MAY 2022

Rail-Vision Signaling Scalable Remote Condition Monitoring Solution

CHG UK

Peter Clarke – Technical Director

About CHG

UK, Sheffield based Company

- Established in 2004 as an electrical contractor and panel builder CHG expanded to provide software systems, integration solutions, products and services for various customers
- CHG focuses its efforts into Rail, Water & Waste Water, Utility Frameworks and Multisite Industrial Manufacturers, offering Engineering and Software Solutions using AVEVA OSI Soft and other software solution providers as well as our own bespoke developed software solution products
- Since 2008 CHG has expanded through growth & acquisition into a group of companies
  - CHG Main Group Company
  - Link2 Software Development & Integration
  - DSL Laboratory Automation Systems
  - Arentis Rail focused CCTV Image Transmission Systems and Solutions

RAIL INFRASTRUCTURE

Railway Signaling Data Visualisation & Reporting

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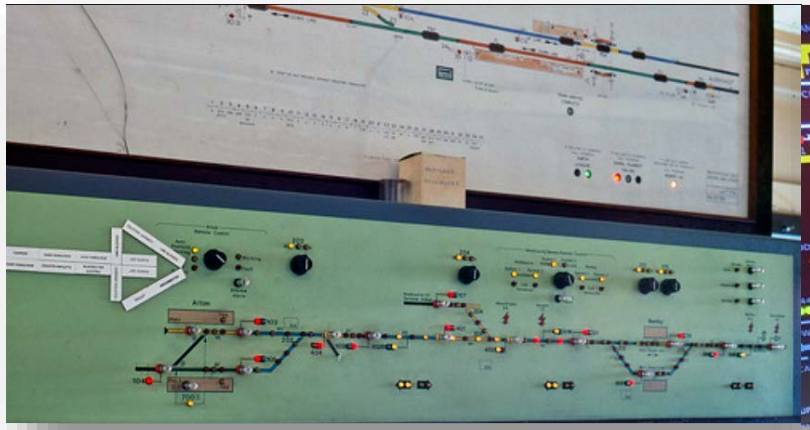

Challenge

- Provide data capture of Signaling and Device Data
- Visualisation & Reporting interlockings
- Translation of complex document input types
- Validated data Input/Output

Solution

- Deployed the latest AVEVA PI System technology including PI AF and PI Vision
- Design Automated File Generation and Validation Tool
- Automated Testing & Validation

Benefits

- Increased granularity of information from disparate data sources
- Enhanced automated and real-time reporting
- Reduced maintenance requirements for fault diagnosis

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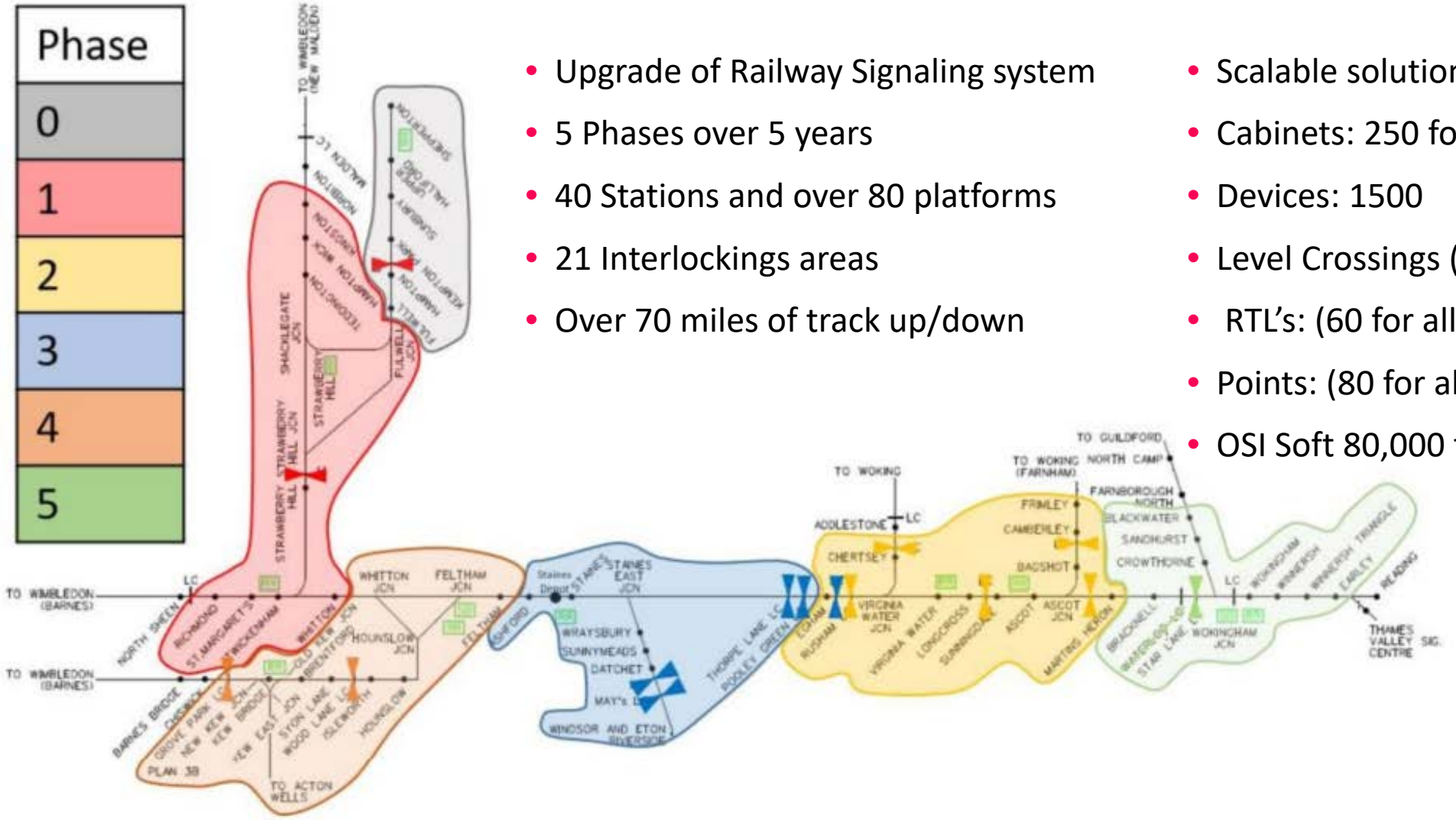
Project Overview



- Upgrade of Railway Signaling system
- 5 Phases over 5 years
- 40 Stations and over 80 platforms
- 21 Interlockings areas
- Over 70 miles of track up/down

- Scalable solution over FTN Fibre Network
- Cabinets: 250 for all phases
- Devices: 1500
- Level Crossings (15 for all phases)
- RTL's: (60 for all phases)
- Points: (80 for all phases)
- OSI Soft 80,000 tags (data points)

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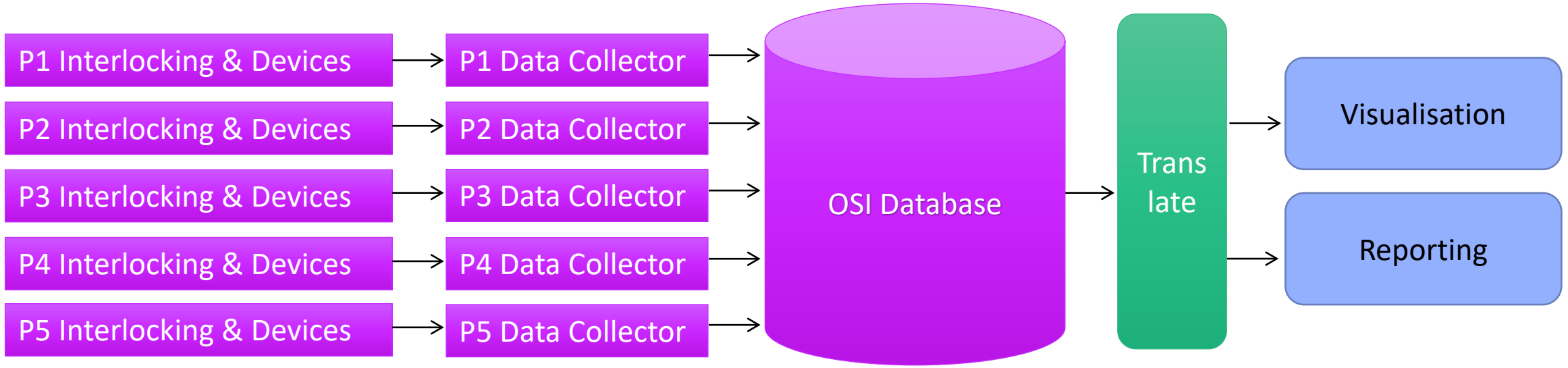
Development and Deployment Challenges

- System Deployment over 5 years
- Cannot adversely affect the running of the railway for previously deployed and operational areas
- Integration of system operation and functionality
- Ability to add innovation and enhancements as project progresses
- Modular architecture allows multiple data collectors to be added

Automated processing and validation of data configuration



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Auto Generation & Data Validation Tool

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- The Auto Config Generator is a proprietary application developed within the Microsoft .Net environment.
- The Auto Config Generator transforms Excel based input files to a variety of output formats using pattern matching and regular expressions.
- Excel Input files are handled by the Microsoft Office Interoperability Layer and validated against known criteria such as Column information and Versioning Information.
- Data is then stored in Collections of Objects representing assets at specific locations.
- These Collections of Objects are then used to build configurations and tasks to build the system.
- Output formats include:
    - CSV Based Configuration Files
    - Command File / Powershell Scripts
    - JSON based Configuration Files
    - Microsoft Excel Documentation
    - Excel based Configuration Files
    - XML based Configuration Files
    - RESTful API Direct Configuration
    - RA FTView Databases (SQL)
- The majority of the outputs from the tool are static file-based configurations, but in two instances outputs are dynamic with scripts to determine the status of the network executed and direct dynamic configuration of Kepware Kepserver OPC Drivers via the product's own RESTful API.

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Signaling Area Displays

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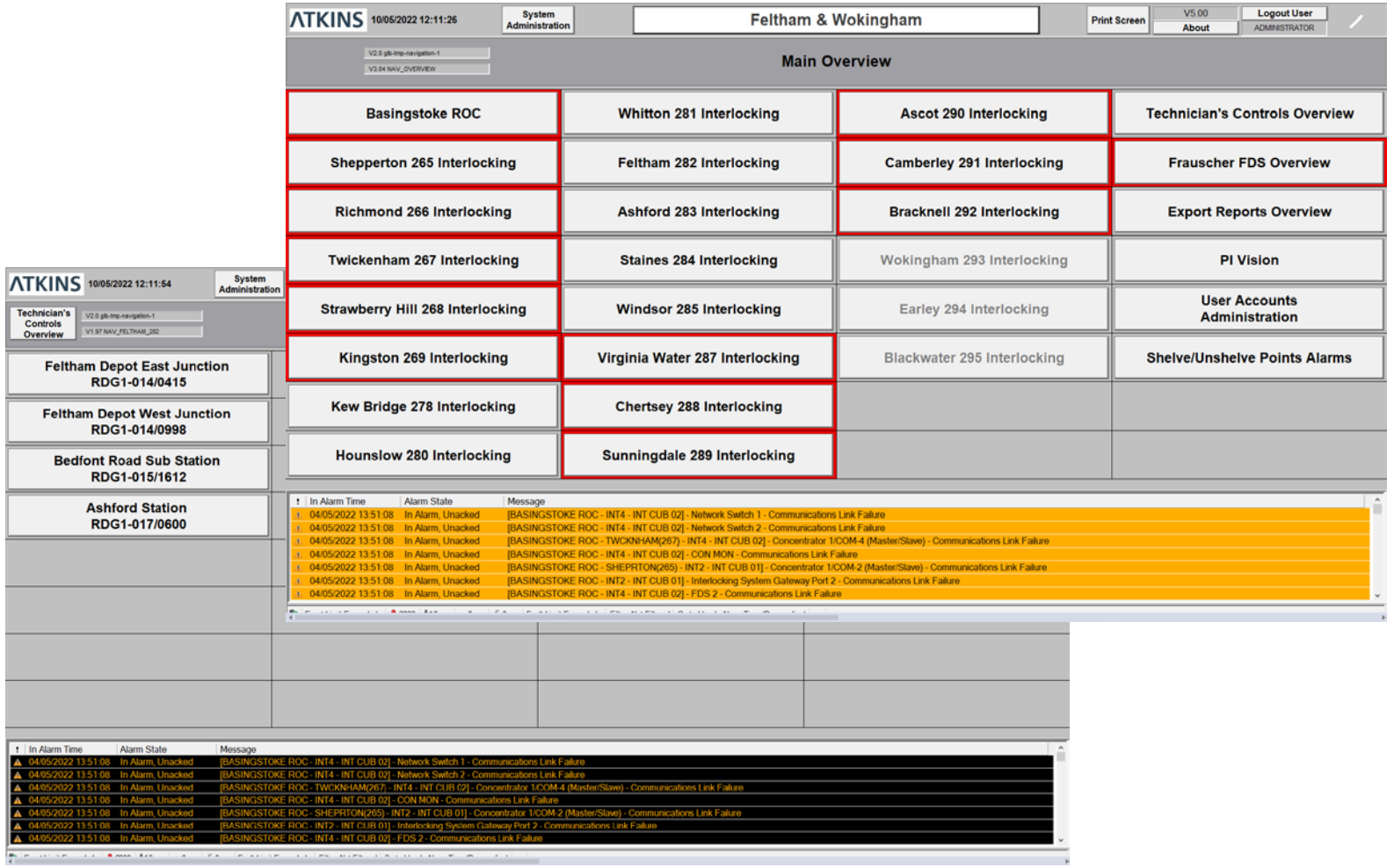

- Interlocking areas are shown in a standardized format for ease of navigation
- Cubicle and devices level displays indicate where issues are with Red Borders
- Detailed alarm and events displays show asset-based detail
- Tabular format to meet human factors requirements

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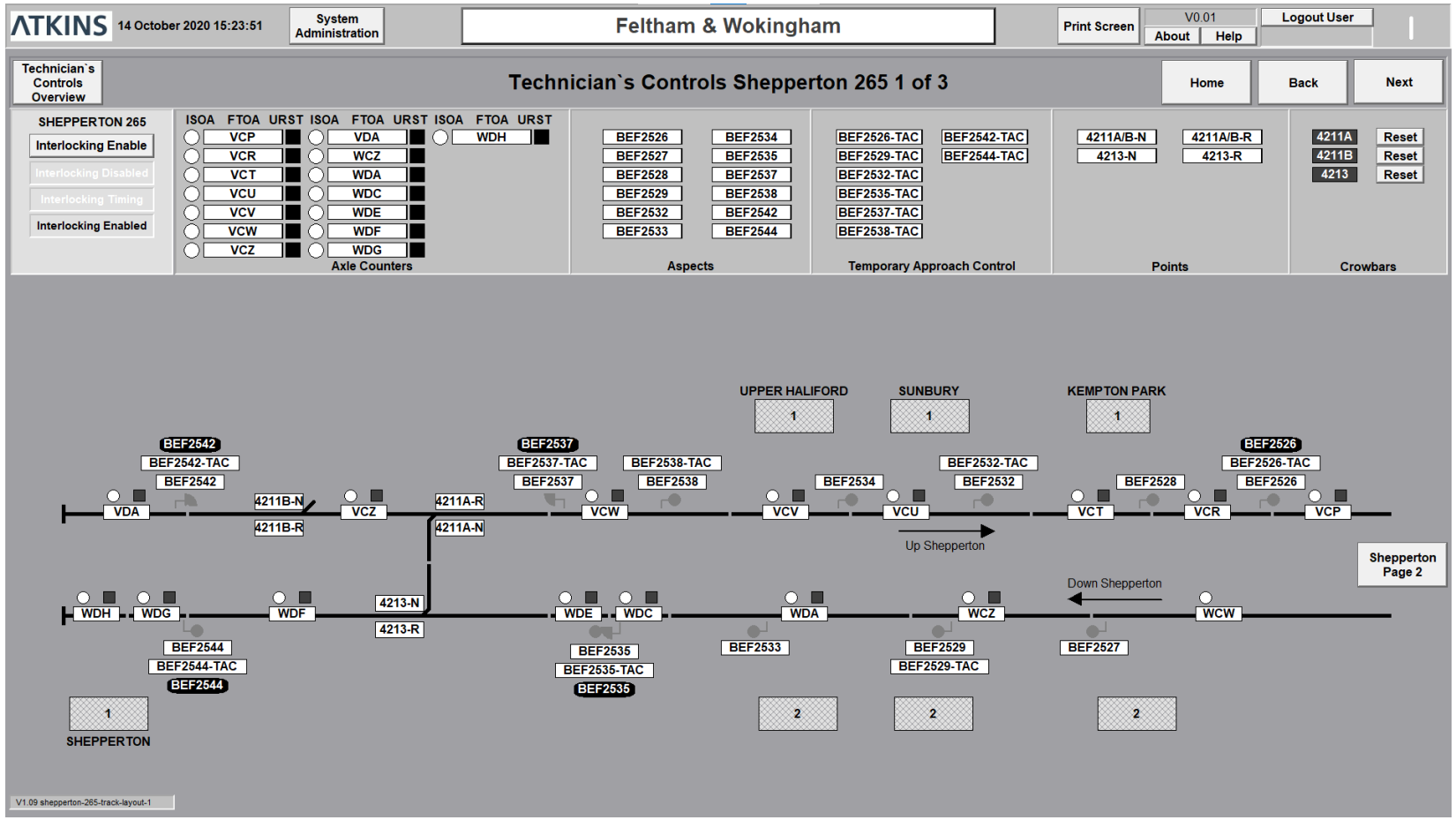
Technician’s Controls



- Scheme plan based layout for Control Centre Technician maintenance activities
- Indication of available and applied Technician’s Controls

Reporting from the PI OLDB Interface using SSRS

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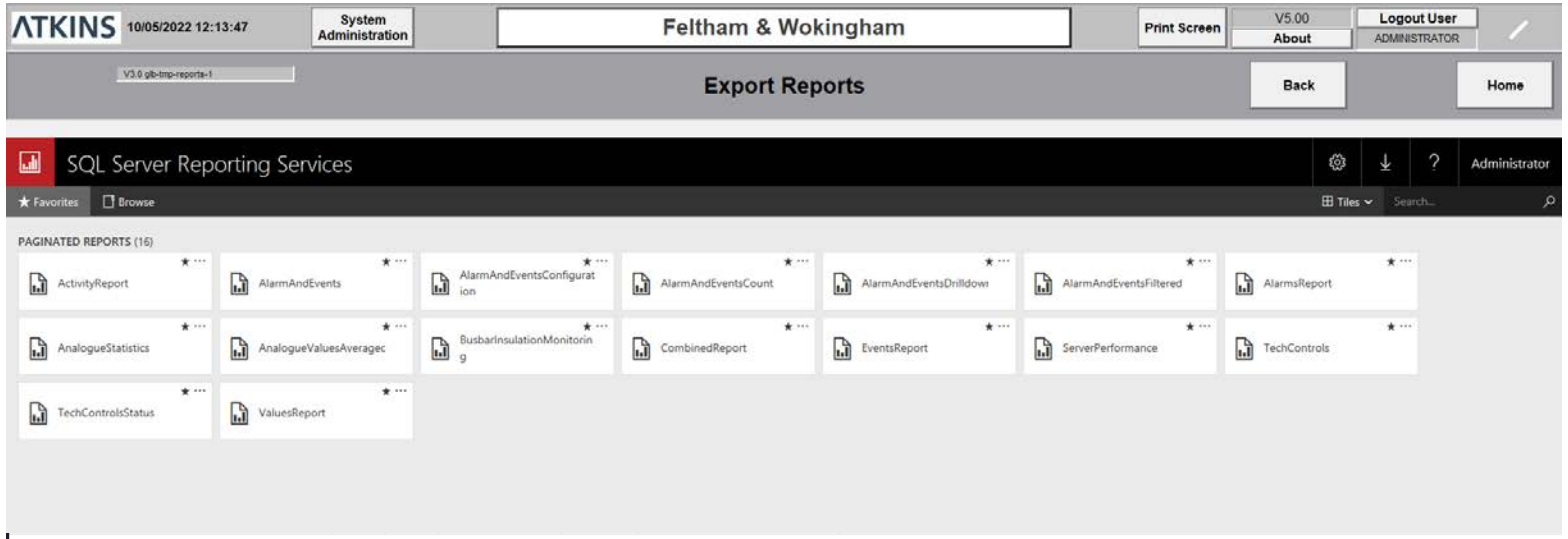

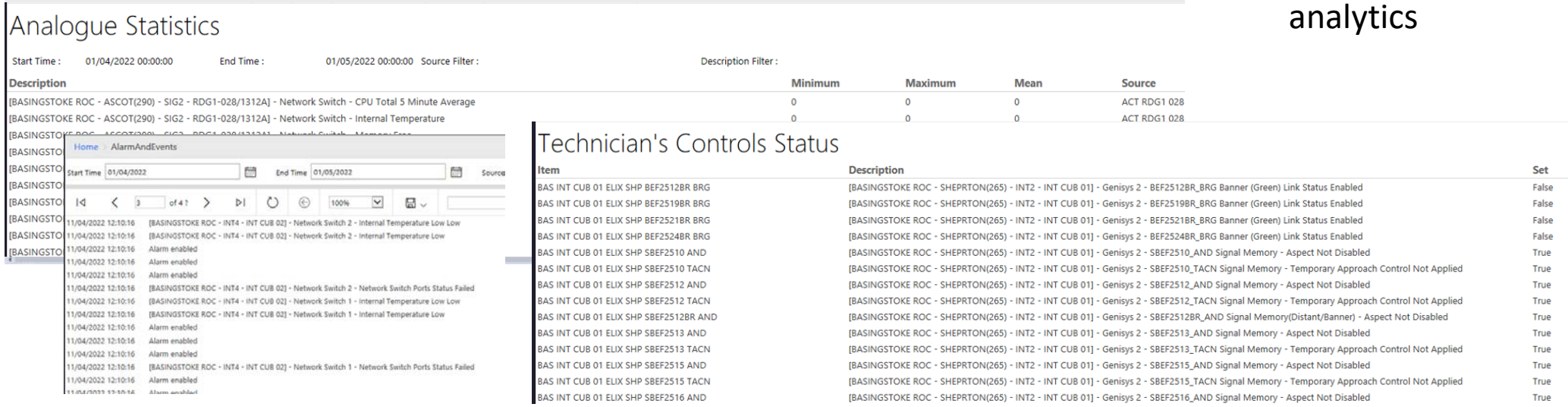

Analogue Statistics

Start Time : 01/04/2022 00:00:00 End Time : 01/05/2022 00:00:00 Source Filter : Description Filter :

Description	Minimum	Maximum	Mean	Source
[BASINGSTOKE ROC - ASCOT(290) - SIG2 - RDG1-028/1312A] - Network Switch - CPU Total 5 Minute Average	0	0	0	ACT RDG1 028
[BASINGSTOKE ROC - ASCOT(290) - SIG2 - RDG1-028/1312A] - Network Switch - Internal Temperature	0	0	0	ACT RDG1 028

Home > AlarmAndEvents

Start Time 01/04/2022 End Time 01/05/2022

11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Internal Temperature Low Low
11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Internal Temperature Low
11/04/2022 12:10:16	Alarm enabled
11/04/2022 12:10:16	Alarm enabled
11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Network Switch Ports Status Failed
11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 1 - Internal Temperature Low Low
11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 1 - Internal Temperature Low
11/04/2022 12:10:16	Alarm enabled
11/04/2022 12:10:16	Alarm enabled
11/04/2022 12:10:16	Alarm enabled
11/04/2022 12:10:16	[BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 1 - Network Switch Ports Status Failed
11/04/2022 12:10:16	Alarm enabled

Technician's Controls Status

Item	Description	Set
BAS INT CUB 01 ELIX SHP BEF2512BR BRG	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2512BR_BRG Banner (Green) Link Status Enabled	False
BAS INT CUB 01 ELIX SHP BEF2519BR BRG	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2519BR_BRG Banner (Green) Link Status Enabled	False
BAS INT CUB 01 ELIX SHP BEF2521BR BRG	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2521BR_BRG Banner (Green) Link Status Enabled	False
BAS INT CUB 01 ELIX SHP BEF2524BR BRG	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2524BR_BRG Banner (Green) Link Status Enabled	False
BAS INT CUB 01 ELIX SHP SBEF2510 AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2510_AND Signal Memory - Aspect Not Disabled	True
BAS INT CUB 01 ELIX SHP SBEF2510 TACN	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2510_TACN Signal Memory - Temporary Approach Control Not Applied	True
BAS INT CUB 01 ELIX SHP SBEF2512 AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2512_AND Signal Memory - Aspect Not Disabled	True
BAS INT CUB 01 ELIX SHP SBEF2512 TACN	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2512_TACN Signal Memory - Temporary Approach Control Not Applied	True
BAS INT CUB 01 ELIX SHP SBEF2512BR AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2512BR_AND Signal Memory(Distant/Banner) - Aspect Not Disabled	True
BAS INT CUB 01 ELIX SHP SBEF2513 AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2513_AND Signal Memory - Aspect Not Disabled	True
BAS INT CUB 01 ELIX SHP SBEF2513 TACN	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2513_TACN Signal Memory - Temporary Approach Control Not Applied	True
BAS INT CUB 01 ELIX SHP SBEF2515 AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2515_AND Signal Memory - Aspect Not Disabled	True
BAS INT CUB 01 ELIX SHP SBEF2515 TACN	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2515_TACN Signal Memory - Temporary Approach Control Not Applied	True
BAS INT CUB 01 ELIX SHP SBEF2516 AND	[BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBEF2516_AND Signal Memory - Aspect Not Disabled	True

- Reporting of system operation from OSISoft stored data
- Predefined reporting for incident investigation
- System performance monitoring
- Equipment operation and analytics

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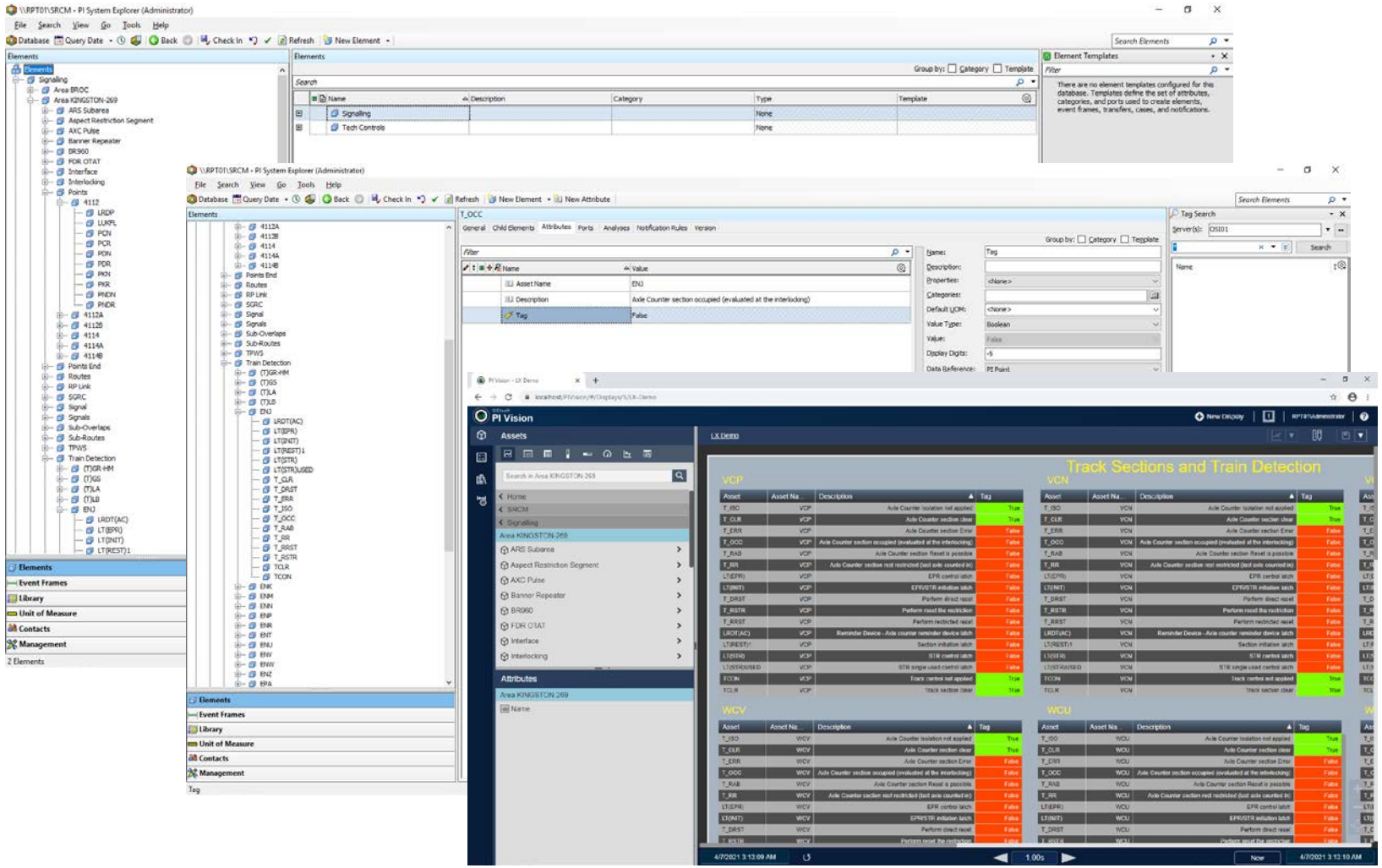
Pi Vision & Asset Framework

Level Crossings

Points Monitoring

Incident Investigation

Railway Assets in Asset Framework (AF)



- Over 125 different assets defined
- Specified by available signaling information from the client
- AF Generated and imported using the Auto Config Generator.

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PI Vision - Level Crossing

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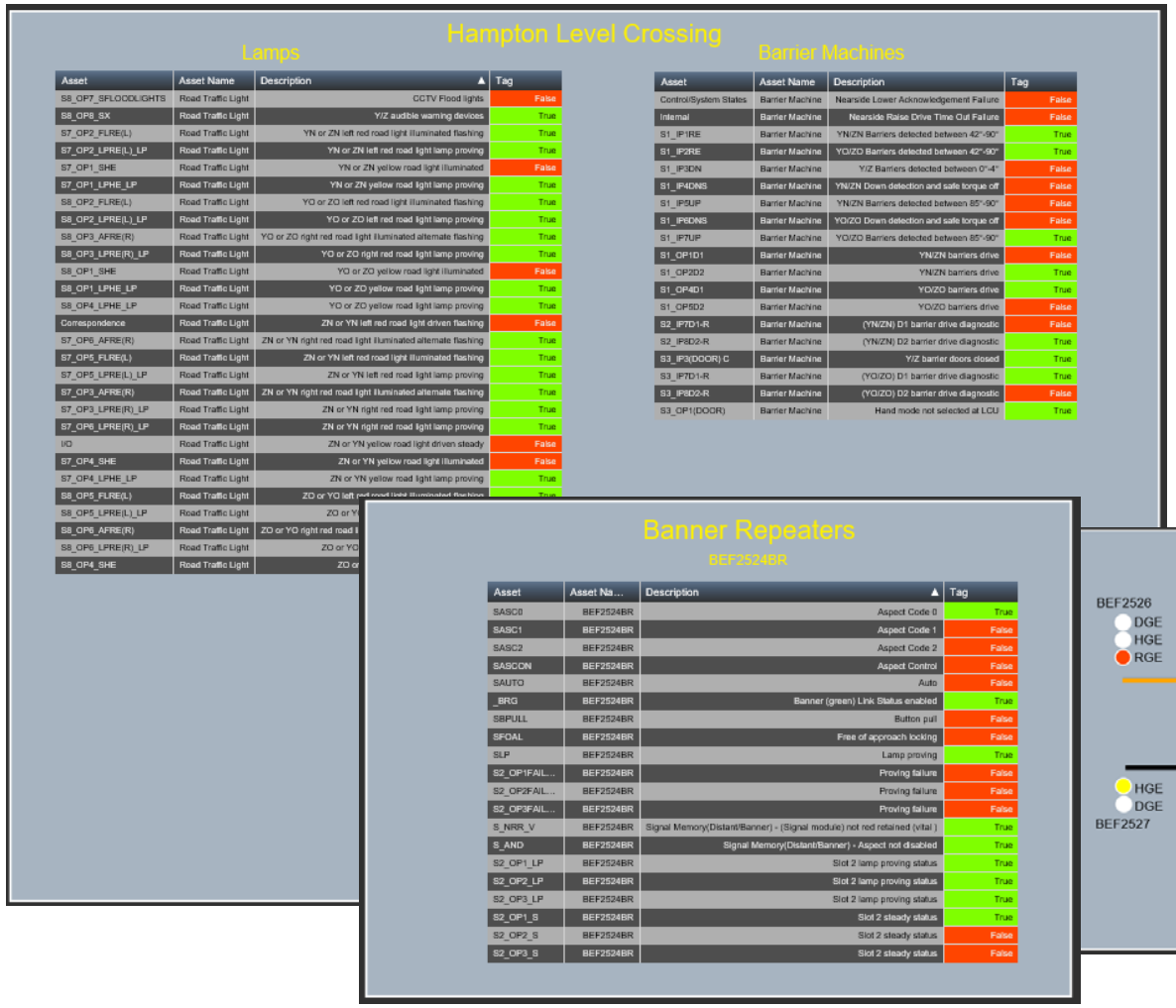
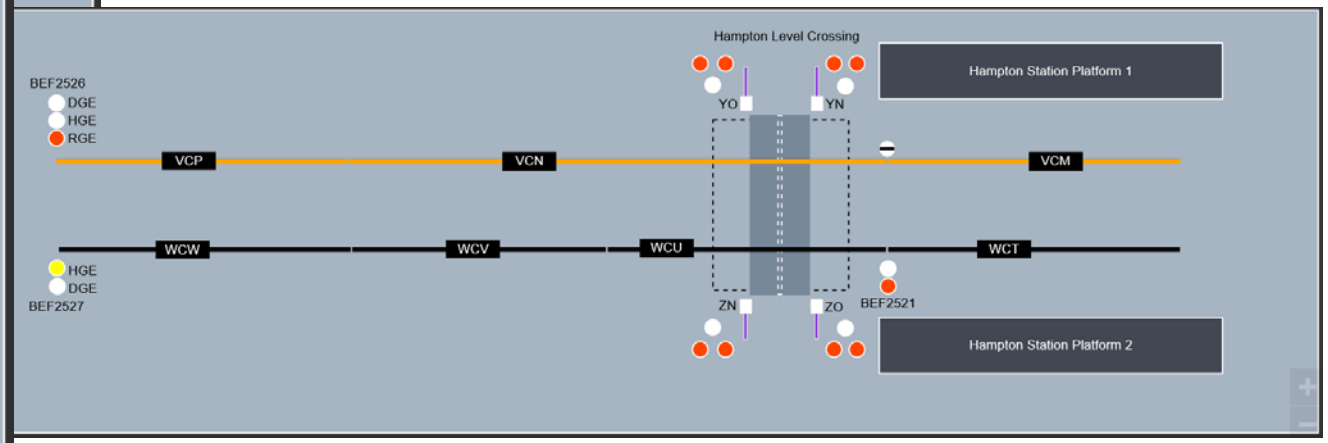


- Signaling interface operation
- Track section occupation
- Barrier Machine
- Road Traffic Lights
- Banner Repeater
- Time series operation



PI Vision - Level Crossing

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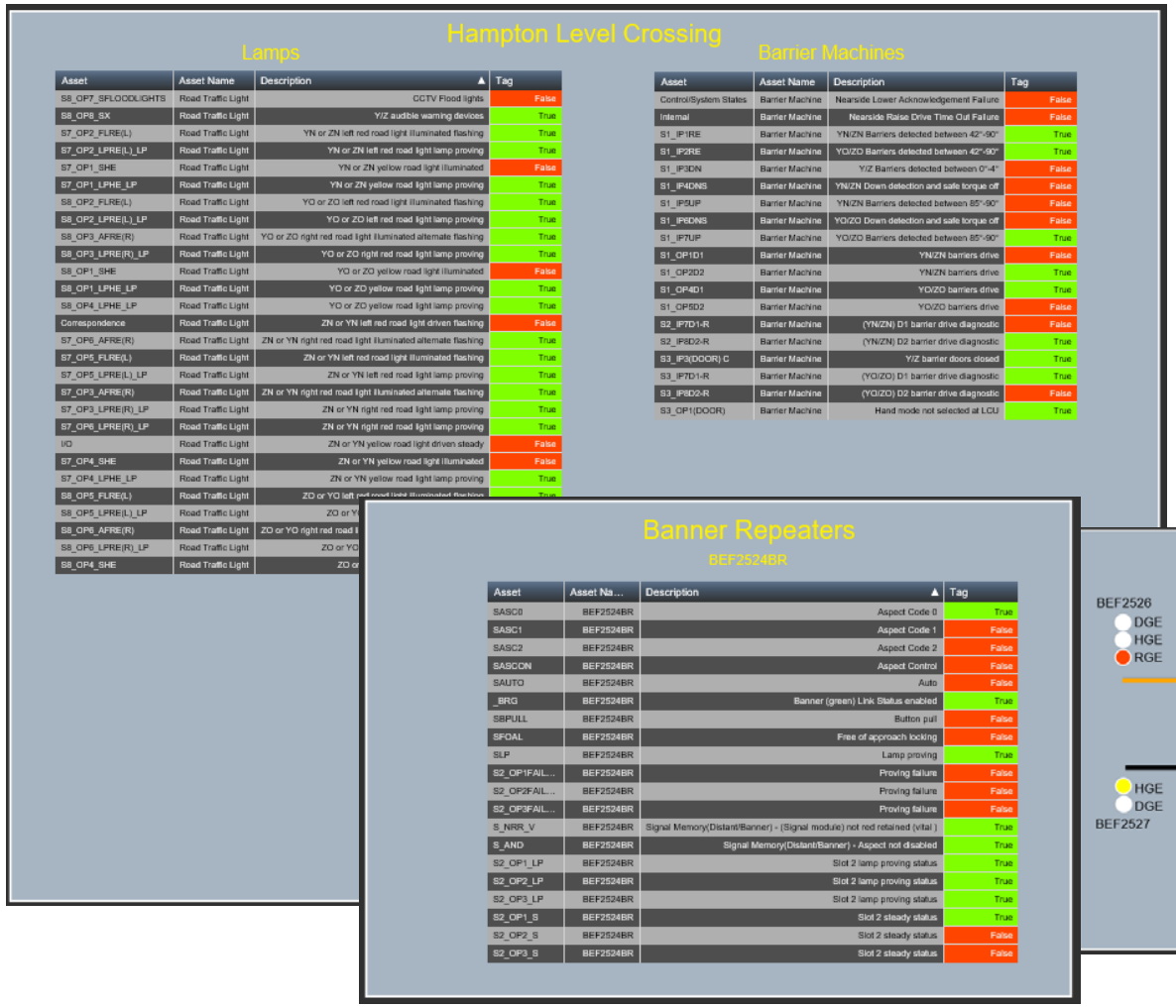

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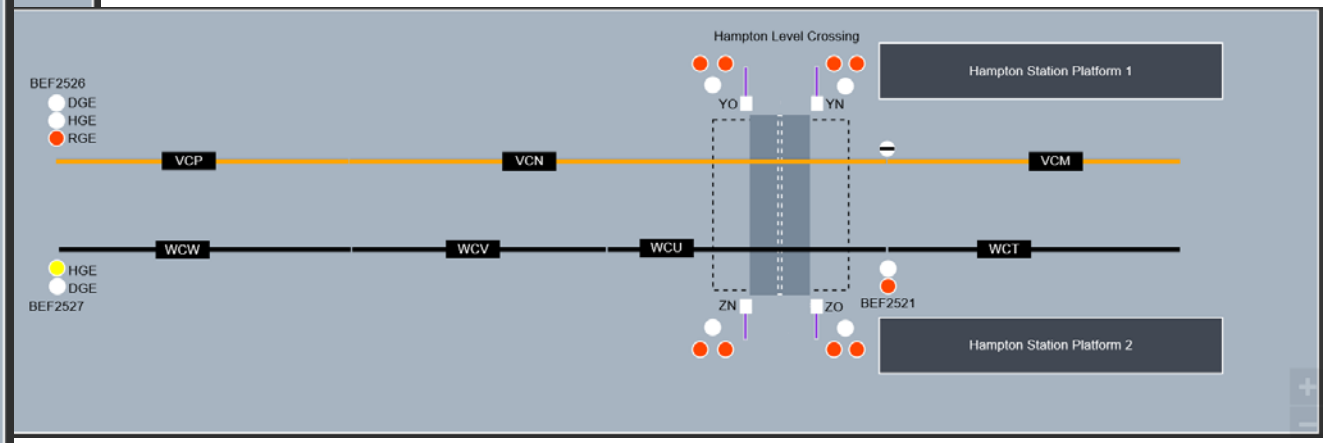
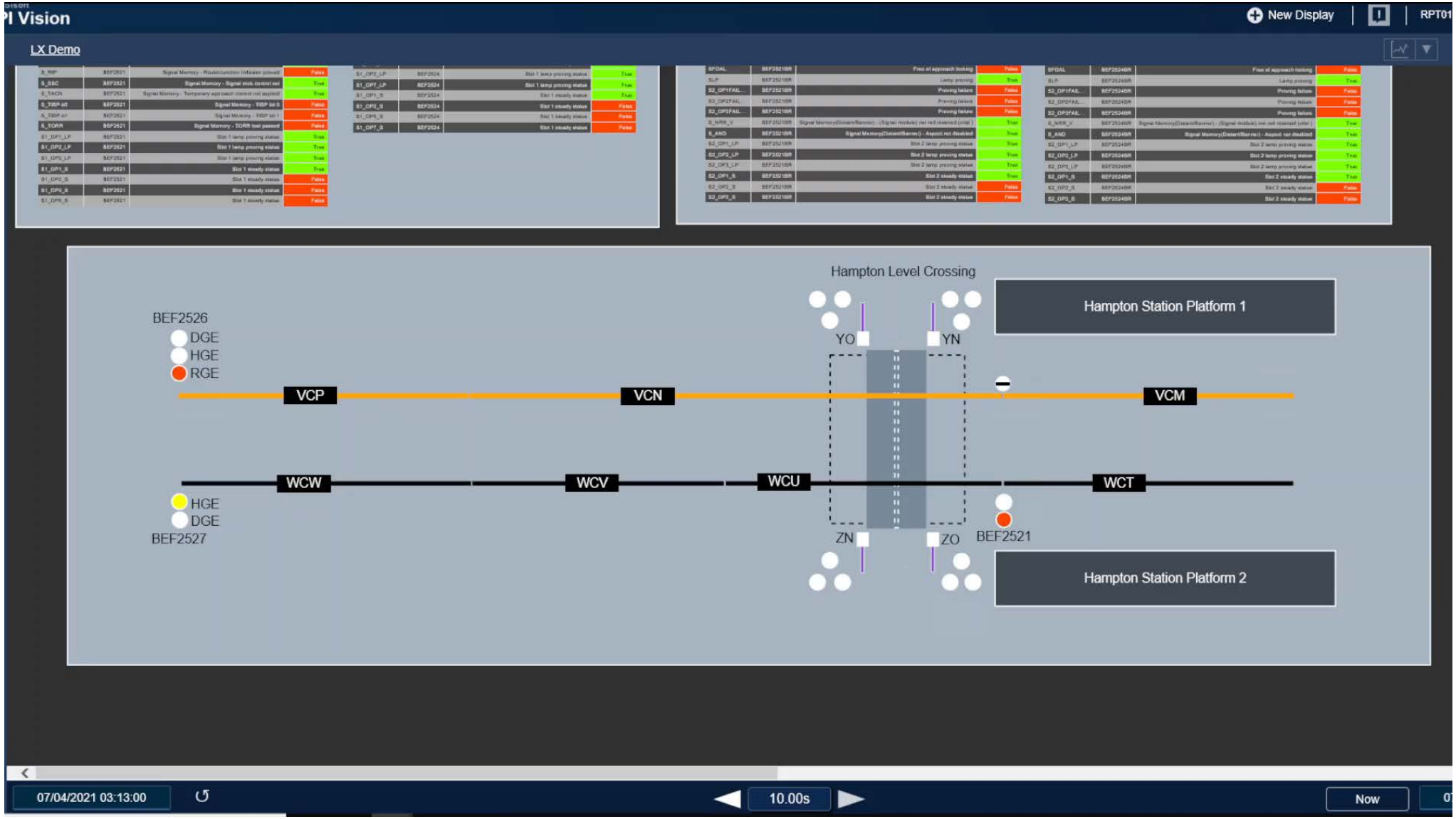


PI Vision - Level Crossing (Video)



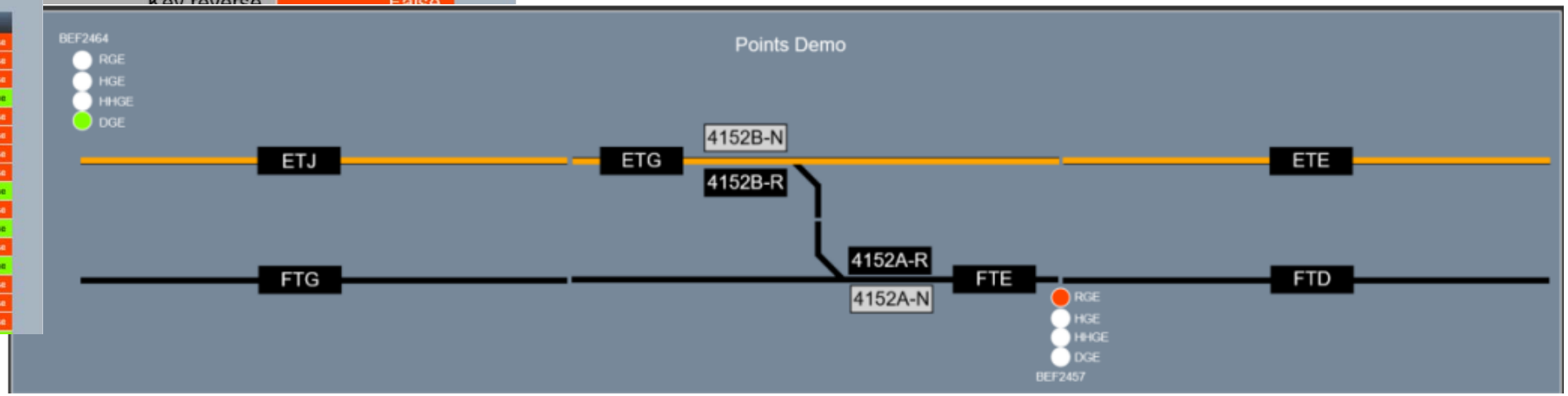
PI Vision - Points

Points Set 4152

Asset	Asset Name	Description ▲	Tag
PDN	4152	(Controlled and) detected normal	True
PDR	4152	(Controlled and) detected reverse	False
LUKFL	4152	Auto normalisation flashing indication	False
PCN	4152	Controls normal	True
PCR	4152	Controls reverse	False
		Key normal	False
		Key reverse	False

Aspect BEF2464

Asset	Asset Name	Description	Tag
LRDE	BEF2464	Reminder Device Latches - ELECTRIC- Entrance Signals	False
LRD	BEF2464	Reminder Device Latches - ALL TRAFFIC - Entrance Signals	False
LRDA	BEF2464	Reminder Device Latches - Auto Working	False
S_AND	BEF2464	Signal Memory - Aspect not disabled	True
S_RIP	BEF2464	Signal Memory - Route/Junction indicator proved	False
LS(RR)S	BEF2464	Restricted route status latch	False
LS(RR)I	BEF2464	Restricted route indication latch	False
S_SSC	BEF2464	Signal Memory - Signal stick control set	False
S_NRR_V	BEF2464	Signal Memory - (Signal module) not red retained (Vital)	True
S_TISP-b0	BEF2464	Signal Memory - TISP bit 0	False
S_TACN	BEF2464	Signal Memory - Temporary approach control not applied	True
S2_OP6_S	BEF2464	Slot 2 steady status	False
S3_OP1_S	BEF2464	Slot 3 steady status	True
S2_OP5_S	BEF2464	Slot 2 steady status	False
S_TORR	BEF2464	Signal Memory - TORR test passed	False
S_TISP-b1	BEF2464	Signal Memory - TISP bit 1	False



- Signaling interface operation
- Track section occupation
- Points Swing Time, Aspects
- Application of Tech Controls
- Time series operation

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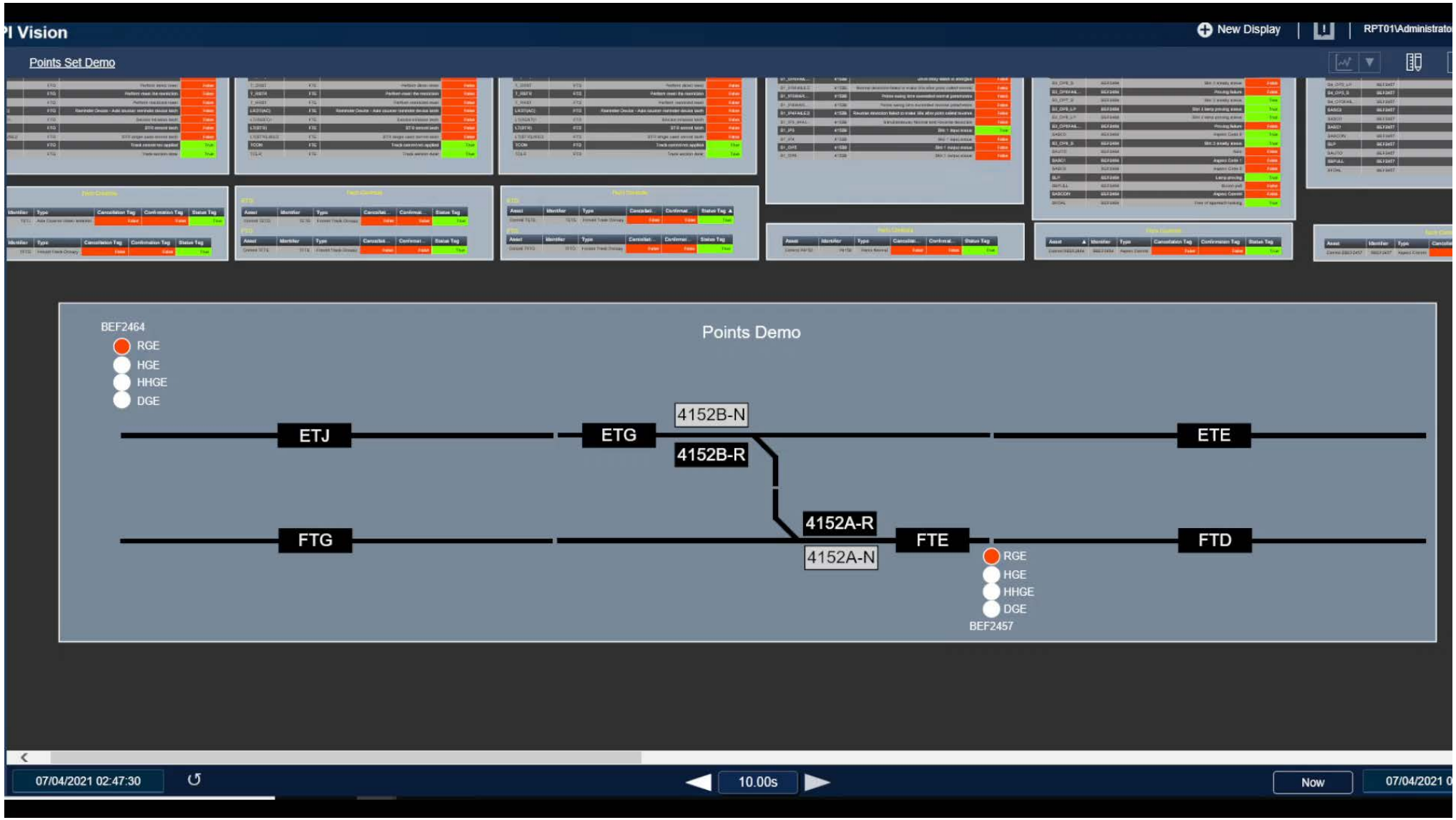
PI Vision – Points (Video)



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PI Vision – Incident Investigation

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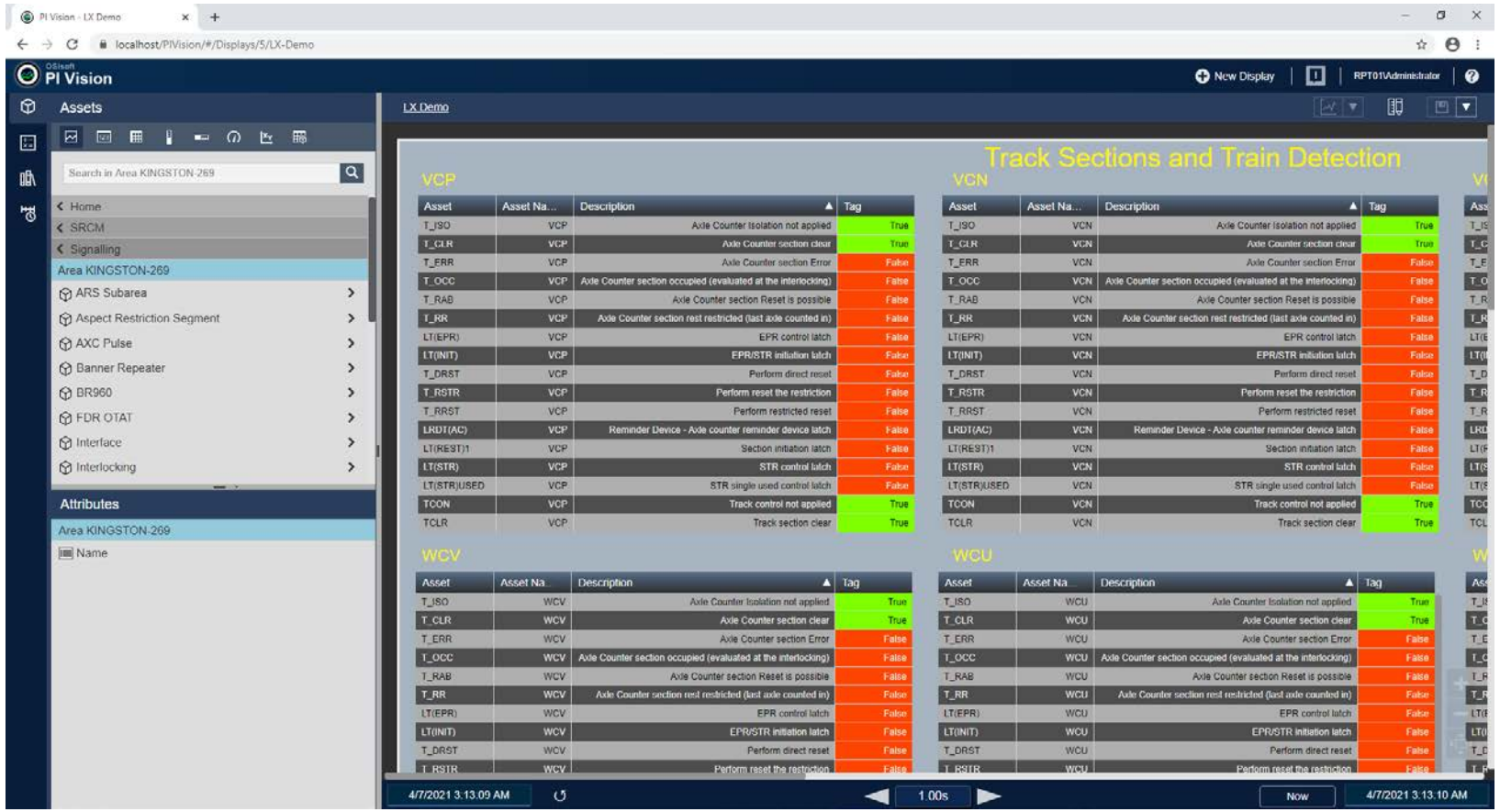

- Drag and Drop asset data and specific signals onto one screen
- Control Centre Technician configurable
- Re play data to identify issues and coloration between data sets
- Time series operation
- Track section occupation
- SPAD detection

RAIL INFRASTRUCTURE

Railway Signaling Data Visualisation & Reporting

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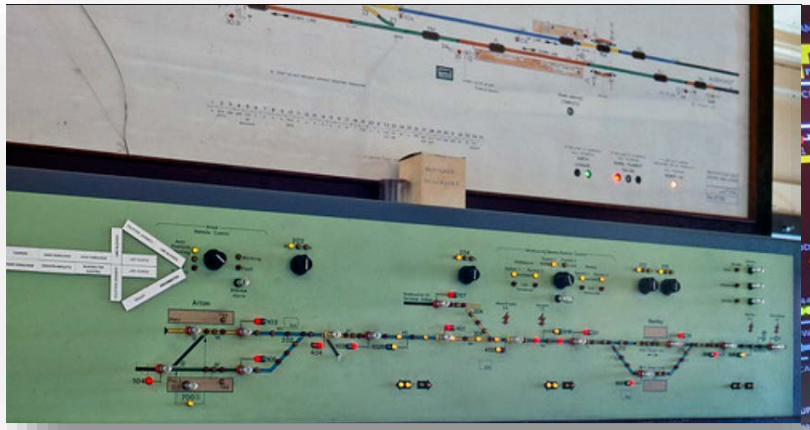

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Solution

- Deployed the latest AVEVA PI System technology including PI AF and PI Vision
- Design Automated File Generation and Validation Tool
- Automated Testing & Validation

Benefits

- Improved visibility of data
- Reduced response time
- Making quicker informed decisions
- Automated compliance reporting
- Improved planned maintenance
- Get trains running quicker

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Questions?

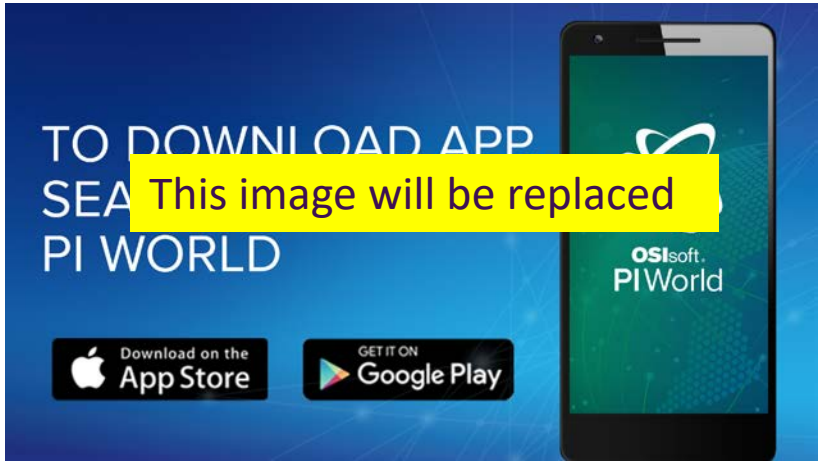
Please wait for the microphone

- State your name and company

Please remember to…

Complete the survey!

- Navigate to this session in the mobile agenda for the survey



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AVEVA is a global leader in industrial software, driving digital transformation and sustainability. By connecting the power of information and artificial intelligence with human insight, AVEVA enables teams to use their data to unlock new value. We call this Performance Intelligence. AVEVA's comprehensive portfolio enables more than 20,000 industrial enterprises to engineer smarter, operate better and drive sustainable efficiency. AVEVA supports customers through a trusted ecosystem that includes 5,500 partners and 5,700 certified developers around the world. The company is headquartered in Cambridge, UK, with over 6,500 employees and 90 offices in over 40 countries.

Learn more at www.aveva.com

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