

Collaborative Geotechnical BIM technologies

Carl Grice – Software Development Director (Keynetix)
Holger Kessler - Team Leader Modelling Systems (BGS)



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



1

Current Challenges

Ground
Investigation
Industry

2

R&D Project

BIM for the
Subsurface

3

Proposed Solution

Collaborative
Geotechnical
BIM Suite

37%

of project overruns
cite ground problems
as a major contributor

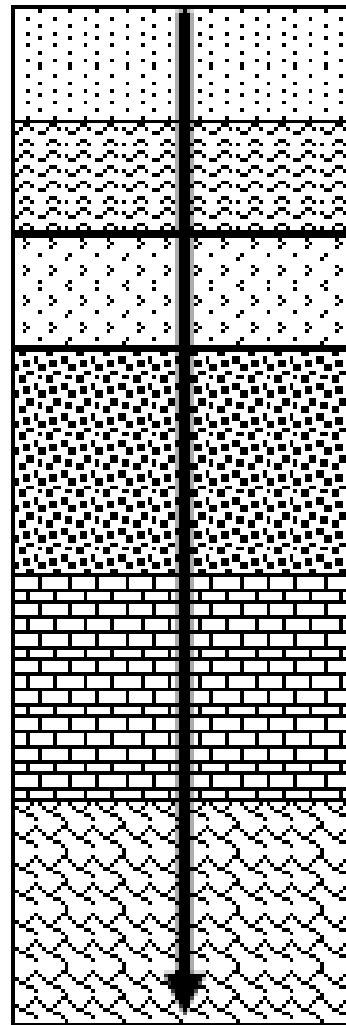
National Economic Development Office

70%

of public projects were
delivered late and 73%
were over the tender price

National Audit Office

#1 – Constrained approaches to site investigation



Site Exploration

Laboratory Testing

SI Presentation

Engineering Analysis

CAD Presentation, 3D modelling and
GIS

Local or national Archive

Traditional Geotechnical Data Journey

R. Chandler, R. Hutchinson 1998

**Linear / waterfall
process**

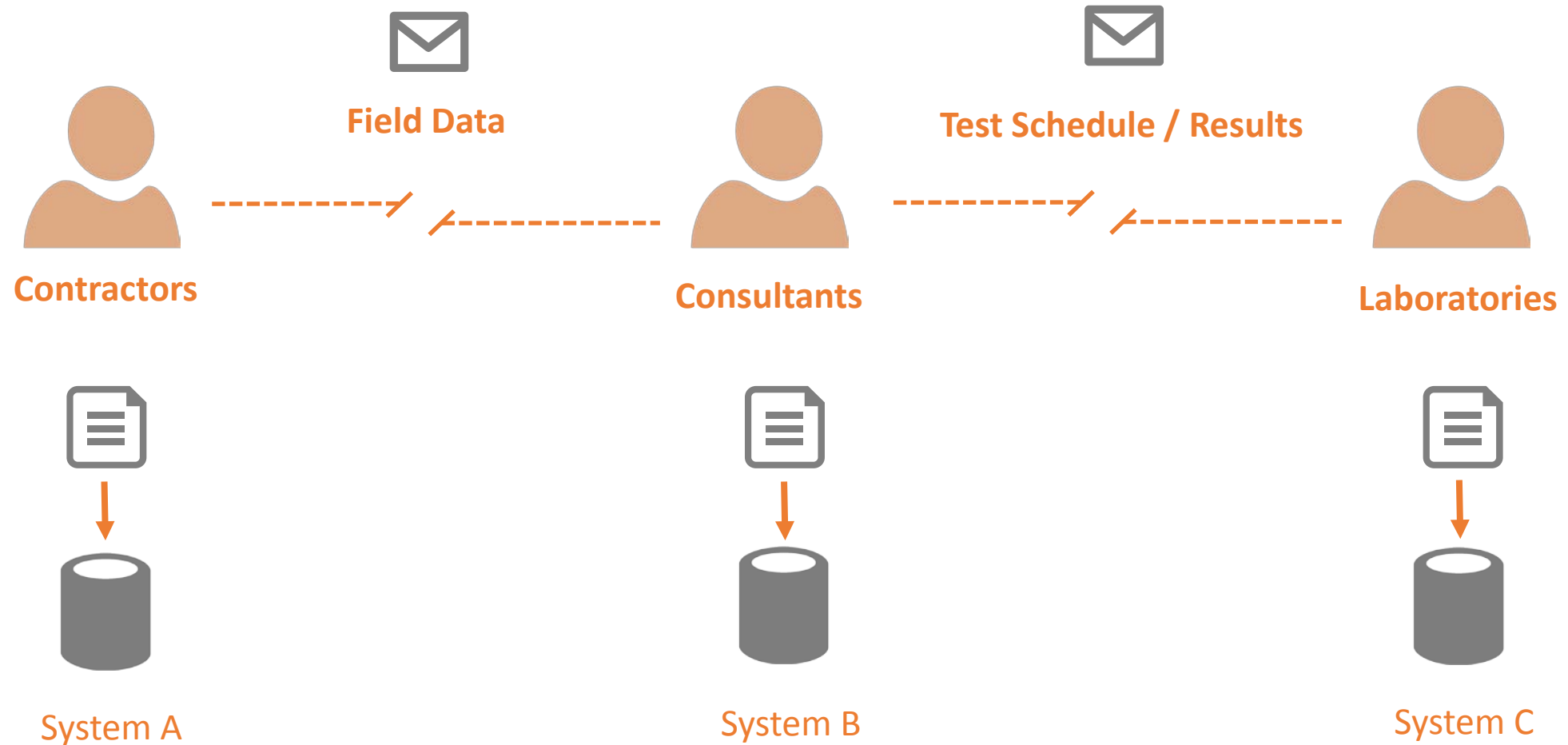
**Inefficient desk
studies & planning**

**Significant delays
receiving data**

**Data re-entered
multiple times**

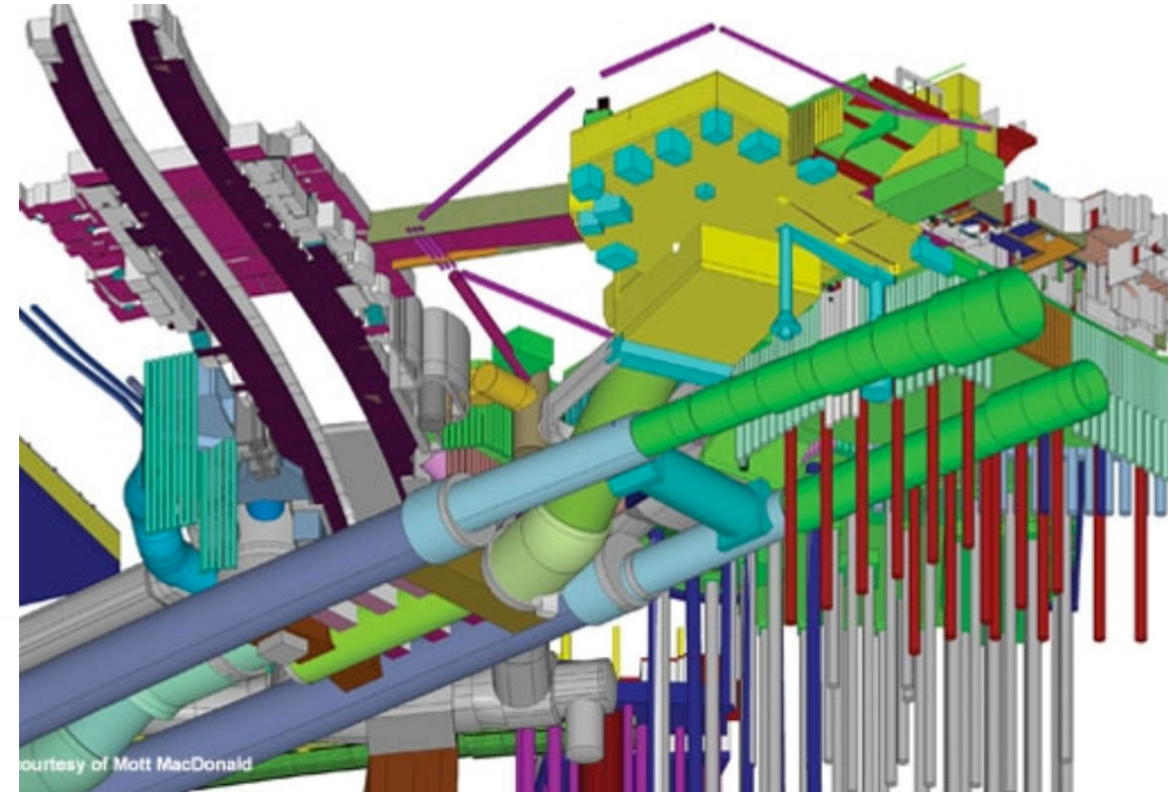
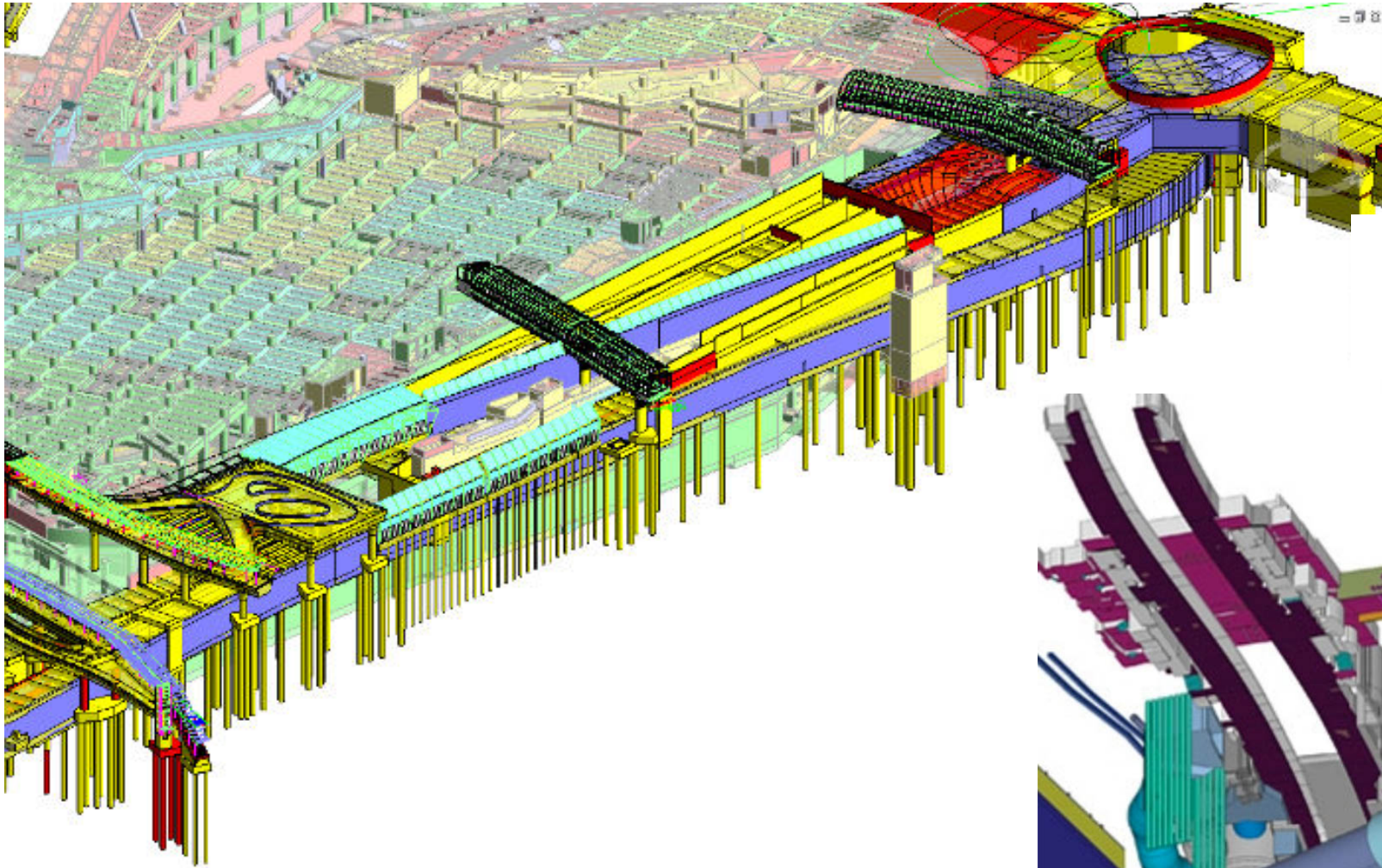
**Data often not
retained or reused**

#2 – Limited availability of quality geotechnical data



How long does it take to get hold of the data - Days, Weeks, Months?

#3 – Limited availability of subsequent Interpretation



Where is the Geology...

Innovate UK

Technology Strategy Board

BIM for the subsurface

2 Year
Project

4 Organisation
Collaboration



British
Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL





Global leader in **Geotechnical Data Management** and **Geotechnical BIM** software. **Autodesk AEC Geotechnical Industry Partners**, providing geotechnical data integration with AutoCAD Civil 3D



World leading **engineering, design and project management consultancy**, proactive in leading the exploitation of BIM, experience **implementing BIM on client projects** and provide advice to the **UK Government on its BIM strategy**



British Geological Survey

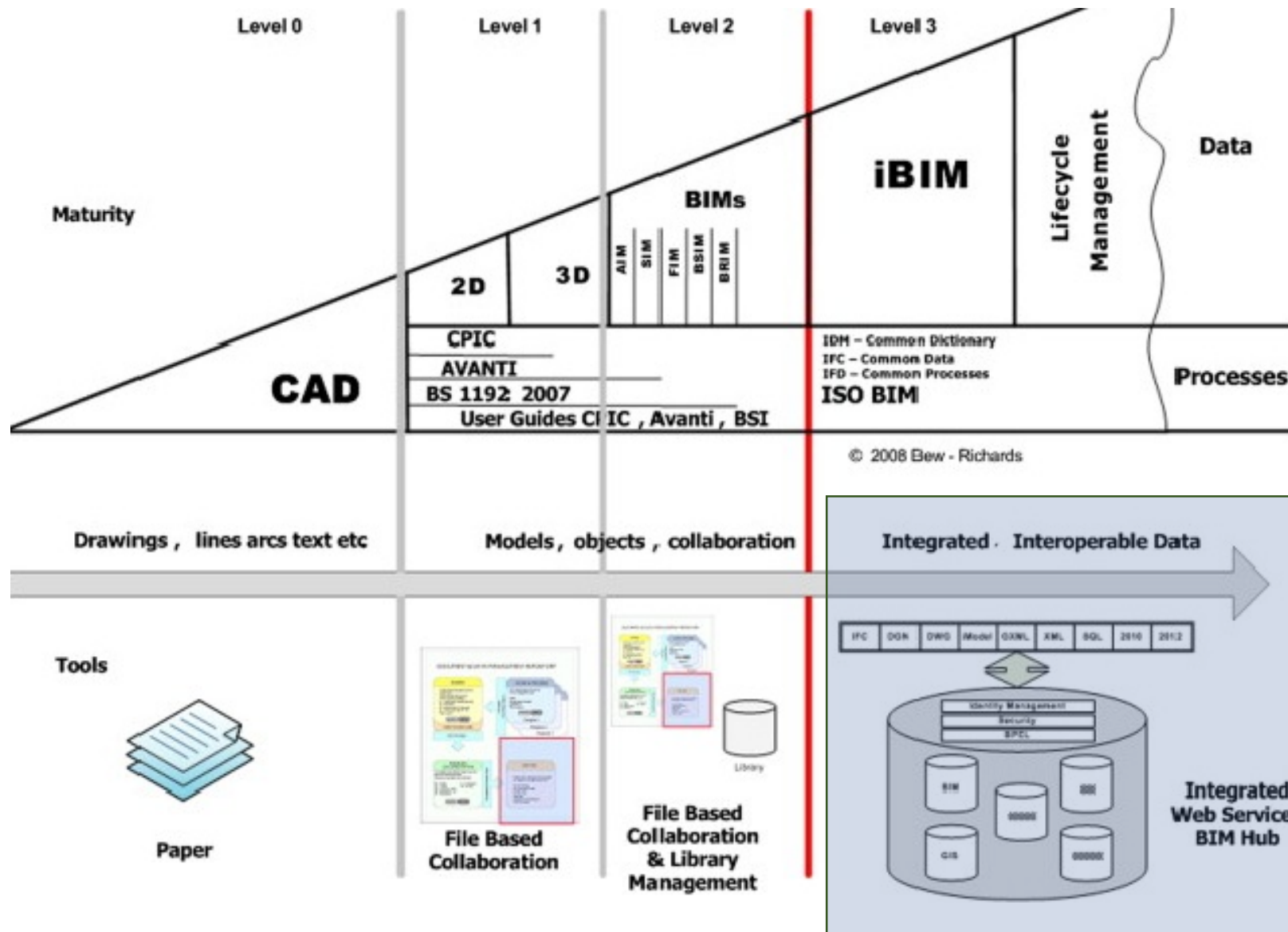
NATURAL ENVIRONMENT RESEARCH COUNCIL

National **custodian of geoscientific data** with extensive experience & knowledge of **3D geological modelling methods**. Over the past 10 years developed **significant coverage of geological models**.



Global leader in **developing BIM solutions for the built environment sector**. **Pioneering BIM solutions in the civil infrastructure sector** with an extensive portfolio of **desktop & cloud solutions**

Implement BIM Level 3 - iBIM



Apply BIM principles throughout the Geotechnical Data Journey



Geotechnical Data Journey - Transformed

P. Child, C. Grice, R. Chandler 2014

Geotechnical BIM

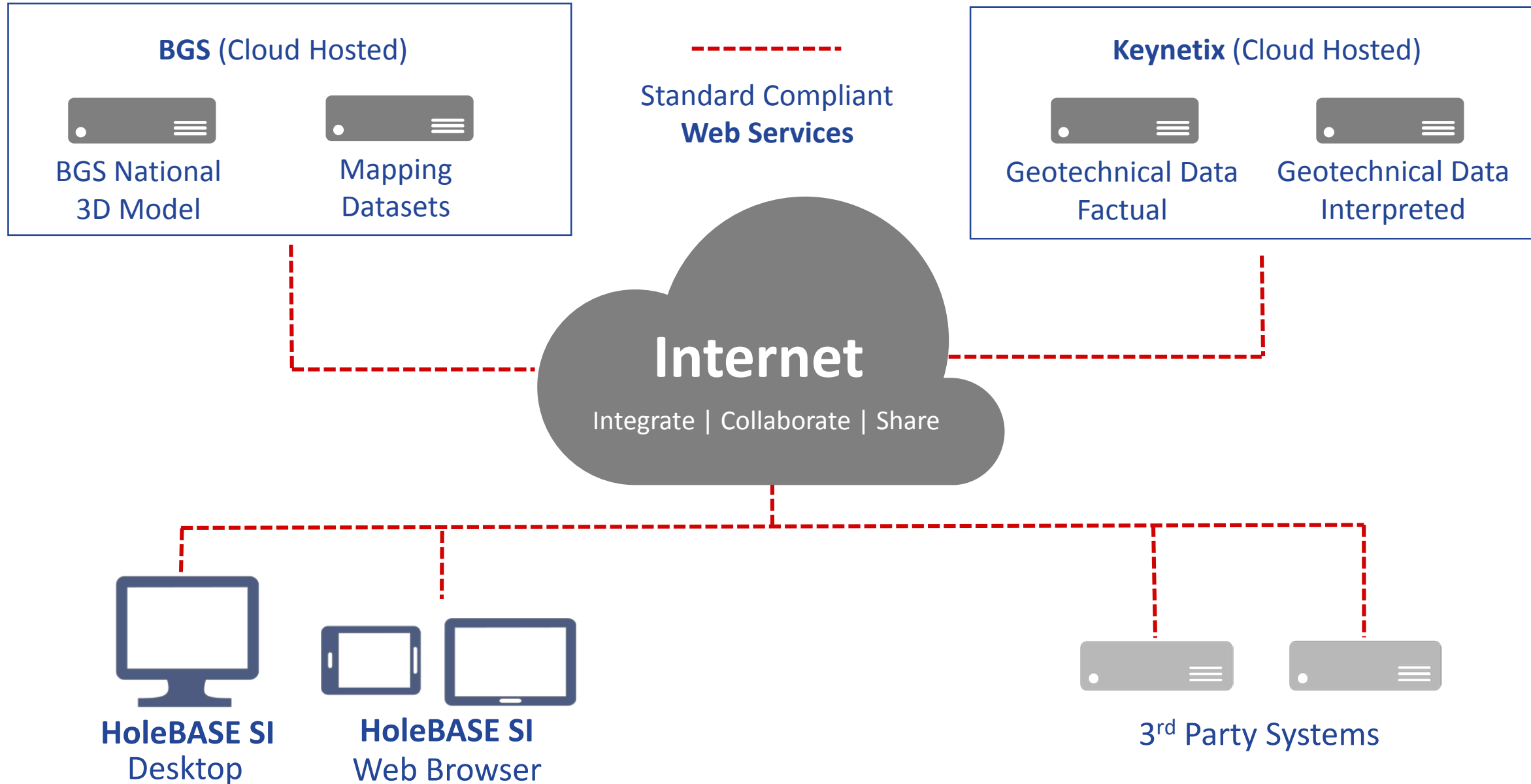
**Historic data & 3D
models utilised
throughout**

**Centralised data
repositories**

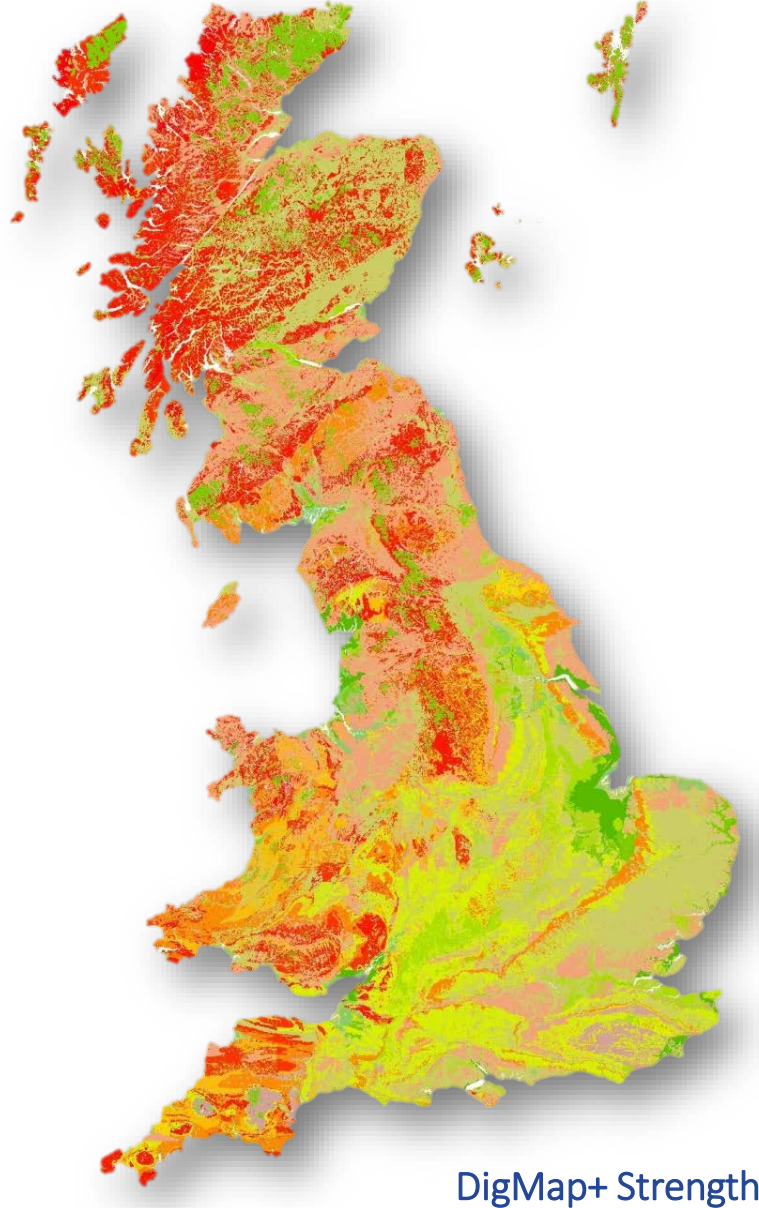
**Incremental data
delivery and
iterative refinement**

**Data reuse and
collaboration**

Implement a Geotechnical BIM Suite



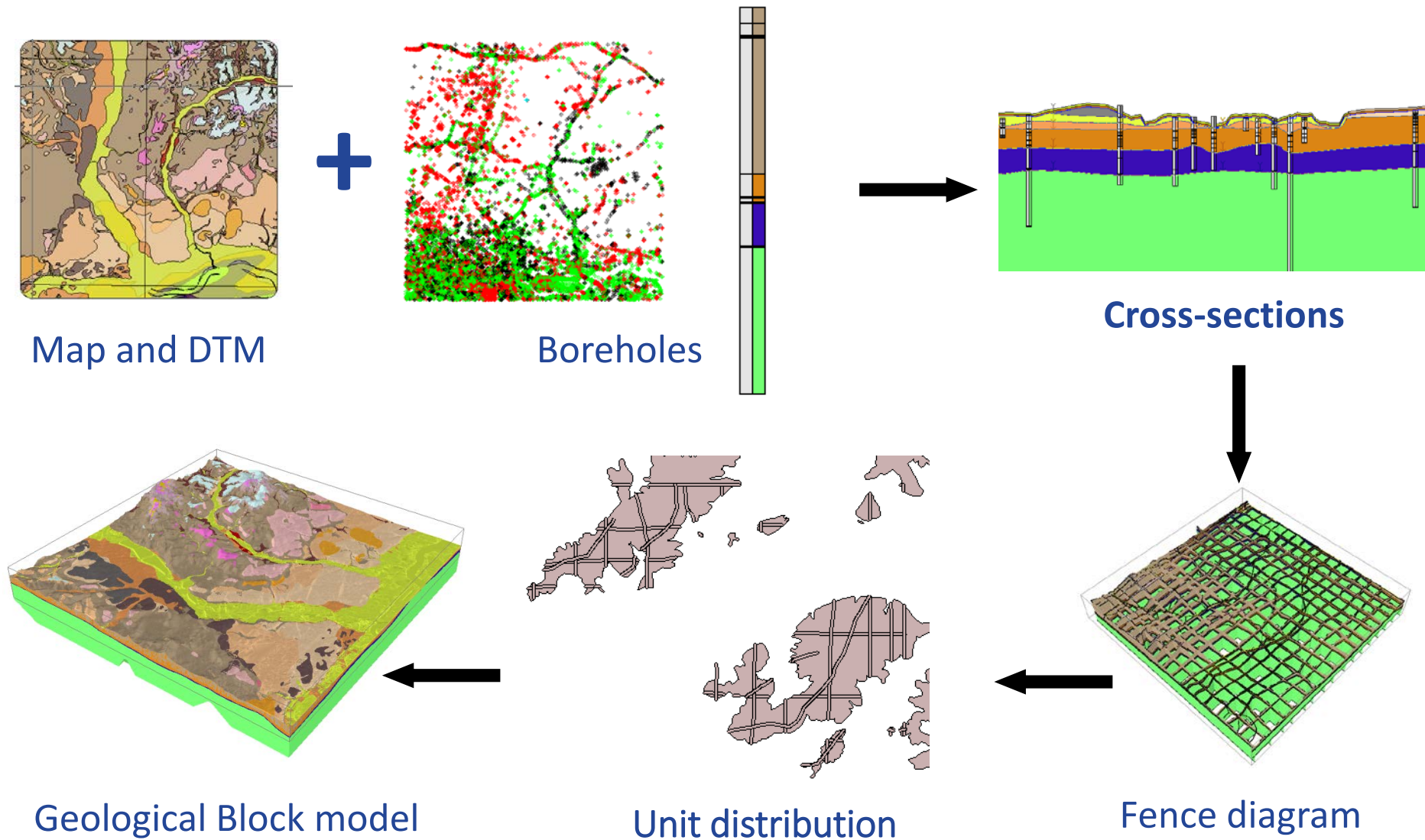
Provide integrated access to BGS National Datasets



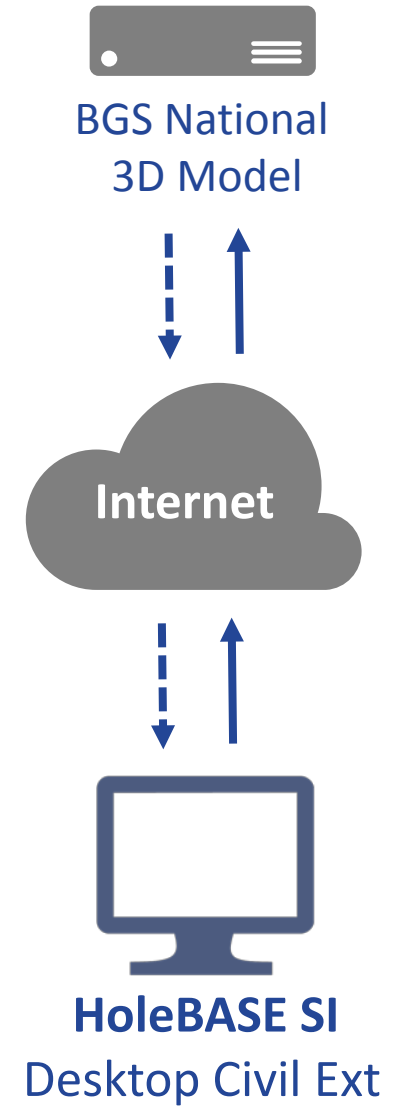
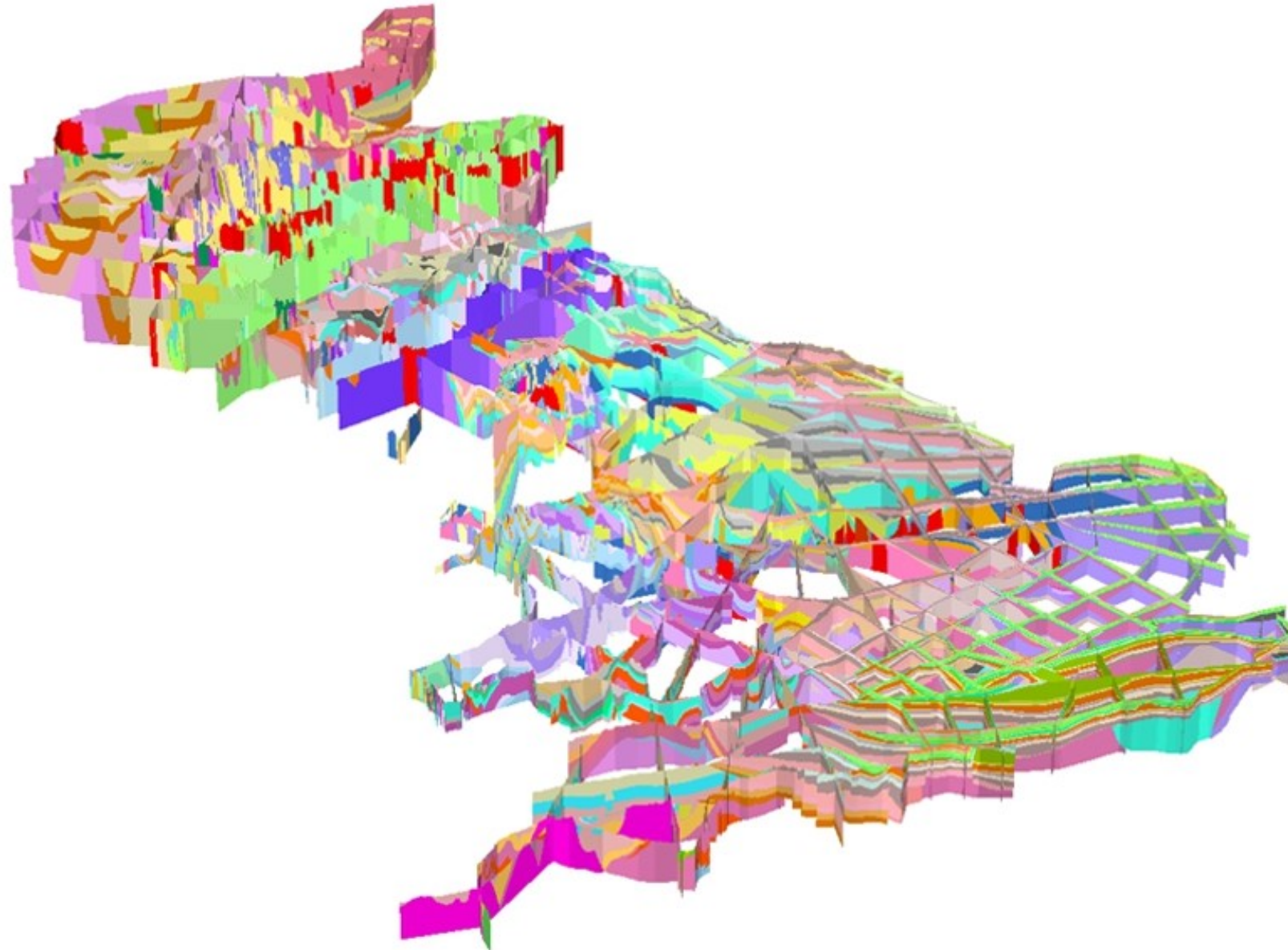
DigMap+ Strength

- DigMap Geology
- DigMap+ Engineering Properties
- GeoSure Ground Stability
- Flooding –Groundwater and Geological Indicators
- Non-coal mining hazard
- Mineral Resources
- Corrosivity
- Permeability
- Marine
- Geophysics
- Geochemistry & Contamination
- Seismology
- & more

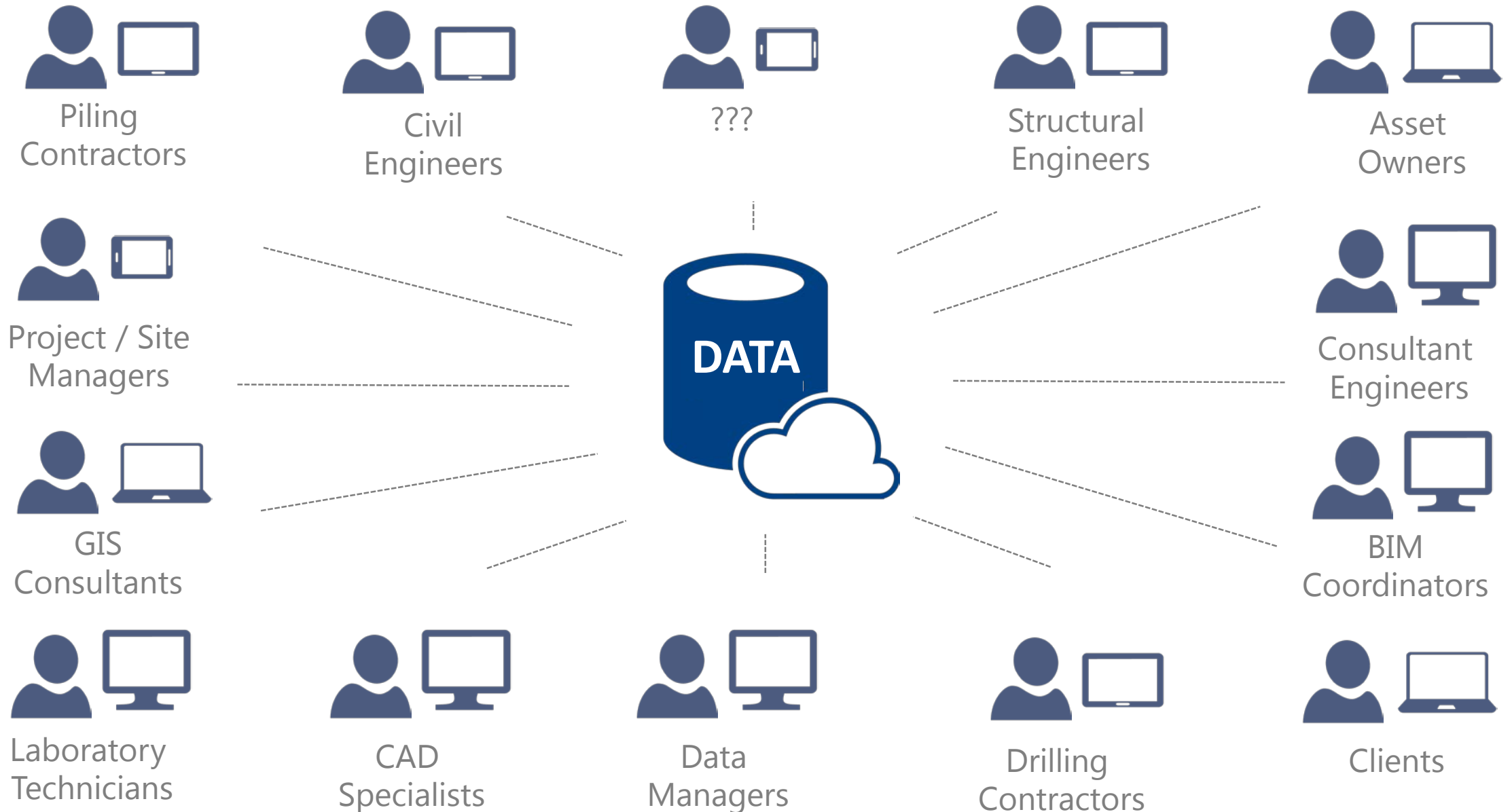
Implement the BGS Geological Modelling Methodology



Enable engineer-driven, collaborative geological modelling



Improve collaboration throughout the wider supply chain



Project Data Scheduling Mapping Preferences Configuration Help Grid Tools

Manage Columns Reload Data Add/Edit Data Delete Selected Audit Log Clear Sorts Clear Filters Bulk Update CSV Export Export XYZ Location Group Saved Search Zoom on Map Set Location Quick Log Log Report View All View Selected Upload

Actions Transfer Data Mapping Log Production Documents

All Data

- Summary
 - Location Details (32)
 - Samples and Lab Tests (4522)
 - Monitoring (21)
 - Hole Construction (152)
 - Insitu Tests (797)
 - Geological Information (140)
 - Discontinuity Data (0)
 - Field Geological Descriptions (132)
 - Fracture Spacing (5)
 - Stratum Detail Descriptions (3)
 - Weathering (0)

- Reports
 - Geology
 - Statistics
 - Summary
 - Validation
- Saved Searches
 - AS (38)
 - GM test (5)
 - CP holes (14)
 - High Aresnic (14)
 - Low blow counts (3)
 - Peat Undisturbed samples (5)
 - PEat U example (5)
 - Peat U samples (5)
 - Peat Samples U (5)
 - SPT > 3m (68)

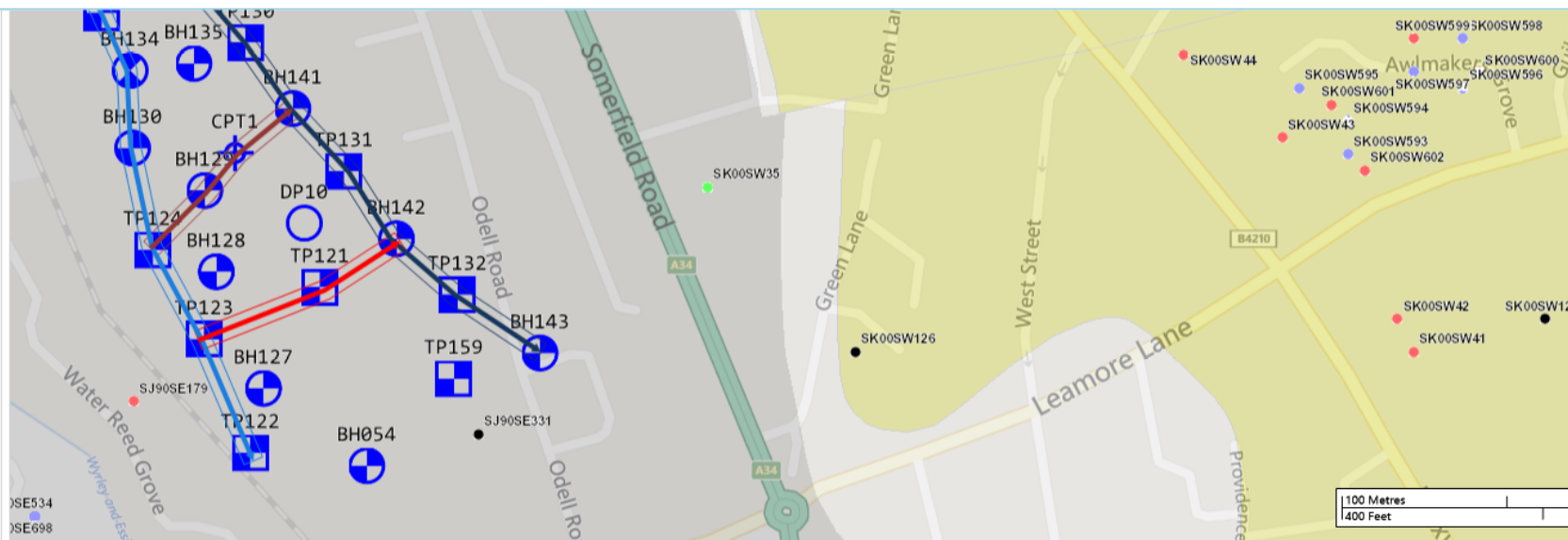
Location Details Field Geological Descriptions

Location ID	Depth Top (m)	Depth Base (m)	Description	Legend Code	Geology Code
BH136	0.00	1.10	TOPSOIL	101	FILL
BH136	1.10	2.70	Dense grey-brown SAND with medi...	404	GLACIAL TILL
BH136	2.70	3.30	Firm brown very sandy CLAY with a...	220	BOULDER CLAY
BH136	3.30	5.30	Brown CLAY with a little well rounde...	205	BOULDER CLAY
BH136	5.30	10.05	Brown CLAY with a little well rounde...	206	BOULDER CLAY
BH137	0.00	0.40	TOPSOIL	101	FILL
BH137	0.40	0.80	Spongy brown fibrous PEAT with so...	605	PEAT
BH137	0.80	3.50	Firm brown very sandy CLAY with a...	220	BOULDER CLAY
BH137	3.50	10.05	Brown CLAY with a little well rounde...	205	BOULDER CLAY
BH138	0.00	0.50	TOPSOIL	101	FILL
BH138	0.50	1.20	Dense grey-brown SAND with medi...	404	GLACIAL TILL
BH138	1.20	2.30	Firm brown very sandy CLAY with a...	220	BOULDER CLAY

Page 1 of 3 (132 of 132)

Map

- Information Layers
 - Measures
 - Sections
 - Long Section AA
 - Long Section BB
 - Section CC
 - Section DD
- Locations
 - Saved Searches
 - Location Groups
 - Project
 - Imported Datasets
 - WMS Datasets
 - British Geological Survey (BGS) GeoIndex
 - BGS 50000 scale digital geology



Quick Log (BH137)

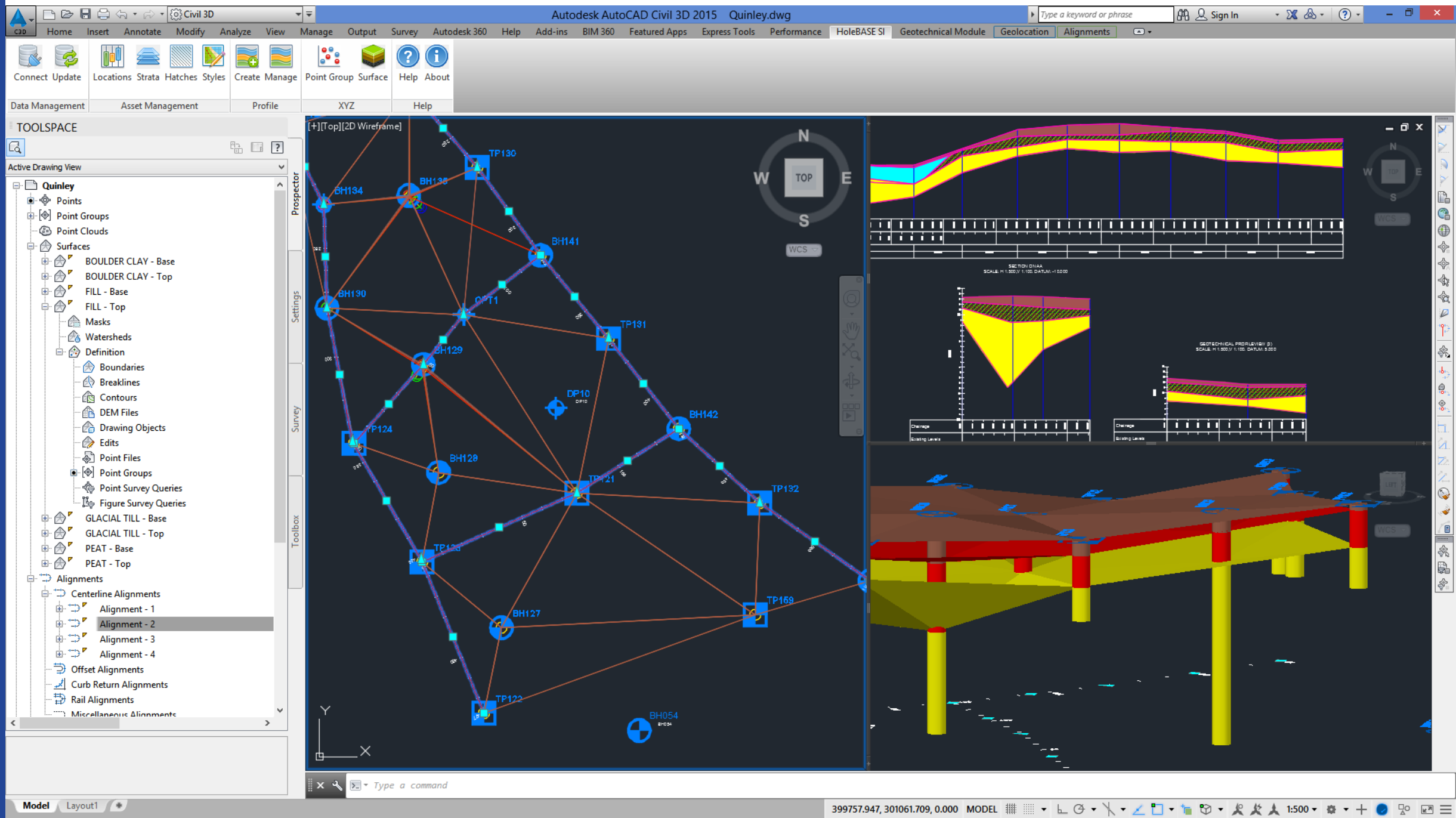
Borehole Log										Borehole No. BH137
Project Name: Quinley I										Sheet 1 of 2
Project No. TestProject										Hole Type GP
Location: Pelsall										Scale 1:50
Client: Test Client										Logged By GJB
Co-ords: 399671.16 - 301433.00										Dates: 29/09/1991 - 29/09/1991
Well	Water	Strikes	Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
			0.00	J	Uplow=0				TOPSOIL	
			0.00 - 0.80	B	Uplow=0				FILL	
			0.80 - 0.95	U	Uplow=0	0.40	6.00		Spongy brown fibrous PEAT with some wood fragments (<200mm) and a little medium gravel. PEAT	
			1.10	D	Uplow=0				Firm brown very sandy CLAY with a little subangular to subrounded medium gravel. BOULDER CLAY	1
			1.30	D	Uplow=0					
			1.50 - 1.95	U	Uplow=0	0.80	5.60			
			2.10	D	Uplow=0					
			2.30	D	Uplow=0					
			2.60	D	N=27 (4.6/5.6/6.8)					
			2.80 - 2.95	D	Uplow=0					
			2.90 - 3.00	B	Uplow=0					

Search Project Explorer...

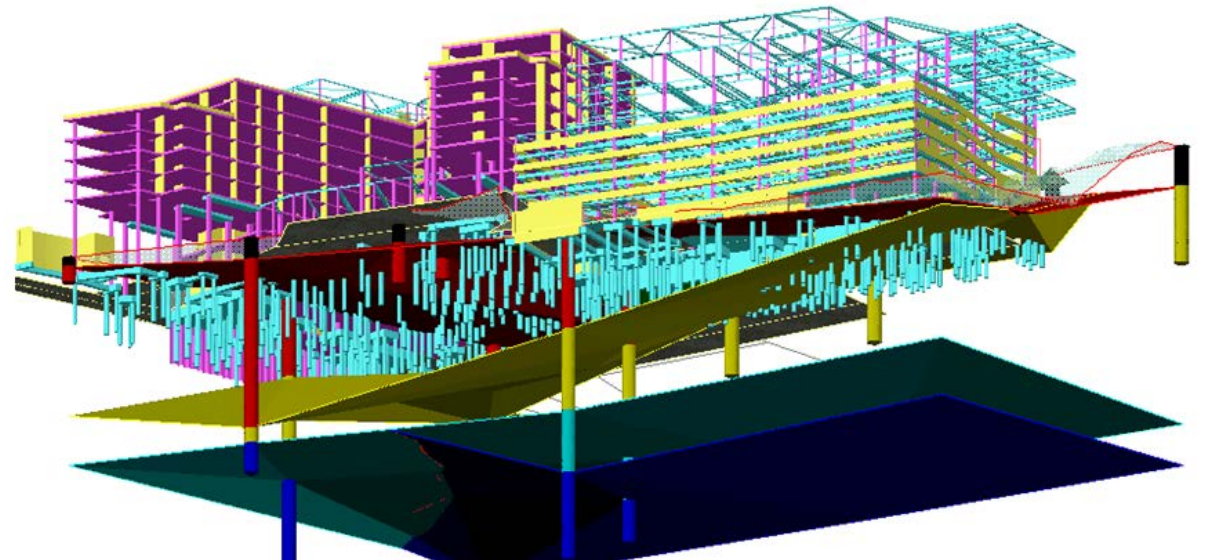
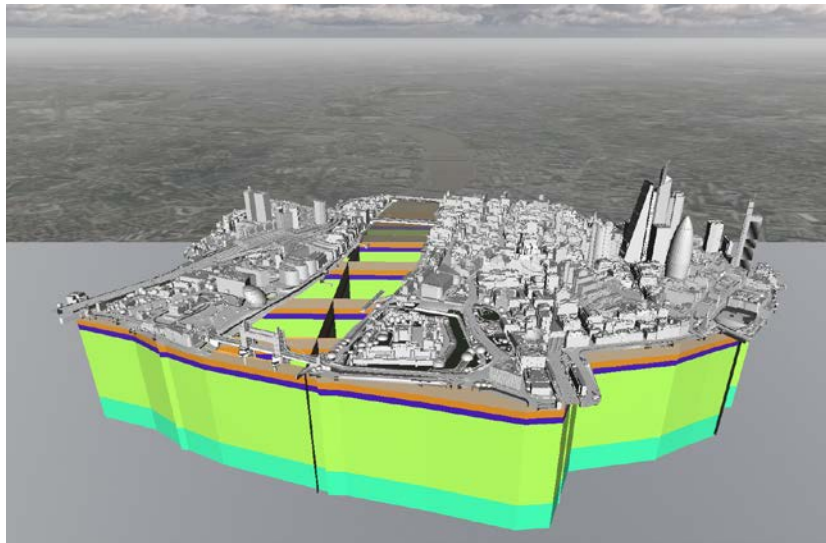
Level 3

m E m N

Proposed Solution



- 1 - Apply BIM principles to Ground Investigations
- 2 - Implement BGS modelling methodologies
- 3 - Extend existing models to include Interpreted data
- 4 - Provide access to BGS mapping and geological datasets
- 5 - Develop Cloud based geotechnical tools
- 6 - Enhance existing Desktop applications



Questions?

Contacts

Carl Grice – Keynetix
carl.grice@keynetix.com

Holger Kessler – BGS
hke@bgs.ac.uk