

# Geotechnical Data Integration: The foundation of good Building Information Models (BIM)

# Gary Logan Bentley Systems

Geotechnica ME

8<sup>th</sup> of November, 2.45pm

# **Bentley Systems**

Bentley provides **software** and **professional services** for the **lifecycle of the world's infrastructure.** 

Comprehensive portfolio for the building, plant, civil, and geospatial markets, spanning architecture, engineering, construction and operations



Civil



Plant



Building



Geospatial





# **Bentley Solution Offerings**

### Solution includes:

- Intra-operable software product portfolio
- Professional services and learning
- Professional communities networking



Oil and Gas



Metals and Mining



Power Generation



Industrial **Facilities** 





Cadastre and Land Development



Roads



**Buildings** 





Bridges



Campuses



**Utility Networks** 



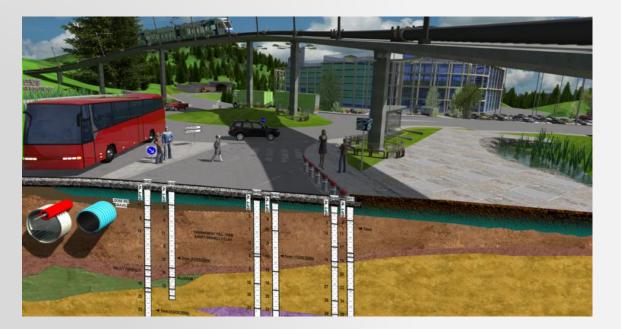


Water and Wastewater



# Agenda

- Defining what is BIM
- Understand key features, terminology and benefits
- What is the role of Geotechnical Information in BIM
- Examples of across discipline and environment delivery







# What is BIM?

Building Information Modelling is nothing more than a multidisciplinary collaborative, model based approach to the design, construction, commissioning, ownership, operation, maintenance, demolition of built assets. John Dickinson, P. Eng., Ph.D.

The BIM model is a digital resource of reliable information for decisions from the initial conception to the final disposal of a facility or asset, founded on open standards for interoperability and integration

Targeted at reducing costs

Not a 'product' it is a "process"





# Why is BIM so important?





# **Government 'Encouragement'**

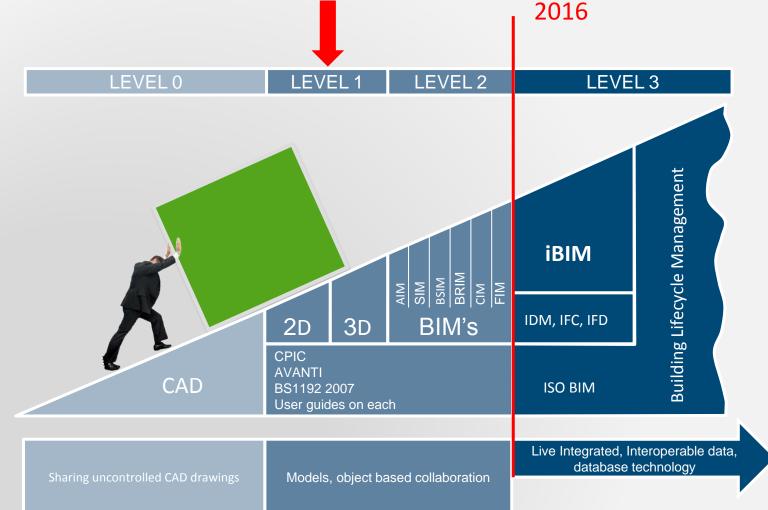


- Reduce costs by 20%
- Public Money
- Adoption within 5 years
- Competitiveness





# **Evolving BIM**





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# **Key elements of BIM**

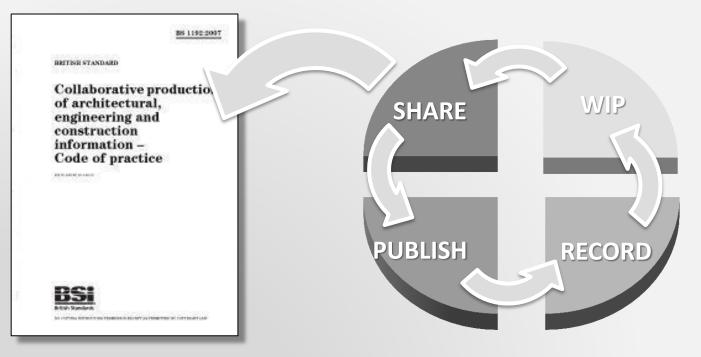
- 2D and 3D data
- Federated data approach
- A collaborative work flow process
- Interoperability and data re-use
- Agreed data deliverables
- Culture







# **British Standards 1192**



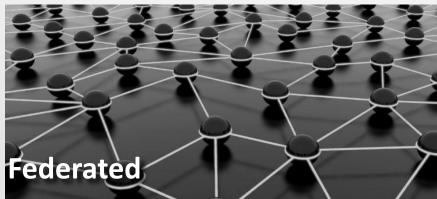
- Defines how to create a trusted common data environment
- Defines processes and conventions that make true data co-ordination and collaboration work
- BS1192 is based upon a federated approach to Building Information Modelling/Management (BIM)





# **Federated Approach**







- Task driven
- Proprietary
- Dictatorial
- Local





- Process driven
- Open
- Democratic
- Distributed
- Sustainable
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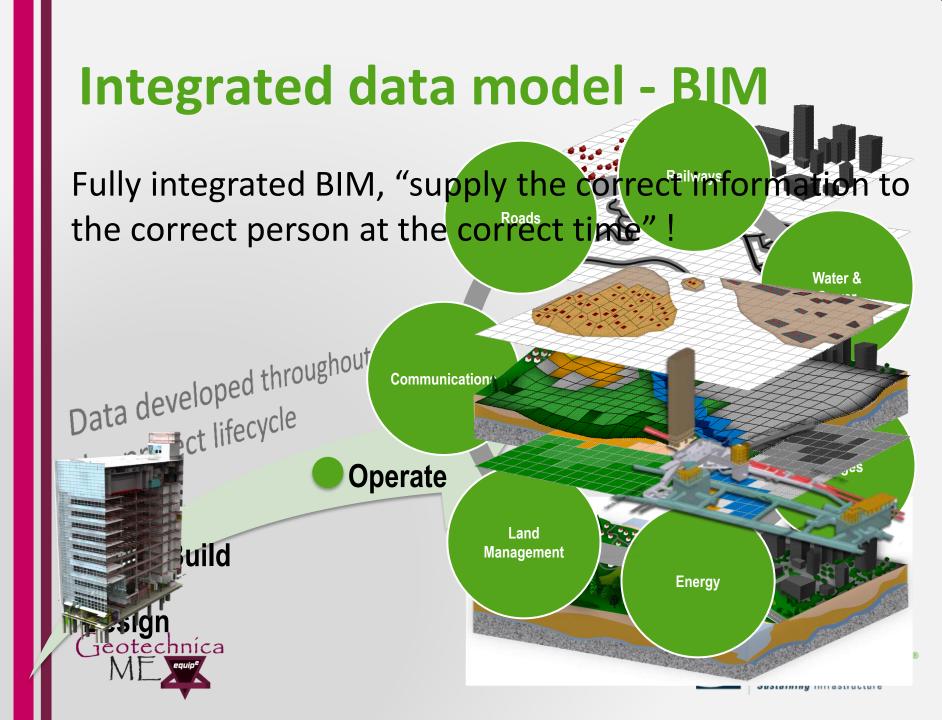
### **Federated BIM Data**

Steel structure Concrete structu MEP services Coordination Combined Togethe

Contextual information



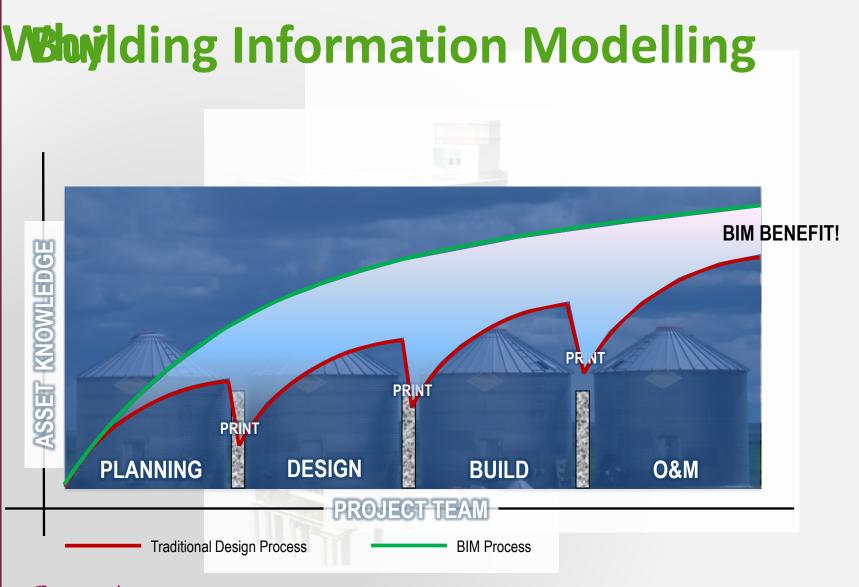




### Okay, so what are the benefits











# Where BIM returns value?

- Reduce costs while improving productivity
- Improve quality while maintaining industry standards
- Improve your understanding of risk on projects
- Provides you with greater control
- Avoid time and cost over-runs
- Increase efficiency within your supply chain
- Increase your understanding of the asset
- Protect profit margins





### The Role of Geotechnical Engineering in BIM

- Underpins all structures that exist on or above the ground
- Surrounds all underground structures
- Dictates the choice of design and costs related to the design
- Subsurface information acts as the source for all BIM models
- If complacent, costs are cut, information is

isolated or poorly managed ...... What happens!!!





### The Role of Geotechnical Engineering in BIM





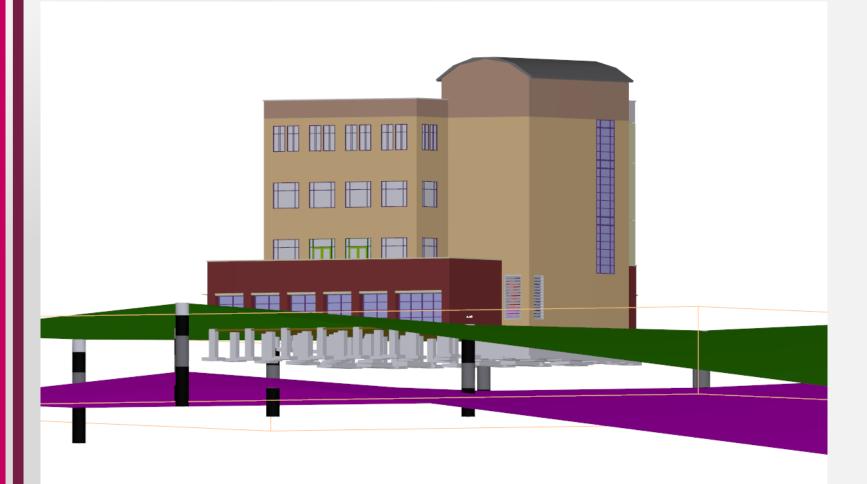








# **Geotechnical Data in BIM**







# **Geotechnical Data in BIM**

What kind of information should be made available to the BIM environment?

- Factual Information hole location, lab, stratigraphy, geophysics, etc.
- Derived information classification, reports, etc.
- Interpretive Information sub-surface models
- Analysis and Design GeoStructural Designs

All have importance when integrated into a multidiscipline environment





What does this mean for Geotechnical Information?

- Data resides where it was created and is managed
- Updated information reduces risk and gives a clear picture of the underlying challenges.
- Decisions are made through interaction not a snapshot in time.

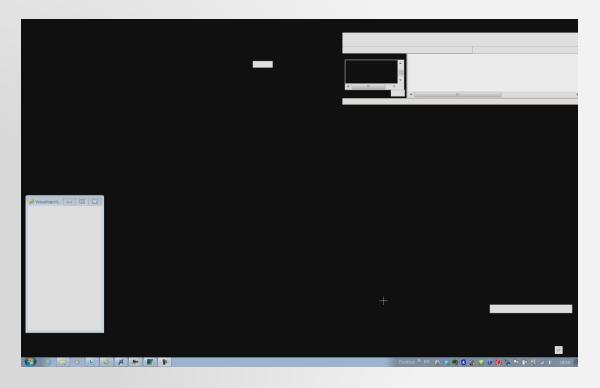




#### **Geotechnical Data in BIM – Federated Approach** Little BIM – often preferred by design teams who wish to adopt the BIM workflow. 10P0 STAGE 🕀 💥 [1] [2] [3] [4] [5] [6] Variable: Sigma Z ▼ Plot: isosurface ▼ 12.000 15.000 565.35 ₩ Desktop Activity Level 3 BIM compliance Assign Anchor E Props **Database Technology** A Geo-rein Beams Surcharge & Water Analysis F# Stability SOI Server Analyze ORACLE Analysis results 🗄 Analysis settings Analysis successfully completed. 100.00 % nalysis settings: standar Level 2 BIM compliance **3D Models** BENTLE DWG Level 1 BIM compliance Flat Files Geotechnica leu **Sustaining** Infrastructure

Application Example – Road Design

### **Feasibility Study**

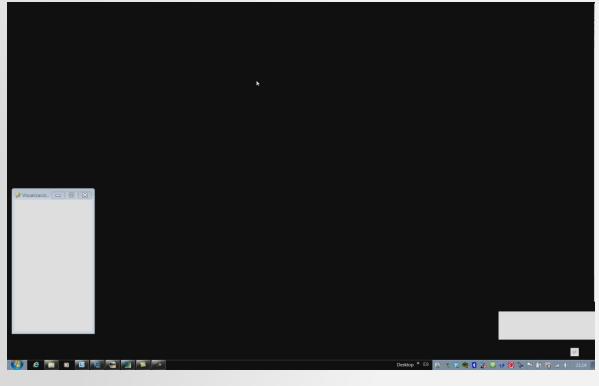






Application Example – Road Design.

Addition of a more detailed survey

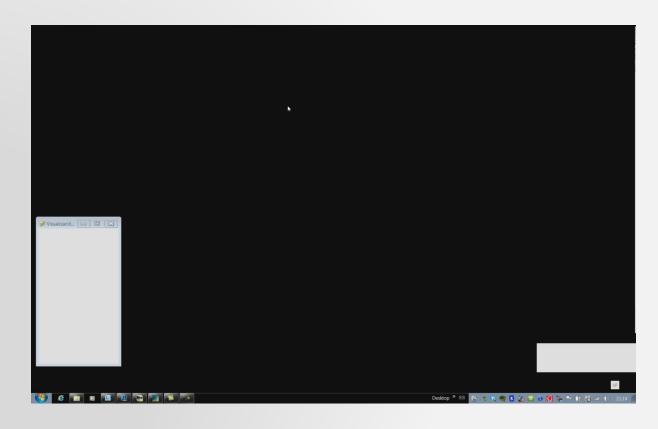






### Application Example – Road Design

### Iterative cycle





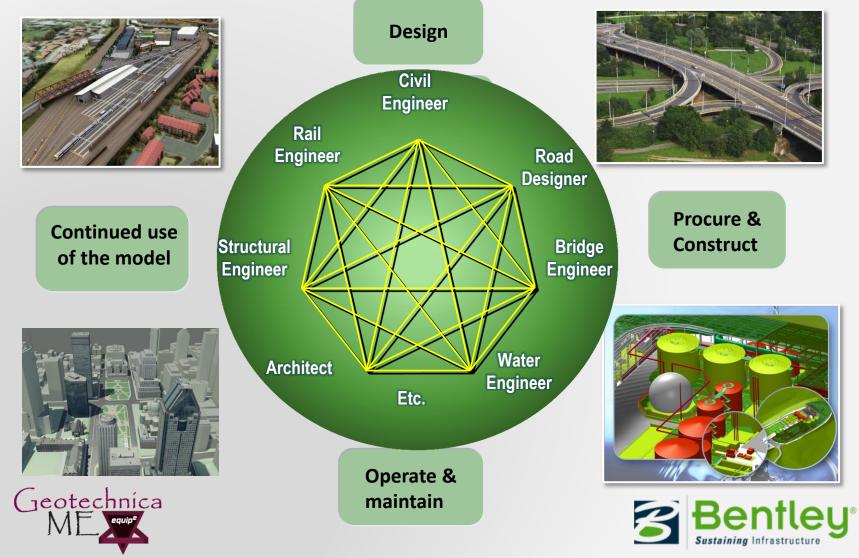


### Application Example – Road Design

### **Completed Design**

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Big BIM – preferred by owner operators



Post build maintenance phase, reusing subsurface information Sharing information through hand held devices

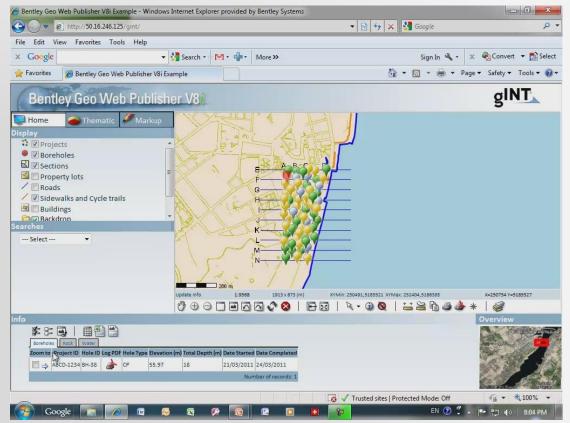






### Post build maintenance phase, reusing subsurface information

### Sharing information to Desktop and Web based GIS







# Summary, what have we learned

- Geotechnical data adds considerable value to the BIM environment
- Subsurface conditions can be the defining parameters to the success of a infrastructure project.
- Supplying the correct information, to the correct person at the correct time, is an effective work practise (BIM)
- Do not be scared, it is only a process









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