Effective Route and Excavation Planning for Utility Installation
The DSS team is working with **Balfour Beatty Gas and Water** on a case study relating to an ongoing **District Heating** installation to enhance and evaluate the DSS in a practical context.

When installing district heating there are:

- different choices for the **route of utilities**
- Which have different consequences for: Installation
  Operation
Problem Definition

Challenges:

• Data collection is time consuming
• May not know exactly what data is appropriate/available for a particular area
• Interpretation – No one person is an expert at everything

Solutions:

• Automate data collection (or at least make it easier/smoothener/less prone to being missed out)
• Facilitate automatic consequence interpretation (at least for part of the data)
Some Issues To Consider

Road
- Traffic (e.g. busy junctions)
- Road closure for safety reasons

Utilities etc.
- Existing buried utilities
- Underground condition (e.g. disused subway station, bomb site, coal authority)

Ground
- Type
- Hydrogeology (e.g. underground water course)

Environment
- Vegetation (e.g. Japanese knotweed, tree roots)
- Avoiding parks and private land
- Health and safety regulations
Required Data Sources

- Utility maps
- Traffic data
- Environmental data
- Ground condition data
- Road construction information
- Historical maps
- Local council regulations (e.g. does not allow works during busy periods with road closure)
Enhancements to the DSS

- A route has a spatial extent (i.e. is not a single point)
- Previously triggers were single points in space (with associated time range)
- New data sources are needed.
Upload route file

Select Option
Select Option
from map
Postcode
Longitude/Latitude
Northing/Easting
Upload kml route file

ATU Decision Support System: Reporting Triggers

Please click on map to select trigger location or type in Postcode: (Longitude = , Latitude = )

- Trigger type:
- Trigger value (*):
- Location:
- Reference:
- Reporter(*):
- Description:
- Reporter source: expertise:
- Reporter source: phone:
- Photo: Choose file: No file chosen

Submit

Assessing The Underworld
Assessing the Underworld advances the Mapping the Underworld (MTU) initiative into a new sphere of influence and is part of a 25-year vision to make street works more sustainable. ATU Decision Support System (ATU-DSS) is an interactive computer system that supports asset management decisions by integrating and reasoning with diverse information sources about assets and their relationships.
A route is segmented as multiple triggers for analysis
DSS Advantages Identified So Far

Automatic Natural England Magic map interpretation

Looking for (potentially culverted) watercourses on historic maps.
Summary

- This case study illustrates how DSS is being applied in the real world.

- DSS Team works with engineers and others to:
  - Define problem
  - Data collection
  - Data Interpretation
  - Extend DSS prototype
  - Evaluate in real world

- IAA follow on funding would facilitate other such case studies/evaluations ....
Future Directions

Now

- **DSS Prototype**: smart, transparent, auditable
- Knowledge-empowered data integration
- Automated reasoning for data interpretation

5-10 years

- **ATU DSS in practice**: real world scenarios
- Problem definition
- Data capture and data interpretation

10-20 years

- **Digital Transformation**: ‘AI & data economy’
- Grand challenges in the sector
- Opportunities provided by data and AI
Future Directions

**Now**
- **DSS Prototype**: smart, transparent, auditable
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**5-10 years**
- **ATU DSS in practice**: real world scenarios
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**10-20 years**
- **Digital Transformation**: ‘AI & data economy’
  - Grand challenges in the sector
  - Opportunities provided by data and AI
Next 5-10 years

ATU DSS in New Scenarios

• Scenario context
• Data collection
• Data interpretation
Future Directions

**Now**
- **DSS Prototype**: smart, transparent, auditable
- Knowledge-empowered data integration
- Automated reasoning for data interpretation

**5-10 years**
- **ATU DSS in practice**: real world scenarios
- Problem definition
- Data capture and data interpretation

**10-20 years**
- **Digital Transformation**: ‘AI & data economy’
- Grand challenges in the sector
- Opportunities provided by data and AI
Next 10-20 years

- UK world leader in digital delivery and smart infrastructures
- Ensuring productivity and resilience
- Digital transformation to fourth industrial revolution
- Cultural change to break old habits and embrace interoperability
- Disruption through influences from more advanced sectors, inevitable transformation
- Focus on needs, evolving requirements
- Balancing impact of society on infrastructure and of infrastructure on society
Next 10-20 years

UK Industrial Strategy: AI and Data Economy

- **Artificial intelligence**: technologies with the ability to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation

- **Machine learning**: a type of AI that allows computers to learn rapidly from large datasets without being explicitly programmed

- **Data-driven economy**: a digitally connected economy that realises significant value from connected, largescale data that can be rapidly analysed by technology to generate insights and innovation
UK Industrial Strategy: UK at the forefront of the artificial intelligence and data revolution

- **Launch and roll-out Sector Deals** – partnerships between government and industry aiming to increase sector productivity (construction)

- **This fourth revolution** is characterised by a fusion of technologies that is blurring the lines between the physical, digital and biological worlds. It will disrupt nearly every sector in every country, creating new opportunities and challenges for people, places and businesses to which we must respond.
Next 10-20 years

Digital Transformation, AI and Data

- Major challenges
- Key developments
- New opportunities