Crossing the streams

Luke Cooper

Data

Digital Transformation

Case Study: The Greater West

Accessibility

Analytics

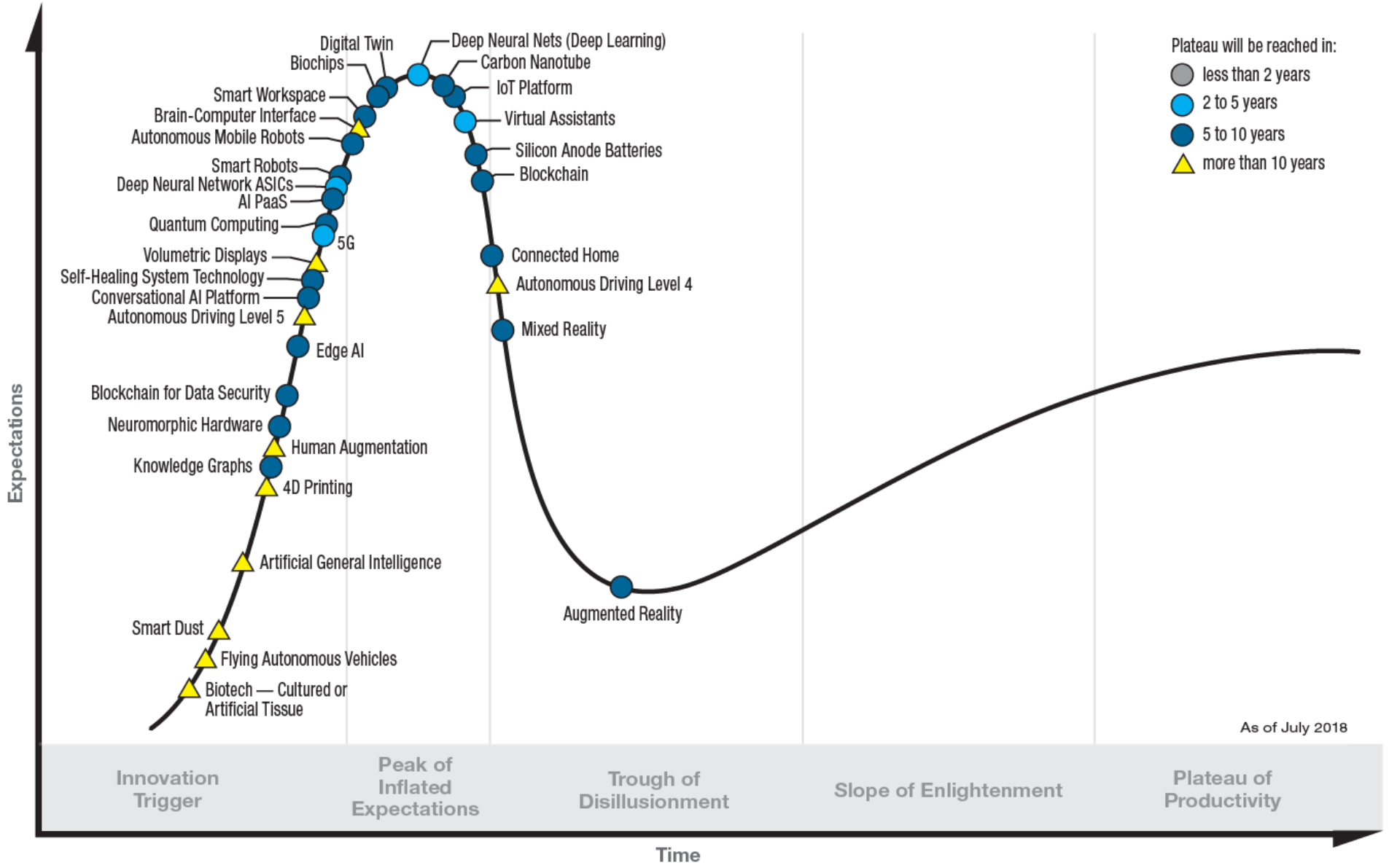
Utilisation

Industry

“It is difficult to visualise how the necessary calculations could have been made without [computers]”

Ove Arup

Hype Cycle for Emerging Technologies, 2018



LATCH

Coordinate Systems

Data Standards

Data Standards

Data Standards - Common Data Environment

BIM Maturity Measurement

The global BIM maturity initiative

With uncertainty surrounding what the UK Government's BIM Level 2 is and how to achieve it, and the lack of consistent guidance on how to apply BIM progressively on projects, Arup identified a need for a maturity model to help professionals benchmark their performance and set targets for improvement – whether for efficiency, reliability, repeatability or improved design.

In 2013 we could find no tools to assess BIM maturity of projects, as opposed to organisations, that could be applied at scale. So we developed the Arup BIM Maturity Measure (BIM-MM) and made it freely available to the wider industry to spread awareness, demystify BIM, and to communicate a clearer vision of the core components of BIM.

It became a useful and supported tool, and between 2013 and 2015 we measured over 300 projects. But, its use was optional and mainly in the UK. So, in 2016 we integrated the tool into our business-as-usual project delivery. This initiative, led by the UK, started in March 2016 and continues today, measures all applicable BIM projects in all Arup offices. We assess all relevant Arup projects as they begin at appropriate points in their lifecycle; to date we've measured 1313 projects.

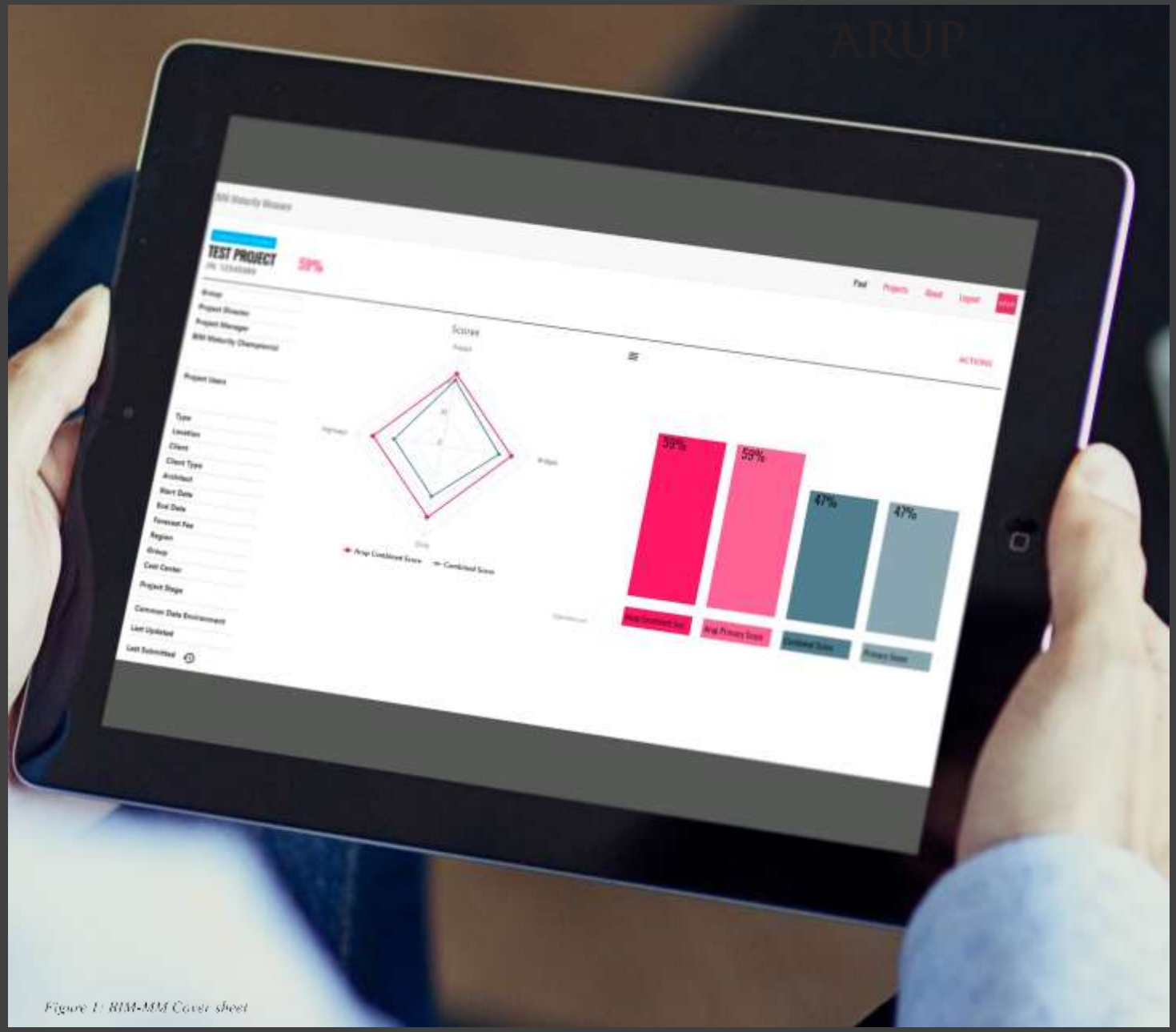


Figure 1: BIM-MM Cover sheet

BIM Maturity Measurement

ARUP

The BIM Maturity Measure model

The Arup BIM Maturity Measure is a simple tool to assess the maturity of BIM implementation within projects. It draws on work by Penn State University under the Creative Commons 3.0 licence. Through use of the BIM Maturity Measure we are able to assess and adopt a common view of what is BIM best practice and the depth of its diffusion across our Regions and Groups. It is a discipline-agnostic tool that seeks to measure just how much a project has used BIM and how successful this has been. We are making the BIM Maturity Measure available for wider industry use in order to demystify BIM, reduce 'BIMwash' and help raise capability across our industry.

It was launched on 2nd December 2014 at AutoDesk University 2014 and is available here to ***download*** along with the presentation shown at the event. If you need information regarding the BIM Maturity Model, please email ***BIM.Maturity@arup.com***.

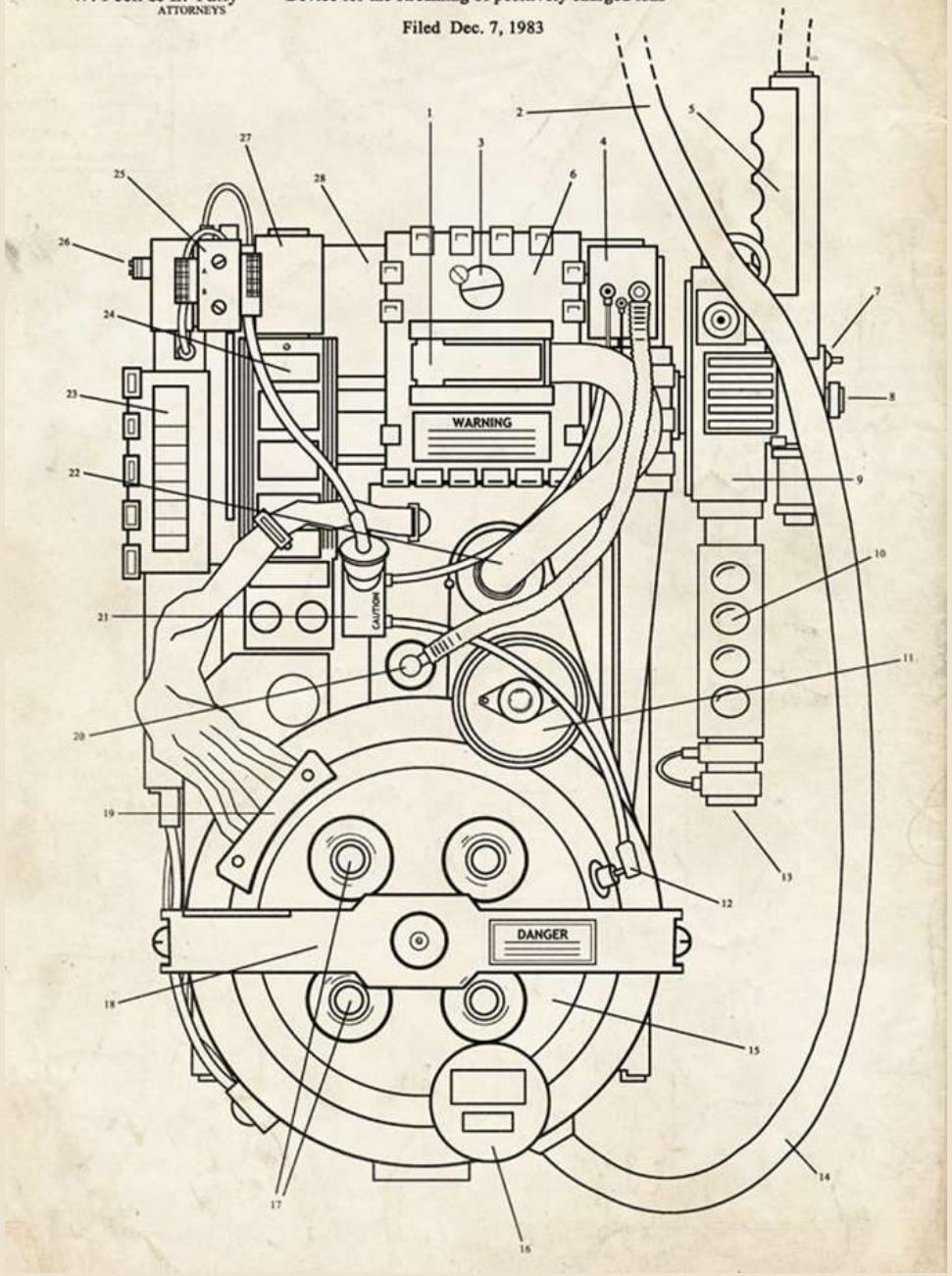
Design

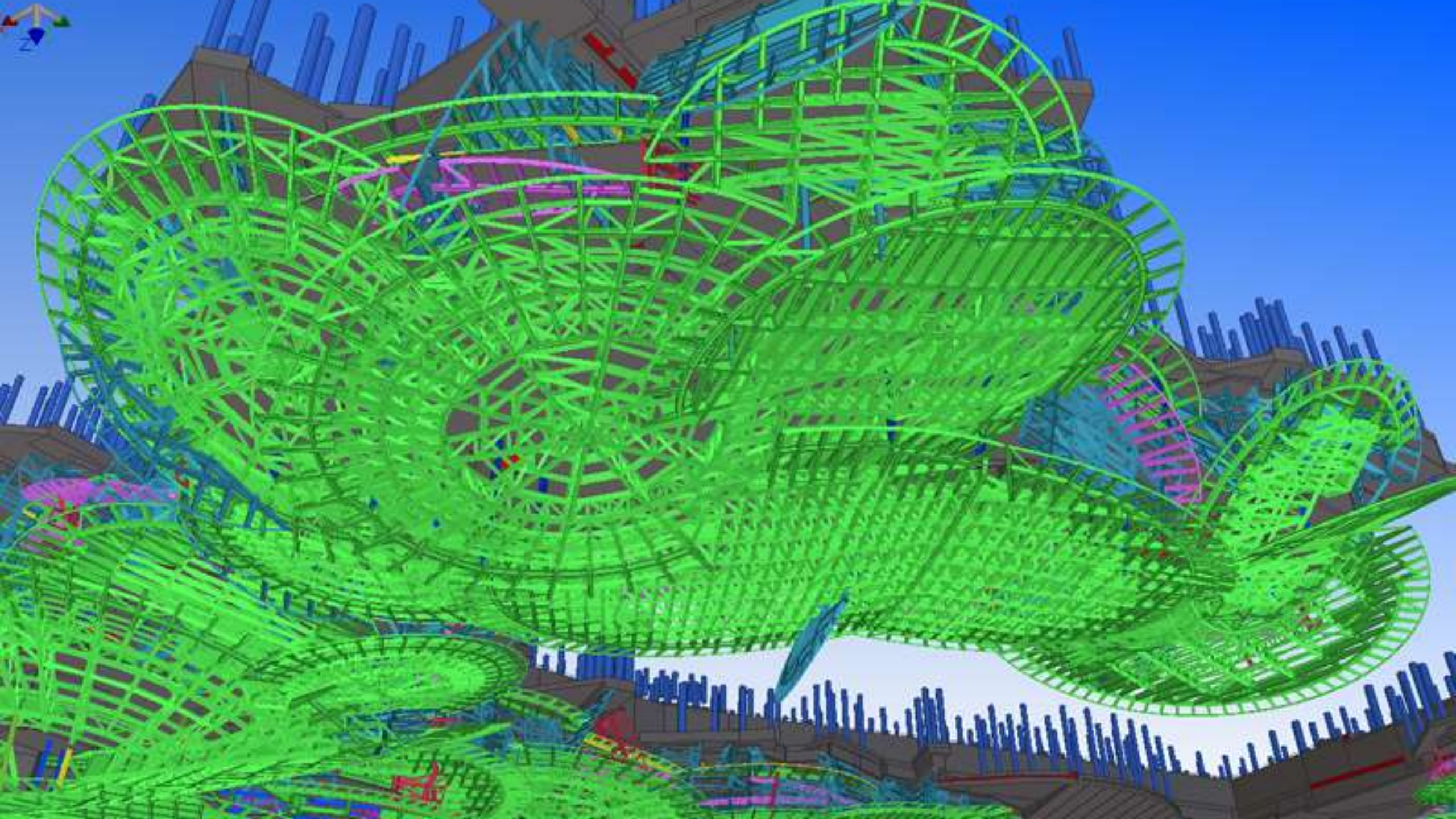
JUNE 8, 1984 E. SPENGLER 12,211,944

W. Peck & L. Tully
ATTORNEYS

Device for the streaming of positively charged ions

Filed Dec. 7, 1983

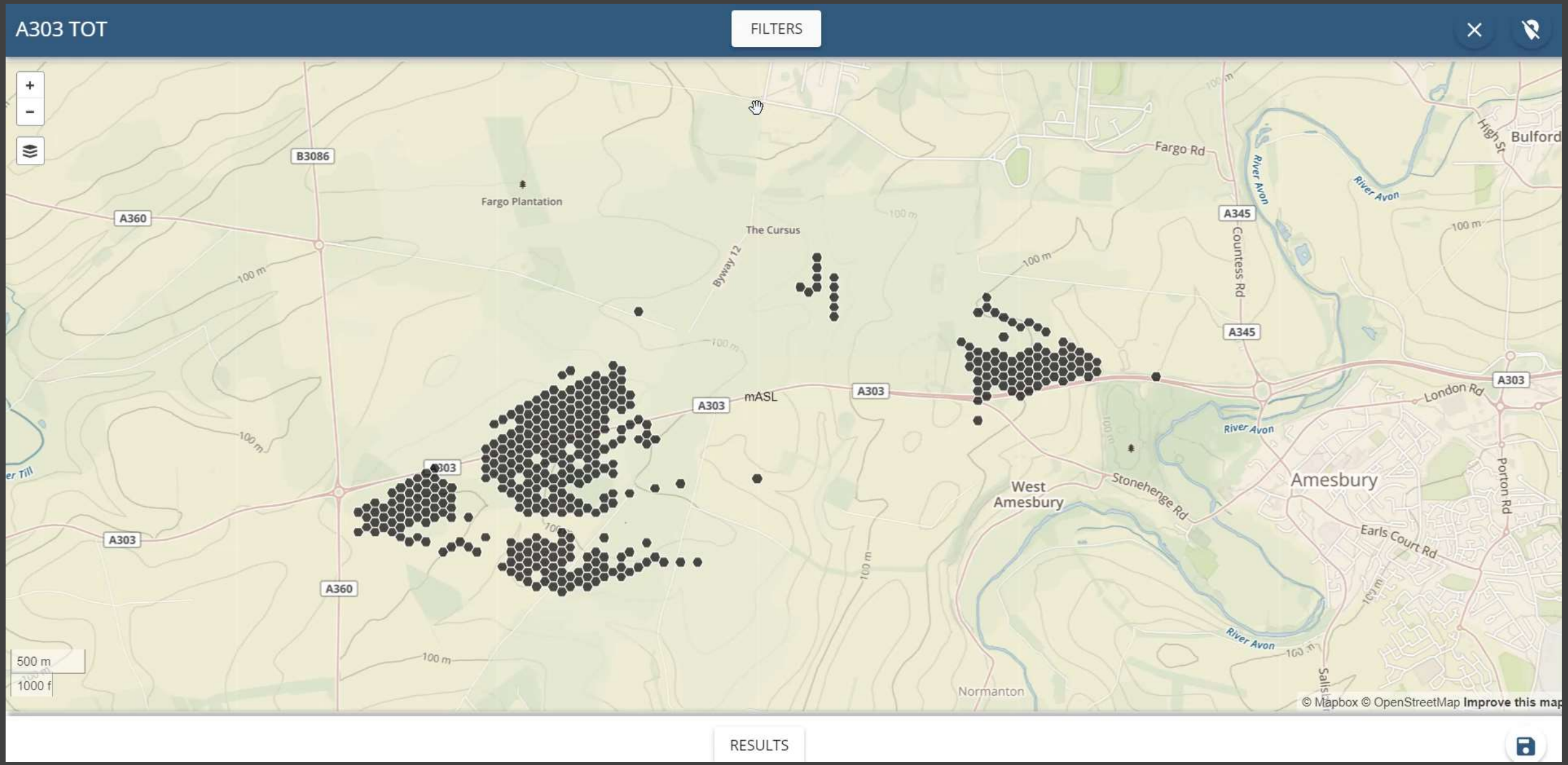




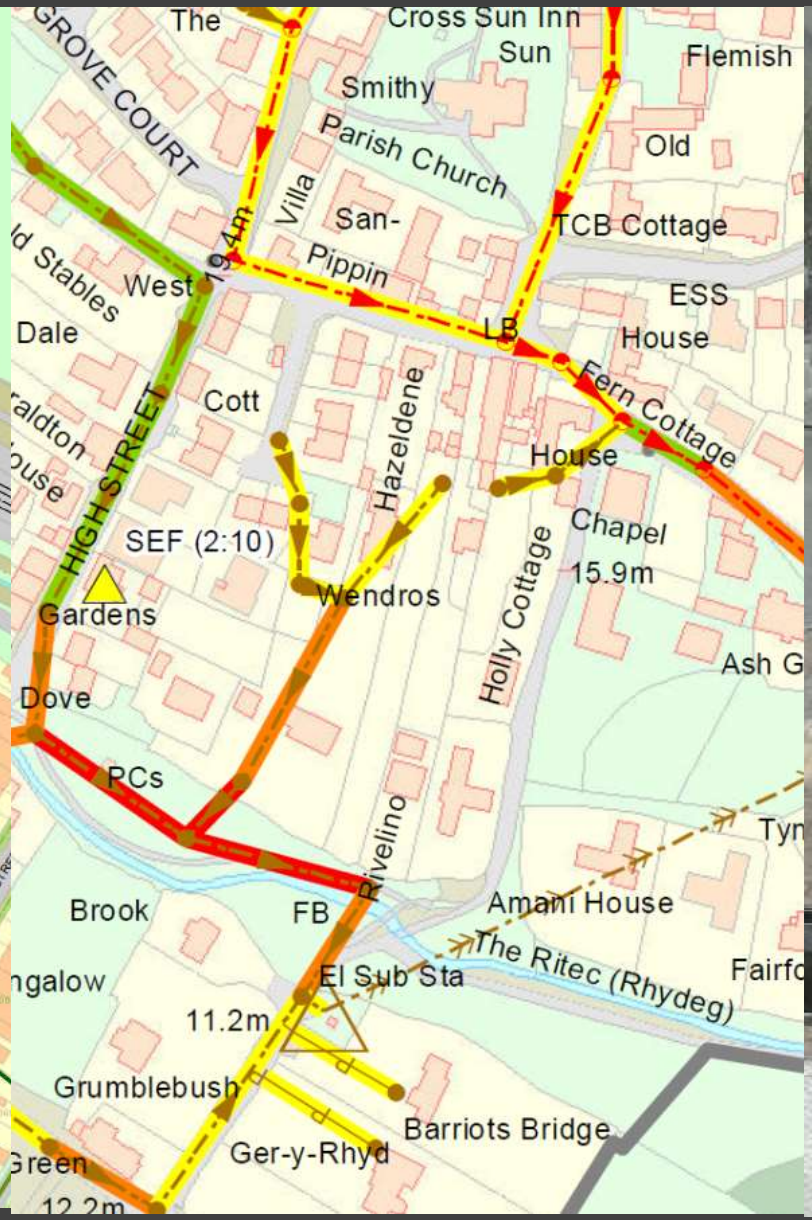
Analytics

MANHATTAN

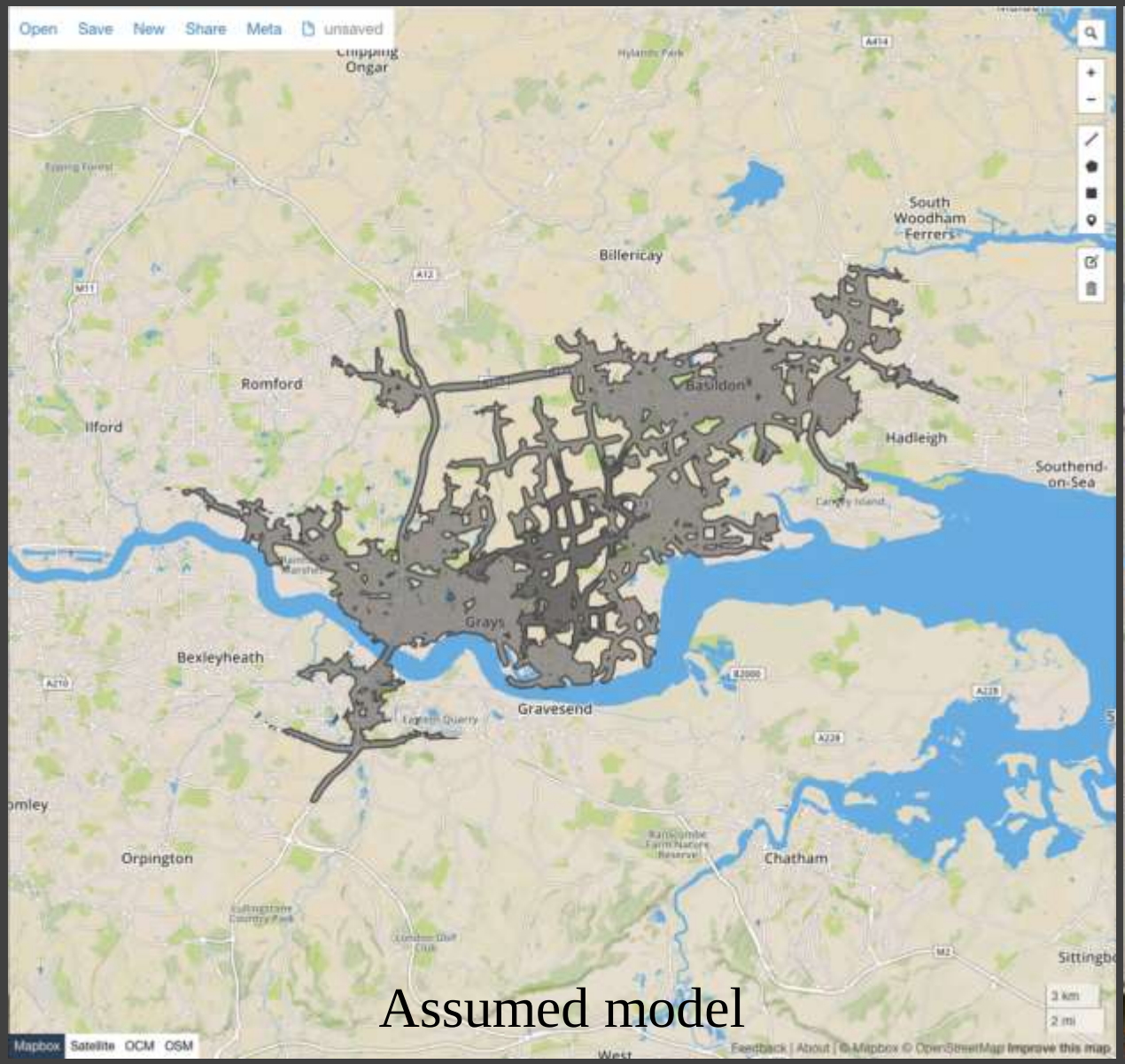
Criteria Evaluation



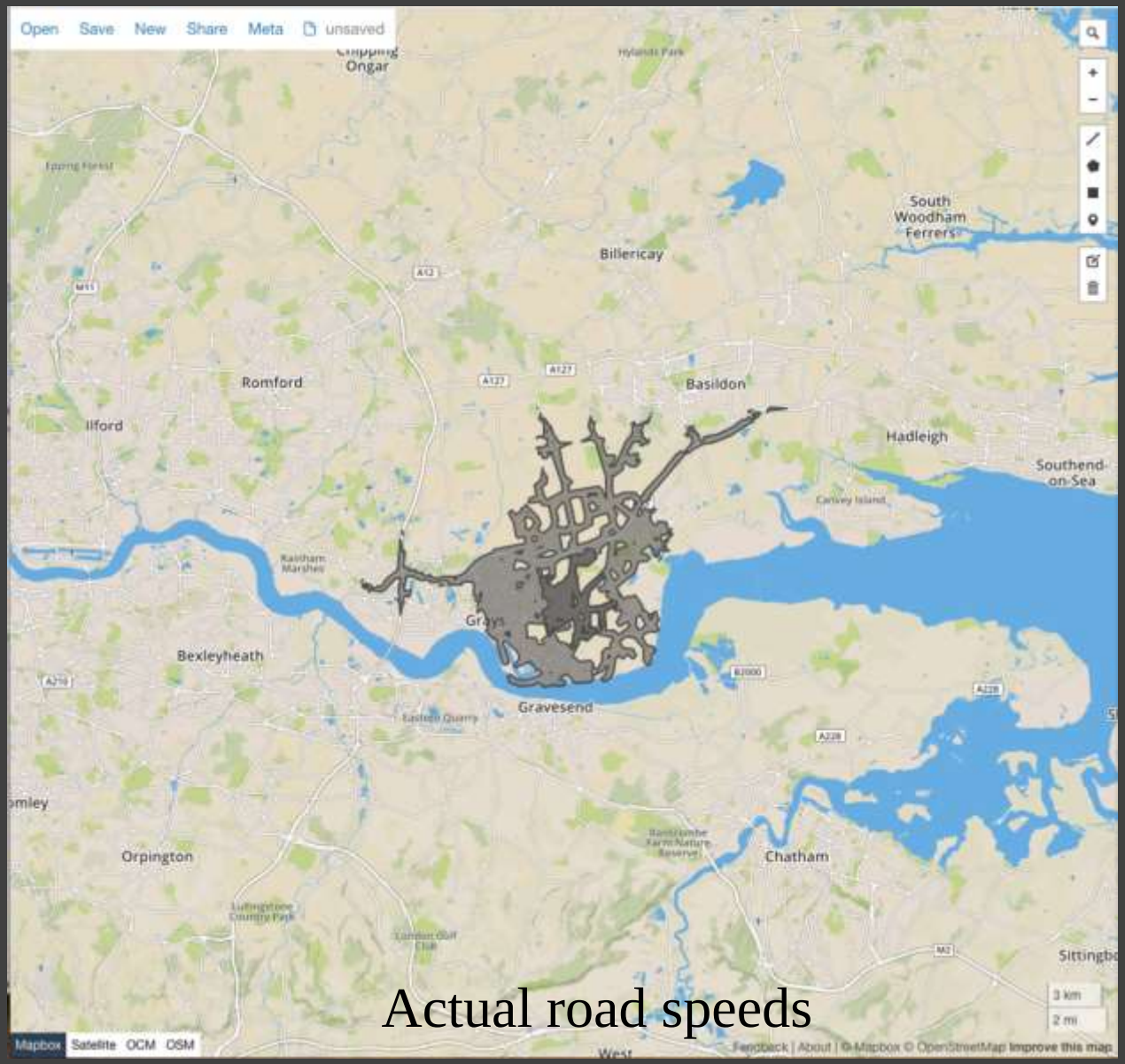
Predictive Analytics



Testing our assumptions about journey times



Assumed model



Actual road speeds

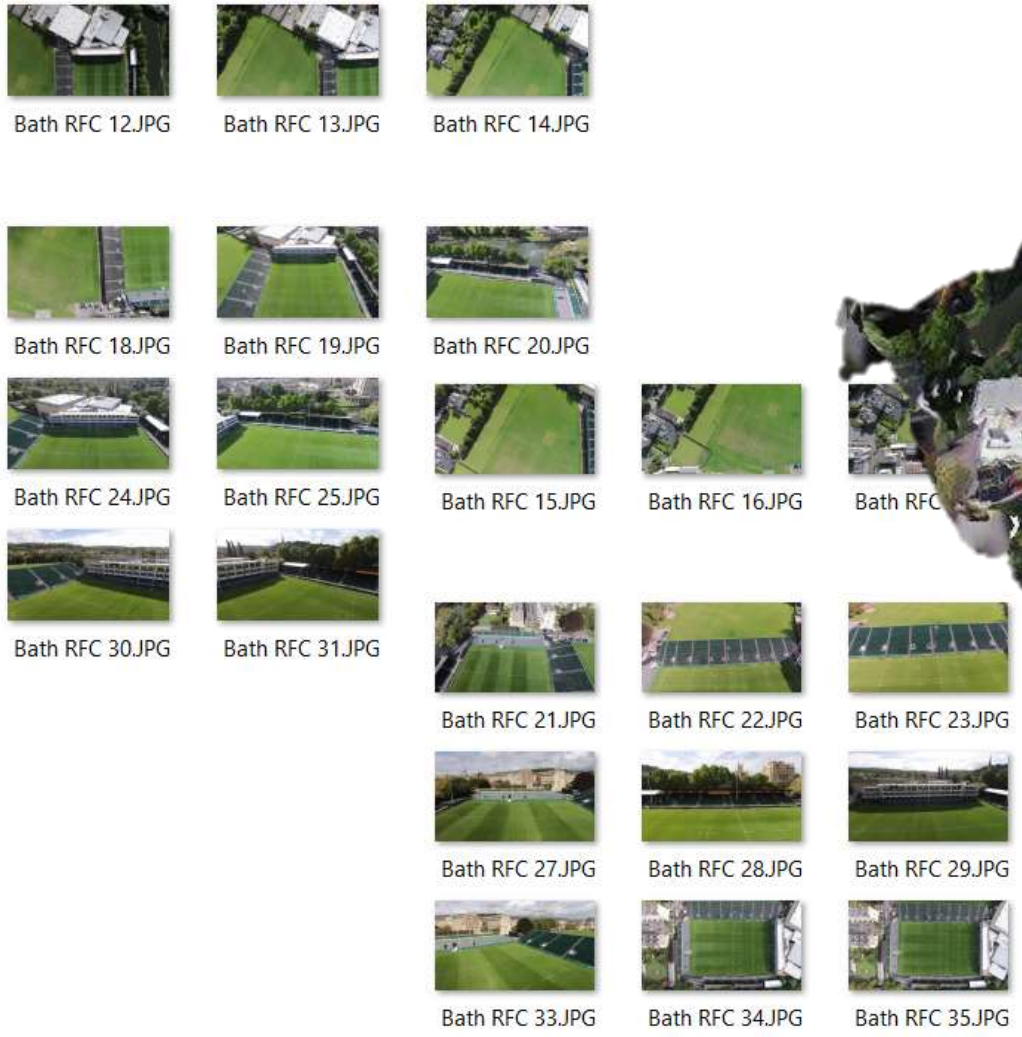
Scenario Analysis

Which parts of London are accessible from Heathrow by public transport within 45 mins? (areas shown in jade)

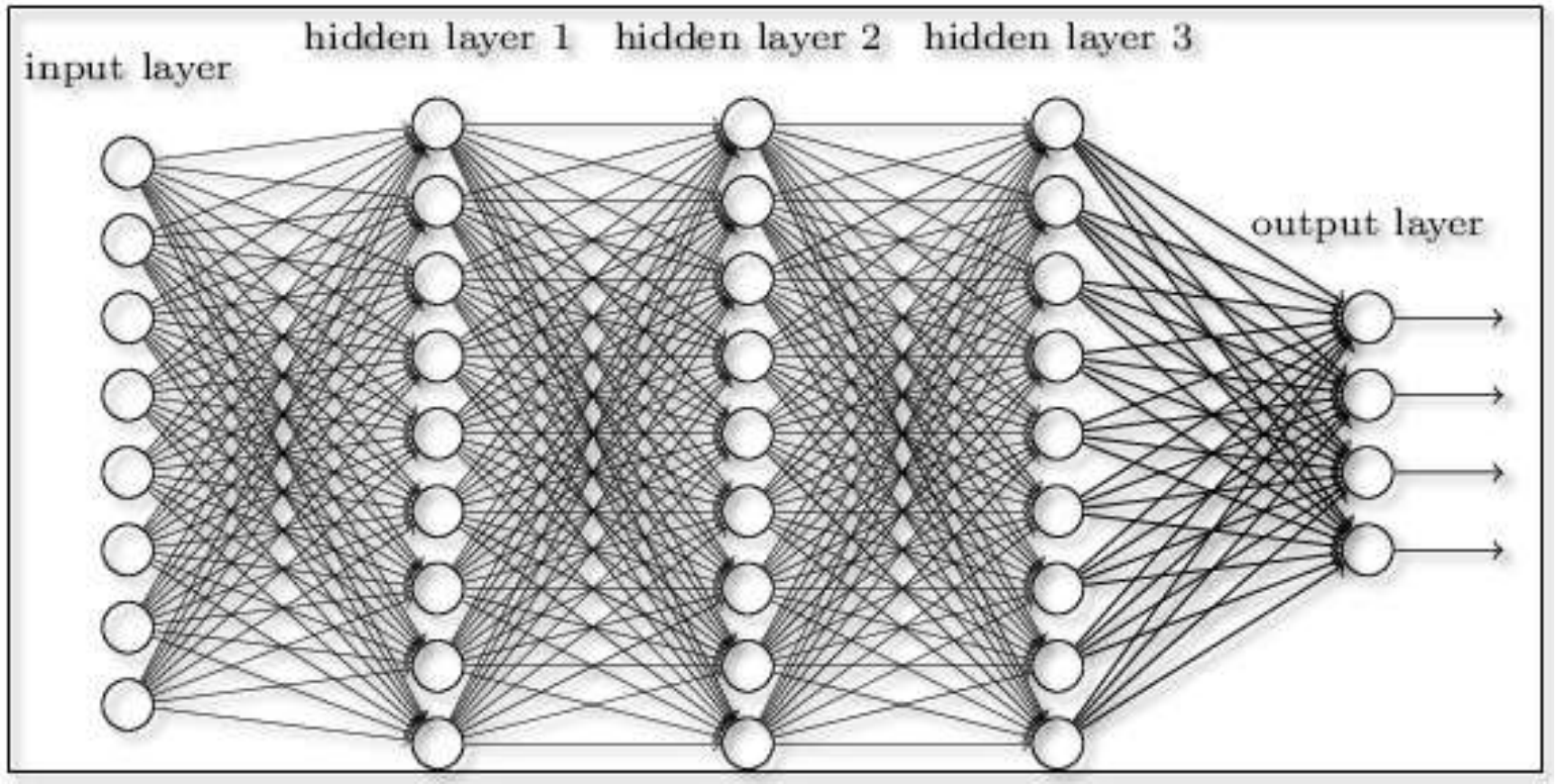
This would change dramatically if there was a total outage on the Piccadilly line, e.g. signal failure, natural disaster, terrorist attack

Utilisation

Photogrammetry



Artificial Intelligence and Deep Learning



Cucumber
99%

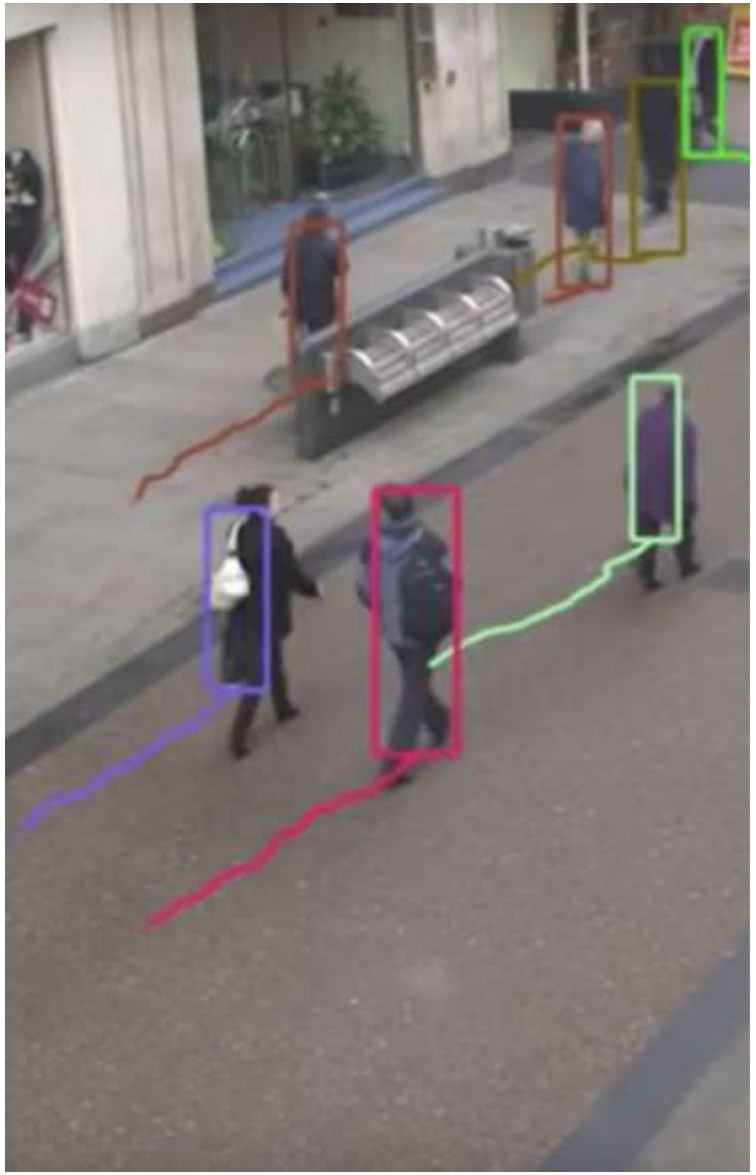
Pixel

Edge detection

Shape

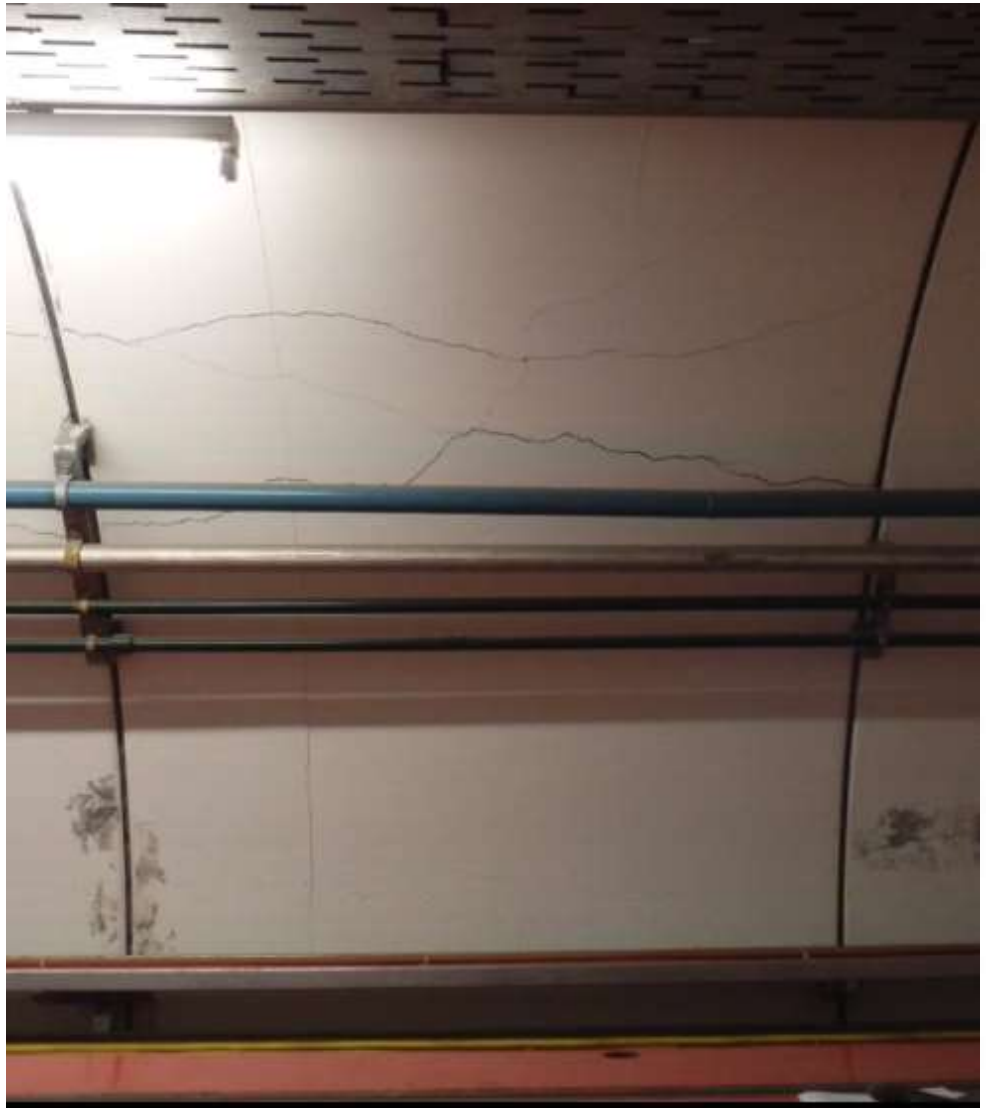
Gaist

RECYCLE IT

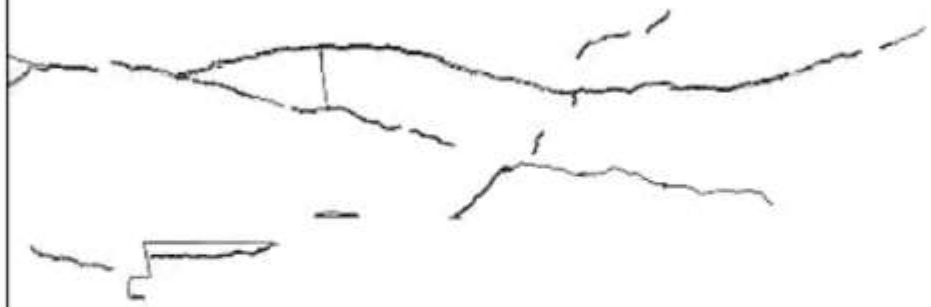


Engineering

Crack Detection



Automatize:
- Sketching



Automatize:
- Statistics

Automated section report

Ring: 254
Total Cracks length: 443mm
Average crack width: 4mm
Longest crack: 123m
Broadest crack :7mm

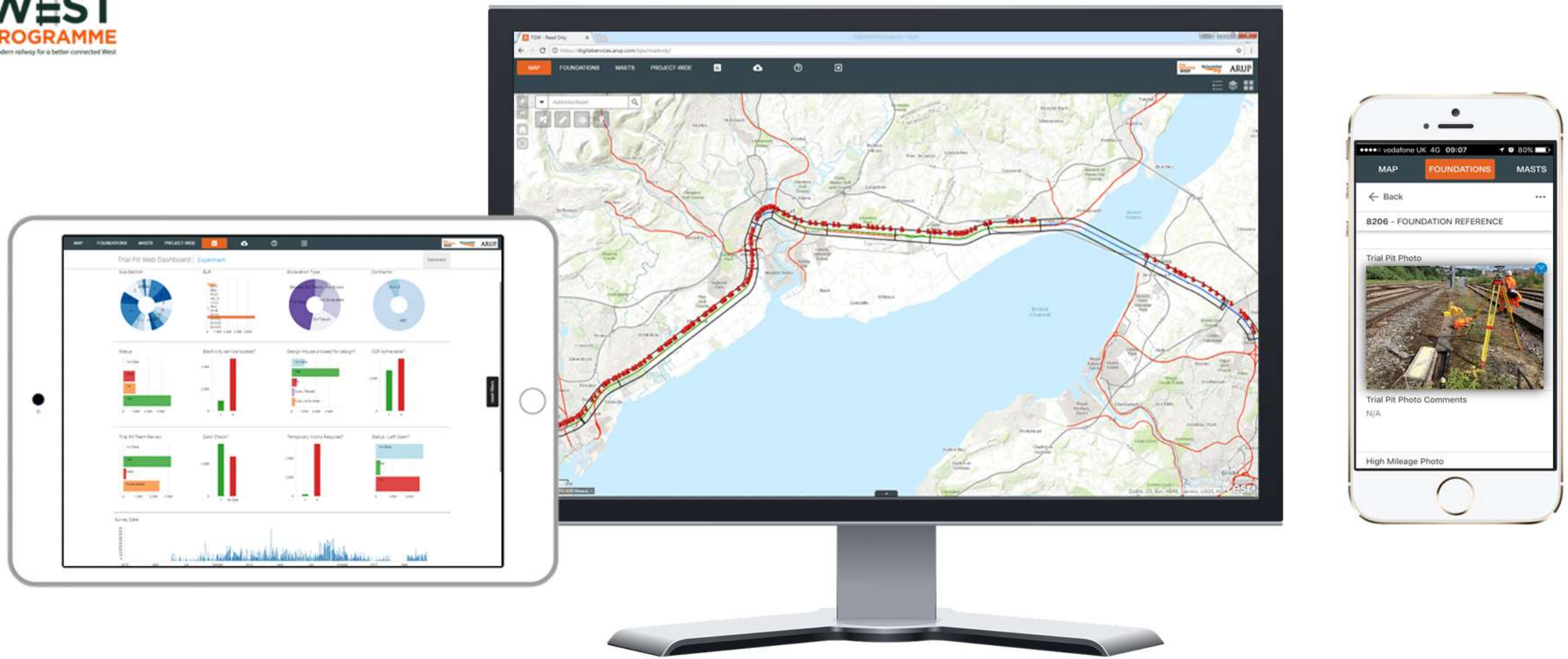
Accessibility

ECTO-1

Desktop
Mobile
Web Application
Native Application Support
Arup Cloud Service
SaaS
API
Web Application
Services
Automation
Analytics
Cognitive Services
Geometry Services
Storage
SQL
Database
Files
Reports
Authentication
Security
Monitoring
Notification

THE GREATER WEST PROGRAMME

A modern railway for a better connected West



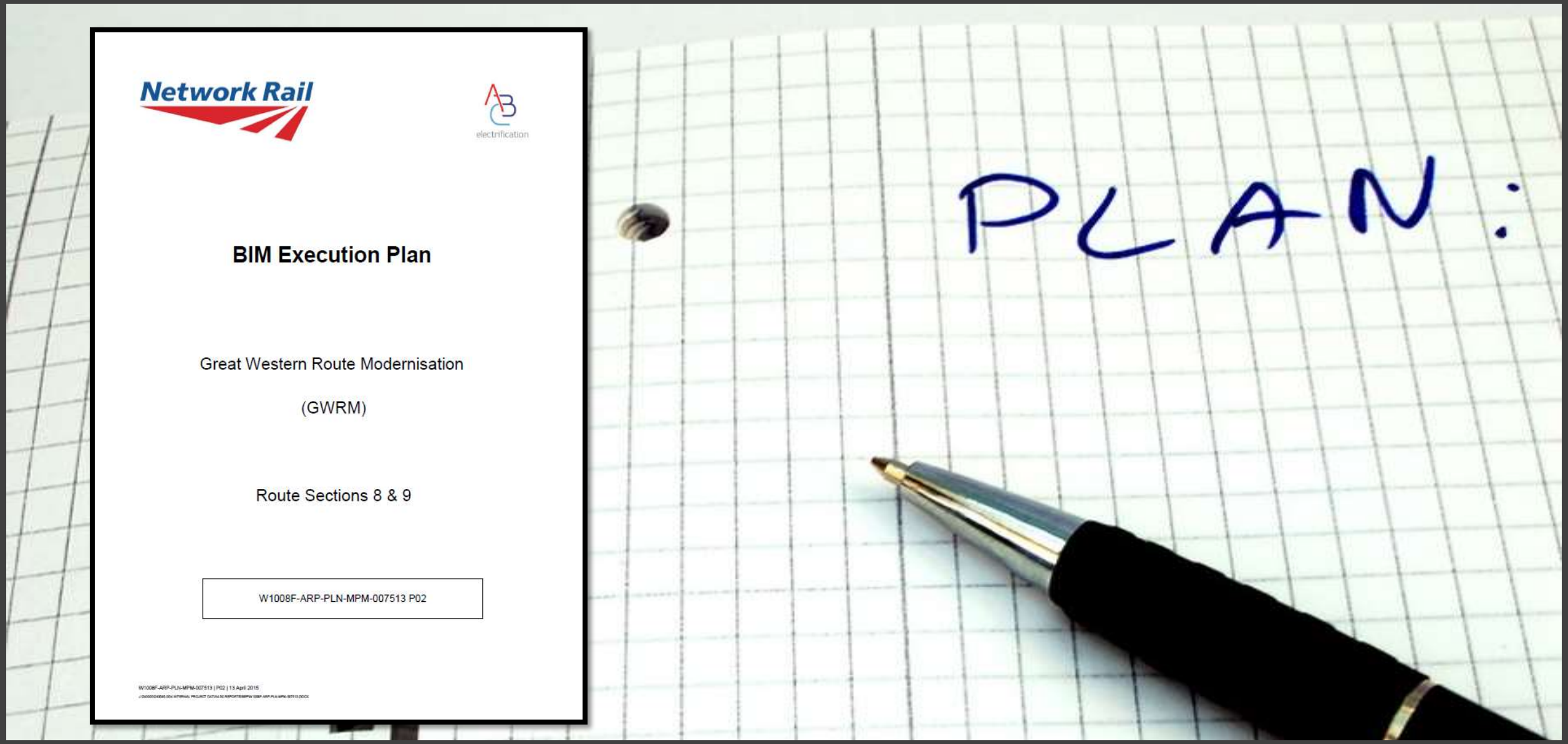
The rail specific web viewer allows all parties to interrogate various data sets from multiple devices and locations. © Arup

NetworkRail

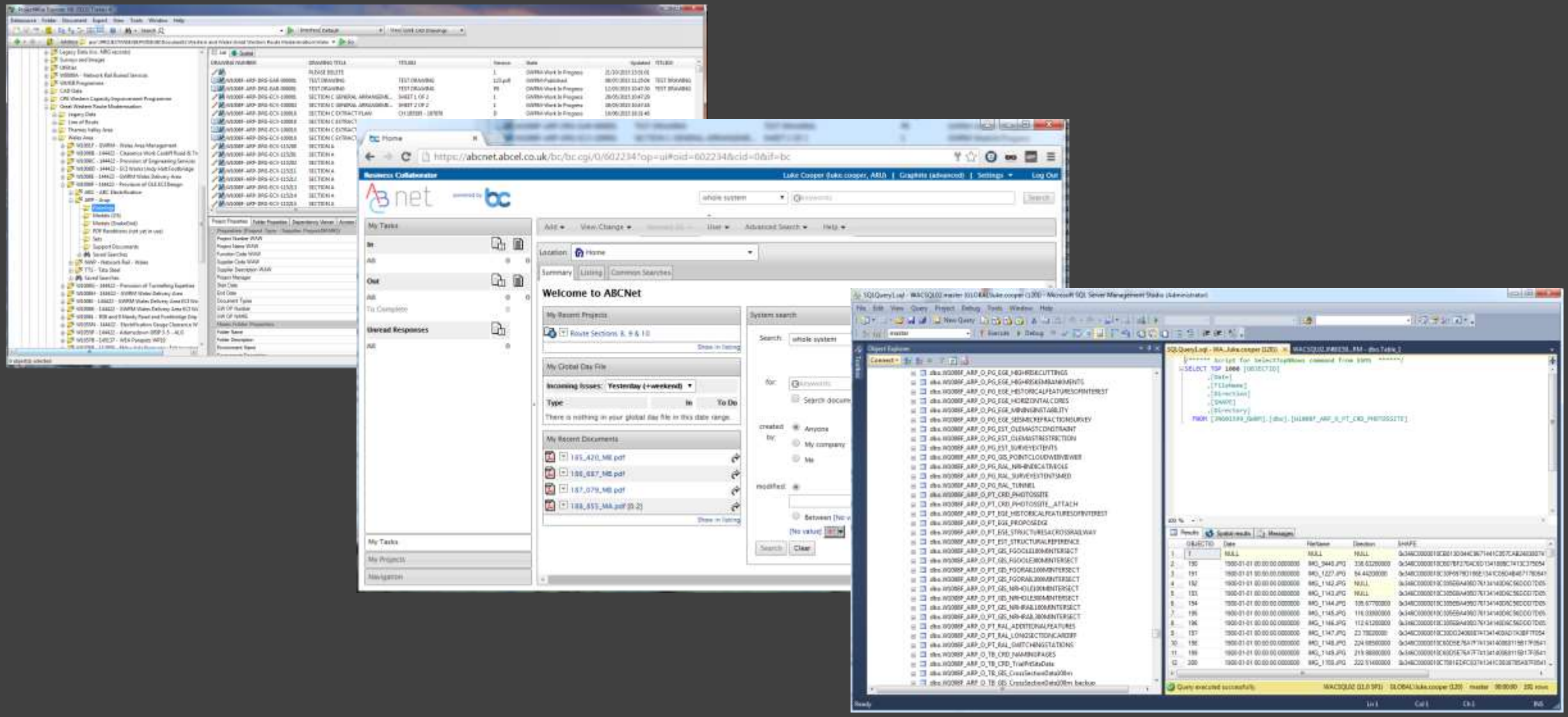
ARUP

Electrification Map

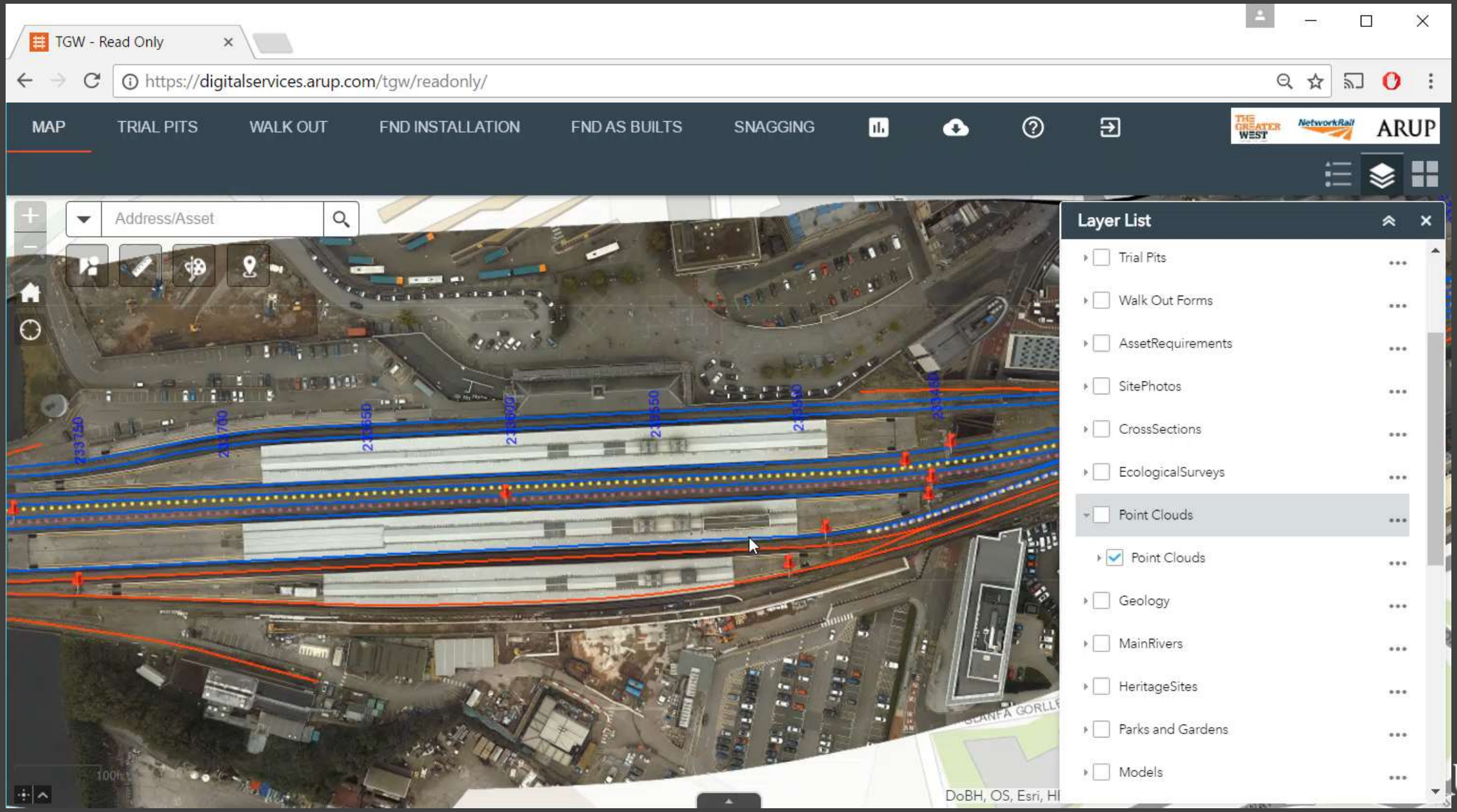
BIM


Network Rail
electrification
BIM Execution Plan
Great Western Route Modernisation
(GWRM)
Route Sections 8 & 9
W1008F-ARP-PLN-MPM-007513 P02
W1008F-ARP-PLN-MPM-007513 | P02 | 13 April 2015
PLAN:

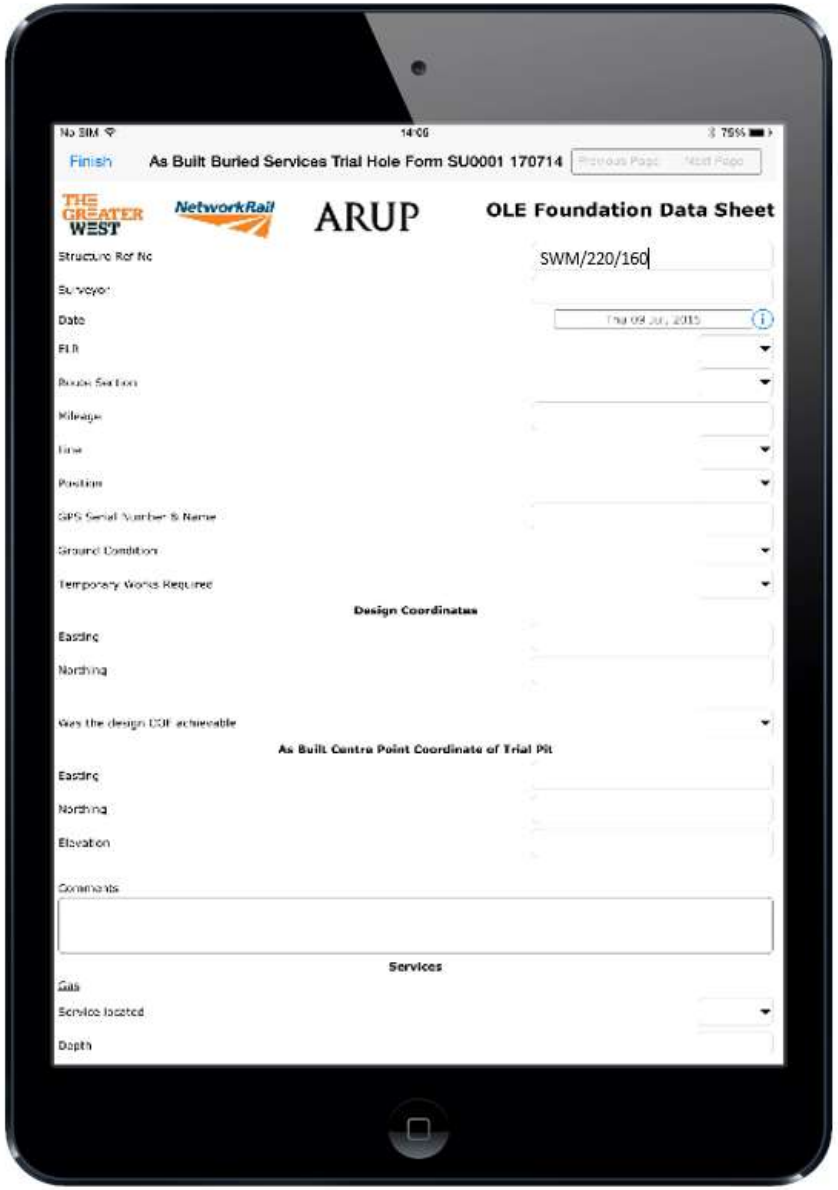
Common Data Environment



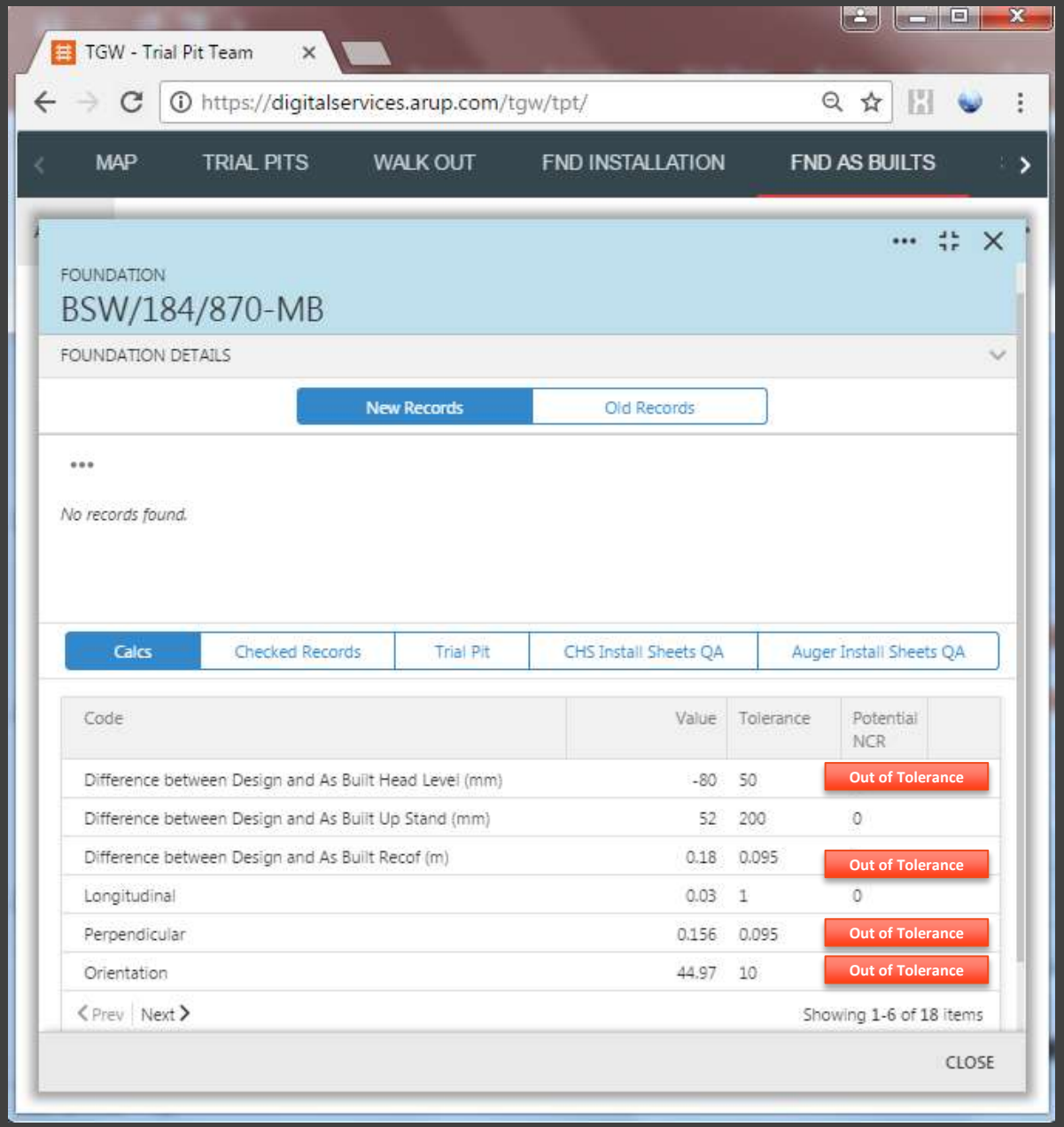
Survey Data

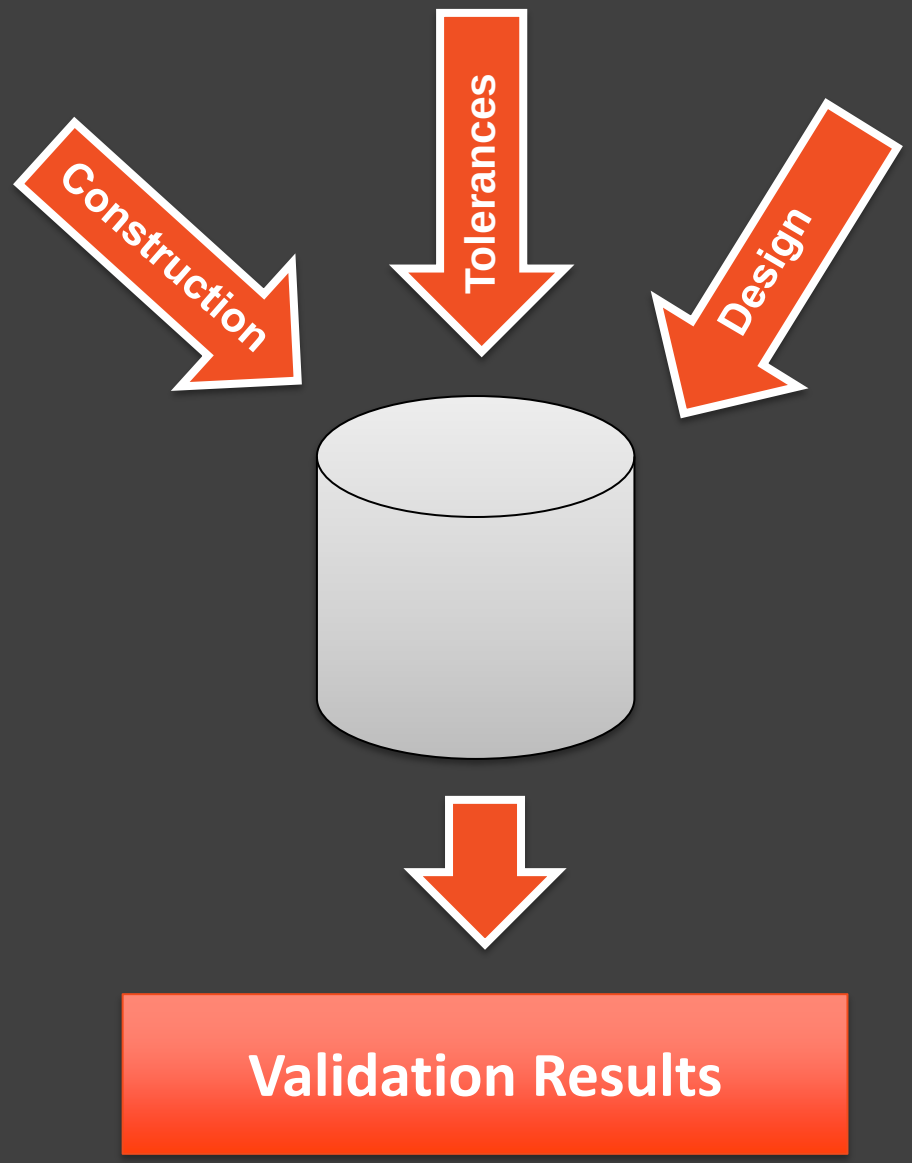

TGW - Read Only
https://digitalservices.arup.com/tgw/readonly/
MAP
TRIAL PITS
WALK OUT
FND INSTALLATION
FND AS BUILTS
SNAGGING
ARUP
Address/Asset
Layer List
Trial Pits
Walk Out Forms
AssetRequirements
SitePhotos
CrossSections
EcologicalSurveys
Point Clouds
Point Clouds
Geology
MainRivers
HeritageSites
Parks and Gardens
Models

Trial Pit Surveys



Construction Validation



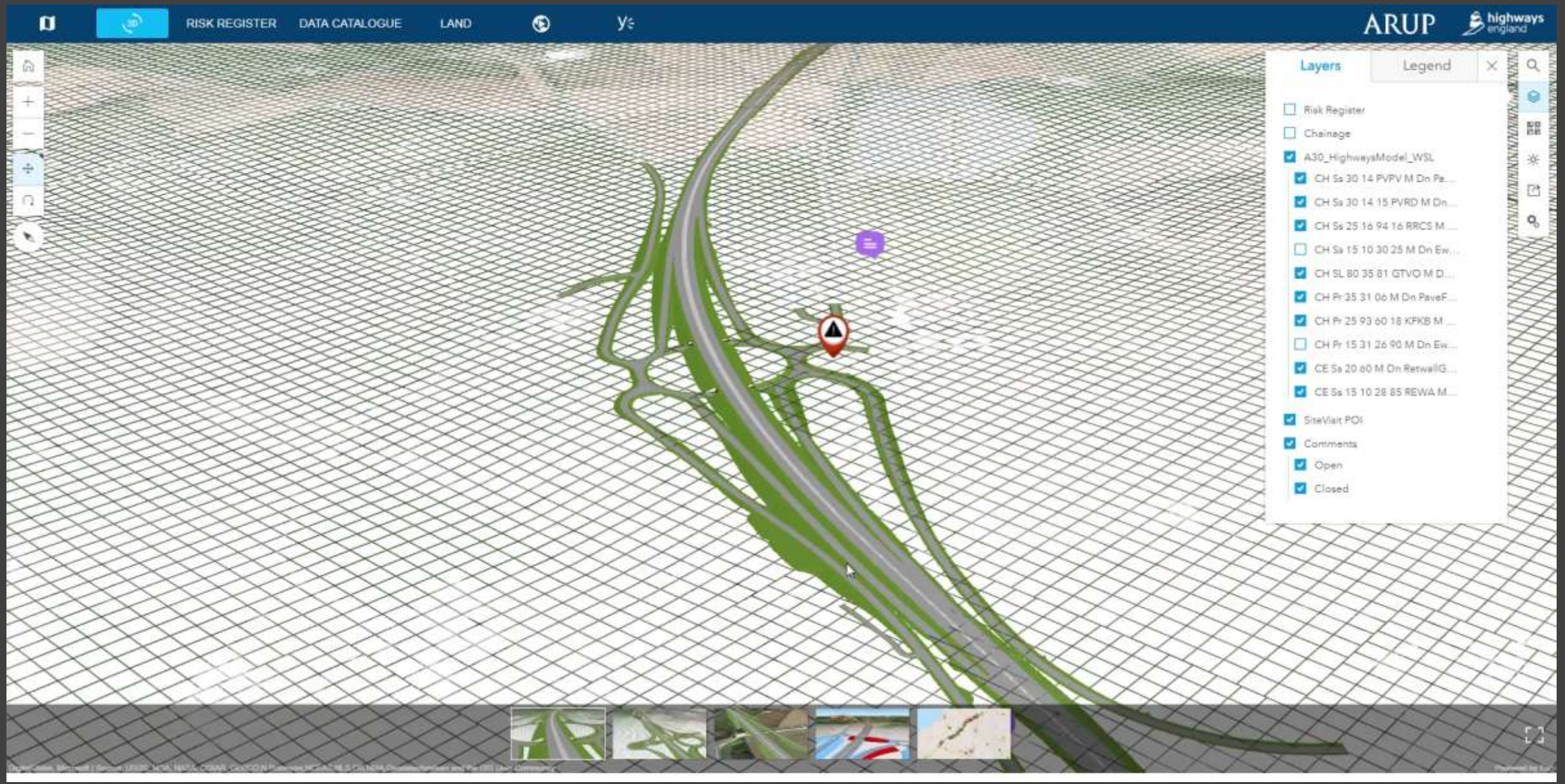


Industry Acknowledgements

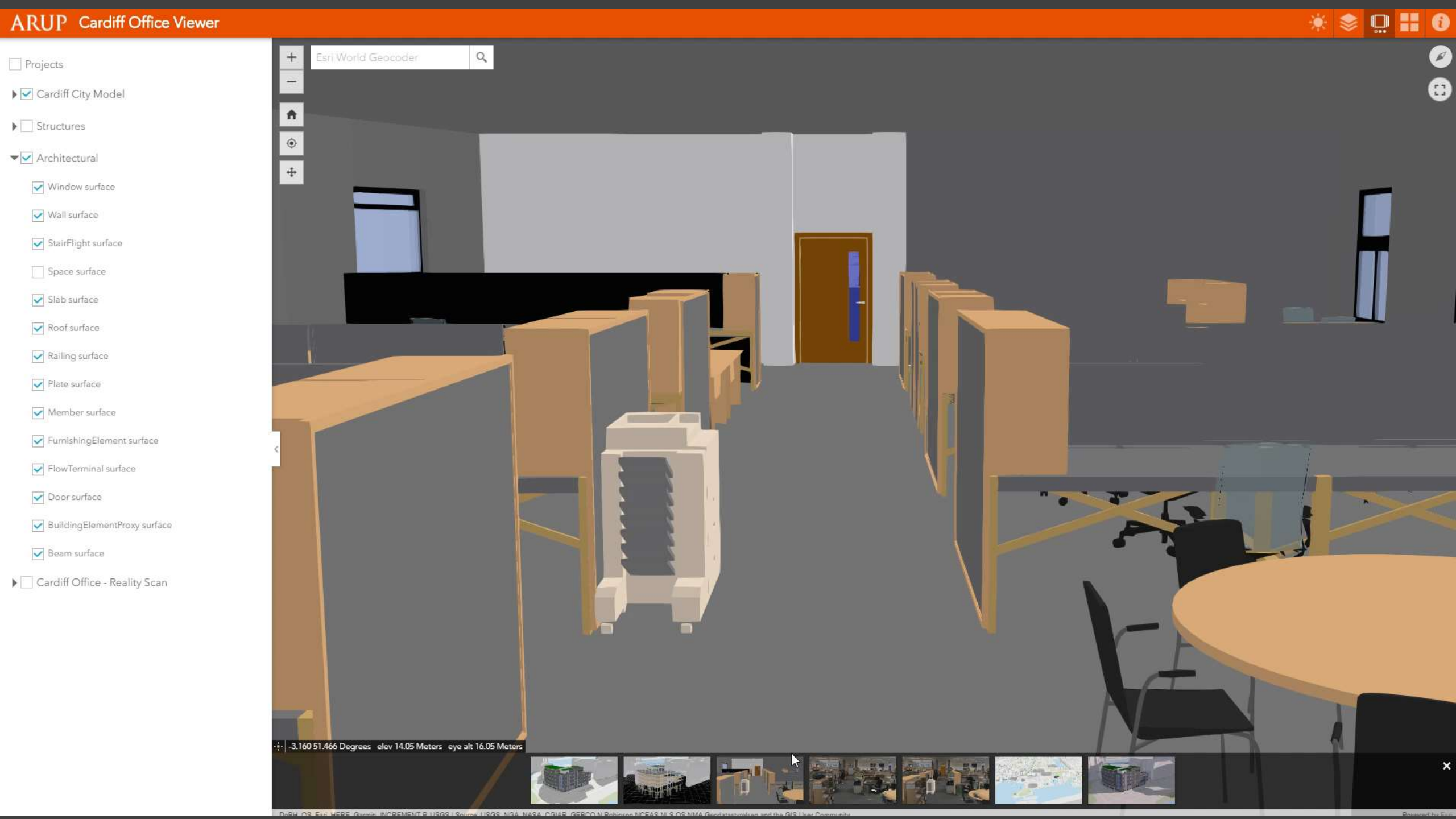
CONSTRUCTING EXCELLENCE
in the built environment

30th anniversary 2017 bcia british construction industry awards

A30


RISK REGISTER
DATA CATALOGUE
LAND
ARUP
highways england
Layers
Legend
Risk Register
Chainage
A30_HighwaysModel_WSL
CH Ss 30 14 PVPV M Dn Pa...
CH Ss 30 14 15 PVRD M Dn...
CH Ss 25 16 94 16 RRCS M...
CH Ss 15 10 30 25 M Dn Ew...
CH SL 80 35 81 GTVQ M D...
CH Pr 35 31 06 M Dn PaveF...
CH Pr 25 93 60 18 KPKB M...
CH Pr 15 31 26 90 M Dn Ew...
CE Ss 20 60 M Dn RetwallG...
CE Ss 15 10 28 85 REWA M...
SiteVisit POI
Comments
Open
Closed

Open Source 3D Model Creation


ARUP Cardiff Office Viewer
Projects
Cardiff City Model
Structures
Architectural
Window surface
Wall surface
StairFlight surface
Space surface
Slab surface
Roof surface
Railing surface
Plate surface
Member surface
FurnishingElement surface
FlowTerminal surface
Door surface
BuildingElementProxy surface
Beam surface
Cardiff Office - Reality Scan
Esri World Geocoder
-3.160 51.466 Degrees elev 14.05 Meters eye alt 16.05 Meters

Virtual Public Consultation

Mixed Reality

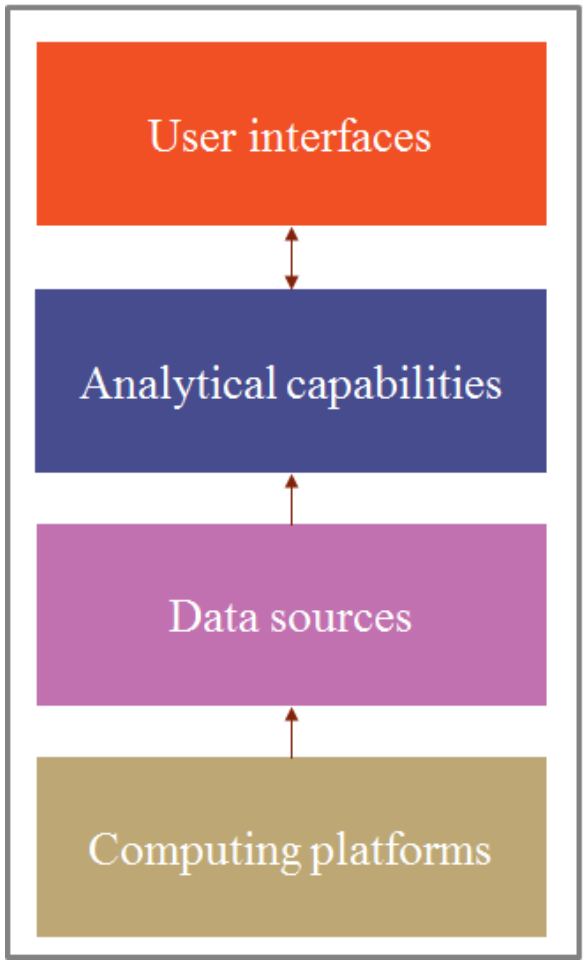
PHILIPS
PHILIPS
NEXT LEVEL RACING

Transformation

Sedgwick

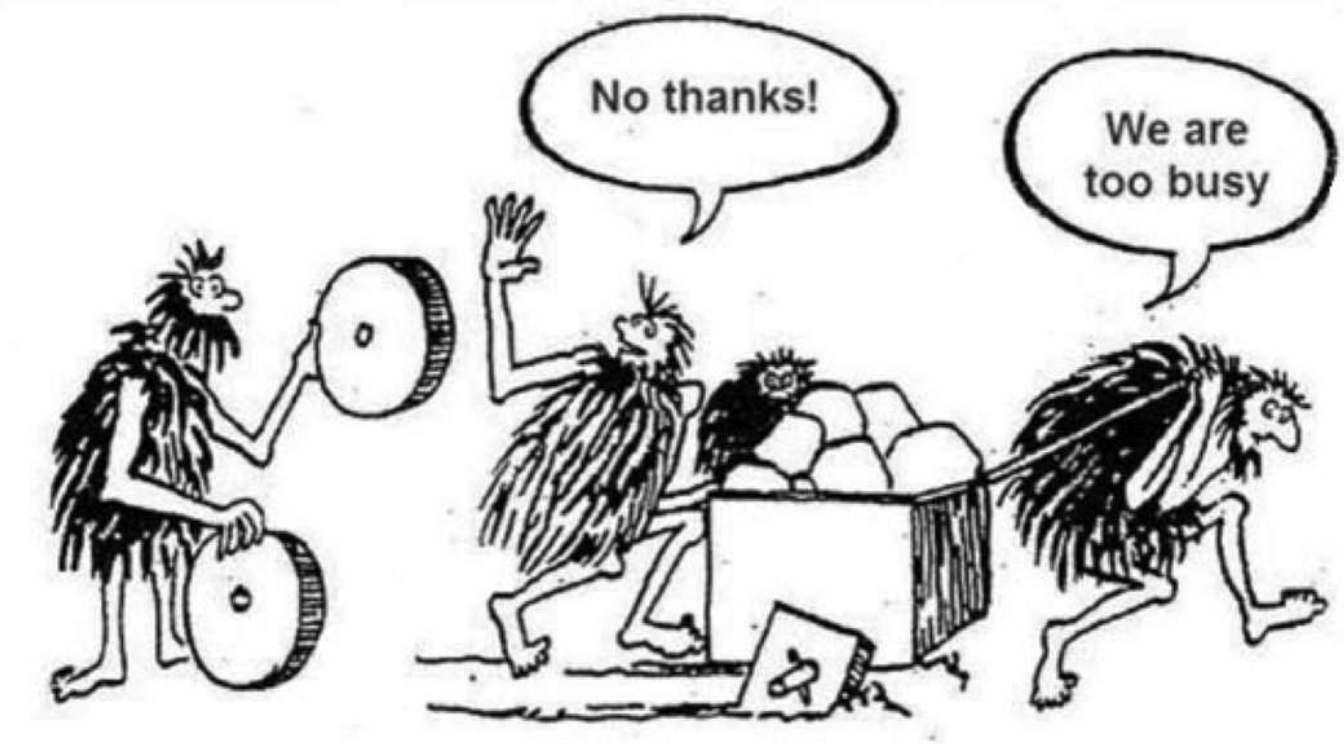
Digital Transformation

Digital change – current and future



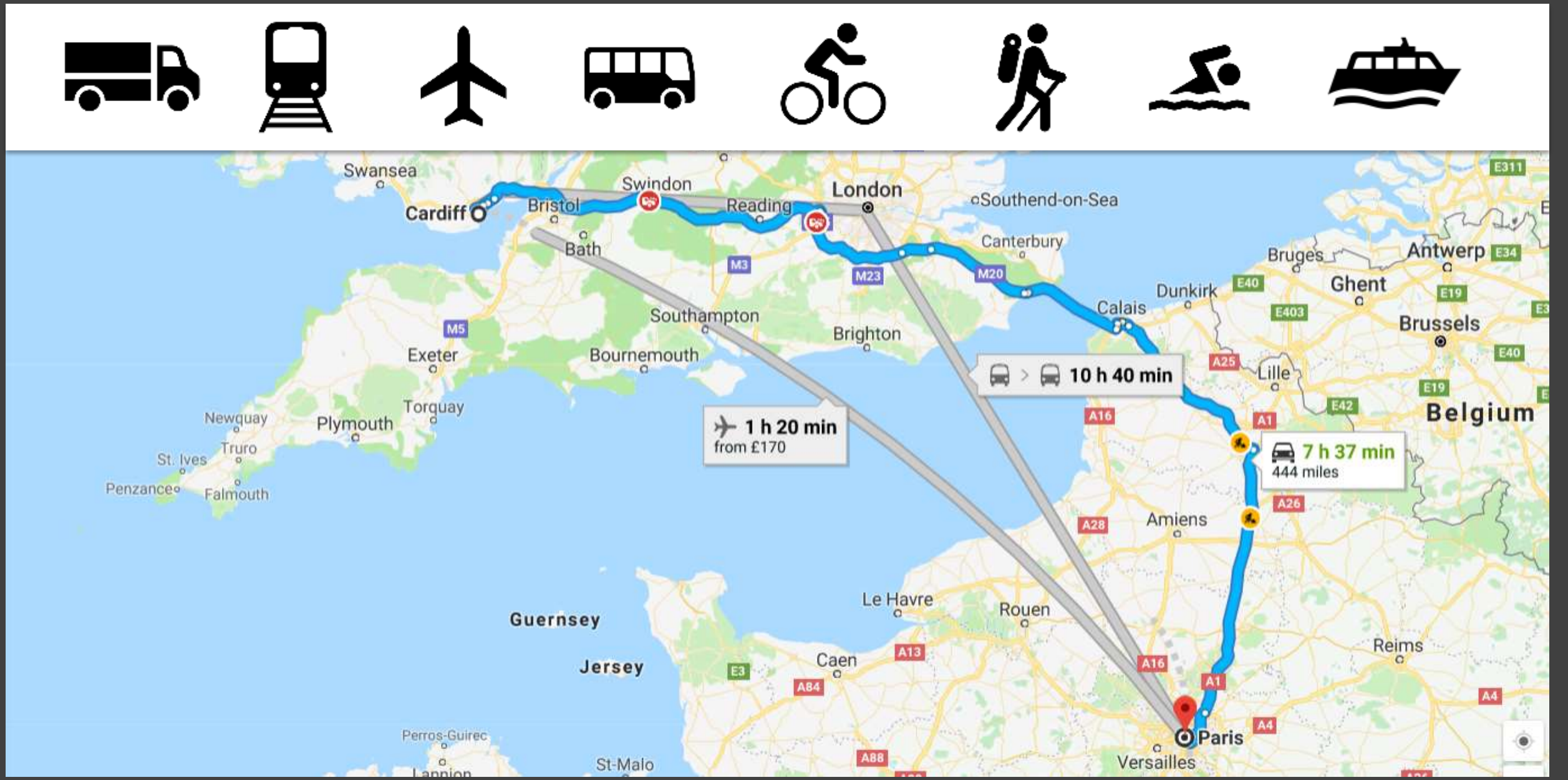
Presentations are static	Tools enable real time scenario testing
We are using static tools developed in the 1980s	We can continually evolve our analytical tools
Data is held in hundreds of folders in separate locations	Data is safe, easy to find, access, use and re-use
It takes days to do simple calculations	I can do in seconds what used to take days

Need to understand technology



Technology without the domain

The question of what, where, how, why



"**Data**! **Data**! **Data**!" he cried impatiently. "I can't make **bricks without clay**."

Sir Arthur Conan Doyle

STAY DIGITAL

ARUP