trust (WST) – which is independent of the original founding institutions of WSRI.

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School of Government