

A satellite map of Europe serves as the background. Overlaid on the map are several large, semi-transparent circles in various colors: a red circle in the top left, an orange circle in the top right, a purple circle on the right side, a large pink circle in the bottom left, a small purple circle in the bottom center, and a large orange circle in the bottom right. A semi-transparent circle is also split vertically, with a red left half and a blue right half, located in the lower right quadrant.

State of Offices of Data Analytics (ODA) in the UK

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About Nesta

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Introduction

People do not conveniently live out their lives in one local authority area. Communities, areas of deprivation, crime, littering and school catchment areas can (and frequently do) cut across borders. However, public sector organisations' data and reach are notably confined within the boundaries of their geographical area and jurisdiction.

Given the complex and geographically-diffuse nature of the challenges, the last decade has seen a significant rise in interest by public sector organisations in the use of data analytics. A number of them have set up their own data teams and are experimenting different forms of innovation. This has been possible also thanks to the growing amount of data that is now openly available.

Nesta has followed such initiatives with interest: through our research we've explored some of the most pioneering uses of data in UK local government (see for instance, our reports *Datavores of Local Government* and *Wise Council*).¹

With our Office of Data Analytics programme, we've conducted pilots in London, the north east of England and Essex. Through these projects we've explored how cities and regions can establish ODAs to get to more intelligent uses of data and collaborative approaches in the public sector.

At Nesta, we define an ODA as:

A model for multiple organisations to join up, analyse and act upon data sourced from multiple public sector bodies to improve services and make better decisions.

ODAs always adopt a shared vision and objectives, sometimes have shared capabilities and resource, often have a range of collaborative working practises, and definitely have a commitment to data analytics.

Ultimately, an ODA creates multi-organisational, actionable insight from otherwise siloed information.

Section One of this report takes a closer look at what an ODA is and how this approach is being put into practice in various parts of the UK. We categorise each ODA as being at an understanding, scoping, piloting or running stage. This section also explores the benefits and barriers to setting up an ODA, and Nesta's methodology for running a pilot.

Section Two provides insights from those already working in ODAs across the UK.² It appears that there is a general sense of concern from organisations that others, whether it be other local or larger authorities, police forces or other services, have done more, or something better when it comes to establishing an ODA. This is why providing the national picture is so important. It's needed to inform current and future practice, alleviate these concerns and encourage information sharing across a UK-wide ODA network.

Lastly, Section Three provides comprehensive case studies of each of the ODAs on Nesta's radar, with details of their vision, structures, processes and more.

Following this report, Nesta wishes to build a National Office of Data Analytics Network to ensure ODAs across the UK are talking to each other; not only joining up and collaborating with data locally but joining up on a larger scale to share information from strategic planning, to setting priorities, and offering day-to-day data expertise.



Section 1

Offices of Data Analytics

Data analytics in the public sector

"The ability to make easy data driven decisions is becoming vital to the way that we all live and work. This should be the way that government provides services."

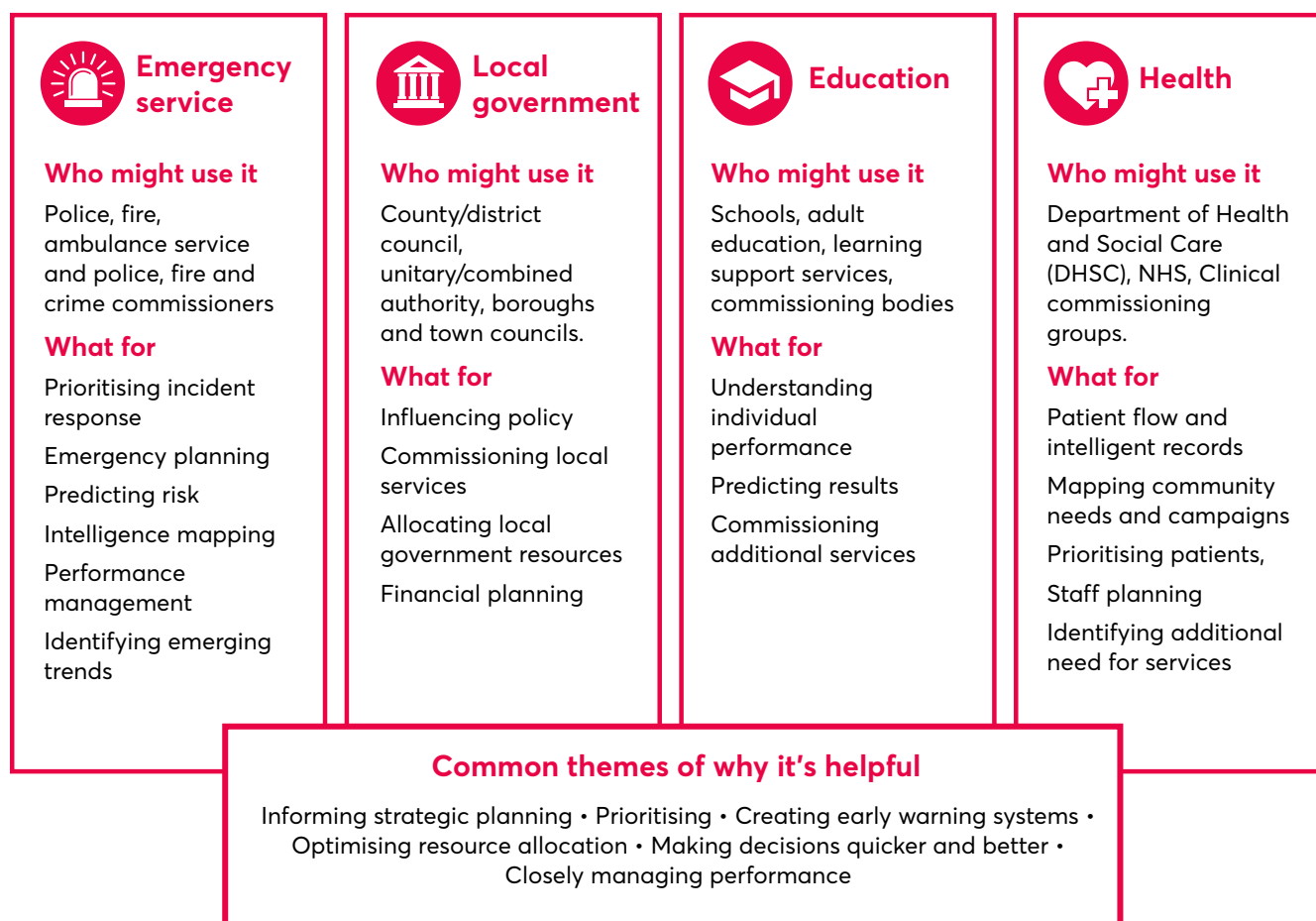
Government's Transformation Strategy 2017-2020³

Reductions in budgets, soaring demand for certain services, austerity, and rising citizen expectations are all current challenges that require public sector organisations to rethink how they deliver their services, deploy their assets and make best use of their staff.

Business as usual is not an option.

At Nesta we believe that some of these challenges can be tackled, or at least assisted, by the good use of data analytics (for example, Nesta's *Datavores of Local Government* discussion paper explores how data can help councils provide more personalised, effective and efficient services).⁴ Done well, it can help save lives, prevent major incidents, enable organisations to make more efficient and impactful decisions and improve the lives of those living and working in the communities they serve. Here are just a few examples:

Data analytics in the public sector



Nesta has championed the model of Offices of Data Analytics (ODA) as an effective means for achieving this aim. Taking inspiration from New York City's Mayor's Office of Data Analytics, established during the administration of Mayor Michael Bloomberg, we and others have worked to adapt the ODA model for a UK setting, while keeping true to its original aim of enabling better services and decision making through data analytics.

Happily, the model is now gaining serious traction in the UK.

Through our research, however, we've come to realise that there is no 'one-size-fits-all' model and there's generally a lack of consensus on what an Office of Data Analytics even is.

What is an Office of Data Analytics?

Offices of Data Analytics are not your 'run of the mill' analytical business functions, nor the usual performance analysis department measuring in-house statistics and activity, nor intelligence teams that only inform internal activities.

Our definition of Office of Data Analytics is:

A model for multiple organisations to join up, analyse and act upon data sourced from multiple public sector bodies to improve services and make better decisions.

ODAs always adopt a shared vision and objectives, sometimes have shared capabilities and resource, often have a range of collaborative working practises, and definitely have a commitment to data analytics.

Ultimately, an ODA creates multi-organisational, actionable insight from otherwise siloed information.

Overall, an ODA has at least two essential functions:

Conducting data initiatives: Conducting practical data sharing and data analytics projects (see Nesta's six stage process described later in this guide).

Templatizing: Creating reusable codes of ethics, data standards, legal documents, process guides and open source tools to make future data sharing and analytics projects quicker and easier to deploy.

If resources are available, two additional functions are desirable:

Convening and coordinating: Acting as a hub for a city or region's data science and policy community; supporting and nurturing the ecosystem of data practitioners.

Training: Running data and methodology workshops catered for the specific needs of public sector leaders and data science practitioners.

Although not all Offices of Data Analytics are structured and run in the same way, they do have a number of principles in common that differentiate them from other approaches.

These include:



An ODA is a multi-agency approach. An ODA may have originated from one organisation, but it should involve multiple partners. This requires an overarching strategic vision that all are signed up to.



An ODA is not a data analytics function sitting within one organisation. It is not an existing performance analysis or business insight team that exists to meet one organisation's own requirements.



An Office of Data Analytics is run by and for the public sector.



An ODA is not set up to deliver profit or benefits for the private sector. It is not run by private sector companies or by external bodies, although sponsors and external consultants might be involved in supporting delivery.



ODAs bring together datasets from a range of different sources (for example: public sector, commercial and open data) through an effective and secure data sharing process. They create a place-based view of a problem by complementing an otherwise siloed picture with information from other areas.



ODAs do not only focus on one single source of information, or a single organisation. They do not solely self serve data from inhouse systems.



ODAs focus on producing actionable insights from information, making sure that actions will be taken following the delivery of analytical outputs. This requires a clearly defined problem that needs to be solved, or question that needs to be answered, in order to ensure that the output is usable and impactful.



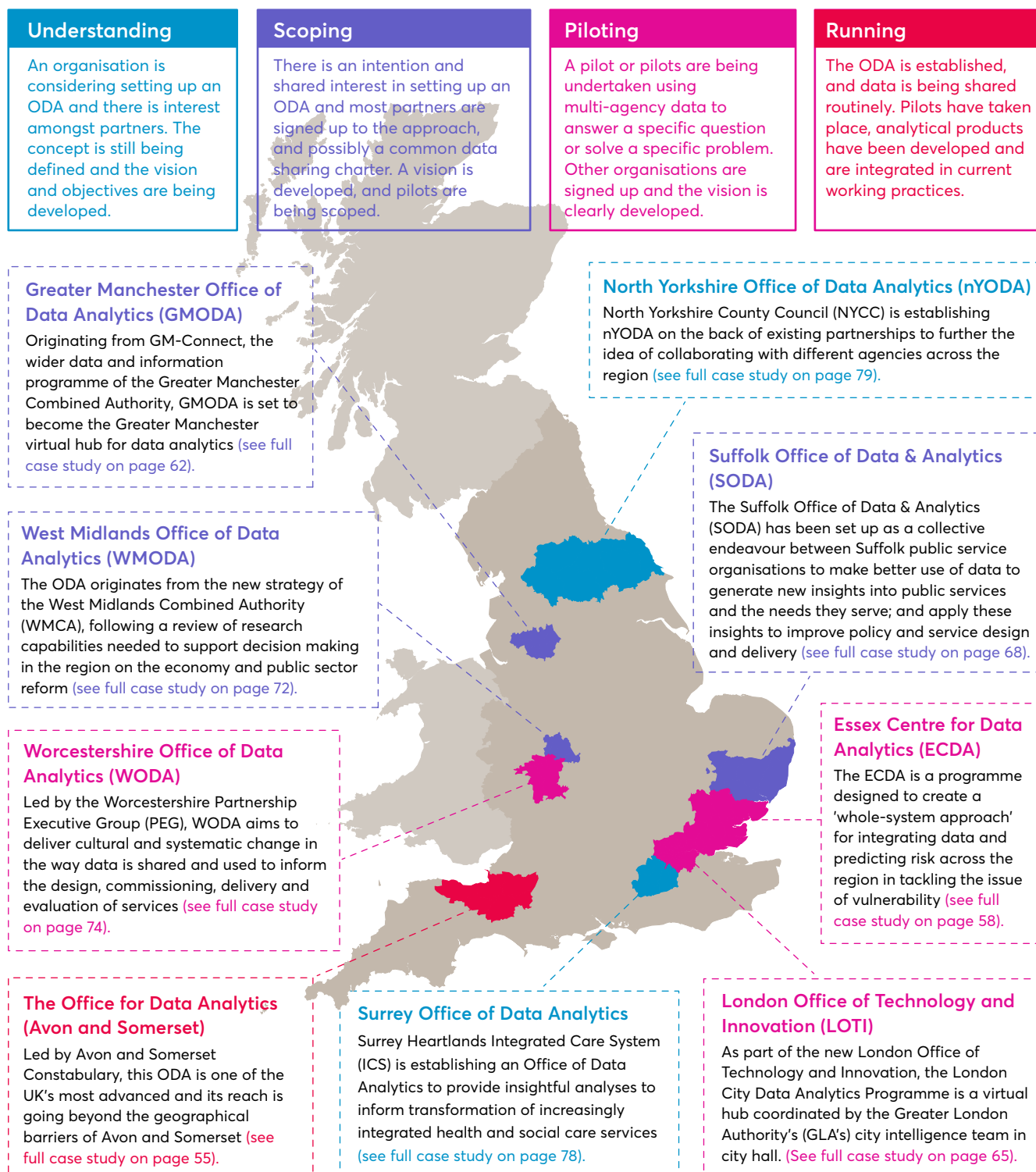
ODA isn't another word for a 'data lake'. It's not about pulling together a number of 'potentially' useful datasets into one place, in case they are needed. An ODA doesn't produce insight because it's interesting, without it being useful.

Mapping the development of the UK's ODAs

Offices of Data Analytics across the UK are at different stages of their journey. Some are just starting out with a new idea and a good intention. Some may have already engaged senior leaders and have the backing of the organisation to progress. Others are scoping or running pilots. Others have been established for a number of months and have the strong leadership backing, funding and capability to progress.

We have categorised each ODA by its progress and current state of operation. It's important to note that this is not a 'grading' or 'rating' of quality or performance. Rather, this is purely to provide an informed picture to help organisations learn from one another.

Status



Benefits of the ODA approach

What are the benefits of having an Office of Data Analytics? This is a common question, even for those organisations that are well into the process of setting up an ODA. It's important that the benefits are well defined and articulated, as they are essential for designing business cases, applying for grants or funding, and gaining senior leadership support.

Below we summarise some of the most common and important benefits of the ODA approach:



Finance

There is no need for a big investment upfront.

It clearly provides return on investment, efficiency training through reducing duplication of effort and possible solutions to mitigate/counterbalance devolution cuts.



Policy

It is policy agnostic and overcomes siloed political interests and drivers.

It is not a superficial bolt-on to the existing local governance, but rather fully ingrained into the way the city (or region) is run.



Collaboration

It allows better targeting of intervention services, through partnerships with different agencies.

It improves multi-agency working relationships and organisational culture.

It cuts across borders of single boroughs, districts and agency jurisdictions - and has a potential for modular applications.



Insight

It provides greater information to inform better decision making. Profiling and predictive modelling, for instance, can be used to better understand demand and target risk and vulnerability.



Innovation

It encourages new innovative ways of working.

The use of new technology and techniques ensures public sector bodies are in line with the rapidly developing national digital agenda.

It grows and develops skill sets of those working with and using data.

Possible barriers to the ODA approach

Although there is often a desire for sharing data amongst services, it can be challenging in reality. Some of the challenges will be deeply rooted in a particular service, its culture and staff, and will take time to change. Other barriers, such as information governance, technology or finance can be more quickly overcome by being well informed and learning from others.

The table below breaks down the different types of barriers associated with setting up an ODA, exploring the problem under each theme and suggesting ways that each problem can be overcome.



Organisational culture

What's the problem?

Many ODA leads report having difficulties in even getting into initial conversations about data sharing and analytical capability in their organisation.

Partly, this is due to organisational cultures that struggle to keep pace with innovation. In some cases, data and digital capabilities are looked at as desirable options rather than essential and effective investment of resources. It's not always understood at all levels of the organisation how these can be used to achieve better outcomes in decision making and service delivery.

How can this be managed?

The good news is that from the experience of existing ODAs, a big part of the solution is getting leadership support.

Communication is key to this, primarily being able to adapt the information and explanations to different audiences. One of the qualities of a good data scientist is being able to explain his or her analysis and findings to a non-data-literate audience, being able to deliver insights rather than describing statistics. The same principles apply here. For example, using plain English, leaving out the jargon or acronyms can help. If people do not understand it, they will not engage with it, or may feel threatened by it. Explaining it simply, identifying tangible benefits and sharing information in a digestible way is key.

Unfortunately, it is not just about having senior executives on board.

In fact, the support of analytical teams is also needed. Although they are the ones that are supposedly more invested in analysis, interestingly enough they are also the ones more likely to look at the opportunity of making data 'operational' with more fear. A risk-averse culture can be overcome by equipping staff with the knowledge they need to confidently do their job. For example, this could be keeping them up to date with legislation or policy changes or through regular training.

Keeping engagement high with the wider workforce is also important. Explaining the benefits of the approach, how it will make the organisation better and what has worked well elsewhere (perhaps by giving examples of other areas doing it well) will all contribute to adopting a good culture around data sharing. Future Cities Catapult has recently provided a list of useful suggestions on where to start tackling this barrier.⁵



People

What's the problem?

In addition to changing the culture, having the right mindset and increasing the appetite for innovative ways of working; having the skills and capability is also a crucial aspect to consider.

Capability may become a barrier due to current organisational structures.

Structures may not align to a collaborative ODA model, meaning it's difficult to identify who takes the lead and how.

It is for each ODA to decide the details of what that core team should look like; however, effective ODAs are not just about hiring a crack team of data experts. Data scientists are key, but it's also vital to have access to the necessary legal, technical, evaluation and comms expertise too. Section Two will explore each of these roles in more detail.

In fact, reforming public services requires a much broader network of talents - not all of which can easily be found inside the public sector.

How can this be managed?

For this, the collaborative nature of ODAs becomes very useful. Partners could include local authorities, public sector bodies, tech firms, data science SMEs, academic institutions, think tanks, civic hacker groups, and so on, all of which could provide bespoke expertise that you wouldn't otherwise have access to.

Some of the roles required in setting up and running could also be secured on a voluntary basis (there are plenty of organisations willing to work on projects that could benefit the community), or through simplified procurement frameworks, put in place by the ODA. There are a number of opportunities to work with private sector businesses and academic institutions to create attractive opportunities for skilled individuals. Catalyst projects are a good example of collaborations between counties and universities. Students of different levels are involved in six-week projects with the council to produce literature reviews, data models and evaluations of projects.



Data

What's the problem?

The first is a basic issue around data quality. Common issues include:

- Records are only recorded on paper
- Records are digitised, but in hard-to-analyse formats like PDF
- Data is recorded inconsistently, such as 'Smith Street' and 'Smith Str'
- Records about the same person or thing lack a common unique identifier
- Records are unknowingly duplicated

A second issue concerns discoverability.⁶ For example, public sector organisations tend to hold thousands of records that have accumulated over time and find them hard to search. As a result, individuals may have little knowledge about what useful data is held by other teams or what information other services have which could be relevant or useful.

In other cases, the existence of the data is known but difficult to extract or use due to its location or format. For example, large databases containing only free-text fields, uncategorised old emails, or PDF or word documents etc.

Additionally, where services or IT are outsourced, a public sector body may even find that it cannot access the data relating to its own service or must pay an additional fee.⁷

We refer to these issues as 'the jigsaw problem', with every team and every service owning their own piece of the data puzzle, but making it difficult to put all of the pieces together to see what the big picture shows.

How can this be managed?

Unfortunately, there are not always quick wins when it comes to 'fixing' the problems underlying public sector data platforms. However, small incremental changes can make the processes easier and pave the way for better data processes in the future, for example:

- Regular training is provided to those responsible for data entry on data quality standards
- Data is entered in mandatory fields or has predetermined entry formats
- Unique identifiers are adopted consistently across services in an area, not just within one service
- Free or relatively cheap duplicate cleaner software is used
- Common set of data standards are signed up to by organisations operating in an area



Technology

What's the problem?

Innovation in tech can be a challenge. Public sector agencies and departments face a number of unique challenges that make it difficult to take risks with technology in the same way as private companies.

In addition to this, finite resources and complex procurement processes make it difficult to implement the same far-reaching digital transformation that is achieved elsewhere. This makes it difficult to be experimental with the different tools and tech that are needed to join up and analyse data on a large scale effectively.

Data is systematically being collected and stored; however, in some cases, those tasked with analysing it are unable to do so effectively. When dealing with

large volumes of data, or even 'big data', the ability to data process requires a particular setup of physical and virtual machines to derive results.

We have also found that in some cases, the ability to extract data is also not always prioritised when designing and implementing new systems. Design tends to be focused on the front end and user experience with the data extraction capability, an afterthought meaning complex 'workarounds' are often required which take time and skill that could be better used on analysis.

How can this be managed?

Digital transformation may already be a strategic objective of the organisation; however, this could provide an opportunity to shape it in line with the data analytics agenda.

Although being experimental can be limited by procurement, there are still ways in which analysts or teams can go beyond their current technological capability to analyse data and draw insight from it by, for example:

- Using free, web-based tools where possible
- Bring IT in at the early state of a project to communicate what you require and understand what could be possible
- Embrace the open data movement and start with sharing what data you can openly via datasets or API-based access
- Collaborate with other services which may have better technology to create use cases to prove its value internally
- Empower analysts to be experimental and resourceful.

Could free trials of software packages and technology be trialled on a short-term basis to make a stronger case for adoption?



Funding

What's the problem?

The global financial crisis hit the UK's public finances hard, creating a deficit that grew to a post-war record of £153 billion,⁸ and although austerity measures have had an impact, public spending remains under pressure. This means that investment must be based on a specific and pressing need, as well as bringing an even greater need for transparency.

Funding can also be difficult to secure without the right level of support within a city or region. Complex governance structures and differing local government arrangements can make it difficult to identify whose responsibility financing the project is. Without being able to articulate service specific benefits upfront, organisations may be less inclined to invest, making a collaborative approach and ownership difficult.

How can this be managed?

ODAs should adopt a multi-agency approach to provide benefits and value to a number of organisations. This makes a strong case for jointly owned ODAs that share in not just a vision but a capability, delivered through jointly-owned functions sharing costs.

In some cases, there may be an opportunity for multi-tiered funding structures, making the possibility of being involved in the ODA a more attractive and attainable prospect for even smaller services in the region. For example, the leading larger organisations such as police or city councils which contribute the most data and resource act as primary owners, with an option for secondary or tertiary membership levels for smaller services such as district authorities.

There are also other routes to getting an ODA off the ground through alternative sources of funding. These will be explained in greater detail in section two but could include grants or other award schemes.



Legal

What's the problem?

As discussed throughout this guide, data sharing is the key enabler to get ODAs successfully delivering results. However, data sharing, especially when highly personal, can raise a number of ethical, privacy and legal concerns. Resolving legal concerns, overcoming governance headaches and managing stakeholder worries is a resource-intensive process which, if not managed effectively, can add lengthy delays to any project in the pipeline.

The Information Commissioner's Office (ICO) guidance explains that while General Data Protection Regulation (GDPR) for the UK market is an extension of the existing Data Protection Act (1998), there are significant differences, and organisations will be subject to more scrutiny as a result of the new regulation. While the public sector is subject to some exemptions over the private sector, the need for compliance is still paramount.

How can this be managed?

GDPR, although a potential administrative struggle, should be considered an opportunity to separate valuable data from data that is not useful or is no longer required. It should encourage organisations to regularly clean databases, making it easier to hold quality over unnecessary quantity data.

Having expertise in the team; for example, data protection officers or hiring a chief data officer for your ODA can help speed up the data sharing process and ensure a consistent approach is taken to creating Information Sharing Protocols (ISPs).

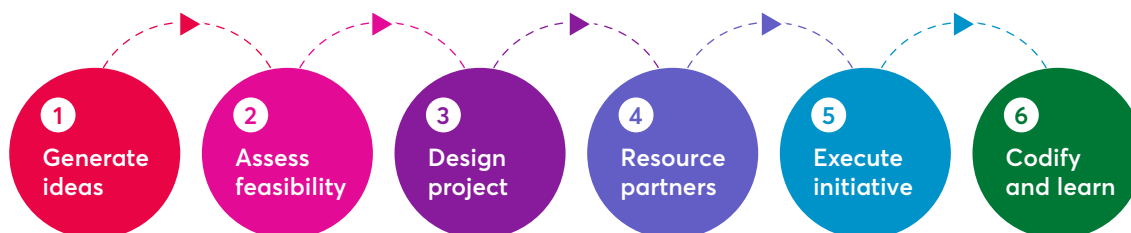
There is also existing guidance that services can easily access to help demystify legislation around data. For example, the Information Commissioner's Office (ICO) has online guidance for companies and individuals trying to navigate legislation and understand their rights when it comes to handling personal data.⁹

In the remaining part of Section One, we look at general considerations on how to set up an Office of Data Analytics and a methodology for selecting pilots.

Setting up an Office of Data Analytics

Different organisations have gone about designing and shaping their Offices of Data Analytics in different ways. Here we outline what we'd regard as the ideal process.¹⁰

In our view, an Office of Data Analytics is best understood as a function to oversee and project manage an end-to-end process made up of the following six steps:



ODA Six Step Process. Let's explore each step.



Ideas for new data analytics projects can be sourced from a number of different places. For example, from local politicians (perhaps taken from manifesto commitments), from local authorities and public sector staff. They might even be drawn from the public, potentially sourced via digital democracy platforms like Your Priorities.¹¹

An ODA could offer several windows each year for ideas to be submitted by these groups. This kind of open process is a core part of ODAs acting as a catalyst for collaboration between multiple actors across a city or region.



The ideas need to be vetted for their feasibility to be addressed as data analytics enabled initiatives. Nesta has developed a four-step methodology for helping public sector organisations understand what types of problems or questions they can resolve with data.



Once the problem and desired outcome (including success criteria) have been clearly defined, one of several project methodologies can be selected, including:

1. **Experiment:** the ODA designs and manages all facets of the project (i.e. data collection, analysis, evaluation, etc.) in collaboration with partners in a pilot.
2. **Challenge Prize:** the ODA offers a reward to the organisation or individual who provides the best data-enabled solution to a defined problem.
3. **Hackathon(s):** ODA organises hackathon(s) for smaller scale problems where data is abundant, or as an initial phase of the experiment or challenge prize design methods.

4

Resource
partners

The ODA assesses its own internal capacity and identifies gaps for covering the data science, technology, project management and legal expertise requirements of each project.

Using its network with the wider innovation ecosystem, the ODA seeks partners to fill those gaps. Partners could include local authorities, local tech firms, data science SMEs, academic institutions, think tanks, civic hacker groups, etc.

These partners could be secured on a voluntary basis, or hired via a simplified procurement framework, put in place by the ODA.

5

Execute
initiative

The data project is then executed. This would typically entail the eight project phases outlined below.

1. **Discovery**: assessing the project's feasibility and refining its approach
2. **Securing the commitment of project partners**: identifying who needs to be involved and their roles and responsibilities
3. **Information governance**: putting in place agreements to share data
4. **Data acquisition**: getting hold of the required data
5. **Data analysis and prototyping**: analysing the data and building the first version of the data product
6. **Testing and evaluating**: trialling the data product in a real-world setting and measuring its results
7. **Refining**: improving the data product based on feedback
8. **Scaling**: putting the data product into permanent/wider use

6

Codify
and learn

The final phase is for the ODA to understand the impact of each project and share lessons learned. This is likely to include:

1. **Assessing impact against a range of success criteria**. This could potentially include rigorous evaluation methods such as a Randomised Control Trial.
2. **Communicating the lessons learned in regular blogs throughout the project**, in a final project report, and through workshops and events.
3. **Releasing codes, templates, tools**, and any other materials that could support others in applying the same work or designing something new.

Piloting data analytics projects: The ODA model

Pilots are vital for testing, showcasing the possibilities for data sharing and identifying tangible benefits that the approach could bring.

Starting with a simple pilot helps:

1. To develop data sharing protocols that can be used longer term
2. To contribute to the development of a wider culture of data-sharing for the purpose of ODA analyses
3. To test the appetite for, and ability to, work across different organisations, through collaboration and problem solving

Collaborative data projects such as ODAs are complex by nature. In order to be successful, they need to provide actionable insight while being adaptive to a changing environment, data challenges such as these need to adopt an agile approach to project management, building in regular opportunities for analysis, testing and reflection.

Building on experience of working with public sector services to develop pilots and think about data differently, Nesta have developed a four-step methodology for defining a successful data analytics project.

Four-Step Methodology

Public sector organisations face many different challenges, but which of them might be tackled with data analytics? Understanding the necessity to move from large, macro-level problems to something narrow and actionable, and being able to identify what it is organisations would do differently, is imperative.

Successful data analytics projects consist of four core elements:



Specific problem

It's vital to move from large, macro-level problems to something narrow and actionable.

While public sector organisations are under immense pressure to tackle their most complex and challenging problems first, data analytics is novel to most organisations. Starting with the basics and getting some quick wins is the best route to sustainably; build the support, skills and momentum needed for more ambitious data initiatives to succeed further down the line.

For example, this problem statement is too vague:

'Modern slavery is occurring in the city.'

With further thought, this could be refined to a narrower problem statement, such as:

'We don't know which regulated businesses are most likely to be exploiting victims of modern slavery.'

When trying to identify a narrower, more actionable problem, it's helpful to consider the types of problem that data analytics is well suited to address.

The analytics team in New Orleans' Office of Performance and Accountability have helpfully outlined these five specific problem types:

Five specific problem types

Targets are difficult to identify within a broader population.

Services do not categorise high-priority cases early.

Resources are overly focused on reactive services.

Repeated decisions are made without access to all relevant information.

Assets are scheduled or deployed without the input of the latest service data.

The specific problem statements should not be in the form of a question, but phrased as follows:

'Our problem is that... [insert specific problem statement].'

Defined action

What would be done differently if all the information needed about the specific problem was available?

The specific, clearly defined action that will be enabled should be articulated. For data to be useful, the focus must be on achieving actionable insights. In other words, can this question clearly be answered: 'What would you do differently if you had better information?' This will run alongside the specific problem defined above to create a statement along the following lines: 'Our specific problem is X in response to which we want to Y'.

Focus on actions within your control to change: Many public sector issues depend on, or are affected by, the actions of other organisations or indeed citizens themselves, over which they have little or no control. The ODA methodology is about finding data insights that enable them and others to do something differently.

There are five opportunity types associated with the five problem types we outlined earlier.

Five specific problem types	Opportunity
Targets are difficult to identify within a broader population.	Identifying specific cases in a wider group.
Services do not categorise high-priority cases early.	Prioritising cases based on risk or need.
Resources are overly focused on reactive services.	Creating early warning tools for proactive working.
Repeated decisions are made without access to all relevant information.	Making better, quicker decisions.
Assets are scheduled or deployed without the input of the latest service data.	Optimising resource allocation.

The actions or interventions that would be put in place to address the specific problem if there was better information should be listed:

● *'Our problem is that... [insert specific problem statement].'*

● *'In response to which we would like to... [list the different actions you would like to implement].'*

Clear
data
product

What would a person need to see on a screen in order to enable the actions defined in the previous step?

Know the Minimum Viable Information Product (MVIP) needed. Raw data is of little use to most people delivering a service. So what form does it need to take to enable the new action specified above?

It's unlikely that whoever is carrying out the action (for example, a frontline worker or service manager) will want a spreadsheet or raw data. Instead they will want the data conveyed in a more intelligible way that provides a real insight – that's what we mean by a 'data product'.

There are five opportunity types associated with the five problem types we outlined earlier.

Five specific problem types	Opportunity	Example Data Product
Targets are difficult to identify within a broader population.	Identifying specific cases in a wider group.	A graph showing anomalies or outliers
Services do not categorise high-priority cases early.	Prioritising cases based on risk or need.	A prioritised list
Resources are overly focused on reactive services.	Creating early warning tools for proactive working.	An alert to flag issues when a threshold has been reached
Repeated decisions are made without access to all relevant information.	Making better, quicker decisions.	A data visualisation
Assets are scheduled or deployed without the input of the latest service data.	Optimising resource allocation.	A map or heat map showing where cases occur

Here are four examples of data products used by UK and US public sector organisations:

Prioritised list: The London Office of Data Analytics pilot developed prioritised inspection lists that would lead inspectors to properties most likely to be Houses in Multiple Occupation (HMOs), based on the characteristics of known unlicensed HMOs.

An alert: The city of Charlotte, North Carolina, combined demographics, training, payroll, internal affairs and other data to develop an early warning system for when an officer was likely to have a negative interaction with the public.

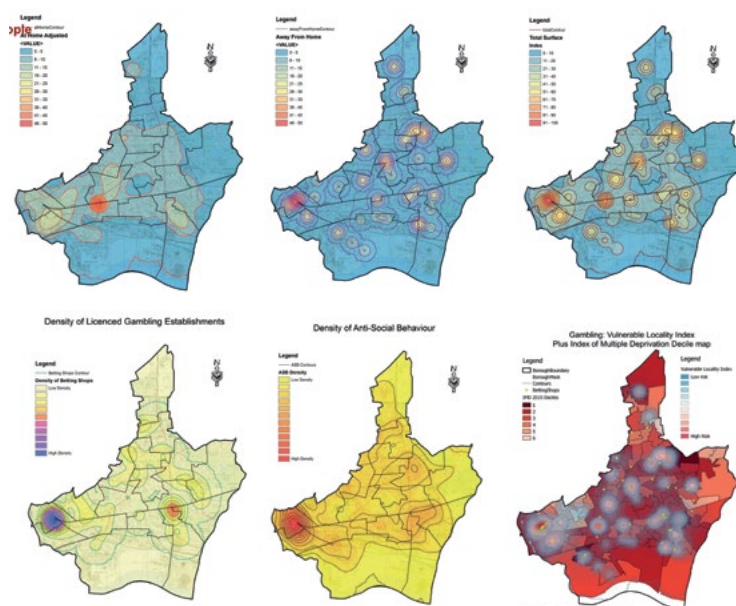
A dashboard: Louisville, Kentucky has improved ambulance turnaround times by using data to identify obstacles to speedier responses, the computer-aided dispatch system spots hidden inefficiencies and monitors the real-time location of ambulances.

A map: New York City is analysing and visualising the patterns of evictions that lead to family homelessness. It's improving the targeting of outreach services by predicting the neighbourhoods, buildings and specific addresses where resources are most needed.

CASE STUDY

The London Borough of Barking and Dagenham conducted analysis to identify areas where individuals are more likely to be at risk from gambling-related harm.

The analysis provided context to the local Gambling Licensing Policy revision and helped create a 'local area profile' identifying two important clusters, debunking the assumption of vulnerable people and gambling shops being dispersed across the borough.



The actions or interventions that would be put in place to address the specific problem if there was better information should be listed:

- 'Our problem is that... [insert specific problem statement].'
- If we could see/if we knew... [insert what the data product shows]
- 'In response to which we would like to... [list the different actions you would like to implement].'

Accessible
Data

What data is needed to create the data product, does it exist, is it available, and Is it useable?

Ensure sufficient data is available to create the Minimum Viable Information Product (MVIP). Don't worry about the quality of the data ('quality' means little until data is used to do something specific). But for any given problem there at least needs to be data available (i.e. possess it, it's accessible, can be requested) to create the MVIP.

Explore solutions that use non-personal data first. Sharing personal data between different public sector organisations is likely to entail a considerable amount of work designing and writing data sharing agreements, privacy impact assessments and security documents. If personal data is the only way to address the issue, then take this path, but do so with caution. It's considerably faster and easier if a problem can be tackled with non-personal data. Think creatively and laterally about alternative data sources that might achieve the MVIP without requiring personal data.

Data can come from many different sources, such as:

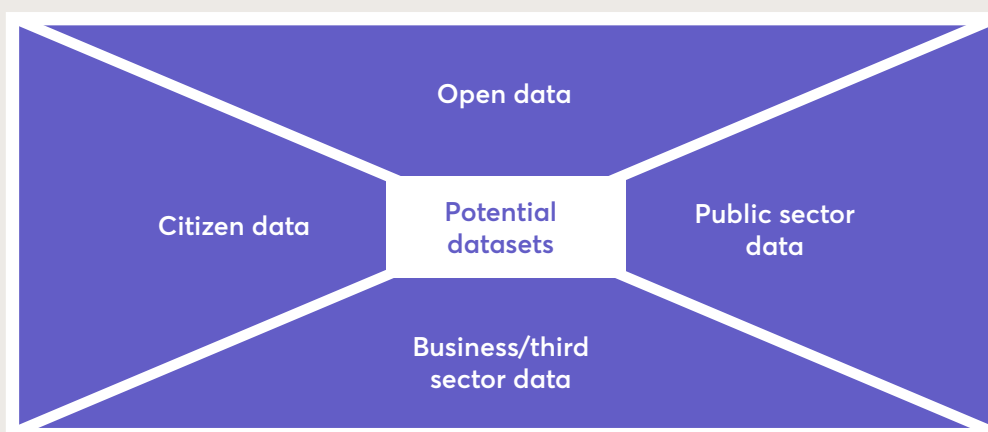
- Open data (for example, data.gov.uk)
- Businesses and Third Sector
- Citizens
- Public sector

If the data needed to create the data product does not exist, the following could be considered:

1. Are there other datasets that might contribute a similar type of information, or act as a proxy measure?
2. Could this data start to be collected so that analysis becomes more feasible in future? (This is still a useful outcome of the ODA process.)

Later on in the project, how the data can be used and if needed shared legally and ethically will be explored. However, at this stage of the process, it's enough to determine if the data needed to create the data product is in principle available.

This simple template can be used to brainstorm what datasets might be available from these different sources.



You should now be left with a four-part statement as follows:

- *'Our problem is that... [insert specific problem statement].'*
- *'If we could see/if we knew... [insert what the data product shows]*
- *'Using these datasets... [insert datasets you plan to use]*
- *'In response to which we would like to... [list the different actions you would like to implement].'*

Using data legally and ethically

During the discovery phase of the data project, it's vital to check that the data required can be used, and if necessary shared, legally and ethically. In May 2018, the European Union introduced the General Data Protection Regulation (GDPR), which places greater responsibilities on all organisations which collect and use personal data.

The UK's Information Commissioner's Office provides a useful guide to the General Data Protection Regulation (GDPR), including a data protection self-assessment toolkit.¹²

Privacy Impact Assessment (PIA)

Once datasets to be used have been identified, it's best practice to carry out a Privacy Impact Assessment (PIA). A PIA is a standard series of screening questions that guides users through the potential risks and benefits of sharing personal data.

The PIA equally prompts users to develop mitigation strategies to minimise potential downsides of information sharing.

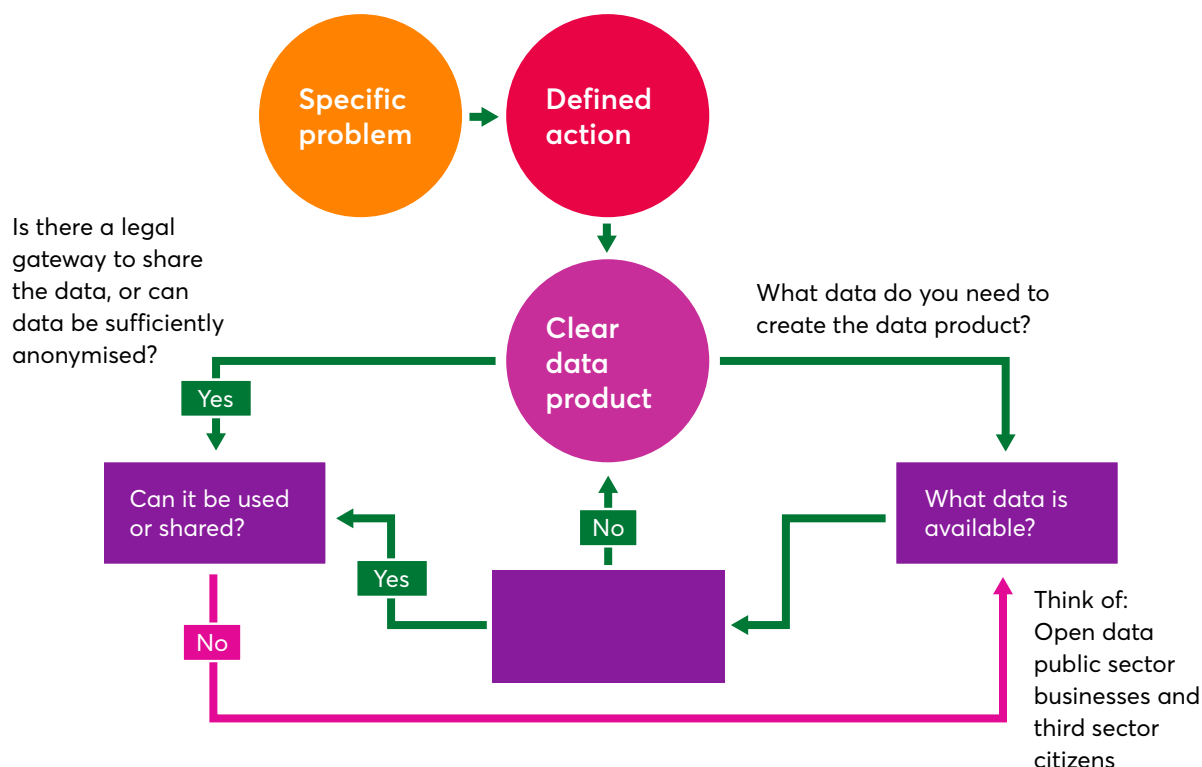
Legal gateways

If personal data must be used, an important step is to identify the legal gateways that grant the organisation the permission or authority to pursue certain objectives, which could be supported by the sharing of personal data. However, it should always be noted that sharing non-personal data comes with far fewer conditions.

Wherever possible, it's best to use non-personally identifiable data. If the source data is personal, it may be possible to remove names (and other personally-identifiable attributes) and aggregate the data to large enough sample populations that it's no longer personal.

The diagram below shows how the data product may need to adapt based on whether particular datasets can be used.

Do I need to adapt the data product?



Data ethics

Data ethics is an emerging branch of applied ethics which describes the value judgements and approaches we make when generating, analysing and disseminating data.

Regardless of whether it's legal to use certain datasets, the proposed data analytics project must be ethical, too. Ethical considerations apply not just to what data is used, and how it's analysed, but also the actions that the data enables.

There are a number of excellent toolkits to help you think about these questions, in particular the DSMS Data Ethics Framework,¹³ which guides the design of appropriate data use in government and the wider public sector.

The Data Ethics Framework includes accessible workbooks and templates to help guide you through the process.¹⁴

Data ethics framework						
	0	1	2	3	4	5
1. Start with clear user need and public benefit. Description of the user need with supporting evidence.	User need is not well defined					User need is clearly defined
2. Be aware of relevant legislation and codes of practice. List the pieces of legislation, codes of practice and guidance that apply to your project.	Needs clarification or expert input					Relevant laws are well understood
3. Use data that is proportionate to the user need. Describe how the data being used is proportional to the user need.	Reuse not proportionate					Reuse of data is clearly proportionate to achieve user need
4. Understand the limitations of the data. Identify the potential limitations of the data source(s) and how they are being mitigated.	Unreliable, unsuitable data					Data is representative and accurate
5. Use robust practices and work within your skillset. Explain the relevant expertise and approaches that are being employed to maximise the efficacy of the project.	Needs further expert input					Methodologies clearly designed and understood
6. Make your work transparent and be accountable. Describe how you have considered making your work transparent and accountable.	No scrutiny or peer review available					Oversight built in through life cycle of project
7. Embed data use responsibly. Describe the steps taken to ensure any new model, policy or service is managed responsibly.	No ongoing plan determined					Evaluation plan developed and resource in place to deliver it

The background is a solid red color. It is decorated with several black geometric shapes: a large circle in the top-left corner, a medium circle in the top-right corner, a small circle in the middle-right area, a large circle in the bottom-left corner, a small circle in the bottom-center area, and a large circle in the bottom-right corner. Additionally, there is a black shape in the lower-middle area that consists of two semi-circles joined at a vertical line, forming a shape similar to a stylized 'P' or a pair of parentheses.

Section 2

Lessons to share

Section One explored what an Office of Data Analytics is and its overarching principles. In this section we look at the different elements that make up an ODA based on our experience, combined with our observations of what is working well across the UK.

In August 2018, Nesta conducted a survey of all the ODAs known in the UK and conducted interviews with others working within data analytics teams or functions in other public sector bodies. The complete case studies can be found in Section Three, providing detail on each ODA's objectives, structure, governance, pilot projects, information sharing approaches and protocols, as well as a breakdown of software and technologies each has access to.

Below we summarise some of the key findings.

Founding, governance and structure

There is no 'one-size-fits-all' solution to building an Office of Data Analytics: each one is structured differently and is governed through different frameworks.

Initiation, ownership and direction of an ODA may come from different sources, such as a combined authority, a police force, a council or can be jointly owned by multiple organisations.

For example, the West Midlands Office of Data Analytics (WMODA) originated after the formation of the Combined Authority and forms part of the wider public sector reform, inclusion and cohesion programme promoted in the region.

Although now governed through the Partnership Executive Group in Worcestershire, the ODA originated from Worcestershire County Council after they experienced an unprecedented increase in local demand generated by complex social problems. Increasingly difficult financial cuts forced the council to explore innovative solutions to some of these problems. This led to the creation of WODA in 2017.

By contrast, in Avon and Somerset, the ODA originated from Avon and Somerset Constabulary. Recognising that other partners' activity has a bearing on police demand and addressing vulnerability, the principles of the existing Multi-Agency Integrated Service Hub were extended, and the ODA was created following a successful Police Transformation Fund bid.

Although ODAs may have different origins, they still require a number of organisations to sign up to the approach and feel invested in it. Some of these organisations may play a part in the governance of the ODA and its projects, and in many cases the governing executive board will be made up of representatives from a range of different services.

In **Avon and Somerset**, the office of the Police and Crime Commissioner is the ODA's sponsoring body. This, together with the Senior Responsible Owner, reports to the Home Office (due to the current police transformation funding stream). However, it is the South West Emergency Service Forum (together with local authority and health representatives) that directs and oversees the ODA's activity.



Governance and management of Offices of Data Analytics tend to follow these general principles:

Mechanism	Role	People
Initiation	One organisation identifies the need for the ODA approach and begins to assemble partners. If a collaboratively owned ODA is adopted, the initiating organisation will not necessarily be the owner or final decision maker.	Local authority, combined authority, police force etc.
Oversight Board	Formed of senior leadership personnel from across the partnership, responsible for setting the vision and objectives and making key decisions.	Chief executives, chief digital officers, councillors, senior police officers etc.
Delivery Board	Led by a programme manager, the delivery group consists of experts, most likely from IT, legal, Information Governance and Data Science. The board will be accountable for the delivery of pilots and subsequent projects.	Programme manager, chief data officer, IT expert, legal representative, head of analysis, and relevant representatives from key partners.
Project Board(s)	Depending on the size of the ODA and number of projects, there may be multiple project boards led by one or more project managers, all accountable to the delivery board.	Project manager, data scientist, IG lead, relevant service representatives, front line workers etc.

The Office

Although there are definitely benefits to having dedicated staff working from one physical location, most ODAs currently operate through a virtual hub, with analysts located in different services, allocated to projects on an ad-hoc basis.

Here we outline the pros and cons of virtual and physical spaces, looking at who is using each approach:

	Physical hub	Virtual hub	Hybrid
Who	The Office for Data Analytics (Avon and Somerset)	Worcestershire Office of Data Analytics, Suffolk Office of Data & Analytics, London Office of Technology and Innovation.	West Midlands Office of Data Analytics, Essex Centre for Data Analytics.
 Pros	<p>Allows quick and easy communication between analysts.</p> <p>Can encourage good working relationships and inclusive practices.</p> <p>Breaks down organisational barriers.</p> <p>Can help give the ODA a sense of identity.</p> <p>Improved and consistent access to software and technology.</p>	<p>Lower cost.</p> <p>Number of resources is not limited or confined to a space.</p> <p>Shared resources can remain within own organisations, reducing contractual challenges.</p> <p>Data sharing capability is prioritised. For example, providing a good data sharing platform and information sharing protocols upfront.</p>	<p>Allows quick and easy communication between analysts.</p> <p>Can begin to develop good working relationships.</p> <p>Can help give the ODA a sense of identity.</p> <p>Opportunities to introduce consistent software and technology for ad hoc working.</p>
 Cons	<p>Large investment may be needed to secure and maintain a space.</p> <p>Resources taken from other organisations may bring contractual challenges.</p> <p>Cultural differences between organisations may become more evident in a combined working space.</p> <p>Differences exist in data security and access for different types of service.</p>	<p>Culture and working practises are more difficult to develop.</p> <p>Communication can be more difficult.</p> <p>Organisations only have access to one source of software and tech.</p> <p>Potential for cross organisational project working is limited.</p>	<p>Can lead to inconsistent working practices.</p> <p>Only the 'visible' resources get recognised as the ODA resource.</p>

Working with partners

An Office of Data Analytics, by its nature, relies on a number of people from different organisations, working together to deliver insight.

A shared vision and objectives developed collectively by key partners will help, but it is also important that all partners agree how they are going to work together in order to deliver a truly collaborative approach. Collaborating with data to create a more complete picture of an issue across a city or region does not interfere with each organisation's priorities. Rather, it can help in overcoming siloed information, contribute to making insights as complete as possible, and eventually help change working practices through increased efficiency and more targeted and coordinated delivery of services.

Such collaboration needs to be supported by a Memorandum of Understanding (MoU), signed by all participating organisations to confirm their commitment to the ODA. The MoU will outline each organisation's roles and responsibilities, their point of contact, the resources they will assign and how they will participate and communicate within the project. Having this agreed upfront will help to manage partner expectations and provide the basis for any conflict resolution further down the line.

The governance arrangements will determine the level of influence and involvement each partner will have. These will vary across different ODAs, with some adopting horizontal structures, in which partners have an equal stake in each project, while others are based on tiered funding and ownership.

The **Suffolk Office of Data & Analytics (SODA)** Programme Management Group (PMG) is made up of all the line managers of analysts from partner organisations, meaning that all have an equal opportunity to contribute. The PMG has the role of facilitating the joining up of resources and acts as a facilitator to remove barriers to data sharing.

It's important to recognise that the level of involvement from each partner will vary, with key differences between those involved in the governance and funding of the ODA, and those involved in more informal roles, such as providing data for individual projects. In some cases, it may be that other groups are involved from outside the ODA governance process, such as information governance leads or analysts who wish to share in the ODA's learnings.

The **Greater Manchester** Analyst Network is a good example of representatives from a range of services coming together to deliver on ODA objectives. The network includes analyst representatives from universities, charities and public sector organisations in the region. It meets regularly, has a Twitter account to publicly share information, shares job opportunities within (and beyond) the group and showcases ideas and projects that each are working on at regular network events.

People

Data analysis is at the heart of an ODA's function, and hence experienced, skilled analysts and data scientists are essential. They are needed to draw meaningful insight from large, complicated datasets and provide actionable insights for a range of different audiences.

However, an ODA is never going to work just with a group of data scientists alone. To achieve data-enabled public service reform, organisations often need complementary skills such as legal expertise to create information sharing agreements; technical support to integrate IT systems; communications to ensure data is used in a transparent way that warrants public trust; a political liaison function to ensure each project has the backing and support of politicians; and project management resources to pull the whole thing together.

Providing and managing these resources is not always straightforward. With demand rising fast for data scientists across many sectors, many public sector organisations struggle to be able to offer competitive salaries. Time can also be a challenge. Existing data and IT staff may find it hard to prioritise supporting an ODA when they have heavy demands from their commitments to their own organisations. Bringing teams of experts sourced from multiple organisations into one place can present additional practical challenges.

Nesta's view is that it is possible to address some of these staffing challenges and create a better, more open and more inclusive ODA model. This could be achieved by drawing on the strengths, skills and resources of many local groups and individuals, for example from businesses, universities, charities and civic hacker groups. Step four, of the six-step process for an Office of Data Analytics project described earlier, involved assessing which teams and organisations need to be involved to complete a particular data project. Wherever the people come from, it's important that an ODA is able to assemble the right roles and competencies for any given data project.

Some of these roles are looked at in more detail in the role profiles below; however, in summary the key roles include:

Project management: Overseeing the design of the project and the coordination of all partners' activities.

User research: Assessing the real needs of those whose work the data project is designed to enhance.

Data science: Collecting, cleaning, matching and analysing data to produce insights.

Technical: Putting in place the necessary tools to upload, share and analyse the data and creating data products.

Legal and information governance: Ensuring that data is being used, shared and analysed legally and ethically.

Implementation: The organisations or teams conducting the data-informed action.

Data providers: Organisations providing data to create the data product.

Let's explore the most important roles.



Data scientist

The core role of the data scientist is to collect, analyse, and interpret large datasets, turning information into insights. While the software, language and technology used may differ, the qualities required in a good data scientist will not.

Requirements and personal strengths

Given the nature of an ODA, data scientists working in this context must be able to work collaboratively, liaising with stakeholders across the participating organisations to understand what is required, what problem needs to be solved or what question needs to be answered through smarter use of data.

Excellent communication skills are essential. Analysis is not good enough if it's not comprehensible or useful to the end user. Data scientists must have an ability to distil lessons from their analysis and translate them to the front line. They must make their information and insight accessible through clear communication and visualisation.

Strong problem-solving skills are key, aided by the ability to assess effectiveness and accuracy of new data sources and analytical techniques. A good eye for detail is essential, being able to spot inaccuracies and inconsistencies in the data and its description.

Technical skills

A good data scientist will, first and foremost, have the ability to handle and analyse data on a large scale, recognising the value of insight to inform decision making. There are a range of technical skills, methods and relevant qualifications, however these should not all be seen as requirements for hire, as many of the core skills can be learned over time.

Here are some examples of analytical skills and techniques that could be considered:

Statistical computer languages (R, Python, SQL, etc.) to manipulate data and draw insights from large data sets.	Statistical techniques and concepts (regression, properties of distributions, statistical tests and proper usage, etc.) and experience with applications.	Coding languages: C, C++, Java, JavaScript, etc.
Machine learning techniques (clustering, decision tree learning, artificial neural networks, etc.)	Statistical and data mining techniques: GLM/Regression, Random Forest, Boosting, Trees, text mining, social network analysis, etc.	Visualizing/presenting data for stakeholders using: Periscope, Business Objects, D3, ggplot, etc.
Data Analysis from third party providers: Google Analytics, Site Catalyst, Coremetrics, Adwords, Crimson Hexagon, Facebook Insights, etc.	Distributed data/computing tools: Map/Reduce, Hadoop, Hive, Spark, Gurobi, MySQL, etc.	Web services experience, e.g. Redshift, S3, Spark, Digital Ocean etc.

While this summary of skills may sound long, there are many approaches to building a data analytics capability. For example, organisations might focus on developing a new recruitment model or training their existing staff, instead of seeking fully trained data

scientists. The following case study shows how one city council altered their recruitment process to consider the types of individuals who would be a good fit for the role in practice rather than just on paper.

CASE STUDY

Sunderland City Council - A different approach to recruiting data scientists

In 2015, when Sunderland City Council were looking to expand their team to include data scientists, they started thinking about recruitment differently. Fully fledged data scientists were hard to come by and hard to attract into a public sector organisation not known for its advancement in data analytics. There was also the accompanying challenge of salary limitations.

At that time, the council had significantly invested in a strategic partnership with Palantir Technologies, recognising the need for information and data to be at the heart of everything they did as an organisation. Working with Palantir, Sunderland City Council was setting out to implement its new approach to intelligence and data analysis, with data scientists being central to driving the change, so the need for recruitment was becoming pressing.

Knowing the challenges of being able to recruit highly experienced, qualified data scientists, Sunderland thought about the type of individual who would be a good fit for the role in practice rather than on paper. By focusing on strengths such as open mindedness, the ability to work collaboratively and having excellent communication skills, they attracted a far greater pool of applicants capable of the role who may otherwise have been excluded.

Of course, the ability to work with data and technology was still crucial to the role so a graduate position was still appropriate, with a job description pitched towards those who had worked heavily with data in their degrees in order to test and draw conclusions or formulate arguments.

The Key Requirements of the data scientist role were:

Education

BA/BS in engineering, computer science, sciences, statistics, economics or mathematics (or equivalent work experience).

Analytical skills

Ability to conduct analysis and solve problems with a wide range of data.

Communication skills

Ability to translate service delivery/business questions into data questions. Ask: What are we doing to provide value? What are the causes and what does it mean for business?

Collaboration skills

Ability to help build customer workflows, train users through these workflows and influence users to adopt new ways of working.

Critical thinking

Coming to new conclusions based on the findings of the analysis; ability to turn thinking into actions/solutions.

Despite unfortunate timing meaning the recruitment process fell just outside of the graduate-fair period, 30 people still applied for the roles undergoing two levels of shortlisting. The interview process was then used to test Microsoft Excel, analysis and communication skills combined by including a practical exercise where the candidates were asked to interpret a piece of analysis to a front-line audience, explaining their processes, conclusions and recommendations in an understandable way.

Additional interview questions were focussed around aptitude and understanding of the benefit of data in the public sector, as well as their ability to handle data on a large scale. It was evident here that the candidates' aptitude, thinking, presentation and communication was much more important than an in-depth working knowledge of R or Python as training was to be provided 'on the job'.

The successful candidates received training and skills development, with the opportunity to work with the technical aspects of Palantir Technologies and alongside the council's strategic partner Sunderland Software City. Some of the investment in training included the completion of the certified 'Microsoft Professional Programme for Data Science' qualification. This is funded by the council but completed in the individuals' own time. All other training was undertaken 'on the job' through work on specific use cases, helping the candidates build skills around data matching, statistical analysis and data visualisation.

Getting the data scientists to stay in the organisation once trained was a challenge. However, three years in, they are still there. Skilled data staff can be hired and retained by emphasising the satisfaction of being able to do work that has an impact on the communities they serve and has great variety in working across a range of council services.



Project manager

A project manager is key to ensure the smooth running of any data analytics project involving multiple different partners. A project manager will most often be responsible for overseeing the initiation, planning, design, execution, monitoring, controlling and closure of the project. The project manager will also be responsible for ensuring the necessary governance and controls are in place to ensure successful delivery.

Requirements and personal strengths

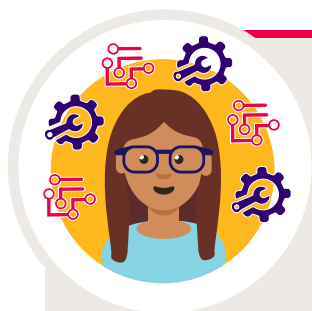
Perhaps the most essential skill for project management is the ability to listen and communicate well. Key to project success is the effective management of senior stakeholders; not just gaining their support but maintaining it. The collaborative nature of an ODA structure means that delivering regular, timely and relevant communications is imperative, as is providing strong leadership and direction to cross-organisational delivery teams.

A good project manager helps instil confidence in the process. Getting people in other organisations to share data can be one of the biggest challenges in an ODA pilot and requires that they have confidence. In the first instance, this solely relies on the project manager's ability to communicate the requirements and explain why they're important.

Technical skills

Ideally, the project manager will have a sound knowledge of project management methods and techniques. At Nesta, we have found an agile methodology to be particularly effective for ODA projects. It allows the adjustment of priorities and requirements according to results and findings throughout the project.

The ability to identify and manage risk effectively is also important, particularly when dealing with multiple partners, types of organisations, expectations and legal requirements. The project manager should have experience in identifying and proactively managing risks, issues and dependencies.



Technical lead

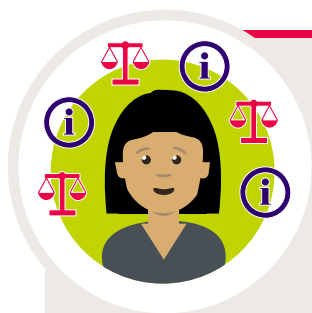
The technical lead will provide advice and expertise on the possibilities for, and limitations of the IT infrastructure needed for the project. Different organisations and teams use different IT systems, many of which do not easily talk to each other or make data accessible. The technical lead will work to understand and overcome these challenges.

Requirements and personal strengths

The technical lead will be familiar with a range of IT network designs, databases and have experience in the storage, sharing and management of data.

Particularly in the early stages of establishing an ODA, the technical lead will need to establish themselves in the core project team, working within the parameters set by the project manager and understanding the wider context of the project. In order to do this, the technical lead will need to possess a range of strengths, including;

- **Problem solving:** Public sector IT infrastructure can be complex. The functionality to safely and securely share data between organisations doesn't necessarily already exist and each service may be using different software (or different versions of the same product) and have different levels of security. Overcoming licensing issues can also be a challenge when an ODA project seeks to create a data product that can be used by end users in multiple different organisations. The technical lead will need strong problem-solving skills to identify suitable solutions to these challenges.
- **Analysis:** The technical lead will need to be able to analyse the issues within the existing capabilities and work with a range of other services to understand each organisation's IT structures. It is important for the technical lead to make informed decisions and recommendations, and this requires a sound knowledge of each user's capability and requirements, rather than implementing solutions which only the lead organisation has the ability to use.
- **Decision making:** The technical lead will make recommendations based on specialist knowledge therefore they will be confident in decision making. In many cases, the project manager or any other senior decision maker will not have this degree of specialist IT expertise therefore the insight and recommendations provided by the technical lead will be relied upon when choosing what IT solution is right for the ODA.
- **Communication:** Due to the collaborative nature of an ODA project, a range of IT departments as well as front line workers will need to be engaged to fully understand each organisation's IT structure. This will require multiple visits to, and the cooperation of, several different IT teams, meaning good working relationships are key.



Information governance/legal lead

The Information Governance (IG) lead¹⁵ will provide specialist information governance advice and guidance to staff at all levels across the ODA, from chief executives to front line users.

They will ensure that the ODA has an effective Information Governance Framework in place which spans the breadth of the services involved.

Requirements and personal strengths

The IG lead should have a highly developed, specialist knowledge of information governance practice and legislation, underpinned by theory and experience. They will provide interpretation, guidance and advice to senior managers to ensure compliance with GDPR, national best practice and associated legislation.

As with all other roles within an ODA, communication skills are imperative to successful collaborative working. The IG lead will be required to liaise extensively with the information commissioner's office in relation to information governance matters, seeking their advice and support as appropriate and be able to effectively communicate this knowledge to ODA partners. They will also be required to brief colleagues across the partnership as needed to enable new measures to be implemented where necessary. This will particularly relate to processes for access, sharing and use of personal and non-personal data in ODA projects.

The IG lead will possess excellent written communication skills as they will be responsible for producing information sharing strategies, reports, policies and other documentation that could be shared not just within the ODA itself, but with citizens to increase transparency and public confidence.

The IG lead should form a key part of the project team and should therefore be able to work within the parameters set by the project manager, while playing a key liaison role between other relevant departments such as legal services, internal audit, and IT in regard to the project implementation.

In **Worcestershire**, IG expertise is essential to enable WODA's ethos on multi-agency data sharing: *"Worcestershire partners will deliver cultural and systematic change in the way we approach data sharing across the county. Collectively, we will work from a default premise of the 'duty to share' data being equal to the 'duty to protect' it. That is, in all circumstances, we will share data unless there is a legal or ethical reason not to."*¹⁶

Information governance

When sharing data among partners, a common set of rules and conditions should be developed. This will typically start with the ODA outlining its intentions in an information sharing strategy or charter, to which all partners sign up (this will often first be mentioned in the Memorandum of Understanding).

Many ODAs have signed a data sharing charter that recognises and respects the underlying principle of 'a duty to share data unless there is a legal or ethical reason that prevents sharing'. This helps to standardise the information sharing approach upfront and uses it as a starting point for setting up the ODA.

The mechanism to then share information for any given data initiative will be made more specific and measurable in the form of a data sharing agreement (also known as an Information Sharing Protocol - ISP). ISPs are necessary whenever personal data is shared, but are equally recommended for the sharing of non-personally identifiable data.

The essential elements to be covered in an ISP are:

- **Purpose of the sharing**
- **Potential recipients and the circumstances in which they will have access**
- **Exact data to be shared**
- **Data quality**
Accuracy, relevance, usability, etc.
- **Data security**
- **Retention of shared data**
- **Individuals' rights**
Procedures for dealing with access requests, queries and complaints
- **Review of effectiveness/termination of the sharing agreement**
- **Sanctions for failure to comply with the agreement or breaches by individual staff**

A range of templates are available from the Information Commissioner's Office,¹⁷ as well as checklists providing a step by step guide through the process of deciding whether to share personal data (for systematic data sharing and one-off requests).

The **Office for Data Analytics (Avon and Somerset)** provides templates of Tier 2 Privacy Information Assessment and Information Sharing Agreement on their website.¹⁸

In these documents the need to share information to meet the purpose is explained, on the basis that all signatories accept and adopt the practices defined in the overarching Information Sharing Protocol hosted by Avon and Somerset Constabulary. Therefore, the baseline security and other specified requirements are not repeated because they are detailed in the agreement.

Information sharing platforms and frameworks

One of the most compelling priorities identified by existing ODAs is to identify a space where all information agreements could be stored, providing information not only for a given dataset (who it is shared with and under what terms), but also for a given organisation (what are the datasets already shared and with whom).

Most of the ODAs we've interviewed are currently using or intend to use the Information Sharing Gateway (ISG), an online tool that helps create, manage, sign and store data sharing agreements.¹⁹ The ISG has legal gateways and privacy screening questions directly built into the tool, meaning that information sharing protocols can be completed and signed off much more rapidly and securely. In addition, it includes a sign-off request option, which allows the sending of information sharing agreements to signatories and includes a system to archive agreements and flag those that need a review.

GDPR-compliant, ISG is a step toward standardising information governance around data sharing and has already been adopted by over 1,900 organisations.

Pros of the Information Sharing Gateway:

- **Information Sharing Protocols (ISPs) and Data Protection Impact Assessments (DPIAs) are more easily created.**
- **GDPR and Information Commissioner Officer compliant.**
- **Allows rationalisation and standardisation of approaches to data sharing agreements.**

In **Essex**, a Whole Essex Information Sharing Framework (WEISF) is in place, providing its members with access to advice, guidance, good practice, networking and tools to support the development of local information sharing. It will lay the foundations for the further development of the **Essex Centre for Data Analytics**. The WEISF provides:

- An overview of all active information sharing protocols submitted to WEISF, allowing practitioners to identify existing sharing, find examples of protocols and provide transparency for citizens
- A list of agencies which are partners in the framework, linking through to their websites.
- Advice and guidance sourced from the ICO as regulators.
- Templates to simplify and standardise the completion of ISPs, flexible enough to meet partners' needs.
- Tools and guidance to assist in increasing data management maturity.



The WEISF Interface

Technology and data

Technology is a key enabler of any Office of Data Analytics. However, it also constitutes one of the biggest challenges within public sector organisations: different systems, poor connectivity and outdated hardware are only three of the most observed blockers to adopting new ways of working with data.

Having said this, the challenges should not be an excuse to delay using data more effectively. Research carried out in Nesta's 'Datavores of Local Government' discussion paper has confirmed that much data-work in local authorities is still carried out using relatively basic tools such as Excel and SQL databases.

The flagship Office of Data Analytics, the **New York Mayor's Office of Data Analytics (MODA)** started out low-tech, using Post-it notes and Excel spreadsheets, before upgrading to more sophisticated tools and analyses.

The first step will entail an honest assessment of what technology is currently available, starting from an audit of the basic hardware and software requirements through to available analytical tools. The overarching data strategy of the ODA can then be sketched out accordingly.

Together with individual evaluations of data maturity²⁰ and technological infrastructure audits, other considerations should include:

- **Data quality and sharing frequency:** Poor data quality and systems that do not talk to each other pose challenges where ongoing data sharing is required. It is important to understand if the ODA will work on a project by project basis requiring one-off sharing, or if it will require ongoing, routine data exchange. This will have a direct impact on the technical architecture that is needed for supporting data sharing.
- **In-house or outsourced data sharing architecture:** commercial pre-built solutions are available on the market, but tailor-made data sharing technical architectures can also be developed in-house or contracted from external consultants and suppliers.

At **London Office of Technology and Innovation (LOTI)**, two data engineers will soon be joining the team to work on platform development.

- **Information Security:** it is vital that the architecture observes not only individual organisational technical security requirements, but that it is also aligned with national guidance. Since 2018, there are new regulations on the security of network and information systems,²¹ and a number of organisations are being set up to provide oversight and enforcement of these.

ODAs across the UK have taken the following measures to ensure security and data safety:

- **Two out of eight** have undertaken penetration testing to their storage to ensure data cannot be compromised.
- **Three out of eight** have a dedicated data protection officer.
- **Two out of eight** have engaged the Information Commissioner Officer in their work.

The following section provides an overview of the most commonly used business intelligence solutions and additional technologies deployed across UK ODAs.

Disclaimer: the following lists include the ODAs subject to our consultation. This does not mean that individual ODAs or partner organisations have not used a range of other technologies.

These are listed as examples of what tools are currently being used, but many other tools from a broad range of suppliers are available.

Data storage

Among the tools available to safely pull and store data across organisations, there are a number of commercial products that ODAs are currently using. Here we have included a list of platforms that provide a service for on-cloud storage. On-cloud storage models store digital data in logical pools. The physical storage is distributed across multiple servers, and the physical environment is typically owned and managed by a hosting company. This is responsible for keeping the data available and accessible, and the physical environment protected and running.

Organisations can buy (or lease) capacity from providers and access the services either through cloud computing platforms; or through applications that use Application Programming Interfaces (APIs), such as cloud desktop storage, gateway or Web-based content management systems, or through APIs themselves.

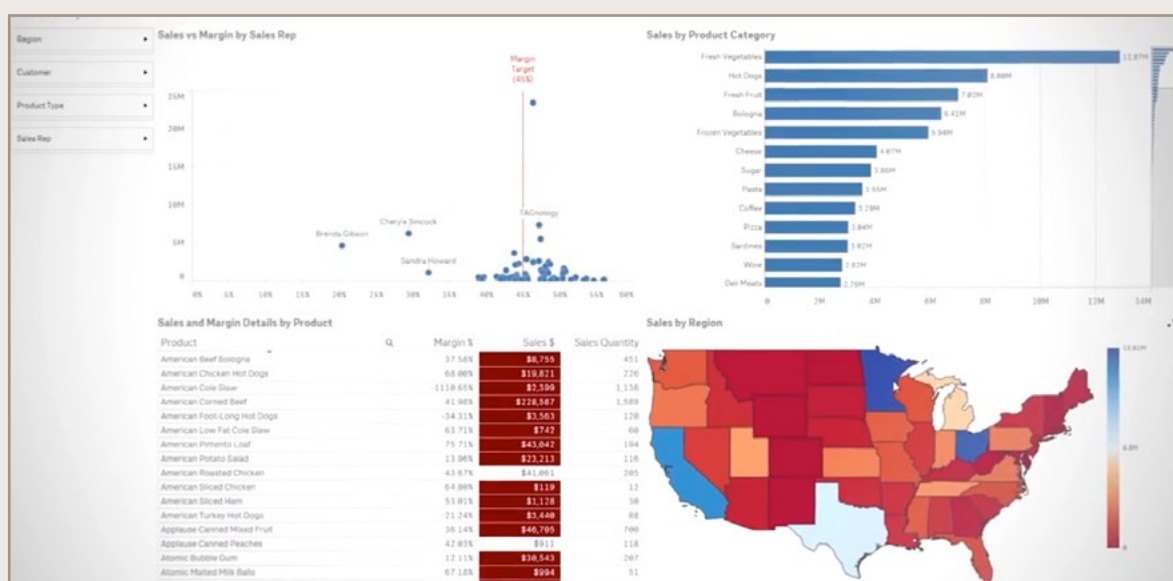
Examples of providers are:

Amazon Web Services (AWS)	Cloud computing platform provided by Amazon. AWS provides a number of services on-demand, from infrastructure, to platform and packaged software as a service, offering pre-loaded application software such as web servers, databases, CRM, etc. Currently LOTI hosts data on AWS and other ODAs are exploring this option.
Witan	Suite of cloud-based tools that, thanks to its data governance and secure storage hub, allows users to share data files in a secure and structured way. Open source technology developed by Mastodon C in collaboration with Greater London Authority and adopted by the London Office of Technology and Innovation before moving to AWS.
Comprehensive Knowledge Archive Network (CKAN)	Web-based open source management system for the storage and distribution of open data, currently used by LOTI.
PredictX	Platform that provides storage, visualisation and predictive analytics capabilities. ECDA is currently hosting part of the data on PredictX, although this is due for renewal.

Business Intelligence (BI) tools: Standalone tools (or suites of tools) to analyse data targeted at a specific industry. These can be referred to as 'data warehouse appliances', or through an endless number of acronyms (ERP, OLAP, CPM, CRM, etc). In practice, BI tools are instruments that help analysing, visualising and communicating insights from data distributed across an organisation (or multiple organisations), making them easier to be understood and acted upon.

Below is a review of the most known BI tools currently on the market: Qlik, PowerBI and Tableau. It considers visualisation capabilities, analytics and integration features and collates information gathered through interviews and desk research.

Qlik Adopted by ODA (Avon and Somerset)



Features

- It is possible to use associative dashboards, where data is not hidden when manipulating views and dimensions, but is 'greyed out' instead. This allows the visualisation of patterns that would not be possible using SQL alone.
- ETL (Extract, Transform, Load) engine available for data cleansing.
- Smart search and intuitive data prep, drag-and-drop abilities and drill-down features. Data relationships can be easily spotted and key insights can be shared quickly and efficiently, without the need for scripting, complex queries or joins.
- Open APIs allow developers to embed Qlik Sense into other applications, customize and extend Qlik's features to meet specific needs.

Usability: Requires proficiency in default SQL and training in Qlik's proprietary query language to build database interactions.

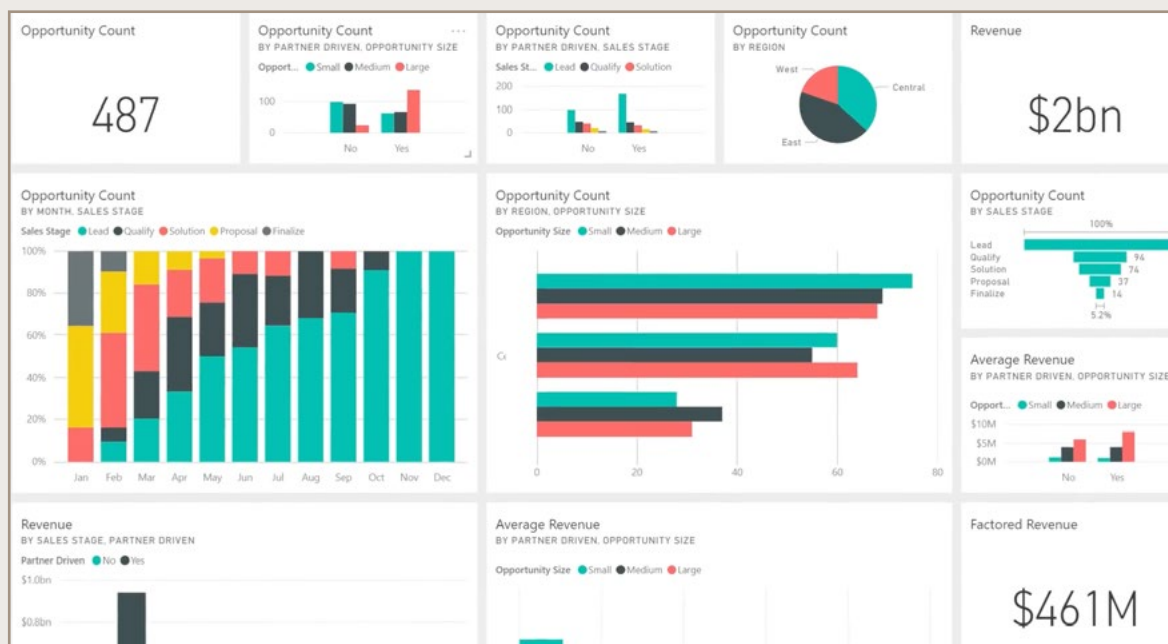
Shareability: Two options available for output analyses to be accessed externally:

- Desktop version (with limited functionality for external users).
- Cloud version, shareable through a link.



No need for initial data preparation
Intuitive user interface and easy searches
Associative engine across data

PowerBI Adopted by ODA (Avon and Somerset), ECDA



Features

- More intended for creating static reports.
- Data prep, data discovery and interactive dashboards are all included in the Power BI Suite and Power BI Desktop, while data cleansing and normalisation tools are available in the desktop version only.
- Drag-and-drop system and Interactive dashboards with real-time feed of data.
- Simple API for integrating Power BI with other applications.
- Different ways to share reports and dashboards.
- Multiplatform support (Web, Desktop, Mobile).

Usability: Besides the tools for standard data analysis, Power BI supports plenty of ways to incorporate or import data (streaming data, cloud services, excel spreadsheets, text files e.g. XML, JSON, third-party connections). It hosts integration with location-based data programs such as SQL Server Geospatial, BING, Esri ArcGIS, other databases and online services (e.g. Google Analytics).

Shareability: External users can access through the integration with Microsoft Azure. This tool enables ODAs to remain open in their BI and analytical choices and allow to scale not only the amount of data stored, but also their processing capability, ensuring security and accessibility to partners at the same time.

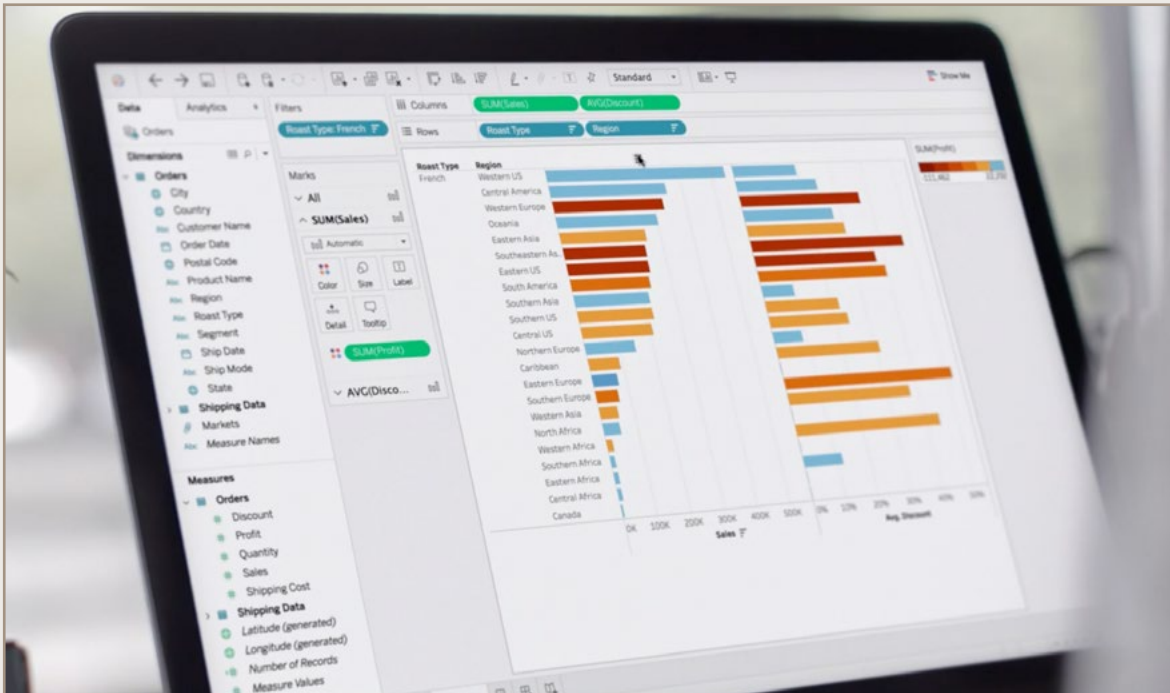


More accessible than other BI solutions in terms of pricing schemes

Able to connect to almost any kind of data source (both cloud-based and on-premise)

Integrated to Microsoft products (e.g. Excel), with a familiar interface for Microsoft users

Tableau Adopted by ODA (Avon and Somerset), GM ODA, Surrey ODA



Features

- Tableau leads the industry in terms of visualisation capabilities. It allows an easy creation and distribution of interactive data dashboards.
- Broad variety of visualisation capabilities and a rich library of visualisations types includes 'word clouds' and 'bubble charts' (not included in other BI tools).
- Support for connection to 30+ data source types (depending on the version).
- Integrated Data Blending tool.
- Ability for collaboration in real time.
- Ready-made drivers for many databases.

Usability: Data sources integration with many systematic types, such as data systems organized in file formats (CSV, JSON, XML, MS Excel, etc.), R, relational and nonrelational data systems (PostgreSQL, MySQL, SQL Server, MongoDB, etc.), cloud systems (AWS, Oracle Cloud, Google BigQuery, Microsoft Azure).

Shareability: It provides the ability to control outcomes through additional filtering with custom parameters;

Complimentary sharing ability (with certain limitations) by publishing them to a Tableau server; via email using Tableau Reader capability; or by publishing Tableau workbook openly and giving access to anyone who has a link.



Pros

Advanced and sophisticated data visualisation

Good integration with big data sources and platforms

Constant development and reliable customer support

Additional technologies	Adopted by	ODA	ECDA	LOTI	GM ODA
GIS Technologies	Geographic information systems (GIS) are designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data. GIS tools include ArcGIS.	•		•	
PostgreSQL	General-purpose object-relational database management system. Designed to be extensible, PostgreSQL allows customisation of many parts of the system using different programming languages such as C/C++, Java, etc.			•	•
NoSQL (Not-only SQL)	An alternative to traditional relational databases that only use structured data (i.e. database in which data schemata are carefully designed beforehand in row-column tabular format). NoSQL databases are more scalable, provide superior performance and are especially useful for working with large volumes of rapidly changing structured, semi-structured, and unstructured data.			•	
Statistical software packages	SPSS is the software package most widely used across ODAs for interactive, or batched, statistical analysis.	•	•		
D3.js	A JavaScript library for producing dynamic, interactive data visualisation in web browsers.			•	
Developer tools and coding languages					
R	An open-source programming language and software environment for statistical computing.	•		•	•
Python	A widely used high-level programming language for general-purpose programming.	•		•	•
SQL	Structured Query Language - this is the language used to communicate with a database.	•		•	

Types of pilots and projects

Choosing the right early pilots can be key to establishing partners' support for an ODA approach, getting the commitment of leadership teams, and securing the financial investment needed. Observing the data analytics projects that have been, or are currently being run by the UK's ODAs, we believe they can be classified into three different themes:

- Cashable savings and transforming working practice.
- Focus on vulnerability or reducing threat, risk and harm.
- Predictive analytics or making better use of AI and machine learning.

Although the direction of the project may arise from one of these three areas, it is likely that the benefits will span all three. Or, it may be that as the project grows and the discovery phase is completed, there are other considerations, objectives or benefits that will be met that weren't on the original agenda.

The pilot for the **Essex Centre for Data Analytics (ECDA)** sets out to reduce the threat, risk and harm to potential victims of modern slavery through creating a predictive model using business inspections data.

During the discovery phase, it was highlighted that before any predictive algorithm was attempted, a wider problem was the lack of any consistent sharing of business inspections data between agencies.

Therefore, the first outcome of a pilot is now aimed at producing a multi-agency picture of business inspections to identify a broader range of risk factors that can improve business practices. This will also help reduce vulnerability further down the line by laying the foundations for building the predictive product originally envisaged, with much higher chances of success.

Therefore, the potential for the pilot has now become:

- Cashable savings and transforming working practice.
- Focus on vulnerability or reducing threat, risk and harm.
- Predictive analytics or making better use of AI and machine learning.

In addition to these themes, our research has identified a number of recurrent topics currently or already considered by ODAs.

Each ODA approached these in slightly different ways and achieved different outcomes, but it is interesting to note that there are recurring themes in project choices, highlighting the need for shared learnings between ODAs.

Topic	Primary theme	Other themes	Who has done it/is considering it?
Domestic abuse	Focus on vulnerability or reducing threat, risk and harm.	Cashable savings and transforming working practice. Predictive analytics or making better use of AI and machine learning	Essex (Prior to ECDA through Essex Data Board). WODA. nYODA.
School readiness	Cashable savings and transforming working practice.	Predictive analytics or making better use of AI and machine learning. Focus on vulnerability or reducing threat, risk and harm.	Essex (Prior to ECDA through Essex Data Board). WMODA. GMODA. nYODA.
Gangs and serious organised crime, early intervention	Focus on vulnerability or reducing threat, risk and harm.	Predictive analytics or making better use of AI and machine learning. Cashable savings and transforming working practice.	Essex (Prior to ECDA through Essex Data Board). Avon and Somerset (reducing the likelihood of people becoming part of serious organised crime).
Businesses and Inspection	Cashable savings and transforming working practice.	Predictive analytics or making better use of AI and machine learning. Focus on vulnerability or reducing threat, risk and harm.	ECDA (Business inspection pilot). SODA (Business rates forecasting model). WODA (Business intelligence register).

We have observed an appetite for sharing project ideas across the ODA network. ODAs would therefore ideally adopt an open approach to the selection and execution of pilots. This means sharing code and being transparent about selection criteria, project execution and lessons learned so that they can be replicated by other regions.

The case studies in section three provide a complete list and description of the projects.

Evaluation

Evaluation is often overlooked or conducted hurriedly at the end of a project. This is a mistake. Good evaluation is vital as it helps identify what works and increases the chance that the best interventions will be refined and scaled. The purpose of testing and evaluation is to trial the data product or intervention in a real-world setting and measure the results.

According to the *Magenta Book*, the UK Government's essential guide on evaluation design in the public sector, there are three broad categories of evaluation: process, impact, and economic.²² The appropriate type will depend on what needs to be learnt, as well as the resources and expertise that needs to be dedicated to the evaluation.

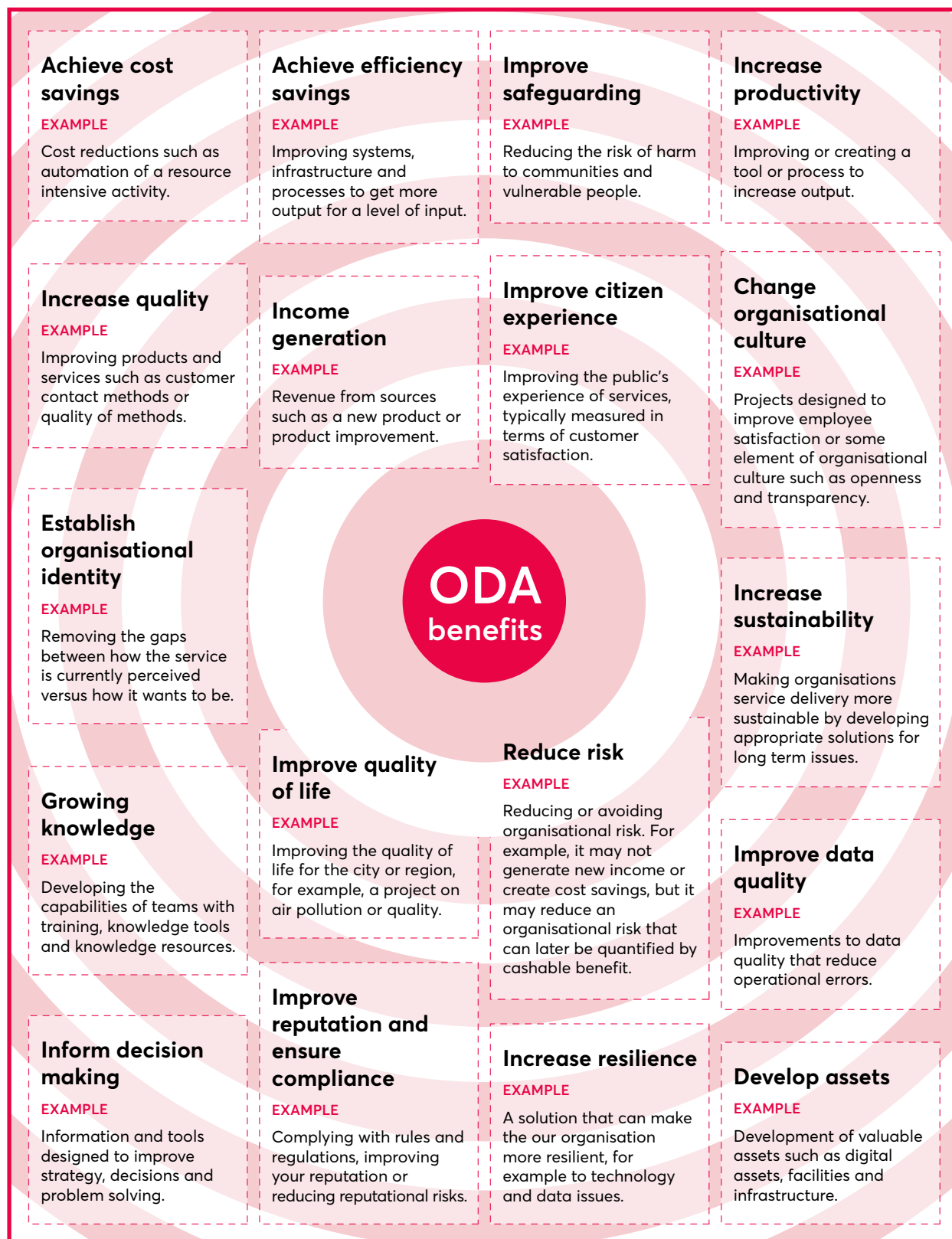
In general, a process evaluation will provide an understanding on how and why an intervention has an impact, while an impact evaluation will measure the change that has occurred, and whether the improvement has been directly caused by the intervention. Following a robust impact evaluation, an economic evaluation is possible to monetise the observed outcomes.

During the pilot for the **London Office of Technology and Innovation (LOTI) City Data Analytics Programme**, a randomised control trial was designed to test whether building inspectors could find more unlicensed Houses of Multiple Occupation, using a list created by an algorithm, than they could through their normal business practice.

Detailed guides on conducting good evaluations are available from Nesta (*Using Research Evidence: A Practice Guide*²³), from Central Government (*Magenta Book*, *Green Book*²⁴), and user-friendly websites, such as BetterEvaluation.²⁵

Benefits

In section one, we discussed the types of benefits Offices of Data Analytics can provide: cost savings, increased collaboration, insight and evaluation. However, at the business case design stage, these will need to be made more specific and relevant to each project. The table below proposes the types of benefits that could arise from the Office of Data Analytics or data project.



Benefits mapping

Benefits mapping is a useful method to link ODA projects and programmes to one or more organisations' strategic aims and could become a useful resource when looking for investment and gaining leadership support. Illustrating the link between project deliverables, new capabilities, potential process changes, and organisational outcomes, benefits mapping should be undertaken at the beginning of the project, in the project conception and initiation phases.

Cost Benefit Analysis

Cost-benefit analysis (CBA) is a useful technique to compare the total costs of the programme/project with its benefits, using a common metric (most commonly monetary units), in order to calculate the net cost or benefit associated with the programme. However, CBA has posed a challenge for ODAs in development across the UK. This is partly due to the complexity of monetising the more intangible benefits such as safeguarding of individuals or improving public satisfaction.

There are a number of cost benefit tools that can be used - such as those employed in HM Treasury's '*The Green Book*'.²⁶

Funding models

Offices of Data Analytics need to go beyond being considered as a 'non-essential luxury' and start to make a case for data analytics to become the 'golden thread' throughout decision making, service design and delivery. How do organisations get started with stretched resources and dwindling budgets?

From business cases to innovation bids, there have been a range of different approaches taken to secure initial funding. The table below outlines ideas for possible funding methods and sources.



In-house investment

What is it: If the ODA originates and is driven from a single organisation, funding would be obtained from within the organisation's own budget. A strong business case is likely to be required in order to achieve this.

The investment may initially be only resource based, with the service's own assets used to design and set up the project, alongside their other roles and commitments (such as project management or information governance).

A data sharing proof-of-concept project could also be run in house if capacity was there, using existing analysts to identify, source and use partner data. However, this would require the input of other in-house resources such as those mentioned above.



Pros

- Cost effective way to lay the foundation to grow the project.
- Early proof of concept puts the project in a strong position to be able to apply for funding elsewhere.
- Creates something tangible to be 'sold' to partners, to get them on board further down the road.



Cons

- Austerity limits possibility of single organisations having the level of investment required.
- Not conducive to a collaborative approach and shared 'place-based' vision.
- Difficult to have all the information needed to inform a business case where criteria will most likely be linked to cashable savings.
- Will be influenced by single organisational culture.



Collaborative and equal funding

A range of services equally fund the ODA and have equal oversight and governance of the process and projects.

Each organisation may also provide time and resources to help the set up and running of the ODA, in addition to financial investment.



Pros

- Breaks down organisational barriers and creates a mutual data-sharing culture.
- Creates and embeds a shared vision and set of objectives.
- Provides a more holistic view of and set of solutions to data sharing issues.
- Provides a wider source of funding.



Cons

- Collaborative funding structures can take a long time to design and agree.
- Competing organisational priorities could make prioritisation and final decision making difficult.
- Time and resources may be difficult to quantify when holding partners to account for their contributions.



Tiered funding structure

One or more organisations form the oversight of the ODA and contribute funding, with a number of tiers underneath made up of other partners, each contributing a predetermined amount (as per their tier).

Tiers may be organised based on the level of input or usage of the ODA function.

This may also incorporate a 'cost- free' tier, where partners can document their interest and support through data provision or consultancy where necessary.



Pros

- Breaks down organisational barriers and creates a mutual data-sharing culture
- Provides a wider source of funding
- Is a true collaborative approach - more partners will feel invested in the overall approach; embedding the vision and objectives
- Provides a more holistic view of and set of solutions to data sharing issues
- Can help formalise the structure and clearly define the level of engagement of different services.



Cons

- A complex tiered funding structure can take a long time to design and agree.
- Would require extra resources to own and manage due the number of partnerships and level of financial partnerships.
- Competing organisational priorities may discourage involvement from wider services.



Grants and prizes

Obtaining a sum of money from a government or other organisation for setting up an ODA or running a particular data sharing project or pilot.

There are a range of grants and prizes designed for innovation, digital transformation or artificial intelligence and machine learning.

Different levels of grants or prizes will be appropriate for different aspects of the ODA. For example, smaller challenge prizes are likely to be more 'project specific'; whereas wider government grants or transformation funds may be more suitable for implementing a new solution or transforming an existing service.



Pros

- There are a number of different options/new sources continually coming available.
- Often come with accompanying mentoring and support.
- Funding is usually timely.



Cons

- Oversubscribed funding mean processes are very competitive.
- Applications are time consuming and need a large amount of detail.
- Grants rarely last longer than three years, therefore a longer-term strategy is required to continue
- Specific priorities for types of activity.

Examples of funds and grants

GovTech Catalyst Fund - The GovTech Catalyst (GTC) supports public sector organisations to find innovative solutions to operational service and policy delivery challenges. The £20 million fund, awarded via competitions, provides support to define, develop, test and access creative solutions to complex public sector problems.

Police Transformation Fund - In excess of £100 million, the fund is intended to transform policing by investing in digitalisation, a diverse and flexible workforce and new capabilities to respond to changing crimes and threats.

In **Avon and Somerset**, a successful police transformation fund bid was of pivotal importance for setting up the ODA by giving the capacity to the team to provide mock-up examples that leveraged data projects' usefulness for implementation.

Horizon 2020 (EU) - Horizon 2020 an EU research and innovation programme with almost €77 billion of funding available over seven years (2014 to 2020). The goal is to ensure Europe produces world-class science and technology, removes barriers

to innovation and makes it easier for the public and private sectors to work together in delivering solutions to big challenges facing society.

Transformation Challenge Award - the former fund was available to support local authorities, including fire and rescue authorities, that were at the cutting edge of innovation for service transformation. The award sought radical innovations involving two or more local authorities combining their operations across all, or a major part, of their service delivery and back office.

Essex Council Council were awarded funding from the TCA which was used to initiate their Essex Data programme and acquire the data sharing platform PredictX.

Prizes - A way to generate innovative and sustainable open data solutions. More NGOs, government departments and city governments, are using challenge prizes to help develop new products and services which 'solve' a problem they have identified using open data.



Section 3

Case studies

Research methods

In the next section we will include the full case studies of Offices of Data Analytics with which we have come into contact so far.

We have included those programmes that we believe fall into our definition of ODA, i.e. *“a model for multiple organisations to share data in order to answer questions, solve problems and provide insight for the benefit of one or more public sector agencies”*. We are conscious that there might be other local authorities doing pioneering work with their data, and their exclusion is not intended as a comment about the quality of their work. On the contrary, if while reading this guide you think you know about additional Offices of Data Analytics do not hesitate to contact us.

In fact, through the publication of this report we aim at turning people's attention to the value of Office of Data Analytics programmes by increasing the visibility of existing Offices and appealing to local authorities and public sector organisations who are planning to establish one.

We've launched a detailed survey in August 2018, covering four main topic areas:

- ODA structures, funding and governance
- Team and working practices
- Completed data projects, selection methods
- Plans for the future

The research has been conducted from August until October 2018 and has been also complemented by semi-structured interviews with ODA leads, additional information gathered through desk research, ODA Network meetings notes and material shared by ODAs with Nesta during the research period.

CASE STUDY

The Office for Data Analytics, Avon and Somerset

Contact: **Lee Howell, Senior Responsible Officer/Programme Director**

The Office for Data Analytics is a virtual hub facilitated through a cloud-based platform and supported by a physical hub of key staff fully dedicated to the ODA. Although Avon and Somerset Constabulary is the lead/host organisation, the ODA engages a number of staff and contractors with a wide range of expertise outside policing.

While the ODA originates in the South West, it is also working in London and Wales, as it has developed a cloud-based platform from which partners can access analytics and insight from anywhere.

Origins and funding

The ODA was created as a result of learning from the Constabulary's work developing data analytics. This was extended to the partnership space following the recognition that focusing on early intervention can release pressure on other services, and therefore, policing demand and activity are strongly related to other partners' efforts.

A police transformation funding bid was submitted by Avon and Somerset on behalf of the partnership in 2017. A number of partners, including local authorities, police and fire services, have already confirmed funding for 2019 onwards to support the work of the ODA and a sustainable model has therefore been created.

Vision and objectives

Led by Avon and Somerset Constabulary, this is one of the most advanced ODAs seen so far and prioritises identifying and protecting vulnerable people at the earliest opportunity.

The ODA is driving public sector reform by developing an integrated hub for the collation and sharing of data from national data sources, police, ambulance and

public health, fire and rescue, local authorities and third sector partners. It aims to become a world leading Office of Data Analytics, innovative in outlook and lean, agile and data-driven in their approach.

It is applying a partnership approach, using data science, predictive analytics and data visualisation to deliver insights that help strategic and tactical leaders improve outcomes for citizens while also reducing costs.

Also, as a condition of the transformation fund bid, the ODA is developing blueprints for data sharing protocols, data transfers, predictive modelling, visualisation, self-service analytical products and early intervention approaches. One of the examples of this in practice is the establishment of the National Analytics Forum, supported by the Home Office at director level, hosting representatives from other ODAs to share learning, good practice and recent developments.

Governance

The sponsoring body is the Avon and Somerset Office of the Police and Crime Commissioner and the monthly board meeting is chaired by the Chief Constable.

The Senior Responsible Owner reports to the Board and to the Home Office through quarterly returns.

Engagement with other key partnerships, including the South West Emergency Service Forum and Somerset Chief Executives Meeting informs the work of the ODA.

Key partners are emergency services, local authorities (county/unitary and district), Public Health England and Highways England; however, the ODA is currently working with data from 66 different organisations to a greater or lesser degree (from initial data requests to fully-engaged partners).

Key partners include:

Avon & Somerset Police	Cornwall Fire Rescue Service	Dyfed County Council	Highways Agency	Mid Devon District Council	Public Health England	South Gloucester Council	Taunton Dean
Avon Fire Rescue Services	Devon & Cornwall Police	East Devon District Council	Hillingdon	National Crime Agency	Public Health Wales	South Hams District Council	Teignbridge District Council
Bath North East Somerset	Devon & Somerset Fire Rescue Service	East Dorset District Council	Historic England	North Devon District Council	Purbeck District Council	South Somerset District Council	Torbay Council
Bournemouth Borough Council	Devon County Council	Christchurch Borough Council	Home Office	North Dorset District Council	Royal National Lifeboat Institution	South Wales Police	Torridge District Council
Bristol City Council	Dorset Police	Exeter City Council	IRS (Fire) Data	North Somerset Council	Sedgemoor Council	South West Academic Health Science Network	West Devon Borough Council
British Transport Police	Dorset & Wiltshire Fire Rescue Services	Gloucestershire Fire and Rescue Service	Maritime Coast Guard Agency	Plymouth City Council	Somerset County Council	South West Ambulance Service Foundation Trust	West Dorset District Council
Cornwall Council	Dorset County Council	Gloucestershire Police	Mendip Council	Poole Borough Council	Somerset Partnership (CCG) Road safety oversight group	Swindon Borough Council	Weymouth & Portland Borough Council
West Somerset & Taunton Council	Western Power	Wiltshire Council	Wiltshire Police				

Team structure

The team includes the SRO, a programme director, a programme manager, a data protection officer, a communication officer, two business analysts, two business developers, one data scientist, one ICT support officer and one administrative assistant.

The programme also includes a range of secondees, contractors and commercial contractual arrangements which are focused on delivering high quality outcomes.

BAE systems are providing significant input and capacity to the programme and Accenture and the Behavioural Insights Team are also supporting the ODA work.

Working practices

Information sharing	Working to ICO guidelines and an ICO signposted good practice DPIA.	
Data sharing	Flat file transfer moving to automated links via cloud.	
Data storage	Cloud-hosted platform. Some 'on premise'.	
Languages used	R	Python
Data visualisation tools and statistical programs	Tableau Qlik Sense	PowerBI IBM SPSS
Additional technologies	ArcGIS	

- ✓ Penetration testing undertaken on their storage to ensure data can't be compromised
- ✓ Dedicated data protection officer
- ✓ Information Commissioner's Office engaged in their work

Data projects

A wide range of analytic solutions have been, and are being developed, all having a partnership and early intervention focus.

Together with discrete pieces of work being commissioned by partners ad hoc, Qlik apps developed and under development include:

Road safety	Informed prevention, protection and engineering effort by partners working better together using a complete picture of risk and supporting early action. Data science assists in predicting where, when and who is likely to be involved in accidents.
Serious youth violence (youth offending)	A solution that applies both data science to identify predictive risk scores, as well as data visualisation to identify trends and networks of influence to inform local intervention programmes in the most cost-effective manner. This has been developed in a London borough, but has national application with local data submitted to the ODA cloud platform and then viewed locally.
Adverse childhood experiences	Work to visualise key components that inform ACE. This is also being used to inform some work on missing children.
Community Risk Index (Vulnerability Index)	A GIS based model has been developed to show where people are dying (across the South West Region). It embeds a vulnerability index informed by Public Health England data. The model also allows a more limited national view.
Missing people	Predicts who is most likely to go missing from specific locations and when this is likely to occur.
Troubled families	A solution that outlines an approach to inform troubled family approaches (early intervention) for local authorities has been produced and is available for partners to use.
Predicting pleas	Work undertaken to forecast the likelihood of guilty/not guilty pleas, and areas of improvement in data capture and processing identified.
Reducing international criminality	A law-enforcement-only solution that brings national and local data together to inform early intervention action, reducing risk, harm and vulnerability.
Reducing suicide	A data science and visualisation analytics solution has been developed that identifies where suicide events occur, but also where those who are most likely to die through suicide live. The latter allows prevention effort to be targeted.
Arson	Tool to predict what type of building is most at risk of being subject to arson attacks. It provides information on when and where, to inform early effort to develop. Other data is incorporated to inform subsequent investigation.
Reducing serious organised crime	An analytics solution that aims to bring local authority and police data together to inform early effort, reducing the likelihood of people becoming part of serious organised crime.

Work plans for the future

A future operating model has been developed, and a work plan is being developed, to be ready in April 2019. This will be informed by the capacity provided by funding partners.

The cloud-based platform and analytics solutions will continue to be available and informed as additional partners come on board. Benefits will continue to be tracked.

CASE STUDY

Essex Centre for Data Analytics (ECDA)

Contact: **Mark Johnson, Head of Analysis, Essex Police**

The ECDA is at the core of the 'Essex Innovates' programme, a data science and AI partnership between Essex County Council, Essex Police and Essex University (University of Essex is home to the Institute for Analytics and Data Science).²⁷ The ECDA is currently in the pilot stage of a project relating to businesses of risk (under the theme of modern slavery) with Nesta and is a good example of applying an agile approach to project management, being responsive to findings in a discovery phase.

Origins and funding

ECDA builds on the foundations of the existing Essex Data (ED) programme.

This programme began as a pilot in 2016, funded by a grant awarded to Essex partners to support system wide transformation. It brought together people and technology to offer a way for councils, police, health, and voluntary and community organisations in Essex to use the power of data to tackle some of the most challenging issues. A tool was developed in partnership with PredictX to store and match multiple data sets from different organisations.

During the ED pilot, the tool was tested within different services in Essex to understand the potential of this type of technology to address some of the big challenges, such as predicting school readiness, preventing escalating domestic abuse, identifying organised gang activity, and understanding A&E admissions, and use the insight to transform the way public services work together.

This ED programme provided the foundations for the Essex Centre of Data Analytics, which is now a collaborative effort, jointly funded by Essex County Council, Essex Police and Essex University.

Vision and objectives

The ECDA is a programme designed to create a 'whole-system approach' for integrating data and predicting risk across the region, identifying the contribution all partners make in tackling the issue of vulnerability.

The vision for ECDA is to make Essex national leaders using the power of data science and AI to tackle public policy challenges. The aims are:

- To make Essex a place that is an exemplar for the integration of data across public bodies
- To have the skill, capability and technology to undertake predictive analytics based on ethical, high standards
- To have a sustainable data infrastructure
- To have the best data science / analytical capabilities in the UK to benefit its people and communities

It will deliver this through:

1. **A data sharing platform:** Having a sustainable data infrastructure to allow organisations join-up and analyse data from multiple sources to tackle local challenges.
2. **A research and development platform:** A 'What Works' Centre that will also host academic research and expertise from a range of institutes and universities, contributing to the existing knowledge of what works in reducing risk and vulnerability. The academic network will also support the evaluation of ECDA projects, thereby demonstrating value for money and continuing to enhance their relationship with academia.
3. **An analytical hub:** It is the aspiration that ECDA will bring together people with the skills and expertise in using the latest analytical techniques (e.g. big data and predictive analytics) in a central, jointly owned 'hub', in order to identify patterns, minimise risk and allocate resources in the most effective way.

Governance

ECDA is overseen by the Essex Partnership Board. It now has the strategic and operational governance structure in place, which is working on the development of ECDA as the delivery platform for the Essex Innovates programme.

The partnership does not have a single leading organisation, there is equal involvement from each partner through both funding, staff and consistent senior sponsorship.

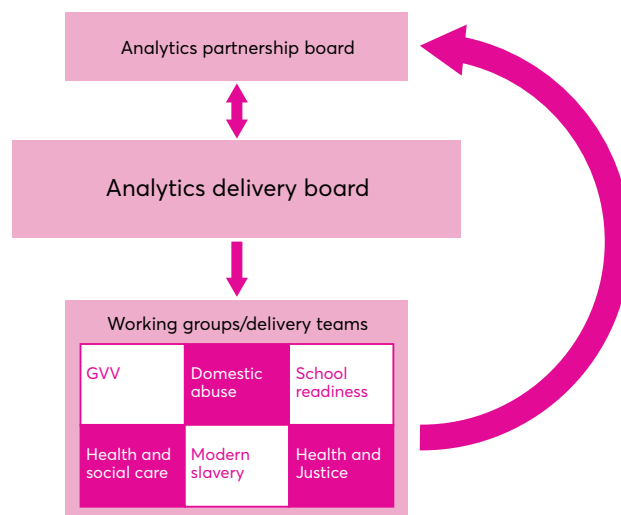
Partner	Essex County Council	Essex Police	Essex University
Senior Sponsor	Chief Executive	Chief Constable	Vice-Chancellor

An analytics partnership board will provide governance and sign-off to drive the direction of the Essex Innovates ECDA work stream, ensuring the delivery of the long-term vision. The board will set a clear and ambitious direction of travel, monitor progress, have oversight of all major analytical projects involving partnership data, and will help to promote the work done so far.

The board will also hold the Analytics Delivery Board to account and help address any issues or barriers to progress. A number of smaller working/delivery groups will sit below the delivery board, formed of partners from a range of other organisations and specialising on each individual project.

There will also be an independent ethics board, representing all key stakeholders including the public. The purpose of this board is to ensure all work carried out by ECDA is done to the highest ethical standards, with the greater public-good central to its purpose.

ECDA governance structure



Team structure

It has not been decided yet whether ECDA will become a physical hub or a virtual one, but it is likely that it will be a physical hub.

The current team consists of 12 people, with representatives from Essex Police, Essex University and Essex County Council, however all are currently working on ECDA alongside other commitments. The core focus of the team in the early stages is governance, project

discovery, and ethics. The analytical capabilities are primarily provided by analysts in Essex County Council and Essex University and the head of analysis currently sits under Essex Police.

District Councils are also involved, although to a lesser degree. Discussions are ongoing with Essex Fire and Rescue, and Health organisations, and it is hoped that both will be fully involved in the near future.

Working practices

Data sharing	Currently both on-premise and on-cloud, they will be developing this aspect early next year.	
Data storage	Cloud-hosted platform. Some 'on premise'.	
Languages used	R	
Data visualisation tools and statistical programs	PowerBI	IBM SPSS
<div> <div>✓</div> <div>Penetration testing undertaken on their storage to ensure data can't be compromised</div> </div>		
<div> <div>✓</div> <div>Dedicated data protection officer</div> </div>		
<div> <div>✓</div> <div>Information Commissioner's Office engaged in their work</div> </div>		

Data projects

The county council through the ED board has already successfully completed three pilots Domestic Abuse, Gangs, and School Readiness. The first ECDA pilot led by Essex Police is now

entering the implementation phase and will soon be ready to present its first prototype: a tool to provide a multi-organisational picture of business inspection and service touch points.

Pilot overview

Mapping business inspections to identify those of concern

Problem	It is hard to identify businesses most likely to be engaged in exploitative labour practices.
Solution	Collate a range of business inspection data to create a map of business inspections across the County. Also, to provide a profile of each business to complement existing intelligence.
Outcome and lesson learnt	<p>The main outcomes of the pilot are:</p> <ul style="list-style-type: none"> • To reduce the risk, harm and vulnerability associated with businesses of concern in Essex. Businesses such as car washes or nail salons are known to engage in exploitative labour practices in Essex, but other businesses are also likely to be the front for alternative criminal activity such as money laundering, fraud or perhaps breaches of standards or compliance. They often remain unidentified because they fall under the radar of different inspecting agencies. • To increase the impact of limited resources available for business premises inspections. Since 2010, local authorities' capacity to conduct both reactive and proactive premises inspections has fallen drastically. We could therefore help target inspections of businesses that are most likely to be in violation of standards and increase the efficiency of resource and time strapped services. <p>The project initially focused on targeting businesses exploiting modern slavery victims. While the aim of the ECDA project remains the same, the topic of the pilot has been modified as a result of findings in the discovery phase. This has revealed a number of challenges around data availability and quality due to the age of the legislation and both working and data collection processes.</p> <p>It also highlighted a lack of multi-organisation approaches to business inspections, with organisations having little or no insight of what the others are doing. Therefore, it was recommended that harnessing this data, intelligence and insight could better identify employees, customers, or even members of the public, who could be in vulnerable situations due to irregular business practises more widely.</p>
Next steps	<p>The tool is to be created and deployed at a strategic and operational level to help inform inspection and change business inspection practises.</p> <p>A second version of the tool is to be developed to incorporate an algorithmic prediction of risk, using the risk factors identified during development, testing and usage of the tool in version one.</p>

ECDA will incorporate all current and future projects in a pipeline project framework, to help prioritise and assess the suitability against

a range of criteria. The framework is still in draft form but is likely to include the following questions:

Link to business objectives/priorities	Feasibility as an ECDA project
<p>Alignment to Essex partners' strategic aims and priorities and to leadership major themes for corporate support.</p> <ul style="list-style-type: none"> • Is it on the business plans? • Is it linked to strategic priorities for more than one partner? • Is it a wicked issue? • Is it linked to statutory regulation (police)? 	<p>Data/variables - understood and define.</p> <ul style="list-style-type: none"> • Is the data required for the proposed project available, able to be matched, or of sufficient quality/frequency to be matched? • How much added value is the insight likely to have compared to what we know now?
<p>Clear area of enquiry - research question.</p> <ul style="list-style-type: none"> • Is there sufficient clarity about the problem (to be addressed)? • Does the proposal set out clearly what they want to achieve? • How, and when will they show what has been achieved? • Have any other ways to address this problem been tried or considered? 	<p>Proactive sponsor identified.</p> <ul style="list-style-type: none"> • Has a project sponsor and lead partner been identified/appointed? • Is there leadership support and buy-in? • Is there partnership support and buy-in?
<p>Use of insight/what will they do differently - defined.</p> <ul style="list-style-type: none"> • Have routes been identified to use the insight gained? • Has consideration been given as to what actions might be taken/changes will be made to services, at what scale, based on the insight? • Will the insight be able to be used operationally? 	<p>Partners willing to share data.</p> <ul style="list-style-type: none"> • Are the resources (capacity, funding licenses etc.) in place to deliver the proposal at all stages - data sharing, risk modelling and application of insight to service reform?
<p>Impact.</p> <ul style="list-style-type: none"> • Will the proposal/prototype support the delivery of improved outcomes for local people? • Reduce/help reduce demands on public services? • Will it benefit the residents of Essex? 	<p>Innovation.</p> <ul style="list-style-type: none"> • Is it innovative? • Does it explore a new area?
<p>Outcomes.</p> <ul style="list-style-type: none"> • Will it deliver/support the delivery of financial benefits? • Have mechanisms and time frames been identified for delivery of financial benefits? 	<p>Opportunities for development and learning.</p> <ul style="list-style-type: none"> • Will the focus of the project - policy area, geography, scale, proposed service reform - help to further test the Essex Data platform (in its widest sense)? • Does it increase the data science and analytical skills in partner organisations? • Is there a mix of data scientists/analysts and operational employees in the working group?
<p>Opportunities for partnership engagement.</p> <ul style="list-style-type: none"> • Will the proposed project create opportunities for Essex partners to develop/strengthen external links? 	<p>Scalability.</p> <ul style="list-style-type: none"> • Could the proposal be scaled up or repeated elsewhere?

Work plans for the future

- **Assessing partnership capabilities**

ECDA in the next few months will identify existing capabilities and infrastructure across the partnership to assess their current situation in relation to their analytics maturity journey. For this reason, ECDA is now encouraging partners from across Essex's public sector to contribute to the Nesta Data Maturity Tool, an online self-assessment tool whose results will contribute towards aggregating scores for each partner organisation's roles and business functions. These will feed into ECDA phase one diagnostic along with other evidence being collated and will help the partnership understand what needs to be done in this field.

This phase will also include a mapping exercise of all existing work that has been done. It is in fact a partnership self-assessment, which is currently being undertaken to identify assets, capabilities and capacity across the system, and to measure what impact has been made so far and where efforts need to be directed next.

Following the initial assessment, partners will develop joined up skills and capabilities across the whole system to implement data-driven solutions towards prevention and benefits for local people and businesses.

- **Create learning opportunities for social good**

There is a need to have a continuous view on what best in class / cutting edge looks like, ensuring they are constantly learning from others and developing talent locally to the benefit of the citizens and local businesses of Essex. There is also an element of engagement with the public, therefore in the nearest future they will need to understand how to engage with public and communicate the work done so far.

- **Undertaking projects**

Future projects will be assessed within the pipeline framework, the plans for projects in the next four years include the implementation of existing projects and a number of new areas that will be soon ratified by the board.

CASE STUDY

Greater Manchester Office of Data Analytics (GM ODA)

Contacts: **Phil Swan, Chief Information Officer**
Julian Cox, Head of Research

Although at an early stage of development, the Greater Manchester ODA has been on our radar for some time now.²⁸ Originating from GM-Connect, the wider data and information programme of the Greater Manchester Combined Authority, GM ODA will become the Greater Manchester virtual hub, developing solutions on behalf of all organisations that want to use data to improve how decisions are made and actions prioritised.

Origins and funding

The initial thinking around aims, objectives, governance of an ODA originated at the time of GM-Connect foundation, following a successful bid to the 2016 Transformation Challenge Award.

The ODA was given a further boost through the development, between 2017 and 2018, of the Greater Manchester Digital Strategy and action plan.

The ODA is primarily resourced through the GMCA - with support in particular from the Strategy and Research, and Digital teams - as well as through research in-kind from Greater Manchester district councils and the GM Health and Social Care Partnership.

Vision and objectives

GMODA's vision is to promote a way of working and creating resources that bring data and problem-owners together in new ways. Unlike existing, frequently

fragmented approaches and teams, GMODA will unite the assets of the city-region and experiment collaboratively to create new insights.

Its objectives are to:

- Increase the collaboration and networking opportunities in the innovation space.
- To improve data skills and technical capabilities of existing teams.
- To support a better understanding of the data available (and its possible uses for public good) across and beyond the Greater Manchester region.

Governance

The host organisation is the Greater Manchester Combined Authority (GMCA).

Senior stakeholders of the GM ODA include the chief information officer and both heads of research from the GMCA.

The ODA programme reports into the GM Digital Steering Group, which brings together local political and public services leaders, GM tech companies and key representatives from the GM digital community.

The ODA benefits from access to a range of existing Greater Manchester-wide networks, including public service ICT and information governance communities, and key public service reform programmes.

Through pan-Greater Manchester work on information governance, over 3,500 data flows have been enabled or are in the process of being enabled. The strategy for information sharing is being owned by a new pan

GM Information Board and a common information governance framework is being established using tools like the Information Sharing Gateway.

Greater Manchester has also reached out to its residents and recently completed an extensive study into attitudes towards data sharing which is of fundamental importance to the city region.

Although there is not a physical MoU in place yet, GM ODA is looking to develop a working partnership with more than ten local authorities: Stockport, Manchester, Wigan, Bury, Trafford, Thameside, Oldham, Rochdale, Bolton, Salford, as well as with wider public services including the NHS and GM Police.

There are no plans at present for the ODA to adopt a physical location.

Team structure

Project Support for the ODA sits within the GM Digital Service, with research and analytics professional support provided by the GM Strategy and Research team. Technical support has been provided by the Business Intelligence team in Stockport Council.

In addition to the central team, there is a strong analyst network, sourcing capabilities across the region. The GM Analyst Network includes representatives from universities, charities and public sector organisations. It meets regularly, has a twitter account (@GMAlysts), shares job opportunities and ideas publicly and showcases ongoing projects and ideas at networking events.

Working practices

Information sharing	Information Sharing Gateway.	
Data sharing	Have previously engaged with some external agencies to investigate secure sharing via a data sharing platform, for example, Witan. At the moment, no data has been shared in the context of the ODA.	
Data storage	An ODA-wide solution is not yet in place, although a business case is being developed to secure funding for a GM-wide information sharing capability to support public service reform.	
Languages used	Python	R
Data visualisation tools and statistical programs	Tableau	
Other technology	PostgreSQL	GitHub

Disclaimer: the technologies listed on the previous page that are currently available for future projects depend on the capabilities of analytical teams across partners. Their goal is to develop data projects using, as much as possible, open source technologies which will allow them to share the code, using open APIs and common standards.

Data projects

GMODA is at the design stage of their first pilot on school readiness, which aims to develop synthetic data to enable solution modelling based on non-personal data that accurately reflects the characteristics of real populations.

Pilot overview

School readiness pilot

Problem	<p>Evidence suggests that whether a child is ready for school or not has a large impact on outcomes later on in school and into adulthood.</p> <p>The proportion of children not ready for school in Greater Manchester (GM) is higher than average and in order to support the GM priority on school readiness, the ODA is developing a model to help better understand school readiness. It is exploring the possibility of building a predictive model to help inform decision making and better target resources in this area.</p>
Solution	<p>To build a predictive model that accurately identifies if a child will or won't be school ready before they enter Reception (aged four). There could also be a potential for individual level risk scores to inform decisions.</p> <p>It is hoped that this could then be used to redirect funding or resources.</p>
How they are going to do this	<p>A smaller pilot has been developed using only Stockport Metropolitan Borough Council (SMBC) data, and by using only a handful of variables, for example birth month, sex, area born etc. The model accuracy was at 80 per cent. SMBC now have a PHD student coming in to peer review what has been done to date for their own model and are aiming to reach 90 to 95 percent accuracy.</p> <p>The challenge is now to build a Greater Manchester wide synthetic dataset, based on this model that is sufficiently anonymised, but where data adequately represents the different regions of Greater Manchester.</p> <p>SMBC are evaluating whether they can share the code/definitions/structure with others. In the smaller pilot, the datasets used were all owned by SMBC and included education data e.g. end of reception data as well as contextual info from own systems on postcode, gender, date of birth, health and their own social care information. There was not a need for data sharing agreements as all data was owned in-house however it is still pseudonymised.</p> <p>Additional information sharing agreements are required for the development of the project.</p>

Work plans for the future

The next, and possibly most challenging step is to develop the ODA structure itself as well as formalising the Information Governance processes and technical architecture.

Leadership sign up is less of an issue, considering the appetite in the combined authority for making a better use of analytics.

CASE STUDY

London Office of Technology and Innovation (LOTI) - City Data Analytics Programme

Contact: **Paul Hodgson, GIS and Infrastructure Manager, GLA**

The City Data Analytics Programme is a virtual hub co-ordinated by the GLA's City Intelligence Team in City Hall. It develops and supports data collaborations across public services in London.

Origins and funding

Supported by the GLA's Intelligence Unit and using the London Datastore as a shop window, the City Data Analytics Programme is built on connections made through the Borough Data Partnership (and previous pan-London data agreements). It was formally set up by the Mayor of London in 2017 following a pilot with Nesta and several London boroughs throughout 2016-17.

The City Data Analytics Programme has now secured £365,000 of investment (including gifts in kind) from City Hall, the London Fire Brigade, the Centre for Urban Science and Progress (CUSP) in London, and Sharing Cities, a Horizon 2020 EU-funded project.

Vision and objectives

Created to support the development, commissioning and implementation of data science projects across different public sector organisations within the Greater London area, the City Data Analytics Programme is a collaborative and convening institution in which data science projects and ideas are formed, tested and executed. Determined to change the culture around data analytics in the public sector, the GLA through the City Data Analytics Programme, provides support in terms of project management, legal issues, technical aspects and data science, together with providing partnerships within the wider GLA family.

Key objectives of the City Data Analytics Programme are to test the policy or service impact of data science, show that data sharing is possible and has tangible benefits, develop data sharing protocols that will be useful in the long term, identify barriers to collaborative working and develop solutions, contributing to the development of a culture of data-sharing within London.

As part of its objectives, City Data Analytics Programme also supports the analytical capacity and technical development of borough data officers through a

'City Data Academy', ensuring that the data science talent within London's public services teams is used to maximum effect, and that capacity and knowledge from the wider data ecosystem is applied in a way that delivers benefits to all.

Governance

Inspired by the model of the Mayor's Office of Data Analytics (MODA) in New York, the City Data Analytics Programme Project Board consists of representation from across the public sector in London alongside academia.

The board includes:

- Theo Blackwell, London CDO (Chair).
- Paul Hodgson and Vivienne Avery, GLA Intelligence Unit representatives.
- Dr Simon Miles, Director of CUSP London (Centre for Urban Science and Progress) at King's College.
- Guy Ware, Director of Finance, Performance and Procurement, London Councils.
- Representation from one or two of the boroughs.

Because of the vast possibilities of topics to address through data science, as well as the type, size and motivations of the organisations able to contribute to individual exercises, it is anticipated that within a broad framework, each City Data Analytics Programme project will be organised around its own individual model and will focus on predictive analytics.

Team structure

The GLA team consists of 36 people in total and is based in City Hall with the necessary resources, technology and expertise to conduct data science projects. The staff delivers ODA projects alongside other commitments, for an estimated time of 3.0 FTE per week.

Roles:




- Project development and management.
- Information governance officer.
- Two data scientists.

The City Data Analytics Programme does not intend to rely on external sources for data science and analysis, although there is a route that is available for suitable projects. The sole use of external data scientists was found to be costly and the insights are not retained by the public sector to inform future work. A data scientist has therefore been hired to work on pan-GLA as well as on the City Data Analytics Programme projects. Two data

engineers will also soon be joining the team to work on platform development.

At the beginning of the project, City Data Analytics Programme had engaged external organisations such as Nesta, to help them identify a pilot (and run workshops to refine its definition) and also acquired external data science expertise. CUSP²⁹ is currently one of their analytics partners.

Working practices

Information sharing	ISG (Information Sharing Gateway).	
Data sharing	On-cloud, encrypted data.	
Data storage	AWS, PostgreSQL, CKAN.	
Languages used	R*	Python*
Data visualisation tools and statistical programs	Tableau*	D3.js*
Additional technologies	GIS*	NoSQL**
 Penetration testing undertaken on their storage to ensure data can't be compromised		
 Dedicated data protection officer		
 Information Commissioner's Office engaged in their work		

*GLA hosts data on AWS (Amazon Web Services), before they used Witan.

**Under development.

One of the important principles of City Data Analytics Programme is that there will never be a single warehouse for all of London's data. Data will always be connected on a project basis, following the principles of openness that exist since the launch of the London Datastore

in 2010. This means that the City Data Analytics Programme will adopt an open-source approach, always sharing knowledge with other cities and publishing, where possible, their algorithmic code using open APIs and common standards.

Data projects

The initial City Data Analytics Programme pilot focused on Houses of Multiple Occupation (HMOs), twelve boroughs took part and the pilot

was supported by the GLA, Nesta and ASIData Science.³⁰ In the following section, the project will be outlined following Nesta's methodology.

Identifying houses of multiple occupation

Problem	It is difficult to efficiently direct the actions of building inspectors in identifying unlicensed rental of Houses of Multiple Occupation (HMOs). Firstly, only 10 to 20 percent of London's HMOs are currently licenced, representing a missed revenue opportunity for local authorities at a time when public sector budgets are tight. Secondly, unlicensed HMOs are the likely locations of some of the capital's worst and most exploitative housing conditions. Identifying more of them could raise money and help protect vulnerable tenants.
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Solution	<p>The development and implementation of a model algorithm has been undertaken to enable boroughs to identify and take action against HMOs in order to protect vulnerable tenants, issue more HMOs licences, and prosecute rogue landlords who fail to comply after initial warnings.</p> <p>Initially focusing on two boroughs of Westminster and Lambeth, workshops were run involving building inspectors' identification of HMO features.</p> <p>Like many front-line workers, building inspectors can provide a long list of risk criteria, honed over many years of experience. In the case of HMOs, they might suggest judging risk based on features such as the height of a property, its age, location, or whether the living accommodation is above a shop or restaurant.</p>
Outcome/ Lesson learned/Future development	<p>As expected, identifying HMOs is not a simple problem and each borough has different methods to record data. Data availability varies across London, as well as the interpretation placed on top of a base level of licensing, consequently affecting the types of HMOs that are licensed in each borough. A detailed section on the results has been published by GLA and Nesta,³¹ highlighting the high variation of data availability and quality across boroughs and the difficulty in running randomized control trials to cross-check the effectiveness of the algorithm in different environments.</p> <p>Another complicating factor is that in the first iteration of the pilot the HMO problem was only 'half-labelled', meaning that the data showed properties that definitely were HMOs, but not those which were 'definitely not HMOs'. Based on this analysis, an adapted balanced random forest method was then introduced to detect anomalies in the data.</p> <p>The report also lists the specific lessons learnt and the recommendations that surfaced through the pilot.</p>

Another ongoing project (in partnership with the Alan Turing Institute), is a long-term data approach to better model air pollution in the capital. This will be achieved by collating existing and new data sources (such as medium and low-cost sensors) and enhancing how they are analysed through probabilistic modelling. This pilot will complement the modelling already undertaken in

London, which adopts a mechanistic approach (in the case of the London Atmospheric Emissions Inventory) and relies on more traditional data sources.

City Data Analytics Programme's initiatives will add to the existing ecosystem of ways for London's boroughs and public services to innovate in data sharing and standards.

Work plans for the future

City Data Analytics Programme is currently working on the two projects described above and intends to move the HMO project from a pilot phase to being operational.

For the selection of future pilots, the GLA is also working on a list of possible problem statements, these will soon be published on London Datastore. This will include an indication of project ideas, challenges and operational priorities from a wide cross-section of departments and public organisations and it will be used to select future

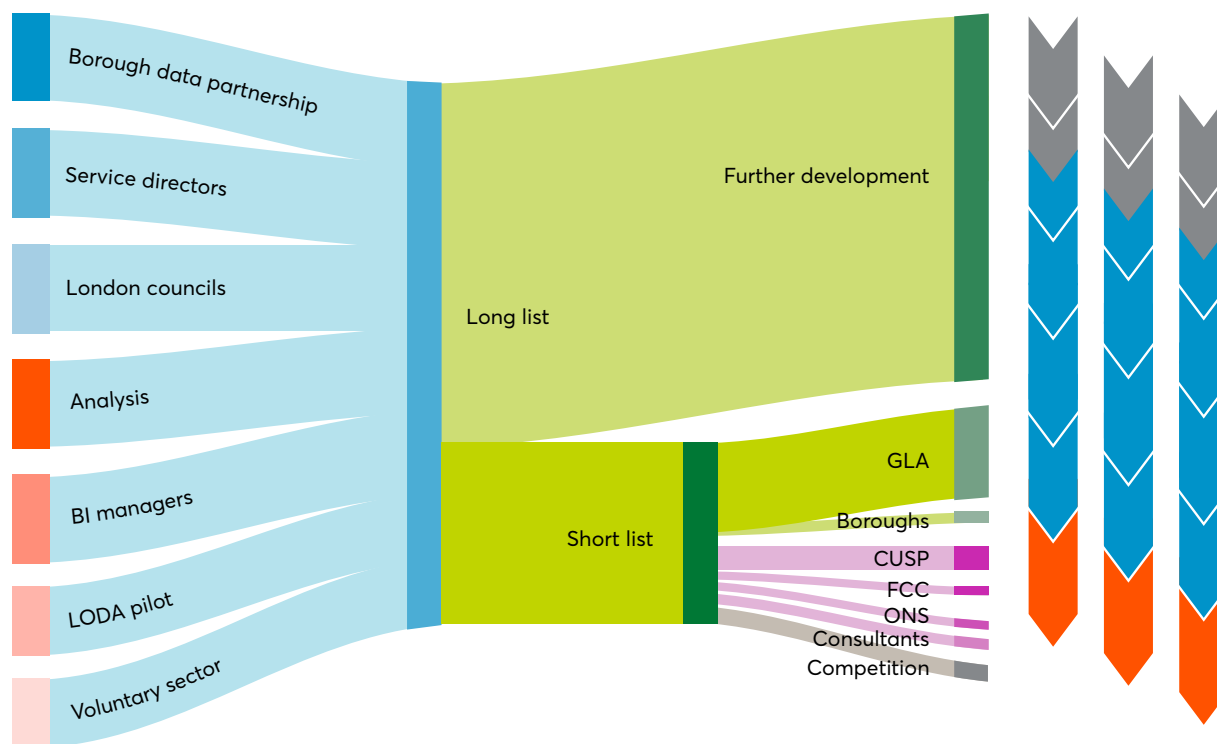
pilots. A rationale already exists that helps visualising data project typologies in which City Data Analytics Programme is likely to get involved.

The list of projects will be prioritised using the Nesta ODA pilot prioritisation methodology (below) and will be regularly refreshed and published on London DataStore starting from Autumn 2018, to help external organisations, such as universities, to identify opportunities for collaboration.

Project ideas

Sifting, prioritising and development

Delivery



CASE STUDY

Suffolk Office of Data & Analytics (SODA)

Contact: **Michaela Breilmann, SODA Manager and Analytical Lead**

SODA is a virtual hub, set up as a collective endeavour among Suffolk's public services with a view to make better use of data and generate new insights.

Origins and funding

SODA originated from the Suffolk System-wide Data and Insight workstream, funded through the Transformation Challenge Award (TCA) in 2015, which saw the

collaboration of Suffolk police with all local authorities and other public sector organisations.

Following this, an official ODA was established in June 2018. This project has been awarded funding for the next two years (2018/19 - 2019/20) from all partners, each equally contributing financially to the ODA.

Partners are :

Babergh District Council and Mid Suffolk District Council	Forest Heath District Council and St Edmundsbury Borough Council	Ipswich and East Suffolk Clinical Commissioning Group	Ipswich Borough Council
Suffolk Coastal District Council and Waveney District Council	Suffolk Constabulary	Suffolk County Council	West Suffolk Clinical Commissioning Group

With all partners contributing equally, there is no lead organisation. This means that the whole system will benefit from SODA's work, with issues being tackled with a place-based approach.

Vision and objectives

'Virtual collaboration, real insight': Suffolk's public service organisations believe that a shared and high-quality evidence base will enable better decision making, improve policy, service design and delivery to ultimately improve the lives of Suffolk residents.

These results will be achieved through joining up and analysing data from multiple sources, including internal data from Suffolk's public services organisations, its partners and nationally available open data.

Governance

SCOLT (Suffolk Chief Officers Leadership Team) is the commissioning body of SODA.

A Partnership Executive Group (SODA PEG), responsible for commissioning the work programmes, meets quarterly to review all activities, finance and agree the prioritisation of resources.

In addition to this sits the Programme Management Group (SODA PMG). The PMG has the role of facilitating the joining up of resources and acts as a facilitator to remove barriers to data sharing. The group comprises of all line managers of analysts from partner organisations.

The analyst team, working mainly virtually and meeting quarterly, will deliver the data analysis. Analysts are already employed in the Suffolk system; however, resources will be utilised flexibly through the existing Suffolk Analysis and Insight Collaboration Group (AICG).

The AICG is used to discuss and propose SODA work programme items, for knowledge sharing and networking, as well as to receive training and development.

Team structure

There are currently two people dedicated to SODA: one full-time manager and analytical lead (1.0 FTE) coordinating all SODA activities, and one part-time (0.6 FTE) information governance and cyber security lead. It will be the information governance lead's responsibility to deliver an Information Sharing Assessment Gateway.

Once the ODA starts delivering projects, the analytical work will be coordinated by the manager and analytical lead, delivered through the network of analysts across the SODA partners and supported by service-specific staff responsible for datasets' management. Analysts will be asked to contribute according to their knowledge, skills and expertise. Nothing will change in terms of analysts' employment, working hours or line-management.

Where a piece of analytical work cannot be delivered by SODA and the Analyst Network, the use of alternative resources within SODA or external partners will be explored.

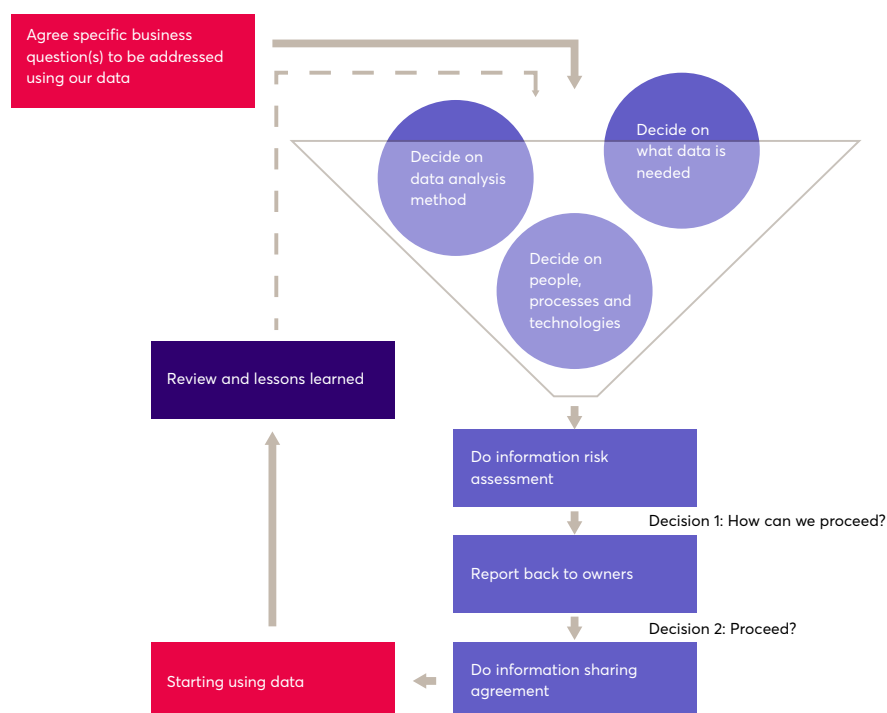
Working practices

Information/data sharing

SODA is developing an Information Sharing Assurance Gateway (ISAG), which describes the set of interconnected processes in eight stages that are required before data is to be shared by partner organisations and utilised for SODA purposes, as well as ongoing actions to maintain the agreed level of security and privacy.

The overarching SODA Data Sharing Charter makes clear that Suffolk partners will safeguard the safety and privacy of people and businesses. It will also ensure the compliance with all Data Protection legislation and other laws, assessing information risks and agreeing security controls when sharing data.

The ISA Gateway is there to ensure that all the commitments in the charter are upheld, including the need to balance public benefit with privacy.



Data storage

SODA is in the process of

- Mapping SODA partners' current IT (Enterprise) Architecture and Master Datasets; and
- Establishing a view of the common, secure technology infrastructure required, which enables information to flow between partners both in the short-term and in the longer-term.

This will enable development of a roadmap to achieve the target architecture to combine data routinely, safely and lawfully.

In the short to medium term, data sharing mechanisms and storage will be determined on a project-by-project basis, to ensure that SODA continues to generate insight, while target IT architecture is delivered.

Data projects

SODA projects can be added to the pipeline by anyone from within the SODA partner organisations. SODA requires a clear briefing on the specific problem, business issue, hypothesis and expected outcomes (i.e. what actions will be taken following the delivery of analytical outputs).

These are turned into project terms of reference, which are discussed and scored according to the following project assessment framework:

Practical	High Impact
Meeting a real need or addressing a problem <ul style="list-style-type: none"> • Have the problem statement/clear objectives been defined? • What is the deliverable of the project? • Potential operational impact? • Who will do what differently? • What different systems and/or processes will be used? 	Delivering positive impact to residents and/or public service organisations. <ul style="list-style-type: none"> • Outcome to residents / Public service organisations? • Cost-benefit? • Measurability of impact/outcomes?
Important	Feasible
Aligned with SODA purpose and of wider benefit to public service organisations. <ul style="list-style-type: none"> • Does the project align with SODA's purpose to increase understanding and develop robust narratives which lead to change, through data analysis and insight generation? • Does the project align with the purpose of SODA's partner organisations (i.e. with the things we are here to do)? • Does the project support collaboration / multi-partner working? • Is this project replicable? • Will this project improve data infrastructure? • Is the project sustainable? 	<ul style="list-style-type: none"> • Can the problem statement be transferred / turned into research questions? • Who needs to be involved? Which partners? • Is data available for the project / does data already exist? • Is the data (easily) accessible? Is the data machine readable, constantly updated and maintained? • Can we tap into existing processes? • How long will the project take (possible to deliver in requested/needed timeframe, if there is one)? • Is there capacity to implement findings from the project?

Initially it is the SODA PMG discussing and scoring the proposed projects, using a scale of one (low) to three (high). This is then taken to the SODA PEG for final agreement or rejection.

SODA has collated all Information Asset Registers from its partner organisations, to ensure that identification of relevant datasets for each potential project is streamlined.

Work plans for the future

With the ISA Gateway almost delivered, SODA will test this framework and various data sharing methods on two key projects: A domestic abuse data project and a whole system dataset project, which is called 'Data on a Place'.

For the latter the intention is to collate, map and analyse the total public service resource efforts across the region. The focus will be on building a picture to show areas of high demand, to allow identification of duplications in efforts and provide opportunities to join up different services to make service delivery more effective. This project is a continuation of the approach taken under the Transformation Challenge Award funding across Suffolk of moving from intervention to prevention.

The domestic abuse data project will test collaboration and data sharing amongst SODA partners and external partners, such as NHS Trusts and commissioned voluntary organisations working in this space. The objective of this project is to develop a more joined up approach to data and information in order to develop a clearer picture of current provision of services, and to develop more effective prevention strategies across the system. In the first instance, a 'minimum dataset' across all partners has been identified, which will enable SODA to connect the data from different service areas and providers. This will be analysed to provide understanding of how and by whom services are used, where domestic abuse victims come into contact with the system. This will enable understanding around duplication and gaps within provision of services and provide a better platform for effective service design and commissioning.

Other projects on SODAs current work plan include:

- Business rates forecasting model
- Social prescribing pilot project's evaluation

CASE STUDY

West Midlands Office of Data Analytics (WMODA)

Contact: **Jason Lowther**, Interim Head of Policy, Programme Development and Research (ODA)

The West Midlands ODA is a hybrid form between a physical and virtual hub, with a small core team and a virtual network of partners' research capacity.

Origins and funding

The ODA originated after the formation of the West Midlands Combined Authority (WMCA) following a review of the research capabilities needed to support strategic decision making in the region on the economy and public sector reform.

Funded by WMCA and partners (mostly in-kind support), WMODA has also received funding from the HM Government as part of its second devolution agreement of £0.8 million over the next three years *"to enable the evidence base for further public service transformation."*³²

Governance

The leading organisation is the WMCA and the programme is led by the WMCA Director of Strategy and Economy. There are currently 15 partners who have varying degrees of involvement, depending on the project.

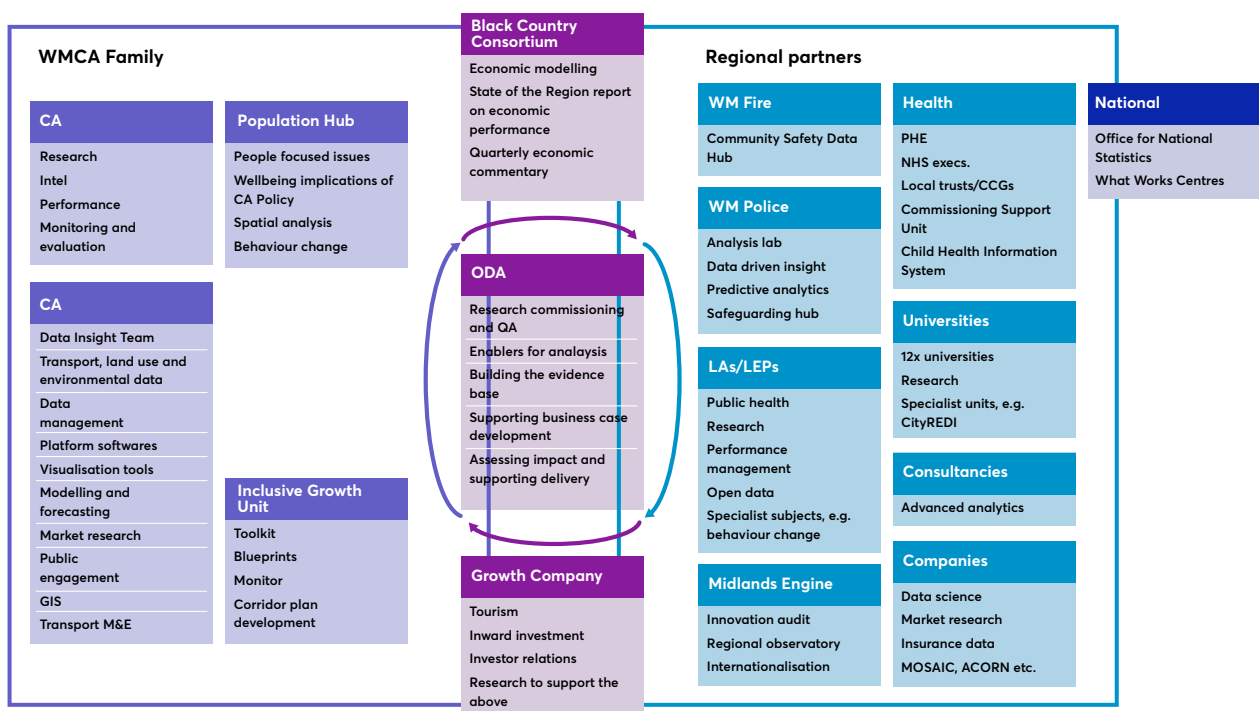
Vision and objectives

WMODA aims to support the delivery of the regional strategy and shared priority outcomes.

Its main objectives are:

- To become an authoritative source of intelligence for the West Midlands.
- To develop robust policy research and analysis across the region, helping the development of an evidence base for reform and devolution.
- To support evaluation and evidence reviews.
- To develop more effective information sharing, and build business and investment cases in the region.
- To develop horizon scanning (on economic and wider evidence) through links to wider networks.

There is a rich ecosystem of analytical capabilities across the region (see diagram).



Team structure

Currently one person is working full-time on the ODA. Decisions about the future structure still need to be made, although it is likely that the majority of the work will be delivered through joint working between partners. Analysts will be recruited to work on ODA-related projects and external consultancies will be involved to assist them, especially covering data science skills.

Working practices

Currently, information sharing is limited and is challenging across organisations in the region, this blocker inhibits effective analytics for better services and better outcomes.

The ODA is therefore delivering on two workstreams.

One is a programme to support better information sharing across WMCA partners. This includes developing:

- A clear roadmap to guide the approach to information sharing across the region. This will be drawn also from previous local experiences of sharing data including the Troubled Families Programme, injury surveillance work with emergency departments, and fire safety target visits to older people.
- An Information Sharing Charter agreement between WMCA partners.
- A consistent and coherent approach to information governance approved by partners in the region. This may include the creation of an online repository of information sharing agreements.
- An active network of civic society contacts and an agreed plan for future engagement.

The second workstream is directed at supporting opportunities for research and pilots:

- An online directory of local academic experts developed by universities West Midlands, which partners can search by areas of expertise.
- A Research Delivery Group (with representatives of all partners), which has supported the shaping of the ODA and will help building pathfinder projects from improved information sharing and analysis (for example, social isolation, school readiness).
- A number of analyses to inform policy decisions within the region, including regular 'on-the-day' briefings on local implications of government statistical announcements, an in-depth analysis of youth unemployment, and housing affordability analysis to support investments and bids.

Work plans for the future

Besides the Information Governance and Sharing governance delivery, WMCA has exciting plans for the future. It has conducted analyses at the request of the combined authority and partners

from different areas, which have identified opportunities for pilots in the future.

These include:

Homelessness Task Force project

Following government funding worth £10 million over three years for the combined authority to help the homeless into secure accommodation, WMODA will deliver research on different aspects of the Homelessness Task Force project, including an analysis of the effect of Local Housing Allowance and demands for particular types of accommodation. Still in the housing field, they will also further develop the evidence base to support WMCA's £350 million Housing Infrastructure Fund bid and Affordable Housing proposals.

Multiple Complex Needs (MCN)

WMODA is currently working with two local universities on a research programme to better understand people with MCN. This is particularly focused on 'radical prevention', building on Coventry's MEAM (Making Every Adult Matter) and Birmingham's Changing Futures pilot, developing and delivering a coordinated approach to services offered to people with MCN locally.

Infrastructure schemes	<p>WMODA is also working with Ordnance Survey and the Office of National Statistics on a new methodology for contributing to the evaluation of infrastructure schemes by looking at local impacts on population, employment and property values.</p> <p>WMODA is developing transport network resilience predictive modelling, gathering information to develop a baseline measure for the current situation and ensure the reliability and quality of journeys provided by the strategic, local, rail and bus networks. The aim includes modelling impacts, testing solutions and understanding the best way to influence behaviour and change the travel choices of the public.</p>
Employment and economy	<p>The initial focus is an analysis of what issues are currently facing young people outside education, employment or training in the region, including a detailed literature review of the evidence base on effective approaches to employment support.</p> <p>In addition to employment-specific employment support, WMODA will also look at a wider range of research on innovative industrial sectors in the region, graduate retention rates and employment in non-graduate roles, regional spending on welfare and education, labour market intelligence, care leavers' skills and qualifications, digital skills demand/supply analysis, and construction skills.</p> <p>Some recent WMODA economic research reports are available alongside the region's Local Industrial Strategy consultation.³³</p>
Evaluations	<p>As part of its devolution agreement, WMODA will ensure robust evaluation of each of the Public Service Reform pilots.</p>

CASE STUDY

Worcestershire Office of Data Analytics (WODA)

Contact: **Neill Crump, Chief Data Officer**

The Worcestershire Office of Data Analytics (WODA) is a virtual hub, where in-house analysts within each applicable agency have supported the delivery of pilots. Since its establishment last year, WODA has unveiled a number of crucial blockers to data sharing across the region and is now working on solutions to overcome them and support a new culture of sharing in a legal, safe and ethical way.

Origins and funding

Like many other Councils in the UK, Worcestershire is experiencing an unprecedented increase in local demand generated by complex social problems. This

is unfortunately associated with increasingly difficult financial cuts that have forced the local public sector agencies to explore innovative solutions to counteract these problems.

WODA was therefore created in 2017 by the Worcestershire Partnership Executive Group (PEG) to prove the operational benefits of a multi-agency data sharing approach to public services delivery. The initiative has had a strong buy-in across the region so far: interviews conducted with over fifty operational and strategic officers across its public sector partners have proven the strong desire for data sharing and exploration of the opportunities to better target intervention services in the partnership.

Vision and objectives

"Worcestershire will use 'data as an asset' to transform our services for the benefit of our residents and businesses and in doing so empower our residents, enhance economic growth and connect our communities."

WODA (2018).³⁴

After realising that both the level of and accessibility to information held by partners varies substantially across the region, the Worcestershire partners have realised that much can be done by linking-up and sharing critical data across organisations. The ODA will therefore act as a hub for multi-agency sharing supporting the cultural change and key transformation programmes aimed at joining the dots, standardise information sharing protocols and target inefficiencies in the current service delivery.

Governance

The PEG (Partnership Executive Group), with chief executive level members from all Worcestershire public sector organisations and representatives of the voluntary sector and other national bodies, have ultimate oversight of the programme, from influencing strategy to signing-off on funding and investments. A WODA Programme Group, chaired by a PEG member and comprised of senior leaders from each partner agency, has been established to act as a robust steering group for the identification and prioritisation of multi-agency requirements.

The WODA Information Governance Group is comprised of managers and officers from each partner organisation. It provides a delivery vehicle for GDPR compliant information sharing agreements in support of WODA use cases.

The Chief Data Officer chairs the WODA Information Governance Group and works with business and technical resources across the Worcestershire agencies to deliver solutions for the benefit of residents and businesses. The CDO is accountable for the overall performance of WODA.

Team structure

The chief data officer was appointed to WODA in September 2017 to deliver the pilots, test and mature WODA ways of working and create a high-level business case for change. From April

2018 onwards, a small team (3.0 FTE) has been recruited to deliver a mix of project management, business analysis, information management, and data science skills. Most of the team are part-time and also members of the partner agencies, which helps bring in practical knowledge of how to get things done across Worcestershire. Support from existing in-house individuals or teams is still required for the delivery of some solutions.

Working practices

Prior to the appointment of the chief data officer, a data sharing roadmap was commissioned and delivered with the support of KPMG. All partners across the region have signed off a data sharing charter and roadmap and have committed to deliver cultural and systematic change in approaching data sharing across the county. Collectively, they will work from a default premise of the 'duty to share' data being equal to the 'duty to protect' it.

The roadmap, apart from setting out the current state of data sharing across partners, suggests the Information Sharing Gateway (ISG)³⁵ as preferred online platform to store data sharing agreements and has a recommendation to test enhanced data sharing agreements through small-scale projects (i.e. pilot use cases).

Data projects

Pilots were chosen by PEG prioritising six use cases from a shortlist of ideas generated by representatives from each agency.

The pilot use cases were asked to prove three non-financial benefits:

- Is it possible to link systems?
- Does data sharing have a positive impact on vulnerability?
- Does data sharing provide benefits across the breadth and variety of Worcestershire public services?

While most of these pilots have focused on proving the benefits of data sharing across agencies, some bespoke data sharing products have been built for three of the six use cases.

Patient flows from acute care to other services

Problem	<p>This use case aimed at supporting the Patient Flow Centre (PFC) and Acute Trust to organise patient care packages by strengthening current information flows between different organisations.</p> <p>Before then, there was no integration of health and social care systems to support the assessment, discharge and withdrawal (ADW) of a patient from acute care into other social care settings.</p> <p>Problems included reliance on manual systems, lack of real-time data sharing, complex discharge processes, delayed transfers of care, lack of clarity on capacity and poor allocation of resources.</p>
Solution	Through linking data from county council and acute hospital sources, a one-point-of-access to patient and management information is operational after being tested with a small cohort of users.
Outcomes and future development	<p>From March to August, there is a reduction of 2.7 days for the referral to discharge pathway. Using average bed day cost for 2015/16 of £306 per day, this equates to cost avoidance of £153,000 per month. This excludes any other positive impacts such as reduced social care costs due to higher likelihood of people retaining independence after less days in hospital, and lost productivity to Worcestershire businesses</p> <p>The NHS has also awarded an additional grant of £163,000 to adopt national standards for ADW, this project therefore constitutes the first step in developing a wider system of information sharing across health and social care organisations throughout Worcestershire.</p>

Domestic violence

Problem	<p>The police share recorded incidents of domestic abuse daily with partners through daily incident reports, but no details are available on previous history of abuse.</p> <p>The inability to take intelligence-led approaches to both prevention and triage of domestic violence cases not only resulted in missed opportunities for identifying and supporting recurrent victims, but also in considerable amounts of time spent by practitioners to reconstruct previous histories of abuse through unnecessarily lengthy triage meetings (due to lack of available data) and often duplicating research efforts.</p>
Solution	A multi-agency platform has been delivered in conjunction with the WCC digital team to allow timely sharing of information across more than eight agencies. This has now a direct integration with social care information and in future will also have direct integration opportunities with West Mercia Police in additional areas, such as for the Multi-agency Safeguarding Hub (MASH), Child Exploitation and Missing People.
Outcomes and future development	<p>This pilot had value through demonstrating significant improvements to the data quality on domestic violence victims, and through the reduction of duplications of data into various systems.</p> <p>Domestic violence triage meeting attendees are, therefore, now equipped with stronger contextual understanding of domestic violence incidents that allow quicker identification and triage of repeat offenders and victims in daily meetings. Increased availability and quality of data have also significantly reduced the length of triage meetings and demands on staff; it has allowed a more structured and consistent access to partner information, and represents the first step to prioritising high-risk domestic abuse cases as key word flags have been added to referrals from the Harm Assessment Unit.</p>

Business Intelligence Register

Problem	Although there has been a lot of attention at the national level on reaching economic growth through local businesses support, local authorities and local enterprise partnerships do not have shared access to local business data, such as turnover or employment size. This lack of information makes it difficult to target specific interventions.
Solution	Opportunities to establish a stronger working connection with HMRC and the Worcestershire Local Enterprise Partnership were identified through liaising with the Scale Up Institute to build a register of business intelligence data.
Outcomes and future development	The project did not go ahead because WODA and partners have been unable to gain enough traction with central government to get any short-to-medium term benefits from this initiative. However, as a result of this pilot a technical option to allow business data to be integrated in the local resilience solution has been delivered.

Work plans for the future

Currently focused on building a business case for establishing the ODA permanently, WODA has planned a number of priorities for future development.

Acting as a hub for multi-agency sharing to support the cultural change and key transformation programmes such as 'Sustainable Transformation Partnership' for health and social care integration and 'Drive' for domestic abuse, WODA's most ambitious project is to create a 'single view' at a resident, property and household level across the region. This platform will give partner organisations a clearer picture of client involvements and interventions with public sector organisations and, where possible, provide early support before things are escalated to a higher tier, at higher costs. This platform will have different uses, among which a safeguarding angle will be developed to support the Harm Assessment Unit and Family Front Door for Children Services to improve their information

sharing practices and hence allow timely interventions in cases of domestic abuse, missing people, and other safeguarding activities.

In addition to the 'Single View' project, one of the projects in the pipeline is a predictive pilot to identify complex dependencies in the population. As the partnership does not currently possess the advanced analytic capabilities required for delivering it, WODA will work in partnership with KPMG and Microsoft.

In future plans, an analysis is included of current Geographical Information Systems across Worcestershire Partners. WODA is currently working with Ordnance Survey to use new land use datasets that will allow pictorial and analytical overlay of business data onto existing GIS layers to support the Worcestershire 2040 vision and enhancing options for delivering multi-agency asset mapping.

CASE STUDY

Surrey Office of Data Analytics

Contact: **Andrew Cross, Consultant in Public Health**

Surrey Heartlands Integrated Care System (ICS) is establishing an Office of Data Analytics to provide insightful analyses to inform transformation of increasingly integrated health and care services. Initial partners are local NHS commissioning and provider organisations and the county council teams of analysts for public health, children's social care and adult social care. Although focused on health and social care at first, this programme has an ambition to include other public sector organisations.

Origins, vision and objectives

The idea of setting up an Office of Data Analytics originates from the knowledge management strategy for the Surrey Heartlands ICS, which sets a vision for a system-wide intelligence unit within the partnership. A new joint way of working across departmental and organisational boundaries is being developed in the region – to deliver intelligence and gather evidence needed to transform how care is delivered.

The Office of Data Analytics will be a virtual hub, combining business intelligence and data analytics capabilities across the partnership. The early area of focus will be to deliver projects where joint working and analysis are required more efficiently and effectively, freeing up resources and improving the quality of insights available to the health and care system.

An audit of analytical skills and capacity is underway across the system to inform development and future working arrangements of the Office of Data Analytics. Next steps include establishing governance structures for the virtual unit and setting up a pathway to prioritise, plan, allocate and facilitate joint projects requiring a multi-organisational approach. The Office of Data Analytics partners will also inform development and start utilising a linked data platform being established across Surrey and Sussex.

The Surrey Office of Data Analytics will be part of the Surrey Heartlands Academy. This is a local enabler run in partnership with Kent, Surrey, Sussex

Academic Health Science Network. It supports the adoption and spread of innovation and best practice, by working beyond organisational boundaries to liberate solutions that will improve outcomes in health and care. The ODA will link into the Academy networks and ICS workstreams, putting data analytics at the forefront of collective decision making.

The Surrey Hackathon Project: Visualising patterns of need and care

Given the urgent need to utilise joint intelligence and build the analytic workforce across partner organisations as progress is made towards a formal Office of Data Analytics, a project was launched in January 2018 to visualise patterns of need and care to inform local decision making. The project has been run between local CCGs and Surrey County Council, with the support from the Kent Surrey Sussex Academic Health Science Network, receiving funding from The Health Foundation's Advancing Applied Analytics programme.

This project includes 'boot camps' on Tableau, aimed at improving skills in visualising data with the tool. Three data hackathon events are also being held, where analysts work intensively with decision-makers to produce innovative and insightful data visualisations. The three hackathons focus on different priority areas: cardiovascular disease, primary care networks and children's services.

A mixed method evaluation is also taking place across the project to understand how hackathon events can potentially improve information available to decision makers, and the project's wider contribution to developing a local analytics community of practice. The visualisations produced will therefore be used to better inform decisions about further

integration of services, changing clinical pathways at a local level, possibly integrating services within Surrey Heartlands and supporting decision makers to make more informed decisions.

CASE STUDY

North Yorkshire Office for Data Analytics (nYODA)

Contacts: **Luke Morris, Data Officer, NY County Council**
John Kelly, Head of Data and Intelligence, NY County Council

Although an Office for Data Analytics has not been formally created yet, the North Yorkshire County Council (NYCC) has recently introduced a dedicated data and intelligence team into its organisational structure to encourage innovation using data. NYCC are now looking to further the idea of collaborating with different agencies and are planning the creation of the nYODA on the back of existing partnerships across the region.

Origins, vision and objectives

The North Yorkshire Office of Data Analytics (nYODA) is about creating a group for data leaders, where they can influence how the region uses, shares and collectively benefits from data. The group will identify areas of improvement and opportunities to influence.

nYODA will help encourage the adoption and/or creation of mutually agreed standards to encourage

working between partners. It will provide oversight and aid the management of data sharing to assure compliance. It will encourage the sharing of tools and techniques to best account for GDPR and other legislative controls. nYODA will be a forum for sharing best practice and will offer a chance to develop better means of sharing data (API's etc.). The group will share tools, skills and help develop shared training and learning resources. It will help encourage a collective move into areas that will allow a certain degree of automation through chatbots and AI tools.

The objectives of nYODA are to offer data access amongst partners, assisting them with the pace of changes in relation to data legislation and providing them with the tools and skills needed to support and encourage innovation within the region.

Projects to-date: Information Sharing Gateway and the Harrogate Integrated Health & Social Care Programme

As nYODA builds on existing partnerships, information sharing agreements across members are already in place through the Information Sharing Gateway platform. The list of signatories includes a wide range of organisations in emergency services, health, district councils, charities and housing organisations.

Data sharing projects have already been finalised, pulling data from different agencies, especially within the Prevention and Troubled Families programmes.

One of the first areas of focus for nYODA will be the development of a Harrogate Integrated Health and Social Care Programme. This aims to develop and create a new integrated community health and social care service model for adults in the Harrogate locality for 2019 with a heavy reliance on sharing information effectively as well as agreed staffing structure and costed options for delivery. The phased 'go-live' will be from April 2019.

In the future, nYODA are also planning a project with a focus on Domestic Abuse.

Conclusions

This report has argued that the greatest challenges facing today's public sector - budget pressures, soaring demand for services and rising citizen expectations - cannot be solved by individual organisations acting in isolation.

Instead, we have made the case that public sector bodies should use data to achieve better collaboration, breaking down silos and supporting better decision making.

Since 2015 we have proposed that Offices of Data Analytics are an effective means of achieving this. This report has provided a definition of Offices of Data Analytics. It has mapped and detailed practical examples of public sector organisations that have adopted the model, and it has explored their work and structure.

While their exact compositions may vary, all the ODAs described in this report are using data from different sources to diagnose the scale and distribution of problems in service delivery, create more accurate pictures of demand, and identify opportunities for service improvements. Most importantly, they are changing the way public sector organisations work, enabling better collaboration, prediction and prevention, and more targeted responses to cases of highest risk.

Happily, we have seen that the UK's ODAs are gaining momentum. Many are securing external funding for their activities and a wider pool of partners to enhance their work.

Nesta will continue to champion these organisations, sharing their lessons and identifying opportunities to scale this approach. So what's next? As a result of our research and conversations with existing ODAs, we've identified two opportunity areas for future development:

First, we will work to create an Offices of Data Analytics community of practice, where resources can be scaled up and used efficiently across members. Nesta will support ODAs to strengthen their networks, share best practice and tools, and identify opportunities to work on joint initiatives.

Second, we will help make the case for the wider adoption of the ODA model. Although more visible than two years ago, ODAs still face several obstacles. Stronger evidence is needed on their impact to ensure they can secure support and sustainable funding. We hope that by providing more evidence on the effectiveness of using data analytics to inform interventions and improve decision making, we can help more cities and regions apply this approach.

For the latest information on Nesta's work on Offices of Data Analytics, please visit:

www.nesta.org.uk/project/offices-of-data-analytics

Glossary

Benefit mapping: A visual method of linking project deliverables to business objectives.

Business Intelligence (BI) Tool: standalone tools (or suites of tools) to analyse data targeted to a specific industry. These can be referred to as 'data warehouse appliances,' or through an endless number of acronyms (ERP, OLAP, CPM, CRM, etc). In practice, Business intelligence tools are instruments that help analysing, visualising and communicating insights from data distributed across an organisation (or multiple organisations), making it easier to be understood and acted upon.

Big data: According to the UK Cabinet Office, the term refers to both 'large volumes of data with high levels of complexity' and the 'more advanced techniques and technologies required to gain meaningful information and insights in real time'. Usually referred to any form of data that, because of size, rate of change or complexity, requires a sophisticated analytical capability to be processed.

CDO: Chief Data Officer, see Information Governance/Legal Lead

Data analyst: A professional responsible for inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, informing conclusions, and supporting decision-making.

Data analytics: The discovery, interpretation, and communication of meaningful patterns and insights in data. It can be used by individual teams and organisations to better inform their own decisions and activities. It can also be used to help multiple teams or organisations collaborate more effectively. At Nesta, we believe data analytics has the most value when it is used to produce actionable insights, hence leading to better actions.

Data scientist: A professional responsible for collecting, analysing and interpreting large amounts of data, with the ability to use advanced analytics technologies, including machine learning and predictive modelling, to provide insights beyond statistical analysis.

Data visualisation: The art of communicating and making sense of data using images.

Data Protection Impact Assessment (DPIA): A privacy-related impact assessment whose objective is to identify and analyse how data privacy might be affected by certain actions or activities.

Information Sharing Protocol (ISP): An agreed set of principles about sharing personal or confidential information; it enables each organisation signed up to the protocol to understand the legal powers and circumstances in which it should share information and what its responsibilities are.

Local authority: A body responsible for the provision of an extensive range of public services in a given area, for example district councils.

Memorandum of Understanding (MOU): A type of agreement between two (bilateral) or more (multilateral) parties. It expresses a convergence of will between the parties, indicating an intended common line of action.

Minimum Viable Information Product (MVIP): A product with just enough features to satisfy early customers, and to provide feedback for future product development.

Further reading

Copeland E. (2016 - 2018) - blogs on Offices of Data Analytics.

07.03.16 'Mayor, whatever you want to do, data can help you do it better.'

06.06.16 'Offices of Data Analytics - From Rhetoric to reality.'

04.08.16 'Overcoming the hurdles to UK City Data Analytics.'

07.11.16 'Nine principles for reforming public services with data.'

16.11.16 'Why data is key to the success of city devolution.'

06.12.17 'What's the ideal model for an Office of Data Analytics?'

27.03.18 'From analytics to AI: Where next for government use of data?'

see: <https://www.nesta.org.uk/team/eddie-copeland/>

Eaton M., Bertoncin C., Nesta's blog 'Offices of Data Analytics: From local to global.' 'Not all roads lead to success, three tips on how offices of data analytics projects stay on track.' See: <https://www.nesta.org.uk/team/michelle-eaton/>

Deloitte (2018), The State of the State 2017 - 2018. Deloitte: London. See: <https://www2.deloitte.com/uk/thestateofthestate>

HMT and WMCA, 'West Midlands Combined Authority. A Second Devolution Deal to Promote Growth.' Page 16, par. 79.

Nesta (2018), 'Can government stop losing its mind?' Nesta: London. See: https://media.nesta.org.uk/documents/can_government_stop_losing_its_mind.pdf [accessed October 2018].

Nesta (2016), 'Datavores of Local Government.' Nesta: London. See: https://media.nesta.org.uk/documents/local_datavores_discussion_paper-july-2016.pdf [accessed October 2018].

Nesta (2016). 'Wise Council: Insights from the cutting edge of data-driven local government.' Nesta: London. See: https://media.nesta.org.uk/documents/wise_council.pdf [accessed October 2018].

WODA (2018). 'Business Case for Change - April 2018.' See: www.worcestershire.gov.uk/woda/.../woda_business_case_for_change_document.pdf [accessed October 2018]

Guidance and strategy documents

DCMS Data Analytics Framework <https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework>

'The Green Book: appraisal and evaluation in central government.' <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

Information Commissioner's Office website <https://ico.org.uk/>

'The Magenta Book, HM Treasury guidance on what to consider when designing an evaluation.' <https://www.gov.uk/government/publications/the-magenta-book>

'Nesta's Guide to Public Sector Data Analytics.' (draft version) https://docs.google.com/presentation/d/1boEBOCNRM8Cx64GA6Tybk21Kyd1QmNuxHY9LLz6DjEY/edit#slide=id.g382b33df32_0_52

'West Midlands Local Industrial Strategy.' <https://www.wmca.org.uk/media/2583/research-library-for-wm-lis-consultation.pdf>

Endnotes

1. Nesta. (2016) 'Wise Council: Insights from the cutting edge of data-driven local government.' London: Nesta. Available at: https://media.nesta.org.uk/documents/wise_council.pdf [accessed 6 November 2018].
Nesta (2016). 'Datavores of Local Government.', London: Nesta. Available at: https://media.nesta.org.uk/documents/local_datavores_discussion_paper-july-2016.pdf [accessed 05 November 2018].
2. As ODAs are changing and progressing rapidly, some of the information in this report will be a snapshot in time, with case studies capturing the situation between August and October 2018. While the development of pilots and some working practices are likely to change, principles and priorities will largely remain the same.
3. GOV.UK (2017). 'Government Transformation Strategy: better use of data.' Available at: <https://www.gov.uk/government/publications/government-transformation-strategy-2017-to-2020/government-transformation-strategy-better-use-of-data> [accessed 06 November 2018].
4. Nesta (2016). 'Datavores of Local Government.', London: Nesta. Available at: https://media.nesta.org.uk/documents/local_datavores_discussion_paper-july-2016.pdf [accessed 05 November 2018].
5. Future Cities Catapult (2018). 'A Quick Start Guide to City Data.' London. Available at: <https://futurecities.catapult.org.uk/project/quick-start-guide-to-city-data/> [accessed 05 November 2018].
6. Nesta has outlined some further potential solutions in the report 'Can Government Stop Losing its Mind?' available at: https://media.nesta.org.uk/documents/can_government_stop_losing_its_mind.pdf [accessed 05 November 2018]. Our advice: you should explicitly prohibit this bad practice in future contracts with external suppliers.
7. Our advice: you should explicitly prohibit this bad practice in future contracts with external suppliers.
8. Deloitte (2018) 'The State of the State.' Available at: <https://www2.deloitte.com/uk/thestateofthestate> [accessed 05 November 2018].
9. See: <https://ico.org.uk/> [accessed 05 November 2018].
10. Nesta has developed a four-step process for helping public sector organisations understand what types of problems and questions they can resolve with data. Full details can be found in Nesta's Guide to Public Sector Data Analytics, available at: https://docs.google.com/presentation/d/1b_oEBOCNRM8Cx64GA6Tybk21Kyd1QmNuxHY9LLz6DJEY/edit#slide=id.g382b33df32_0_52 [accessed 05 November 2018].
11. See: <https://yrpri.org/domain/3> [accessed 07 November 2018].
12. This is available from the Information Commissioners Office website: <https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/> [accessed 05 November 2018].
13. GOV.UK (2018) 'Data Ethics Framework.' DCMS. Available at: <https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework>
14. Reproduced from the DSMS Data Ethics Workbook.
15. Could also be known as Chief Information Officer, Data Protection Officer, etc.
16. Worcestershire Office of Data Analytics (WODA) [n.d.], 'Vision for WODA.'. Available at: http://www.worcestershire.gov.uk/woda/info/2/about_woda/6/vision_for_woda [accessed 06 November 2018].
17. See: <https://ico.org.uk/> [accessed 07 November 2018]
18. See: <https://www.officefordataanalytics.com> [accessed 05 November 2018].
19. See: <https://www.informationsharinggateway.org.uk/> [accessed 05 November 2018].
20. A useful tool to assess this is the data maturity self-assessment tool for local government, which Nesta produced in partnership with the LGA and Porism. It can be accessed through the LGA website.
21. The Network and Information Systems Regulations 2018 are available at: <http://www.legislation.gov.uk/ukxi/2018/506/made> [accessed 05 November 2018].
22. GOV.UK (2011), 'The Magenta Book, HM Treasury guidance on what to consider when designing an evaluation.'. Available at: <https://www.gov.uk/government/publications/the-magenta-book> [accessed 06 November 2018].
23. Breckon, J. [n.d.], 'Using Research Evidence: A Practice Guide.'. Nesta. Available at: <https://www.nesta.org.uk/toolkit/using-research-evidence-practice-guide/> [accessed 06 November 2018].
24. GOV.UK (2013), 'The Green Book: appraisal and evaluation in central government.' Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government> [accessed 05 November 2018].
25. See: <https://www.betterevaluation.org> [accessed 06 November 2018].
26. 'The Green Book' also includes business case guidance for projects and programmes that ODA leads may also find useful.
27. See: <http://www.essexfuture.org.uk/vision/priority-projects/essex-innovates/> [accessed 06 November 2018].
28. Nesta has been involved at an early stage of the ODA's development, supporting in the identification of the focus for the first pilot and mapping stakeholder engagement.
29. See: <https://www.cusp.ac.uk/> [accessed 06 November 2018].
30. See: <https://blog.asidatascience.com/a-bright-data-future-for-london/> [accessed 07 November].
31. GLA and Nesta (2018). 'Piloting the London Office of Data Analytics'. Available at: <https://londondatastore-upload.s3.amazonaws.com/LODA%20pilot%20report.pdf> [Accessed 08 November 2018]
32. HMT and WMCA, [n.d.] 'West Midlands Combined Authority. A Second Devolution Deal to Promote Growth.' P. 16.
33. See: <https://www.wmca.org.uk/media/2583/research-library-for-wm-lis-consultation.pdf> [accessed 06 November 2018].
34. Neill Crump, N. (2018) 'Business Case for Change – April 2018.' Available at: www.worcestershire.gov.uk/woda/.../woda_business_case_for_change_document.pdf [accessed October 2018].
35. For information on the ISG, see Section 2, Information Governance.



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