



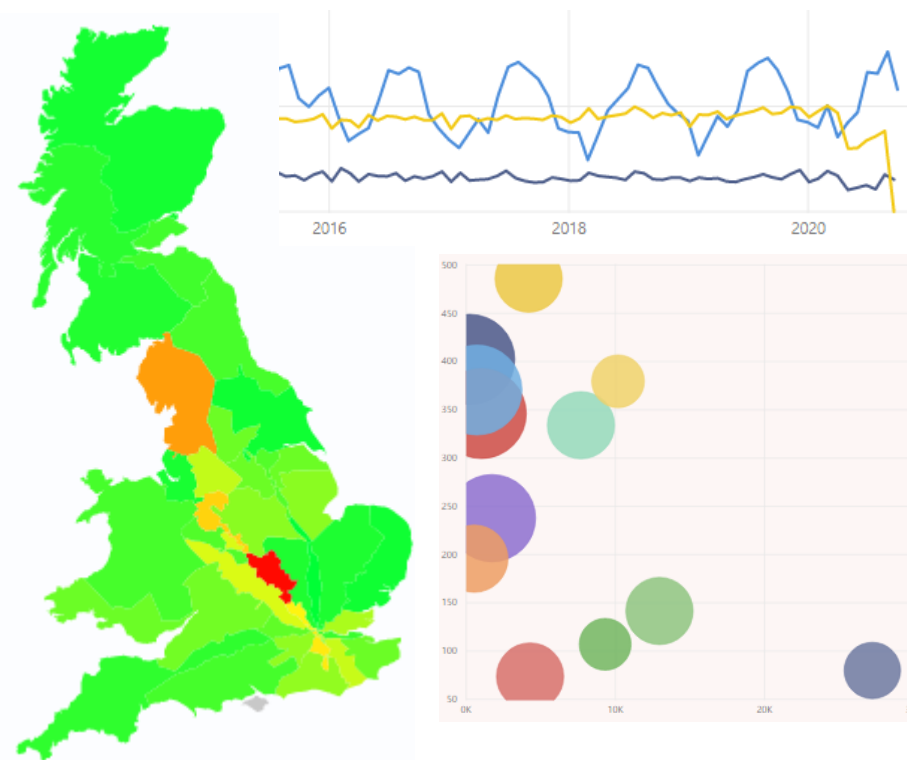
# International Railway Safety Conference

19-21 October 2020

Webinar Series

## Seeing events in context: the human ↔ data interface

Howard Taylor  
Senior Civil Engineer, ORR



# Background

Railway data & the regulator

# The oldest railway (1825) ...The oldest regulator (1840)

Please use Q/A button for any questions



IRSC 2020



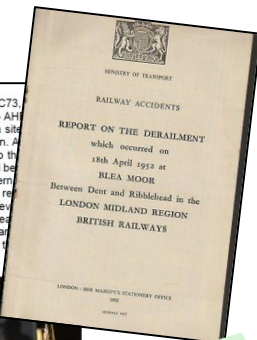
1838 >> 1947 >> 2007 >> still worried

Since 2004:

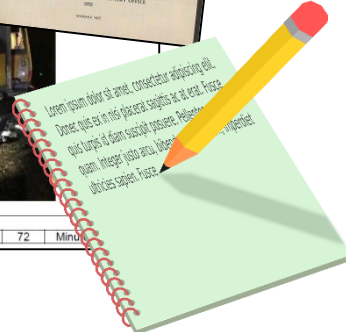
## Information:

### Incidents

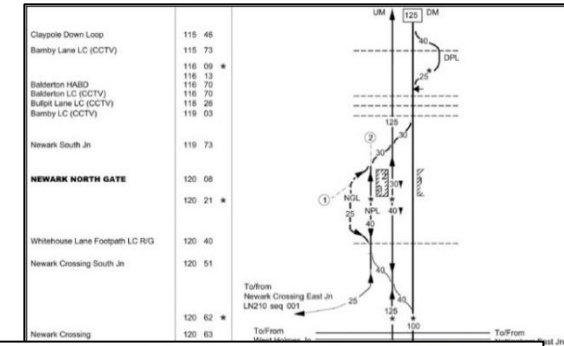
**Southern (Wessex) – CCIL 2066753**  
With reference to the item in this section of yesterday's regarding 2C73 (Thu) London Waterloo – Reading, striking a road vehicle on Waterloo A/H Bracknell: the 146 passengers were evacuated and transported from site summoned to site to assist in extricating the road vehicle from the train. A road at the crossing to be closed. Significant damage was caused to the nationwide parts request circulated by the NOC. Buses were arranged for the first services. Ticket acceptance was agreed with Great Western Wokingham and Reading to Paddington. By 0707, the car had been removed. Full road closure was implemented due to damage sustained to the level work was carried out to allow the train to be assisted clear of the area. S&T and P/Way repairs were carried out and the possession had authorised past one signal in each direction pending further repairs to the Blockage was granted at 0005, with work ongoing at close of Report.



TRUST 628534 XOCW					
Cancelled	3	Part Cancelled	34	Trains Delayed	72



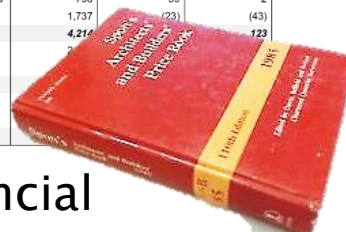
## Engineering



148.5 Miles Per Hour  
1st November 1987



Em, 2019-20 prices	Actual	Variance to CP6 delivery plan better / (worse)	Of which out / (under) performance
Network grant income	5,260	(627)	-
Franchised track access charges	2,577	(63)	2
Other single bill income	1,144	491	15
<b>Total income</b>	<b>8,981</b>	<b>(199)</b>	<b>17</b>
Schedule 4	303	12	25
Schedule 8	57	37	37
Network operations	657	8	5
Support	662	211	97
Traction electricity, industry costs & rates	798	59	2
Maintenance	1,737	(23)	(43)
<b>Total operating expenditure</b>	<b>4,214</b>	<b>123</b>	<b>123</b>
Capex – Renewals	2		
Capex – Enhancements			
<b>Total capital expenditure</b>			
Financing costs & other <sup>17</sup>			
<b>Total expenditure</b>			
<b>Financial performance measure (FPM)</b>			



Performance

Financial

- [https://assets.publishing.service.gov.uk/media/547c903ee5274a428d000183/R052008\\_080228\\_Merstham.pdf](https://assets.publishing.service.gov.uk/media/547c903ee5274a428d000183/R052008_080228_Merstham.pdf)
- <https://www.theconstructionindex.co.uk/news/view/hooley-cutting-enabling-works>
- <https://www.sciencedirect.com/science/article/abs/pii/S2210970617300409>
- <https://www.ebay.co.uk/itm/Railway-Accident-Report-BLEA-MOOR-1952-/293437347188>
- <https://www.125group.org.uk/product/world-speed-record-print/>
- <https://www.ebay.co.uk/itm/Spons-Architects-and-Builders-Price-Book-1985-Anonymous-E-and-F-/312226354496>

## A typical day for the regulator

We receive reports  
of an incident...

A trespasser managed to get onto the track...

...because the fence had fallen over...

...because there was a landslip...

...because there was a huge storm last night...

...but the drainage was overdue for an upgrade...

...because last years budget was moved to signalling ...

CONTEXT

What is “this”?

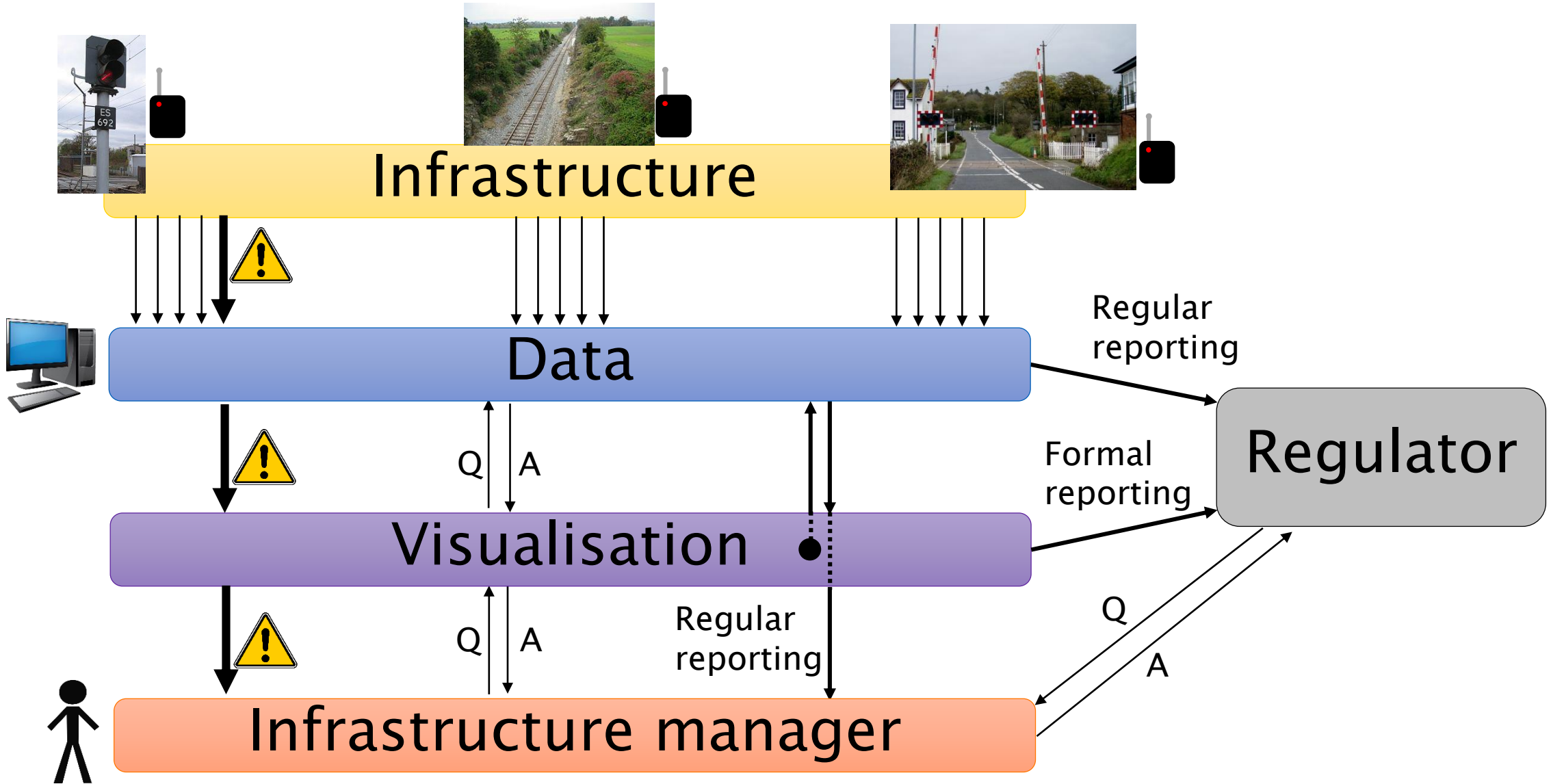
How common is “this”?

How can “this” be prevented?

We want to make sure this  
doesn't happen again...

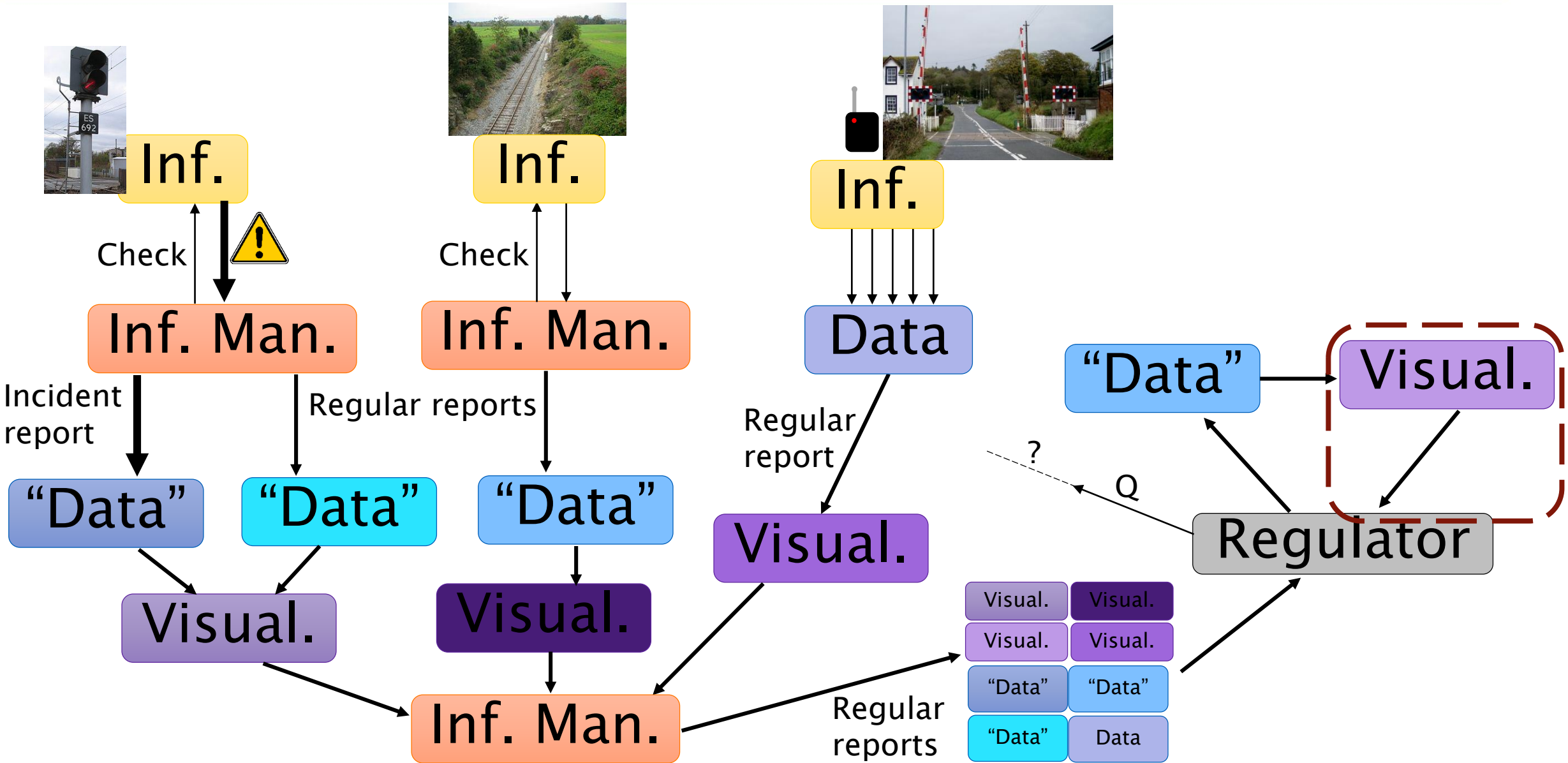


# Green-field railway data



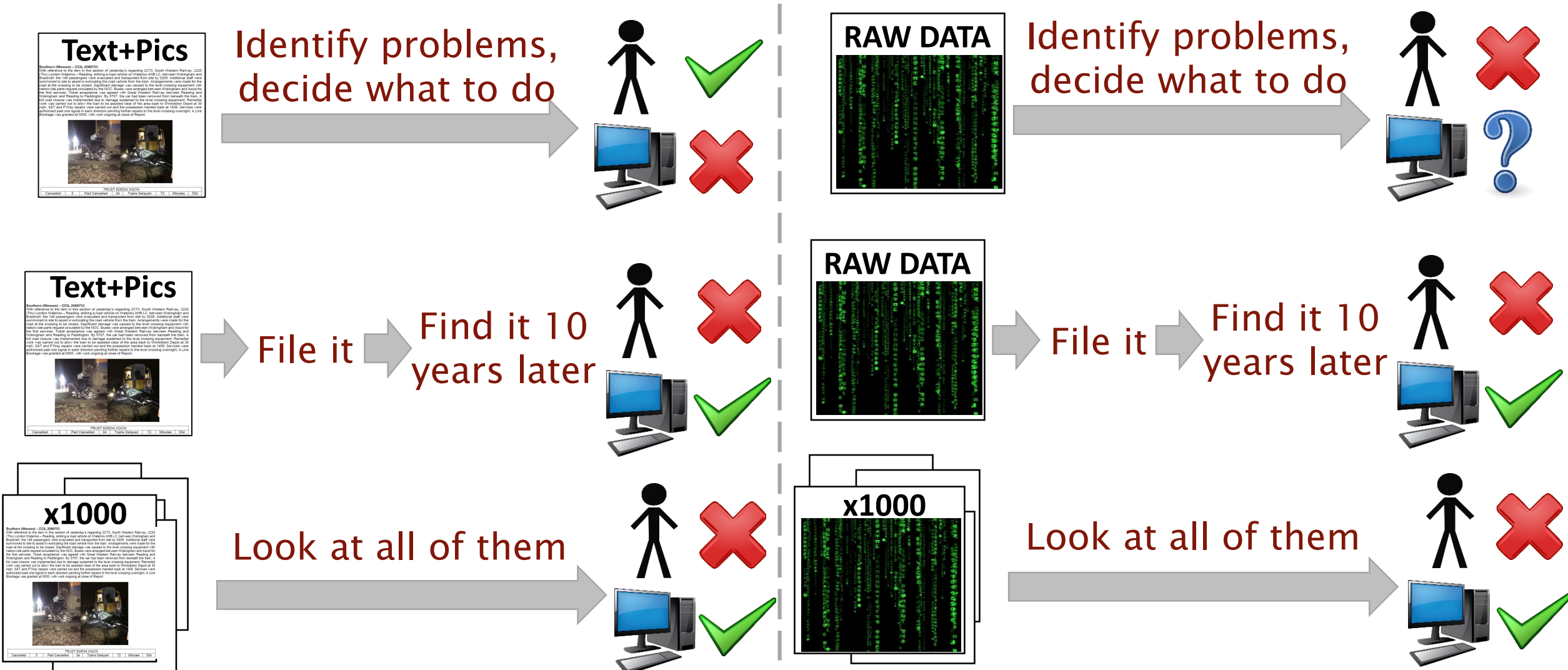


# Brown-field railway data





# The human↔data interface



# A resource-friendly solution

The data ~~lake~~  
puddle



Please use Q/A button for any questions



IRSC 2020

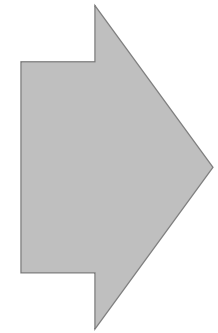
# Neutralise >>>

		Subject		
Location		Repairs	Failures	Delays
Date	London Bridge	...	...	...
	Jan	...	...	...
	Feb	...	...	...
	Mar	...	...	...

Values

		Date		
Subject		2017	2018	2019
Location	£m Spent	...	...	...
	Scotland	...	...	...
	Wales	...	...	...
	England	...	...	...

Values



Location	Date	Value	Subject	Narrative
London Brg	Jan	...	Repairs	n/a
London Brg	Jan	...	Failures	n/a
London Brg	Jan	...	Delays	n/a
London Brg	Feb	...	Repairs	n/a
London Brg	Feb	...	Failures	n/a
London Brg	Feb	...	Delays	n/a
London Brg	Mar	...	Repairs	n/a
London Brg	Mar	...	Failures	n/a
London Brg	Mar	...	Delays	n/a
Scotland	2017	...	£m Spent	n/a
Scotland	2017	...	£m Spent	n/a
Scotland	2017	...	£m Spent	n/a
Mmark102	Wk26	n/a	Inc.Report	A trespasser...
... etc	...	...	...	n/a

Subject	Date	Narrative
Incident report - Tuesday 8 <sup>th</sup> Sep		A trespasser managed to get onto the track near mile marker 102....

Location

How does £ spent relate to failures? ?



# Revive >>>

How does London relate to England?

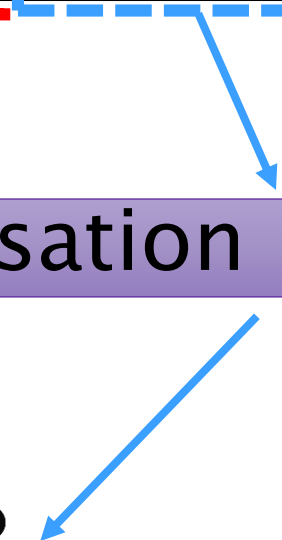
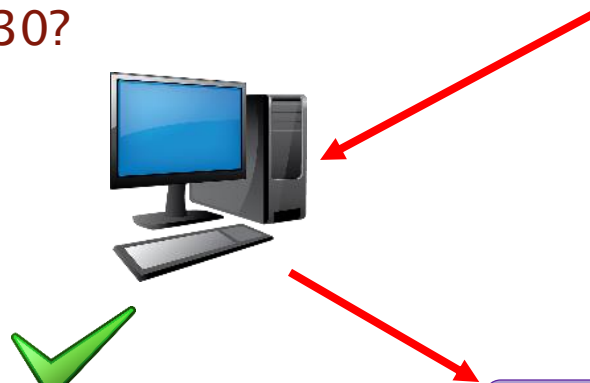
How does "Week 26" relate to 2018?

How does 1.652 relate to 2.130?

Location	Date	Value	Variable	Narrative
Scotland	2017	...	£m Spent	n/a
London	Jan	...	Fatalities	n/a
London Brg	Wk26	...	Delays	n/a
Mile 102	8 Sep	n/a	Inc. Report	A trespasser...
...	...	...	...	...



Visualisation





# The new human↔data interface

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**LIVE DEMO**  
**(screenshots on next slides)**

# Delay\_Minutes

Trespass (including non-I...

Colour Stations by

Station Search

Incident\_Count

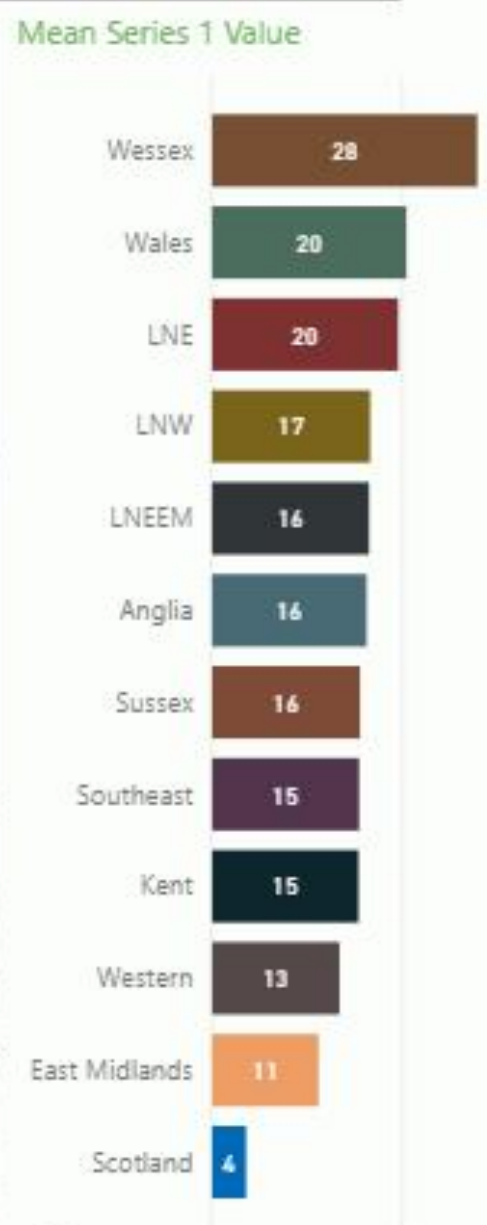
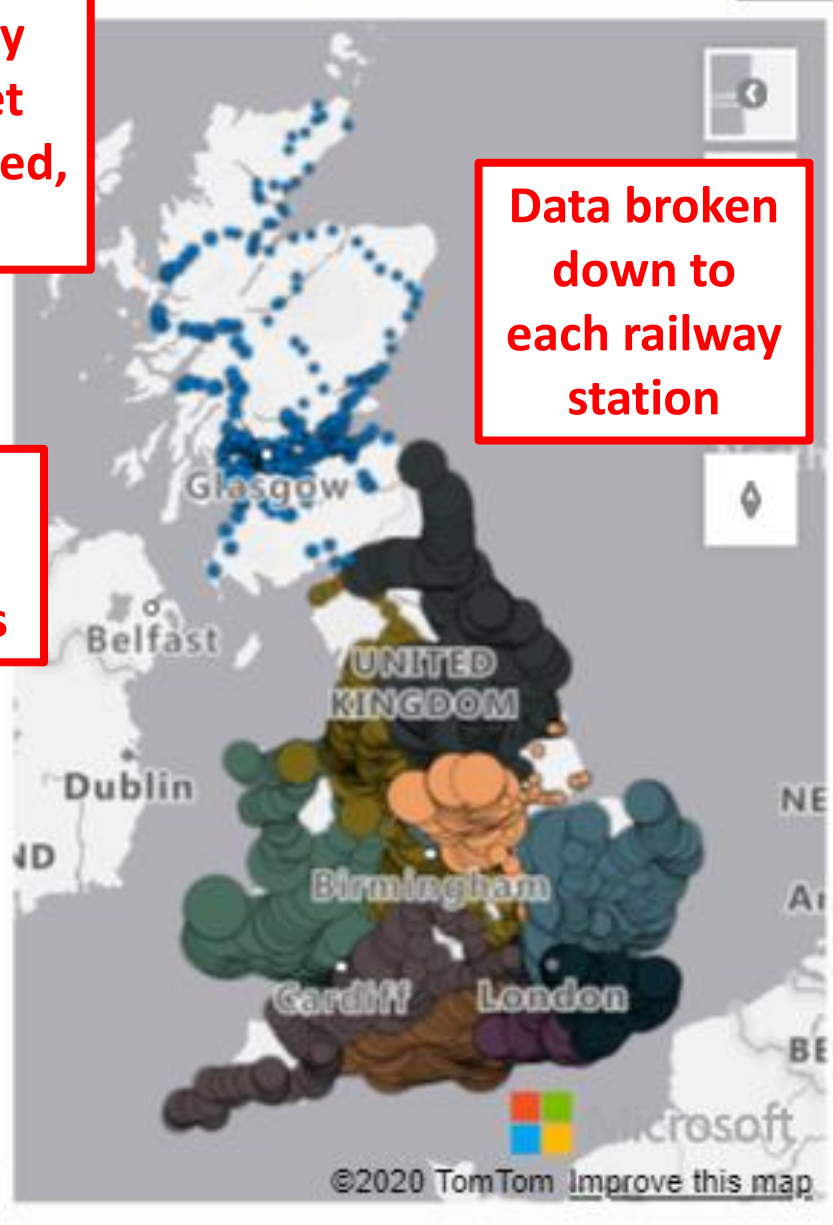
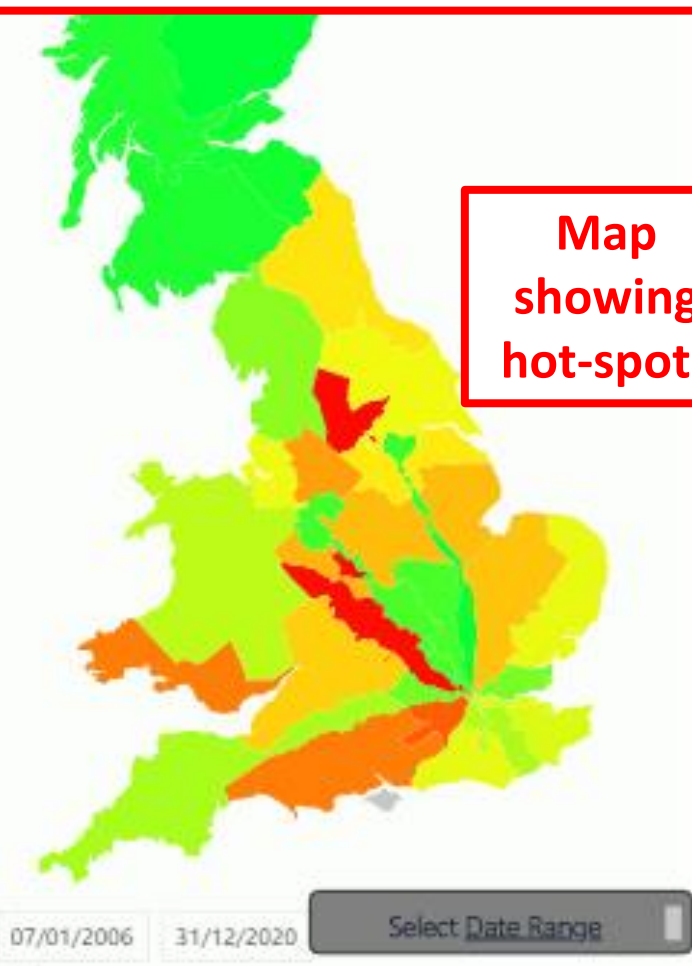
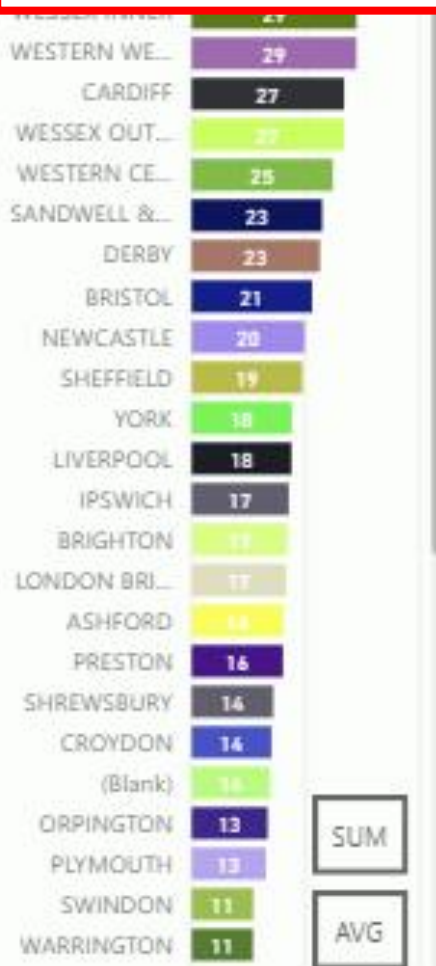
Route

Search

Pick any of the 10,000 datasets, this is num. of delay incidents due to trespassers. Options include asset failures, weather, £ spent, maintenance jobs completed, late/cancelled trains, road traffic – etc etc

Data broken down to each railway station

Map showing hot-spots



07/01/2006 31/12/2020 Select Date Range



# Delay\_Minutes

Trespass (including non-i...

Incident\_Count

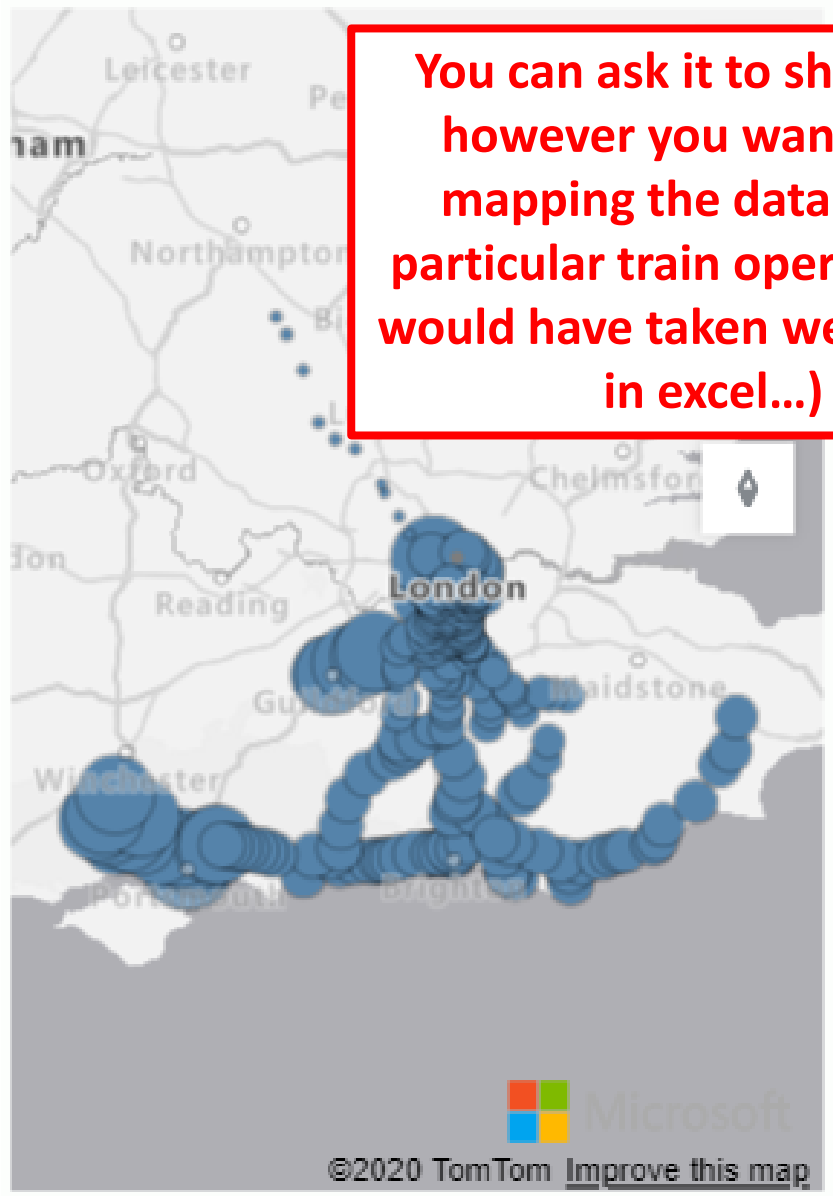
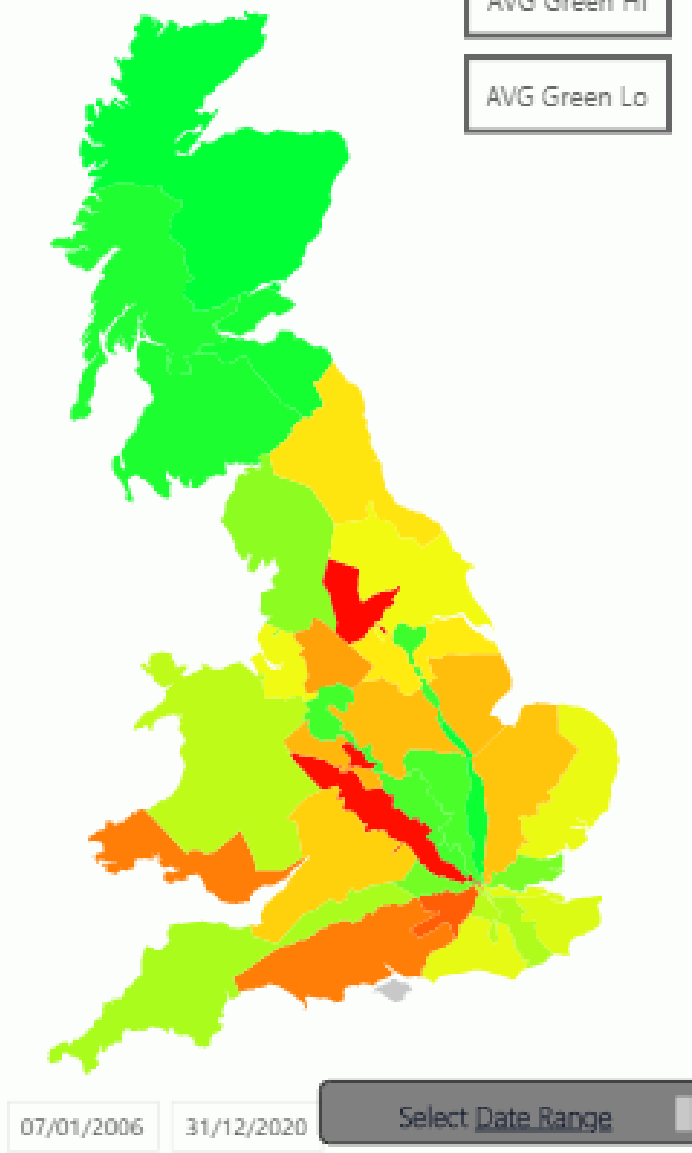
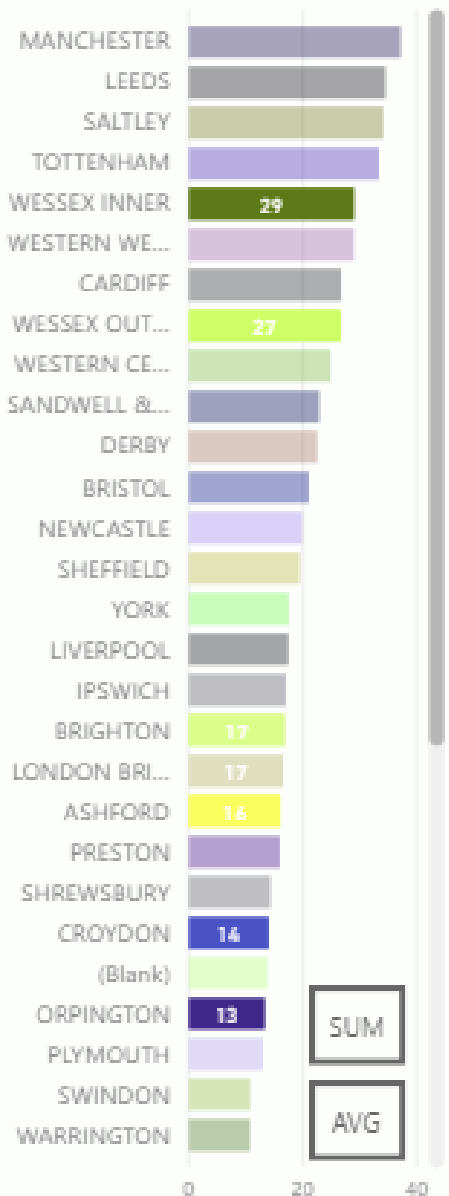
Colour Stations by

TOC

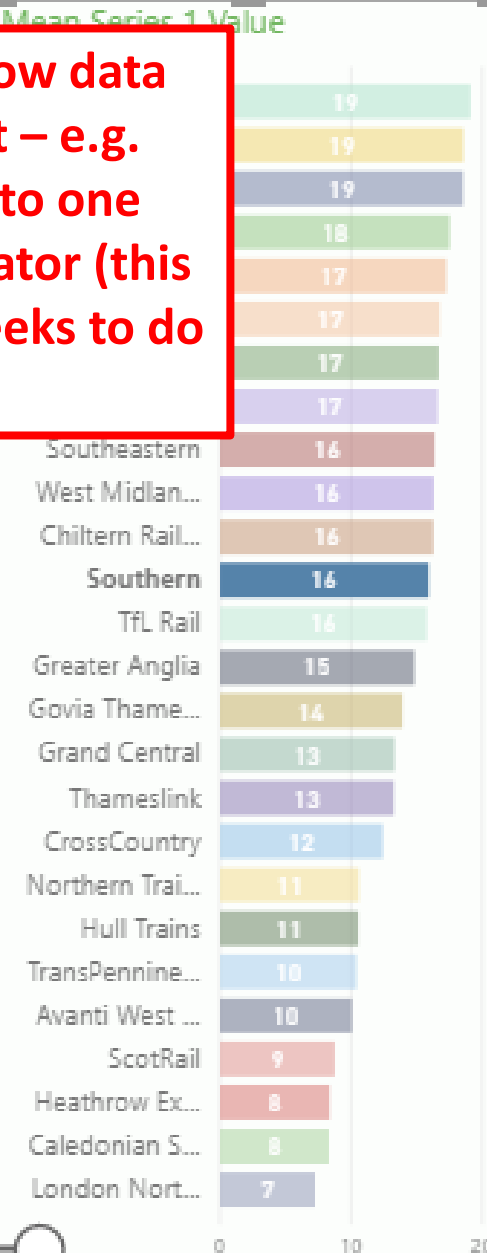
Station Search

Search

Mean Series 1 Value by Loc'n



You can ask it to show data however you want – e.g. mapping the data to one particular train operator (this would have taken weeks to do in excel...)



Weather

Service\_Affecting\_Failures

Performance

07/01/2006

31/12/2020

Rainfall

Earthworks

CaSL Trains

Time Range:

x

Earthworks failures

Calculations

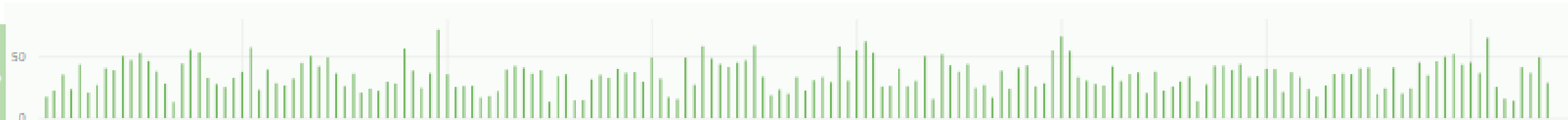
Locations:

Location Type

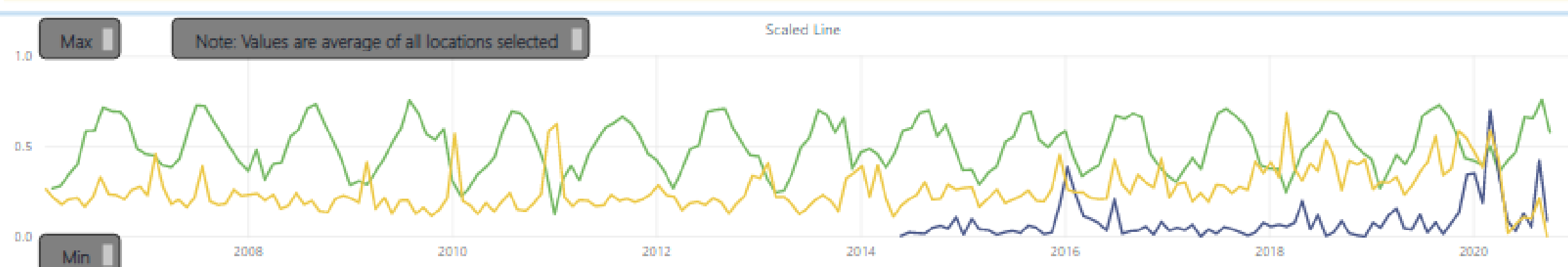
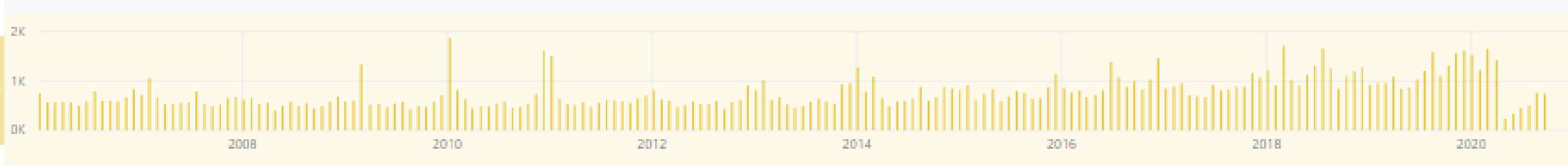
Location

\_EMPTY

All



**Same 10,000 datasets available as timelines, rather than maps**



Weather  
Rainfall  
x

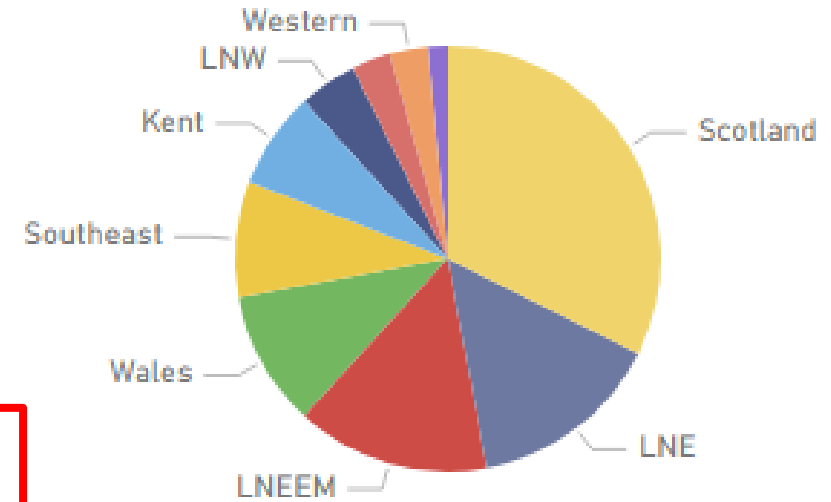
Service\_Affecting\_Failures  
Earthworks  
Earthworks failures

Performance  
CaSL Trains  
Calculations

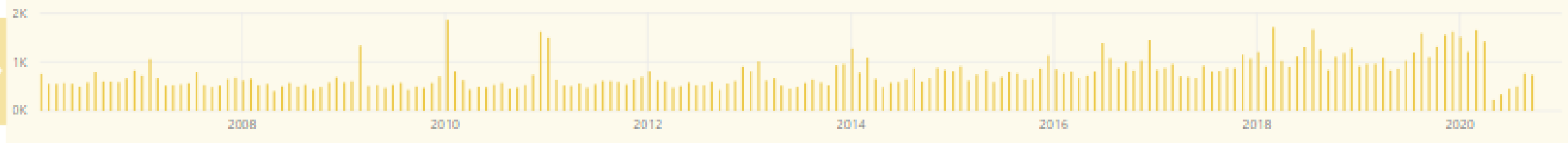
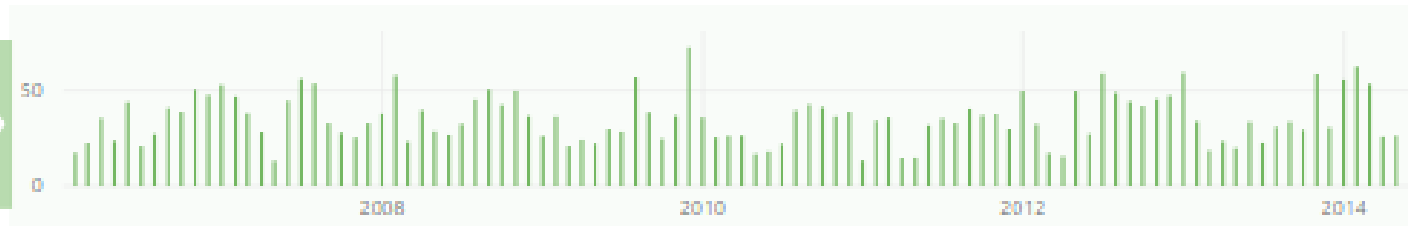
Time Range

Location

Values are Average of:



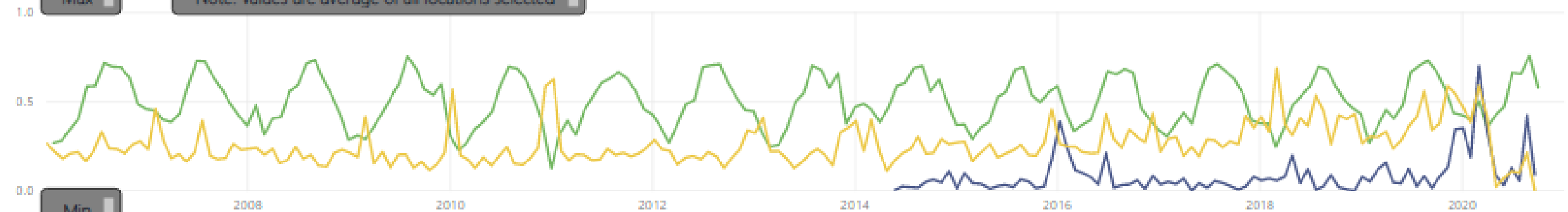
You can hover over any spike to see how the data is made up



Max

Note: Values are average of all locations selected

Scaled Line





# The new human↔data interface

incident\_date

01/04/2019 27/07/2020

narrative

Search

route

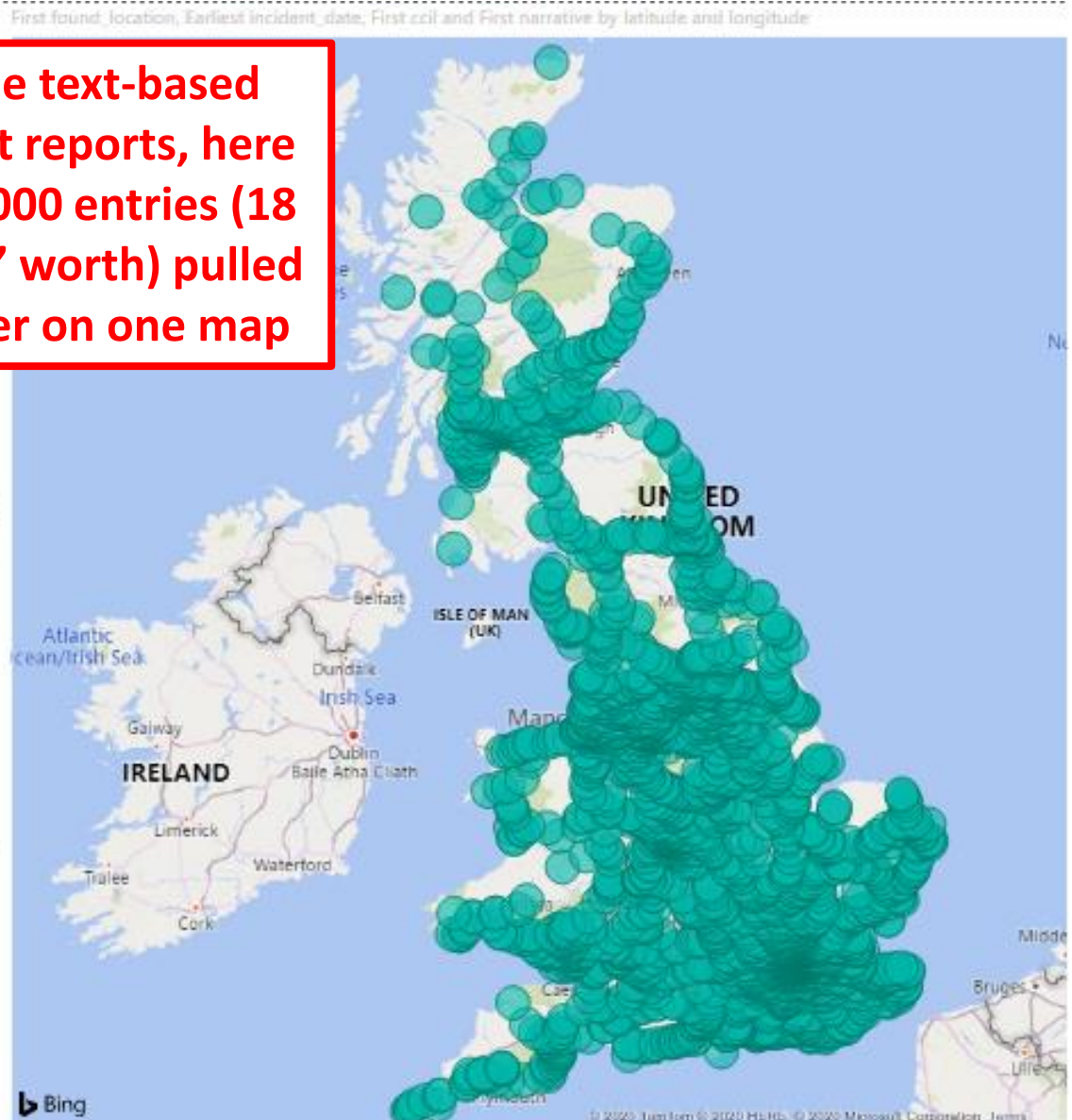
All

narrative

York) North Eastern Chester Le. Street following loss of detection.  
Wrong direction movement to Wales & Western  
With regard to the rising floodwater under the Severn River bridge at Shrewsbury station which required the passage of trains into and out of the south end of the station be suspended from 1400 (Tue): the situation was monitored, and the water levels dropped. Staff to carry out a sonar survey were in their boat by 1000, and by 1224 the data had been collected. After the data was interpreted, the suspension of traffic was lifted at 1341. The associated warning boards were removed by 1406, and the normal passage of trains resumed.  
With regard to the derailement on the Up Slow line between Luton Airport Parkway and Harpenden as recorded in this section of the Report yesterday: by 0201, the OLE on the Down Slow line had been energised to allow 9T52, Govia Thameslink Railway, 1826 (Sat) Brighton 44" Bedford to be powered up. Having been withdrawn by an assisting locomotive the other stranded unit was under its own power by  
With regard to the closure of the route between Hereford and Newport from Sat 26/10/19 after the line was washed out in several places in the Pontrilas area: repairs were completed and the route was made available for traffic from 2139, with a 5

Count of narrative by incident\_date

**For the text-based incident reports, here are 10,000 entries (18 months' worth) pulled together on one map**







# The new human ↔ data interface

incident date  
01/04/2019 27/07/2020

narrative  
flood Search

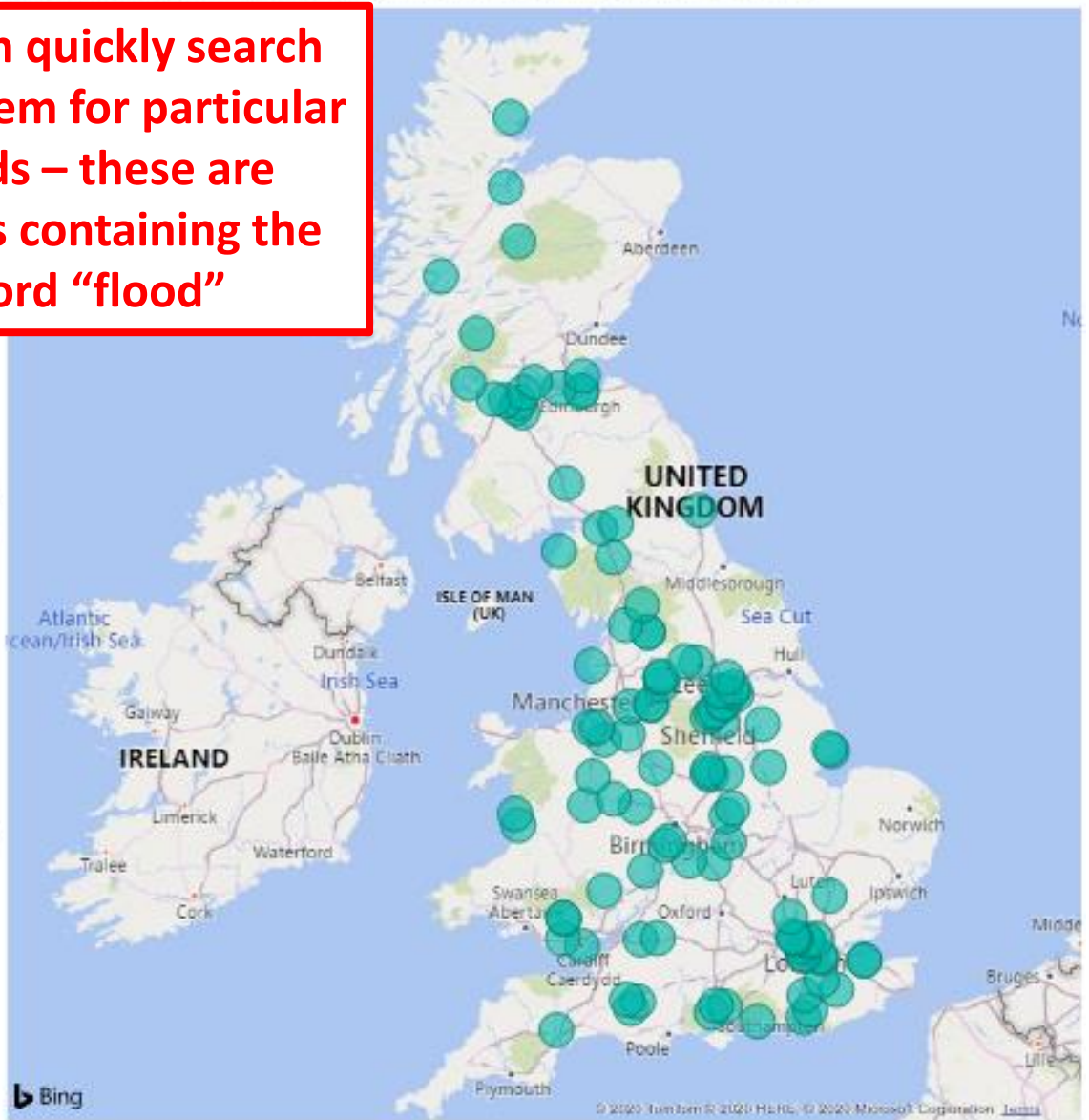
route  
All

narrative

With regard to the rising floodwater under the Severn River bridge at Shrewsbury station which required the passage of trains into and out of the south end of the station be suspended from 1400 (Tue): the situation was monitored, and the water levels dropped. Staff to carry out a sonar survey were in their boat by 1000, and by 1224 the data had been collected. After the data was interpreted, the suspension of traffic was lifted at 1341. The associated warning boards were removed by 1406, and the normal passage of trains resumed.

Count of narrative by incident\_date

You can quickly search all of them for particular words – these are reports containing the word “flood”



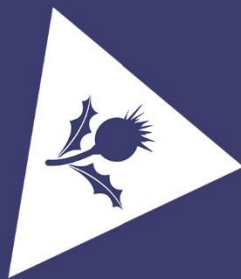


# The new human↔data interface

The screenshot displays a data interface with several components:

- Incident Date:** A date range selector showing '01/04/2019' to '27/07/2020'.
- Search:** A search bar with the word 'flood' entered.
- Incident Details Panel:**
  - latitude: 52.950725
  - longitude: -1.453734
  - First found\_location: Breadsall
  - Earliest incident\_date: 08 November 2019
  - First ccil: CCIL 2044327
  - First narrative: Fault No. 151776 / At 1258 an off-duty East Midlands Railway driver reported floodwater on the Down Fast line at Breadsall, between Derby and Duffield. The Down Slow was blocked to traffic at 1305, whilst a 20 mph ESR was imposed on the Down Fast line. Services were diverted via the Erewash lines where possible. S&T staff and Mobile Operations Manager were sent to site traveling via train due to road conditions in the area and following securing points and inspection location cabinets in the area for damage the staff were returned to Derby by train. An inspection was due to be carried out by S&T and P&W staff on the morning of Sat 09/11/19 to evaluate the site.
- Map:** A map of the United Kingdom with several teal circular markers indicating incident locations, primarily in the Midlands and East of England.
- Bar Chart:** A chart titled 'Count of narrative by incident\_date' showing the frequency of incidents from July 2019 to July 2020.

**Then you can hover over an individual incident to read the actual report – we no longer need to spend time trying to find the PDF report from several years ago!**



# International Railway Safety Conference

19-21 October 2020

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## Thanks for listening

**PLEASE NOTE: this tool is not currently available to the public, because it contains a large amount of confidential and commercially sensitive information...**

**...But, all of the data we hold which is not sensitive, is available to the public through our Data Portal, which also includes some easy-to-use visualisation tools:**

<https://dataportal.orr.gov.uk/>



A Better,  
Safer  
Railway

