

ORDNANCE SURVEY

Innovation Festival 2018

Track: “Mapathon” - Common Underground Infrastructure Map

Sponsor: Ordnance Survey

9-13 July 2018

Bart Chudas

Consultant, OS Ventures

24th July 2018



The NWG Innovation Festival 2018

510 of the world's leading businesses and most innovative minds gathered and worked together for the five-day-event in order to tackle 13 major social and environmental challenges.

They were joined by innovation experts, scientists, engineers, designers, local businesses, Universities, schools, artists and members of the public to come up with and explore innovative ways to help change the world.



Starting from scratch - How do you create the 'perfect' water company?



Going deeper underground - Can we build an underground map of the UK?



Fans for life - How to build advocacy with our communities and customers



Smart Objectives - Smart devices are filling up our homes. How can we improve customers' lives by making the most of Smart technology?



Moving on - What will the future of transport look like?



Vision of the future - How can we improve the lives of people who are visually impaired?



'Testing the water' - How can the use of Digital Twins improve our future?



Smiling happy people power - How can we create a happier more productive workforce?



Green planet - How can we become a carbon positive company?



Building blocks - How can innovation and tech improve Design, Construction Operation and Maintenance?



Blue Planet: Teenager sprint - How can we reduce the impact of single-use plastics?



Every drop counts - How and why do we need to save water?

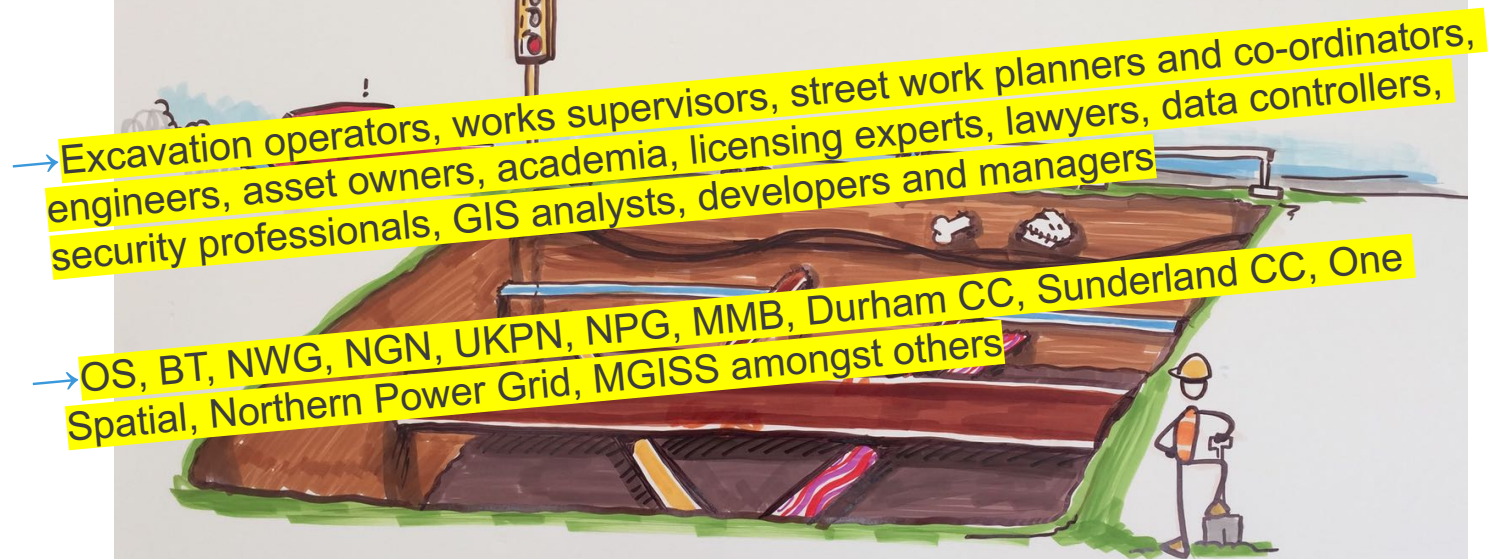


Leakage Hack & Share



Flooding Data Hack

The Mapathon [vision](#) was to build a [Combined Infrastructure Map](#) pilot for Newcastle and surrounding area and create a [working system](#) that allows to demonstrate queries for people [digging holes](#) and [planning works](#).




Around 60 professionals gather together to define problem and scope the solution

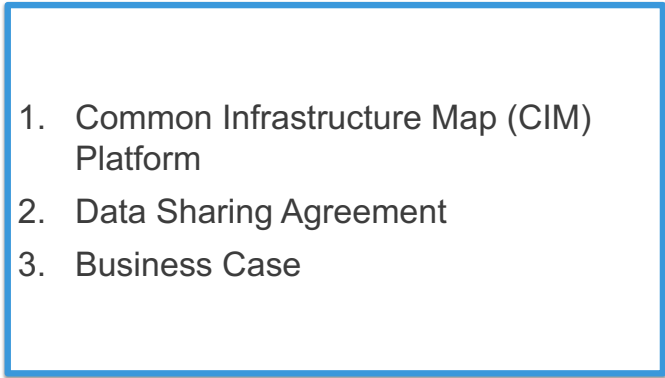
How we can improve the way we share information about underground assets



In Great Britain there are approximately 60,000 utility strikes a year

Five sprints to work on main problems related to the creation of **Common Underground Infrastructure Map** which led to three delivery products

- 
1. Asset Management
 2. Excavators
 3. GIS and Data Professionals
 4. Policy Makers – data sharing
 5. Planners

- 
1. Common Infrastructure Map (CIM) Platform
 2. Data Sharing Agreement
 3. Business Case



Examples of the **data sets** provided for the purpose of the workshop

Northumbrian Water Group

- Discharge Device – Point
- Hydrant – Point
- Injection Point – Point
- Main – Line
- Sewer Structure – Line
- Sewer Node – Point
- Stopcock – Point
- Valve – Point

Durham County Council

- Street lighting
- Manholes –highway drainage and watercourses
- Pipelines - highway drainage and watercourses
- Illuminates

Ordnance Survey

- Topography
- Land Use

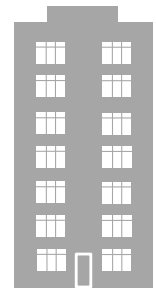
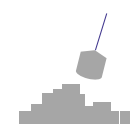
Northern Powergrid

- 33kV Underground Cable – Line
- 66kV Overhead Cable – Line
- 66kV Underground Cable – Line
- Ducts – Polygon
- Kiosks – Ground mounted metal

Northern Gas Networks

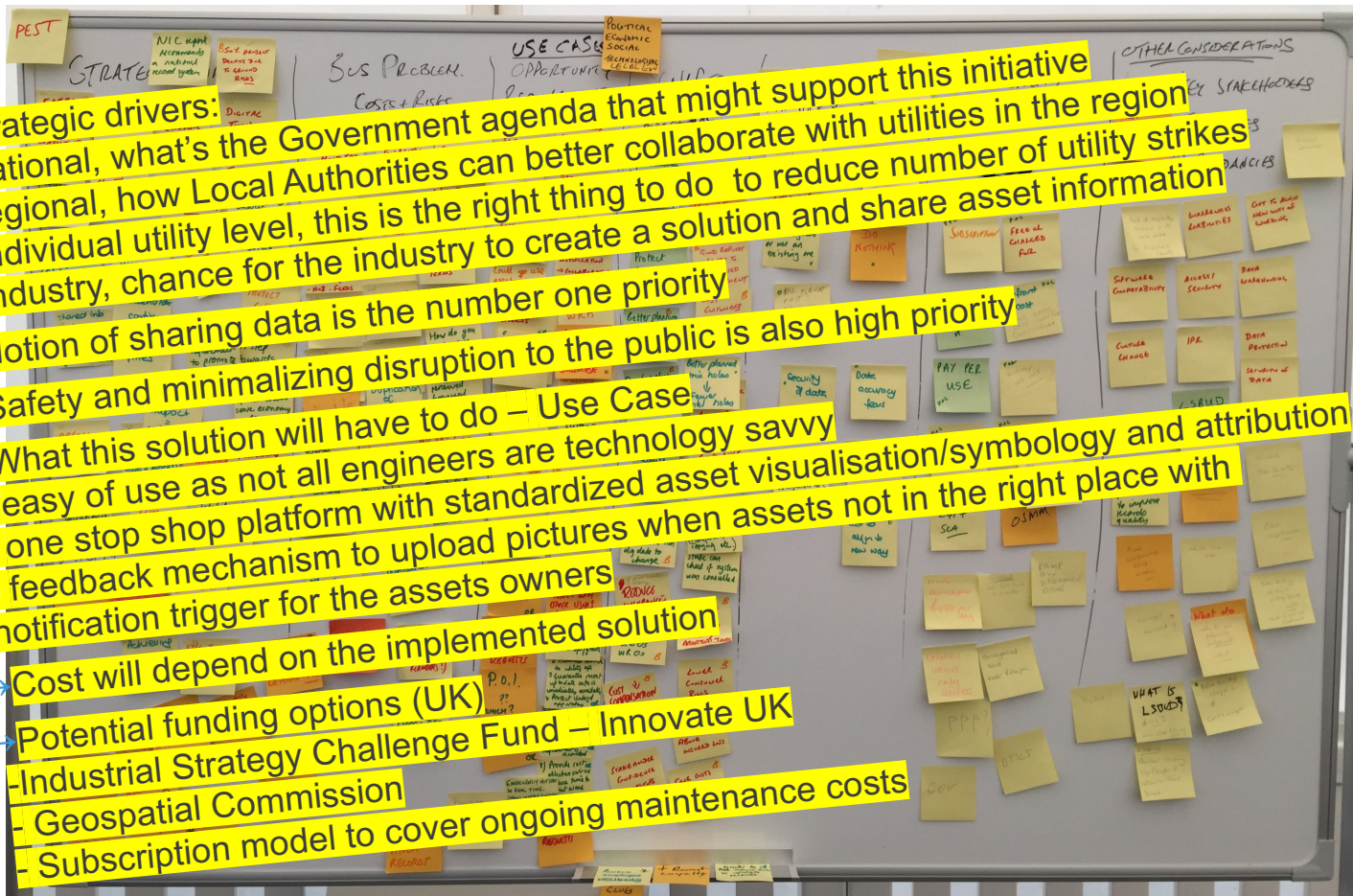
- Network Asset Point
- Abandoned Pipe
- As Built Transmission Pipe
- As Built Pipe
- Protection Line

- Varied quality of data (location and attribution) formats, symbology, currency
- Lack of universal standards for storing and recording data – leads to confusion of asset
- Lack of standard timelines for updating data particular for use in emergencies
- Need to Identify risks for 'as is' asset information – what is good enough accuracy
- No recorded depth
- Security of data – controlled access, recorded access, limit pollution of data
- No one stop shop for data - creation of job packs timely and costly exercise

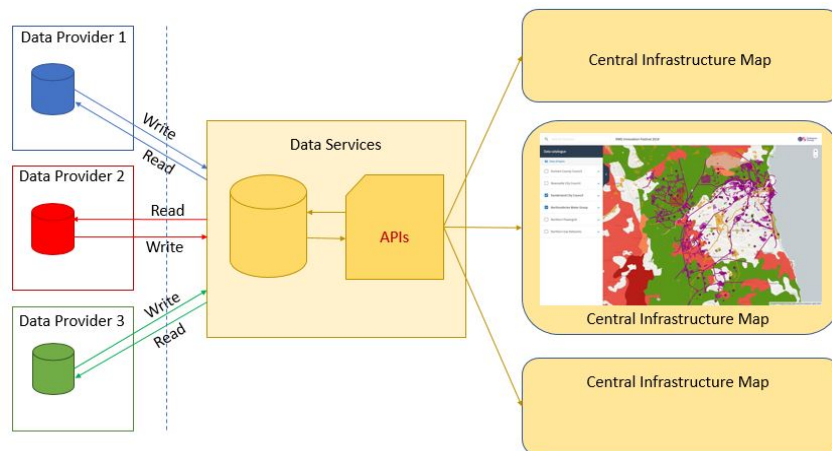


Over 70 datasets made available to developers

PESTLE Analysis was used to prepare Business and Use Cases

- 
- Strategic drivers:
 - national, what's the Government agenda that might support this initiative
 - regional, how Local Authorities can better collaborate with utilities in the region
 - individual utility level, this is the right thing to do to reduce number of utility strikes
 - industry, chance for the industry to create a solution and share asset information
 - Notion of sharing data is the number one priority
 - Safety and minimalizing disruption to the public is also high priority
 - What this solution will have to do – Use Case
 - easy of use as not all engineers are technology savvy
 - one stop shop platform with standardized asset visualisation/symbology and attribution
 - feedback mechanism to upload pictures when assets not in the right place with notification trigger for the assets owners
 - Cost will depend on the implemented solution
 - Potential funding options (UK)
 - Industrial Strategy Challenge Fund – Innovate UK
 - Geospatial Commission
 - Subscription model to cover ongoing maintenance costs

Three **technical architecture scenarios** were proposed based on the **Business and Use Case** developments

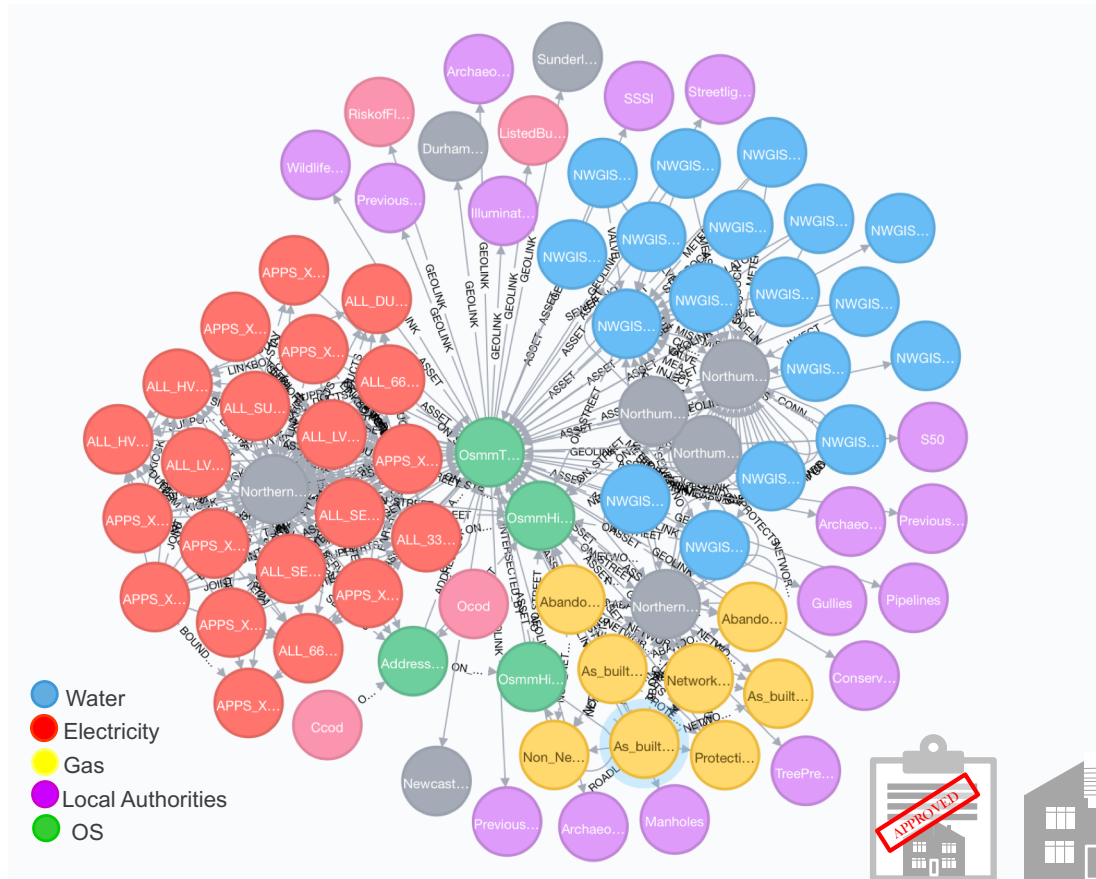


Scenario 3

In this scenario each Utility (or Data Provider) would no longer hold the 'Gold Standard' of their data, it would be held by a central organisation and edited, read and written to by each Data Provider. Then similar to Scenario 2, the central organisation that would manage the Data Services, create APIs from that database and publish these to a CIM. This would then be only one service that needs to be resilient, under Service Level Agreement and be available 24/7. This also means one point to access all of the APIs and one set of API keys. As a solution the hurdle here is more of an organisational one about ownership of data.



Graph database model was built and hosted on AWS to link all of the **underground assets** data with surface features of the base **map**

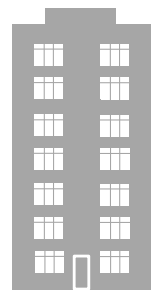
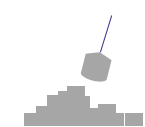


Some of the advantages and functionality

→ I want to see all the assets within particular section of the road, draw polygon

→ I want to see assets within the whole length of road, search by road name

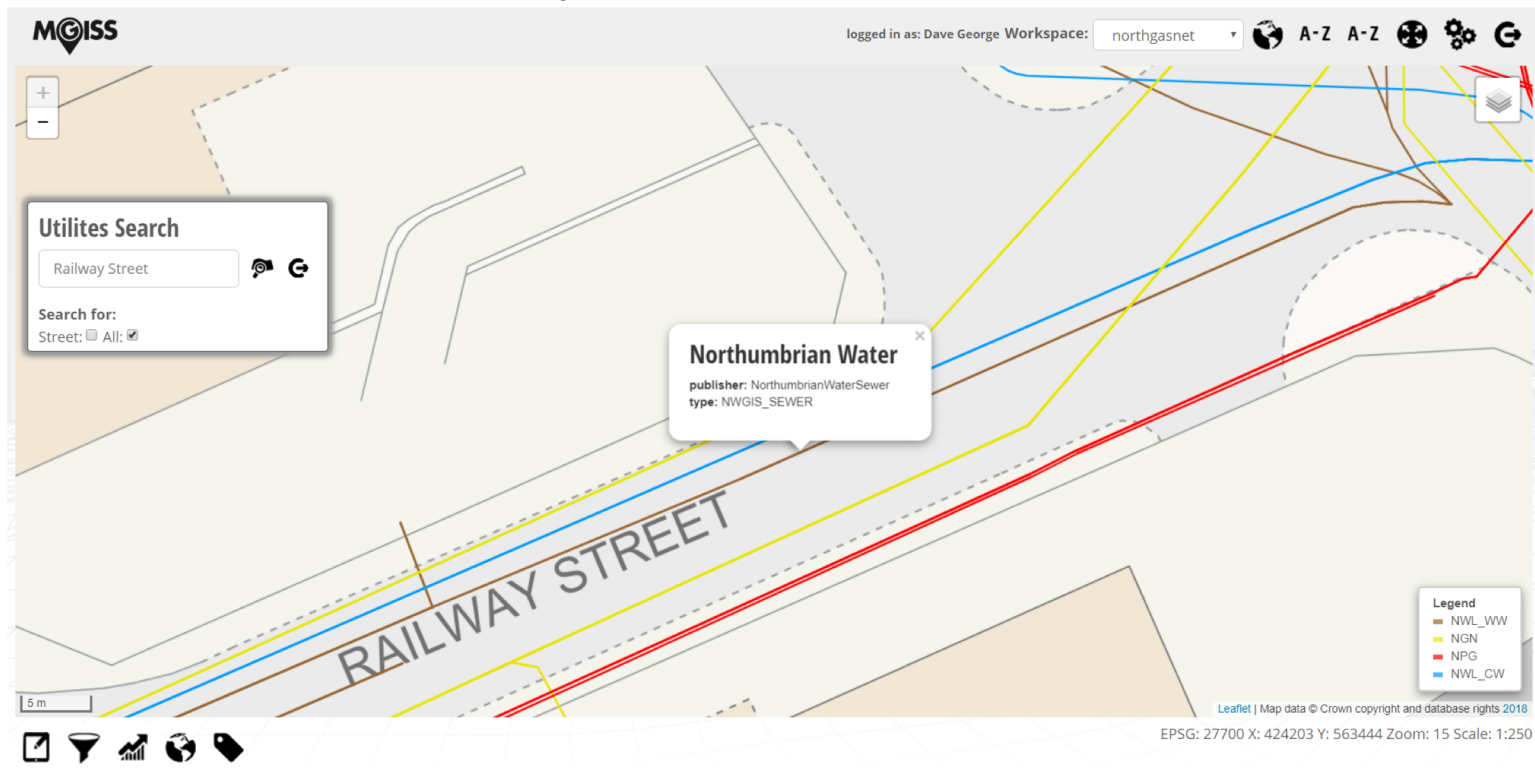
→ I want to see addresses related to the assets



Agnostic Data Hub architecture built on the Open Standards allows to integrate with existing front end solutions or build bespoke interfaces



Visualisation and clear understanding of the provided information was one of the key end user requirements



“We don’t always know what we’re looking at when plans are provided” – Excavators

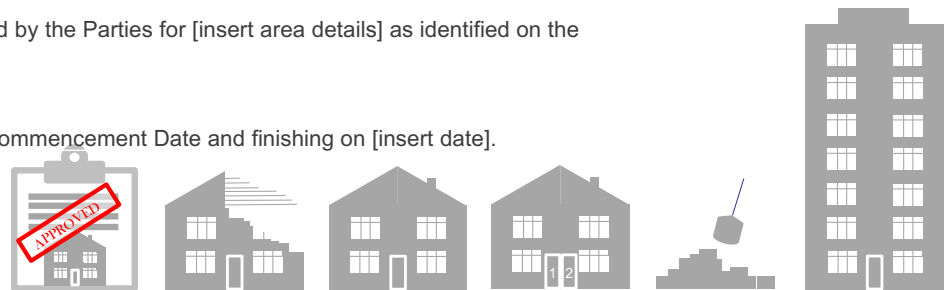
Corporate lawyers, licensing experts, data controllers and security experts work together to develop Hackathon Agreement which will be used as a foundation for future **Data Sharing Agreement**

'HACKATHON' AGREEMENT Template

This agreement is made between the parties listed in Annex 1 (the **Parties**) on the terms and conditions set out below, in consideration of working together to share datasets and endeavouring to create an underground asset map as part of a 'hackathon' project to be held at the [insert festival name] (the **Festival**).

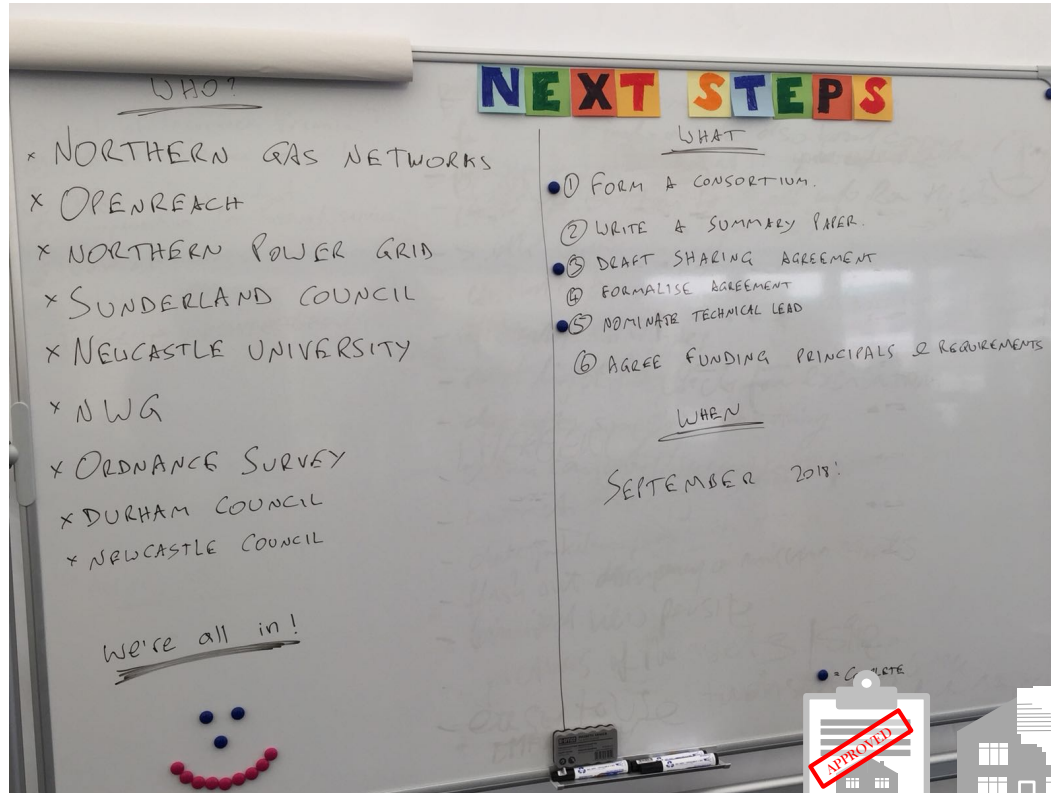
By participating in the Project, accessing the Platform and / or supplying Licensed Data pursuant to this Agreement, each Party fully and unconditionally accepts and agrees to be bound by these terms and conditions.

Purpose:	[Insert purpose].
Title:	[Insert project title].
Aims and objectives:	[Insert project aims and objectives].
Key Outputs:	<ul style="list-style-type: none">• The creation of a representative model of [insert details] (the Representative Model), to be provided on a restricted access platform.• [insert other details]• [insert other details]• [insert other details]
Licensed Data:	Utility, OS or other data as may be provided by the Parties for [insert area details] as identified on the Location Map in Annex 2.
Project Commencement Date:	[Insert date].
Festival Period	[Insert period dates].
Project Period	A period of time starting from the Project Commencement Date and finishing on [insert date].



No formal process of sharing data exists

We've also agreed on the **next steps**



- Form a Consortium ✓
- Write a summary paper ✓
- Draft a sharing agreement ✓
- Formalise sharing agreement ✓
- Nominate technical lead ✓
- Agree funding principles and requirements



When? September 2018



PROJECT ICEBERG

Integrated
city data

UK Research
and Innovation

Stephanie Bricker, BGS
Rollo Home, OS
Stefan Webb, Future Cities Catapult

projecticeberg@os.uk
www.bgs.ac.uk/urban/Iceberg

OGC MUDDI Workshop | New York | 24-25 July 2018



© NERC All rights reserved

PROJECT ICEBERG

▶ Market Research into Current State of Play and Global Case Studies

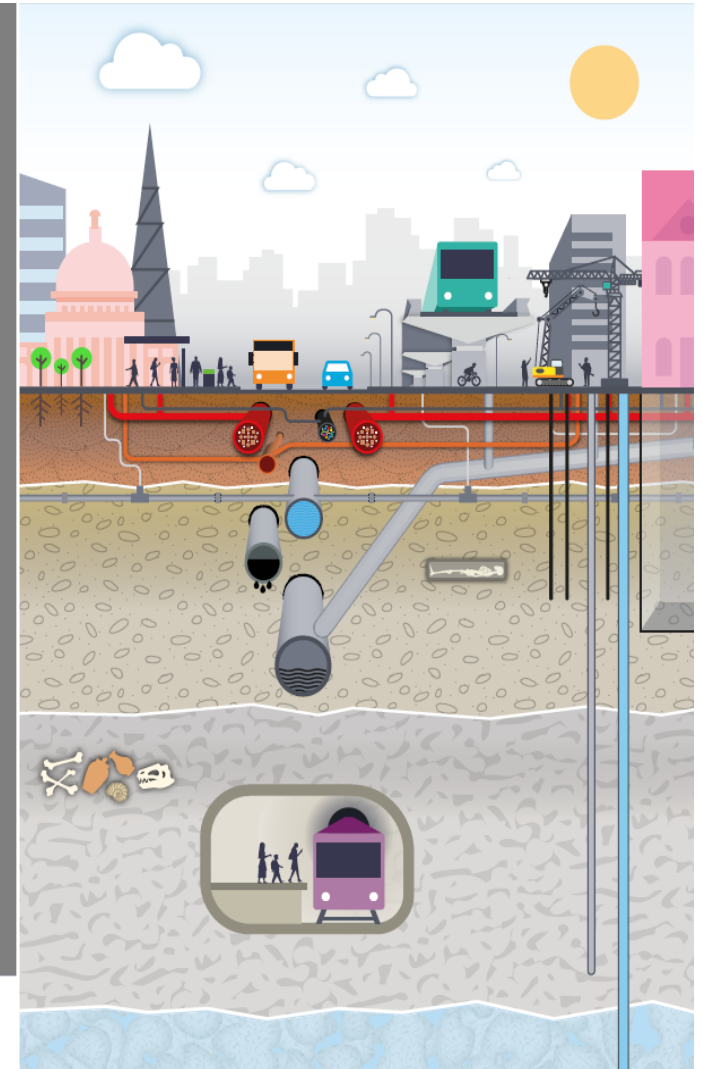
why ?

▶ Data operation systems and interoperability for an integrated data platform

how ?

▶ Identification of use cases for an integrated data platform

for who ?



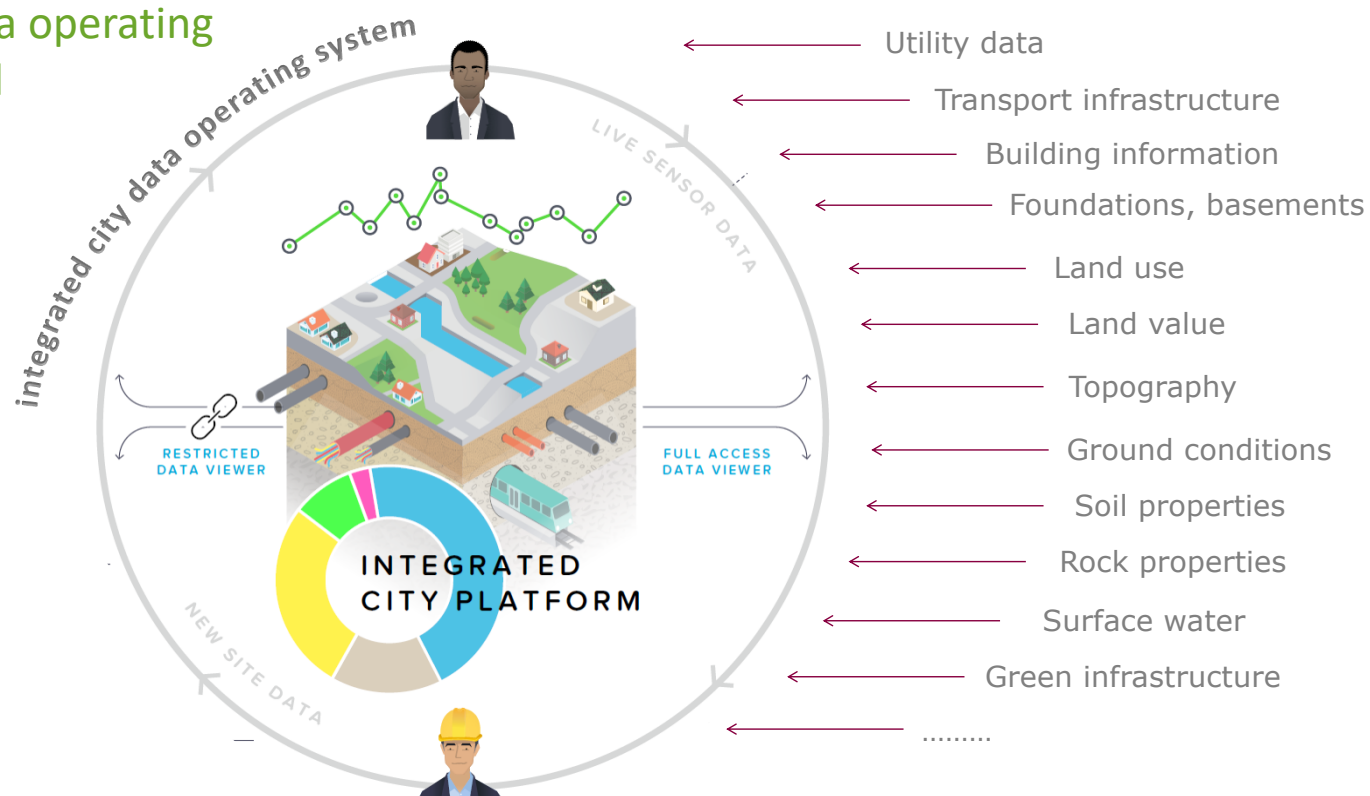
PROJECT ICEBERG

CATAPULT
Future Cities

Ordnance Survey

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

An integrated data operating system above and below ground

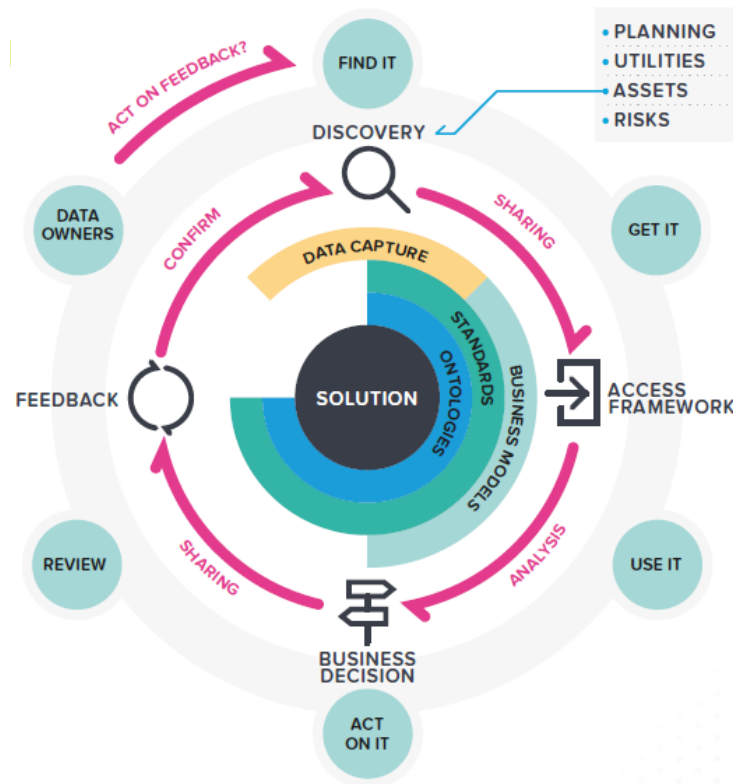


PROJECT ICEBERG

CATAPULT
Future Cities

Ordnance Survey

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL



Subsurface data

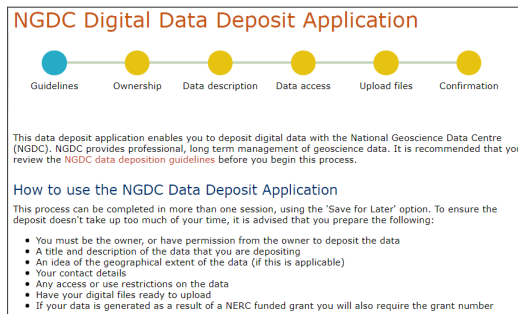
- Government-backed data exchange framework
- Consistent digital data workflow
- Integrate with existing city data systems
- National standards and accompanying policy/legislation

PROJECT ICEBERG

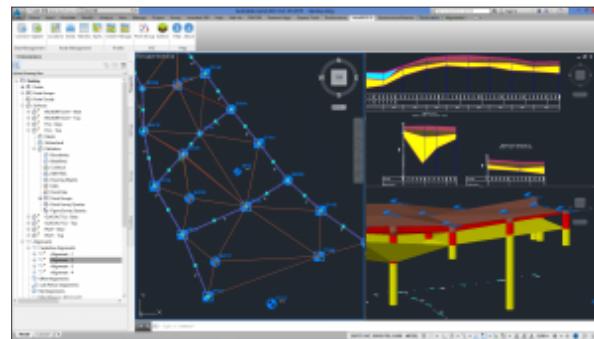
BGS' commitment to integrated data-exchange



Data ingestion (SI data)

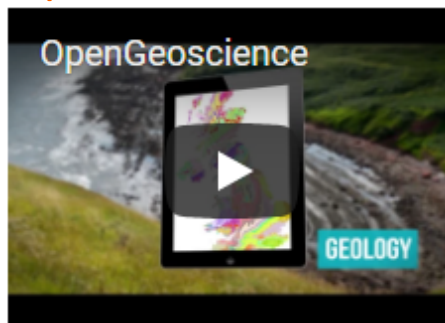


BIM for the subsurface

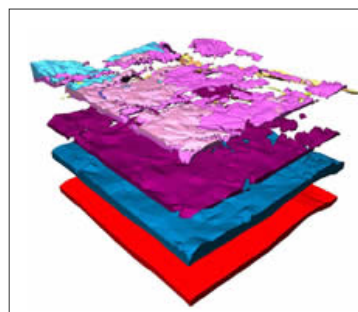


- Digital data standards (AGS)
- Digital workflow (BIM)
- Data security/IPR
- Interoperable formats
- Working with industry to develop data systems and agree data-sharing.

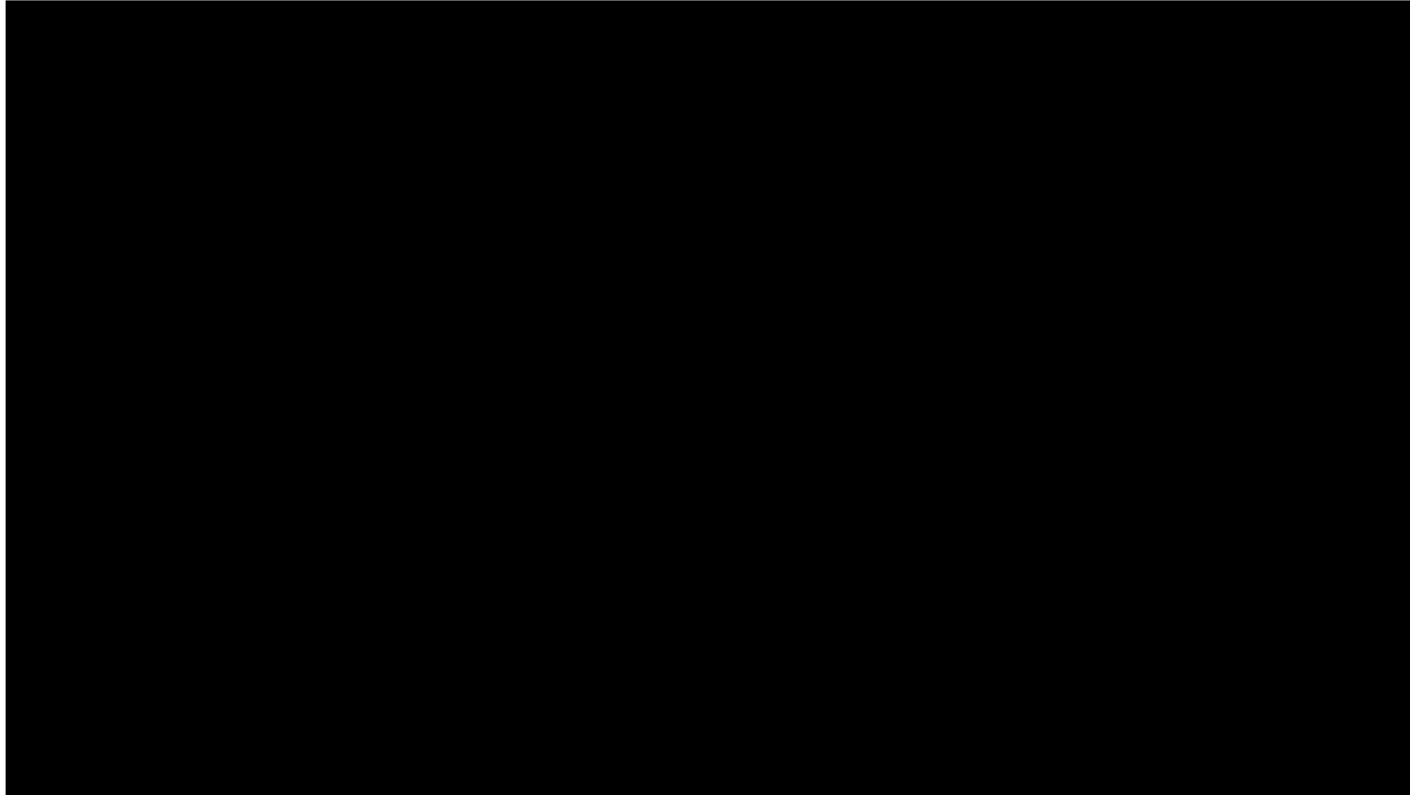
Open data



3D Ground models



What a good idea to dig only once



https://www.youtube.com/watch?time_continue=41&v=dg3StO-7zZY

Thank you

Bart Chudas

Consultant

bart.chudas@os.uk

(+44) 07825 715 853



Appendices



List of data sets provided for the purpose of the workshop


Durham County Council

- Street lighting - Public street lighting columns owned and maintained by Durham County Council
- Gullies - Highway drainage gullies (only a guide to the general position of the gully within the highway.)
- Manholes – Manhole information on highway drainage and watercourses
- Pipelines - Pipeline information on highway drainage and watercourses.
- Illuminates Signs - Illuminated signpost, bollards and zebra crossings & associated electrical equipment, owned and maintained by Durham County Council.

Newcastle City Council

- Conservation Areas
- Site of Special Scientific Interest (SSSI)
- Tree Preservation Order (TPO) Group
- Tree Preservation Order (TPO) Single

Sunderland City Council

- Archaeological Sites (Point) – Point indication of site of archaeological find or area of interest
 - Archaeological Sites – Extent of site of archaeological find or area of interest
 - Archaeological Sites (Line) – Site best represented as a line, especially railways
 - Previous Industrial Use (Point) – Point showing site of previous industrial use
 - Previous Industrial Use (Polygon) – Extents of area of previous industrial use. These may overlap
 - Previous Industrial Use (Line) – Site of previous industrial use best represented by line feature. Especially railways
 - Wildlife Corridors – Area designated as a corridor for movement of wildlife
 - Tree Preservation Orders – showing the extent of TPOs
 - SSSI – Site of Special Scientific Interest
- 

List of data sets provided for the purpose of the workshop

Northumbrian Water Group


- Cleaning device – Point
 - Connect – Point
 - Discharge Device – Point
 - Ending – Point
 - Hydrant – Point
 - Injection Point – Point
 - Main – Line
 - Measuring Device – Point
 - Metering Device – Point
 - Miscellaneous Access – Point
 - Regulator – Point
 - Sewer Structure – Polygon
 - Sewer Structure – Line
 - Sewer Node – Point
 - Stopcock – Point
 - Valve – Point
-
- Soils Data – Types of soil across the region
 - Soils Corrosion – how corrosive the soil is to different types of iron

List of data sets provided for the purpose of the workshop

Northern Powergrid

- 33kV Underground Cable – Line
- 66kV Overhead Cable – Line
- 66kV Underground Cable – Line
- Ducts – Polygon
- 11-20kV Overhead Cable – Line
- 11-20kV Underground Cable – Line
- Low Voltage Overhead Mains Cable – Line
- Low Voltage Overhead Service Cable – Line
- Cable Support Structures, i.e. Wooden Poles and Metal Towers carrying cables – Point
- Auxiliary (Signal) Cables (Underground & Overhead) – Line
- Northern Powergrid Boundaries – Polygon
- Earthing Equipment (underground) – Point
- Feeder Pillars – Ground mounted metal/GRP box with electrical equipment inside. – Polygon
- Kiosks – Ground mounted metal/GRP box with electrical equipment inside. – Polygon
- Cable Joints (underground) – Point
- Link Boxes (underground) – Polygon
- Northern Powergrid Sites – Polygon
- Cable Support Stay Wires – Above ground (permanent tether for poles against the tension in an overhead cable system – Line
- Cable Termination Joints – underground – Point

Northern Gas Networks

- Abandoned Plant
 - As Built Network Plant
 - Network Asset Point
 - Non-Network Asset Point
 - Abandoned Pipe
 - As Built Transmission Pipe
 - As Built Pipe
 - Protection Line
- 

HACKATHON' AGREEMENT Template

This agreement is made between the parties listed in Annex 1 (the **Parties**) on the terms and conditions set out below, in consideration of working together to share datasets and endeavouring to create an underground asset map as part of a 'hackathon' project to be held at the [insert festival name] (the **Festival**).

By participating in the Project, accessing the Platform and / or supplying Licensed Data pursuant to this Agreement, each Party fully and unconditionally accepts and agrees to be bound by these terms and conditions.

THE PROJECT

Purpose:	[Insert purpose].
Title:	[Insert project title].
Aims and objectives:	[Insert project aims and objectives].
Key Outputs:	<ul style="list-style-type: none">• The creation of a representative model of [insert details] (the Representative Model), to be provided on a restricted access platform.• [insert other details]• [insert other details]• [insert other details]
Licensed Data:	Utility, OS or other data as may be provided by the Parties for [insert area details] as identified on the Location Map in Annex 2.
Project Commencement Date:	[Insert date].
Festival Period	[Insert period dates].
Project Period	A period of time starting from the Project Commencement Date and finishing on [insert date].

TERMS AND CONDITIONS

1. This Agreement shall start on the Project Commencement Date and continue for the Project Period.
2. The Parties shall where applicable share their Licensed Data in advance of the Festival Period with OS. The Parties shall endeavour to develop and / or deliver the Key Outputs for the Project, as detailed above.
3. OS shall provide a restricted access platform to host the Representative Model and for the sharing of the Licensed Datasets (the **Platform**). Access to the Platform shall be made available to the Parties during the Festival Period. The Parties agree that they shall not provide any unauthorised third parties with access to the Platform.

Intellectual Property & License Granted

4. The Parties warrant that they are either the sole owner of all intellectual property rights in any Licensed Data, technical know-how and other information or software they provide for the Project, or that they are authorised to provide to the other Parties the right to use such Licensed Data, technical know-how and other information or software for the Project.
5. All intellectual property rights including technical know-how, data and information that was known by any party at the date of entering this agreement or existed prior to this agreement or developed separately from the Project, and any Licensed Data provided for the Project shall belong to the Party which provides it (and / or their third party licensors).

Except for OS Licensed Data, any Party sharing its Licensed Data grants to the other Parties a non-exclusive, revocable, royalty-free, non sub-licensable and non-transferable licence to use such data for the Purpose only, including to create, test, and demonstrate the Representative Model, and for demonstration to the attending participants at the Festival (**Attendees**) during the Festival Period. This licence shall cease at the end of the Project Period for all Parties. The Parties expressly agree to use the Licensed Data only for the Purpose, and shall not be permitted to otherwise use, copy, sell or pass any other Party's Licensed Data to third parties unless they have entered into separate licence terms specifically permitting this.

7. For Licensed Data provided by OS for the Purpose (**OS Licensed Data**): (a) where a Party is a PSMA Member, the OS Licensed Data shall be licensed to that Party under the terms of the PSMA; (b) where a Party has an existing commercial licence agreement with OS, the OS Licensed Data shall be licensed under the terms of that licence, to the extent that the rights to use the OS Licensed Data are covered by the terms of that licence; and (c) where a Party has no existing licence to use OS Licensed Data or the terms of a Party's existing licence with OS for OS Data do not cover the use of OS Licensed Data for the Purpose, then the terms of the Data Exploration Licence ('DEL') available at the following link shall apply for the Purpose, as may be modified by the terms of this Agreement: <https://www.ordnancesurvey.co.uk/docs/licences/data-exploration-licence.pdf>
8. The Parties agree and acknowledge that in the event that any Party wishes to use the Representative Model and / or develop the Representative Model further beyond the Project Period, any such use will need to be the subject of a separate agreement. No Party shall be obliged to enter into any separate agreement however.

Termination

9. A Party may withdraw from this Agreement by giving OS and NWG not less than 2 working days' notice in writing. On withdrawal of a Party from this Agreement, the remaining Parties shall ensure that any of the withdrawing Party's Licensed Data or confidential information or property (either digital or physical) held pursuant to this Agreement is returned or irrevocably destroyed (to the extent technically practicable where it is in digital form), at the withdrawing Party's request.
10. On termination of this Agreement, all the Parties' Licensed Data, confidential information or property (either digital or physical) held pursuant to this Agreement shall be either returned or irrevocably destroyed (to the extent technically practicable where it is in digital form).
11. Any provisions of this Agreement which are expressly or by implication intended to come into or continue in force on or after termination of this Agreement shall continue in full force and effect.

Publicity

12. The Parties will endeavour to: (a) keep the other Parties informed of any media interest in the Project; (b) cooperate with one another regarding any public announcement or media response; and (c) recognise the contributions of the other Parties towards the Project. OS may produce media material e.g. in the form of case studies and videos relating to the Project and will endeavour to notify the other Parties of this prior to release.

Confidentiality & Disclosure

13. Each Party shall treat all information that would be reasonably regarded as confidential, or is identified as such, in confidence. The Parties agree that they shall not disclose, or permit their employees or contractors to disclose, to any person either during the course of this Agreement or after, any confidential information which a receiving Party has come into possession of, unless with the consent of the disclosing Party or due to a legal, governmental or regulatory requirement. Some Parties are bound by the Freedom of Information Act 2000 and the Environment Information Regulations 2004 and the other Parties will provide such assistance, without charge, as shall be reasonably requested to assist those Parties to comply with these statutes.

Warranty and Liability

14. The Key Outputs, Licensed Data and Representative Model for the Project shall be supplied on an “as is” basis, and to the extent permitted by law, all warranties, conditions and terms relating to the Key Outputs, Licensed Data and Representative Model are excluded.
15. Nothing in this Agreement limits any Party’s liability for: death or personal injury; fraud; any which liability that cannot be limited or excluded by law or breach the obligations related to confidential information.

Personal Data

16. The Licensed Data provided for the Project will not contain any personal data. However, to the extent that a Party’s Licensed Data does contain any personal data, that data shall be processed in compliance with applicable UK data protection legislation.

General

17. Any variation to this Agreement will be subject to the signing of another agreement between the Parties. Should a Party not find a variation acceptable it may withdraw from this Agreement.
18. Nothing in this agreement creates a partnership or joint venture between the Parties. No Party is authorised to act as agent for any other Party or to bind any other Party in any way. A person who is not a Party to this agreement has no right to rely on or enforce any term of this agreement.
19. Any notices under this Agreement sent by first class post shall be deemed accepted 2 days after posting. Any notices sent by email shall be deemed to be served the next working day after sending.
20. No Party may licence, assign, transfer or novate the rights and / or obligations under this Agreement without the prior written consent of the other Parties, such consent not to be unreasonably withheld.
21. In the event of any conflict between this Agreement and the rules of the Festival, or the DEL, the Parties agree that the terms and conditions of this Agreement shall prevail.
22. These terms shall be governed by the law of England and Wales, and the Parties submit to the exclusive jurisdiction of the courts of England and Wales.

ANNEX I PARTIES

Ordnance Survey Limited, with registered office at Explorer House, Adanac Drive, Southampton, SO16 0AS (company registration number 09121572) (**OS**);
[Insert other participating parties below...]

