# Using open data to deliver public services

ODI

Open Data Institute

# Contents

# About

This report has been researched and produced by the Open Data Institute, and published in February 2018 as part of its project on using open data to deliver public services. Its authors were Ed Parkes, Therese Karger-Lerchl, Peter Wells, Jack Hardinges and Roza Vasileva. If you want to share feedback by email, develop the thinking in your national context, or would like to get in touch, contact the team at randd@theodi.org.

To share feedback in the comments, highlight the relevant piece of text and click the 'Add a comment' icon on the right-hand side of the page.

The report is part of a wider project on new service delivery models, which aims to improve understanding of how to implement data-enabled service delivery models in government, and how to publish more open data as part of these approaches.

# Acknowledgements

We would like to thank Emma Doyle, Gary Todd, Ian Makgill, Rikesh Shah, Ryan Dunn, Thom Townsend, Tom Forth, Yeonhwa Lee and their teams for the interviews and workshops, which were essential for this research and report.

Pia Waugh, Paul Maltby, Professor Lucy Kimbell, Leigh Dodds, Bill Roberts, Louise Downe and Martin Jordan also contributed to discussions that helped to define our approach. We ran two workshops at Local Gov Camp 2017 and UKGovCamp 2018 and received many helpful contributions from participants.

**WORK IN PROGRESS** This is work in progress. It is likely to be updated as we continue our work. Keep an eye out for updates!

**OPEN FOR FEEDBACK** How can it be improved? We welcome suggestions from the community in the comments.

# Executive summary

*This paper explores how open data can be used in public service delivery and its potential for collaboration, joint problem-solving and open innovation. It highlights where open data has been released by public sector institutions and its effects on delivering public services*

The nature of the public sector is complex, as are the policy areas it is responsible for. At the same time, there are new possibilities presented by the changing nature of data.

This paper encapsulates the ODI's research into different ways of understanding the impacts of releasing open data for public services while capturing the complexity of delivering public services.

We visualised open data within an ecosystem to identify open data opportunities in the public sector. By taking this approach, we developed three high-level patterns of open data use in public services.

**High-level patterns of open data use:**

- **Pattern 1** uses open data to increase access to services for citizens or organisations
- **Pattern 2** uses open data to plan public service delivery and make service delivery chains more efficient; direct beneficiaries are commissioners, managers and frontline public service workers
- **Pattern 3** uses open data to inform policymaking; direct beneficiaries are elected representatives, policymakers and citizens who want to influence policy

We identify examples of each pattern and draw insights from their similarities.

So far, we have developed practical recommendations for a range of actors to support greater use of open data to deliver public services.

**Practical recommendations for greater use of open data in public services focus on:**

- **Organisational collaboration**
- **Technology infrastructure, digital skills and literacy**
- **Data infrastructure**
- **Open standards for data**

- **Senior level championing**
- **Peer networks**
- **Intermediaries**
- **Problem focus**

We will develop the methodology behind this report further as part of our wider project on new service delivery models, in which we are supporting four local areas in the UK to redesign a public service using open data.

We will use our insights to develop learning materials to support those in the public sector to better use open data to deliver public services.

# Introduction

*Many public services in the UK are expected to deliver efficiency savings along with improved outcomes for citizens. At the same time, public service delivery is increasingly interconnected with many organisations from the public, private and charitable sectors. To ensure effective and efficient delivery, we need to understand these links and interdependencies.*

Data is moving from being scarce and difficult to process to being abundant and easy to use. There are increasing opportunities to harness its value for economic and social benefit. Open data is data that anyone can access, use or share. It drives innovation by and for government, individuals, businesses, startups and communities.

We can see open data's potential for transparency, economic growth and productivity in international open data for accountability initiatives,[1] open data startups and businesses improving processes with open data.

This paper describes how open data is used to deliver public services and the effects it has. We suggest a framework for understanding these impacts and set out ways in which others – from the public sector and beyond – can help develop this understanding.

As part of its broader research project, the ODI is supporting four local areas in the UK to redesign a public service using open data: Doncaster Metropolitan Borough Council, Kent County Council, North Lanarkshire Council and the London Borough of Waltham Forest.[2] We opened an invitation to tender in summer 2017 and received 24 applications from consortia in the UK, ranging from community policing to public health, arts and culture. The responses demonstrated an appetite to innovate with open data in public service delivery. By engaging with teams going through service transformation, we hope to test some of the insights in this paper and develop our understanding of effective service patterns using open data.

We are also analysing learning resources available to those in the public sector who design and deliver public services, to help them use open data to support their service.

[1] Open Government Partnership (n.d.), 'Stories', https://www.opengovpartnership.org/stories?country=0&type=0&theme=1196
[2] ODI (2017), 'Four UK teams win funding to redesign public services with open data', https://theodi.org/blog/four-uk-teams-win-funding-to-redesign-public-services-with-open-data

While open data can support a variety of public services around the world, the scope of this report is limited to UK examples. This is because our methodology requires us to engage closely with those working in the public sector to understand the ecosystems they operate in. We will incorporate examples from other countries in future work.

## How we define public services

We developed a working definition of a public service early on. This helped us to identify examples to examine in more detail. The definition is:

> " *A public service helps groups of people to fulfil a need, the fulfilment of which is viewed to be in the public interest, and which public sector organisations recognise the need to provide.*

We settled on this definition for several reasons. We wanted to recognise a definition of public service which was as broad as possible, so we could capture the wider effects of open data, ie where data collected and published in one part of the system was used by another part of the system at another place and time.

Our current definition focuses on the needs that individuals or groups of people have, as suggested by Cassie Robinson,[3] as we did not want to align our definition too closely to the legal responsibilities that public sector organisations have. We wanted to recognise that – particularly in relation to services that rely on external organisations for their delivery and are not necessarily totally funded by government – there would not always be a distinct legal requirement for provision to a particular group.

This definition is evolving and we will refine it further to make it more succinct.

## Previous work on open data in public services

During our research we identified blog posts, reports and previous analyses on the use of open data in public services. There is quite a wide literature on the use of data in central and local government[4] and the impacts of open data on

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[3] Cassie Robinson (2017), 'Putting users first is not the answer to everything', https://medium.com/doteveryone/putting-users-first-is-not-the-answer-to-everything-dd05b9f11b5
[4] Nesta (2016), 'Wise Council: insights from the cutting edge of data-driven local government', https://www.nesta.org.uk/publications/wise-council-insights-cutting-edge-data-driven-local-government

economic growth and innovation,[5] but a relatively limited range specifically on open data and public services.

This is a brief summary of those publications specifically relevant to the impacts of open data on public service delivery.

Pia Waugh, who has worked for both the Australian and New Zealand governments, has outlined some effects of open data on public services in a number of blog posts and presentations, including this summary:[6]

### i) Efficiency

> Proactively publishing data that is commonly asked for in an automated way frees up resources.

### ii) Innovation

> Once data is published, so long as it is published well and kept up to date, other people and organisations will use the data to create new information, analysis and services. This innovation can be adopted by the agency, but it also takes the pressure off the agency to deliver all things to all people, by enabling others to scratch their own itch.

### ii) Improved services

> By publishing data in a programmatically accessible way, agencies found cheaper and  more modular service delivery was possible through reusable data sources. Open data is often the first step for agencies on the path to more modular and API driven way of doing things (which the private sector embraced a decade ago). I believe if we could get government data, content and services API enabled by default, we would see dramatically cheaper and better services across all governments, with the opportunity for a public ecosystem of cross jurisdictional service and information delivery to emerge.

In the UK, the ODI's work with the Environment Agency[7] has captured the benefits of releasing open data since the Environment Agency made their organisation-wide commitment in 2010.

**The impacts the Environment Agency identified at that point were:**
- Helping the Environment Agency to achieve its core objective
- Saving time and resources
- Building external relationships and getting the user-voice heard
- Improving data quality and public perception

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[5] This Google Doc contains links to papers on the economic potential of open data. This is not an exhaustive list but includes reports we considered during this project. Please get in touch if we missed any.
[6] Pia Waugh (2016), 'Finding the natural motivation for change', http://pipka.org/2016/02/21/finding-the-natural-motivation-for-change
[7] ODI (n.d.), 'Benefits for EA', https://theodi.org/ea-going-open-benefits-for-ea

- Better understanding and managing risks around data use and publication
- Bringing diverse teams together
- Working more easily and efficiently with external partners
- Harnessing the power of the tech industry to make useful applications

Another sector-focused study by GovLab examined the opportunity for open data use in the UK's National Health Service (NHS) in 2014.[8] Along with exploring potential impacts of open data on the system, it set out a conceptual framework which could be used to help measure the impact of open data in the NHS.

The report set out a logic model for open data in the NHS, described as: "The use of certain kinds of inputs and data, by certain kinds of users, for certain kinds of activities, will achieve certain outputs and outcomes that indicate impact. Specific methodologies will be used to collect and measure indicators, helping to assess impact."

The report also made recommendations for taking the agenda forward in the NHS, including to "develop an open health data ecology map, possibly using crowdsourcing, with a dictionary of all open health datasets used along with the variety of uses and users."

In summary, these previous pieces of work have begun to explore impact areas experienced by the public sector in releasing open data. Our work will expand on this by identifying particular examples and their shared characteristics so we can study in more detail how the release of open data will make public service delivery better.

## Approach

From the ODI's experience working with partners across multiple sectors – national and international, public and private – we have developed an understanding of how to build value on top of data.

Value can be drawn from organisations that steward data (whether collecting, maintaining or sharing it), those that build data services, and those that use data and data services to make decisions.

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[8] GOVLAB (2014), 'The open data era in health and social care', http://www.thegovlab.org/static/files/publications/nhs-full-report.pdf

## The public sector, and the policy areas it is responsible for, are complex

To understand how open data could be used in the public sector, we first need to understand public service delivery. Modern public services are complex and include an ecosystem of actors and organisations with different roles and responsibilities.

There are various groups in the public service delivery system. This is especially true now that parts of the public sector are increasingly using organisations like outsourced contractors and charities to help deliver services.

Meanwhile, there are more and different ways of funding these services – eg social impact bonds and other forms of social investment – which makes the picture of public service delivery complicated. Different parts of government have unique powers for tax raising, regulation and distribution of public funds. Add democratic oversight at a number of levels, such as central and local government, and this picture becomes more complicated still.

In addition, public sector organisations are themselves facing complex issues. Childhood obesity, workforce planning, crime prevention and many other policy issues have different origins, and effective interventions are multifaceted and need a long-term approach and collaboration.

To explain the relationships that support government service delivery, our approach must allow for complexities and interaction between those involved.

## The nature of data has changed, creating new possibilities

Data is moving from being scarce and difficult to process to being abundant and easy to use. But harnessing its value for economic and social benefit – in ways that support innovation and deliver social justice – is hard.

Data can enable us to innovate, create more efficient and effective services and products, and fuel economic growth and productivity. To bring about this future, we must make data as open as possible while protecting people's privacy, commercial confidentiality and national security. We need to find the right balance for all societies and economies to feel data's benefits fairly.

This report is focused on open data. We have to start somewhere. We will expand our thinking about opportunities for public service delivery to include other ways of sharing data in the future.

Open data offers a way of creating social and economic value from data in a changing environment. Open data is data that anyone can access, use or share. Anyone can use it as a resource for innovation. When data is published openly, others can use it and create value from it. We currently know less about creating value from open data than from historic methods of collecting and selling data.

A good understanding of data ecosystems and the benefits that open data creates in them can help to identify how value is created.

By making data openly available while respecting privacy, the public sector can create a resource for external innovation and build ecosystems to help deliver public services. Those ecosystems will include public sector organisations, businesses, startups, individuals and communities.

## Understanding the impacts of releasing open data

The ODI has been focusing on understanding the impacts of releasing open data for public services, while capturing the complexity of public service delivery.

To enable the public sector to understand how open data can support public service delivery, we have looked for ways to make the mechanisms clearer and easier to experiment with.

## Visualising public services as ecosystems

Because public service delivery is complex and processes are not linear, identifying impacts and beneficiaries is not straightforward. Impacts may not be easily understood, or may be indirect and take time to materialise. Visualising a public service as an ecosystem allows us to identify and be explicit about the impacts and who is affected, and helps us to understand the different types of value exchanged within networks of data publishers and users. We can then explain these impacts more clearly to the public sector and data holders, encouraging further release and use of open data.

Visualisation brings sense to complex systems and issues across business and government. Government departments have created visualisations of ecosystems to help convey the overarching strategy and vision for an organisation.[9] Maps of business processes and data collection help understanding of opportunities in government data collection.[10]

Visualising and drawing are core approaches in service design and the UK Cabinet Office Policy Lab and academics such as Lucy Kimbell have pushed their use forward in a government context. Kimbell has provided a number of useful approaches to thinking about service design in the public sector and her methodologies have inspired the way in which we have conducted research for this project.[11]

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[9] DWP Digital (2015), DWP's 2020 Vision,
https://dwpdigital.blog.gov.uk/2015/03/18/dwp-2020-vision-andrew-besford
[10] Michael Rose (2010), 'The complications of a right to data',
https://www.slideshare.net/slideshow/embed_code/key/hqYlWFPoX4yLbf?lipi=urn%3Ali
%3Apage%3Ad_flagship3_profile_view_base_treasury%3B%2BUJNc%2BWdQT6UkBD
N9gziRQ%3D%3D
[11] Lucy Kimbell (2015), 'Service Innovation Handbook',
https://serviceinnovationhandbook.org
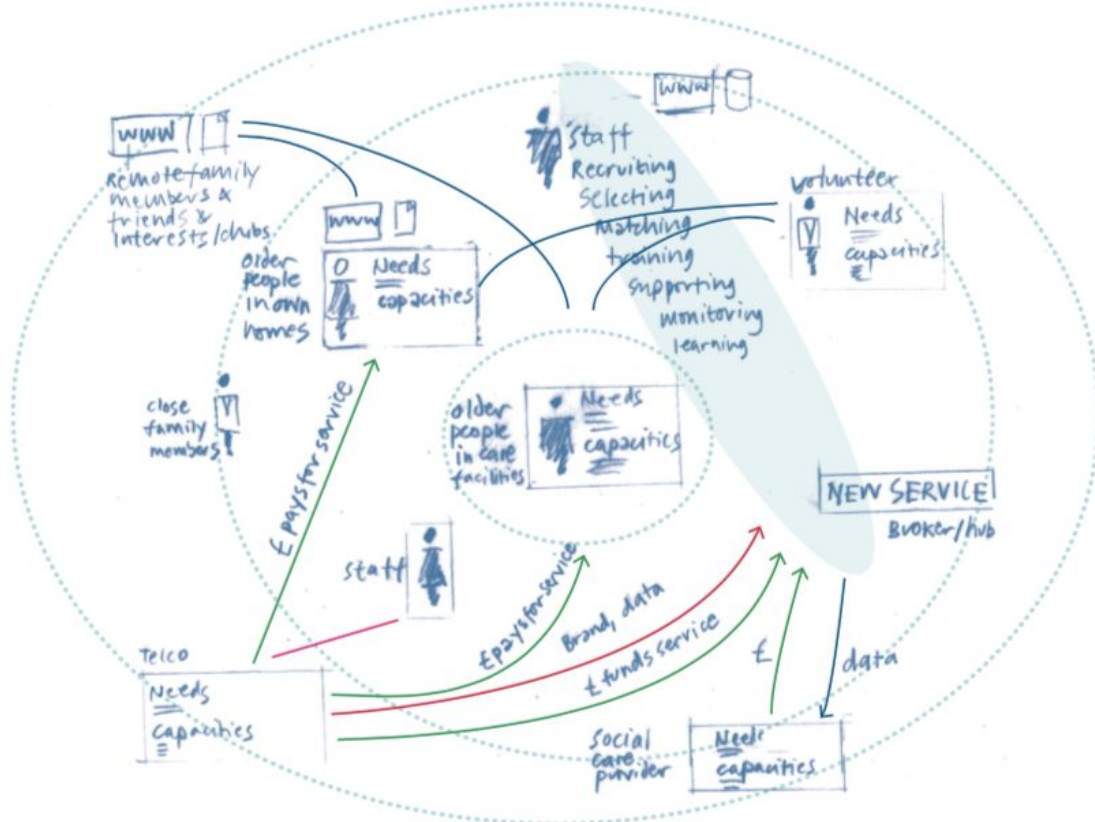
*Visualising service innovation ecosystems by showing how people, data, resources, firms and institutions are connected together now, or could be in the future.*[12]

In relation to open data specifically, members of the open data community also use visualisation of ecosystems.[13] ODI Head of Data Infrastructure Leigh Dodds has been experimenting with ecosystem diagrams for open data as a way of exploring its effects.[14]

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[12] A method used in Kimbell, L. (2014). *Service Innovation Handbook*. Amsterdam: BIS Publishers. Illustration: Andrew Boag

[13] See: http://www.jargonautical.com

[14] Lost Boy (2017), 'Some tips for open data ecosystem mapping', https://blog.ldodds.com/2017/03/13/some-tips-for-open-data-ecosystem-mapping

# Energy Sparks

**Open Data**
**Value Network**
**Tangible Value**
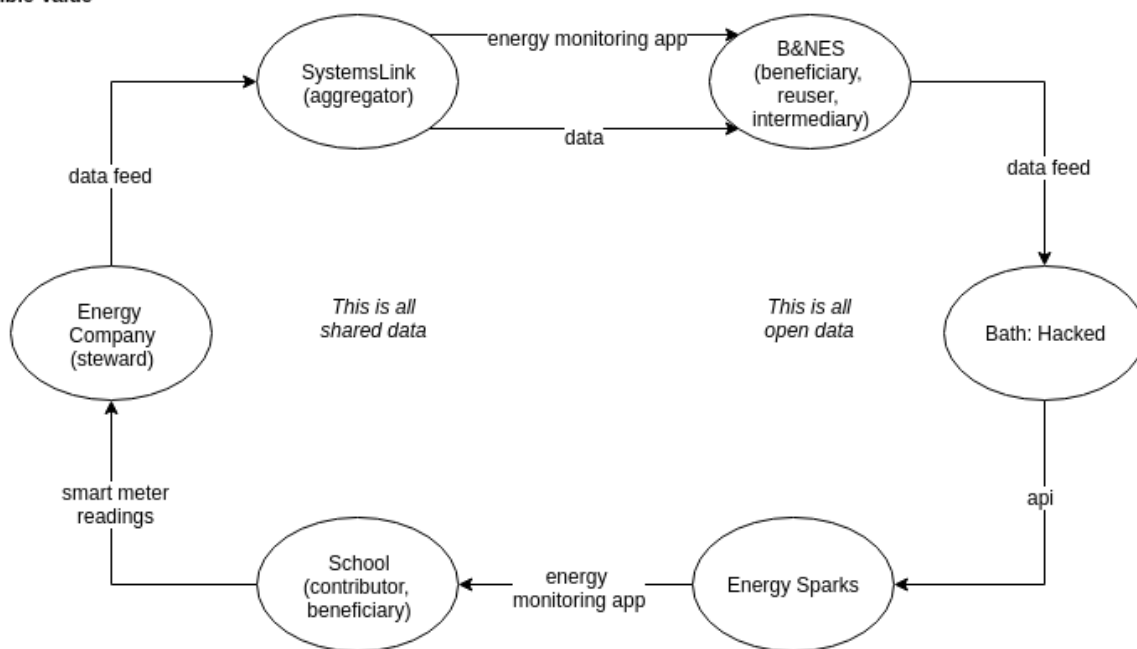
There are a number of academic disciplines that visualise ecosystems and networks to bring insight to complex systems. In particular, a soft-systems methodology approach can be helpful in capturing people's involvement in a system. Soft systems methodology is an approach to business-process modelling which is useful for general problem-solving and managing change.

The system was developed to deal with "soft problems" – those where there are divergent views and where organisations and people are key parts – with lots of similarities with public sector systems. In addition, value network analysis uses visualisation to understand complex economic systems.

In our research, we experimented with a technique from soft-systems methodology called rich picturing. When exploring an issue, we ran workshops with public sector groups working with open data, to visualise the relationships between organisations, technologies and datasets.

# Patterns of open data use in public service delivery

*The following examples and analysis are our first attempt to describe specific impacts of open data on public service delivery. We are seeking input from within government and the broader open data community to help us identify and describe these impacts further.*

Those within the public sector are best placed to highlight the impacts of open data on public service delivery, and in many ways are the only ones able to describe them in detail. In many cases, there is a lack of transparency in the operation of public sector organisations. We need a detailed understanding of how services operate to begin to understand what effect data – open data in particular – has on the system.

Following our initial research and interviews with experts, we identified examples to investigate in detail using our visualisation methodology. Given that we needed to engage with those working in the public sector in detail to understand the dynamics of public service delivery, we had to confine our analysis to UK examples for the time being.

# The three patterns of open data for better delivery of public services

We propose that open data can be used in the public sector to help deliver services in three ways. We call these "patterns" and have used them to group the examples in this work.

## Open data for…

| | 1 Better access to public services | 2 More efficient service delivery chains | 3 More informed policy development |
|---|---|---|---|
| **Direct beneficiaries** | Citizens<br>Businesses | Commissioners<br>Managers<br>Frontline staff | Public sector workers<br>Elected representatives |
| **Decisions/actions taken** | How and where to access public services | Where to prioritise operational resources | Where to target policy interventions |
| **Information produced** | Targeted service information | Insight and patterns | Data visualisations and analyses |
| **Types of data** | Open real-time service data | Open performance data | Open data about a policy area |

The figure above shows that the patterns occur at different points of public service delivery, moving from direct impacts for the user (on the left) towards indirect impacts through better delivery and policymaking (on the right).

**High-level patterns of open data use:**

- **Pattern 1** uses open data to increase access to services for citizens or organisations
- **Pattern 2** uses open data to plan public service delivery and make service delivery chains more efficient; direct beneficiaries are commissioners, managers and frontline public service workers
- **Pattern 3** uses open data to inform policy-making; direct beneficiaries are elected representatives, policy-makers and citizens who want to influence policy

The graphic shows how these patterns vary in terms of direct beneficiaries, and that we think they differ in the types of open data currently released and used. For instance, in Pattern 1 we find more examples of rapidly changing data being used – such as that released by Transport for London (TfL) – than in those patterns targeted at civil servants (Pattern 3).

Impact is not limited to direct beneficiaries. It can extend to many, if not all, of those who deliver and receive public services. This report focuses on the benefits generated from open data. We recognise that open data can also create risks or feedback loops that have negative impacts and that potential outcomes should be carefully assessed on a case-by-case basis.

The following sections look at the dynamics of the patterns in more detail. In presenting the ecosystems, we also explain how each was developed. This offers insight into how these arrangements came to be, and highlights important aspects of how open data supports particular services that are not obvious when looking at the ecosystem drawings in a fixed state.

### Note on visualisations

The ecosystem maps were initially drawn in workshops with those involved in delivering the service; we then redrew them and structured them according to the types of data, information produced and direct beneficiaries (as in the diagram above). Finally an illustrator designed some of the maps to bring out the actors and processes more clearly. Examples below have ecosystem maps across these stages attached to them, including hand-drawings and designed pictures, to showcase the methodology. Some of the ecosystem maps that we present are those we have developed with an illustrator, some are the drawings from the workshops and in some instances we have not presented ecosystem maps, as further work to understand the ecosystem is needed.

## Pattern 1: open data for increasing access to public services

The first is perhaps the most well-rehearsed pattern, since it clearly sets out an open data "startup" story – where organisations delivering public services can release data and a startup can take it to develop a product or service. These examples tend to be of customer-focused and in-person public services.

# Example 1a. Transport for London release of transport data
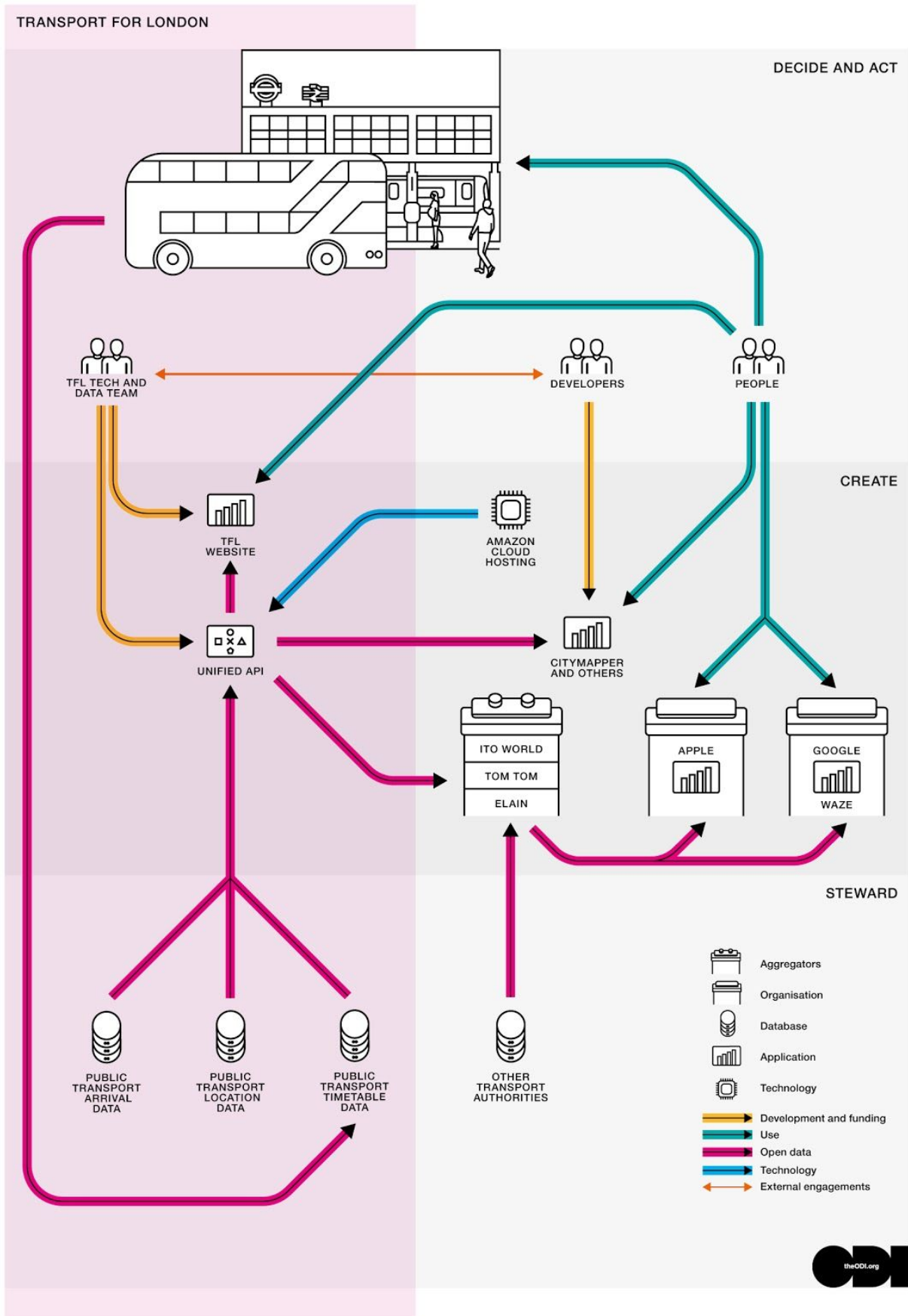
## Transport for London – in a nutshell

Transport for London (TfL) is a local government body responsible for the transport system in Greater London. TfL has the responsibility for London's network of principal road routes, for various rail networks including the London Underground, London Overground, Docklands Light Railway and TfL Rail, for London's trams, buses and taxis, for cycling provision, and for river services.

## How open data supports the delivery of Transport for London's services: benefits to the public sector

TfL is one of the UK's leading open data publishers. With over 31 million journeys made in London every day,[15] it has long recognised the need to make travel information readily available to passengers. Publishing open data is a central part of TfL's customer information strategy of providing real-time information that helps people to use their services – it enables them to provide information about service locations, routes and delays to passengers far beyond their own online and offline channels.

## Transport for London's story

Towards the end of the 2000s, TfL found that developers were scraping information about its services from its website. In an attempt to enable others to more easily display this information on their own websites and desktops, TfL launched embeddable widgets – including maps of its network and live travel news – in 2007. While TfL still makes a set of widgets available,[16] the launch represented the beginning of a process in which the organisation would publish increasing amounts of data for others to access, use and share.

Between 2007 and 2011, TfL introduced an area for developers on its website and openly published real-time transit data via a range of feeds and downloads.[17] This helped to satisfy a growing demand for its data among developers, who used it to develop user-facing journey planners and other applications. The anticipated influx of visitors to London during the 2012 Olympic Games was a stimulus for the introduction of live bus arrivals data, which led to a number of successful bus-only transport applications. Shortly after this came the launch of a new unified Application Programming Interface (API) for TfL's website.

The development of TfL's unified API in 2014 and the decision to open it up to external users was an important step in the organisation's open data journey.[18] Historically, the data it had published on different transport modes was made available in a variety of formats and structures, which made it difficult for developers to stitch together and develop multimodal applications (such as

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[15] Transport for London (n.d.), 'What we do', https://tfl.gov.uk/corporate/about-tfl/what-we-do

[16] Transport for London (n.d.), 'Widgets', https://tfl.gov.uk/forms/12425.aspx

[17] TfL also publishes open data related to transparency and accountability, such as details of its expenditure; this case study focuses on the organisation's transit data.

[18] See: https://tfl.gov.uk/info-for/open-data-users/unified-api?intcmp=29422#on-this-page-0

those that enable users to plan a journey using both buses and the London Underground). The unified API presented the data in common formats (XML and JSON) and, for the first time, consistent structures.

TfL's open data now covers timetables, routes and lines, embarkation points and facilities, transit status, disruptions and works, and fares.[19] According to recent research by Deloitte,[20] in total there are over 80 TfL data feeds (75% of which are available via the unified API) and over 13,000 registered developers.[21] Data users range from multinational technology companies to individual developers. The research has shown that TfL's approach to open data is improving journeys, saving people time, supporting innovation and creating jobs.

According to the Deloitte research, TfL open data is now used in over 600 apps (including journey planners, mapping tools, booking and scheduling tools, and analytics engines).[22] 42% of Londoners use an app powered by TfL data and passengers benefit from between £70m and £90m per year in time saved from using open data-powered applications to plan journeys more accurately. Up to £20m additional revenue is generated from increased journeys per year, driven by access to travel information, and £1m is saved per year by enabling external development of new customer-facing apps, rather than producing campaigns, systems and apps in-house. TfL save £2m annually by moving away from SMS passenger alerts and TfL open data currently supports 730 jobs, including those in new companies made viable through its availability.

## Insights

Clearly describing the benefits of open data in relation to TfL's wider organisational objectives has established a strong, ongoing case for its publication. Providing accurate and timely information to passengers is central to TfL's ability to deliver its physical services – open data enables developers and other organisations to develop customer-facing tools that do this on a scale that TfL could not do alone. Efforts to establish the value of the benefits of TfL's open data approach include the Shakespeare Review,[23] which documented the approach in a case study in 2013, and the Deloitte research commissioned by TfL that has estimated the total value of open data to the organisation, customers and others to be in the order of £130m per year.[24]

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[19] TfL Website (n.d.), 'Our open data',
https://tfl.gov.uk/info-for/open-data-users/our-open-data?intcmp=3671
[20] Deloitte (2017), 'Assessing the value of TfL's open data and digital partnerships',
http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf
[21] Note that TfL still supports the use of some data feeds and bulk downloads that preceded its unified API. In some cases, these contain additional data not yet available via the unified API.
[22] See Deloitte (2017), 'Assessing the value of TfL's open data and digital partnerships',
http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf (pp 5, 9, 15)
[23] Gov.uk (2013), 'Shakespeare review of public sector information',
https://www.gov.uk/government/publications/shakespeare-review-of-public-sector-information
[24] See Deloitte (2017), 'Assessing the value of TfL's open data and digital partnerships',
http://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf (p 5)

Engaging with developers and other users has helped to build a vibrant ecosystem around TfL's open data. Having begun with creating an area dedicated to developers on its website in 2007, TfL continues to engage with and provide support to users of its open data through hackathons, blog posts on its website, and other channels. In 2017 it launched the TfL Tech Forum and also ran a consultation focused on understanding how it could improve its open data publication.

Publishing open data has supported conversations and partnerships between TfL and other organisations who hold valuable transit data. By making data available to others, TfL has benefited from engagement with companies such as Waze, Apple and Citymapper – some of which provide TfL with access to the data they collect. This includes data related to transport modes and areas for which it does not itself collect data (eg crowdsourced traffic incident data), giving TfL access to a rich source of data enabling them to better manage traffic in London than it otherwise could.

A number of intermediary users combine TfL open data with data from other sources to create their own products and services. Organisations like ITO World, TransportAPI, Tom Tom and Elgin gather data from different sources to provide aggregated data feeds and additional services to developers and other organisations. This type of use demonstrates the need for transport data standards that allow interoperability – part of the value currently added by these intermediary users is to harmonise the data published by different transport operators and other organisations to make it easier to use and to develop new products and services.[25]

As well as using open data published by TfL to increase access to the organisation's physical transport network, some users are developing their own transport services. For example, CityMapper helps users make decisions about how to get from A to B in London using different modes of transport, which are managed and run by providers including TfL, Uber and Arriva. In 2017, CityMapper trialled the SmartBus, which uses data it collects on how users of its service move around the city to create the routes and timetables for the new SmartBus service.

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[25] The ODI is currently working with a wide range of stakeholders to support the development of open data standards. This includes producing a case study focused on the General Transit Feed Specification (GTFS), which is a widely adopted standard for public transportation data.

## Example 1b. Leeds release of data in relation to bin collection
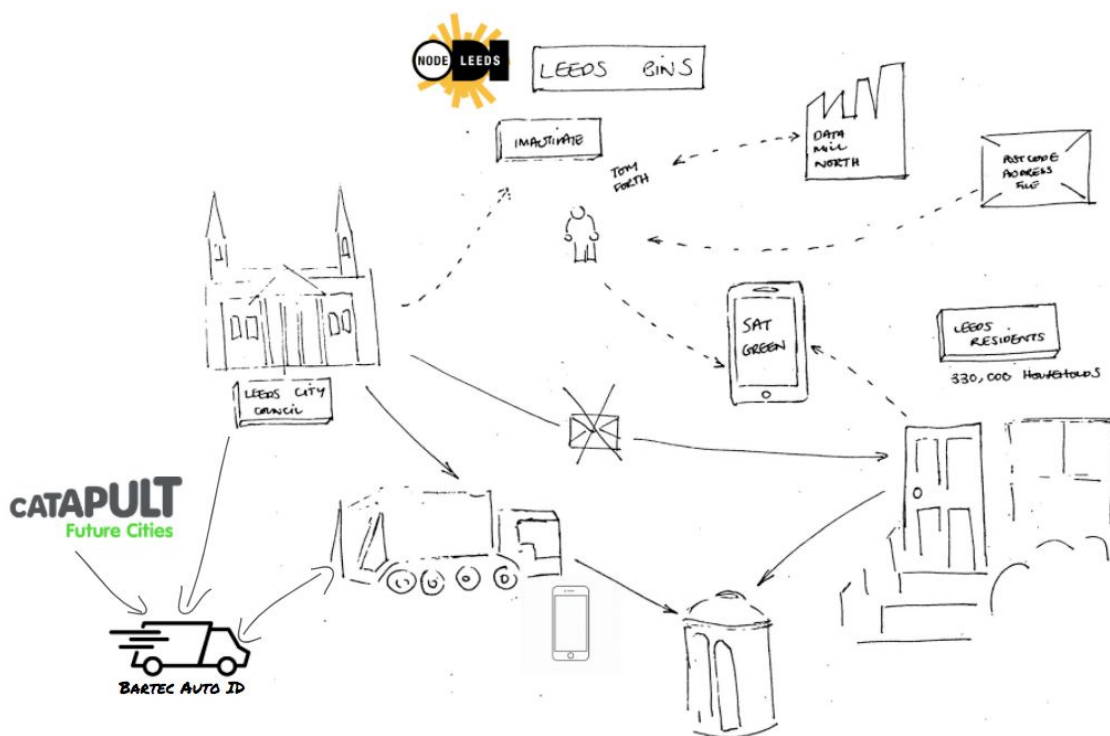


### Leeds Bins app – in nutshell

The Leeds Bins app is a mobile application that tells people who live in Leeds when their green, brown and black bins are due to be collected, and adds reminders to their calendars. The diagram above is an example of a work-in-progress version of an ecosystem map, displaying the actors involved in the service delivery.

### How open data can support the delivery of waste management services: benefits to the public sector

Open data on bin collection routes and times is used to inform people living in Leeds when their bins are collected. The application adds bin collection dates to people's calendars, reminds them the night before to put out their bin, and includes links to what to put in which bin and where to take items that cannot be put into bins. The reminders make rubbish collection more convenient for citizens, and publishing open data – instead of sending out letters – saves the council approximately £100,000 per year based on estimations by imactivate.

### Leeds Bins app's story

Leeds has long seen open data as a means of supporting local economic growth while dealing with substantial reductions in local government spending power. In 2014, Leeds Council decided to invest significantly in making open data work for

the city. Leeds has a lot of digital talent and city leadership saw potential to showcase the city's strengths to potential investors.

In setting out the open data initiative, the council asked city departments what challenges they faced to consider how open data could help. The council assigned funding to encourage the release and use of open data to solve city challenges. The Urban Sustainable Development Lab was one the programmes funded. An innovation lab was set up to generate ideas and pilot them. Some of the funding for this came from the UK's national "Release of data" fund with extra local funding boosting this.[26]

Leeds' open data platform Data Mill North hosted an event at ODI Leeds, an ODI Node, with developers working with council departments – including office staff, frontline workers, and sometimes elected members – to consider how open data could be used for better service delivery. People working in waste management shared the problems they faced in their work, one being that people did not know when their bins were collected and were unhappy with the service as a result, and that the council had to mail out bin collection timetables either annually or twice-yearly, an expense that they increasingly could not afford. Data was made available for the event and developers built prototypes to address the identified problems. imactivate, a small software company in Leeds and partner organisations of ODI Leeds, developed a Leeds Bins prototype, initially as a website. This idea and three others from the other teams of developers were presented to the waste management department. A winner was selected and the Leeds Bins team got the funding to develop what later became a mobile application, due to the difficulty and cost of updating Leeds City Council's website.

Bartec Auto ID manage the bin routes in Leeds and have software that manages their bin routes and sends and receives live updates. Data Mill North worked with Bartec Auto ID to release household bin collection data openly, and the council included the open release of the bin collection schedule in its contract with Bartec Auto ID.[27] Future Cities Catapult had previously worked with Bartec Auto ID to develop a standard for publishing bin collection routing data, which was used for this project. Imactivate developed the Leeds Bins mobile application using the open bin route data. Uptake of the application has been fast and widespread, data on which is published openly.[28]

The council uses open data on app usage to identify areas of low uptake, and has launched targeted initiatives to increase awareness of the application and/or promote other ways of informing people when their bins are collected, to reduce the risk of people without smartphones not receiving information about collection times. These targeted initiatives are more cost-effective than regular mail-outs. The open data on uptake allowed Leeds City Council to choose which

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[26] Data.gov.uk (2014), 'Release of Data Fund Update', https://data.gov.uk/blog/release-data-fund-update
[27] Data Mill North (n.d.), 'Household waste collections', https://datamillnorth.org/dataset/household-waste-collections
[28] Data Mill North (n.d.), 'Leeds Bins app record of lookups', https://datamillnorth.org/dataset/leeds-bins-app-record-of-lookups

channels to prioritise. This decision is difficult because it involves weighing up needs and costs. Data can inform these decisions but the council ultimately needs to make them democratically.

## Insights

Starting with the problem, in this case people not knowing when to put out which bin, and working closely with the local authority on solving it with open data, has proven helpful in delivering a better public service. The ongoing cost to Leeds City Council for this solution is about £1,500 per year, significantly lower than mail-out costs.[29] imactivate and Bartech Auto ID are now selling the app to other councils, powered by open data where possible and by direct data-sharing between imactivate and Bartech Auto ID where open data is not preferred by the local government, or where opening the data adds unacceptable costs (eg PAF licensing).

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[29] Numbers are based on estimations by imactivate.

### Example 1c. Famiio improving access to childcare and family service information

### Famiio – in a nutshell

Famiio is planning to provide a platform for information on childcare and family services. Information on the platform will be available to the public, professionals and local and central government. Parents will be able to search and discover more than 500,000 services and activities across local authority borders in England; service providers will be able to promote their service offer effectively in one place; local authorities and commissioners will have access to better data more easily and cost-effectively, which in turn will help them to manage the childcare market and deliver "smart commissioning" of services.

### How open data can support childcare and family services: benefits to the public sector

The UK Department for Education found that information about available services plays an important role in uptake of childcare by parents.[30] The variety of services available and the number of different service providers can make it difficult for parents to understand what services they can use. Once launched, Famiio will improve access to the right services for families that need them. Local authorities will be better able to direct citizens to the right service by providing help better and earlier through Family Information Services and by targeting services.

In addition to providing information on available services to parents, the platform will also publish this information openly, to be reused by commissioners for gap analyses, to assist grant awards, and to be used by third parties. Famiio has the potential to help local authorities save costs in their internal information systems as information will be more readily available and it may become easier to match families' needs with the existing services.

For parents not able to or interested in using the Famiio interface, Family Information Services will be able to use the application and continue to provide more traditional support to parents. (This highlights the need for infomediaries that produce non-digital information.)

### Famiio's story

Most local authorities have a Family Information Service that provides information to parents about childcare and family services, the provision of which is a statutory responsibility of local authorities under the Childcare Bill 2016. In 2008, the government initiated a project to aggregate information on all services available to families, including services not commissioned by local authorities.

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[30] Department for Education (2016), 'Childcare and early years survey of parents 2014 to 2015',
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516924/SFR09-2016_Childcare_and_Early_Years_Parents_Survey_2014-15_report.pdf.pdf

This information was shared publicly, but not as open data. In 2012, this system was closed down under austerity measures.

Famiio was conceived to help parents access services across borders between local authorities and to protect family information from the uncertainty of government funding.

Statutory guidance for local authorities from the Department of Education specifies how local authorities should share information on childcare and family services, and suggests that as far as is reasonably practicable, data should be published in a reusable and machine-readable format based on open standards.[31]

Local authorities will be able to use the Famiio platform to meet this guidance and, once the data is aggregated into the platform, parents will be able to access it free of charge, while local authorities and service providers will pay a subscription fee.

### Insights

Funding is an essential part of an open data project. The potential of Famiio for better childcare and family services can only be realised once the organisation receives funding. Access to funding may be particularly difficult for organisations outside of government.

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[31] Department for Education (2017), 'Early education and childcare. Statutory guidance for local authorities',
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/596460/early_education_and_childcare_statutory_guidance_2017.pdf

# Pattern 2: open data for more efficient delivery chains and planning

In this second pattern, we identify examples of open data release supporting planning and delivery. The direct beneficiaries are likely to be those in public sector organisations commissioning services and those in external organisations involved in service delivery.

These examples highlight the role open data can play in better coordination between the public and private or third sector organisations involved and making the delivery of public services more effective and efficient.

# Example 2a. Local authority publication of spend data



SPEND NETWORK
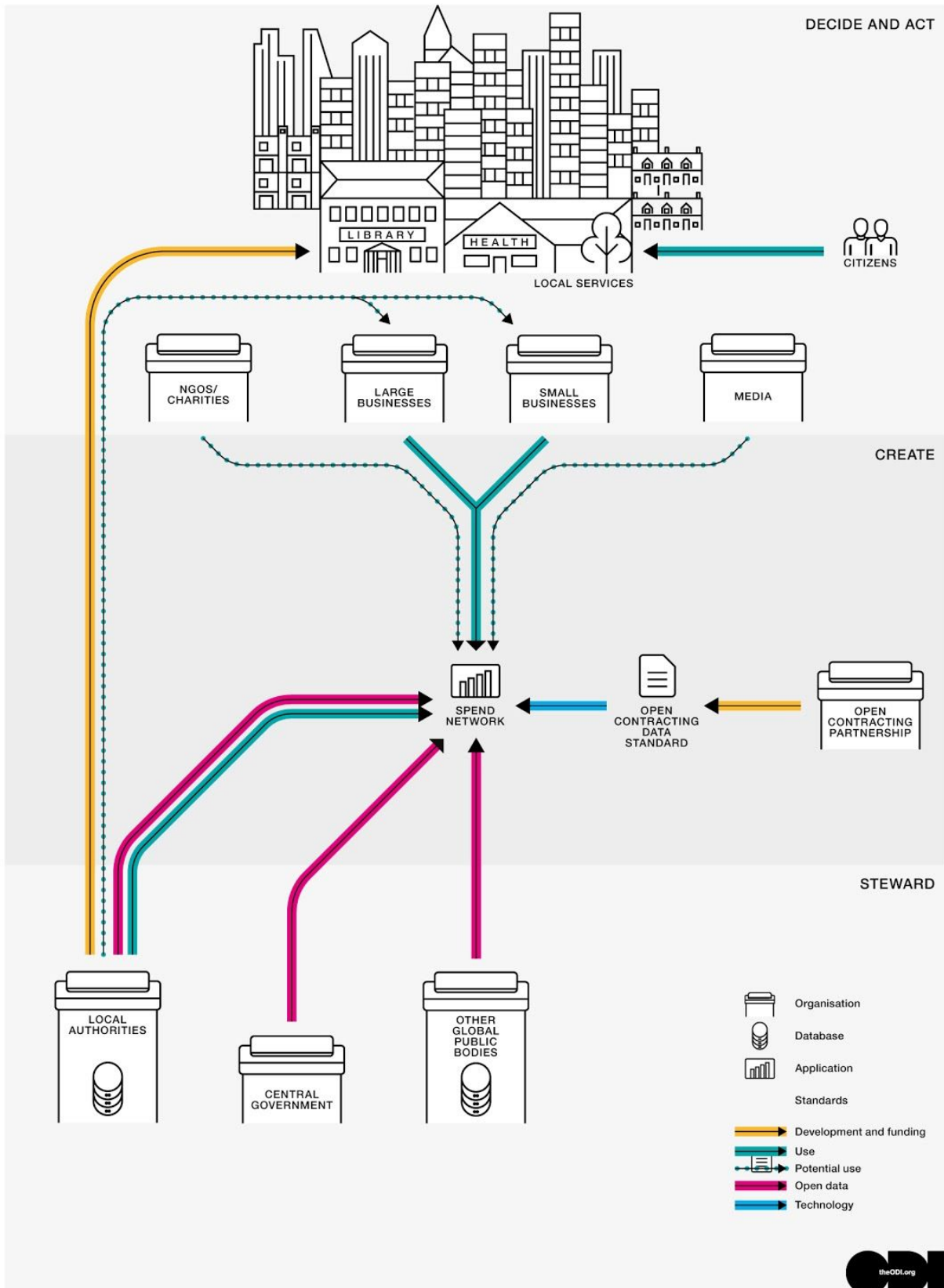
## Spend Network – in a nutshell

Spend Network pulls together spending, contract and tender data published by local authorities and other organisations in the UK. The organisation then provides insight and consultancy services to potential service providers to public sector organisations, and provides similar services back to government.

## How open data supports the delivery of local public services: benefits to the public sector

Open data published by government organisations is analysed and repurposed by Spend Network to provide analysis, which will help make delivery chains and relationships between suppliers and buyers more efficient. The same (closed) data is used to save public money and improve the quality of services delivered to citizens.

## Spend Network's story

Inspired by Windsor and Maidenhead Council – which had started to release details of their spending in 2008 – the UK government, as part of the transparency drive in the previous coalition government, set out expectations[32] of the spend and transparency data it needed UK local authorities to publish.[33] For instance, this set out that all UK Local Authorities had to publish all spending transactions over £500 and all Government Procurement Card spending and contracts valued over £5,000. The policy motivation for these commitments was to ensure that taxpayers could have insight into how public authorities were spending money.

Supported by guidance produced by the Local Government Association,[34] some local governments began to publish this data in open formats. In addition to spending data, data on let contracts was also made available.

The councils were required to publish the data on their websites. Spend Network began to pick up the data and aggregate it across many different UK local authorities. Spend Network was launched in November 2013 using open data to create the first comprehensive and publicly available repository for government transaction data, a market worth in excess of £130b per annum. Spend Network has published over 100m transactions, worth in excess of £3t. The company has grown out of Ticon, a small consultancy focused on government procurement and payments, founded by Ian Makgill.

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[32] Gov.uk (2015), 'Guidance Local government transparency code 2015', https://www.gov.uk/government/publications/local-government-transparency-code-2015
[33] See *The Guardian* (2010), 'Government data: full text of David Cameron's letter pledging to open up the datasets', https://www.theguardian.com/news/datablog/2010/jun/01/government-data-david-cameron-letter
[34] Local Government Association (2015), 'Local transparency guidance', https://www.local.gov.uk/our-support/guidance-and-resources/data-and-transparency/local-transparency-guidance

Spend Network provides services such as procurement intelligence to both small and large businesses who are providers of services to local government. It is also involved in a data reseller market to large consulting firms who then offer services back to the public sector.

Spend Network data is standardised and linked and can be used to compare between bodies, regions or sectors. The ability to compare can help with spotting patterns and anomalies, which can then be addressed to improve the delivery process. The data can also be used to compare between suppliers; for example, comparing prices can inform spending decisions and lead to more effective allocation of resources.

Spend Network also provides a service to government by re-publishing the open data made available according to the Open Contracting Data Standard (OCDS). OCDS was created by the Open Contracting Partnership and is used in many countries around the world. This makes it easier to scale. The team behind Spend Network are now using the standard and their experience gained in the UK to expand their tender-finding services worldwide using the brand name OpenOpps. FTSE 100 companies and the government use the site.

## Insights

Despite the guidance from central government on the publication of data by local authorities, Spend Network spends a lot of time and effort identifying, cleaning and analysing data. In this ecosystem, as an aggregator, they curate data, push for its publication when it isn't available, query quality issues and suggest improvements. They also lobby for data with copyrights to be published openly.

However, despite the large amount of activity on both the part of Spend Network and public sector organisations, and despite the opportunities mentioned, we are yet to identify specific examples of where the data has been used to improve procurement in a public sector organisation.

## Example 2b. NHS publication of open data

### NHS open data – in a nutshell

The NHS spends over £110bn a year delivering health services in England and has a complex arrangement for providing these services at a local level. There are many organisations who variously support and oversee the design and provision of services. Many of these organisations collect and analyse data, which is used to analyse performance and improve quality and access to health services for citizens. The ODI undertook a workshop with members of NHS England and NHS Digital to begin to map out some of the key open data uses in the NHS. The NHS is a vast network of organisations and understanding the full position of use of open data would take considerable further research and expert knowledge.

### How open data can support the delivery of health services: benefits to the public sector

The majority of data use within the NHS is individual-level data. This data is used for the delivery of direct care or, in pseudonymised or anonymised form, for research and planning. The data is made available to NHS organisations through the NHS Digital Secondary Uses Service and to outside organisations through other means with appropriate controls in place. Some healthcare trusts have data-sharing arrangements with private, voluntary or academic sector organisations who also provide analytical insight and services to organisations at various levels within the NHS. Performance improvement organisations in the NHS such as clinical audits and the Commissioning Support Units (CSUs) also use data and analysis in their work with health care trusts and Clinical Commissioning Groups.

### NHS open data story

In our very cursory consideration of this area we identified some examples of open data use. The ODI has highlighted in this blog post[35] a number of key open data sets which have been – and are being – published. A relatively well-known example of the potential of open data in the NHS is the use of open prescribing data. Practice-level prescribing data is published by NHS Digital every month. This is a list of all medicines, dressings and appliances prescribed by all practices in England, including GP practices. In 2012, Mastodon C and the Open Data Institute used this data to demonstrate the type of analysis that open data could provide. They issued a report highlighting the savings the NHS could make if they shifted from branded drugs to generic ones using the open prescribing dataset. Latterly, an organisation called Open Prescribing has been using the data to provide ongoing analysis to the health service.

There are also examples of open publication of data within the NHS that have been associated with clinical impacts. For instance, when MRSA instances were published as open data there was an 85% reduction in the number of cases,

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[35] ODI (2015), 'How can open data help improve healthcare?', https://theodi.org/blog/how-can-open-data-help-improve-healthcare

though it is difficult to disaggregate the impact that publication has from things like media activity and quality and safety improvement work.

## Insights

Although data is used routinely throughout the NHS, it seems from our initial research that the potential of open data is not fully realised. The few examples of open data publication are yet to show impacts in terms of changes to services, despite the promise that they show (eg prescribing data).

The NHS open data agenda could perhaps learn from the tactics and approaches used in ecosystems that we have explored elsewhere, where connections have been made between the potential uses of open data and its publication, and feedback loops established. We recognise that this is a more complicated undertaking given that the NHS is a complex system and its data is also complicated. There may be an opportunity to use a "problem-focused" approach at Trust level and on data which is more able to be published due to its non-personal nature (e.g. around service provision).[36]

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[36] We welcome feedback as comments in the document or in an email to randd@theodi.org

### Example 2c. Urban Intelligence publishing local planning information

#### Urban Intelligence – in a nutshell

Urban Intelligence is a PlanTech startup developing a central repository of open information on UK planning policies. A tool called Howard provides a map that links planning policy information to its relevant locations, making it easier and quicker to navigate the complex planning policy landscape. Howard offers a mapping interface that allows property professionals to click on a site and get all relevant planning policy information for that site. It is the first centralised repository of planning policy information in the UK and allows planners to assess planning risks and opportunities associated with a specific location.

#### How open data can support the delivery of urban planning services: benefits to the public sector

Spatial planning and planning approvals are public services. The process is simpler if the relevant policies for each location and project are easier to find. Local authorities can use the platform free of charge to inform planning decisions, and with planning information available online, it is quicker and easier to provide this information to developers.

#### Urban Intelligence's story

Urban Intelligence aggregates and organises information and data on planning policy from local councils, including policy documents and geospatial data. A number of local authorities have published their geographic data openly on data.gov.uk via Ordnance Survey's "Presumption to Publish" process.

Not all local authorities currently publish geographic data openly, which means the platform can't currently cover these areas. Urban Intelligence works closely with local authorities to encourage them towards an open data approach. As a member of Ordnance Survey's Geovation Hub and as Ordnance Survey's partner organisation, Urban Intelligence has been developing their map feature using Ordnance Survey MasterMap. OS MasterMap is a source of highly detailed geographic data about Great Britain, offering topographic, imagery and networks layers. OS MasterMap data is not open, but the Autumn Budget included a commitment that could lead to OS MasterMap data being made available as open data.[37] Open OS MasterMap data would encourage more services like Howard to emerge.

The product is used by private sector organisations (planning consultancies, architecture practices, property developers, etc), who are often interested in understanding policy frameworks within and across different councils. Equally, local authority planning officers are provided with access to the platform for free to aid their work and service provision.

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[37] See ODI (2017), 'What will the UK's Geospatial Commission look like?', https://theodi.org/blog/what-will-the-uks-geospatial-commission-look-like

## Insights

Local authorities differ in the types and amount of data they publish openly. Actively working with them to support the release of open data to achieve benefits for the public sector appears to work well. There may be potential for peer-to-peer networks of local authorities at different stages of their open data progress. The development of new tools and approaches is made easier when geospatial data is made as open as possible. This should form part of any strategy to build stronger data infrastructure at local or national level.[38]

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[38] https://theodi.org/what-is-data-infrastructure

# Pattern 3 – Open data for policy development

Finally, this group of examples centre around open data informing policy development and strategic direction. In these, the direct beneficiaries are involved in policy and strategy for the development of public services. Openness improves access to data across different branches of government and beyond, which can then be used to inform policy decisions.

# Example 3a. The Department for Work and Pensions development of Churchill
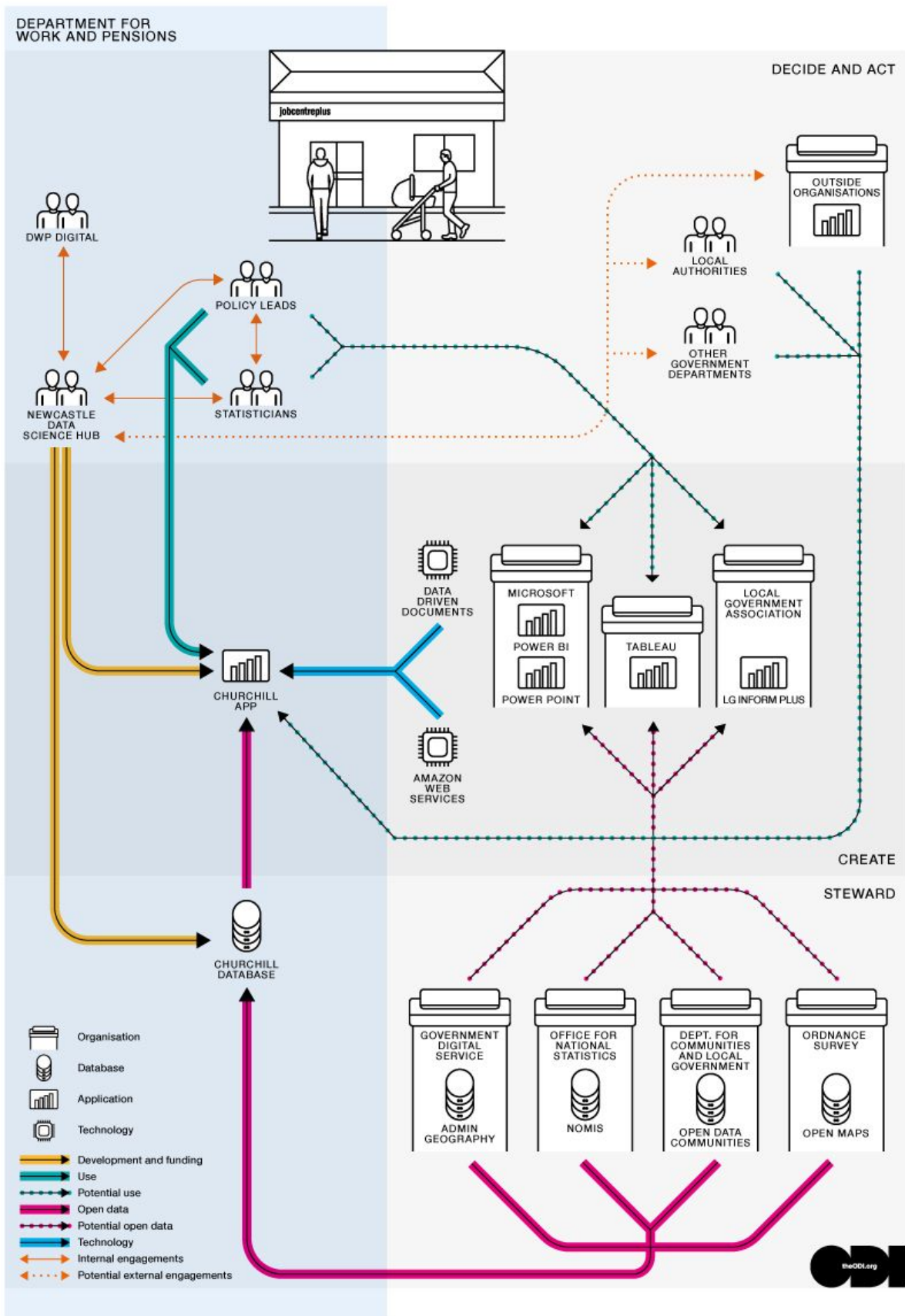
## Churchill – in a nutshell

Churchill is the working title for a digital data service being developed by the Department for Work and Pensions (DWP) that is run entirely on open data APIs and data published in CSVs from UK government sources. The service is a combination of a data visualisation tool built on D3 javascript libraries and a Mongo DB backend. This video[39] explains Churchill briefly.

## How open data can support the delivery of DWP services: benefits to the public sector

Churchill helps policy and delivery officials in DWP to develop more evidence-driven policy and services with data visualisations pulled from open data across government.
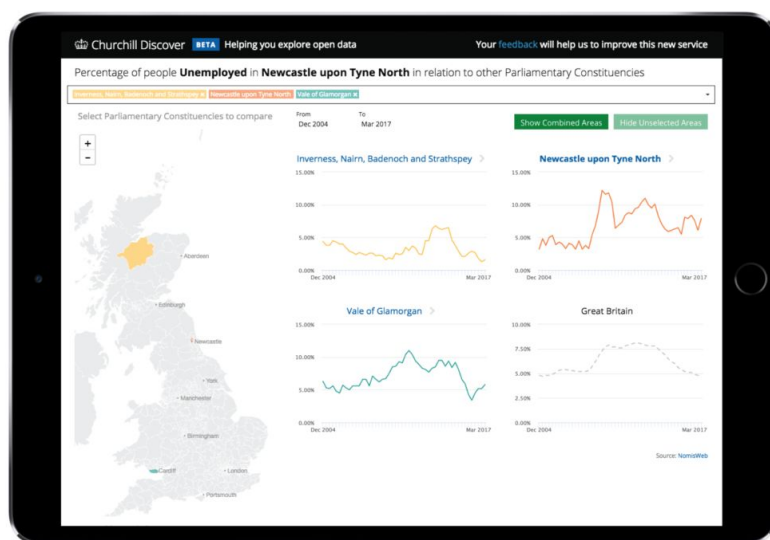


## DWP Churchill's story

The DWP has a history of making its statistical data available to the public through statistical publications and more recently through the online portal Stats-Xplore. There was a renewed expectation that the department would become more digitally driven,[40] which has included data. This resulted in some organisational restructuring to bring data teams and digital teams together. The new Director General, Mayank Prakash, also made a commitment to "driving hard for visualised analytics to be the norm not the exception".[41]

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[39] Youtube (2017), 'Churchill, making better use of data',
https://www.youtube.com/watch?v=hn-Utxqjthg

[40] DWP Digital Blog (2017), 'DWP Digital: Delivering the government transformation vision',
https://dwpdigital.blog.gov.uk/2017/02/17/dwp-digital-delivering-the-government-transformation-vision/

[41] Digital Leaders (2017), 'Transformation and Innovation – use of data analytics in designing services',
https://digileaders.com/transformation-innovation-use-data-analytics-designing-services/

One of the data science teams based in Newcastle began exploring the user needs of policy colleagues in the DWP who use data to inform policy and service design. They undertook extensive user research with policy colleagues at Grades 6/7 about what their needs were, and then developed a persona and elaborated the user needs for a new data-driven product. This work captured the level of data literacy as well as the current workflows and packages being used. They also considered other products and services that could be used by policy professionals and analysts in the DWP, such as LGInform developed by the Local Government Association, which pulls together data from DWP as well as data published by local authorities. The eventual approach to the product was inspired by the world of data journalism, including that used by ONS on their ONS.visual site, which creates a number of statistical visualisations based on user research.

An prototype of the software was developed in DWP. It draws on data available from open data APIs across government, which is then copied into a database and updated regularly. A key part of the development was to make sure that the platform satisfied DWP security protocols – the system was set up from scratch. The frontend visualisation is run on the D3 javascript library. Part of the development of the product has been working in the open.[42]

There were a number of reasons for using open data to power the service. First, in some instances, it is easier to access open data than it is to access shared data. Second, some of the interviewees saw open data as trusted data as it has gone through a process of quality assurance prior to publication. The product was launched internally to demonstrate the possibilities to colleagues. Subsequently, Churchill has attracted interest from other government departments and has been profiled externally[43] as well as having had interest from the Canadian and Australian governments.

The main potential impact of this use of open data and the development of Churchill is likely to be the reduced amount of time that policy colleagues and analysts in the DWP will need to spend accessing, cleaning and analysing data. This may also support more iterative and agile policy development as issues can be investigated more quickly. Potentially, the tool could help release the resource of an analyst.

Quicker data access and analysis can free up resources to better focus on policy and strategy decision-making. In addition, better data quality and better data visualisation can support more informed policy and strategy decisions. Availability of data visualisations of related services means it is easier to spot dependencies and relationships that need to be considered in service design and the direction of policy decisions. An example of this could be more effective job seeker allowance policy. This is in line with government aspirations set out in

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[42] DWP Digital Blog (2017), 'Data for people who don't like data', https://dwpdigital.blog.gov.uk/2017/02/24/data-for-people-who-dont-like-data/
[43] apolitical (2017), 'How can policymakers get the most out of data? Ask Churchill', https://apolitical.co/solution_article/can-policymakers-get-data-ask-churchill/

the recent Government Transformation Strategy[44] to make better use of data by making it available for internal uses through APIs.

If the tool was shared across government there would also be a strong value-for-money benefit in the reduction of each department procuring individual solutions, as well as the productivity impacts. In the longer run, it could support greater standardisation of geographical data across government as civil servants will be more able to spot the datasets that need standardisation by attempting to use them through the tool. Use will also likely highlight anomalies or inconsistencies, which will help to improve the quality of government open data as there is a greater link between those who collect the data and those who are using it.

## Insights

The release of open data has brought innovation within government. Churchill's development by a team within DWP is only possible if data is opened up; open data innovation leadership can come from unexpected places.

Digital transformation tools and approaches have supported the development of a data product. One of the key drivers of Churchill's development was that it was incorporated within a broader digital transformation agenda within the DWP, which gave energy and process to the development.

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[44] HMG (2017), 'Government Transformation Strategy', https://www.gov.uk/government/publications/government-transformation-strategy-2017 -to-2020/government-transformation-strategy#build-better-tools-processes-and-govern ance-for-civil-servants

# Example 3b. Cabinet Office release of government grants data
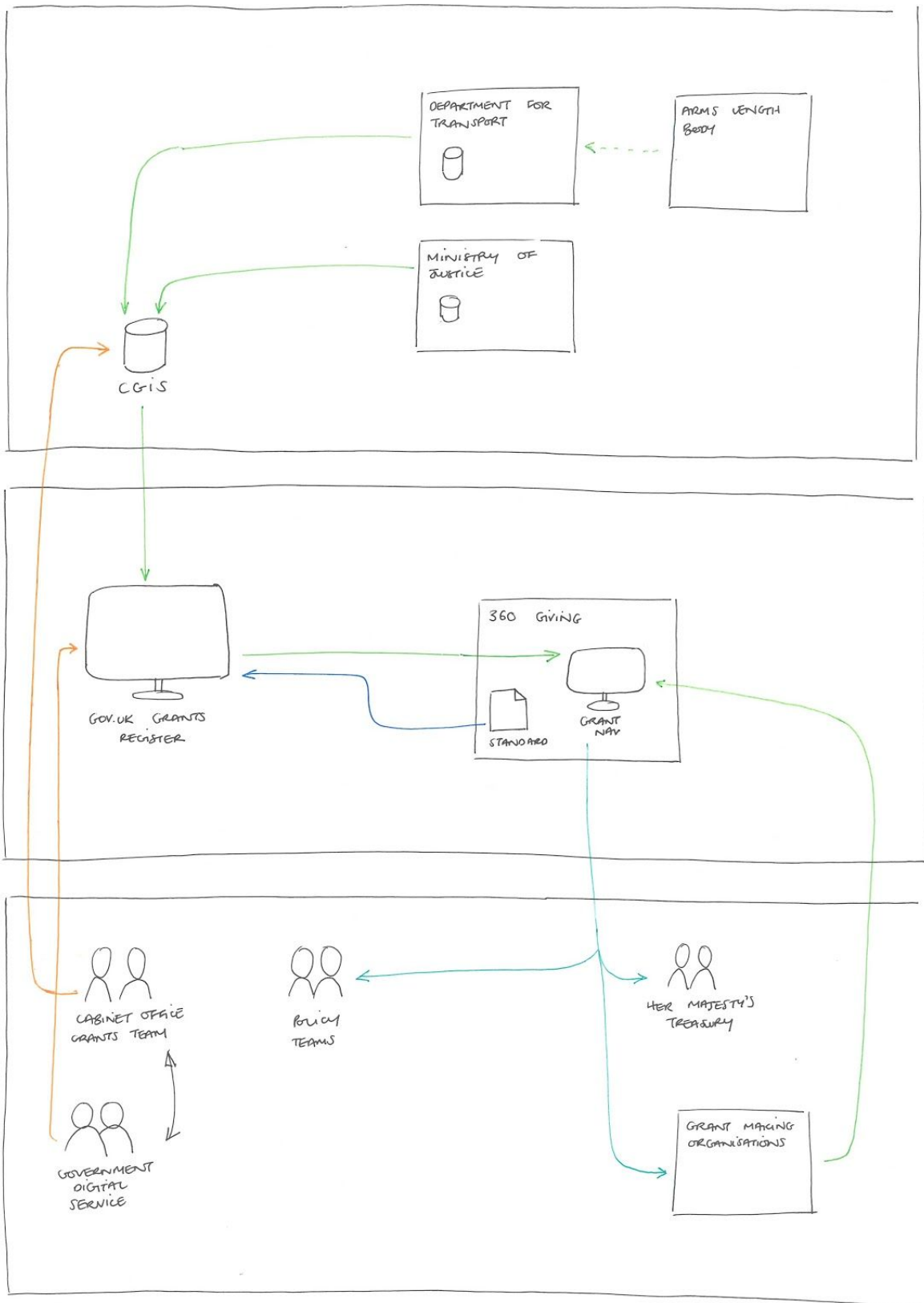
### Government Grants Information System – in a nutshell

The Government Grants Information System (GGIS) provides information on grants worth £100 billion (2016–2017) from 16 government departments.[45] Grants range from government funding for schools, to UK Sport grants, to funding for bus service operators.

### How open data can support the delivery of grant-funded public services: benefits to the public sector

Access to grants data provides government and external organisations with opportunities to assess resource allocation on a national as well as on a more granular level. This contributes to transparency, efficiency and effectiveness in government.

### Government Grants Information System's story

The grants team within the Cabinet Office receive data from 16 central government departments (including HM Treasury, who make payments to departments to award grants but who also issue grants directly) on the grants they pay out to about 35 organisations – for example, schools, UK Sport organisations, or bus service operators. The total annual amount of grants in GGIS is about £100 billion.[46]

The 16 departments use their individual legacy systems to manage data. To arrive at a common format, the departments transfer the data into a template spreadsheet, which they send to the grants team in the Cabinet Office, where all data gets aggregated in GGIS. Grants are structured in schemes, which are broken down into individual awards. The majority of grants data is broken down into awards but some of it is on a scheme level. The system generates unique identifiers on an award and scheme level to allow detailed analysis. This data is openly available to download in csv format.

The Cabinet Office use the data internally to inform policies and spot opportunities for efficiency gains across government. GGIS data also feeds into the government grants register, where it can be downloaded in csv format. The data also feeds into 360Giving, who support funders to publish their grants data openly and in a comparable way on the open data platform GRANTNAV, under the 360Giving Standard.

GGIS offers transparency in the grants system, which makes up a substantial share of the UK budget, and allows anyone to use this data to analyse grant flows in the UK. Central government benefits from having a single source of data in a common format to get a broad view across departments and to design an intelligent grants system.

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[45] Gov.uk (n.d.), 'Government grants register', https://www.gov.uk/government/publications/government-grants-register

[46] Gov.uk (n.d.), 'Government grants register', https://www.gov.uk/government/publications/government-grants-register

Individual departments benefit from understanding their own grant flows better and identifying overlaps or synergies with other departments. As services become more integrated, departments need to break down silos and understand their role as part of a larger ecosystem; having sight of grants can help with that. Open grants data also enables an assessment of particular programmes that are run across departments.

360 Giving have launched a [Challenge Fund](#)[47] to identify what questions need answering and how open grants data can help. Participants submitted questions about the geographical distribution of grants[48] and the types of organisations that receive grants.[49] This initiative suggests that open grants data is used to answer important questions about access to funding for the delivery of public services.

Outside of government, the media, civil society and individual citizens can use data to analyse grant flows or find out how much funding a local organisation receives. Grant recipients can compare their own grants with those of similar organisations and prepare targeted applications.

If open grants data is linked with [Open Contracting](#) data from the Crown Commercial Service, it would be possible to identify the total amount of funding received by an organisation in grants and project funding.

Open grants data refers to grants awarded. Ideally, in future this could be compared with actual spending to get a full picture.

### Insights

Sourcing data from different departments with their own legacy data management systems and publishing it on different databases highlights the importance of common data standards and formats that make it possible to aggregate and compare datasets.

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[47] 360Giving (2016), 'Challenge Fund – seven weeks in', http://www.threesixtygiving.org/2018/01/03/challenge-fund-seven-weeks-in/
[48] See for example Forum 360 Giving (2017), 'Profile by where there are geographical gaps?', https://forum.threesixtygiving.org/t/profile-by-where-there-are-geographical-gaps/133
[49] See for example Forum 360Giving (2017), 'Core or project funding', https://forum.threesixtygiving.org/t/core-or-project-funding/121?u=natalia

# Insights from examples

There are some similarities across the examples which are worth elaborating on. We can group these in terms of organisations and processes, and in terms of effects and outcomes.

## Organisational collaboration

A key characteristic is that each of the ecosystems is made up of organisations that all play a discrete role in the delivery of a public service.

This characteristic is perhaps highlighted by the fact that in none of these examples is one organisation responsible for the end-to-end delivery of public service. Each of these public services in each of the ecosystems can only be delivered if a number of organisations and individuals within those organisations have the resources and appropriate knowledge to do their jobs correctly. When working across organisations, the need for easy access and use of data becomes even more important. In this way, open data can be said to be a key ingredient in ensuring greater coordination, more efficiency and a better end-user experience.

- In the Leeds City Council example (1b.), Bartec and imactivate jointly deliver the waste collection service
- In the Urban Intelligence example (2c.), local planning involves councils, developers and landowners and planning is made more efficient by the service offered by Urban Intelligence

## Technology infrastructure, digital skills and literacy

Another aspect of each of the ecosystems is the importance of technology. There is a minimum level of digital infrastructure, skills and literacy, and capability needed for public-sector organisations to make the most of open data in their public-sector delivery model. This does not just relate to the technology within the public sector but also within the wider ecosystem of the private sector and civil society.

- In the Leeds City Council example (1b.), Leeds City Council saw value in open data and technology for local service delivery. This led to an exploration of how open data can solve real problems and made the development of the Leeds Bins app possible.
- In the Familio example (1c.), guidance from the Department for Education on the potential of open data for service delivery is an important success factor. In order for councils to make use of the data, a minimum level of digital skills and literacy are necessary.
- In the Cabinet Office example (3b.), a dedicated team in the Cabinet Office, through their understanding of the opportunities provided by technology and data, support the establishment and use of the Government Grants Information System.

## Foundational data infrastructure

A data infrastructure consists of data assets, the organisations that operate and maintain them, the technologies and processes required to use the data, and more[50]. Strong data infrastructure opens up new opportunities – it makes it easier for others to use data to create new products and services, or develop new insight, and it can support diverse data ecosystems. Often, data infrastructure will include foundational datasets that support a broad range of uses, particularly if made available as open data that anyone can access, use and share.

There are a number of key types of datasets that support the different ecosystems we have identified. Given the nature of the discussions in the interviews and workshops we held we cannot necessarily be sure that the most important datasets were always highlighted, although geospatial data such as maps, addresses and boundaries were of particular importance in at least half of the ecosystems. They help members of the public and people within government make sense of other data.

- In the TfL example (1a.) data describing the location of stations is often used to help people access the most relevant transport options nearby.
- In the Urban Intelligence example (2c.), geographical data is at the core of the tool Howard – which provides a map that links planning policy information to its relevant locations – making it easier and quicker to navigate the complex planning policy landscape.
- In the Churchill example (3a.), administrative geography data is important in understanding relationships with other open datasets.

## Open standards for data

Data standards were used in open data releases across most of the ecosystems. For instance, a data standard was developed following the development of the Leeds Bins app.

- In the example on local authority spending (2a.), two international standards have been central to reducing the additional data preparation and increasing the value of the data released.
- In the Cabinet Office example (3b.), receiving grants data from different departments across government with their own individual financial systems highlights the importance of standards.

## Senior-level championing

In many of the examples, we found that systems matured best when the open approach was championed at the senior level. This can be a councillor, minister or a senior individual, depending on the type of organisation. These senior leaders highlight the strategic opportunity that the organisation has in releasing open data, prioritise resources to focus on it, and give cover for others to overcome internal resistance elsewhere in the organisation.

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[50] https://theodi.org/what-is-data-infrastructure

- In the Leeds City Council example (1b.), the City Council's drive and initiative has been a key success factor, which led to problems being articulated, solutions being developed, open data being included in the contract with Bartec, and finally the Leeds Bins app.

## Peer networks

As well as the senior leaders in these ecosystems, there was also a pattern of peer networks across organisations helping to encourage development. Equally, closed data ecosystems can be developed with networks and connections among key individuals. However, in the case of these open data ecosystems it seems that influential networks may use different, more open, channels and approaches – for instance connections through Twitter, blogging, and unconferences such as Open Data Camp, LocalGovCamp, etc (2a.).

This is currently anecdotal, and further research could look in more detail at whether there is clearer evidence that processes and opportunities like these have made a difference in the approach that some of these open data ecosystems have taken.

## Intermediaries

Key players within many of these ecosystems (1a., 2b.) are data intermediaries, organisations which have a specific role in ensuring that the open data the public sector organisations make available is usable by other organisations. These intermediaries take data published openly or shared by the public and private sector and can undertake a number of activities such as aggregating data from a number of sources, standardising it and making it more usable by others. The role of these organisations is not always obvious from a cursory description of the effect of open data and can be missed from a description of how open data is actually used to deliver a service. The exact form of the intermediary and the activities they undertake can also belie the maturity of the particular ecosystem.

- In the Familio example (1c.), different providers, coordinated by the council, deliver childcare and family services, and Famiio improves access for citizens. The example highlights that it is important to consider intermediaries and the role they play in the delivery of a service.

## Problem focus

Where services have more successfully integrated open data in their delivery, they have had processes that work to solve a particular problem that the organisation is focused on rather than publishing open data for the sake of it.

- In the DWP example (3a.), the team developing the Churchill service took a user-centred design approach to understand how government policy officials used data, and then sought out relevant open data to incorporate into the product.
- Similarly, in the Leeds City Council example (1b.), the app came out of an acceleration programme to identify service issues which could be tackled

through the use of data and identified a specific problem of citizens not knowing when their bins will be collected, which then drove the development of a solution in the form of the Leeds Bins app. Different approaches might also be successful in identifying how open data can support the delivery of public services, but focused activity might be able to identify opportunities more easily.

- In examples 2a. (Spend Network), 2b. (NHS) and 3b. (Cabinet Office) we can see a focus on the publication of open data rather than on a problem. This might explain why these ecosystems are less mature in their development than some of the others and why we found fewer use cases.

## Open innovation

Early releases of open data seem to have helped push forward and identify further possibilities for improvement, which created impact in service delivery. For instance, in the case of TfL the release of a small number of datasets as feeds eventually led to the development of a more open [API](#) system – a development which might not have happened if closed data-sharing agreements had been made. In addition, in several of the ecosystems we concluded that choosing an open approach to data publication has attracted more external interest and involvement than if the public sector organisation had taken a closed approach.

- As an example, TfL are now be able to claim the involvement of more than 14,000 developers in their data, which would have been difficult if they had had to make arrangements to grant each of these specific access.
- In examples 1c. and 2c., organisations outside the public sector have developed solutions for problems in delivering public services. This is made possible by sharing the challenges and releasing the relevant data openly.

# Recommendations

*Based on the work undertaken so far, we have developed recommendations for a range of actors in order to support greater use of open data in the delivery of public services.*

These are initial ideas: we would value feedback on them[51] and will also test them throughout the rest of the project. We have organised them according to the main insights that we have identified from the research so far. These recommendations are also based on the experience the ODI has gained [working with governments internationally to develop their open data programmes](.)[52]

The main audience for the recommendations are those working in the public sector and thinking about how to support their open data ecosystem to help deliver their public service. However, we have also identified specific ways that central government could support each of these aspects and have flagged these up where relevant.

## Organisational collaboration

- In starting to explore the ways in which open data can support the delivery of a service, be clear about which organisations are involved, both within and outside of government.
- Recognise that there are players in an open data ecosystem beyond publishers and users. How data is licensed and published shapes those ecosystems by making some roles more or less viable.

### Central government recommendation: fund public sector organisations to experiment with using open data to support the delivery of public services

The availability of funding for activity is a key determinant of activity. We received 24 responses to the invitation to tender for the Stimulus Fund aspect of this project. We could have funded more consortia if we had had the resources to do so. There is clearly appetite within local government to undertake experiments in this area but there are funding challenges. Central government should consider funding further activity in this area to help develop these new patterns and deliver better services to citizens.

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[51] We welcome feedback as comments in the document or in an email to randd@theodi.org.
[52] ODI (2015), 'Open data in government: how to bring about change', http://opengov.si.md/wp-content/uploads/2015/02/255887396-Open-data-in-governme nt-how-to-bring-about-change.pdf.

# Technology infrastructure, digital skills and literacy

- Consider how a focus on the potential of open data to support your service could be undertaken as part of any digital transformation in your organisation.
- Ensure that you have the appropriate underlying technology and skills.
- Support staff to use open data in public service delivery with practical tools and approaches

**Central government recommendation: train public sector staff how to use open data in public sector delivery**

In the fieldwork, participants referred to the Government Digital Service (GDS) leadership on service design as best practice. This extended to the curriculum for the GDS academy and the GDS service design manual, which were influential both for public sector staff and the training courses they received from public and private sector training providers.

As part of the expansion of the curriculum of service design training towards covering data and technology roles and digital competencies, we recommend developing specific content for this. This would build on some of the insights from this research to help those in non-technical roles understand how open data can support services at a strategic level. By including content on this topic in the core curriculum, we would hope to influence broader training activity to also encompass this topic and hence increase use of open data in public service delivery.

# Data infrastructure

- Public services are underpinned by data infrastructure.[53] It is essential that this data infrastructure is as open as possible, while respecting privacy, to support innovation and encourage the creation of efficient and effective services.

# Open standards for data

- Explore whether open standards are already developed for the data that your service supports.

# Senior-level championing

- Ensure that senior management and elected representatives are aware of the opportunities to use open data to deliver your services and champion its use in delivery.

# Peer networks

- If you have not already, join existing networks on Twitter and through unconferences such as UKGovCamp and LocalGovCamp.

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[53] https://theodi.org/what-is-data-infrastructure

- Create a network of those who are interested and involved in using open data for public service delivery.
- Allow members of your organisation to network across and outside your organisation.
- The ODI has recently published a [methods paper on developing peer networks for open data leaders](#) which contains more recommendations for activities.[54]

## Intermediaries

- When looking to elaborate the broader ecosystems, identify and establish relationships with intermediary organisations who are adding value by taking and transforming their data for other purposes.

## Problem focus

- Focus initial discussion of an open data approach to service delivery on the issue you are trying to improve in the service rather than the data that is available. Always link the benefits of the publication or use of open data to your organisation's overarching or fundamental goals and objectives.

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[54] ODI (2016), 'Method report: Peer networks for open data leaders', https://theodi.org/method-report-peer-networks-for-open-data-leaders

# Next steps

*To carry the research findings forward, we will pilot learning materials and continue working with the Stimulus Fund consortia to experiment with redesigning public services using open data.*

## Learning materials

We are developing and testing a range of learning materials with different audiences within the public sector.

These will build on the learnings from this report and the materials which are being developed by the four consortia that are part of the Stimulus Fund.

Specifically, we will also continue to develop the ecosystem mapping methodology. So far, in the fieldwork and broader engagement undertaken in this research, we have received positive feedback regarding ecosystem mapping as a way to elaborate and understand how open data can make public service delivery better.

We will further develop the methodology in the remainder of our research. In particular, we will:
- adopt the methodology to document the work undertaken in the four Stimulus Fund consortia
- examine how this methodology can be used as one of the learning materials developed in this project
- extend the methodology to other aspects of the ODI's R&D programme, including its open standards for data project
- explore how this methodology can more systematically capture the commonalities identified between ecosystems in this research, such as the foundational data, open standards used, etc.

## Stimulus Fund

The four Stimulus Fund consortia will finish their redesign of a public service using open data. They will create design patterns and capture the effects open data has or will have on the delivery of their public service. Along the course of the funding period, they will capture their learning and develop tools and approaches that they find useful as part of their redesign process. We will share the design patterns, tools and approaches openly on ODI's website as resources for other councils that want to redesign public services using open data.

# Method

Having settled on a working definition of a public service, we started our research by compiling a database of UK and international examples to identify which examples to pursue.

These examples came from three sources. First, there were those which were already known to members of the ODI through its global work with the public and private sector.

A second source was a broad internet search and screening research organisations that had similarly been focusing on the open data agenda. This included organisations such as Open Knowledge, GovLab, the Knight Foundation and Sunlight Foundation, amongst others. In addition, we looked at open data portals where they listed examples of use.

Finally, we undertook a search of reports and other documents published on the topic of data use within UK government, with a specific focus on open data.

We supported this secondary research by primary research interviews with experts from the community. These interviews highlighted examples and helped to develop and expand our approach and explanatory framework for the rest of the project.

The details in the examples were mostly captured in workshops with individuals who had a close working knowledge of the area. We spent the majority of the workshop time working with the participants to draw a rich picture of the example identified and talking through the key aspects that emerged.

Working with illustrator Ian Dutnall, we have translated these rich pictures into more schematic diagrams and accompanied them with a written description of the key characteristics of each. We have tried to make these examples as comparable as possible but due to their subject matter and the insight of the individuals, there may be differences in detail.

In the process of developing the illustrations and drafting the descriptions of the examples, we have reconfirmed the detail with relevant individuals and, where appropriate, have omitted commercially sensitive or otherwise confidential information at their request.