

Briefing

# Data visualisation

Part 1. How to use data visualisation

January 2022

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# Introduction

This is part 1 in a series of three briefings that aim to provide practical guidance for local public services on using data visualisations, such as graphs, charts and maps, for both external and internal uses, from a single chart on a webpage to more complex visualisations.

It covers reasons for and against using visualisation and existing examples in local public services. Parts 2 and 3 cover how to set up effective visualisations while avoiding common problems, including the use of specific types of charts and maps; and software and online services that can be used to produce visualisations.



## When to use visualisations

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When used well, visualisations can communicate data much more effectively than text or tables, in some cases making dozens, hundreds or even thousands of pieces of data easily understandable. However, they are not the right choice in all circumstances and if done badly can become an expensive way to confuse people.

Visualisations work particularly well in the following situations:

### Showing changes over time

Graphs that show something measured at a series of points in time can make clear the direction of change and whether this is accelerating or slowing, as well as what has happened previously.

- › Changes over time typically use line graphs, such as of economic indicators or share prices. Conventionally, time uses the horizontal x-axis and value or price uses the vertical y-axis.

### Showing comparisons

Comparing sets of data with each other, fixed benchmarks or both.

- › Vertical column or horizontal bar charts are the most obvious visualisations for simple comparisons, but other types of chart and map can also work well.
- › Many visualisations combine comparisons with changes over time, for which line graphs with multiple lines are commonly used, although clustered column or bar charts can also work well.

### Showing geographic differences

Map-based visualisations can provide a strong way to show localised information, including how areas compare with each other.

- › Electoral results based on geographic constituencies or wards are commonly displayed through maps, although 'heat maps' or choropleths are also used for comparable data organised by geography.

## Managing

Regularly updated visualisations can provide an overview of how well a set of processes or operations are performing, particularly to indicate areas of concern. These are often produced for an internal audience.

- › A set of management-focused visualisations of this kind are known as dashboards, although regularly published reports often use the same concept. Given that dashboards typically include several visualisations, they can work better with simpler graph types such as pie charts.

## Influencing

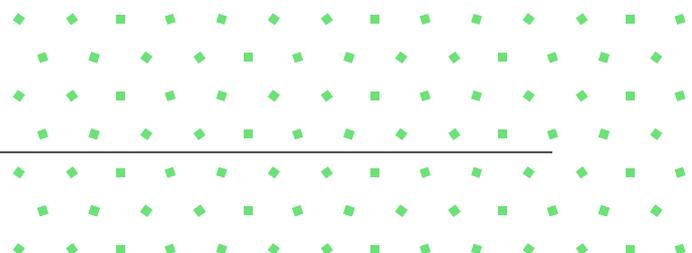
Visualisations often communicate data very powerfully, making them a good way to affect behaviour either within or outside the organisation.

- › In this case simplicity should be the aim, with as few actual visualisations as possible and thought taken over format, design and labelling as to what will have the greatest impact.

## Reasons to be cautious

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**Cost in time and money:** it is usually more time-consuming and expensive to visualise data than to write about it or present it in a table. However, the cost differential is likely to fall and even be reversed if a visualisation is updated or repeated automatically or with minimal effort after it is first set up. Describing data in words is cheap but is likely to cost about the same each time; visualisation tends to be relatively expensive to set up, then cheap to update or reproduce.



- › An alternative way to communicate data that is regularly updated or mass-produced is through natural language processing, which can insert data into sentences and adjust them based on rules. This technique can also be combined with data visualisations.

## Over-emphasis of data

Choosing a set of data for visualisation suggests it is more important than anything that has not chosen; it literally gains visibility. However, one set of data may be chosen for visualisation simply because it is available in a suitable, easy-to-access format or because it has been measured at regular intervals.

- › Particularly for a regularly used set of visualisations, such as those in dashboard or a report, there should be a regular review process to see if one set of data should be replaced by another. Another option is to include a 'guest slot', which includes a set of data for a limited period or a single edition of a report.

## Impact of targets

A version of the over-emphasis issue comes from highlighting data through visualisation to make it into a target. Goodhart's law, named after the economist Charles Goodhart who outlined it, states that when a measure becomes a target it stops being a good measure, as people are tempted to game it.<sup>1</sup> An example is schools judged on average exam grades which discourage pupils thought likely to do badly from taking exams, improving average grades artificially.

- › An overly target-driven culture is a broad problem, but the way visualisation is used can make it worse. It can be partly tackled through well-written commentary for visualisations that discusses problems or explains reasons for trends. As with over-emphasis, it also makes sense to institute a regular review process of the sets of data used.

## Aesthetics

Work on data visualisations can get tangled up in concerns over design, such as choices on colours, fonts and similar.

- › Design choices should serve clarity of communication. This can be boosted by putting data visualisations through the same review and editing process as important written material.

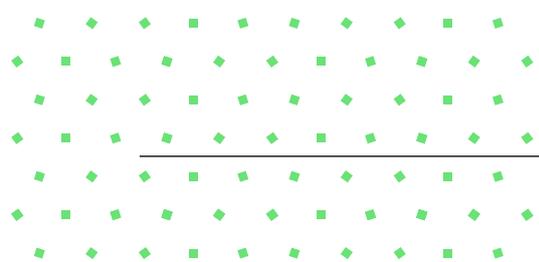
## Local public service uses of data visualisation

### Open data portals

In March 2021, Hull City Council launched a new Hull Data Observatory site,<sup>2</sup> which brings together data on the city from a range of official sources. It covers children and young people, crime and community safety, deprivation, economy and employment, environment, health and social care, housing and population. As well as all-city figures the site provides breakdowns of data by the city's 21 wards and 166 lower-layer super output areas (LSOAs), the smallest geographical areas used by the Office for National Statistics (ONS) covering between 1,000 and 3,000 people. It provides two advanced data tools: a data explorer that allows searches and a custom area reporter that can produce themed reports for bespoke geographical areas such as collections of LSOAs.

Hull joins local authorities that run open data services that make use of visualisation, including the following:

- › Camden: [opendata.camden.gov.uk](https://opendata.camden.gov.uk)
- › Glasgow: [data.glasgow.gov.uk](https://data.glasgow.gov.uk)
- › Leeds: [observatory.leeds.gov.uk](https://observatory.leeds.gov.uk)
- › London: [data.london.gov.uk](https://data.london.gov.uk)
- › Nottingham: [opendatanottingham.org.uk](https://opendatanottingham.org.uk)
- › Plymouth: [dataplymouth.co.uk](https://dataplymouth.co.uk)
- › Stockport: [bigstockportpicture.co.uk](https://bigstockportpicture.co.uk)

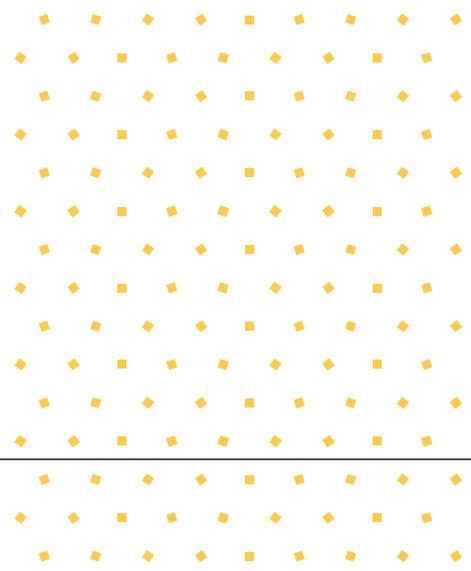


## Dashboards

As the name suggests, dashboards typically show visualisations of a few measures that together provide an overview of the state of a service or an organisation. Dashboards are typically available only to staff (in some cases only senior staff) within organisations, so are not as visible as open data services.

However, several local authorities have discussed their use of such services, with some having started or increased their use because of Covid-19, often to share data. Local authorities in Cambridgeshire and Peterborough created a common dashboard of public health data charted and mapped by age and demographic measures.<sup>3</sup> Great Manchester Combined Authority had already developed a digital platform to join up health and social care in the city region, which during the pandemic it used to manage the area's contact tracing efforts.<sup>4</sup>

Although establishing such systems may be easier for larger local authorities, smaller ones can do so as well. Tendring District Council in Essex has set up management dashboards with visualisations of how council services are performing, including waste collection and its My Tendring public web portal. "Data visualisation has helped us to understand our processes, visualise a process, help higher authorities understand our processes and then see if there are any trends that we can improve," Dan Pobjoy, IT operations manager, told UKAuthority in October.<sup>5</sup>



## References

- <sup>1</sup> Goodhart described this process in a narrow way concerning British monetary policy in 1975: “Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes.” Its broader use appears to date from a 1997 academic paper by anthropologist Marilyn Strathern, who was discussing the increasing use of auditing in British universities.
- <sup>2</sup> Hull Data Observatory: [data.hull.gov.uk](https://data.hull.gov.uk)
- <sup>3</sup> Mentioned by Socitm President Sam Smith, who works for Cambridgeshire County Council, during a speech to President’s Week in June 2021.
- <sup>4</sup> Discussed at a UKAuthority event in July 2020 (UKAuthority): [bit.ly/3oU5P4K](https://bit.ly/3oU5P4K)
- <sup>5</sup> Article on Tendring’s use of data visualisation, October 2021 (UKAuthority): [bit.ly/3EPhxTP](https://bit.ly/3EPhxTP)

## About this briefing

### Author

**SA Mathieson** – Analyst and writer

### Editor

**Martin Ferguson** – Director of policy and research

### Designers

**Magdalena Werner** – Senior creative designer

**Benjamin Hughes** – Graphic designer

## Have your say

We always welcome feedback and discussion on the contents of our publications.

### Martin Ferguson

Director of policy and research

[martin.ferguson@socitm.net](mailto:martin.ferguson@socitm.net)

### Nadira Hussain

Director of leadership development and research

[nadira.hussain@socitm.net](mailto:nadira.hussain@socitm.net)

## Get in touch

Website: [www.socitm.net](http://www.socitm.net)

Email: [inform@socitm.net](mailto:inform@socitm.net)

Tel: 01604 709456



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