

Data Analytics at the National Audit Office (UK)

NAO data analytics strategy has focused on adding value, reducing costs

Insight

Creating new insights & value through linking together data and mining for patterns and anomalies. Recognising best practice in government. More robust audit opinions

Productivity

Drive out cost from our processes through automation and speeding up time to insight

Quality

Maintaining focus on avoiding error and taking opportunities to add greater value.

Innovation in external client focused assurance work

Three key areas of NAO data analytics

Cleaning, linking, and
storing data

NAO Data
Service

Applying big
data techniques
to audit -
statistics,
machine
learning and
text mining

Analysis in
Audit

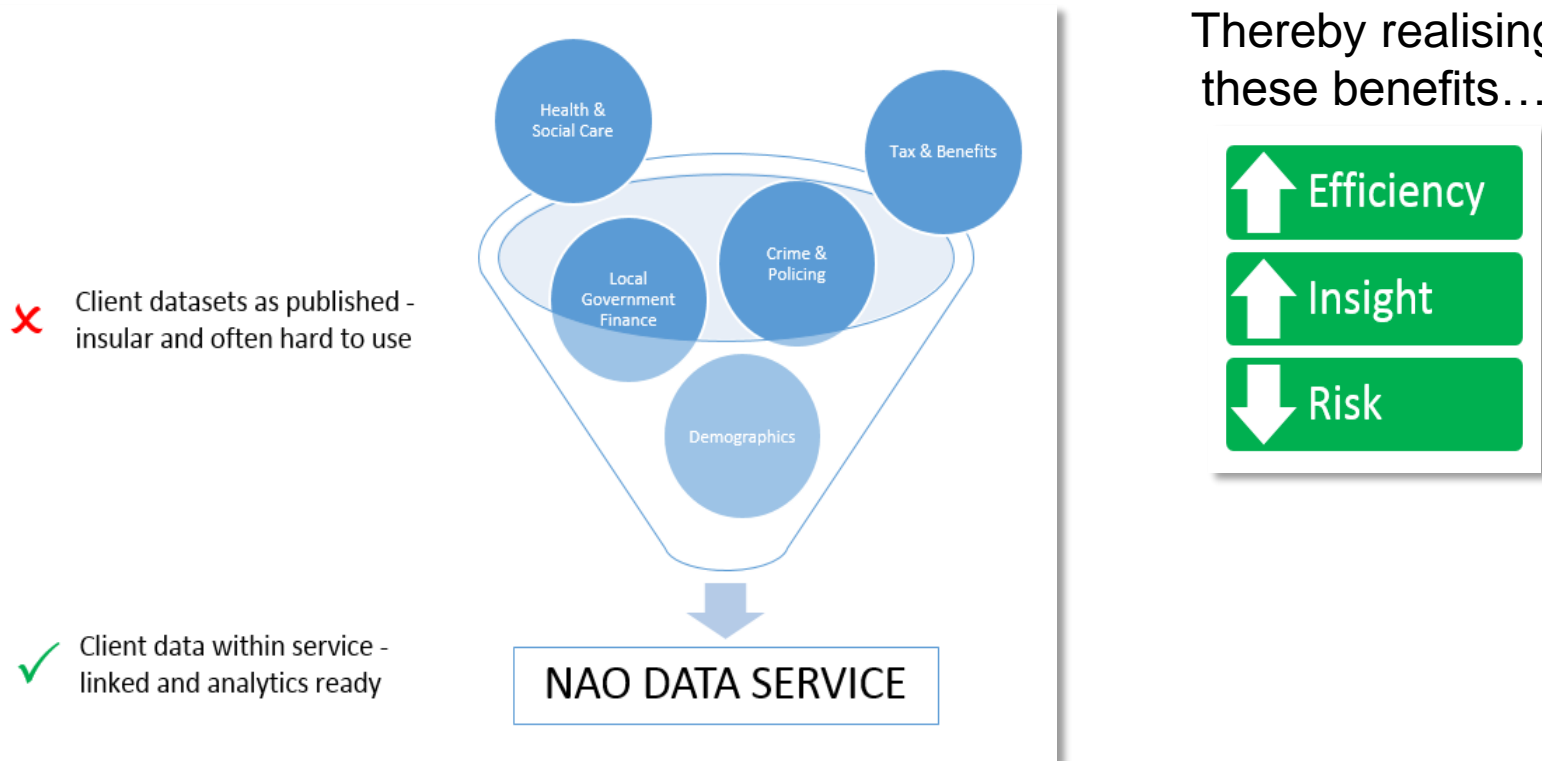
Visualisation

Presenting and
disseminating
findings in a
clear and
concise way
using data
visualisation

All supported by greater use of automation, coding, software and hardware

NAO Data Service

- Takes a range of client datasets, stores them in an NAO data warehouse and links them together for easy consumption...



NAO Data Service

Entry point to service is through dedicated Share Point site...

The screenshot shows the NAO Data Service SharePoint site. The browser address bar displays <http://naodataservice.nao.gsi.gov.uk/>. The SharePoint navigation bar includes links for Home, How-to & Tutorials, FAQ, and EDIT LINKS. A search bar is located in the top right corner.

Browse Data

- Crime & Policing
- Demographics
- Health & Social Care
- Local Authority Finance
- Tax & Benefits
- Bus Matrix
- Report Templates
- Example Reports
- External Data Sources
- Admin
- Site Contents

Welcome to the NAO Data Service. To start exploring the data, select the theme you are interested in from the menu on the left.

Alternatively, if you know which dataset you'd like to use, simply select a spreadsheet from the Report Templates folder.

*** The Data Service has now been expanded to include data about Crime, Policing and Justice. These datasets add to existing data within the service about Local Authority Finance, Health and Social Care and Demographics. ***

*** Datasets relating to Tax and Benefits will be added shortly. ***

Featured Report

Local Gov Revenue: Spend per head in the Inner London Boroughs

Borough	Spend per head (approx.)
Camden	12.5
Greenwich	10.5
Hackney	11.5
Hammer-smith and Fulham	14.5
Islington	12.0

Year

2013
2012
2011
2010
2009
2008
2007

Level 02

EDUCATION SERVICES
HIGHWAYS AND TRANSPORT SERVICES

Contact Details

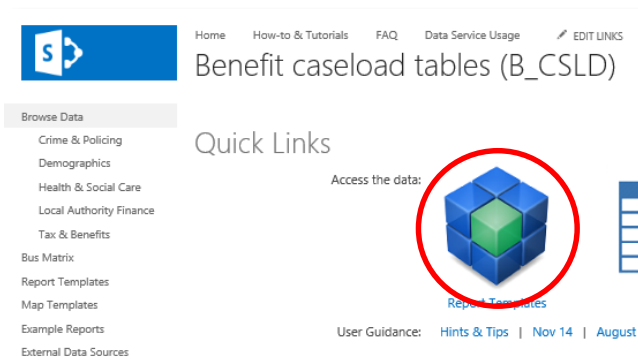
- Project team: Ben Coleman, Joanna Taylor, Heather Reeve-Black
- Data leads by theme:
 - Local Authority Finance: Mark Burkett
 - Health & Social Care: Will Palmer (Health), Mark Burkett (Social Care)
 - Crime & Policing: Rob Sabbarton
- Technical faults: Z3-Data Service Support

Announcements

Title	Modified
Minor revisions to historic recorded crime data by ONS - to be added to the data service shortly	15 Apr
Labour market stats revised by ONS - to be added to service shortly	26 Mar

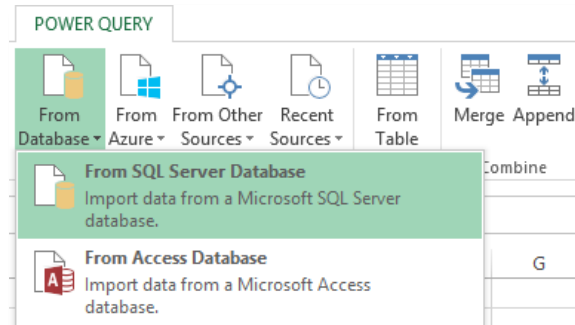
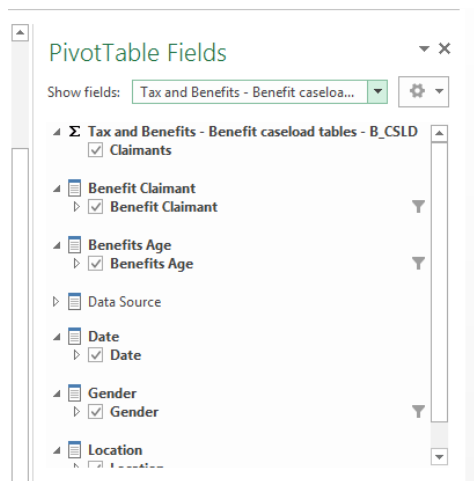
NAO Data Service

Access to data is via cube icon...



...providing access to data in pivot table form

...with the ability to easily customise & link to other data in service



Alternatively, advanced users can connect to the SQL database directly

Automating our approach to analyzing our past reports

Search Past NAO Reports

Search Criteria | About

Enter search criteria below. Summary results appear below, detailed extracts and analytics to the right.

Report Section: All

Year: All

Search term: Procurement

Number of matches found: 2452

Top reports matched:

Report	# matches
Improving government procurement	162
Police procurement	124
The Government Procurement Card	100
Procuring new trains	91
The procurement of consumables by NHS acute and Foundation trusts	87
Major Projects Report 2014 and the Equipment Plan 2014 to 2024	75
Major Projects Report 2015 and the Equipment Plan 2015 to 2025	69
Reducing the cost of procuring Fire and Rescue Service vehicles and operational equipment	69

Matching report extracts shown below. Use controls to further filter, sort or download your results.

Show 5 rows | Copy | CSV | PDF

Showing 1 to 5 of 2,452 entries

Year	Report	Section	Subsection	Paragraph Text
2015-16	Disposal of public land for new homes	summary	Land ownership	In the case of the site at Blackwall Reach, Swan Housing Association noted that although GLA and Tower Hamlets have taken steps to acquire the relevant titles prior to tendering the development, there is a title issue yet to be resolved at the time of our interview over land that will be needed in the final phase Case study 1. Similarly, the site at Manor Kingsway is owned by several governmental bodies. During the procurement process, HCA has indicated that there was an agreement between all the landowners committing them to support the development. However, the developer later discovered that as this was only a memorandum of understanding, it has since encountered difficulties in negotiating with landowners Case study 2.
2015-16	Disposal of public land for new homes	appendices	Observations	The land is owned by several governmental bodies. During the procurement process, HCA indicated that there was an agreement between all the landowners committing them to support the development. However, Kier Partnership Homes later discovered that this is no more than a memorandum of understanding and noted that some of the landowners seemed to be reluctant participants, leading to some difficulties in the negotiation process, which significantly delayed the development. Kier Partnership Homes recommended that the agreement could be better drawn up to align the interest of all the third party landowners. Additionally, there should be a single public body empowered to represent all the public sector landowners.
2015-16	Early review of the Common Agricultural Policy Delivery Programme	main content	The CAP Delivery Programme	1.11 Procurement and development of the system took place during 2013 and 2014. The Programme was working towards immovable deadlines the service had to be ready to accept BPS claims by 15 May 2015 and to make BPS payments to customers between 1 December 2015 and 30 June 2016. Failure to meet these deadlines would incur disallowance penalties. Figure 3 sets out the key events.
				3.24 GDS committed to reducing overall costs and improving delivery confidence. However, no formal estimates of cost reductions were provided and the Major Projects Authority's delivery confidence assessments did not improve. The Memorandum of Understanding agreed between

Selected analytics based on matched report extracts shown below. Press button to refresh.

Update

Number matches per year

Number reports matched per year

Report sections containing matched text

Word cloud: procurement

Web scraping – Ofsted (inspection body) to harvest data on pupil premium

1. Programmatically navigate to school page

Ofsted
raising standards
improving lives

Register / Login

High contrast version

Find an inspection report About our inspection reports GOV.UK/Ofsted Parent View

Nelson Castercliff Community Primary School
Unique Reference Number (URN): 119281

Marsden Hall Road North
Nelson
Lancashire
BB9 8JJ

Telephone number: 01282617627
Fax number: 01282693526

Download the latest school inspection report

Overall effectiveness **Inadequate**
Inspection date 7 May 2014
First publication date 3 Jul 2014

Data Dashboard

Report	Inspection date	First publication date
Section 8 inspection report	9 Jun 2015	1 Jul 2015
Section 8 inspection report	20 Jan 2015	11 Feb 2015
Section 8 inspection report	11 Sep 2014	2 Oct 2014
School inspection report	7 May 2014	3 Jul 2014
Section 8 inspection report	15 Jan 2013	5 Feb 2013

2. Identify link to latest inspection report within HTML and download

Ofsted
raising standards
improving lives

Nelson Castercliff Community Primary School
Marsden Hall Road North, Nelson, Lancashire, BB9 8JJ

Inspection dates 7-8 May 2014

Overall effectiveness	Previous inspection:	Requires improvement	3
Achievement of pupils	Inadequate	Inadequate	4
Quality of teaching	Inadequate	Inadequate	4
Behaviour and safety of pupils	Inadequate	Inadequate	4
Leadership and management	Inadequate	Inadequate	4

Summary of key findings for parents and pupils

This is a school that requires special measures.

- The school's work to safeguard pupils is inadequate. Leaders' and governors' checks on safeguarding fall to meet government requirements.
- Pupils in all year groups across the school make inadequate progress. Standards by Year 6 in English and mathematics have been very low for several years and show too little sign of improving.
- Pupils' key numeracy and literacy skills are poor. They do not use and apply them well enough in other subjects.
- Teaching is inadequate. Expectations are too low. The most able pupils are not challenged enough. Pupils' work and progress are not properly checked.
- Pupils' achievement is held back in a range of subjects because the pupils that teachers plan do not build successfully on pupils' previous knowledge.
- Pupils' behaviour requires improvement because in lessons, pupils' attitudes to learning are not always good. They do not always listen to their teachers and pupils' work is often poorly presented.
- A record of decline in the school's performance since the last inspection reflects the inadequate ability of the leadership to make the necessary improvements.
- Leaders have failed to ensure adequate procedures are in place for checking and improving the performance of teachers. Methods for tracking pupils' progress are weak, consequently, both teaching and achievement have fallen to inadequate levels.
- Governors do not hold leaders to account sufficiently, or challenge them robustly enough about the school's performance, including the impact of the pupil premium funding.

The school has the following strengths:

3. Search text for refs to pupil premium

ensure adequate for checking and nce of teachers.

Methods for tracking pupils' progress are weak, consequently, both teaching and achievement have fallen to inadequate levels.

- **Governors do not hold leaders to account sufficiently, or challenge them robustly enough about the school's performance, including the impact of the pupil premium funding.**

■ The recently appointed headteacher has accurately evaluated the school's strengths and weaknesses and has started to make improvements.

4. Copy all paragraphs out for further analysis

urn	School name	refs to 'pupil premium'
137816	Eston Park Academy	<p>- The performance of students known to be eligible for free school meals varies too much between subjects. The academy does not use its pupil premium funding effectively to ensure these students achieve as well as they should, particularly in English.</p> <p>- The proportion of students known to be eligible for the pupil premium (additional funding for those pupils known to be eligible for free school meals, children from service families and those children that are looked after) is above average.</p> <p>- The pupil premium funding is used to provide additional support and resources. However, these are not targeted precisely enough on the students for whom the funding is intended. As a result, the achievement of these students is too variable. In English, for example, students known to be eligible for free school meals underachieve in comparison with other students and with similar students nationally.</p> <p>- The governing body manages the academy's finances efficiently, although the impact of pupil premium funding and the link between pay progression and performance are not being checked closely enough. The governing body makes sure that safeguarding requirements are met.</p>

...then simply repeat (7,000 times!)

Webscrapping – Readability of Tax Guidance

GOV.UK



Income Tax

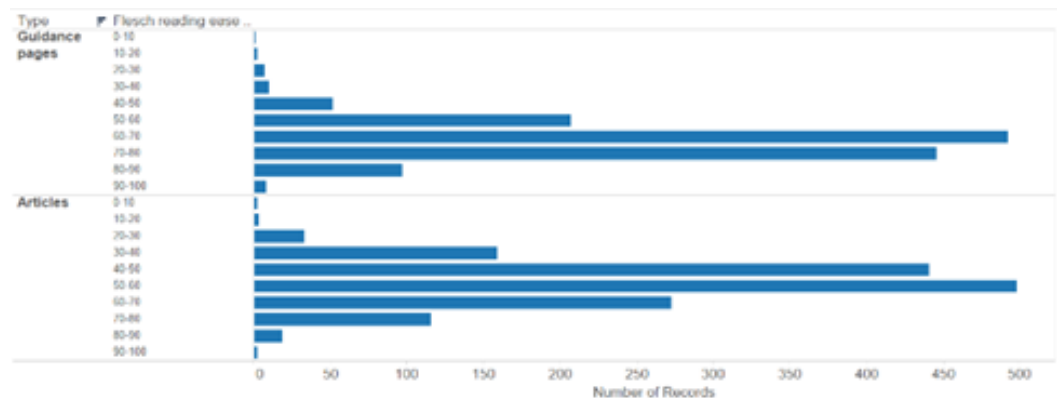
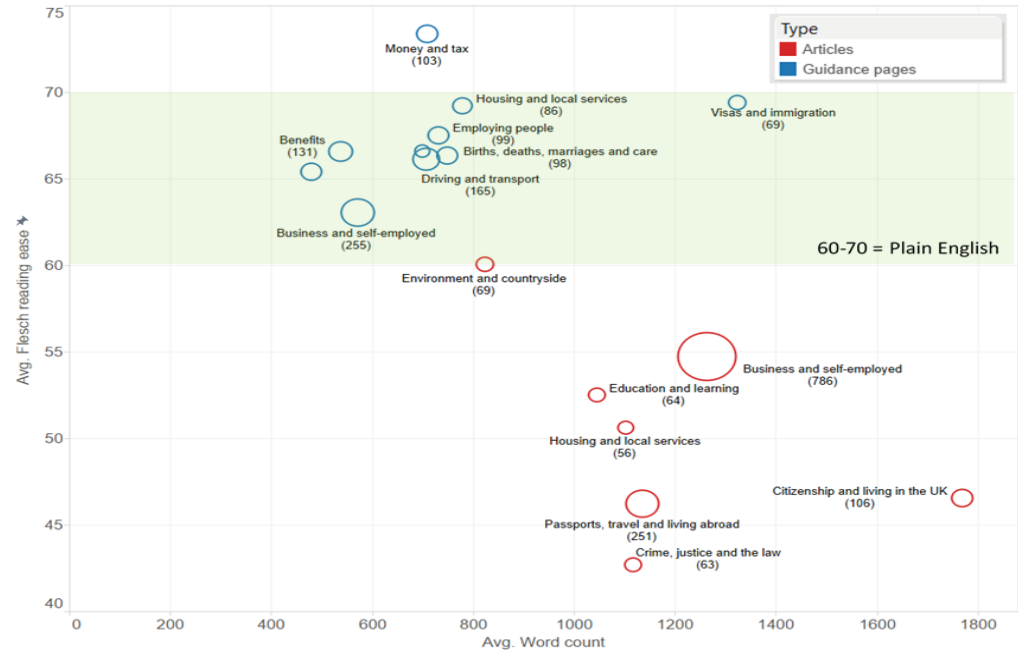
1. Overview
2. [How you pay Income Tax](#)
3. [Tax-free and taxable state benefits](#)
4. [Work out if you need to pay Income Tax](#)
5. [Check you're paying the right amount](#)

1. Overview

Income Tax is a tax you pay on your income. You don't have to pay tax on all types of income.

You pay tax on things like:

- money you earn from employment
- profits you make if you're self-employed - including from services you sell through [websites or apps](#)



Parliament Monitor

NAO Parliament Monitor

☰

Select function:

Home

Search questions

PAC

View members

Constituency map

Questions from PAC members

House of Commons MPs

Select question types

Questions from PAC members

Number of results per PAC member:

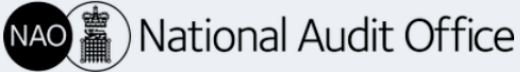
10

This page may take a few seconds to load - please be patient!

Number of questions per month

Date	Number of questions
Nov 13	1
Dec 13	1
Jan 14	3
Feb 14	1
Mar 14	0
Apr 14	0
May 14	1
Jun 14	1
Jul 14	1
Aug 14	0
Sep 14	0
Oct 14	1
Nov 14	3
Dec 14	5
Jan 15	6
Feb 15	4
Mar 15	3
Apr 15	0
May 15	3
Jun 15	0
Jul 15	0
Aug 15	1
Sep 15	2
Oct 15	2
Nov 15	3
Dec 15	4
Jan 16	7
Feb 16	11
Mar 16	1
Apr 16	3
May 16	0
Jun 16	3
Jul 16	1
Aug 16	1
Sep 16	14
Oct 16	8
Nov 16	11
Dec 16	10
Jan 17	29
Feb 17	27
Mar 17	21
Apr 17	13
May 17	0
Jun 17	11
Jul 17	36
Aug 17	8
Sep 17	22

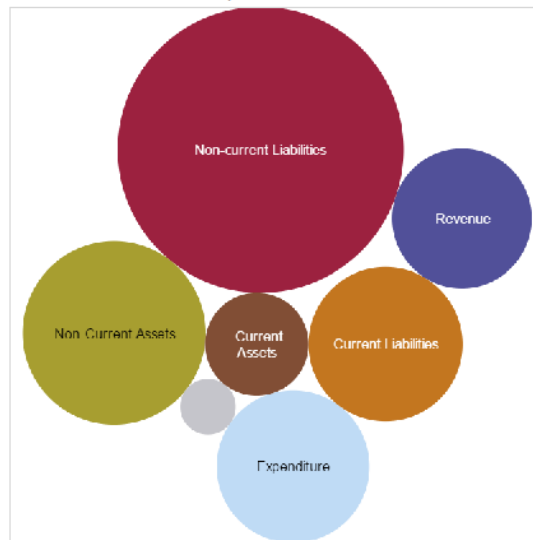
The table below lists the most recent results for PAC members, as listed on data.parliament.uk. Refine your results using the filters in the column headers.



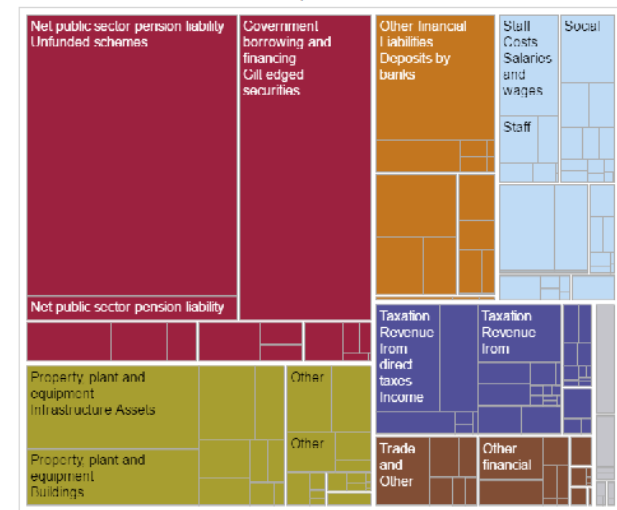
Interactive data visualisations – Whole of Government Accounts

Our most popular data visualisation, with a combined total of 25,000 views over a two year period. This visualises the consolidated financial data of the UK Government, and allows users to explore the detail for 5 years.

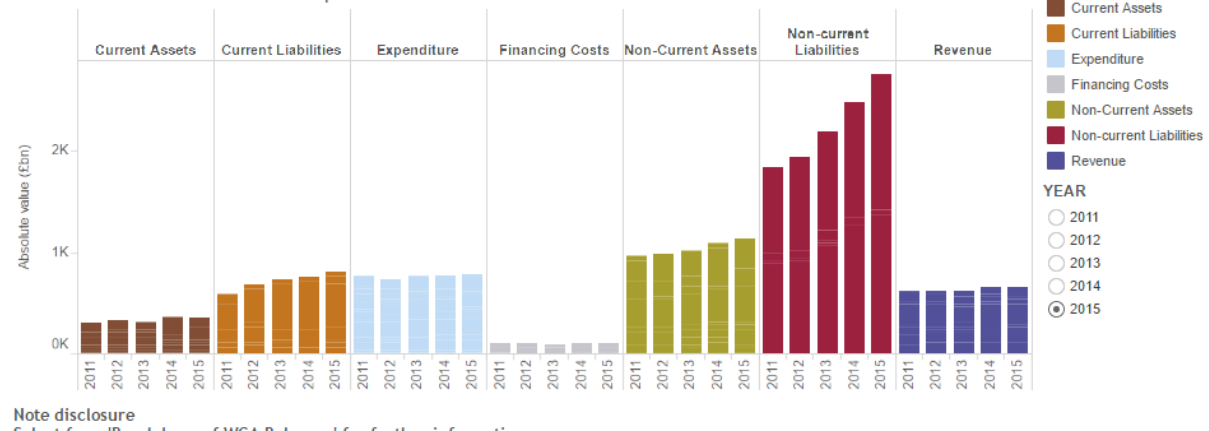
Overall WGA Balances | 2015



Breakdown of WGA Balances | 2015



2011-2015 Balance Information | All



- <https://www.nao.org.uk/highlights/whole-of-government-accounts/>

Interactive data visualisations – Housing In England

The market for private housing

Figure 1.1: Median Price | Dwelling: All | 2015 | All

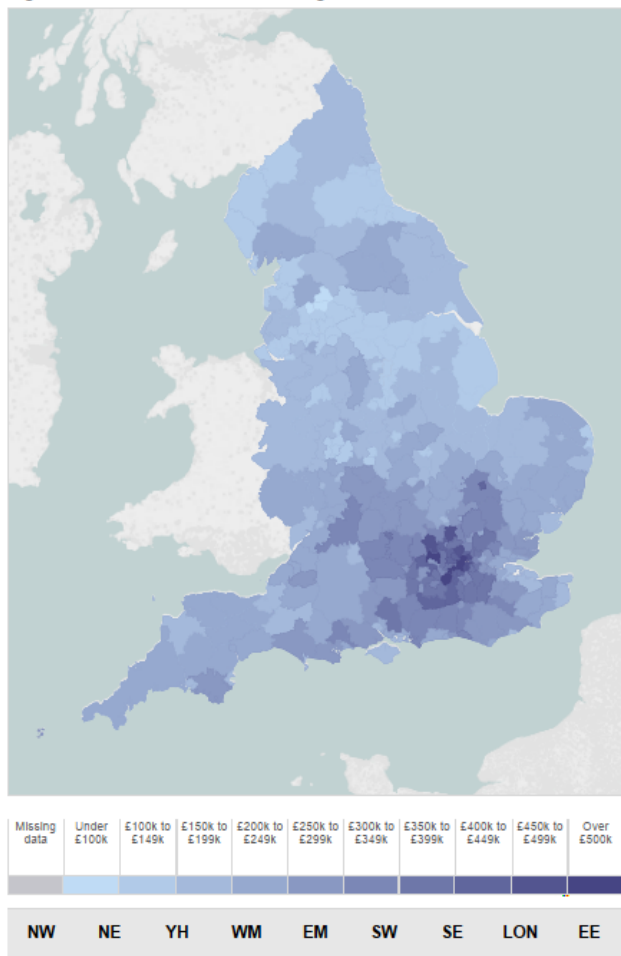


Figure 1.2: Dwelling: All | Basis: Indexed | LA: *

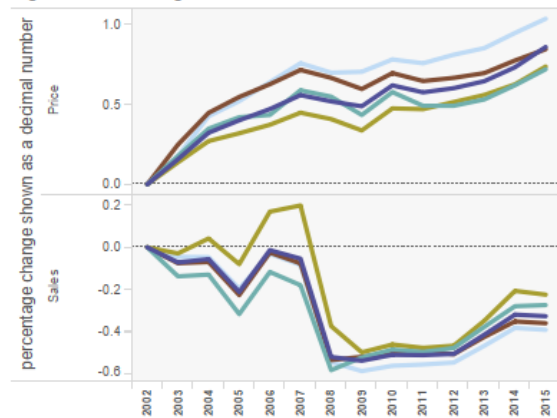
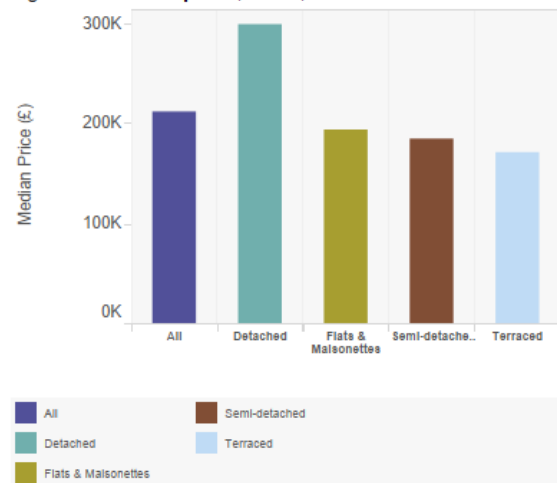


Figure 1.3: Median price | 2015 | LA: *



Price/Ratio (Fig 1.1 | 1.2 | 1.3)
Median Price

Year (Fig 1.1 | 1.3)
2015

Indexed/Actual (Fig 1.2)
Indexed

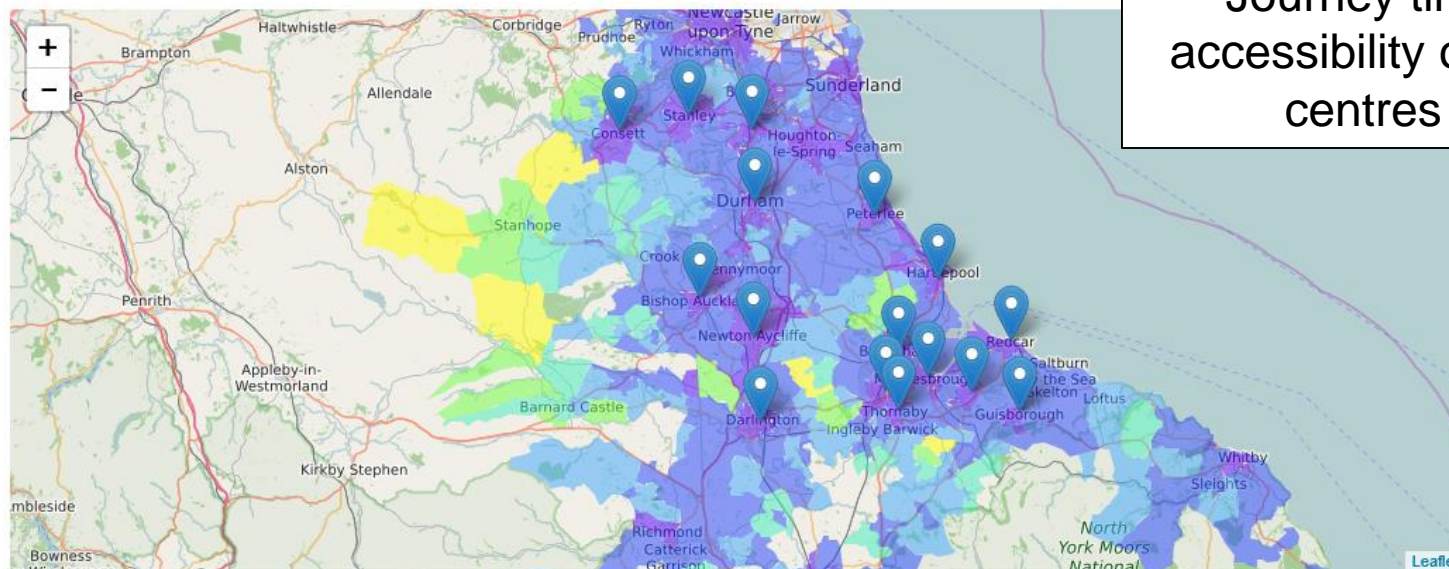
Local Authority
(Fig 1.1 | 1.2 | 1.3)

Adur
Allerdale
Amber Valley
Arun
Ashfield
Ashford
Aylesbury Vale
Babergh
Barking and Dagenham
Barnet
Barnsley
Barrow-in-Furness
Basildon
Basingstoke and Deane
Bassetlaw
Bath and North East Somerset
Bedford
Bexley
Birmingham
Blaby
Blackburn with Darwen
Blackpool

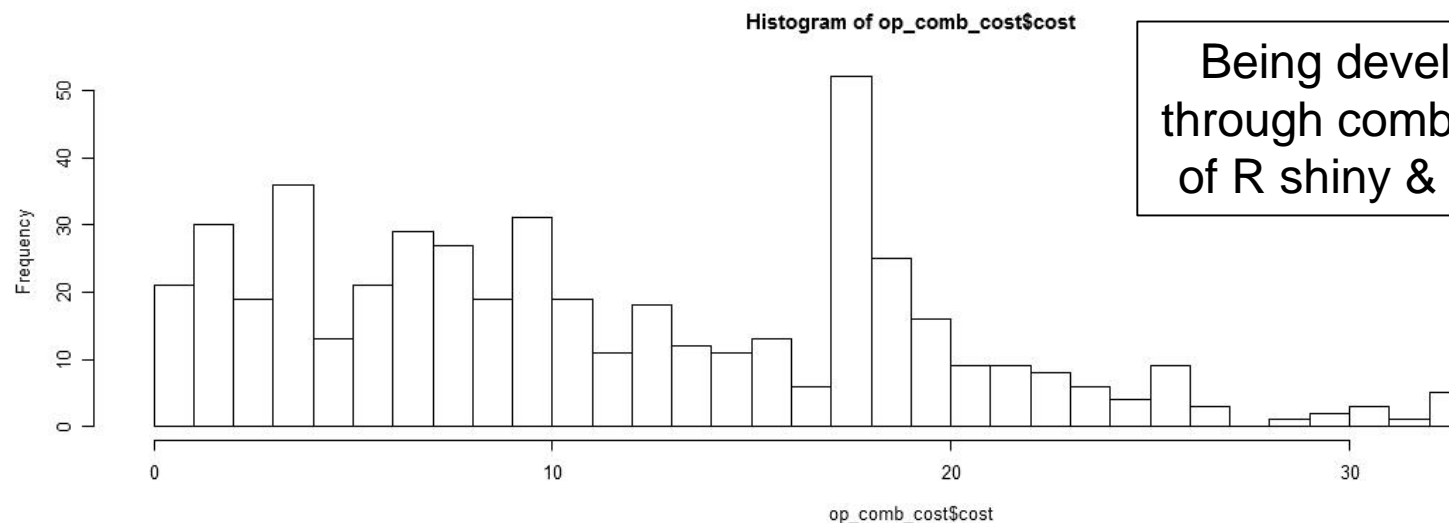
One of our latest data visualisations, with 2,500 views in three months.

Designed so that a member of the public can look at house prices in their local area, a topic of much interest in the UK.

Interactive mapping

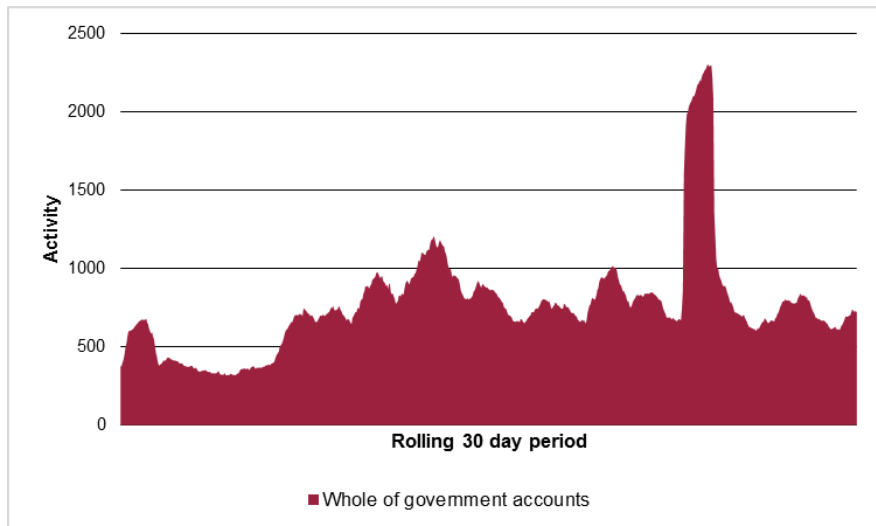


Journey time
accessibility of job
centres



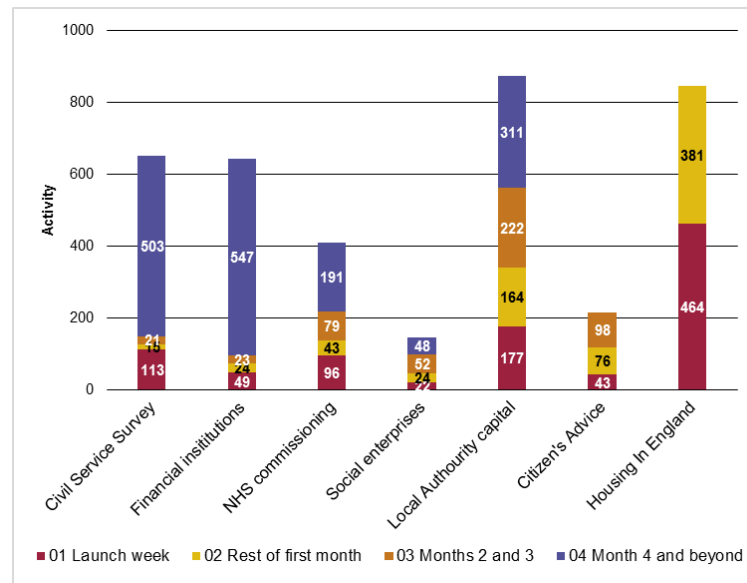
Being developed
through combination
of R shiny & leaflet

Interactive data visualisations – What we have learnt so far



- There is an appetite for data presented in an engaging way. Some visualisations attract almost as much interest as the reports they support.
- Topics attract different levels of interest, however reaching the right people can be as important as reaching a large number.

- Visualisations increases the amount of activity for the reports they support.
- Activity around the launch is crucial to securing awareness and ongoing interest.
- Social media is particularly effective form of promotion. Going forward we will be giving more thought to 'share ability'.



The 8 key enablers...

1. We leveraged senior sponsorship

2. We built on our existing analytical community of practice

- Structures and roles
- Awareness/profile

3. We secured dedicated expert resources

- Recruited a new manager to develop the data service
- Carved out 50% of another Manager's time to build the network

4. We reached out to junior staff

- Identify and nurture a network of people with inquisitive and can-do mindset.
- Help them to help each other.

The 8 key enablers...

- 5. We focused on what audit teams want, making basic tasks easier and quicker, eg**
 - Webscraping
 - Back catalogue analyser
 - Visualisation tools
- 6. We developed a portfolio of examples that have delivered results**
 - with quantified time/cost savings.
- 7. We have developed a structured L&D offer**
 - Enthusiast, Doer, Expert
 - Specific skills defined
 - core vs specialist
 - Data gathering/manipulation vs analysis and presentation
- 8. Comms. Comms. Comms. Every method. All of the time. Repeat!**