

Presented at the FIG Working Week 2016,
May 2-6, 2016 in Christchurch, New Zealand

TSSU5D-6 - SENSOR FUSION, DATA ACQUISITION AND PROCESSING TECHNIQUES FOR MOVING MEASURING COMPLEXES



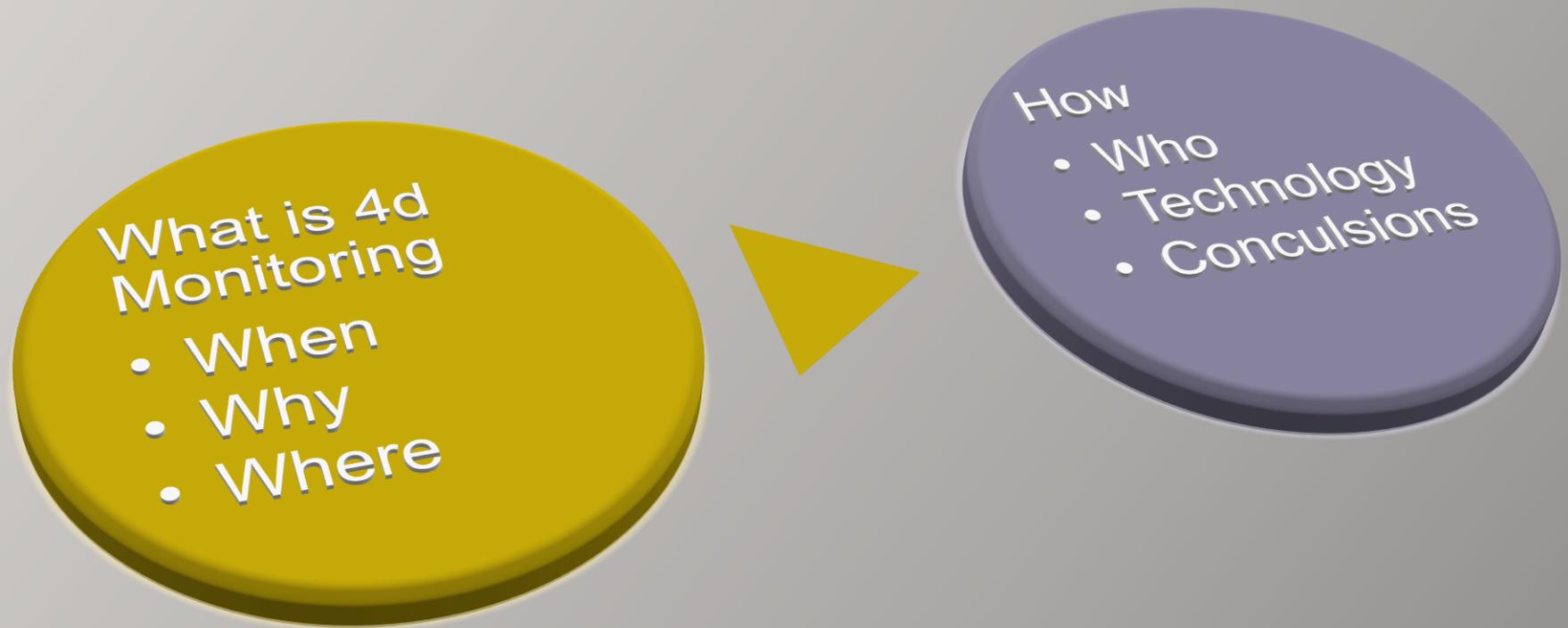
4D Survey and Geotechnical Monitoring Achieving Enhanced project Outcomes for Construction

Presentation to FIG working week Christchurch 4 May 2016



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Overview 4d Monitoring





What is 4d Monitoring

MONITORING ON STEROIDS!

- ✓ More Frequent
- ✓ Delivers Faster
- ✓ Safe Environment
- ✓ Highly Accurate
- ✓ Fixed Costs
- ✓ Single data provider
(Survey and Geotech)



When is it used?



- ✓ High Risk Construction
- ✓ Unstable Environments
- ✓ Safe Access Constraints
- ✓ Significant Public Risk
- ✓ Response Time is Critical
- ✓ Periods of >6 weeks
- ✓ Fixed Cost is Needed

Why is it used?



- ✓ Better Information
- ✓ Better Collaboration
- ✓ Minimises Risk
- ✓ Enhances Safety
- ✓ Saves time and money!

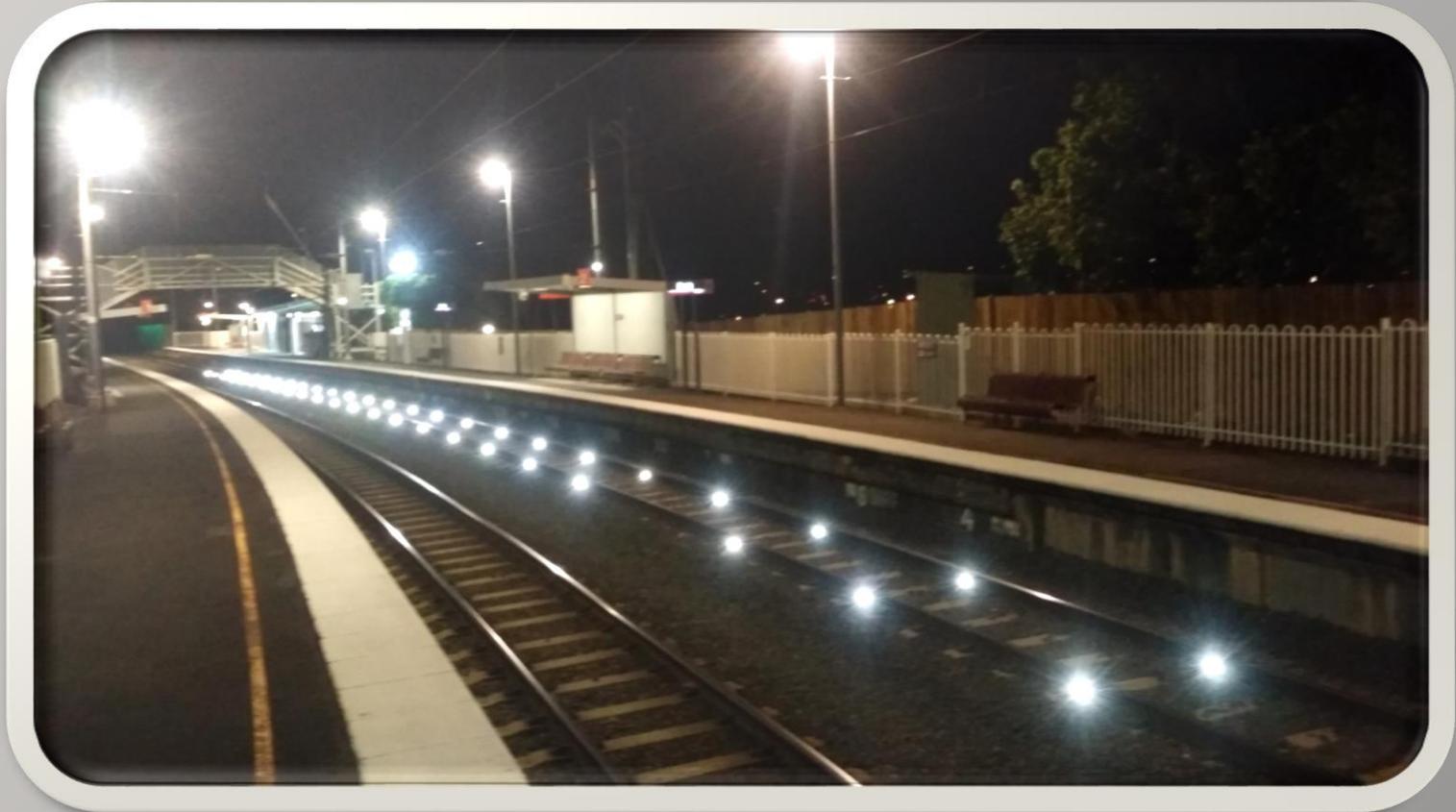
Where is it used?

✓ Excavations



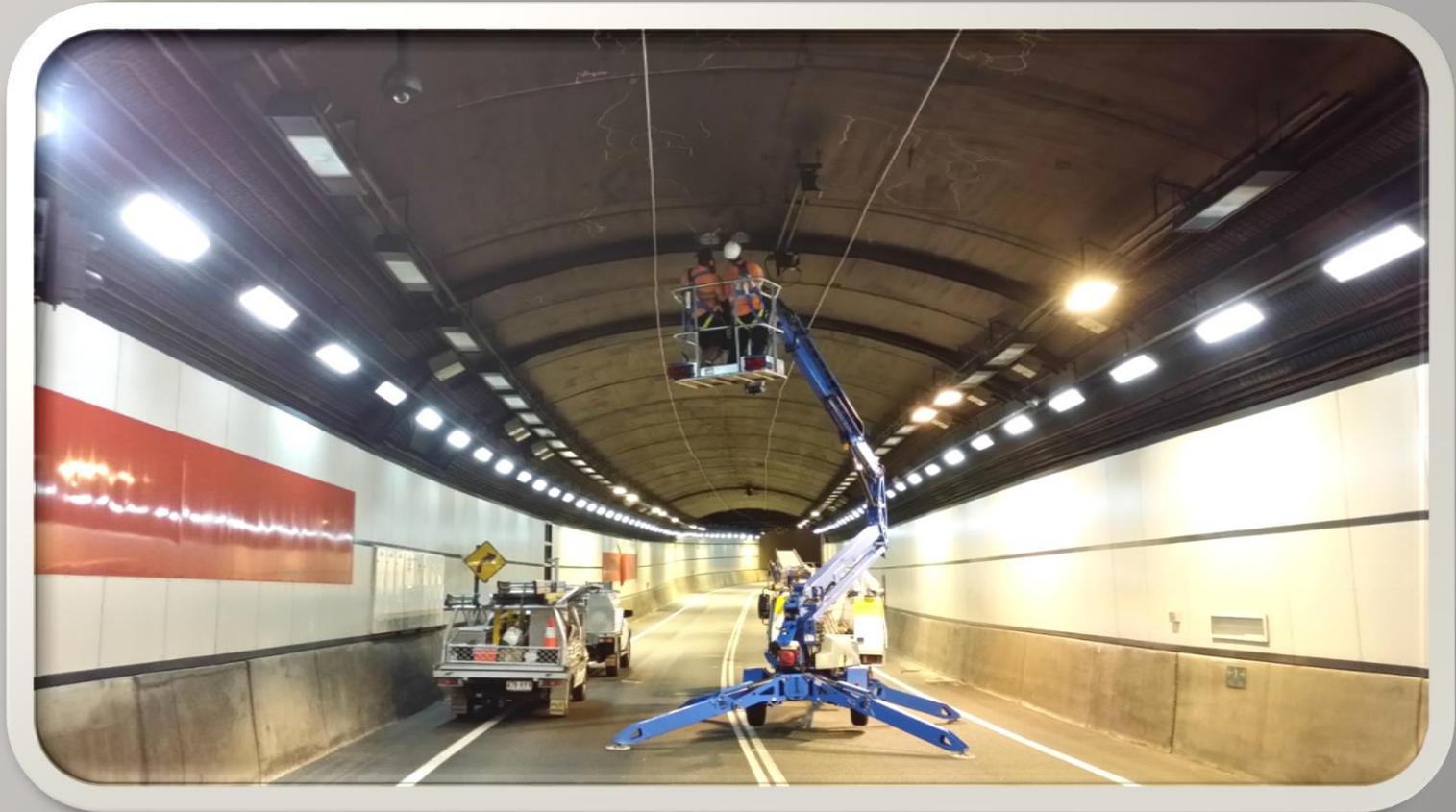
Where is it used?

- ✓ Rail Lines and Infrastructure



Where is it used?

✓Tunnels



Where is it used?

- ✓ Buildings/ Structures



Where is it used?

- ✓ Sewerage Plants/
Tanks



Where is it used?

- ✓ Water Reservoirs/ Infrastructure



How does it work?



Design/Plan

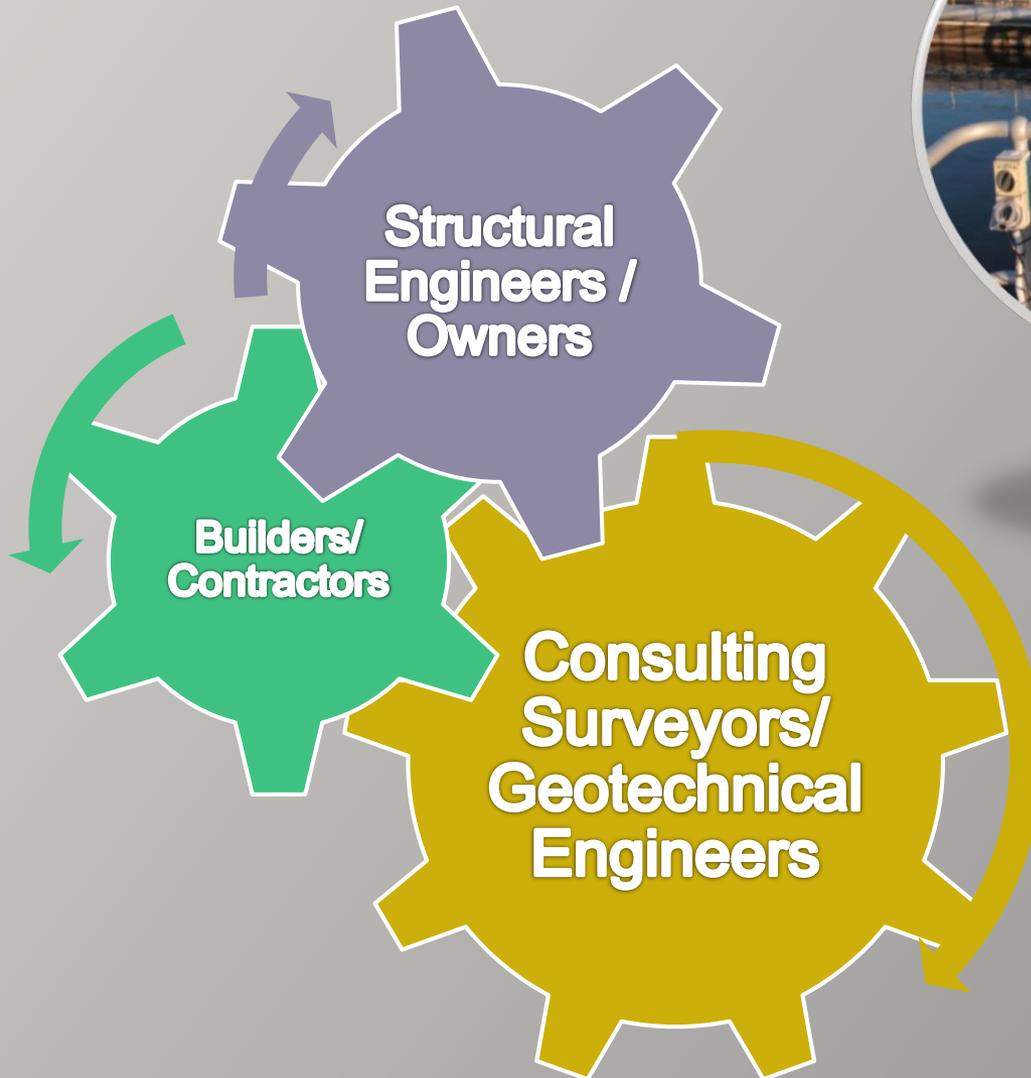
Install

Maintain/
Report

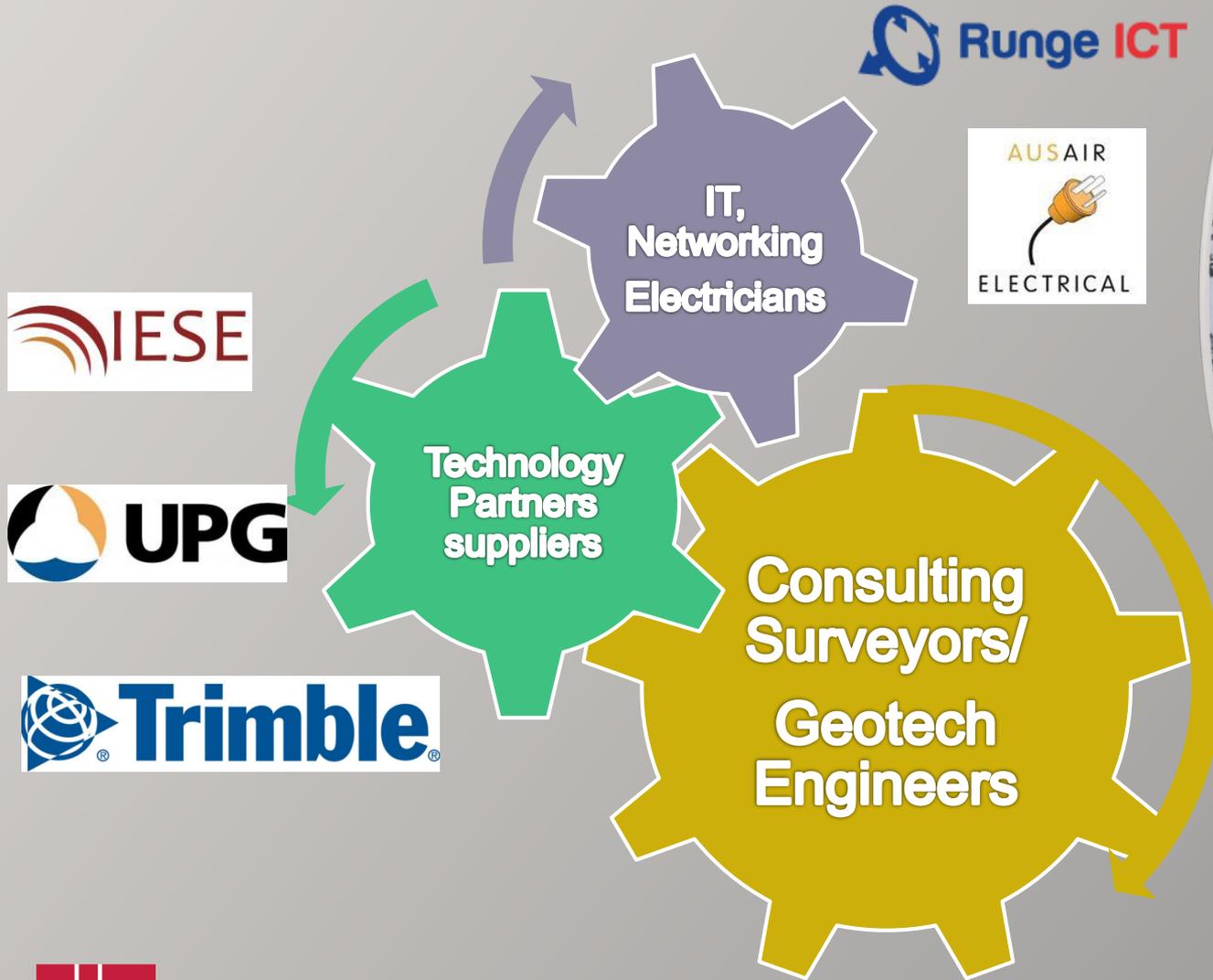
Remove



Who?

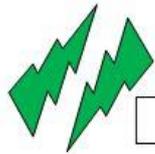


Who (Internal) ?



Technology?

Land Solution – S8 Monitoring Setup



Fixed ADSL connection

Server operating
T4D software

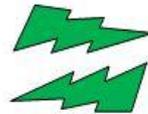


Trimble S8 Robotic Total
Station integrated pressure
sensor on custom bracket

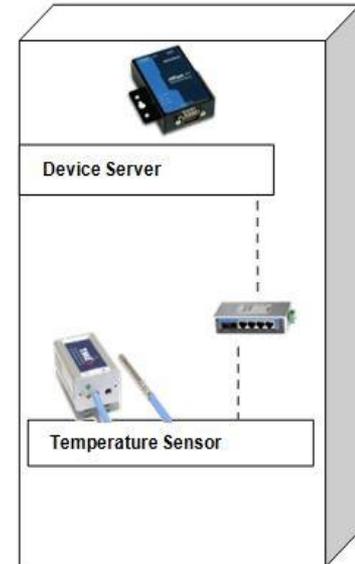


CAT 6E

Provision for 2.4 GHz solution if
redundancy is required at a later date.



4G Network



Total Station
Comms Box



Geotech/ Structural Sensor Installations?

- ✓ Shapeaccelarrays
- ✓ VW Crack meters
- ✓ Geophones
- ✓ Accelerometers
- ✓ IP Inclinometers



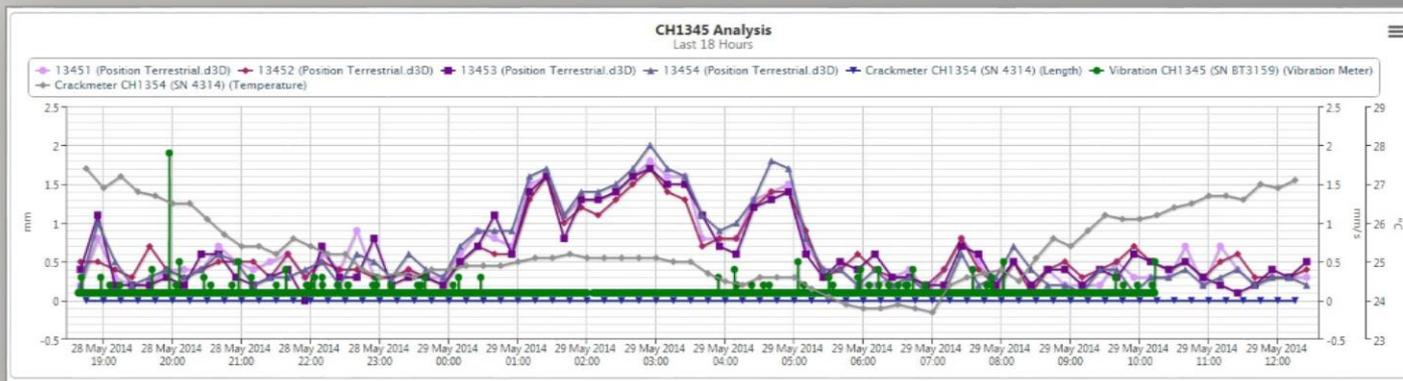
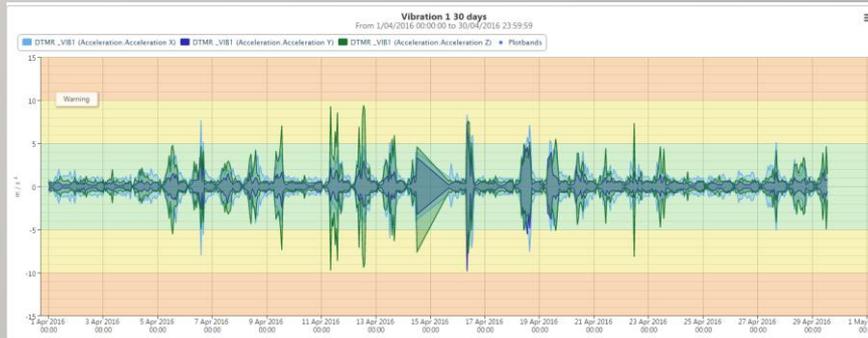
Total station Installations?

- ✓ Water tanks
- ✓ Sewerage Plants
- ✓ Tunnels
- ✓ Buildings
- ✓ Railways

Data Delivery Reporting

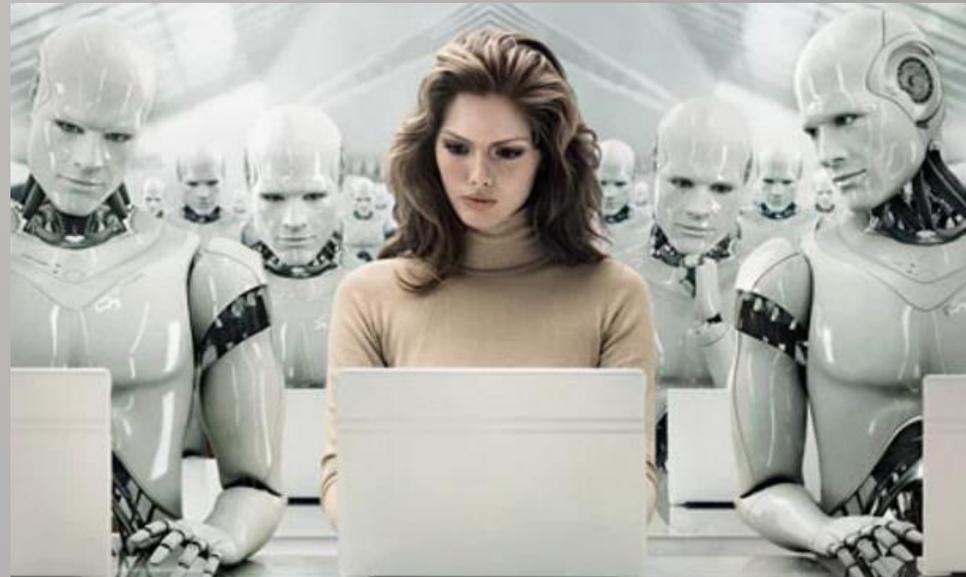
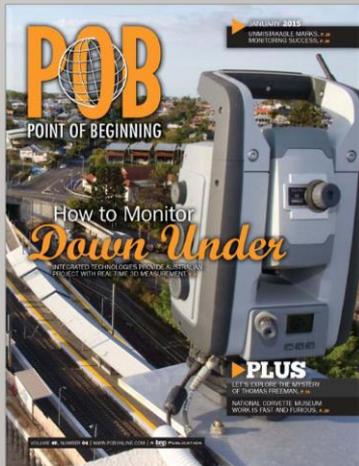


- ✓ Automated Notification alerts SMS/Email
- ✓ Fully customised user login and access
- ✓ Analysis, logs charts and reports on demand or automated
- ✓ Combine Geotech and Survey and environmental sensors automatically



Conclusions

- ✓ 'We are in a New Paradigm'
- ✓ Precise observation for high risk at any frequency on any scale
- ✓ Cellular networks and solar power make possible almost anywhere
- ✓ A 'new world' of precise kinematic sensor technology is here
- ✓ Dawn the 'Age of the Robot' and the consultant who controls them.



The future is robotic. Photograph: Blutgruppe/zefa/Corbis

Thank you



'Please read or paper titled'

'4D Survey and Geotechnical Monitoring Achieving Enhanced Project Outcomes for Construction'

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