

Using Geospatial Technology on Railway Resignalling Projects

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DANIEL WATSON
TECHNICAL SOLUTION MANAGER
THALES UK



Multi-national Organisation with heavy presence in the UK

- Space
- Defence
- Security
- Aerospace
- Transportation - GTS - URS - MLS - ICS - RCS
 - » **Signalling systems**
 - » Supervision and communications systems
 - » Revenue collection systems



Thales in the UK working in partnership with transport operators

- Transport for London
- Network Rail
- London Underground
- DLR
- Transport operating companies

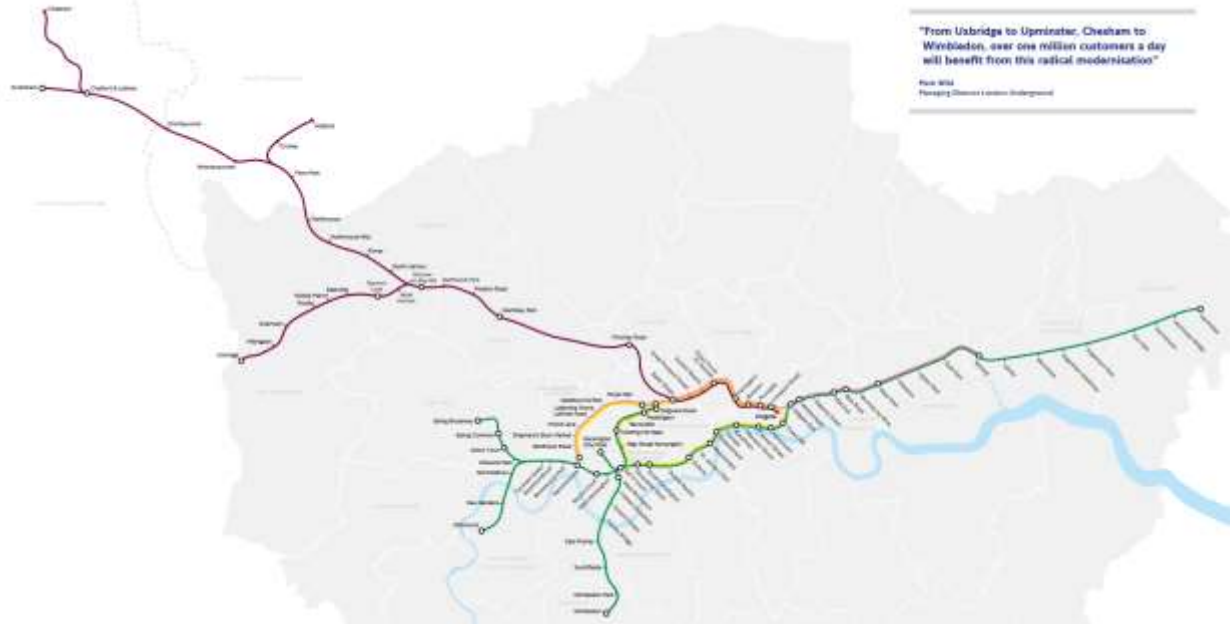


4LM Project – Four Lines Modernisation

The Project – 4LM (Four Lines Modernisation)

- The design and installation of a new CBTC (communication based train control) system for four lines of London Underground

- **Hammersmith & City**
- **Circle Line**
- **District Line**
- **Metropolitan Line**

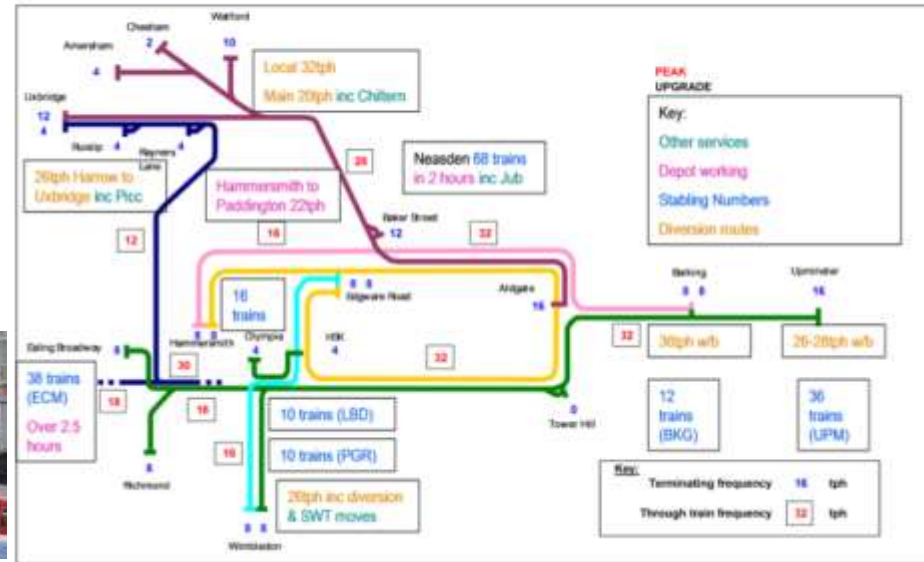
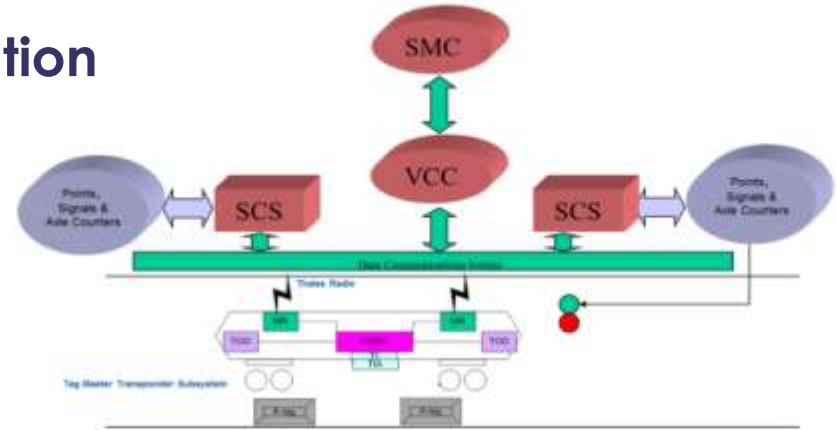


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4LM Project – Four Lines Modernisation

The Project

- The design and installation of a new CBTC (communication based train control) system for four lines of London Underground
- The CBTC system allows for automatic train operation by providing vital communications between the train and the trackside.
- Equates to **11,766** trackside assets
- Site surveys to identify asset locations require measurement from fixed reference points, using measuring wheels and tape measures.



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4LM Project – Four Lines Modernisation

The Project

➤ **11,766** trackside assets include:

- Access Points for track to train communications
- Transponder Tags to identify accurate train position
- Signals and Signs to provide indication to drivers
- Axle counters to detect train movement

Access Points



Transponder Tags



Signals



Signs



Axle Counters



The Transformation to using GPS on Railway

The Proposal

- Installation staff to use GPS Tools for locating wayside assets for open sections of 4LM Railway which will also complete As-built survey
- Use GIS data to present a graphical and scaled view before going to site.

Current method

- Site surveys to identify asset locations require measurement from fixed reference points, using measuring wheels and tape measures.

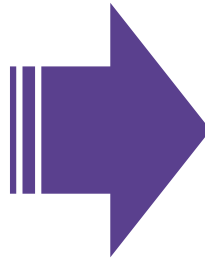
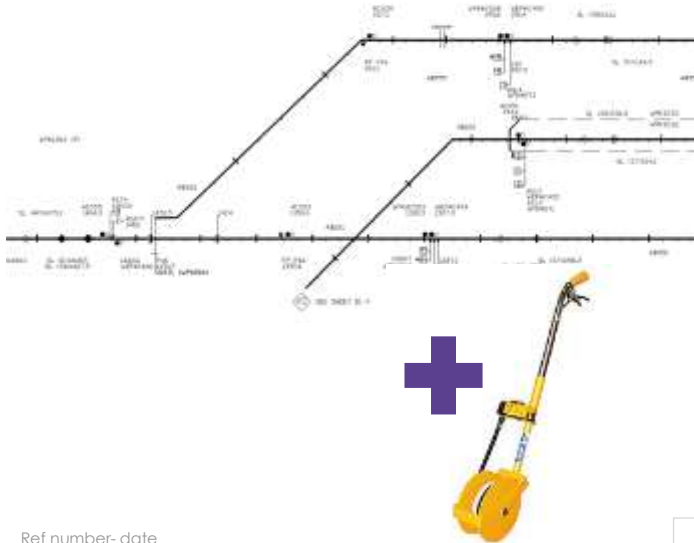
Benefit

- Reduce Site Surveys 50%, by doubling assets surveyed per shift
- Safety benefit by reducing on-site man-hours
- Accurate view of railway for installation staff before installing assets

The Transformation to using GPS on Railway

Enablement

1. Complete trainborne surveys with GPS capabilities
 2. Develop chainage to GPS conversion process
 3. Purchase GPS tools and application for use during installation activities
- Continued management and administration of location data



1. Train Survey

- Capture existing wayside railway asset location data
- Mesh LiDAR and video data for office based review
- Provide track centreline chainage and GPS co-ordinates to allow for conversion between to location reference systems
- Accuracy suitable for our application, i.e. 0.1m absolute accuracy



Omnicom
Balfour Beatty



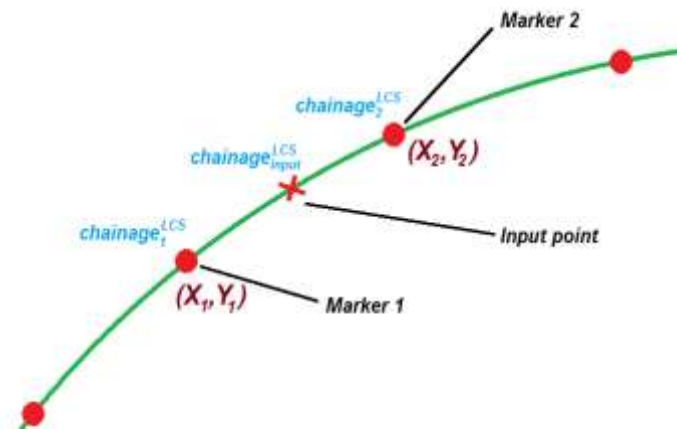
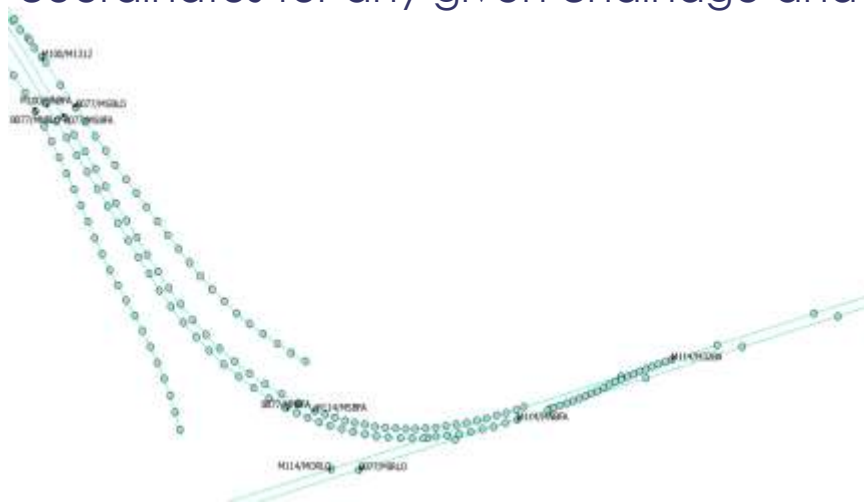
2. Development of 1D to Coordinates Conversion Tool

Survey Output

- For every 0.5m, a chainage and a set of coordinates is provided

Conversion Tool

- Completed look-up and interpolations to determine the corresponding coordinates for any given chainage and vice versa



3. GNSS Tools for Installation Staff

GNSS Antenna – Trimble’s Catalyst with Precision Subscription

2m Pole, Tablet Holder, Tablet hosting Application

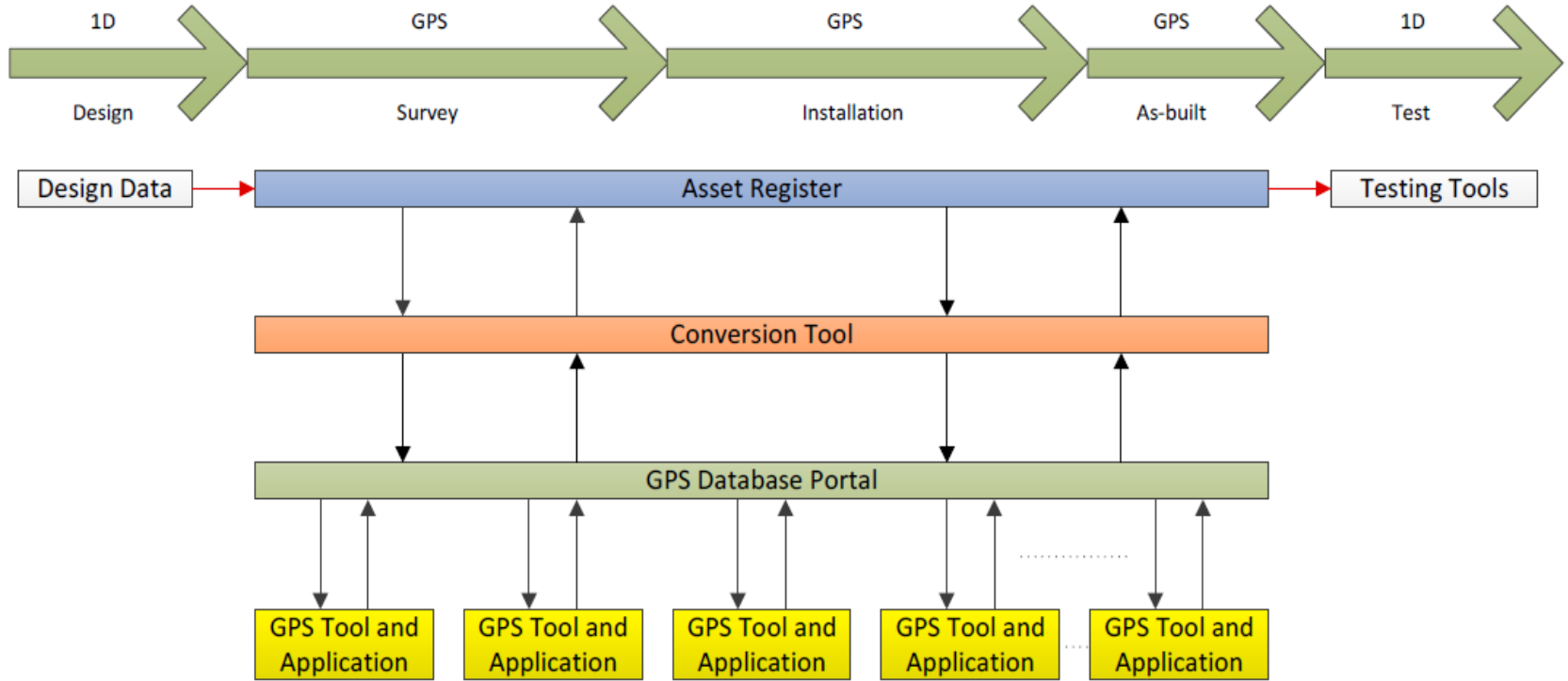
Software Application - Korec

- Tablet – K-Mobile
- Desktop – K-Portal



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Engineering Lifecycle and data flow



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Overview

- Potential to reduce time and cost when needing to be on the railway in very restricted time and resources
- Reduction in time on site reduces overall hazard exposure to personnel
- Not only improved technique for capture location information, but also reduction in manual calculations and use of error prone paperwork

The Current Status

- Not yet fully implemented..... the story continues...

The Future

- Look to further implement GIS technologies in this railway project domain.