

WISE COUNCIL

**INSIGHTS FROM THE CUTTING EDGE
OF DATA-DRIVEN LOCAL GOVERNMENT**

Tom Symons

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Any omissions and errors are those of the author.

Tom Symons



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Foreword - LGA

The common observation that ‘information represents power’ is never truer than in the area of local government. As providers of over 900 unique local services for the people and places we serve, councils assemble vast quantities of business and transactional content as part of day-to-day operations. This mountain of data provides the potential for impressive analytics, further innovation and a powerful evidence base.

It is only in recent years, however, that the potential for making better use of data within local government has been considered in earnest. The challenges of austerity, along with a drive towards improved efficiencies and transparency in the public sector have encouraged the creation of a more reliable evidence base from which decisions for future directions can be taken reliably.

Whilst local government has assembled these huge quantities of data, data base connectivity has been confined to a smaller number of forward thinking authorities. Silos of data are widespread in local government and, whilst they support their primary functions successfully, opportunities have been missed because data between councils (and even within councils) are often incompatible for connection, sharing and wider re-use for other purposes.

But information management practices within local government have improved substantially over the last decade, largely driven by the move towards increasing electronic delivery of services, a drive for productivity gains and improvements in the capabilities and skills of IT resources. It is arguable that local government is one of the most advanced sectors in relation to the work and progress made in the area of information standards and data collection.

When done well, information management is not restricted to IT standards and process monitoring. A whole raft of other important considerations are essential for a fool-proof local information infrastructure. Examples include: quality control measures, security, governance, data cataloguing, sharing protocols, timeliness of update, licensing and release.

There are a number of impressive success stories where pioneers have addressed the essential considerations above and have used data to support decisions and improve services or reaped the other benefits that better use

of data can bring. These examples all required navigation of a series of barriers, direction changes, mistakes and strategy refinement along the way. However, the experience and lessons learned can encourage other local authorities to engage and move forward in similar ways.

During 2016, the Local Government Association teamed up with Nesta on their Local Datavores work, a research programme which seeks to explore how local authorities can use data better to improve the lives of people and communities. This involved engagement and research with groups of experts (data analysts, project managers, IT specialists and senior leaders) in local authorities and their partner organisations. From the information gleaned, the project team was able to review and analyse councils’ uses of data. The result is a powerful and impressive list of innovative and successful projects. This report summarises the key findings and bases its content on a series of case studies drawn from widespread geographical locations and very different areas of local government responsibilities.

We hope that the materials provided in this report will encourage other local authorities (and their local partners) to begin to move into this space and feel confident that there are good sources of experience and support to help them make better use of data. For everyone, we can take heart that highly skilled data practitioners are in post, working daily to improve the use that is made from local data sets; and that, by working together, all authorities can benefit from the learning and experience of these pioneers and improve the use they make of data for local and regional decisions and service transformation.

Councillor William Nunn

Chairman, LGA Improvement and Innovation Board

Executive summary


Think of a local government service area and the chances are that data can be used to improve it. Whether it's protecting vulnerable children, supporting older people to return from hospital independent and healthy, collecting the bins, fixing housing repairs, gritting the roads, or helping local businesses to grow, data can help councils to perform these tasks better. This report explores the many and various ways in which councils are already using data to make their services more effective, manage budget cuts and support the local economy.

This report, the second in the [Local Datavores series](#), uses case study research to profile some of the most pioneering uses of data in local government. It features a wide range of councils that have been using data to inform decisions about adjusting to a harsher financial climate while maintaining high quality service levels. The research has explored the specific ways in which data can benefit people and communities, and how councils can make this happen. The report is aimed primarily at helping local public sector staff, from senior commissioners through to frontline professionals, get more value from their data.

The research has involved nearly 40 interviews with data analysts, project managers and senior leaders in local authorities and their partner organisations. Through these interviews and a literature review, the research analysed councils' uses of data, impact, their mindset and methodology, the challenges they encountered, the critical success factors they identified, and how these innovations could be scaled-up.

How and why councils are using data

The case studies revealed myriad ways in which data and analytics are helping councils across a wide range of statutory and discretionary services and responsibilities. The research found that the benefits are also many and numerous, helping councils to save money, make their staff more productive and their services more effective, support local businesses to grow, and reduce environmentally harmful activities. The ways councils are using data to realise these benefits - the key use cases - fall broadly into 11 areas of local government activity:

Activity	Example use case
 Optimising management of place and infrastructure	<p>Birmingham uses data from temperature sensors in roads to inform where gritting vans are required in icy or snowy conditions.</p>
 Testing ‘what works’	<p>Kent’s integrated data set in health and social care enables rigorous testing of the impact of services and interventions.</p>
 Intelligent case management	<p>Manchester’s integration of data from multiple agencies gives social workers rapid insight into family needs and circumstance during triage and assessment.</p>
 Outcomes-based performance management	<p>Suffolk’s shared health and social care outcomes framework align incentives between multiple organisations towards the same objectives.</p>
 Early identification of adverse events and future service pressures	<p>Newcastle’s data analysis identified the factors which are most predictive of a child becoming NEET, enabling earlier intervention.</p>
 Understanding and responding to citizen needs	<p>Bristol uses plastic, sensor-equipped frogs to collect data which help residents report and manage damp in their properties.</p>
 Informing public service transformation	<p>Newcastle’s data-informed changes to children’s social care services help social workers deal with complex family needs better.</p>
 Streamlining operational council processes	<p>Camden’s Resident Index automates data integration, makes services more responsive, and eliminates duplication in the back office.</p>
 Opening government	<p>Leeds’s open data portal for councils in the North of England creates transparency and frees up officer time from the burden of Freedom of Information requests.</p>
 Supporting the local economy, businesses and innovation	<p>Leeds’s Innovation Labs provide a space for local developers to experiment with open data sets to solve social problems, and develop viable new products and services.</p>
 Identifying fraud and error	<p>Camden’s Resident Index can automatically check for the anomalies and discrepancies which indicate fraud and error.</p>

Data-led innovation - making it happen

Realising these benefits is neither straightforward nor insurmountable. Any council undertaking data-led innovation should expect to encounter at least some of the challenges the case study councils contended with. For instance, they are likely to find they need to spend time making their data of useable quality, that legislation about information governance will offer few black and white answers, or that pulling data together from legacy IT systems will feel harder than it should. Councils undertaking data work are likely to share the case studies' experience that embedding data and analytics in council services and decision-making can be challenging for some working cultures and staff.

The case studies covered different types of data work in different council service areas, but there were striking similarities in what they told us about how to make data projects work.

Many reported that they had sought expert legal guidance and invested significant staff time in developing highly specific information sharing agreements. Data quality was usually tackled head on, by attempting to use the data, exposing and fixing quality problems. To help their colleagues and working cultures be more receptive to using data they engaged with end users about their needs and requirements. They built data models and analysis that responded to these needs, for instance saving staff time or helping them do their jobs better. Their working methods involved starting small, being flexible, testing and iterating, often without a fixed idea of what the final product would look like. Finally, they all worked to bring senior managers and leaders on board as champions of their work, helping them push through barriers such as a reluctance to share data or use data tools in day-to-day work.

Taken together, the experiences of the case studies can be seen as a how to guide to undertaking data-led innovation in local government. The lessons they learnt can be lessons for the whole sector. Collating these insights offers a ten-step guide to data-led innovation in local government:

1. Start with a clear problem to be solved, for which data can offer impactful and actionable insight.
2. Gauge the level of support for data-led work in senior leadership and work to convince them of the importance of the project.
3. Start small, engage with end-users to find out where and how data could be used to make their day-to-day work easier.
4. Be clear about ultimate objectives and how these will be measured.
5. Ensure there are realistic financial and staff resources allocated to the project.
6. Approach the work through a series of short, repeatable work cycles, which enable rapid development, testing and iteration.
7. Secure dedicated expertise for information governance and be specific about the purposes of sharing data.
8. Test the product with end-users and take on board their feedback.
9. Be receptive to making decisions informed by data.
10. Evaluate the overall impact of the work against the original objectives.

The work profiled in this report has all happened recently, in the period from 2011 onwards. Even in that short period, analytical capabilities have increased massively, as has the ambition of local authorities to use their data. The opportunities to get more value from data are increasing all the time.

There is a range of ways in which progress can be accelerated:

- Opportunities to embed more data analysts with frontline staff and in management teams should be explored to promote further data-led innovation.
- There is a need for a programme which can spread the knowledge and expertise of the people involved in these and similar projects.
- The integration of data across local authorities brings huge potential and a quicker route to impact. This should be a feature of devolution deals and other local partnerships.
- More systematic evaluation is required to ensure we are continuing and replicating the right data tools and analysis.
- And finally, there is scope for the learning about how to use data better in local government to be turned into practical tools and resources to help other councils.

Over the next year, Nesta will be exploring these opportunities and others to help government - central and local - get more from the data they hold. This report features ways of using data which are having hugely positive impacts for people, communities and councils. We want these to be the start of the story, not the end.

Introduction

At the outset of government austerity in 2010 there were two dominant ideas about how to address public sector funding and service pressures; streamlining and sharing back office services to reduce waste, while integrating and coordinating frontline services across the whole local public sector so that they are more effective. As councils have followed these two approaches, it has become clear that one of the essential ingredients in making both work is the better use of data and analytics.

Local authorities sit in the middle of a web of information. Everything from social care for vulnerable children, waste collection, procurement, council tax collection to planning applications produces huge quantities of data. This data is sometimes garbled, hard to analyse or personal and sensitive. But it is potentially very useful in helping councils to make services more targeted and effective, to allocate resources to where they will have the biggest impact, to save officer time in front and back office processes, and to provide insight into the causes and solutions to costly social problems.

Running a city or a local authority is to a great extent about managing and responding to information. Increasing digitalisation of services, the use of sensors and other forms of data collection mean that there are emerging data sets which capture the wide variety of activities performed by councils. And while big data presents opportunities for local councils, there are equally important opportunities presented by smaller data sets already available to councils. Whether the data sets are big or small, there are major benefits to be had from using them more intelligently, sharing them more widely and making them more open.

The need to do this has scarcely been greater. Local government is entering its seventh year of austerity, with spending cuts set to continue until 2020 at the earliest. The central government grant is forecast to be reduced by 54 per cent between 2015-2020, to just £5.4 billion. Newly permitted increases in council tax rates may mitigate some of these reductions, keeping funding levels broadly constant in this period, though there are concerns this will not be enough for all councils and may not cover increases in wage costs through the rise in the national minimum wage.¹ Furthermore, set against increases in demand, such as pressures in adult social care caused by an ageing population, it is clear councils will need to keep finding new ways to reduce costs while maintaining service quality and meeting their statutory obligations.

This research focuses on the specific ways in which data can help councils to meet these challenges. This is not to argue that data is a simple or complete solution. It is just one tool of many that councils will need to use. But while data on its own may not be enough, without making the most of the data that is available, an already tough task will be a lot harder.

A note on terminology

Nesta developed the concept of a ‘datavore’ in the 2012 report *Rise of the Datavores*. This defined datavores as companies which:

“Gather online customer data intensively, subject this data to sophisticated analyses (such as controlled trials and data and text mining), and use what they learn to improve their business. They also report that they are more innovative than their competitors, in products as well as processes.”²

For the purpose of this research programme, we define local datavores as councils which:

“Intensively gather data about people, communities, places, businesses, council processes and services, infrastructure and the environment and subject this to sophisticated analyses. They also seek to share, integrate and use data where possible for the improvement of services and operations. They use what they learn to inform decisions about improvements to council operations, processes, services and infrastructure, and to ensure they meet the needs of their residents.”

Section 1 introduces the case studies from the UK and overseas. The case studies cover a range of data uses, social issues and benefits.

Section 2 outlines the benefits of using data as a tool of improvement in local government. These use cases are grouped together under 11 areas of council activity or service.

Section 3 explores the eight in-depth case studies and the detailed accounts of their work, methods and impact. The challenges they encountered, their strategies for overcoming these are considered. The section ends with a step-by-step guide to undertaking data-led innovation in local government, based on the lessons offered by the case studies.

In the conclusion, recommendations for increasing the use of data in local government, based on the insights of the work, are outlined. These include a programme to promote further data-led innovation, and a twin programme to help scale and replicate the most effective data-led projects from across the UK. The need for better cross-authority collaboration - as explored in Nesta’s work to establish Offices of Data Analytics - is also outlined.

Section 1 - The case studies

This report uses case studies to showcase leading examples of data-led innovation and articulates the value of better data use and analytics by councils. The case studies chosen reflect a range of council service areas, types of data use, types of council, region and geography.³ The case studies are grouped across four themes which represent the core of local government activity, both in terms of service and funding pressures:

- Children's social care and troubled families.
- Adult social care, health and public health.
- Smart places and local economic growth.
- Public service transformation and open data.

The eight case studies

Full summaries of the case studies can be found in [Appendix 1](#). Below is a short summary of each.

Leeds City Council - opening data to drive innovation and transparency

Theme: Public service transformation and open data

Leeds City Council has created one of the largest open data portals in the UK. The objectives were to:

- Increase transparency about the council's work, decisions and spending.
- Reduce the amount of time officers spent dealing with Freedom of Information requests.
- Bring businesses, developers and citizens together with the council to collaboratively solve problems.
- Support local economic growth by giving business new sources of intelligence and identifying where the council's resources could support the local economy.

Data Mill North hosts over 300 data sets from over 40 different organisations. The council

has used the Data Mill to proactively engage with Leeds' community of developers and civic enthusiasts through Innovation Labs. These are day-long events which address specific problems and award funding to the idea which best uses open data to tackle them.

Benefits

- The council is implementing new procedures which will increase the number of published datasets to reduce the number of FOI requests.
- New product and services have been created which benefit the people of Leeds, such as an app which helps residents to put the right bins out on the right collection days.
- Open data has enabled analysis of the areas in Leeds which had the highest cycling accidents, informing plans to improve cycle safety.

London Borough of Camden - Camden Residents' Index

Theme: Public service transformation and open data

Camden has created the Camden Resident Index and data dashboards to make its public services better. The objectives were to:

- Identify and eliminate instances where staff activity was duplicated.
- Make delivery of services such planning and housing repairs quicker, higher quality and less costly.
- Identify where fraud and error were taking place.

The Camden Resident Index brings together data from 16 council IT systems, covering 123 fields of primarily demographic information. This is used to streamline processes and

provide a more responsive service to citizens. Bespoke data dashboards give managers a view of operational data which is geared towards customer satisfaction, making it easier to improve services.

Benefits

- Data has been used to improve public service delivery and back office processes, required to meet a funding shortfall of £70 million.
- Identified fraud, such as housing tenancy, blue badge or schools applications fraud.
- Supported changes to services which improved customer satisfaction and reduced how much officer time was used in delivery.

Newcastle City Council - data-led transformation of children's social care

Theme: Children's Social Care and Troubled Families

Newcastle has used data and analytics to improve the way that children's social work is delivered. The objectives were to:

- Improve the way that social workers deal with complex family needs by giving them feedback and research about what works best.
- Make it easier and less time consuming for social workers to manage their caseloads.
- Identify the factors which are predictive of poor and costly outcomes.

Data was used to change the way Newcastle delivers long-term children's social work. Social work units now specialise and work with a caseload of families who all have similar needs and circumstances. The family groupings are based on data analysis of 'concern factors' when children become known to social care services. Data analysts are embedded within the social work units

and develop data dashboards for social workers, review team performance, undertake research and analysis about 'what works', and provide deep-dive analysis into the needs of children and parents. These insights feed directly into how social workers help some of the most vulnerable families in the city.

Benefits

- Social workers become more specialised, improving the quality of the support they provide to children and families.
- Data dashboards make it quicker and easier for social workers to manage their caseloads.
- Data analysis provides rich information about how social workers can best help children and families.
- Cases are now closed more quickly, in comparison to traditional social work methods.
- Fewer additional services are required for families known to children's social care.

Manchester City Council - using integrated data to improve family support services

Theme: Children's Social Care and Troubled Families

Manchester has developed a data warehouse for children's social care that integrates 16 different data sets from multiple agencies. The objectives of the project were:

- Identification of families in need of additional support.
- Quicker access to better quality information about families at the point of assessment.
- Testing whether services are achieving their stated objectives.

The system is used by frontline workers to make assessments about the type of support children and families need. Data integration provides instant access to information about family genealogy, involvement with different

agencies such as the police or schools, and relationships to other families also known to local services. Manchester can also use this data to make decisions about which types of service are needed, for whom, and at which points.

Benefits

- Increases staff productivity, saving an estimated two weeks a year for each key worker.⁴
- Improves the quality of decision-making by key workers on the frontline.
- Gives decision-makers quality information about whether to commission or stop services.
- Identifies factors which are predictive of poor and costly outcomes, such as involvement with the children's social care system.

Bristol City Council - the citizen-centric smart city

Theme: Smart places and local economic growth

Bristol runs a smart city programme which is open, collaborative and responsive. The objectives were to:

- Improve how Bristol manages factors such as congestion, emergency incidents, weather and issues that are important to the public.
- Collect data about citizen needs and preferences, and to respond to these.
- Make all data that isn't confidential open to the public.

Bristol has created a digital and data infrastructure that enables collection of data from a wide range of sources. An Internet of Things mesh network enables citizen generated data, along with data from sensors, CCTV cameras and operational services,

to be used by the council. Harnessing this data allows the city government to focus on everything from reducing congestion to how best they can respond to citizen concerns about household damp. Bristol uses an open data portal to make as much data as possible available to the public.

Benefits

- The open data portal has supported the creation of a number of apps and services which respond to needs identified in Bristol.
- Collecting citizen-generated data can enable the council to give people the tools and know-how to solve problems they face, such as household damp.
- Bringing data about the city into an operations centre will make Bristol run better, from quicker journeys to improved responses to emergency incidents.

BirminghamCity Council - Digital Birmingham

Theme: Smart places and local economic growth

Digital Birmingham is a specialist unit tasked with crafting and implementing a smart city strategy for Birmingham. The objectives were to:

- Help the city adapt to future challenges, using technology and data to help people live, learn and work better.
- Make the city better able to respond to problems such as adverse weather or congestion.
- Be a test-bed for new digital technologies which can improve the lives of citizens.

Birmingham has undertaken smart city initiatives to improve city management, such as temperature sensors in roads so that

gritting can be targeted when it snows, and motion sensors in 5,000 free bikes provided to the community to help plan new cycling infrastructure based on the most common journeys. Birmingham also has an open data portal which local developers and businesses can use to create new products and services.

Benefits

- Birmingham can provide more efficient and targeted services by using data, such as only gritting roads which temperature sensors indicate have snow or ice.
- Collecting data can bring insight into what citizens need, such as where new wheelie bins should be located.
- Data collected can test the impact of experimental schemes, such as whether free bikes improve people's health outcomes.

Kent County Council - informing commissioning with the Kent Integrated Dataset

Theme: Adult social care, health and public health

Kent has developed one of the largest integrated health and social care datasets in the UK, covering a population of around 1.5 million people in Kent. The objectives were to:

- Help Kent council and health services understand the impact of changing the services provided in the county.
- Rigorously test whether services were achieving their stated objectives.
- Identify where there are variations in performance levels in the county.

The data set is comprised of pseudonymised data from acute, community, mental and primary health services and adult social care. This data set enables the public health team in Kent to conduct sophisticated

data analysis about what would happen if changes to services or policies were made. Having an integrated data set of this size also means Kent can test 'what works' in the county by running matched cohort analyses. These compare the outcomes of people who receive a service or intervention with a statistically similar group who didn't. This indicates whether differences in outcomes are attributable to the programme.

Benefits

- Decision-makers get high quality information about the possible impact of changes to health and social care services.
- Decisions to reduce or expand services can be made on the basis of rigorous evidence of effectiveness.
- Analysis can highlight where remedial action is needed because services are not performing as they should.

Suffolk County Council - integrating health and social care using data

Theme: Adult social care, health and public health

Suffolk council and local health services are using data to help them create an integrated service. The objectives were to:

- Shift funding towards preventative work and away from costly reactive services.
- Improve the culture and effectiveness of performance management.
- Support the co-location and integration of frontline teams in health and social care.

To do this Suffolk has integrated data from health and social care, changed the performance metrics used by managers,

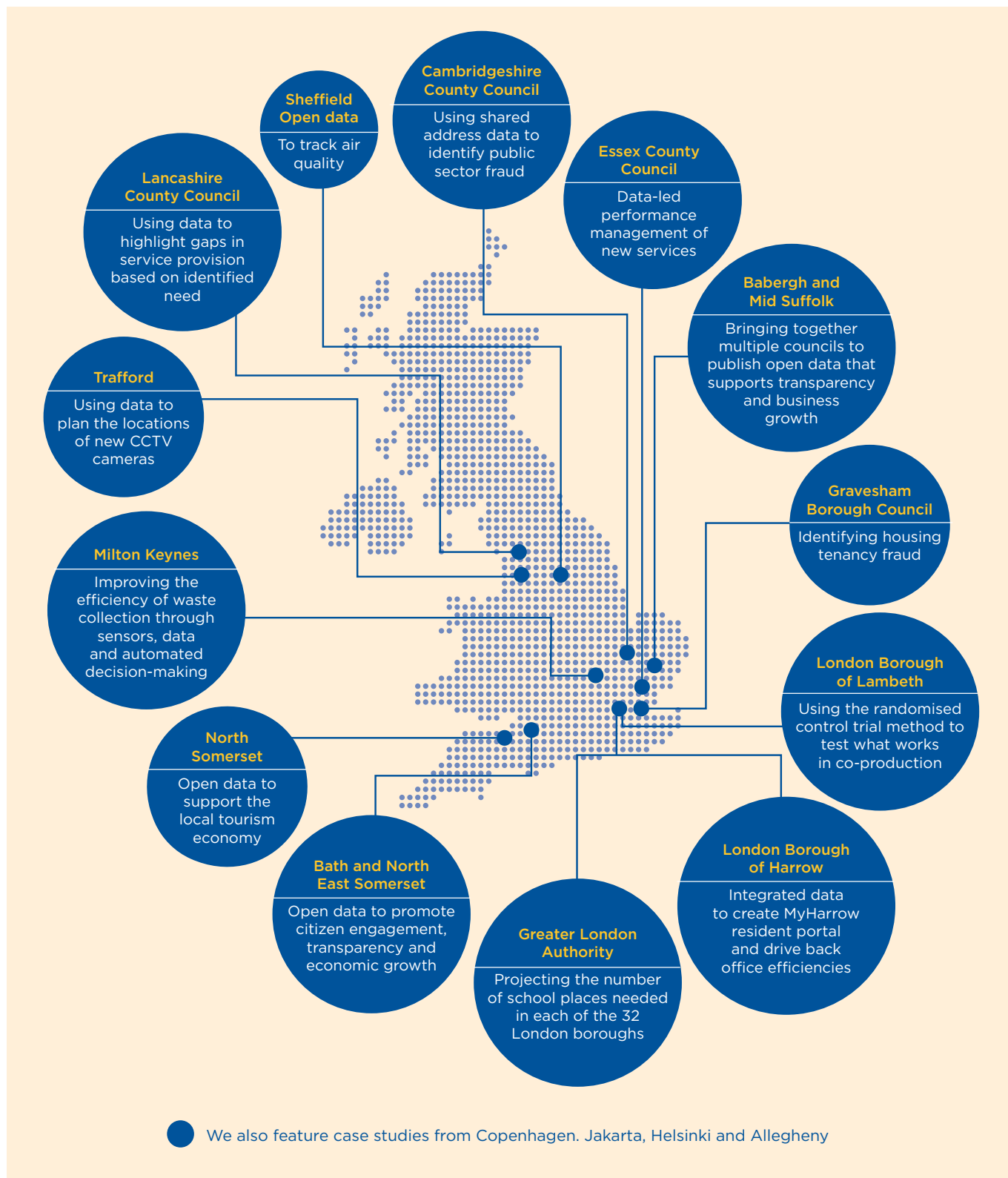
and undertaken analysis of future service pressures and customer journeys.

Benefits

- Suffolk can diagnose problems in the system more easily, such as why there are high numbers of people who have Delayed Transfers of Care from hospitals to residential care.
- Data integration means new preventative programmes can be evaluated better and supports planning for further preventative work.
- Performance management is now based on meaningful outcome measures such as wellbeing, rather than crude input or output measures.

Additional case studies

Alongside the eight in-depth case studies, a range of innovative approaches to data use by councils in the UK and abroad are used to illustrate use cases and benefits.









Section 2 - The benefits of using data




Data is a tool which helps councils perform a range of activities better. Across the case studies, we saw some of the many ways this can happen. This section collates these examples of data use and describes the ways in which this benefits people, communities and local businesses.

In our earlier discussion paper⁵ and background research for this paper we identified three basic principles for getting value from data:

- Be driven by a problem to be solved or hypothesis to be tested.
- Seek data and analysis that will lead to actionable and impactful insights.
- View data as one tool of many that will help outcomes or objectives to be achieved.






Using these principles as a starting point, we analysed the case studies to see how they had used data and how this had created value. The ways in which data has been used - referred to as use cases - are grouped together according to different kinds of activity councils can undertake. For this report, a use case is defined as 'a process, action or task that can be improved using data'.

Activity		Example Use Case
	Optimising management of place and infrastructure	Birmingham uses data from temperature sensors in roads to inform where gritting vans are required in icy or snowy conditions.
	Testing 'what works'	Kent's integrated data set in health and social care enables rigorous testing of the impact of services and interventions.
	Intelligent case management	Manchester's integration of data from multiple agencies gives social workers rapid insight into family needs and circumstance during triage and assessment.
	Outcomes-based performance management	Suffolk's shared health and social care outcomes framework align incentives between multiple organisations towards the same objectives.
	Early identification of adverse events and future service pressures	Newcastle's data analysis identified the factors which are most predictive of a child becoming NEET, enabling earlier intervention.
	Understanding and responding to citizen needs	Bristol uses plastic sensor-equipped frogs to collect data which help residents report and manage damp in their properties.

	Informing public service transformation	Newcastle's data-informed changes to children's social care services help social workers deal with complex family needs better.
	Streamlining operational council processes	Camden's Resident Index automates data integration, makes services more responsive and eliminates duplication in the back office.
	Opening government	Leeds's open data portal for councils in the North of England creates transparency and frees up officer time from the burden of Freedom of Information requests.
	Supporting the local economy, businesses and innovation	Leeds's Innovation Labs provide a space for local developers to experiment with open data sets to solve social problems, and develop viable new products and services.
	Identifying fraud and error	Camden's Resident Index can automatically check for the anomalies and discrepancies which indicate fraud and error.

Types of impact

The research found multiple ways in which data can benefit local authorities, spanning different council departments and activities. To illustrate the different types of benefit data can create, they have been grouped into five broad categories of impact:

	Productivity impact	Increasing the quantity or quality of output for the same or fewer inputs. This includes reducing the amount of time taken for staff to complete tasks, or increasing the effectiveness of commissioned programmes at delivering outcomes.
	Financial impact	Tangible reductions in spend, e.g. reductions in headcount, materials and supplies, buildings or contracted services.
	Social impact	Benefits for residents and communities, such as reducing the number of children entering care, reducing readmissions to hospital increasing independence for adults with learning disabilities.
	Economic impact	Increased economic activity, such as increased taxation, employment, purchasing and investment.
	Environmental impact	Reducing environmentally harmful actions and increasing environmentally positive actions, such as reducing carbon emissions, reducing pollution, or increasing recycling.

Optimisation of place management

Why is this important?

Smart places and Internet of Things (IoT) initiatives combine data with technology to improve the working of a place's assets, such as transport, energy networks or waste management. It is estimated that by 2020, somewhere between six and 20 billion devices will be connected to one another via the internet.⁶ The data created by these devices – physical objects equipped with sensors and network connectivity – has huge potential to improve the way cities and towns are run.

Councils of varying sizes and types are exploring this potential. This includes using real-time data to manage traffic and reduce congestion, matching public transport capacity and frequency with passenger demand more accurately, dynamic responses to government responsibilities such as waste collection which reduce unnecessary journeys and effort, and improving responses to emergencies such as flooding, major accidents, fires or police incidents.

Increasingly, smart places are focusing as much on people as they do on the hardware so that they are not just smarter, but also more liveable. Nesta explored a number of these developments in *Rethinking Smart Cities from the Ground Up*.⁷ These include the use of collaborative technologies such as environmental sensors, sharing economy initiatives, crowdsourced data, to allow citizens to shape their cities. Many smart cities have ambitions for environment sustainability, with some aiming to become zero carbon places.

How councils are using data to make the management of place smarter

Spotlight - Birmingham City Council: How can monitoring the weather help to run a road network better?

Birmingham, in partnership with Birmingham Urban Climate Laboratory (BUCL), have been using air temperature sensors on roads to manage responses to winter weather such as ice and snow as part of an IoT demonstrator. BUCL has fitted air temperature sensors, which go alongside weather stations installed by the Met Office and sensors fitted by Birmingham's partner Amey, to provide data about air temperature on an hourly basis. A wireless mesh network was installed across all of Birmingham's major roads which connects the temperature sensors and other

roadside equipment such as air traffic signals, CCTV and street lights to the internet.

Data from temperature sensors across the city, as well as from a gritter fitted with a sensor, is fed back to a hub to be analysed to ensure that ice, snow or flooding can be geographically pinpointed and responded to.

Impact

While this project is too recent to have been evaluated for impact, the ability to respond in an informed way to winter weather creates a range of benefits.



Financial: reductions in expenditure on petrol and grit as only the areas in need are covered. Over time this could reduce the size of the fleet Birmingham needs to manage the city's roads.



Economic: fewer accidents and less traffic congestion mean that businesses and workers benefit from quicker travel times.

Bristol is creating an operations centre which will bring together data from the road traffic control centre and emergency services centre, along with police and CCTV operations, to provide a unified response to incidents in the city. Better optimisation of city processes will result in lower congestion, which in turn will reduce carbon emissions. Bristol aims to assess traffic and other incidents affecting roads across the city at any given time and be able to provide emergency services vehicles with the optimum route to take in emergencies. Another objective is to identify significant incidents that occur on CCTV, via data transmitted to the operations centre, and to generate an appropriate response to the incident.

In **Milton Keynes** an IoT demonstrator is exploring how connected technology and data can deliver new services for cities and people. One demonstration involved installing sensors in recycling bins which can communicate when they are full and ready for collection. This enables targeted rather than routine bin collections, increasing efficiency and saving money. Other projects include sensors in short-term parking bays, which communicate their availability to public dashboards and can be overlaid on Google maps. This project led to the creation of the MotionMap app, which provides information to users about where they can park, the number of people in the town centre or how busy the next bus is.

Testing ‘what works’

Why is this important?

Doing ‘what works’ refers to making decisions about which services to run, or which policies to implement, based on rigorously established objective evidence. Evidence-based decision-making has been growing since it was popularised in the early 1990s and is seen as a vital means of ensuring that taxpayers money is spent effectively. Collecting greater quantities - and quality - of data, integrating it and making it available in a timely and useable manner enables councils to generate their own evidence about what works locally.

Nesta has been supporting this agenda through the Alliance for Useful Evidence and has looked at a number of local government areas in which data and evidence can improve the effectiveness of services. These include *Knowing How to Protect: Using Research Evidence to Prevent Harm to Children*,⁸ and *Better Public Services Through Experimental Government*.⁹ Nesta has also developed practical tools such as the Standards of Evidence for evaluating impact.¹⁰

Most evaluation methods compare data about outcomes in an intervention group against a baseline, which can be done in a number of ways. Councils can run randomised or matched control trials, which use statistically similar groups for comparison. Councils can take advantage of ‘natural experiments’ whereby an intervention or policy is only applied in a certain area or with a subsection of the population. Another option is to compare outcomes by using evidence of what happened before, known as an historical baseline, and comparing this against outcomes for individuals receiving the intervention or policy.

Data can also be used to create a feedback loop which provides practitioners, managers and leaders with rapid information about the effectiveness of their decisions, work or services. While this may lack a control group, it is a quick way of gaining insight into what works and enables rapid adaptation to improve performance. This type of approach is likely to become more common as data becomes ubiquitous and available in real or near real time.

How councils are using locally collected data to test what works

Spotlight - Kent County Council: Are commissioned services delivering positive social outcomes?

Kent have created one of the largest integrated data sets in health and social care (known as the KID) which they use to run matched cohort analysis, assessing the impact of services by comparing outcomes of service recipients with statistically similar people who don't receive the service. Examples include

- Evaluation of the impact of the c.10,000 home safety visits carried out by Kent Fire and Rescue Service (KFRS) on A&E attendances originating from the home. The KID created a comparison group at the individual level against which to compare the number of A&E attendances. The analysis suggested that there was no significant difference in A&E visits between the two groups, though it should

be noted that reducing A&E attendances was not the primary objective of the checks.

- Evaluating a pilot of a reconfigured GP practice, with additional services for people with long-term health conditions, for its impact on acute care usage.
- An interrupted time-series analysis of a falls prevention service, which found that the service did not make a difference to acute care usage.

It is also possible to run further analysis to test which types of people a programme is most useful for, and for whom it has limited impact, helping prioritise which groups should receive certain interventions or services.

Impact



Financial: evaluation of effectiveness can isolate which services are not having enough impact to justify their cost. These services can either be scaled down to focus only on the people who benefit from them, or decommissioned, releasing cashable savings.



Social: the analysis can identify services which are highly impactful, supporting a business case for expansion and allowing more people to benefit from access.

Lambeth, working with the Institute for Fiscal Studies used data to run a randomised control testing whether incentives would encourage residents to participate in 'co-production' of street cleaning. The trial divided 170 streets randomly into a control group, a group which offered the chance to be a Street Champion with no incentive, and three groups with different incentives to be a Street Champion. Street Champion activity levels and street cleanliness data was collected and compared. The council found higher activity levels in the incentive groups, but observed no difference in overall street cleanliness (in part because the streets were all already considered clean). The results suggest that incentives could bring additional resource to bear on street cleaning, but are unlikely to ever replace the need for a paid-for service.¹¹

Intelligent case management in people-oriented services

Why is this important?

Frontline council workers require information from multiple places in order to manage their work, cases and caseloads.¹² This information is used to make decisions about the support an individual might need, the level of risk they might be exposed to, or whether other organisations should be involved in their care. This data needs to be high quality and easily accessible so that these decisions are based on the best possible information available. In reality, the rich and detailed information collected by frontline workers is often stored in free text form in specialist IT systems. When other staff take on responsibility for a case, it can take a long time for them work through this information to understand the parameters and key details of the case.

Piecing together a complex family network can be painstaking, involving hours reading through repetitive written assessments. Important information can be missed. It is hard for managers to have good, quick oversight of what is happening with a case or caseload. It is hard for social workers to monitor and manage their caseloads if there is no ability to see the combined high-level information of multiple cases in a single view. The information is usually not mobile and social workers cannot check details while they are making visits or assessments. Some systems do not offer basic case or caseload management functions, such as when statutory visits¹³ are due for each case.

A further challenge is that clients with multiple needs interact with many different parts of the local public service system. Collating this information is important for good decision-making, but has traditionally relied on social workers requesting specific information, and individual decisions about whether to share that information. This creates inconsistency in the information being used to make assessments, leaving frontline officers dependent on a colleague's judgement about sharing information. As a result social workers may be making life and death decisions based on incomplete or poor quality information.

How councils are using data for intelligence case management

In recognition of these limitations, some councils are now looking at ways in which this data can be integrated, visualised and made more accessible. Some councils are developing data dashboards for their social workers while others are providing them with mobile tablets to use while they make assessments and visits. Extracting, simplifying and presenting information in this way improves the efficiency of social work by making it easier and quicker to find key information for case and caseload management. It can also improve the quality and consistency of decision-making.

Spotlight - Manchester: How can frontline professionals get better quality information to make assessments with?

Manchester's integrated data set gives frontline social work professionals and key workers far greater quality and quantity of information about the families they work with. In just a few clicks, they can gain a comprehensive view of a family, including interactions with other agencies, needs and genealogy. Through traditional methods, such as case files stored in client management systems, gaining an equivalent understanding

would be dependent on which professionals were present at a case conference, many hours of reading case file notes, or on being able to share information between agencies which could be time-consuming and inconsistent. The software also makes it easier to monitor and check social workers' cases for managers, and provides a useful set of checks at the point at which a case is closed.

Impact



Productivity: it is estimated that the integrated data set saves key workers approximately three to four hours when completing an assessment. A key worker can undertake 40 assessments a year, translating into a saving of two-weeks of some key workers' time, or the equivalent of increasing the total amount of key worker resource by 4 per cent.

In **Newcastle**, embedded data analysts produce data dashboards, known as ChildStat, for social workers and team managers. The dashboards provide an overview of case loads, the actions needed to respond to statutory timescales and requirements, and outcomes data. The dashboards can also be used to report on performance of social work teams. ChildStat gives social workers a feedback loop so that it is easier to see which strategies for working with families are most effective. The dashboards draw information from a data warehouse, which pulls in data from three sources – social care, education and the Common Assessment Framework.

Outcomes-based performance management

Why is this important?

Across local government, councils are reorienting their approach to performance management. This is in response to what are now commonly recognised limitations in traditional approaches to performance management, going back to the era of New Public Management. These limitations range from the over-emphasis on input and output based monitoring, the retrospective nature of performance management, and a lack of clear feedback loops.

Councils are now exploring ways around these common pitfalls. They are using existing data sets better, collecting new data sets which measure important outcomes, and integrating data from multiple systems and services. Councils are using data dashboards, which give them up-to-date overviews of their service or case loads and offer actionable insights and prompts. There is also an increasing emphasis on measurement of outcomes, rather than outputs or inputs, which can help to get different services to work together in a more coordinated way. By agreeing a set of shared outcomes across services, it makes it more likely that they will work together to achieve this. This theory has been used in public health, where the shift of public health functions from CCGs to councils was accompanied by a shared outcomes framework to focus efforts from councils and the NHS on the same shared objectives.¹⁴

How councils are using data for outcomes-based performance management?

Spotlight - Suffolk: How can performance management support health and social care integration?

“We want to have good decisions based on good evidence, and we want to see if we are doing what we say we will do. All of that is based on data”

Senior Manager, Adult Social Care, Suffolk County Council

Suffolk County Council and local health bodies have been integrating to provide better quality services. At the outset, data was identified as an obstacle to doing this. Culturally, there was an over-emphasis on using data to look retrospectively at activity, rather than understanding the future needs of the service. Data lacked consistency and was not comparable between health and social care.

In response, Suffolk created the Connect Measure, a set of shared outcomes to which health and social care would work towards. This contains 35 measures, relating to efficiency savings, such as emergency admissions, A&E, ambulance call outs, length of stay in hospital and delayed transfers of care. It also contains measures of workforce development, neighbourhood networks, reablement¹⁵ rates and public health.

This Connect Measure is shared on a monthly basis to provide a top-level view of performance against outcomes. It also enables comparison of impact between teams. Teams also use this to look at workflows at an operational level. A weekly meeting is used to review waiting lists and decide which members of the integrated team are best placed to do visits. It is also used to manage complex cases, such as looking for opportunities to do joint visits or joint care and support plans.

Impact



Productivity: The Connect Measure Set focuses the activity of multiple agencies on the same shared objectives, improving the likelihood of effective partnership working.

Producing the Connect Measure Set revealed the opportunity to automate data collection that was once done by frontline staff. This improved the quality of data collected and frees up staff time.

Camden uses data dashboards to enable operational data to be viewed in a bespoke way, designed by the service managers and operatives. The dashboards have been particularly important for changes made to delivery of the housing repairs service, which is responsible for around 50,000 repair jobs a year on the council's housing stock. The dashboard allows repairs managers to dissect information by type of job, repairs operative, completion time, and satisfaction levels. This pinpoints areas where problems are arising, such as jobs not being closed on the system which led to high levels of failure demand. As a result satisfaction levels have improved by 6-8 per cent over two years, and the number of repairs calls has reduced by 25,000 (or 14 per cent), which translated into 2,850 fewer repairs orders.

In **Essex**, the council launched a Social Impact Bond (SIB) to support children on the edge of the care system. The SIB is a form of payment-by-outcomes contract, between Essex council and a group of social investors. A dedicated performance management team are responsible for real-time monitoring of data to adapt and refine the programme. The ongoing performance management enabled early identification of referral trends. This meant the team could focus on areas where referral rates needed to be improved, ensuring the service worked with more of the cases that are likely to benefit most from it, with fewer referrals being turned away because they are considered unsuitable.¹⁶

Early identification of adverse events and future service pressures

Why is this important?

As councils face an ever rising tide of demand for their services, having greater foresight is an essential component of successful demand management and prevention strategies. Many of the issues councils deal with are complex, involve responses from a variety of agencies, and have many contributing factors. Preventing children going into foster care, people becoming homeless, or individuals requiring adult social care services is helped by identifying the underlying drivers of these issues early and accurately.

Data analysis can help councils to isolate the most important or significant factors involved in social problems, which in turn helps them to identify the best way to tackle the problem at its source. Where multiple data sets about the same people or issues can be combined, there is even greater ability to isolate the root causes. This gives councils the ability to capture a fuller range of contributing factors, improving the accuracy of diagnosis. This kind of analytics is gaining sophistication and can now provide granular detail about the dimensions of future service demand, helping councils to allocate scarce resources more efficiently.

How councils are using data to identify adverse events and future service pressures

Spotlight - Newcastle: Which factors are the most influential in whether a child becomes NEET (not in education, employment or training)?

Newcastle undertook analysis into the underlying drivers that result in people becoming NEET. Newcastle's analysis looked at a range of possible indicators, present at school age, which were linked to becoming NEET, such as whether a young adult had poor educational attainment, was eligible for free school meals, had a truancy or offending record, or had been involved in the Children's Social Care (CSC) system.

These factors were given a 'risk ratio', to indicate how likely they were to be associated with later becoming NEET. For instance, NEETs were five times as likely to have been a Looked-After Child (LAC), four times as likely to have been in a Pupil Referral Unit, and three times as likely to have had some kind of children's social

care involvement. The population was then divided into six mutually exclusive groups to isolate which factors were underlying drivers of poor outcomes, rather than consequences.

This analysis found that while only 25 per cent of the population had had involvement with children's social care, 67 per cent of the NEET population had. CSC involvement was also found to be predictive of a longer duration of being NEET. The analysis also showed protective factors that can help children avoid being NEET, such as obtaining good GCSEs, which is associated with a risk reduction of 70 per cent. Using this analysis, Newcastle council, together with other agencies, are redesigning the approach that the local public sector takes to reduce the incidence of NEETs.

Impact



Productivity: services can be more effective at preventing problems when the root causes are known.



Social: knowing which children to provide preventative support to can reduce the number that go on to experience poor social outcomes such as unemployment.

The Greater London Authority (GLA) provides school roll projections to 30 of London's boroughs to support their school places planning. The GLA estimate demand for state funded school places will have increased by at least 120,000 by 2025. The GLA model takes pupil level data and models the flow of pupils from their home wards to their schools in order to account for cross-borough travel patterns. These flows are then linked to the GLA's small-area population projections to project future school rolls. The projections can improve the efficiency of capital investment. For example, a borough which had committed to a large expansion at secondary level scaled back plans after seeing revised projections of lower demand, averting unnecessary spending. The analysis has also created the opportunity for more coordination between boroughs through its cross-border flow component which projects the number of children living in one borough but attending school in another.

In **Allegheny** (Pittsburgh, USA), the local government has worked with researchers from Auckland University of Technology to develop and implement a data led approach to child protection, known as predictive risk modelling (PRM). When a report of child maltreatment is received, a risk score is calculated based on a range of data held about that family. The score classifies the call into one of four categories, from high to low risk. Based on historical data, analysis shows that children given a high risk score are seven times as likely to be involved in a critical event¹⁷ and 18 times as likely to be in placement within a year, in comparison with low risk score calls. The call operator is then given this score to assist their decision-making about the course of action to take.

Trafford has developed a tool to indicate the current and best locations for its CCTV camera resources. Initially using data derived from the CCTV control centre systems, Trafford was able to present an interactive map with locations of the current setup, approximated fields of view for each camera and category based filtering options to customise the map. Trafford then overlaid additional data including the location of Trafford's building assets, street level crime statistics and road traffic incidents to give a better picture of the optimum location for the new cameras. This map formed the basis of discussions with local agencies about where new CCTV should be located. The locations of CCTV cameras have also been released as an open dataset.

Data gathering to understand and respond to citizen needs

Why is this important?

The data councils collect about people has tended to be skewed towards the information collected during the delivery of services, such as social services or social housing. As we explored in our discussion paper,¹⁸ councils do collect other forms of data, but typically this is in the form of administrative data, occasionally customer satisfaction data, and only rarely in survey form of the whole population. This has created a blind spot for information about public sentiment, how people prioritise local issues, and what people think the council should be doing to improve their area.

This is starting to change, with councils exploring new ways of finding out how their citizens think and feel about where they live, what they think is important and what they would like to change. This is partly about a more proactive approach to collecting data about what citizens think and feel, and partly about harnessing citizen-generated data. Together this represents a form of collaborative government whereby the government, people and private organisations come together to solve public problems.

Collaborative data collection can take numerous forms. Councils can use mobile applications to directly interact with citizens, work with companies already collecting data, mine social media, or use low-cost, distributed sensors.¹⁹ Alongside the identification of citizen needs, a major benefit of citizen-generated data is that it enables governments to carry out data collection far more cheaply.

How are councils using data to understand and respond to citizen needs?

Spotlight - Bristol: How can citizen collected data be used to respond to identified social problems?

Bristol's Citizen Sensing project is about using data to understand citizen needs. One example of this is via 'Frog Boxes' which record levels of damp and condensation in people's homes in East Bristol. The origins of this scheme were a series of discussions with residents, run by Knowle West Media Centre and Bristol City Council. These identified three issues that were particularly important to residents: poor (damp) housing, use of green spaces, and independent businesses. The first pilot focused on damp housing and the design phase explored a range of ways to measure levels of damp in people's homes and find ways to help them deal with damp.²⁰

Residents who volunteered to take part have been given a frog box. In the middle of the frog's back there is a temperature and humidity sensor. This is connected to a Raspberry Pi 3, which collects the data every five minutes, saving it into a simple database. There is also a web site which gives the householder the current temperature, humidity, and dew point. Residents are given

lily pads to keep a diary of events that might lead to damp – times when someone was showering, cooking, or washing clothes – and this information, alongside the data from the sensor, will help to understand what people can do to reduce damp in their homes.²¹



Damp-busters frog sensor - The Bristol Approach to Citizen Sensing, Knowle West Media Centre

Impact



Social: the project is live and evaluation has not been completed. However, the activation phase of the work has helped residents to acquire knowledge and resources that will help them to solve identified issues of damp and challenge landlords to take action. Longer term, the council aims for this to be one of a number of initiatives that will give residents the ability and tools needed to fix problems themselves, rather than be reliant on the council.

Birmingham has been collecting and integrating a wide number of data sources to give them better insights into citizen's needs. The council has launched a Single Customer View application which brings together data about people in Birmingham's interactions with council services, in order to provide a better understanding of citizen's needs and interests based on past activity. Using data to understand citizen needs has led to the council making changes to services and the public realm, such as increasing the number of wheelie bins or the introduction of new 20 miles per hour zones.

In **Jakarta**, Twitter was used to create a real-time map of flooding. Flooding is a major issue in Jakarta and can force thousands to abandon their homes every year. The Jakarta Disaster Management Agency (BPBD) monitor changing flood patterns or sudden onsets of flooding²² and while their online map of flooding activity is accurate, it is not immediate.²³ In 2014, the city launched PetaJakarta to crowdsource flood reports. Jakarta has one of the highest numbers of Twitter users of any city on earth and activity spikes during floods,

giving researchers and city officials an abundance of data.^{24, 25} PetaJakarta sources data from tweets about flooding as well as encouraging those caught up in the flooding to report their experience to @petajkt. The software then uses this data to create a real time map of flooding in the city and can be accessed by both city officials and citizens. By the end of the first flood season, the project had mapped 1,000 confirmed flood sites in real time.²⁶

Informing public service transformation

Why is this important?

Many councils, having already managed significant funding cuts since 2010, must still find ways of taking out millions more in savings without affecting the quality of services. This requires changing how services which deal with highly complex issues, working with some of the most vulnerable people in society, are delivered.

Delivering services which are coordinated with other agencies, address causes not just symptoms, and which respond to individual needs are not just better services but also better economics. However, changing and implementing new service delivery models is complicated and high risk, with councils often working with minimal information about what works, especially for new innovations.

Data and analysis can help in a number of ways. It can help councils to model the impact of new service configurations on resourcing, outcomes and budgets. It can help councils to identify where and how resources can be targeted to have the biggest impact. And data can help councils to identify where there is unmet need in the area or where services are not meeting people's needs.

How are councils transforming public services using data?

Spotlight - Newcastle: How can services respond to complex needs more effectively?

Newcastle used data to inform changes to the long-term social work in the city. The objectives of the programme were to reduce the number of children who become looked-after, reduce the number of re-referrals for children known to social care, and to improve life chances for the children the council supports. Data was used initially to understand patterns of demand and expenditure in the children's social care system. This was the foundation of the changes to the system, which combined evidence-based interventions with data analytics.

A major feature of the new service is the segmentation of the population of families by common groupings of needs. These groupings, analysis of historical concern factor data,²⁷ correspond to new specialist social work units. When children are referred to long-term social work teams, data analysis

identifies which social work unit can best respond to their individual combination of needs. By specialising in cases that are similar in terms of need, social workers get more feedback and insight into the most successful strategies of supporting families.

Each social work unit also has an embedded data analyst, who works alongside the social workers. Their role is to look for hypotheses to test and analysis to perform which offer insight into how best to support families. Their role is not purely quantitative and they are expected to identify patterns, and undertake deep-dive analysis or case study analysis. The data analysts also test what works, measuring the success of externally commissioned services. The unit data analysts are responsible for maintaining ChildStat, a data dashboard social workers use to help manage their caseloads.

Impact



Productivity: data dashboards make it easier and quicker for social workers and managers to monitor caseloads and team performance.



Social: Newcastle's initial data suggests that families which are allocated to needs-based teams rather than generalist teams will exit the children's social care system quicker. This equates to them achieving positive social change quicker, making it more likely that children will experience positive social outcomes.

Kent has used its integrated data set (known as the KID) to inform major changes to its services. This includes the Kent Sustainability and Transformation Plan (STP), a five-year plan for improving how health services are commissioned. The integrated data set allows Kent to model the impact of changing levels and types of service. Additionally, the KID has been used to inform work to reduce delayed transfers of care, better meet winter pressures, and to forecast where and how many beds are needed in acute settings.

In 2015, **Lancashire County Council** changed the way it analyses the needs of local residents by breaking the boundaries laid down by administrative geographies. The council analysed a range of health, deprivation, housing and economic data at MSOA²⁸ level. This highlighted pockets of high need within some otherwise lower-need administrative areas. In order to better serve all communities and reduce inequalities, MSOAs with similar levels of need were grouped together into 34 new service planning areas (SPAs). These SPAs formed part of the 0-19 public health review. This led to changes in the geographical distribution of staff including health visitors and school nurses in 'islands of need' which were previously overlooked and underserved.

Streamlining operational council processes

Why is this important?

Finding efficiencies in back office services such as legal, HR, finance and IT has been a major component of managing budget reductions, stretching back to an era of annual 3 per cent savings required by the Gershon Review.²⁹ Councils have been sharing services, promoting channel shift, and using technology to reduce administrative burdens. Better use of data and analysis can be an important enabler of these improvements.

This research found that the traditionally siloed nature of local government has resulted in multiple IT systems and methods of data collection, and replicated capabilities such as payment processing and identity verification. It was commonly reported in interviews that IT systems lack interoperability which prevents the easy exchange of data between them. This leads to duplication of activities, and an administrative burden created by the need for data extraction, cleaning and integration to be done manually.

Councils are now starting to deploy specialist software which can act as a broker between multiple legacy systems, integrating data so that it is available in one place. This can expose where different parts of the council are doing effectively the same work, reducing the amount of duplication. It can also make many processes quicker, more efficient and more accurate. Automated data integration also reduces the amount of officer time consumed by manually processing data from one system so that it can be used in conjunction with another, for instance to check eligibility, spot fraud and error, provide business insights or diagnose service failure.

Councils are finding that being able to use data from around the organisation seamlessly can also make the customer experience better. Integrating data from across line of business systems can reduce the number of times residents need to repeat the same information to different bits of the council. It can speed up the response to applications, enquiries or complaints.

How are councils using data to make processes more efficient and streamlined?

Spotlight - Camden: How can we complete back office operational processes with fewer resources?

The Camden Residents Index (CRI) brings together client data from 16 business systems in the council to create a complete picture of each resident. In total the CRI extracts 123 fields of primarily demographic information. By integrating much of the data Camden holds about each resident, they have reduced administration time, provided a more seamless service, spotted opportunities for efficiencies and detected fraud.

The CRI is also used for automating business processes. Once information would have been manually extracted from one system, cleaned and prepared to go into another. This can now be done automatically. This has been a major enabler of organisational restructuring, identifying where officer time can be diverted to more valuable activities and where headcount reductions can be made. It can also be used to delete duplicated data entries in back end systems, which is a resource intensive exercise when done manually.

Impact



Financial: Camden has been able to make cashable savings through reducing duplication. This includes cancelling reporting tools and management systems. In the planning team, applications have been put into a dashboard and then into the open data portal with an API which enables 'Google style' searching on this data and a new email alert system. This has contributed to savings of £200,000.

Harrow has combined integrated data from its back office systems with a single customer facing online portal to reduce the resource intensity of responding to citizen enquiries. The MyHarrow service enables residents to carry out a significant range of online transactions as well as find out about local services and events. It also enables data entered through online forms to be used multiple times, saving people entering the same information multiple times. Integration of back office systems means that when data is entered into online forms, this can be automatically communicated to other forms, freeing up staff time.

In **Wychavon**, the district council used address data to improve the efficiency of their processes and find previously unidentified properties for council tax purposes. The council had multiple addresses listed for the same property and many duplicate entries, making a number of services such as council tax collection more difficult. In response, all records were assigned a Unique Property Reference Number (UPRN). This provides a unique key for each record to enable linkages with other data sources. Services are now more joined up, in particular the link between planning and the address team, and more properties are paying council tax.³⁰

In **Helsinki**, the city government created a digital case management system to track and coordinate all information about decisions made by the city government. Previously, the vast quantities of paperwork produced by the city government made coordination between different departments and employees difficult, created a large amount of redundant administrative work and excess paper usage. The solution is a platform, called Ahjo, which

replaces paper records and stores all agendas, minutes and exhibits used for council debates. The Ahjo case management system has saved an estimated €500,000 per year in paper, machinery, labour, postage and handling and storage space costs.³¹ In 2013, Helsinki launched Open Ahjo, an Application Program Interface (API) which makes all documents available as open data.

Opening government

Why is this important?

Open data is defined by the Open Data Institute as data which “*anyone can access, use and share*”.³² The increase in computing power and capacity has enabled more data to be made open, and in more accessible ways. This can take the form of data tables containing static data through to real-time data which can be streamed through Application Program Interfaces (APIs). Good open data is considered to be data which can be linked, is available in a standard structured format, is available consistently, and can be traced back to its original source.

Transparency and accountability were the original drivers for the release of open data. Enabling people to see financial, performance and other data in local authorities creates a more open form of government that invites public scrutiny. Increasingly councils are using open data portals, which consolidate open data in one place, can have automated updates and allow APIs to be used to access the data. This transforms data from merely being available, to being useful and useable. This contributes to realising the benefits of openness, such as designing services around user needs, engaging citizens to shape their communities and services, promoting economic growth and providing transparency and accountability.

How are councils using data to open up government?

Four of our case studies have open data portals - [Leeds](#) (see below for more information), [Camden](#), [Birmingham](#) and [Bristol](#) - but there are many others, including [Cambridgeshire](#), [Glasgow](#), [Edinburgh](#) and the [Greater London Authority](#).

Spotlight - Leeds City Council: How can data provide transparency and save officer time?

Leeds City Council has created one of the largest open data portals in the UK, hosting over 300 data sets from nearly 40 different organisations. [Data Mill North](#) (DMN) is an open data portal for the north of England. It was developed by Leeds City Council, supported by government funding, but has benefitted from a true partnership approach. It is hosted by a private digital company, was developed by a local SME, is powered by an Open Data Institute startup and is managed by Leeds City Council.

At its launch it had 50 data sets, which had been gathered from within the council over a two-month rapid development phase. The council found the most effective and efficient way to get additional data would be to form a partnership with council officers dealing with Freedom of Information (FOI) requests.

Officers dealing with FOI requests were made ‘Open Data Champions’, with the expectation that any data provided as an FOI should also be published as open data on DMN. Open Data Champions were expected to think beyond the specific request of the FOI and publish all the data related to that issue, in a machine readable format. This has reduced the number of FOI requests the council receives. Once data is uploaded to the portal, it is allocated to an Information Asset Owners who are responsible for keeping the data up to date.

The platform enables new data publishers to be added easily and with no additional cost. There are currently over 40 different organisations publishing on the Data Mill North including Yorkshire Water, Northern Power Grid and Heritage Lottery Fund.

Impact



Productivity: the Data Mill has reversed a steady year-on-year increase in FOI requests. Some data sets have eliminated almost entirely some types of FOI, such as those about business rates or empty properties (down from 15 a year on average to four). Each FOI request takes three hours to respond to on average, meaning that every FOI request avoided is a productivity gain.

Baberg and **Mid Suffolk** lead a collaborative of seven local authorities across Suffolk publishing open data to enable self-service, create transparency and support local businesses. The seven councils each publish their data on the same 25 data topics using a data mining tool which automates data uploads. The interface has a visualisation tool which enables viewers to interrogate the data in new ways. Communities have used the data to develop Local Neighbourhood Plans and the data can also help businesses to decide where to expand or locate.³³

Sheffield's Air Quality+ open data project enables collaboration with the local open data community via the Better with Data Society (BWDS). It delivers a programme of co-designed activities to engage local people with the data and help them understand drivers and consequences of poor air quality in the city. The council has used a range of activities to engage the community in data about air quality. This includes a series of commissioned artworks made using data measuring air pollutant levels, an Air Aware Sheffield education campaign, and hack and play sessions for developers to hack, explore, and design useful tools with the data. The project has raised awareness of the issue of air pollution in the city.³⁴

Supporting the local economy, business growth and innovation

Why is this important?

Promoting local economic growth is increasingly important for councils. Plans for local retention of additional business rate revenues make driving local economic growth a fundamental part of meeting statutory responsibilities and the growing demand for services. Councils are finding that through data they have another means of stimulating economic growth to complement more conventional methods such as infrastructure investment, skills and planning.

Increasingly the use of open data by entrepreneurs, innovators and researchers is seen as one of open data's key benefits. The ODI estimate there are 270 companies that work with open data, with a turnover of £92 billion a year, and employing over half a million people. The vast majority are working with open government data.³⁵ Open data can also help developers and entrepreneurs to develop new products and services. Transport data is one of the most widely used and the London datastore estimate that over 460 apps have been developed using London's open transport data, with a return on investment of 50:1.³⁶ Councils can also proactively engage with business through open data, by running hacks or challenge prizes which incentivise developers to create new products and services which respond to identified social needs (see for example Nesta's Open Data Challenge Prize Series).³⁷

Councils can also provide or analyse data to inform strategic decisions related to business growth. Councils can follow the lead of the New York business atlas³⁸ by making the wealth of demographic, operational and financial data they possess available to help businesses make decisions about where to locate as startups or to expand. Councils can also collect data to gain a more detailed understanding of the composition of their local economy and where additional public support or intervention is needed to help local companies.

How are councils using data to support the local economy?

Spotlight - Leeds City Council: How can data be used to bring the public and private sector together to solve common problems?

Leeds have proactively engaged their local community of developers, businesses and civic enthusiasts in the Data Mill. They have run hacks and Innovation Labs, which bring the council and the community of developers together around a common problem.

Innovation Labs pair developers up with council staff. The Labs are held over the course of a day, and in the morning the pairs have to develop an idea of how open data could be used to solve the issue identified as the topic for the Lab. In the afternoon the developers work on their own to build a prototype, which could be an early-stage website, app, or just a powerpoint presentation which explains the concept. At

the end of the day there is a presentation and feedback session on the prototypes. Participants opt for which developer they would like to work with to develop the idea into a working prototype over the next two-to-three months. The chosen developer is given seed funding to support them as they develop the prototype.

The Innovation Lab series produced some tangible products which are now to be used by the people of Leeds, including a website to show energy usage by building; a website/app to help people find the best place to live in Leeds depending on age and preferences; and a new bin app which informs residents which days their various bins should be put out.

Impact



Economic: Combining open data with Innovation Labs enables developers and SMEs to grow by identifying new products and services for them to develop.



Social: products developed through Innovation Labs address identified social problems in Leeds, improving outcomes such as wellbeing and resident satisfaction.

Bath: Hacked - an open data portal for Bath and North East Somerset - uses open data to help with school applications, track new business creation, guide travel around town, and report on air quality. One of its most notable achievements has been in using the open data community as an business accelerator to help local business win new contracts (over £1 million to date), leveraging access to new data sources.

Copenhagen, has launched a data marketplace to increase the amount of business data that is openly available. Copenhagen's aim is to help developers, entrepreneurs and businesses to make new products and services. The City Data Exchange provides a service for the sale, purchase and sharing of a wide variety of data from multiple sources between all types of users in a city – citizens, city government, businesses. [The City Data Exchange](#) removes the need to rebuild the data architecture for each analysis and eliminates data silos, which make it easier to share information between organisations.³⁹

North Somerset uses open data to boosting tourism and grow the local economy. Council datasets which hold information about local tourist activities were published on a data portal, and then re-published on a dedicated website (Discover North Somerset) promoting tourist areas of interest. The website also features local events, and tourist images have been crowdsourced from the public and local libraries. Officers have engaged with a group of local developers through a hack day to find new uses for the data. There is a wide range of benefits from the portal, including driving additional tourist activity when the Banksy Dismaland exhibition opened in Weston Super Mare.⁴⁰

Spotting fraud and error

Why is this important?

Local government lost an estimated £2.1 billion in fraud in 2011, the last year for which figures are available.⁴¹ This can be from people falsely claiming entitlements such as Blue Badges, housing tenancy fraud, or procurement fraud. Alongside this, money is lost through error such as duplicated payments to suppliers or incorrect payments to individuals. Integration of data and analytics increasingly makes fraud and error preventable, offering another means of making savings.

Better matching of data sets within councils and with external organisations can make fraud and error easier to detect. This can expose variations and anomalies which are indicative of fraudulent activity, such as individuals registered at more than one address or inconsistencies in details of household composition. Spotting fraud, especially in procurement, can be done by analysing large data sets and looking for abnormal patterns of payment activity. This can flag up possible procurement fraud for further investigation.

Data analysis can also be used to spot duplication of payments. In 2011, Experian estimated that councils lost £147 million through duplicated payments.⁴² Through data analysis, councils can get a better understanding of the factors which lead to payment errors and the key predictive factors. Councils can then monitor operational activity for these factors, enabling them to take preventative action to reduce the amounts lost to error.

How are councils using data to reduce fraud and error?

Spotlight - Camden: How can fraud be detected automatically?

Camden integrates data from 16 lines of business systems which helps them to find anomalies and suspicious variations which indicate fraud. The Camden Resident Index (CRI) can automate checking processes to detect fraud, such as in school applications, single person discount for council tax claims

and illegal subletting. The CRI can identify discrepancies in the system, such as flagging up households with more than one person registered which are claiming single person discount for council tax. Camden has also used data to spot housing tenancy fraud.

Impact



Financial and Social: Camden estimate that they have saved £800k so far from the identification of illegal subletting of council housing. In the last round this flagged five school places which had been obtained through fraudulent claims about addresses. This can save money, as housing can be reallocated to people in genuine need and families moved out of expensive temporary accommodation. This also improves the housing conditions for these families, giving them stable accommodation and access to schools.

Gravesham used data analytics to detect households committing social housing tenancy fraud. A data matching exercise was run on 5,800 tenancy records to provide a list of high risk properties for Gravesham's Fraud Investigation team. This helped Gravesham prioritise how it deployed benefits investigators, and saved them time in having to calculate allocations manually. This process identified over 75 properties where the council made a range of interventions, from repossession of properties to re-housing, updating tenancy agreements

and resolving tenancy succession issues. The council found eight properties at which repossession was required, four properties that were under-occupied and 12 secure tenancies which were passed on to someone who wasn't legally entitled to it.⁴³

In **Cambridgeshire**, a cross-county data sharing warehouse, bringing together 24 data sets from five district councils, was used to identify social housing fraud. Address data was crucial in this process as it provided a standard property address with which to link all records. Each month, c.270,000 records are fed into the data warehouse, with a 100 per cent match rate with the address custodian supplied by GeoPlace. This has detected approximately 80 cases of fraud, at an estimated value of between £0.8 million - £1.7 million.⁴⁴

Section 3 - Using data to drive value in local public services

In this section, we present the learning from analysis of the case studies about how to make data-led innovation successful. This covers what to expect when undertaking data work, the factors which make projects successful, the working methods which can be used, and the factors to bear in mind when thinking about replicability.

Data-led innovation - what to expect

As with any significant project, data-led innovation will meet a range of challenges. The purpose of this section is to describe the challenges which are most likely to arise, so that councils considering this kind of work can make more informed preparations. The interviews with the case studies explored the challenges they encountered when undertaking their work. These challenges have been collated and all which were present in two or more of the case studies are summarised in the table below.

	Birmingham	Bristol	Camden	Kent	Leeds	Manchester	Newcastle	Suffolk
Lack of data standards (hampering integration of data)	●	●	●	●	●			●
Data Quality		●	●	●	●	●	●	
Lack of data-centric culture/appetite for data-informed decisions and working	●	●	●			●	●	●
Information governance and data sharing		●	●			●		●
Working with legacy IT systems			●	●	●			●
Lack of skills and capacity	●	●	●	●	●		●	

Connecting decision-making structures				●				
Making the business case and accessing financial resources	●		●		●			●
Persuading people to make their data open	●				●			
Persuading people to engage with open data	●				●			

Below, the most commonly encountered challenges are described in more detail:

- **Data quality will be poor.** At the outset of work in every case study, some or all of the data was not of a useable quality. In some cases, this was because manual data entry was inaccurate. Interviewees ascribed this to the fact that the staff inputting data are often not the primary users of the data, and are not exposed to the problems that poor data input creates. In other instances, data is collected or organised by individual teams in idiosyncratic ways, which makes it hard for it to be integrated with other data. Finally, sometimes data is not routinely checked for quality. The case studies confirmed that poor data quality is likely to be a feature of most if not all local government data projects.
- **Integration of data will mean dealing with a lack of common data standards** - a number of the case studies reported that within councils, and across the local public sector, a lack of data standards meant integration was difficult. In most cases, this problem was associated with differences in how values were represented, data categories and fields, or how the data is organised. In some cases, while there are agreed data standards, they have not been adopted systematically across local government.
- **The concept of data-led innovation will be unfamiliar to some staff** - many interviewees commented that embedding data and analytics into day-to-day work represented a change in working culture in their councils. Challenging the status quo within any working culture can provoke resistance. Interviewees reported that it was difficult to get cooperation and bring people into their work because people were sceptical of both motives and the chance that the project would make a positive impact. Successful data projects are likely to need some degree of cultural and behavioural change within the organisation.
- **The work may challenge the technical capacity of staff** - half the case studies reported that there had been a gap between the aspirations of the project and the technical expertise and skills of their staff. This ranged from a lack of people capable of performing advanced statistical analysis, through to a lack of staff who are able to code or programme in specialist software. It was recognised that there is no commonly defined skills-set for data analysts or scientists in local government, and being more ambitious about how data is used may require staff to up-skill or for external support to be brought in.⁴⁵

- **Information governance concerns are unavoidable where data integration is involved** - some of our case studies involved integrating data about individuals, sometimes of a personal or sensitive nature. Interviewees reported that legal and cultural hurdles are unavoidable and have to be cleared when sharing data in this way. In each case study, it was possible to legally share data in accordance with current legislation and this should not be seen as an unsurmountable barrier.
- **There can be resistance to opening data, and people might not use it** - councils promoting open data all encountered a resistance to sharing data from other teams in their councils. Often these teams would be nervous that data quality was poor, that the data might show them in a bad light, were concerned about information governance, or that it would generate negative press coverage. These councils also found that it was challenging to get people to engage with the data once it had been made open, or as one interviewee from Leeds put it:

“Build it and they probably won’t come.”

Information Governance Officer, Leeds City Council, 13 July 2016 (2nd workshop, London)

- **Making a robust invest-to-save business case may not be possible** - as financial resources become increasingly scarce, there is a pressure for any new project to demonstrate its return on investment or the cashable savings it generates. While data-led projects can produce financial savings, in some instances our case studies were trialling something new which necessarily didn’t have an evidence base. It will be the case that either due to the level of innovation, or through a lack of evaluation, the evidence may not exist to produce an invest-to-save business case that would satisfy an average council Finance Director. An interviewee Camden summarised the challenge as follows:

“One of the problems is that the business case for improving insights can be a bit intangible. You won’t know what insights you’ll have until you build it, so it will always be a bit of a leap of faith.”

Strategy Officer, London Borough of Camden (1 July 2016)

- **Using data to inform decision-making can be a bigger shift than it seems at first** - decision-making in organisations is highly culturally ingrained. While many councils may perceive that they are data or evidence led, the case studies suggested that the reality of proactively seeking data to inform decisions, and committing to this at the point of making the decision, was often different. Basing decisions on intuition, accumulated experience or even subconscious biases is a hard habit to shake. While we would not advocate entirely data-driven decision-making, the case studies found that data-informed decision-making can be valuable. However, the case studies also found that even with robust insights, they can be ignored by decision-makers who find the implications uncomfortable or challenging to their previously held beliefs.

How to tackle typical challenges

The interviews with case studies were used to understand the ways in which councils had overcome the challenges mentioned above. Below the lessons learnt from analysis of these accounts is outlined. The purpose of this section is to set out the strategies councils can employ when undertaking data-led innovation.

Lessons learnt	Birmingham	Bristol	Camden	Kent	Leeds	Manchester	Newcastle	Suffolk
Support and buy-in from leadership	●	●	●	●	●	●	●	●
Realistic financial and staff resourcing	●		●		●	●		●
Work in an agile way	●	●	●		●	●	●	
Have expertise in information governance and be specific about purpose				●	●	●	●	
Expose data quality problems through use				●			●	
Engage with end-users			●			●	●	●
Demonstrate tangible benefits	●	●	●			●	●	●
Be open to experimentation		●						
Build trust with partners to enable sharing				●				
Have a purpose for working with data					●			
Develop capacity and skills in-house				●			●	
Be persistent					●			
Publish full, raw datasets					●			
Develop partnerships with local developer community		●			●			

Having supportive leadership is vital

The most significant factor in implementing a successful data project is support from leadership. In some cases this was via the chief executive, sometimes directors of departments, and in some cases from politicians. It is unsurprising but still instructive that this was identified as such a critical component of success. In confirming its importance it suggests that leadership support is a prerequisite for any council that wants to pursue more ambitious data work. If there is a lack of leadership support within a council, securing greater levels of support is one of the most important early objectives.

A number of reasons were given for the importance of support from council leadership. As noted above, the work being undertaken was often challenging for the established culture of the organisation. By having an endorsement or sponsorship from key decision-makers, interviewees reported that it helped them to push through this resistance and bring sceptics on board, for instance in Leeds where leadership support helped overcome resistance to opening data:

“When I speak to people who aren’t persuaded by the argument to open data then we have the report that’s been agreed by senior councillors to put in front of them. [Decisions about whether to share] shouldn’t be about what individual officers think.”

Information Governance Officer, Leeds City Council, 12 July 2016

Other reasons given included better access to financial resources, and an easier route to impact as decision-makers were more likely to act on the outputs of the analytical work.

Interviewees also noted that leadership can bring vision and ambition. The smart city and open data programme in Bristol was driven by political and officer leadership from the outset. Between 2012-2016 Bristol’s independent mayor was a champion of technology and data for the city and put his own personal capital behind the project. In complement to this, the council’s senior management were positive about embracing waves of disruptive technology as a chance to create a city that is better for people to live in. Interviewees argued this gave the work a strong external advocate which rippled down throughout senior management and gave permission to experiment. This was also important in creating the vision for the smart city and openness agenda, which goes beyond many of the tech-dominated approaches to smart cities in other places.

Where there was not initially support from leadership for projects, interviewees reported that they invested significant time in making a strong and compelling case to bring their leadership on board early on in the work. In some cases, making a link between investment in data activity and participating in a high-profile national scheme which brought extra funding was noted as one means of getting an initial level of support. Being able to demonstrate tangible benefits was also recognised as persuasive for decision-makers.

The importance of leadership is also underlined by looking at situations where it was absent. In Kent, immediate leadership was supportive, but key decision-makers were not always persuaded of the value of data. Respondents noted that in some instances the insight provided by data analysis had not translated into changes in practice or commissioning. It was noted that this could be due to a disconnect between who is making decisions and who is asking for analysis. Much of the analytical work has been requested by CCGs, rather than the County Council, where there appears to be less appetite for the analytical work of the Public Health team. This was attributed to the movement of Public Health from the NHS to local authority, which was still relatively recent. The Public Health team has not become a recognised part of decision-making processes in the council. It was also suggested that there was a lack of appetite for data or evidence-led decision-making. An interviewee from Kent commented:

“Frustration can arise when the findings of linked data analyses are not accompanied by information to enable senior managers to operationalise organisational change.”

Public Health Officer, Kent County Council (4th July 2016)

Time, resources and expertise are needed to manage information governance concerns

Of the case studies which worked with personal and sensitive data, in particular integration from multiple different services, there was no escaping the need to produce information governance protocols which could satisfy both legal and cultural scrutiny.

Amongst interviewees, it was noted that having access to expert legal judgement, either from within the council or brought in from external organisations specifically for the project, was an essential component of success. The legislation which surrounds information sharing is complex and sometimes ambiguous, but with expert legal judgement confidence can be given to decisions made about when information can and can't be shared.

Case studies also emphasised the need to be highly specific about the types of information required and why. By doing this, expert legal judgement could be given on a case-by-case basis, which could then be applied consistently for the regular sharing of data. Exploring all the different legislation, and the various gateways for sharing, was also cited as an enabling factor. Conducting a privacy impact assessment was reported as another essential action as this helped to ensure that the sharing of information was proportionate.

The case study of Manchester profiled sharing and integrating sensitive data from multiple different sources and Manchester's experience is instructive for other councils considering something similar. Manchester's data warehouse has embedded decision-making about data sharing between agencies. This is based on expert legal guidance and the system is built to reframe the idea of sharing information. Through the new system, key workers do not have to ask to share data, they are entitled to see data in line with the responsibilities and duties of their job.

The decisions built into the system were based on meticulous work to decide the legality of sharing data in very specific, defined instances. This includes sharing school attendance information, or reports of police call-outs, where there is a safeguarding concern about the child. Advice from a barrister was sought on these specific instances, which then informed the development of a Privacy Impact Assessment in collaboration with partner agencies. Manchester wanted to reduce individual decision-making about data sharing because different interpretations led to inconsistencies in which data was being shared.

The data warehouse creates a system which protects data better than a manual process, while also permitting data sharing in instances where the legislation allows it. The system records the digital footprints of key workers who use it, which means that any inappropriate use can be detected and acted upon. Manchester estimate that more time was spent on information governance than technical development, confirming the importance of committing dedicated resources and expertise in order to get data sharing right.

It was noteworthy that case studies reported that resistance to sharing information was often more cultural than legal in basis. Interviewees mentioned that some staff were uncomfortable with the idea of sharing information, even when provided with assurance that it was being done appropriately and legally. In Suffolk, interviewees suggested that there was a strong aversion to sharing information, created by the training staff were given on the Data Protection Act. This emphasised the potential £5,000 fine staff would be liable for if they shared information in a way which was deemed inappropriate. To address these persistent cultural barriers, communication and training were cited as effective methods of reassuring staff about when and when not to share.

There are also a wealth of online resources dedicated to helping councils with information sharing. The [Centre for Excellence for Information Sharing](#) has resources such as template protocols, as well as online learning and good practice materials. The Local Government Association has published a template [Privacy Impact Assessment](#), based on the work of Manchester and Camden.

Rapidly prototype, test, evaluate and iterate

In theories of software or IT system development, project management is often described as a choice between ‘waterfall’ and ‘agile’. Waterfall refers to methods which are linear and sequential. It begins with design and progresses through development and testing to implementation. Importantly, there is agreement at the outset on the specifications of the end product, and there is a clear end outcome at the beginning. In contrast, agile approaches are iterative and emphasise the rapid delivery of the functional components of the product through short bursts of activity known as sprints. The agile method allows for refinement of the specifications of the end product, and uses testing and feedback to continually improve the product through the development cycle.

The project management approaches employed by the case studies were a mixture of agile and waterfall methods. However, while both were used, agile-like methods were reported in some instances as being crucial to success. Interviewees generally did not talk in terms of agile or waterfall, but the actions described echoed much of the agile project management approach. For instance, in Leeds the open data portal was launched rapidly through an initial phase of rapid development to find data sets which could be uploaded. In Newcastle, the development of the segmentation analysis and the work of the data analysts has been highly iterative, with each phase focused on developing a working prototype further. In Suffolk, they developed the project through rapidly testing, looking at what worked and iterating:

“From the start, accept you won’t get it right first, second or even third time. It’s an evolution of the approach in how we do things, in both service delivery but also data and evidence level.”

Senior Manager, Adult Social Care, Suffolk County Council (18 August 2016)

In Camden, an agile approach with a multi-disciplinary team was used to develop the Camden Resident Index and data dashboards. Camden’s implementation teams worked in small batches, learnt what was working as they went along and iterated. As one respondent noted:

“I don’t think anyone could implement what we’re doing by knowing what it looks like at the start. The waterfall method wouldn’t have worked. [You] have to work out what is successful and not successful as you go. Everything changes around you and so having an end goal at start might not be the end goal at end. You need a vision but don’t be too rigid.”

Business Intelligence officer, London Borough of Camden (29 June 2016)

For one aspect of the project - the open data portal - the team began by using monthly work cycles with the aim of pushing out as much data as possible. The work cycles gave Camden the opportunity to adapt where needed, but also to become more efficient with the way they worked through routine tasks.

Camden also made efforts to create a partnership around development so that the project would not end up marooned as an IT project. The work was completed in combination by

IT and the corporate strategy team, which ensured there was both technical capacity and a strategic importance for the project. The approach to implementation also focused on bringing the whole organisation into the project, which helped gain buy-in from staff at all levels.

“ We took a team approach. We didn’t just have half a dozen managers in a room making decisions. We had people from all levels of the organisation involved and that made it tick along.”

Strategy Officer, London Borough of Camden (1 July 2016)

The advantages of the agile approach are that work can be delivered more quickly than via traditional approaches. The method encourages closer collaboration between developers - in this context the data analysts, programmers or data scientists - and the end-users of the product. Testing enables teams to adapt as problems are encountered, the lack of pre-defined specifications for the end product prevents perseverance with bad ideas, and the use of rapid development enables continual improvement of the product.

Understand the needs of end users and demonstrate tangible benefits to them

One of the most significant challenges observed related to the aversion to the use of data in decision-making in local authorities. Interviewees reported that there was often a perception that data work was a discrete and compartmentalised activity and as such was not considered an important or useful part of other activities, such as frontline social work or decision-making. As a result, there was a resistance from these staff to projects which required them to work with data in a different way.

The case studies found that most effective strategy was to work with the end-users to establish what their needs and working requirements were. Typically, this would focus on what might make their job easier or more effective. In Manchester, it was to reduce the amount of time it takes to collect the information needed for triage and assessment. In Camden, Leeds and Bristol, data owners who were reluctant to share their data also often had officer time bound up in responding to FOI requests. In Suffolk, the team developed an off-the-shelf menu of products based on feedback from Service Transformation Group, showing staff the information and analytics they said they needed to do their jobs. This created a direct connection between the use of data and the day-to-day needs of frontline staff.

“ You see people change when they realise that it can actually work for them.”

Senior Manager, Suffolk County Council (18 August, 2016)

Interviewees reported that producing something that clearly addressed observed needs was highly persuasive in turning sceptics into data enthusiasts. In Newcastle in particular, embedding data analysts into teams of social workers was reported as crucial to changing how staff saw the use of data in decision-making, from the frontline up to senior management levels.

Embedded data analysts developed a data dashboard - called ChildStat - which gives each social worker 25 different metrics to view, including an overview of their caseload, statutory visit deadlines and information about outcomes. To ensure these met the needs of end users, the data analysts convened a range of staff members to discuss what the main objectives were for the service, and which data could be collated into a set of dashboards to reflect this.

Before Newcastle's data-led changes to children's social care, there was a deep distrust of data among social workers, as one interviewee commented:

“Social workers see themselves as people people, and they think data people are not people people.”

Data analyst, Newcastle City Council (7 July 2016)

However, since the introduction of embedded data analysts, there is a lot more affinity between different disciplines about the use of data. The proximity of data analysts to frontline social workers was an important factor in this as it meant the data analysts could 'live and breathe' the cases. The impact of the data analysts was summarised by one interviewee:

“Social workers are now looking at data in a totally different way. They no longer see it as a stick or a weapon to be used against them. They can see it can be used to help them manage their caseload. One social worker told me that ‘data has gone from being a top down compliance driven weapon, to a bottom-up tool which enables understanding, insight and aspiration’.”

Data analysis manager, Newcastle City Council (7 July 2016)

Commit realistic resources to the project

Across all the case studies, there was a requirement for investment in new software or staff time, and often both. While none of the projects had large budgets, all were made possible because there was sufficient financial and staff resource to do the work thoroughly and to a high standard.

In some cases, the resource came from external funds. Newcastle's project was financed by the Department for Education's Innovation Programme. Data Mill North was originally funded through various sources of open data government funding. Camden's programme was funded by the sale of high-value property assets with an aspiration that the transformation work in general would eventually pay for itself.

While it is unsurprising that having realistic approaches to resourcing was identified as important, it is instructive that successful data projects were treated as core business projects rather than niche and marginal activities.

In some cases, gaining additional financial resources was contingent on the data project being successful. In Kent it was easier to gain support for the Kent Integrated Dataset as its primary purpose - the Year of Care programme - was high profile and had finance attached to it. Interviewees mentioned that while information governance could often be used as a reason not to do work like this, in this instance because of the high-profile nature of the programme:

“No-one was trying to stop it, instead people wanted to work out how to make it happen.”

IT officer, Kent County Council and Medway Health Informatics Service (4 July 2016)

Suffolk demonstrated the value of ensuring there is sufficient staff and financial resource given to a project. Their shared performance framework took time to develop, as new data sources had to be found along with methods to automate data refreshes. Suffolk took

the view that it would be too challenging for this to be done alongside 'business as usual' performance monitoring with no additional resource. The pressure to respond to the next big panic, be it an FOI request, a question at council, something in the press, can often mean that staff are pulled away from development work and back towards fire-fighting.

In response, additional staff resource was made available to support the data aspects of health and social care integration. This meant that existing performance monitoring could continue, while other staff were allocated exclusively to the integration project so they could focus on new work without being drawn back into their usual day-to-day activities. Suffolk updated the job specification for one analyst and aligned their role to business partner with IT colleagues. This created space which gives legitimate grounds to protect the analyst from time-consuming FOI and business as usual type work. One interviewee noted:

“It’s expensive to have two data functions, but really important to have someone doing the here and now and someone who is freed up to think about the future.”

Senior Manager, Suffolk County Council (18 August, 2016)

Proactively engage with the community to grow use of open data portals

For councils with open data portals, respondents reported that it was helpful to actively engage and develop local communities of programmers, data analysts and civic enthusiasts. This increased the use of open data, but more importantly created partnerships between these communities which could be used to solve challenges faced by the local public sector. Bristol were able to engage a community that was already forming:

“We were really fortunate to have a data ecosystem – the individuals who are passionate and understand the value of data inside and outside. That existed before we started this programme. We found them, joined it and tried to be part of it rather than to dominate it.”

City Innovation Officer, Bristol City Council (22 June 2016)

Data Mill North in Leeds has become one of the biggest open data portals in the country through proactive collaboration with the local community of developers, entrepreneurs and civic enthusiasts. This approach was taken after initial engagement with the portal was low:

“We naively thought ‘build it and they will come’, that if we put a lot of data out there people will come and do good stuff. And that might happen if you have a great groundswell of data, but we’re not there yet.”

Information Governance Officer, Leeds City Council, 12 July 2016

To drive up usage and engagement, the council ran Innovation Labs and hacks which bring together developers with open data to solve challenges identified by the community. The portal itself is open source, which enables people to make visualisations, stories and blogs on the Data Mill. An interviewee summarised this as follows:

“Using open source software, working collaboratively – the reason we have a successful project is because of that approach, of reaching out to other people across the city and now going beyond to other people across the region. I would advocate that approach – you can’t do it alone.”

Information Governance Officer, Leeds City Council, 12 July 2016

Other important success factors

- **Start using the data to flush out problems with data quality** - Some interviewees noted that the best way to deal with poor data quality is to start trying to use the data, preferably with the data owners. This quickly exposes where the data quality is problematic, and puts the onus on the data owner to improve the quality. In Newcastle, the use of data dashboards helped to expose where poor data quality was linked with data input methods. When social workers saw their data visualised in the dashboards they would often ask questions as the data didn’t look right. This created a conversation about how they were recording data, and in turn improved the quality of the data held.
- **Use the project as a chance to develop internal capacity** - Some case studies found that it was helpful to develop internal technical capacity as their projects progressed. This prevented them becoming either reliant on a small number of technical experts, or on external resources. Using data projects as a means of developing staff was both good for the projects, and beneficial for future work. Camden’s technical personnel was a combination of in-house IT team members, external consultants and staff who were developed as part of the programme. Camden reported that by developing expertise in-house through the programme they have combined the high technical skills of their external consultants with a strong understanding and tacit knowledge of the council and how it works.
- **Start with a problem that can be solved by data** - The discipline of working in a ‘problem-oriented’ way was reported by some interviewees as being beneficial. By starting first with a problem, and asking which data and which analysis might help to solve it, there was a better chance that the work would lead to actionable insights and impact. Manchester’s work began as a response to the problem of identifying troubled families in order to participate in the government’s payment-by-results programme. This gave it a very specific focus and easily measureable first assessment of success.

Additional considerations for data-led innovation in local government

Evaluation and evidencing impact

One notable observation about the case studies was the lack of systematic evaluation. This was despite many interviewees reporting that being able to show the tangible impact of data analytics is a key part of advocating for further data-led work. In the case studies we reviewed evidence that had been collated, which ranged from evidence about financial savings to improved social outcomes. However, this evaluation was often ad hoc or produced opportunistically after-the-fact on the basis of the data available. Where agile approaches were employed, this involved testing but this did not always extend to testing the end impact once the project was up and running. A more rigorous approach would have involved designing an evaluation framework into the projects from the beginning, defining the key outcomes targeted and how success would be measured.

Evaluation of impact is an area Nesta has placed particular emphasis on, throughout our research, practice and impact investments. Nesta has developed tools and resources to promote evaluation of impact. Nesta's [Standards of Evidence](#) provide a framework for determining how confident we can be that an intervention or initiative is having a positive impact. The [Alliance for Useful Evidence](#) is a repository for resources and materials which encourage the creation and use of better evidence in government.

Future data-led innovation should ensure that systematic evaluation is integral and planned in advance. This will help to assess whether the use of data is creating real benefits, and in instances where it does will help make the case for further data work.

Could the case studies be replicated elsewhere?

In interviews, we asked people whether their projects could be replicable in other local authorities. Responses indicated that there was little about the local context of these projects which would mean they couldn't be replicated elsewhere. There were no specific geographical, technical, demographic, organisational or personnel related factors which would be impossible to recreate in other areas. However, along with the identified success factors, there were some features which may be harder to replicate and for which alternatives might need to be found. For instance:

- The upfront financial resource sometimes came from specific central government funds, or from the sale of high-value council assets, which may have since closed or are beyond the immediate control of the council.
- The vision or organisational mindset was sometimes recognised as being both locally-specific intrinsic to the project, such as in Bristol
- Open data portals which are thriving have often been fortunate to have a ready-made community of developers on their doorstep. This could be hard to recreate in areas where there is no tech component to the local economy, or where there are few universities.
- While leadership can be persuaded to back data projects, in some of the case studies decision-makers were already convinced of the value of data at the outset. Where this was a part of the overall strategy and vision, it would be harder to replicate the work without a supportive leadership already in place.

How to approach a data project in local government

What does this research tell us about the process of using data to improve council services or to inform better decision-making? We collated the insights gained in the research to set out a series of steps to take in order to get value from data

1. Start with a clear problem to be solved, for which data can offer impactful and actionable insight.
2. Gauge the level of support for data-led work in senior leadership and work to convince them of the importance of the project.
3. Start small, engage end-users to find out where and how data could be used to make their day-to-day work easier.
4. Be clear about ultimate objectives and how these will be measured.
5. Ensure there are realistic financial and staff resources allocated to the project.
6. Approach the work through a series of sprints which enable rapid development, testing and iteration.
7. Secure dedicated expertise for information governance and be specific about the purposes of sharing.
8. Test the product with end-users and take on board their feedback.
9. Be receptive to making decisions informed by data.
10. Evaluate the overall impact of the work against the original objectives.

Section 4 - Conclusion

Whether it's supporting vulnerable children, stripping out inefficient back office processes, knowing where to send the gritting vans or which bins need emptying, councils are exploring a range of ways in which data can help them do what they do better. This research finds that councils are increasingly sophisticated in how they gather their data, how they manage it, the types of analysis they can perform, and the ways in which they use this to contribute towards positive social change.

But this is really just the beginning. Most councils are only just starting to get to grips with all the data they have, and all the ways they could use it to make improvements. The data held by the local government sector is a potential goldmine of insights into how to improve people's lives and make our communities better. The case studies featured in this report are some of the first attempts at doing this.

Nesta is keen to work with the sector and others to get more from local data. Our Innovation Lab programmes include pilots for Offices of Data Analytics in UK cities, which enable us to put these insights and our expertise to use in practical settings. Based on the findings of this work, we also set out five opportunities which Nesta will be exploring and developing with the sector. These are described in brief below, and explored in greater detail in our separate recommendations paper.

1. Driving further data-led innovation

This research found that bringing data analysts and scientists together with end-users (such as frontline professionals, managers, or senior decision-makers), can result in new and impactful uses of data. To promote further data-led innovation, there should be exploration of a dedicated scheme which pairs data analysts with frontline workers, managers and leaders in councils across the country. This scheme could bring funding and expertise as a means of creating the space for problem-oriented data work in councils.

2. Scaling up existing best practice

Imagine if it wasn't just Manchester's social workers saving two weeks a year in the time taken to triage and assess new cases, but all the social workers in local government. Or if it wasn't just Bristol's local transport data that was available through an open API, but all local transport data. Replicating some of the case study work across the hundreds of local authorities, even just in England, would be a means of generating significant benefits.

Scaling these initiatives up across the country is not as simple as finding the funding to purchase the software and technology used by the case study councils. The interviews showed that successful implementation requires managing the internal culture of organisations, knowledge about data sharing and information governance, and the ability to champion the work to data-sceptic stakeholders. There is a need to develop a knowledge transfer programme that enables local authority staff to share their knowledge and skills with other local authorities.

3. Getting to grips with data at a combined authority or sub-regional level

The case studies which integrated data, such as Manchester or Kent, demonstrate that some of the biggest opportunities lie with linked data. There are enormous opportunities that come from integrating data across the local public sector, such as health, education, housing, police, and social care. But the benefits of linked data apply as much across local authorities as to a single 'place'. With the emergence of new combined authorities, sub-regional entities such as LEPs, and other local partnerships, there are opportunities to bring together data at a large scale. This should be a main area of focus for local authorities exploring how to get more from their data. Nesta's programme of Offices of Data Analytics will be looking at some of these opportunities, but it should also become a feature of all devolution deals and combined authority arrangements.

4. Using systematic evaluation to see what works and what doesn't

Scaling-up the use of data should be done on the basis of rigorous evidence of impact. Our research noted that a lack of systematic evaluation of impact was a feature across the case studies. This was often for good reason and this is certainly not unique in the local government sector. However, systematic evaluation makes scaling impact easier. Interviewees frequently noted that presenting tangible evidence of impact was the easiest way to promote further data-led work. Properly evaluating data and analytics work will provide a clear picture of which tools, analysis and projects should be scaled, and which do not produce the impact to justify continuation.

5. Translating insight into tools and resources

The case studies were testament to the fact that the process of using data to inform changes to services, or as part of decision-making, is not straightforward. There are identifiable challenges that occur frequently where data and analytics are involved. The commonality of these challenges suggests that there is scope for the development of practical tools and resources that can be used by the sector.

In this research, we used the insight gathered to develop a prototype data maturity framework (see [Appendix 2](#)). This was prompted by discussions in research workshops, interviews and the project's advisory group, which identified the opportunity to produce a framework which would help councils think about the data they hold and how they use it.

As the sector continues to learn about how to use data and analytics for social good, we will see opportunities to turn this insight into practical tools and resources as should central government organisations working across the local government sector.

What comes next

Over the next year Nesta will be exploring these opportunities and others to help government - central and local - get more from the data they hold. This report features ways of using data which are having hugely positive impacts for people, communities and councils. We hope this to the start of the story, not the end.

Appendix 1 - The case studies

Leeds City Council



Uses of data



Opening government



Supporting the local economy, business growth and innovation



Optimising management of place and infrastructure

Impact

Key success factors



Economic

Leadership



Productivity

Problem-oriented approach



Social

Agile approach

Data Mill North

(formerly Leeds Data Mill)

“Open Innovation is really key to what Leeds does. (Leeds is) trying to crowdsource solutions from the talent in the region. We start with a problem, set by the council or someone else, then get people in a room and look for data driven solutions”

Director of Open Data SME in Leeds,
29 June 2016

Summary

Leeds City Council has been using data to support open innovation. Opening up public sector data has enabled external innovators to develop solutions to the challenges facing the city, its residents and its businesses. The council has also used data to understand how it can best support its local economy and adapt the city to the demands of the future.

There are three initiatives which exemplify the council's approach:

- Data Mill North (an open data platform for council and other data), and the Leeds Observatory (a Local Information System).
- Innovation Labs and open innovation strategies.
- Support for the local economy.

Data Mill North

Leeds City Council launched Data Mill North (DMN)⁴⁶ in 2014. It has since become one of the largest open data portals in the UK, hosting over 300 data sets from over 40 different organisations. It has been a key driver of open innovation in the city helping to forge a network of local coders, programmers and civic enthusiasts.

Leeds wanted to create an open data portal that would open up as much data as possible to the public. This was very deliberately a portal for the city of Leeds, rather than a portal for Leeds council, as one respondent explained:

“Our approach was to differentiate Leeds as a city. We realised that if we wanted to understand the city better, and the issues that affect it, then the council is just one piece of the jigsaw. And increasingly, it's a smaller bit of the jigsaw as we commission more services externally”

Information Governance Officer, Leeds City Council, 12 July 2016

Data Mill North is a true partnership. It is hosted by a private digital company, was developed by a local SME, is powered by an Open Data Institute startup, and is managed by Leeds City Council. At its launch it had 50 data sets, which had been gathered from within the council over a two-month period described as a 'sprint'.

To grow the Data Mill, officers dealing with Freedom of Information (FOI) requests were given the title of 'Open Data Champions', with the expectation that any data provided as an FOI should also be published as open data on DMN. Their role was to proactively identify potential datasets before FOI requests were received, to think beyond the specific request of the FOI, and to publish all the data in a machine readable format. Once data is uploaded to the portal, Information Asset Owners are responsible for keeping the data up to date.



In November 2015, Leeds committed to being 'open by default'. This required a culture change within the organisation, as open data has to become part of everyone's jobs:

“If you want to be open by default, you have to embed it. It can’t just be left to a couple of people. We want it to be part of everyone’s job just as health and safety, diversity and information governance currently is.”

Information Governance Officer, Leeds City Council, 12 July 2016

Leeds’ experience shows that proactive efforts are needed to get the outside world to use open data:

“We naively thought ‘build it and they will come’ – that if we put a lot of data out there people will come and do good stuff. And that might happen if you have a great groundswell of data, but we’re not there yet.”

Information Governance Officer, Leeds City Council, 12 July 2016

Leeds have run hacks and Innovation Labs (see below), which bring the council and the community of developers together around a common problem, as a way of driving up usage rates. Leeds has also recognised that the real value is in real-time data available through APIs, which has become a longer-term ambition for the portal.

The open data platform enables new data publishers to be added easily and with no additional cost. There are currently 43 different organisations either publishing or being signposted on the Data Mill North including Yorkshire Water, Northern Power Grid and Heritage Lottery Fund. In July 2016, Leeds announced that DMN would become an open data platform for organisations across the north of England.

Alongside the Data Mill, the council hosts the [Leeds Observatory](#), which is a portal for council data which aims to transform data into intelligence and insight about council services. The Observatory puts data into profiles, onto maps, or into reports.

Some of the products that have been developed using data published on the Data Mill include:

- [StreetWise.life](#)

This is a website which displays local information such as NHS hospital locations, accidents, planning applications and restaurants.

- [Leeds Empties](#)

Leeds Empties are a social enterprise concerned with filling empty homes. They use data from Data Mill North to show how their work is contributing to the reduction of empty homes across the city.

- [ViaggiArt](#)

This is a visitor app created by Italian company Altrama. Using data from Data Mill North they have created a free interactive app which guides visitors around the city.

- [Dashboard](#)

Working with Hebe Works, a local digital SME, the council has created the Leeds City Dashboard. This makes the data published on Data Mill North and elsewhere more accessible.

- [Student Data Labs](#)

The labs [analysed data published](#) on the Data Mill to show the accident ‘hot spots’ in Leeds as well as the prevalence and spread of diabetes in the city to make GP practice-level forecasts about the future demand for diabetes medication.

Innovation labs

Leeds uses Innovation Labs as a means of connecting local developers and civic enthusiasts to local public policy problems, with the aim of solving these using open data. The council made a small amount of money available for a number of pilot projects.

The Labs are held over the course of a day. In the morning, groups generate ideas which use open data to solve the thematic issue. In the afternoon developers build a prototype, which could be an early-stage website, app, or just a PowerPoint presentation which explains the concept.

At the end of the day there is a 'show and tell' presentation and feedback session on the prototypes. Participants opt for which developer they would like to work with to develop the idea into a working prototype over the next two to three months. The chosen developer is given seed funding to work up the prototype.

The Innovation Lab series produced some tangible products which can now be used by the people of Leeds, including:

- **Energy Innovation Lab**

A prototype website is being created to show energy usage by building. The data can be visualised at a high level for senior managers to make decisions or lower for staff to see what impact they make.

- **Great Sense of Home**

A website/app to help people find the best place to live in Leeds. Developed as part of Leeds City Council's Age Friendly agenda, the app uses simple questions to 'match-make' people with areas of Leeds. While originally aimed at older people, it's a tool that can be used by anyone.

- **Waste Innovation Lab**

A new bin app has been created which informs residents which days their various bins should be put out. It's an app which aims to reduce the number of complaints about missed bins, increase recycling rates and reduce the need for paper communication from the council.

- **Education Innovation Lab (in development)**

A website (in development) to help parents make better, informed choices about which schools to choose for their child.



Rubbish at putting your bin out?

Help us test the new Leeds Bins app which sends helpful reminders and offers extra guidance on recycling

Search for 'Leeds Bins' and download the app now!

Leeds City Council | Leeds Data Mill | Urban Innovation Lab | imactivate

Get it on Google play | Available on the App Store

Future-proofing Leeds through data-led collaboration

Leeds has formed a number of collaborations with local institutions in which data has been a core part of work to improve the city. Some of these have already produced tangible results, while others are more forward looking and focus on how data can be used to generate smart city solutions to existing or emergent problems.

- **Leeds Data City** - a collaboration with a local job recruitment agency, the ODI and KPMG - used data from multiple sources to map the Leeds Digital Economy. This found 1,300 businesses in Leeds with digital in their remit. The mapping exercise is being used to inform strategies on digital skills and graduate retention, forming a better connection between students and the business community.
- **The Leeds Institute for Data Analytics** is a partnership involving the University of Leeds, the council, NHS bodies and other organisations. It secured £12 million of funding which resulted in a state-of-the-art centre for data analytics. Projects include Quanticode which will develop novel data mining and visualisation tools and techniques for quantitative and coded longitudinal data. The EMPOWER project sets out to substantially reduce the use of conventionally fuelled vehicles (CFV) in cities.⁴⁷
- Leeds has a citizen science scheme used to monitor air quality with cheap sensors given to cyclists or ride-share scheme Uber to record air quality. The data produced could be used for traffic management, but also to highlight air quality black spots which is useful for people with asthma or COPD.

Impact



Economic

- Local organisations have created commercial products from the data available in the DMN, such as Hebe Works, an award winning multi-media organisation that among other things has developed a tool - Soloman - which can bring data to life through dashboards and visualisations.
- Combining open data with Innovation Labs enables developers and SMEs to grow by identifying new products and services for them to develop.



Social

- Data analysis about cycling accidents was used to inform the Cycling Pathway Programme, which created new cycle routes across the city, avoiding spots identified as dangerous for cyclists.



Productivity

- The council is implementing new procedures which will increase the number of published datasets to reduce the number of FOI requests. Leeds estimate that each FOI request takes three hours to respond to on average, meaning that every FOI request prevented is a productivity gain.
- The waste innovation lab led to the creation of an app which notifies people when their next bin collection is and nudges them to recycle. This reduces the costs of notifying residents of collection changes, for example, at Christmas.



Environmental

- The bins app also encourages people to recycle, reducing landfill waste (and associated taxes).

Challenges	Success factors
<ul style="list-style-type: none"> • Initial lack of usage of open data. • Teams in the council were reluctant to open their data. • Poor data quality. • Legacy IT systems and a lack of funding for new technology and training. • Detachment from decision-making structures made impact harder to achieve. • The council's organisational culture is not yet data centric. 	<ul style="list-style-type: none"> • Support from senior leadership. • Persistence. • Focused data analysis on solving problems. • Published full, raw data sets in the open data portal. • Devoted resources to work with legacy systems. • Employed agile working methods. • Backing from key stakeholders, including the Chief Executive and Leeds City Council Executive Board Councillors.



Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 3](#).

Key

● = Council's retrospective self-assessment of data maturity at outset of project

■ = Council's current self-assessment of data maturity

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection				●	■
	Organisation		●	■		
	Quality			●	■	
Data governance and openness	Governance				● ■	
	Openness		●			■
Data use	Decision-making			●	■	
	Performance and evaluation		●		■	
	Process optimisation and automation			●	■	
Data skills capability				●	■	
Data awareness and culture			●		■	

Replicability

The original funding for the DMN came from central government support for open data which is no longer available.

Useful links

Data Mill North - <https://datamillnorth.org/>

Leeds Data City - <http://datacity.org/>

Leeds Institute for Data Analytics - <http://lida.leeds.ac.uk/>

Leeds Observatory - <http://observatory.leeds.gov.uk/>

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London Borough of Camden



Impact	Key success factors
 Financial	Support from leadership
 Productivity	Partnership approach to implementation
 Social	Agile working
 Economic	Upfront investment

Uses of data

	Streamlining operational council processes
	Outcomes-based performance management
	Opening government
	Identifying fraud and error

Transformation through integrated and open data

“In our current plans some 85 per cent of all savings needed to balance the books in Camden have a digital technology-based solution in one form or another.”

Councillor Theo Blackwell⁴⁸

Summary

In 2010, as central government spending cuts began, Camden made a strategic decision to manage funding reductions through a fundamental change to their services and operations, rather than crudely ‘salami slicing’ budgets. Camden adopted Outcomes-Based Budgeting (OBB), focusing on the outcomes required for each service, and then identifying the resources, funding and ways of working required to get there. In doing so, Camden recognised that having and using high-quality data was essential to achieving the objectives of OBB.

Data for intelligence - data dashboards

The first wave of data-led change piloted data dashboards in three service areas: parking, housing repairs and planning. The aim of the pilot was to give managers and operatives a different view of their operational data, such as dynamic monitoring of metrics and trends that are core to improving service quality. Camden has since introduced data dashboards in over 35 areas, with plans to extend coverage with a further 35.

The dashboards have had a particularly big impact in the housing repairs service, which is responsible for around 50,000 repair jobs a year on the council's housing stock. The data dashboard accompanied a 'systems thinking review' of the service. Camden wanted to manage repairs jobs better, improve customer satisfaction and reduce 'failure demand'.⁴⁹ Camden also wanted to understand better which factors drive satisfaction, and to control expenditure. The repairs service considered the data it needed to see in order to effectively manage the service to meet these outcomes. One respondent described this process:

“Previously in the Audit Commission days, with KPIs, we measured things just because that is what we had to do rather than because they had any value. So we asked people what they would need to help them do their jobs better. The challenge was not just about getting some nice charts, but that we were getting insight that people could use as part of their job We now try and look at trends and what is influencing things. We want to understand data rather than just have a static view of what is happening.”

Housing Repairs officer, London Borough of Camden (29 June 2016)

Some of the changes introduced by the data dashboard were simple. For instance, limitations in legacy software would only display repairs jobs as 'issued' or 'completed', making it hard to keep track of jobs and resulting in failure demand. Through the dashboard, Camden can now view jobs as 'incomplete' or 'partially accounted for', and can then prioritise these jobs. These jobs are now closed within a 12-week period, whereas before they could remain open for a year.

Camden also made information about customer satisfaction available on the dashboard. Satisfaction surveys, managed by an external organisation, are loaded into the system and onto the dashboard. Repairs managers can now dissect information by a range of variables, such as job, repairs operative, speed of completion, method of completion, all on a monthly basis. This helped pinpoint areas where problems were arising, prompted remedial action and as a result satisfaction levels have improved by 6-8 per cent over two years. The number of repairs calls has reduced by 25,000 (or 14 per cent), which translated into 2,850 fewer repairs orders.

Camden identifies four key benefits of the dashboards:

- Better quality data leads to better quality decisions, from scheduling of repairs jobs to what to do about the disposal of high value assets.
- Devolving decision-making - the dashboards give staff the information they need to be able to make decisions on their own, avoiding decisions being sent upwards into organisational bottlenecks.
- Exposing data quality issues - by showing staff their own data in dashboards, staff recognise data quality problems and act to fix them.

- Informing team restructuring - Camden use dashboards to realise cost savings as teams are restructured, reducing the number of people undertaking time-consuming data extraction, cleansing and reporting work. Previously significant officer time was absorbed by production of reports, but dashboards give managers and officers immediate access to high quality information without having to go through legacy system intermediaries.

Integrating the council's data - The Camden Residents Index

The Camden Residents Index (CRI) brings together data from 16 business systems in the council to create a complete picture of each resident. Integrating a large proportion of the data Camden held about each resident reduces administration time, provides a more seamless service, identifies opportunities for efficiencies, and helps detect fraud and error. Following a proof-of-concept exercise, Camden procured a software package to enable the integration. It is to date the largest master data management installation in local government in the UK.

Camden did not use a 'waterfall' approach to implementation and instead worked in small batches, learnt what was working as they went along and iterated.

“I don't think anyone could implement what we're doing by knowing what it looks like at the start. The waterfall method wouldn't have worked. [You] have to work out what is successful and not successful as you go. Everything changes around you and so having an end goal at start might not be the end goal at end. You need a vision but don't be too rigid.”

Business Intelligence officer, London Borough of Camden (29th June 2016)

In total the CRI extracts 123 fields of primarily demographic information. To integrate data at an individual level, the CRI takes identifiers from the back end of each system, then provides cross-service reporting using these IDs. Staff have to be approved in order to have an account on the CRI, and receive training in how to use it. There are different layers of access, depending on authorisation. Some of the uses of the CRI include:

- Analysis looking for relationships between different factors, such as testing the hypotheses that poor school attainment was positively correlated with overcrowded housing. It also enables better service planning, for instance providing information about the number of children aged 0-5 in a ward to forecast future service levels.
- Automating business processes. Information would once have been manually extracted from one system, cleaned and loaded into another, but is now done automatically.
- Automating fraud checks, including validation of residency for accessing council services such as school places. In the last round this flagged five school places which had been obtained through fraudulent claims about addresses. The CRI identifies discrepancies in the system, such as households claiming single person council tax discount where there is more than one registered resident.
- Checking household composition for safeguarding purposes, such as for the Multi-Agency Safeguarding Hub (MASH)
- Providing granular, multidimensional and longitudinal insight into services. In adult social care, Camden mapped a ten-year journey of a very complex social care case with an anonymised citizen which shows the interactions they have had with the council and external agencies. This provides new insights around the system as a whole and flags where interventions could have been made earlier to improve care.⁵⁰

While the CRI does not extract sensitive case file information, there were information governance challenges and unfounded fears among staff that the CRI would enable staff to see all information about individuals. In response, a Privacy Impact Assessment was undertaken and layers of access were agreed depending on team and role.

The introduction of dashboards and the CRI has changed working practices and the quality of decision-making across the organisation. It has also driven an innovation culture. For instance, IT are not seen as a back office service anymore and instead are deployed out to work in council teams on a project-by-project basis. IT partners are aligned to senior managers in each directorate improving innovation capability.

Opening data - Camden open data portal

Camden's open data portal hosts approximately 250 data sets. Camden wanted to be transparent, and has adopted an Open Data Charter. The portal also reduces the number of FOI requests received, and the time officers spend responding to them. The portal supports local business development by providing data from which developers could build commercial products.

Camden's off-the-shelf open data portal allows unlimited data uploads and provides front-end functions such as visualisations and displays. The software connects with existing systems and using a Windows scheduler can extract data at specified frequencies. Most of the data is updated on a daily basis, but there is potential for data updates to be in real-time.

Impact



Financial

- The data dashboards and CRI have enabled wider transformation that has saved the council £70 million per year. This includes:
- Reducing duplication, such as cancelling reporting tools and management systems, in the planning team.
- Notification for planning applications is [now conducted through a new portal](#), rather than unaddressed letters sent to adjacent properties. This allows greater personalisation (notifications can be sent at neighbourhood-level, not just street) and saves £300k a year in second class postage stamps alone.
- Automated checking processes to detect fraud, such as in school applications, single person discount for council tax claims and illegal subletting. Camden estimate that they saved £800k so far from identification of illegal subletting of council housing.



Productivity

- The Camden corporate KPI report was formerly a 120-page PPT which took significant amounts of officer time to put together. This can now be produced by the CRI, reducing much of the time required.
- In the planning service, after introduction of a systems thinking review and data dashboards, the average 'end-to-end' time for an application has gone down from 106 days to 49 days and failure demand from 53 per cent to 18 per cent.
- Reduced the number of housing repair orders per year by approximately 2,850 a year.



Economic

- The open data platform enables businesses to use Camden's data, create their own apps, such as Camden-based tech business Appy Parking.



Social

- Frontline professionals, such as multidisciplinary social workers, use the CRI to do their jobs in ways that wouldn't previously have been possible, such as flagging safeguarding issues which otherwise wouldn't have been seen by legacy systems.

Challenges	Success factors
<ul style="list-style-type: none"> • Finding staff with both technical skills and domain knowledge. • Establishing what is useful to measure and view with data. • Staff did not all view data as an asset they had responsibility for. • Establishing the correct information governance decisions to enable integration. • Countering incorrect perceptions about the motives for integrating data. • Building a business case with little evidence to indicate impact. • Poor quality legacy architecture and systems. • Poor quality data. • Tracking the benefits of the CRI, data dashboards and Open Data Portal. 	<ul style="list-style-type: none"> • Backing from key stakeholders, including the assistant Chief Executive and Cabinet Member for Finance and Technology. • Implementation through partnership of IT and the corporate strategy team. • Working in an agile way. • Having practical benefits to demonstrate value. • Having IT capital funding for the initial investment in three pieces of new software.

Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 2](#).

Key

- = Council's retrospective self-assessment of data maturity at outset of project
- = Council's current self-assessment of data maturity

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection	●		■		
	Organisation		●		■	
	Quality			● ■		
Data governance and openness	Governance			● ■		
	Openness		●			■
Data use	Decision-making			●	■	
	Performance and evaluation		●	■		
	Process optimisation and automation		● ■			
Data skills capability			●	■		
Data awareness and culture			●	■		

Replicability

- Long-term commitment from the senior team is needed.
- Significant investment was required, funded in part by the sale of high-value properties.

Useful links

Camden Open Data Portal - <https://opendata.camden.gov.uk/>



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Newcastle City Council



Impact	Key success factors
 Productivity	Co-location of data analysts with frontline professionals
 Social	Demonstrating tangible benefits Matching domain knowledge with technical data skills

Uses of data

	Informing public service transformation
	Intelligent case management
	Testing 'what works'
	Early identification of adverse events and future service pressures

The Family Insights Programme

“It’s opened up decision-making to the use of data and analysis. That’s the difference in the organisation between where we were and where we are now”

Manager, Newcastle City Council
(7 July 2016)

Summary

Newcastle has put data at the heart of strategies to redesign services in children’s social care (CSC) and related areas. This case study profiles two examples of this data-led redesign.

- The Family Insights Project, which puts data at the heart of changing how the council works with children and families.
- Redesigning services provided by Newcastle to prevent people becoming NEET (not in education, employment or training).

Family Insights Programme

The Family Insights Programme (FIP) is a data-led redesign of how Newcastle CSC delivers long-term social work. At the outset of the project, Newcastle were concerned by relatively high re-referrals and the number of children becoming looked-after (LAC). CSC represents a significant chunk of the council's budget and central government funding cuts were placing a strain on the service. Additionally, as with many other councils, there was a concern that bureaucracy and paperwork had taken over, giving social workers little time for value-adding direct work with families.

Newcastle worked with Social Finance to analyse available data to gain a detailed understanding of patterns of demand and expenditure in the children's social care system. This analysis informed the redesign of services, focusing on reducing rates of LAC and re-referral, building a new approach on evidence-based practice. Newcastle bid for funding from the Department for Education's Innovation Programme in order to implement the Family Insights Programme. The FIP introduces elements of the Hackney Reclaiming Social Work model,⁵¹ such as Social Work Units, but is the first of its kind to have a data-driven approach to the case-loads allocated to each unit. The FIP uses data in three main ways:

Grouping families together by need so that social workers become specialists in conditions

Typically social work units in the RSW model are generalists, organised geographically. In Newcastle, units specialise and work with families who all have similar needs and circumstances. Newcastle undertook cluster analysis of the 30 DfE concern factors embedded within the Single Assessment. This analysis identified common groupings of concern factors to identify, such as cases where the main issue is the child's challenging behaviour, or where physical abuse is the biggest risk factor. When new children enter the CSC system and are referred to a long-term social work term, analysis of concern factors is used to inform which social work team they should be referred to. A team of senior social workers then review this placement to ensure that referring them to that unit is appropriate based on qualitative details of the case. This enables the social work teams to specialise and improve in dealing with common presentations of need so that they can refine their approach more quickly.

Embedding data analysts to provide insight

Each social work unit also has an embedded data analyst, who works alongside the social workers and whose role it is to look for hypothesis to test, analysis to perform and other ways of supporting the work of the social workers using data. Data analysts take part in team meetings, attend supervisions and are constantly listening to the work of units and their work. Their role is not purely quantitative and they are expected to identify themes and undertake deep-dive analysis or case study analysis. The data analysts also test what works, measuring the success of externally commissioned services, along with cost information. Data analysts have a different view of team activity to social workers which means they can look across sets of families for common patterns.

Enabling intelligent case management

A data warehouse was developed to provide information to social workers, via a data dashboard. The data warehouse pulls in data from three sources – social care, education and the common assessment framework. The data is updated nightly and loads into ChildStat, the data dashboard social workers use to help manage their caseloads. ChildStat provides social workers with an overview of all their cases and can also report on the performance of the social work units. The unit data analysts are responsible for maintaining ChildStat.

Following the success of the Family Insights Programme, senior decision-makers have committed to expanding it across all of children's social care.

NEET early identification and prevention

Newcastle's 2020 Group brings together leaders from across the city, public, private and social sectors to take a strategic view of the city's future. The 2020 group identified better supporting young people at risk of becoming, or who are, NEET as a strategically important objective for the city's growth and reform agenda.

Newcastle led the analytical work to identify the underlying drivers that result in people becoming NEET. This analysis took a different approach from most work looking at NEETs. Usually this analysis looks at the demographic and experiential factors which are most common among NEETs. This usually focuses attention on poor GCSE attainment as the key predictor, and therefore intervention point. While NEETs tend not to have good GCSEs, this approach is not a precise means of identifying NEETs: Newcastle's data indicated that of all young people who achieved poor GCSEs, only 14 per cent were NEET in April 2015.⁵²

Newcastle's analysis looked instead at a range of possible indicators, present at school age, which were linked to becoming NEET, including whether a young adult had poor educational attainment, was eligible for free school meals, had a truancy or offending record, or had been Looked After or otherwise in the Children's Social Care system.

These factors were given a 'risk ratio', to indicate how likely they were to be associated with later becoming NEET. For instance, NEETs were five times as likely to have been a Looked-After Child (LAC), four times as likely to have been in a Pupil Referral Unit and three times as likely to have had some kind of children's social care involvement. The population was then divided into six mutually exclusive groups to tease out which factors were underlying drivers of poor outcomes, rather than consequences.

This analysis found that the 25 per cent of the population known to Children's Social Care in Newcastle accounted for 67 per cent of the total NEET months and 76 per cent of the total youth homelessness presentations in the city. This allowed partners in the city to more accurately target resources to achieve maximum impact. The analysis also showed protective factors that can help children avoid being NEET, for instance that for children at highest risk, the single biggest protective factor was obtaining good GCSEs, associated with a risk reduction of 70 per cent.

Impact



Productivity

- Social workers have reported being consistently happier with the working environment and have lower levels of absence than colleagues not in the social work unit model.
- Dashboards reduce the amount of management time tied up in compliance which means supervision with managers can be more oriented on improving practice.
- Data suggests so far Newcastle is using fewer external services.
- The Family Insight Programme has increased social work time working directly with families, from 27 per cent pre-FIP towards the target of 50 per cent.
- Early indications are that the data-led social work teams are closing cases quicker and have fewer re-referrals than non-data led teams.
- Across the organisation the mindset about data has changed. Social workers now see data in a more positive way and believe it can be used to help them perform their jobs better.



Social

- Data insights can uncover the need to work in a different way. For instance, one social work unit works with children at risk of physical abuse. Case file analysis of the mental health histories of the parents found that 20 per cent of children had parents with a personality disorder, and 60-70 per cent of the children had a parent who had experience of sexual or physical abuse as children. Traditional social work methods may not have uncovered this insight, it led Newcastle to look for new responses to working with these types of families.
- Qualitative work with children and families, has shown very positive feedback in comparison to previous experiences.

Challenges

- Data matching challenges.
- Managing external inspection organisations during a major innovation project.
- Negative perception of data among social workers.
- Data analysis can identify what is going wrong, but not always how to fix it.

Success factors

- Data analysts used practical applications like data dashboards which persuaded social workers of the value of data.
- Continuous communication with all staff involved.
- Co-locating data analysts and frontline professionals so that opportunities to use data to solve problems can be identified.
- Reflect data back to people to expose data quality problems.
- Having domain knowledge and understanding to go alongside technical data skills.
- Commitment from senior leadership.
- Creating a team of many different skill-sets to implement the project.

Key

- = Council's retrospective self-assessment of data maturity at outset of project
- = Council's current self-assessment of data maturity

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection		●		■	
	Organisation			●	■	
	Quality				●	
Data governance and openness	Governance				●	
	Openness			●		
Data use	Decision-making			●	■	
	Performance and evaluation				●	■
	Process optimisation and automation				●	
Data skills capability					●	
Data awareness and culture				●	■	

Replicability

- Initial funding which came from the DfE's Innovation Programme
- Some technical expertise for analysis was provided by an external organisation

Contact details



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Manchester City Council



**MANCHESTER
CITY COUNCIL**

Impact	Key success factors
 Financial	'Use case' oriented approach to information governance
 Productivity	Demonstrating tangible benefits Supportive leadership team

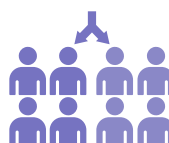
Uses of data



Informing public service transformation



Intelligent case management



Testing 'what works'

Data integration for family support services

“Through integrating data we can do analysis that we just couldn't do five years ago”

Performance, Research and Intelligence officer, Manchester City Council (11 July 2016)

Summary

Manchester has been embarking on significant public service transformation projects, with an ambition to be more integrated with other public services and invest more in prevention. These have included redesigning core service areas such as children's services or early years, deep integration with surrounding authorities, and participation in national pilot schemes such as Community Budgets. Participation in the Troubled Families Programme led Manchester to develop a data warehouse which brings together data from across the public sector to improve services for vulnerable families.

The Troubled Families Programme (TFP) is a payment-by-results scheme created by central government in response to the 2011 riots. The TFP required identification of troubled families through a centrally-specified set of common identifiers: youth offending, anti-social behaviour, school attendance and receipt of out of work benefits. Troubled families can be highly transient, and accurate identification requires more than address data because there

are families where members live at more than one residence. Manchester found that using spreadsheets and a manual approach to data matching was too cumbersome and that dedicated software was needed.

The data warehouse that Manchester created for the TFP integrates 16 different data sets from multiple agencies. This provides instant access to information for key workers and other professionals working with children and families. The system also aggregates data so analysis can be performed on the records in the system from the past five years.

The system uses a physical data centre, rather than a federated model, and each agency loads its data in at an agreed schedule. As troubled families can have multiple addresses, and individuals can have multiple families, Manchester had to find the right links between these people so that families were correctly identified. The software is designed to find pre-defined entities, in this case either people, objects, addresses or events, and connections between the entities. The system is programmed to look for these entities across the 16 data sets, inferring connections between them based on definitions of a connection specified by Manchester. The system provides establishment-oriented links, such as being known to children's social care, the police or another local agency, which helps identification and also enables different agencies to view the data in multiple different ways depending on their needs.

The software has many uses beyond the identification of families for the TFP.

Intelligent case management - the software provides a full genealogical picture of families, connections to other agencies and key events which provide social workers with a quicker and superior view at the triage point. Through traditional methods, such as case files stored in client management systems, gaining this same understanding would take many hours of reading case file notes and requesting data from other agencies, or be dependent on which other agencies had been present at meetings or case conferences. The integrated data set also makes it easier for managers to monitor and check social workers' cases, and provides a useful set of checks at the point at which a case is closed.

Informing service redesign - the population level data enables a range of statistical techniques to forecast or evaluate the impact of policies

- **Decision trees** – these review recent history and using binary decisions down a tree can predict the likelihood of future events, for instance to isolate the factors most likely to predict a family will meet the troubled family definition. In Manchester the number of Child in Need⁵³ events was the most predictive factor of a troubled family.
- **Cluster analysis** – reviewing distributions of needs or characteristics of families to identify common groupings, for instance for factors such as school absence, school exclusions and criminal offences.
- **Regression analysis**, providing indicators or predictors of future events based on past events. Manchester's analysis found that increases in unauthorised school absences, or increases in a family's offending behaviour, are a predictor of a child being classed as a Child in Need. However, exclusions and personal offending were not found to be predictive of a child becoming a Child in Need.
- **Spatial analysis** – showing for instance the areas in which there is the highest density of families with complex needs.

Evaluation and Testing 'what works' - At the end of an intervention, Manchester can analyse the data to map out all of the events and activity that happened during the intervention. This analysis can be used to evaluate how effective the intervention was.

Budgeting - children's services has a complex budget and the software can be used to develop investment plans for early intervention with families.

Information sharing arrangements

The data warehouse has embedded decision-making about data sharing between agencies. This is based on expert legal guidance and the system is built to reframe the idea of sharing information. Through the new system, key workers do not have to ask to share data, they are entitled to see data in line with the responsibilities and duties of their job.

The decisions built into the system were based on meticulous work to decide the legality of sharing data in very specific, defined instances. This includes sharing school attendance information, or reports of police call-outs, where there is a safeguarding concern about the child. Advice from a barrister was sought on these specific instances, which then informed the development of a Privacy Impact Assessment, in collaboration with partner agencies. Manchester wanted to reduce individual decision-making about data sharing because different interpretations led to inconsistencies in the way in which data was being shared.

The data warehouse presents a system which protects data better than a manual process, while also permitting data sharing in instances where the legislation allows it. The system records the digital footprints of system users which means that any inappropriate use can be detected and acted upon. Manchester estimate that more time was spent on information governance than technical development, confirming the importance of committing dedicated resources and expertise in order to get data sharing right.

Impact



Financial

- Performance data from the system is combined with cost data to inform the investment case for early intervention programmes. For instance the system was used to inform an investment case for Multi-Systemic Therapy (MST) by accurately identifying likely cohort size. MST involves teams of four staff, and requires a minimum cohort size. Correctly identifying the likely demand for services prevents wasted expenditure.
- The system provides evidence about the effectiveness of different interventions such as FIP (Family Intervention Programme) or Early Help, which can be used to decide on re- and de-commissioning of services or how to reshape service provision.



Productivity

- The greater quality and consistency of information available improves the quality of decision-making for frontline social workers. With the data integration system all social workers are able to view the same level and quality of information for each case, making it more likely that decision-making will be better and consistent.
- It is estimated that the integrated data set saves key workers approximately three to four hours when completing an assessment. A key worker can undertake 40 assessments a year, translating into a saving of two weeks of some key workers' time, or the equivalent of increasing the total amount of key worker resource by 4 per cent.

Challenges	Success factors
<ul style="list-style-type: none">• Information governance was identified as a significant challenge.• The poor quality of data posed technical development challenges.• Implementation was not a priority for all stakeholders. Not all service managers insisted that their staff use the new system, and across Manchester there were people who did not proactively engage with the project.	<ul style="list-style-type: none">• Taking a specific 'use case' oriented approach to information governance.• Embedding decisions about sharing data into the system.• Senior buy-in for the project.• Communicating to users the ways in which the new system meets their needs to change behaviours and dispel myths.• The modest financial cost of the project was met from a separate budget.• Good working relationship between Manchester staff and the software development team to ensure it met requirements.• Leading the project through children's social care, rather than it being an IT-led project.

Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 3](#).

Key

● = Council's retrospective self-assessment of data maturity at outset of project

■ = Council's current self-assessment of data maturity

For more information on the data maturity framework see [Appendix 2](#)

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection		●			■
	Organisation	●			■	
	Quality			●	■	
Data governance and openness	Governance			●		■
	Openness		●			■
Data Use	Decision-making	●			■	
	Performance and evaluation		●		■	
	Process optimisation and automation		●		■	
Data skills capability			●		■	
Data awareness and culture			●	■		

Replicability

- Manchester's work benefitted from support from senior levels in the organisation
- Manchester didn't modify software and its cost was relatively modest. Manchester have made their data model available to any local authorities who would like to use it


Contact details

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Bristol City Council



Impact	Key success factors
 <p>Social</p>	Agile approach
 <p>Economic</p>	<p>Leadership and vision</p> <p>Communication and partnership building</p>

Uses of data

	Opening government
	Supporting the local economy, business growth and innovation
	Optimising management of place and infrastructure
	Data gathering to understand and respond to citizen needs

The citizen-centric, open approach to smart cities

“You can’t just build it and they will come for open data. You have to encourage its use and embed new sets of practices within the organisation so that open data becomes part of everyday work”

City Innovation Team Officer, Bristol City Council (22 June 2016)

Summary

Bristol was named Smart City Innovator of the Year⁵⁴ 2016, in recognition of the ambitious project undertaken to open the city to future technologies in a citizen-centric and collaborative way. The driving idea was that technology and data are a means to improve Bristol’s future.

The council’s leadership saw that when confronted with waves of disruptive technology, the role of the council was to use these to create a city that is better for people to live in. The smart city programme has four key objectives:

- **Environmental** - achieving a 40 per cent reduction in CO₂ emissions by 2020.
- **Economic** - new data driven products and services.

- **Efficiency** - managing the combination of reduced funding and increasing demand.
- **Transparency** - open data as the means to citizen engagement and open democracy.

This case study discusses some of the individual programmes that together comprise Bristol's smart city programme.

Bristol - a playable, programmable, living, sensing city

Bristol's Smart City programme comprises a number of different activities and projects including the Living Lab, the Programmable City, the Playable City and the City Operations Centre. The catalyst for this was the award of InnovateUK funding to become a Future Cities Demonstrator in 2014. Bristol's ambition was to be a city that was both smart and which could understand and respond to the needs of citizens through data.

Data plays an important role as the means of communicating between city infrastructure, the city council and residents and businesses. The council uses data collected by Internet of Things (IoT) networks, citizens and sensor devices to monitor factors such as traffic, air quality and damp levels. Some aspects of the programme are highly experimental, placing Bristol as a 'first adopter' of new forms of technology.

The smart city programme is driven by the council's City Innovation team, working closely with Bristol is Open (BIO), a partnership between the city council and the University of Bristol. BIO delivers research and development initiatives to drive the Smart City programme in the city, covering the development of infrastructure through to projects which use data created by the IoT and sensors to solve problems facing the city.

Bristol is Open is creating a '**programmable city**', which turns the IoT network, data and technologies into a resource which gives citizens the ability to interact, work and play with their city. By doing this, Bristol can respond or engage in real-time with everyday events including congestion, waste management, entertainment events, e-democracy or energy supply. This includes installing the infrastructure for an IoT Mesh network using access points mounted on 1,500 street lamp posts. This is part of a network of sensors, including smart phones and GPS devices of people who have volunteered to share their data, which will provide data about many aspects of the city, such as energy use, poor air quality and traffic flows.

Bristol's **Citizen Sensing** project uses data to understand citizen needs. One strand uses 'Frog Boxes' to record levels of damp and condensation in people's homes in East Bristol. The origins of this scheme were a series of discussions with residents, run by Knowle West Media Centre and Bristol City Council. These identified three issues that were particularly important to residents: poor (damp) housing, use of green spaces, and independent businesses. The first pilot focused on damp housing and the design phase explored a range of ways to measure levels of damp in people's homes and find ways to help them deal with damp.



A damp sensing frog box⁵⁵

Residents who volunteered to take part have been given a frog box. The frog has a temperature and humidity sensor, connected to a Raspberry Pi 3, which records data into a simple database every five minutes. There is also a web site which gives the householder the current temperature, humidity, and dew point. Residents are given lily pads to keep a diary of events that might lead to damp – times when someone was showering, cooking, or washing clothes – and this information, alongside the data from the sensor, will help to understand what people can do to reduce damp in their homes.⁵⁶

Bristol Operations Centre

Bristol's bid to become a Future City Demonstrator included creating an operations centre that integrates data from multiple sources to enable a wide range of services to be coordinated and optimised. The operations centre will bring together existing hubs for road traffic control, emergency services, police and CCTV operations. The centre will provide a unified response to incidents in the city coordinated by 'super operators'.

In late 2016 the project was at implementation stage, with a range of procurement processes required to bring in new software and systems to enable the complex integration. The operations centre will use physical security information management (PSIM), a *"category of software that ... integrates multiple unconnected security applications and devices and control them through one comprehensive user interface."*⁵⁷ Later stages of the project will add in additional data sources, such as public transport data. In line with Bristol's commitment to open data, the PSIM will use open interfaces with open standards, published wherever possible on the open data portal.

The operations centre will utilise the data infrastructure already installed across the city. The dark fibre network under the streets has large bandwidth and will be used to link CCTV and the traffic signal data with the operations centre.

Better optimisation of city processes will result in lower congestion, which in turn will reduce carbon emissions. Bristol aim to assess traffic and other incidents affecting roads at any given time, to provide emergency services vehicles with the optimum route to take in emergencies. Another objective is to identify significant incidents that occur on CCTV, via data transmitted to the operations centre, and for an appropriate response to the incident to be generated. The operations centre may also enable Bristol to model the impact of closing roads or changing road layouts on other aspects of the public service ecosystem, such as rates of hospital admissions.

Open data portal

“There are only two types of data in Bristol: confidential data and open data”

Councillor Mark Wright⁵⁸

Bristol uses open data to engage citizens, provide transparency and open up democracy. The city has been making data open since 2009 and adopted its own open data portal in 2014. Working with an 'off the shelf' portal, Bristol began with a sprint to upload 100 datasets in 100 days. The focus has been on providing as much data as possible, updated as frequently as possible, and with free-to-use APIs for as much data as is feasible. All data published is in recognised standards. In October 2016 there were approximately 130 data sets on the portal.

Bristol recognised that making transport data available through APIs is valuable to developers and has a strong link to the smart cities agenda, which led to the Bristol API for transport data, developed by Urban Things. At the same time, the council has been proactive in

engaging with stakeholders, from businesses to colleges and community groups, to promote the portal and encourage people to use it. One interviewee commented:

“You can’t just build it and they will come for open data. You have to encourage its use and embed new sets of practices within the organisation so that open data becomes part of everyday work.”

City Innovation Team Officer, Bristol City Council (22 June 2016)

Much of the data that Bristol wanted to publish on the portal was of poor quality. Significant amounts of office time was spent cleaning data and making it useable. To increase usability for external audiences, Bristol automated the process of refreshing the data. The team developed what’s described as a ‘functional but not permanent solution’ - a piece of code written by one of the team which can push and pull the data into the portal.

Impact

Much of Bristol’s work has been experimental and in some cases is too recent for there to be information available about its impact. In other cases, there has been no evaluation of impact.



Economic

Usage rates for the open data portal are consistently increasing and a number of apps have been developed, responding to identified citizen needs.

- **Tiny Tours App** - an app to help families plan days out in Bristol with integrated journey planning using data from The Bristol API.
- **Planning Data** - published planning data can support new developments in the city by highlighting where planning appeals are most likely to happen, and which planning consultants have the highest success rates.
- **Crocodile** - an app to encourage walking to school. The app extracts open data to list the timetable of the ‘walking bus’ routes by location, and allows parents to book places on walking buses. The app also confirms that a child has arrived safely at school.
- **Hills are Evil** - prototype accessible route finder which overlays information about hills, cobbles and other street furniture onto Google maps to help people with mobility problems.
- **Community Energy Manager** - an app to advise local energy groups on the areas in most need of support, to cut their emissions and energy costs.
- **City Radar** - smart reporting of problems in Bristol such as graffiti and flytipping.
- **Bus Checker** - runs off the Bristol API and provides real-time updates on bus departures.



Social

- The damp sensing frogs project is live and evaluation has not completed. However, the activation phase of the work has helped residents to acquire knowledge and resources that will help them to solve identified issues of damp and challenge landlords to take action. Longer term, the council aims for this to be one of a number of initiatives that will give residents the ability and tools needed to fix problems themselves, rather than be reliant on the council.

Challenges	Success factors
<ul style="list-style-type: none"> • Much of the data Bristol wanted to make open was of poor quality. • There was not a culture of opening and sharing data at the outset. • Automating data extracts at specified frequencies was challenging. • Perceptions of concerns about information governance left little appetite to be more ambitious with data. • The data from Bristol's legacy systems was not always in the same data standards as other councils. • Some analytics relating to traffic modelling and or prediction was not possible because of a lack of technical capacity. 	<ul style="list-style-type: none"> • The elected Mayor was a strong external advocate. • Showing people tangible examples of value created by data and analytics. • Learning by doing was an effective way to build momentum and support. • Being open to experimentation. • Working with partnerships, collaborations and the ecosystem of organisations that wanted to engage with data.



Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 2](#).

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	Openness		●			■
Data use	Decision-making			●	■	
	Performance and evaluation			●	■	
	Process optimisation and automation		●		■	
Data skills capability				●	■	
Data awareness and culture			●		■	

Replicability

- Bristol's mindset - to be a resilient, playable city has been important in how the projects have evolved.
- The local ecosystem of data enthusiasts was also not created by the council and existed before any of the projects started. Without this well networked, vibrant and passionate group, progress would have been more difficult.

Useful links

Bristol is Open - <http://www.bristolisopen.com/>

Open Data Portal - <https://opendata.bristol.gov.uk/>

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Birmingham City Council



Impact	Key success factors
 Economic	Leadership
 Social	External funding for innovation projects
 Environmental	Agile approach Partnership approach with local developer community

Uses of data

	Optimising management of place and infrastructure
	Collaborative government to understand citizen needs
	Opening government
	Supporting the local economy, businesses and innovation

Digital Birmingham

“Smart cities are not just about individual projects. It's also thinking about what it actually means to be a smart city when many of the benefits are from greater inter-agency integration.”

Officer, Digital Birmingham
(8 July 2016)

Summary

Birmingham City Council sees data and digital as one of the central planks of its strategy to adapt to future challenges. Like many councils, Birmingham is experiencing increases in demand, budget reductions, and at the same time has challenges specific to the council, outlined in the Kerslake Review of Birmingham City Council's structure and governance. While data cuts across all aspects of the council's strategic planning, it has a particularly prominent role in the development of the smart city programme in the city.

The City Council's Digital Birmingham is a specialist unit tasked with crafting and implementing a smart city strategy for Birmingham. In 2016, this was ranked as the third best smart city project in the UK, behind Bristol and London. Birmingham's smart city strategy is to become *"the agile city where enterprise and social collaboration thrive – helping people to live, learn and work better by using leading technology"*.⁵⁹ There are three core elements to the strategy and roadmap:

- **Technology and Place** - spanning connectivity, planning for digital infrastructure and information marketplaces.
- **People** - covering digital inclusion, skills and employment and innovation.
- **Economy** - including health, wellbeing, and care; energy efficiency; and mobility.

The ambition for Birmingham's smart city extends further than optimising city management. Birmingham sees itself as a connected city, which uses data and digital to achieve social and economic aims too:

“Smart cities are not just about the individual projects. It's also thinking about what it actually means to be a smart city when many of the benefits are from greater inter-agency integration.”

Officer, Digital Birmingham (8 July 2016)

The smart city programme has provided the framework to run a number of pioneering pilots and demonstrators which collect and use data to improve the management of the city and services for its citizens.

Optimising the management of place and infrastructure

Optimising responses to hazardous weather - Birmingham, in partnership with Birmingham Urban Climate Laboratory (BUCL), have been using air temperature sensors on roads to manage responses to winter weather such as ice and snow as part of an IoT demonstrator. BUCL has fitted air temperature sensors, to go alongside weather stations installed by the Met Office and sensors fitted by Birmingham's partner Amey, which provide data about air temperature on an hourly basis. A wireless mesh network was installed across all of Birmingham's major roads which connects the temperature sensors and other roadside equipment such as air traffic signals, CCTV and street lights to the internet. Data is fed from temperature sensors across the city, as well as from a gritter fitted with a sensor, back to a hub where this information can be analysed to ensure that ice, snow or flooding can be geographically pinpointed and responded to.

Opti Cities uses data collected by sensors to understand how weather conditions affect traffic movements, and how traffic lighting flow can be changed to reduce congestion. Data from traffic sensors across Birmingham detect incidents and a decision support tool proposes possible solutions. The sensors include 300 'inductive loop' sensors that are built into the road surface for controlling traffic signals, providing data on traffic flow and speed. A network of 80 journey time cameras provide information on journey times on key routes in the city. Using data from the equipment Birmingham can evaluate the impact of the decision support tool, comparing journey times from before and after the trial. Alternative data from third party sources, such as Google, TomTom and Waze is used for additional comparison. Some of the data used in the project is being made open, such as the traffic information held in the Urban Transport Management and Control (UTMC) database.

SETA is an EU funded Horizon 2020 funded project involving multiple European partners, run by Sheffield University, with Birmingham as one of its data collection sites. The project collects all traffic sensor and bike data in Birmingham. The project visualises in real time how a city moves from a motorised and non-motorised position. 2016 was the project's first year but the initial evidence is positive, suggesting a ten-fold reduction in the costs of modelling transport.

Using citizen data to improve Birmingham

City4Age aims to capture open and personal data using wearables from elderly people with mild cognitive impairment and use it to support them to remain active and mobile. It also aims to test when data can provide insight about when to intervene earlier to prevent health and care needs arising.

Bike Revolution - the council has provided 5,000 free bikes fitted with GPS trackers. The data collected by the bikes, which indicate changes in levels of physical activity, will be mapped against healthcare usage, environmental factors and employment outcomes to evaluate the impact of providing free bikes.

The Single Customer View project brings together data about people in Birmingham's interactions with council services in order to provide a better understanding of citizens' needs and interests based on past activity.

The Civic Dashboard was a pioneering project which involved the capture of data directly from the Council's Customer Relationship Management (CRM) system. The data was aggregated and anonymised and presented on a ward by ward basis onto a map to provide insights into the main issues and problems identified by citizens within their locality. The Civic Dashboard enables the council to target promotional materials based on past interactions and preferences.⁶⁰

Using data to stimulate business startups and growth

Project DISC (Data-driven interactive smart city decision support toolkit) will create a data-driven, interactive, smart city decision toolkit. This will serve as a platform on which developers will be able to create and test new products and services.

The Big Data Corridor is a platform for developers to access open, commercial and personal data and provides toolkits for them to design new products and services using data produced by the smart city project



Green travel districts

Open data

Birmingham have established an information marketplace where data can be released, licensed for re-use and made available to communities, data enthusiasts and developers. The portal uses off-the-shelf software, a choice made through consultation with the local developer community who requested an open source platform. The council has since adopted a policy of being 'open by default'. The council had three objectives for the introduction of a data driven approach:

- Drive internal efficiencies through open and other data types e.g. reduce the number of FOI requests, create a greater evidence-based approach to service development.
- Support communities to get better understanding of their dynamics through data, which assets they have and how this can contribute to community cohesion.
- Support local SMEs to develop new products and services.

Impact



Social

- Establishment of community-based open data surgeries to improve community access to local information and insights.
- Using data to understand citizen needs has led to the council making changes to services and the public realm, such as increasing the number of wheelie bins or the introduction of new 20 miles per hour zones.



Economic

- Availability of open data portal, Birmingham Data Factory, as a resource for developers.

Challenges

- Slow uptake of the open data portal.
- Few staff with advanced analytical skills.
- Lack of a data-led culture.
- Organisational silos extend to data.

Success factors

- Supportive senior leadership.
- Providing tangible use-cases.
- Access to external funding for innovation projects.
- A flexible and iterative approach.
- Involvement and engagement of entrepreneurs, SMEs and other city partners.

Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 3](#).

Key

- = Council's retrospective self-assessment of data maturity at outset of project
- = Council's current self-assessment of data maturity

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection		●	■		
	Organisation		●	■		
	Quality		●	■		
Data governance and openness	Governance			●	■	
	Openness		●		■	
Data use	Decision-making			●	■	
	Performance and evaluation			●	■	
	Process optimisation and automation		●	■		
Data skills capability			●		■	
Data awareness and culture			●		■	



Birmingham Bikes

Replicability

- Some of the projects have been funded as demonstrators or through European funding and may therefore be harder to replicate in the short term.
- The ICT and Digital Strategy has recently been approved which establishes the important and strategic role of data and information insights. This will provide the leadership to adopt an open by default policy throughout the organisation.

Useful links

Digital Birmingham - <http://digitalbirmingham.co.uk/>

Birmingham Data Factory - <https://data.birmingham.gov.uk/>



Contact details

Raj Mack, Head of Digital Birmingham


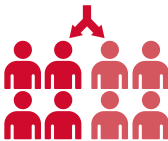

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Kent County Council



Impact	Key success factors
 Productivity	Information governance expert
 Social	Existing infrastructure

Uses of data

	Informing public service transformation
	Testing 'what works'
	Identifying and forecasting future service pressures and outcomes

The Kent Integrated Data Set

“We did not bring this agenda together by monopolising the space – we’re doing this as a partnership”

Senior Manager, Kent County Council
Public Health, 4 July 2016

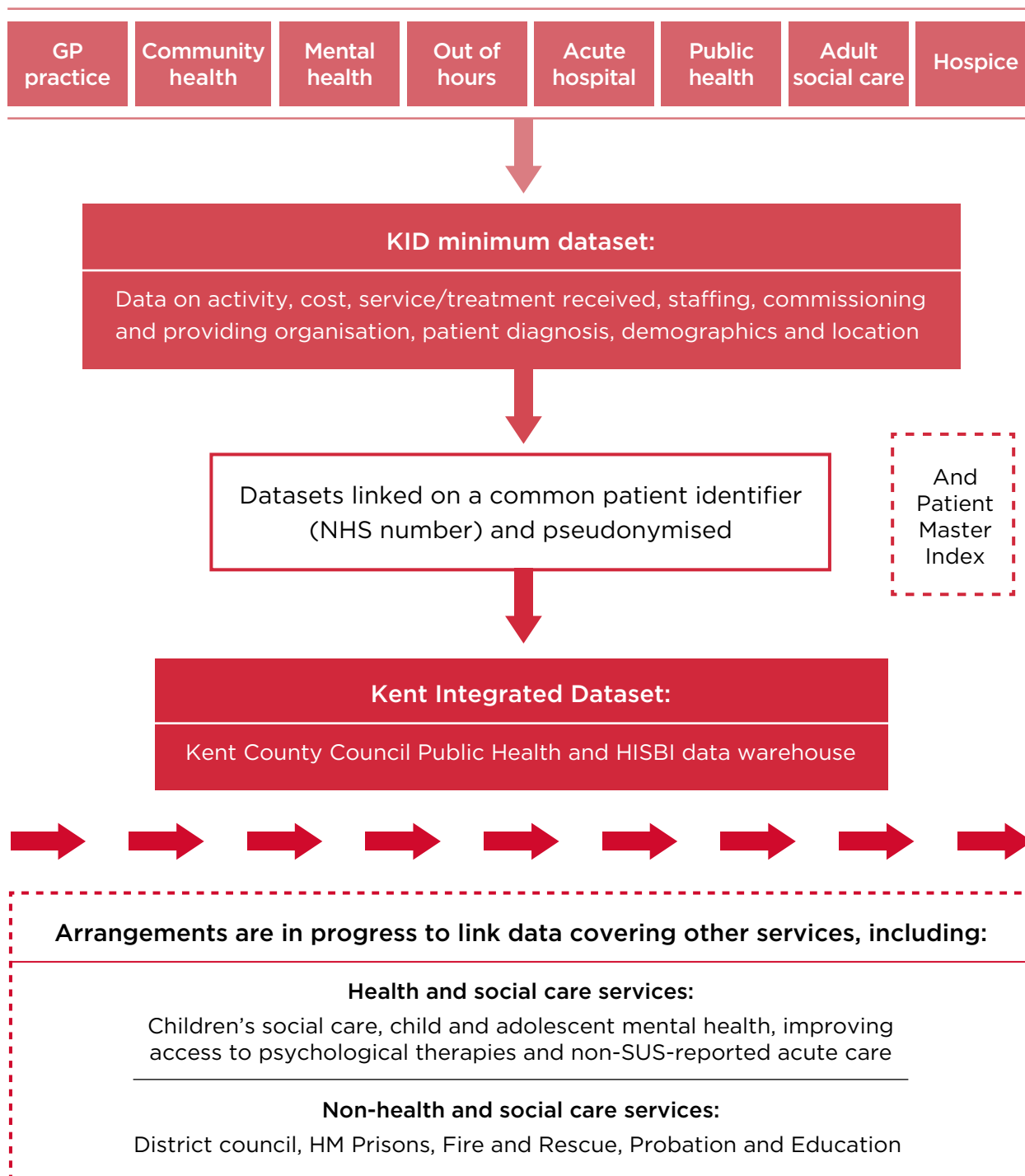
Summary

Kent County Council (KCC) and Kent’s seven Clinical Commissioning Groups (CCGs) have created one of the largest integrated health and care databases in the UK, covering the health records of 1.5 million people. This data set enables the public health team in KCC to conduct sophisticated data analysis to inform decisions about which services to provide and how to organise them across the county. An integrated data set of this size also enables Kent to test ‘what works’ in the county, running evaluations of interventions and services.

The integration of data was a response to the NHS Year of Care programme, a national programme which redesigned the approach to payments for long-term conditions (LTCs). Building on an existing data warehouse infrastructure, Kent brought together data from council adult social care, GP practices, mental health services, public health and community health to form the Kent Integrated Dataset (KID). After the Year of Care programme concluded, decision-makers agreed to continue the KID with a focus on performing advanced analytics that could provide insight into the best ways of delivering services for health and social care.

The population of Kent is 1.5 million, and the health and social care economy is estimated to be worth £3.2 billion. The KID is estimated to cover £1.3 billion of this. Currently 80 per cent of GP practices feed data into the KID. The data in KID is updated at a monthly frequency at the same time as Secondary Use Service data is released.⁶¹ The KID was built from existing systems, using a SQL-server data warehouse and a purchased business intelligence tool.

Flow of data into the Kent Integrated Dataset



Bringing together the dataset

The Kent and Medway Health Informatics Services (KMHS) has provided IT services for GP surgeries, and commissioners in Kent for nearly 20 years. In the years preceding the KID, KMHS had been working on a secure data warehouse for health data. This prior work made KMHS the logical place for the KID to develop, as much of the infrastructure and expertise was already in place.

The core requirement for the KID was to link data from multiple sources together at an individual level. This would mean that for any particular individual, information relating to them from hospitals, social care, GP surgeries and out-of-hours services would be linked together, providing a full picture of the health and social care experience. The KID had to do this in a way which would provide complete information about the health and social care journey but not reveal the identity of the individuals involved.

KMHS developed a 'black box algorithm' for data as it enters the KID. This runs an algorithm to check that the information on either side matches up, without the system operators needing to see the data which identifies individuals. The programme then creates a pseudonymised NHS number - a 64 bit sequence - which is given to each piece of personal data and is applied to all files that come in relating to the same person.

Considerable work was required to ensure that this approach would be compliant with all relevant information governance legislation. A specialist information governance expert was assigned to the project and looked across the various pieces of legislation and produced legal guidance advising of the requirements of KID and of each agency. This then informed data sharing agreements for each agency to sign, including the 240 GP surgeries in Kent.

Using the Kent Integrated Dataset

Kent wanted to move away from data analysis which was limited to data produced by organisational silos as it struggles to capture the full complexity of a large public service system. Integrating the health and care data creates cradle-to-grave health and care records, enabling whole patient journeys to be analysed. The KID also opens up a far greater number of variables which can be scrutinised during analysis. This enables Kent to use analysis of the KID to inform care, health and public health strategies.

Testing 'What Works'

Kent use the KID to conduct matched cohort analysis to evaluate the effectiveness of services and interventions. For example, Kent's Public Health team analysed the added value of home safety visits by Kent Fire and Rescue Service (KFRS), beyond the primary benefits of assessment of fire safety and falls prevention. Each year, the KFRS does c.10,000 home safety visits, either initiated by calls from members of the public or through a risk analysis. Kent Public Health explored the impact that the home safety check service was having on A&E attendances originating from a home setting.

The KID was used to create a comparison group at individual level, so that the rate of A&E utilisation could be compared between the group of people having a home safety visit with a similar group of people not having a visit. The analysis suggested that there was no significant difference in A&E visits between the two groups (though it should be noted this was not the primary objective of the safety checks). KFRS have used this analysis as a baseline for how their checks were being implemented. This information is also useful in deciding whether to continue provision of the service, with greater insight provided about its wider value.

Another piece of analysis looked at a trial of reconfigured GP practice provision in Ashford which has been trialling a new approach which includes an active triage process for long-term conditions (LTCs) and a LTC outreach nurse. The practice felt they had anecdotal evidence that this configuration of primary care reduced use of acute care services. The KID can identify practices that have similar demographic and socio-economic characteristics so that comparative analyses can measure whether any changes in acute care usage are meaningful.

The KID has also been used to perform an analysis of its falls prevention service by running an interrupted time-series analysis. Evaluation with a control group suggested that the service had not made a difference to acute admissions related to falls. This analysis did not result in any changes to the service, despite being a valuable insight into its efficacy. This demonstrates the importance of having senior decision-makers who are persuaded of the value of data insights, and a strong relationship between them and teams producing analysis.

Exposing variation in the quality of service provision

Kent Public Health has also been able to use the KID to look for variations in quality of provision. In this analysis, average per capita costs for all points of care delivery (adult social care, community care, A&E attendances, non-elective admissions and Out of Hours care) were calculated at GP practice level and then compared before and after, with an adjustment for deprivation. The results from the analyses teased out systematic differences in care resource consumption across the county. Even after adjustment for deprivation, Kent found a ten-fold difference in per capita costs across the county. This could suggest an unwarranted level of variation in some parts of the county, possibly due to poor care co-ordination.

Informing public service transformation

The KID has recently been used to inform the Kent Sustainability and Transformation Plan (STP). Producing an STP was a requirement placed on CCGs by NHS England. It is a five-year plan for redesigning the whole health commissioning landscape to achieve financial balance. There is a heavy emphasis on preventative services and working in an integrated way with all aspects of the local health economy. Future funding levels are dependent on how robust the plan is judged to be by NHS England. Kent Public Health have been using the KID to forecast the impact of changes being considered as part of the STP. Analysis of potential impact provides decision-makers with sophisticated intelligence about their options for changing services.

Impact



Productivity

- The work on the Year of Care became the focus of national level discussions about new payment models.
- The evaluation of the Kent Fire and Rescue Service Home Safety checks is now a nationally recognised method.
- Dynamic modelling using the KID underpinned a number of Kent's plans for redesigned services.
- The KID has enabled services to gain a baseline understanding of their performance, for monitoring purposes. For instance Kent and Medway were reviewing procedures around elective procedures and KID provided baseline analysis of how much activity and cost were related to each condition.



Social

- Kent undertook analysis to identify gaps in provision for particular client groups, such as a needs assessment for the population of clients with autism spectrum disorders which informed new provision of services.

Challenges

- Connecting data insights with decision making.
- Few staff who can undertake advanced analysis.
- The size of the data set placed a strain on the processing power of the system.
- Finding the right architecture for multiple data sets without common fields.
- Poor data quality.

Success factors

- An expert data security advisor who was able to marshal the legislative frameworks and broker a way to get all of the data in one place.
- Trust between organisations and working in partnership.
- The Director of Public Health was a champion for the work.
- Dealing with data quality by using the data.
- Connection to a high-profile programme - Year of Care - with finance attached.

Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 3](#).

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	Openness		●		■	
Data use	Decision-making	●			■	
	Performance and evaluation			●		■
	Process optimisation and automation		●			■
Data skills capability				●		■
Data awareness and culture				●		■

Replicability

- Existing data warehouse infrastructure - the KMHIS - meant Kent had a solid foundation in place to build on.
- Kent's in-house data governance expert dealt with the information sharing aspects.




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Suffolk County Council

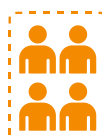


Impact	Key success factors
 Social	Leadership
 Productivity	Communication
 Financial	Demonstrating the benefits

Uses of data



Outcomes-based performance management



Informing public service transformation



Testing 'what works'

The Connect Programme: integrating health and social care services using data

“We want to have good decisions based on good evidence, and we want to see if we are doing what we say we will do. All of that is based on data”

Adult Social Care, Suffolk County Council
(18 August 2016)

Summary

Suffolk's health and care system is facing familiar challenges: decreasing budgets, increasing demand, increasingly complex individual health and care needs, and a lack of coordination between health and care services. In response, Suffolk County Council, Suffolk's CCGs and acute and community health provision have embarked on an ambitious integration project - Supporting Lives, Connecting Communities (SLCC).

It has three strands

- Building individual and community resilience to reduce demand.
- Integrated support for those who need it.
- Personal budgets for those with continuing care and support needs.

Data has been a fundamental aspect of the change process. One interview respondent summarised the ambition as follows:

“We want to have good decisions based on good evidence, and we want to see if we are doing what we say we will do. All of that is based on data”

Senior Manager, Adult Social Care, Suffolk County Council (18 August 2016)

Suffolk identified that a number of integration challenges stemmed from its use of data. Data was being used to take a backwards look at incidents or performance. There was a lack of data quality and consistency. Data about the same events or people was different between health services and social care, and each told a different story.

Suffolk wanted to begin using data to understand the future needs of the service, to diagnose the root cause of system problems, and to enable preventative work. They wanted all services to use the same, consistent data and that two people could ask the same question of the data and get the same answer. Without this single data view, Suffolk recognised that one of the key enablers of integration would be missing.

This case study focuses on the way data was used to enable integration of two complex public service systems.

Using data to understand the system at an individual and population level

To deliver preventative services Suffolk needed to understand what was happening at all levels of the health and care system. Suffolk had particularly acute pressures created by delayed transfers of care (DTOC) - where patients are ready to return home or transfer to another form of care but still occupy a hospital bed. Ipswich Hospital is one of the few which fines the local authority for high DTOC levels, creating a strain on finances in addition to poor outcomes for residents. Suffolk wanted to understand, using data, why this was happening.

By bringing together a suite of data Suffolk could understand this whole journey including interactions with hospitals and GPs, rather than simply the adult social care element. They could identify and interrogate instances in which a person had a fall, followed by a hospital stay, was declared fit to leave but had to wait four weeks for residential care to complete the transfer. This analysis helped create a dialogue about integrated services with health services giving a common language to discussions with health service managers.

This insight led to the STEP, a Short-Term Enablement Plan to reduce DTOCs and assist customers to remain as independent in their own home for as long as is possible and safe. The evidence shows that the STEP programme is reducing people's need for recurring care: people who have STEP have a 60 per cent chance of not having recurring support four months later. Analysis suggests it is the STEP that makes the difference. Of the 30 per cent of people who had a tier two conversation⁶² but no STEP, there is a good chance of still having a recurring package four months later.

Suffolk has also used data to get a population level view of current and future needs, different types of journey, and the costs of care packages. The breadth and quality of data means that interrogating problems and failures is possible, and can isolate the root causes of problems. The data can be used to identify problems, and also to show the whole system impacts of individual areas of failure.

Integrated Teams

Suffolk are in the process of implementing integrated teams in 13 different locations as part of the SLCC. Two sites are up and running, with a further 11 launching in late 2016. Social work teams and community healthcare staff are co-located to provide a single set of support to people with health and care needs. This includes joint processes and practices such as triage, assessment and support planning. Professionals can also meet to discuss cases and share data to support decision-making where appropriate.

In two teams, a shared data set - the Connect Measure set - is being trialled. This provides a comprehensive set of whole system measures to evaluate the effectiveness of integrated working. The Connect Measure set covers metrics such as emergency admissions, A&E, ambulance call outs, length of stay in hospital and DTOC. It also contains measures of workforce development, integrated neighbourhood team, neighbourhood networks, reablement and public health. Integrated individual level data from different systems is planned for future iterations of the project.

The Connect Measure integrates data from multiple sources, some of it automated and some it done manually. It pulls data from the local authority's IT system for care, and integrates it with data from CCGs which is provided in spreadsheet format with identifiers which enables matching of individuals. This is currently a manual process which has been automated with macros, but over time this will integrate into business intelligence systems with a data warehouse approach.

This Connect Measure is shared on a monthly basis to provide a top-level view of performance against outcomes. It also enables comparison of impact between teams. Teams also use this to look at workflows at an operational level. A weekly meeting is used to review waiting lists and decide which members of the integrated team are best placed to do visits. It is also used to manage complex cases, such as looking for opportunities to do joint visits or joint care and support plans. At a population level, this can be used to look comparatively at performance across the county. For instance, Suffolk can extract data based on postcodes attributed to uses of domiciliary care, link this to neighbourhood teams, and then map this against GP surgeries about their usage of emergency care services.

Changing the culture of performance management and measurement

To get a single data view of the health and care system, Suffolk needed to change the culture of performance management and measurement. Getting a meaningful, objective data view required changing the way data is collected, changing what is measured, and changing the way data is seen, as described in one interview:

“Previously the culture of data was seen as ‘this is your target, you’re not hitting it, slap’, now it is seen as ‘something is not working here, what can we do to fix it.’

Performance and Intelligence Officer, Suffolk County Council (18 August 2016)

One factor behind poor data quality was the disconnect between the people who used the data (performance and evaluation teams) and those who collected it (frontline social workers). Because social workers did not see the purpose of the data, they were not invested in collecting it consistently and saw it as an add-on to their day job. Suffolk has reviewed the data social workers collect and has automated aspects of this. This gives social workers more time to do other aspects of their job, and ensures that there is greater consistency and accuracy in data collected.

Suffolk has also changed the types of data it collects, and in turn the way that this means the system can be managed. Suffolk wanted data collection to enable an approach to work which was outcomes based rather than based on process measures. The data collected is now led by the service, which in turn changed the working culture associated with measurement and evaluation.

Impact



Financial

- The new data-led approach demonstrates the effectiveness of preventative work. For instance, Suffolk invested in an admissions prevention service, because 'before and after' data of care journey costs following the introduction of preventative services five to six years previously showed the financial impact of prevention.
- Commissioners have used data and analysis to make informed judgements about continuing or decommissioning services.



Productivity

- The scope of data now collected and analysed means Suffolk can come to informed judgements about the success of different aspects of the integration programme. Two pilot sites were chosen in Sudbury and Ipswich and a comparison site in Beccles, running on an old-style single-agency, is being used as a control group to test the effectiveness of the new model.
- Data collected can be taken back to management teams highlighting opportunities for partnership working which would reduce costs. Better data can identify where value is being created by different bits of the system, such as an early-help service targeting people with lower-level needs run through libraries.
- Better data has meant that the implementation of integrated teams was done using data-led planning, rather than on the basis of assumptions.

Challenges

- Staff were resistant to the idea of sharing data.
- Creating a more data-led culture provoked resistance from the frontline.
- Legacy systems made integration and sharing of data difficult.
- The budget was tight.
- Health and social care had different interpretations and definitions of data.

Success factors

- Supportive leadership.
- Showing the value of data in tangible ways to persuade cynics and resisters.
- Dedicated staff to work exclusively on transformation programme.
- Adopting an agile approach.
- Communication and relationship building with frontline teams.

Data maturity self-assessment

The case studies were asked to use the data maturity framework created through this work to make a self-assessment of their level of data maturity before they started their projects, and where they felt they were at the time of the case study research. It should be recognised that the self-assessments are based on the areas of the council for which the respondents could knowledgeably comment upon. For more information on the data maturity framework see [Appendix 3](#).

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	Quality		●		■	
Data governance and openness	Governance	●		■		
	Openness					
Data use	Decision-making		●		■	
	Performance and evaluation		●		■	
	Process optimisation and automation			●		■
Data skills capability			●		■	
Data awareness and culture			●		■	

Replicability

- Suffolk invested time to develop relationships between the key people working on the project.
- Suffolk had to develop their own answers to the technical challenges presented by their legacy infrastructure.

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Appendix 2 - Data maturity framework

Data maturity can refer to the readiness of a local authority to take on data work of different levels of complexity. Data maturity models are often used to explain “a journey from looking at retrospective ad hoc data to explain the past, to a more continuous ‘current/real time’ understanding of the here and now, a level of optimizing for efficiency and effectiveness, through to the ultimate state of predicting and creating the future”.⁶³ Defining the parameters of this journey can be a useful way of thinking about the different aspects of how value is created through data.

DataKind estimate there are 40-50 data maturity frameworks now in use, each developed for various different contexts such as the ODI’s open data framework, DataKind’s charity sector framework or IBM’s Big Data framework. Our desk research suggested that no UK-specific local government data maturity frameworks existed. In response, we have developed a prototype of a data maturity framework in collaboration with the eight in-depth case studies.

Each case study was asked to retrospectively situate itself on the framework in each category, as if it was at the outset of the project again. The case studies were also asked to indicate whether they had progressed further along the framework in the intervening period. The self-assessments for each case study can be seen the case study summaries in [Appendix 1](#).

The case studies in the main reported being in the nascent to mid-range of the framework for each category, with none of the case studies identifying as ‘datavore’ when they started out. Some case studies reported that as a result of their ongoing work, they have moved into the datavore category on some criteria. This suggests that the framework developed represents a realistic way of thinking about data in UK local government. It also suggests that other local authorities considering work of this kind should not be deterred if they are currently at the nascent end of the spectrum.

There is scope for this framework to be developed further through testing it with local authorities and gathering their feedback. This is work that Nesta will explore in the future. This data maturity framework is a prototype that aims to provide a useful set of considerations at the outset of a data-led project.

		Nascent	Basic	Intermediate	Advanced	Datavore
Data management	Collection	Data collection is a by-product of operational and service delivery, and driven by central government requirements and key performance indicators.	Collection goes beyond operational use and mandatory reporting requirements but there is little strategic purpose behind collection or use.	Data is used well in operational settings and data is sometimes collected for strategic purposes but predominantly there is little strategic rationale for collection and use.	Data is used well in operational settings and other data is collected in line with broader organisational strategies and decision-making.	Data is collected extensively across all services and in-line with organisational strategy. Data can provide a holistic view but data is not collected where the immediate use is not apparent (avoiding data exhaust). Data is seen as an organisational asset.
	Organisation	Data is organised in silos with limited ability to share across the council.	Some data can be more widely published or shared and integrated manually.	Lots of data is exported and shared across the council, but mostly it requires manual integration.	Most data can be shared and integrated, some of it automatically through data warehouses or federated approaches.	A data warehouse or federated data models are used so that data is owned diffusely but can be integrated easily/ automatically. There is an information asset list or inventory which is published as metadata.
	Quality (accuracy, completeness, currency and consistency)	Data quality is patchy but is not addressed.	Data quality is low but can be addressed on an ad hoc basis when basic analysis is undertaken.	Most data that is exported from IT systems is of useable standard but errors remain and are not addressed comprehensively. Data quality is maintained and improved by staff involved in line of business data collection.	Data is generally of useable quality, and most staff understand the need for accuracy in inputting data.	All data is of useable quality and data quality issues understood and managed by all staff proactively. All staff take responsibility for the quality of the data they collect.
Data Governance and Openness	Governance	Data protection is a major reason not to share data and undertake analysis.	Information governance concerns prohibit most sharing of data for analysis purposes. Assigned senior level data owners responsible for specific data sets and accountable for	Data sharing does occur but not extensively, and there is limited consistency in decisions made about sharing. The organisation has assigned senior level data owners for specific	There are some information sharing protocols and data can be shared internally and externally to undertake analysis.	Information governance protocols based on specific use-cases have been embedded in IT systems to enable responsible data sharing. A Corporate Management team member proactively drives information /

			agreeing new uses and access to data is done on an ad hoc basis.	data sets accountable for agreeing new uses and access to data.		<p>data integration internally and with partners to secure new insights, joined up services and savings.</p> <p>Information sharing and data sharing decisions are based on a balanced risk assessment that weighs privacy concerns against the risk to the organisation or individual of not sharing.</p>
	Openness	<p>Data is not made available to the public in machine readable formats.</p> <p>No public message about how the council uses data.</p>	<p>Data is made available on an ad hoc basis.</p> <p>Data is in a mixture of machine readable and non-machine readable.</p> <p>Public message about data use is technical/legal in nature.</p>	<p>There is an ambition to make more data available and some data sets are updated at regular frequencies, but is done mostly manually.</p> <p>Data is mainly in machine readable formats.</p>	<p>There is a single open data portal and most data is machine readable. Most data has a scheduled frequency for updating, and some of this is done automatically.</p>	<p>There is an open data portal with multiple data sets, open by default approach and a user-friendly interface which enables basic visualisation and analysis.</p> <p>All open data is machine readable in standard open format and use APIs where possible. At least some data has an ODI open data certificate.</p> <p>A clear public message about how and why data is used.</p>
Data Use	Decision-making	Rich in data, poor in intelligence. Data is not a key part of decision-making processes.	Data is used in reports but usually in a cursory way and with little reference to decisions which have to be made.	Data analysis is usually requested for decision making, but can be inadequate because analysis is not of high quality, targeted at the decision to be made or the right data is not available.	Some decisions are informed by data on both the frontline and at senior levels, but it is not consistent across the organisation.	Rich in data intelligence and insight. Data is analysed on specifically for the purposes of key decisions which have to be made, consistently across the organisation. Data is available in a timely fashion to support decision-making.
	Performance and Evaluation	Services and performance are not evaluated using the data available.	<p>Data is used to look retrospectively at performance, often in static format such as a spreadsheet.</p> <p>Data offers little insight into why events or performance variations occur.</p>	<p>Data is sometimes used to understand why events, or levels of performance, have occurred.</p> <p>Performance management using data is of limited value.</p>	<p>Data is sometimes sought to conduct evaluations of services and interventions, but mainly on an ad hoc basis.</p> <p>Data can be used to usefully performance manage staff and services, and there</p>	Data is used to support service delivery in real-time, is used to understand in granular detail issues of performance, and can be used to understand the effectiveness of services and individual interventions.

					is scope for it to trigger changes.	Relevant data is collected to monitor outcomes and historic data sets that are no longer relevant are retired.
	Optimisation and automation of processes	No processes have been automated or improved using data.	Efforts to use data to improve services tend to involve very basic analysis, and is ad hoc across the organisation.	In some services data is used as part of efforts to improve processes, but data dashboards are not routinely available and no processes have been automated.	Data dashboards are used to optimise processes. Data is used to manage services and processes and some are automated.	Data is used in real time where possible, often with APIs. Processes which require little or no human judgement have been automated and optimised using data, such as detecting fraud and error.
Data Skills Capability		Skills and capacity are limited to IT system managers and basic software use. Most staff lack basic data literacy and skills.	Some staff are able to use basic software for simple analysis. Data literacy is patchy.	Data integration and analysis can be performed by some staff, but is not highly sophisticated. Most staff have a basic level of data literacy.	Sophisticated analysis can be undertaken, but not consistently across the organisation. Some staff have good data literacy but it is not uniform.	Data analysts are highly skilled and can work with multiple software packages. Sophisticated data science can be undertaken routinely across the organisation. All staff have a level of data literacy appropriate to their role. The organisation has timely access to all its data from line of business systems whether held internally or in Cloud facilities.
Data Awareness and Culture		There is limited awareness of how data can be used to improve services and outcomes.	Data is seen as having some value in niche uses, but most staff do not routinely try to use data to help them with their work.	Data integration and analysis can be performed by some staff, but is not highly sophisticated. Most staff have a basic level of data literacy.	There are some highly data-literate staff and the culture of the organisation expects data to be used in decision-making and service delivery.	All staff see data as a tool which can support them to do their jobs better.

Appendix 3 - Research methods

The research combined semi-structured interviewing with a document review to answer a range of questions about how and why data had been used, and the impact this had created. The key research questions were defined following a workshop with over 40 delegates from local authorities and a period of preliminary research which culminated in a Discussion Paper.⁶⁴

Overview of the key research questions

What were the key use cases for the data in the project/programme?



What were the critical success factors for the project/programme?



What is the value case for the project /programme? in terms of internal productivity and external benefits?



How replicable is the project/ programme? for the wider sector?



What level of data maturity preceded the work?

In each case study we interviewed three distinct roles to provide different perspectives on the project:

- The project lead or project manager.
- The relevant senior or service manager - e.g. relevant Director/Executive Director.
- The technical lead responsible for the data science, analysis or coding work.

In some case studies, due to the size or dispersed nature of the project, these roles were shared between staff. In these cases we included additional interviewees in the research. We also undertook a document review for which we requested any documents which could be shared publicly and which fell under one of the following three headings:

- Internal reports and analysis including reports to senior management and councillors.
- External evaluations and analysis.
- Financial data - e.g. budget documents about relevant service areas which demonstrate the costs and savings of the project.

Case study selection criteria

The case study selection criteria was based on the preliminary research phase,⁶⁵ a workshop held with local authority delegates, and discussions with the project advisory board. This feedback suggested the project should seek a balance of case studies across a range of variables, including council service area, data maturity, types of data use, type of council, region and geography.

We sourced ideas for a long-list through desk research and conversations with our advisory group and other experts in the sector. Four key categories were defined for the long-list which represented the core activity of local authorities in terms of both spend and strategic priority:

- Children's social care and troubled families.
- Adult social care, health and public health.
- Smart places and local economic growth.
- Public service transformation and open data.

The shortlist was selected to provide a balance across these four areas, and the other variables listed above, along with examples of data use which represented examples of leading-edge data use. Alongside the eight in-depth case studies, short case study summaries were collated from the long-listed case studies, along with examples from around the world, to provide a fuller perspective.

We are aware that there are many other local authorities doing pioneering work with their data. Their exclusion is not intended as a comment about the quality of their work. We hope to turn people's attention to the value of data, and by doing so we hope that there will be more opportunities for local authorities to tell their stories about how they have used data to innovate.

Endnotes

1. New Policy Institute (2016) 'Local government will be in uncharted water by 2020.' <http://npi.org.uk/blog/local-government/local-government-will-be-uncharted-water-2020/>
2. Nesta (2012) 'The Rise of the Datavores'. London: Nesta.
3. The case study selection criteria was developed from the research involved in our preliminary research (Symons, T. (2016) 'Datavores of Local Government.' London: Nesta.) <http://www.nesta.org.uk/publications/datavores-local-government>, a workshop held with local authority delegates, and discussion with the project advisory board. See [Appendix 3](#) for more information.
4. Based on a key worker completing approximately 40 assessments per year.
5. <http://www.nesta.org.uk/publications/datavores-local-government>
6. <http://spectrum.ieee.org/tech-talk/telecom/internet/popular-internet-of-things-forecast-of-50-billion-devices-by-2020-is-outdated>
7. Saunders, T. and Baeck, P. (2015) 'Rethinking Smart Cities from the Ground Up.' London: Nesta. See: <http://www.nesta.org.uk/publications/rethinking-smart-cities-ground>
8. <http://www.alliance4usefulevidence.org/publication/knowning-how-to-protect-using-research-evidence-to-prevent-harm-to-children/>
9. <http://www.alliance4usefulevidence.org/publication/better-public-services-through-experimental-government/>
10. <http://www.alliance4usefulevidence.org/publication/knowning-how-to-protect-using-research-evidence-to-prevent-harm-to-children/>
11. Rogger, D. and Sibieta, L. (2016) 'An evaluation of different ways to incentivise citizens to co-produce public services in Lambeth.' See: <https://www.ifs.org.uk/uploads/publications/bns/BN%20184.pdf>
12. In this report, case management is used to refer to the general process of managing a case, rather than the specific meaning of case management in elderly care contexts, whereby a social worker manages a single budget on behalf of an elderly individual in the community.
13. These are visits for which a social worker must complete at a certain frequency in order to comply with statutory guidelines, for example when a child is subject to a Child Protection Plan.
14. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263658/2901502_PHOF_Improving_Outcomes_PT1A_v1.1.pdf
15. Reablement involves providing personal care, help with daily living activities and other practical tasks, to encourage people with support needs (either after an acute medical episode or to reverse or halt a decline in functioning) to develop the confidence and skills to carry out these activities themselves and continue to live at home.
16. Social Finance (2014) 'The Essex Social Impact Bond - a Year in Review.' See: http://www.socialfinance.org.uk/wp-content/uploads/2014/11/Essex_A_year_in_review.pdf
17. Defined as fatalities or near fatalities where abuse is suspected.
18. Symons, T. (2016) 'Datavores of Local Government.' Discussion Paper. London: Nesta.
19. Saunders, T. and Baeck, P. (2015) 'Smart Cities from the Ground Up.' London: Nesta.
20. Damp-busters' frog sensor - The Bristol Approach to Citizen Sensing, Knowle West Media Centre.
21. <http://www.analyticronin.co.uk/?p=59>
22. http://ifrc-media.org/interactive/wp-content/uploads/2015/09/1293600-World-Disasters-Report-2015_en.pdf
23. https://www.nesta.org.uk/sites/default/files/rethinking_smart_cities_from_the_ground_up_2015.pdf
24. https://tomholderness.files.wordpress.com/2012/11/holderness_turpin_2015_social_media_for_government_services_chapter_6_preprint.pdf
25. <http://voices.nationalgeographic.com/2016/02/10/jakarta-a-city-on-the-edge-of-a-social-media-revolution/>
26. <https://www.theguardian.com/public-leaders-network/2016/jan/25/floods-jakarta-indonesia-twitter-petajakarta-org>
27. The concern factors are specified by the Department for Education and councils identify these as part of the Single Assessment Framework.
28. Middle Super Output Area refers to a geographic hierarchy used by Office of National Statistic to improve the reporting of small area statistics in England and Wales.
29. Gershon, P. (2004) 'Releasing resources to the front line: Independent Review of Public Sector Efficiency.' London: HM Treasury.
30. <https://www.geoplace.co.uk/-/linking-essential-services-in-wychavon>
31. [http://www.lafabriquedelacite.com/fabrique-de-la-cite/data.nsf/5DA2F01AAE028AE7C1257F77005B9743/\\$file/timo.pdf](http://www.lafabriquedelacite.com/fabrique-de-la-cite/data.nsf/5DA2F01AAE028AE7C1257F77005B9743/$file/timo.pdf)

32. The Open Data Institute 'What makes data open?' See: <https://theodi.org/guides/what-open-data>
33. <http://www.local.gov.uk/documents/10180/11655/Suffolk+Open+Data+Breakthrough+Projects+evaluation+report+2014-15+final.pdf/48f4f60f-112a-4f08-8de0-f820dd430409>
34. <http://www.local.gov.uk/documents/10180/6869714/Sheffield+Open+Data+Plus+Case+Study+Final.pdf/Od5e8ca8-3cf9-420e-b91d-a7d6596a207e>
35. Open Data Institute (2015) 'Open data means business: UK innovation across sectors and regions.' Open Data Institute: London. Available at <http://theodi.org/open-data-means-business-uk-innovation-sectors-regions>
36. Andrew Collinge, presentation to launch the GLA Open Data Strategy (March, 2016).
37. <http://www.nesta.org.uk/project/open-data-challenge-series>
38. <https://maps.nyc.gov/businessatlas/>
39. <https://www.hitachiinsightgroup.com/en-us/pdf/solution-profile/hitachi-solution-profile-city-data-exchange.pdf>
40. <http://www.local.gov.uk/documents/10180/6869714/North+Somerset+Tourism+Data+Case+Study+Final.pdf/f2a94c14-8400-4a7d-af9a-baa0fc716681>
41. Cabinet Office (2011) 'Eliminating Public Sector Fraud - Interim Report.' London: Cabinet Office. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61023/eliminating-public-sector-fraud-final.pdf
42. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/39264/50_ways_2.pdf
43. Gravesham and Fujitsu case study - <http://www.fujitsu.com/fts/about/resources/case-studies/CS-Gravesham-Borough-Council-171013.html>
44. GeoPlace (2016) 'Everything Happens Somewhere: address and street data - a common standard for digital transformation.' London: GeoPlace. link
45. Useful resources for more information on data skills and capabilities include the Local Government Association and LARIA.
46. Data Mill North was originally called Leeds Data Mill.
47. <http://lida.leeds.ac.uk/>
48. <https://medium.com/@camdentheo/digital-transformation-technology-and-local-public-services-camden-and-beyond-c3b0c347a5ca#.ckexvnh5z>
49. Failure demand in this context refers to the number of repairs jobs which originate because the council had made an error in processing a previous order.
50. <https://medium.com/@camdentheo/digital-transformation-technology-and-local-public-services-camden-and-beyond-c3b0c347a5ca#.ckexvnh5z>
51. The Hackney Reclaiming Social Work (RSW) model was developed by former social workers who thought that a culture of risk-aversion and box ticking had changed social work into a primarily assessment driven profession, with too little emphasis on direct work to create positive change with children and families. The RSW groups social workers into units, headed by a highly-skilled Consultant Social Worker who manages four social workers, each trained in systemic therapy. Each unit has an administrator whose role is to support the running of the team and reduce the time social workers spend filling in forms and doing administration. For more information about the RSW model, see: <http://springconsortium.com/wp-content/uploads/2014/07/Case-Studies1.pdf>
52. Social Finance (2016) 'New insights into improving outcomes for at-risk youth.' London: Social Finance.
53. 'Child in Need' is category of social care work which defines a child who is unlikely to achieve or maintain, or to have the opportunity of achieving or maintaining, a reasonable standard of health or development without the provision of services
54. Awarded by TM Forum Live!
55. Damp-busters' frog sensor - The Bristol Approach to Citizen Sensing, Knowle West Media Centre
56. <http://www.analyticronin.co.uk/?p=59>
57. https://en.wikipedia.org/wiki/Physical_security_information_management
58. http://www.local.gov.uk/documents/10180/11643/Bristol+City+Council_+Bringing+open+data+to+life.pdf/ed8db46c-e3e3-427c-b33b-claa4bd72e4f
59. <http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Huawei-Smart-Cities-Report-FINAL.pdf>
60. This project is no longer live.
61. The Secondary Uses Service (SUS) is the single, comprehensive repository for healthcare data in England which enables a range of reporting and analyses to support the NHS in the delivery of healthcare services.
62. A tier two conversation is centred around helping people retain the maximum amount of independence possible while remaining safe. Tier 2 services typically provide low level equipment or reablement services that are designed to help customers with short term conditions be independent for as long as is possible and safe.
63. Basker, S. and Spinks, M. (2016) 'Data Maturity in the Social Sector 2016.' <http://dataevolution.org.uk/wp-content/uploads/sites/8/2016/05/PublishReviewofDataMaturityModelsFinal.pdf>
64. Symons, T. (2016) 'Datavores of Local Government.' London: Nesta.
65. Ibid. See: <http://www.nesta.org.uk/publications/datavores-local-government>

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