PHYSICAL ASSET TRACKING VISION PLATFORM

PLANT HAMS HALL

WE MOVE PARTS • TO MOVE PEOPLE •

THE BMW iFACTORY

PROFITABILITY. Efficient, high-precision, highly flexible production.

SUSTAINABILITY. Cutting-edge technologies save resources and support circularity.

DIGITALISATION. Taking data consistency to a new level.

PEOPLE. Are the base of our transformation.

PROFITABILITY

SUSTAINABILITY

DIGITALISATION

PEOPLE

BMW GROUP PLANT HAMS HALL

Plant Hams Hall is a part of the Drive Machine Division.

Working together alongside our BMW Group Drive Machine manufacturing network, we power vehicles with cutting-edge:

➢ internal combustion engines (ICE)

➢ plug-in hybrid engines (PHEV)

➢ electric engines (BEV) and

➢ fuel cell drives (FCEV).

We manage the drive machine transformation and support BMW Group's focus to provide the right technology to the right market for customer needs across the world.

INNOVATION & DIGITALISATION

Plant Hams Hall is a forward-thinking plant, always looking to improve with innovation and digitalisation seen as key in transforming and preparing for the future.

ICE   PHEV   BEV   FCEV

BMW GROUP PLANT HAMS HALL

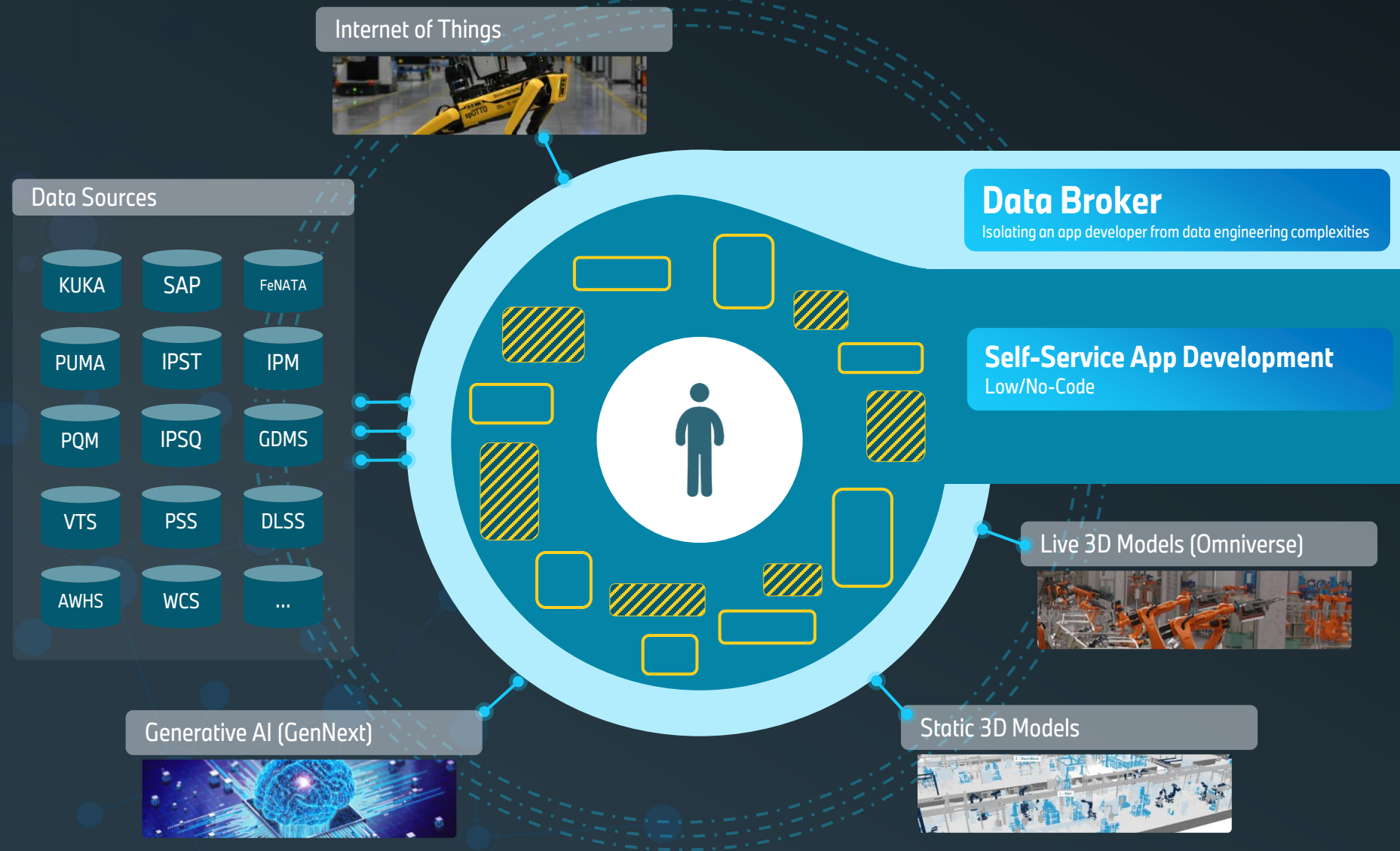> Annual engine production 350,000 -400,000
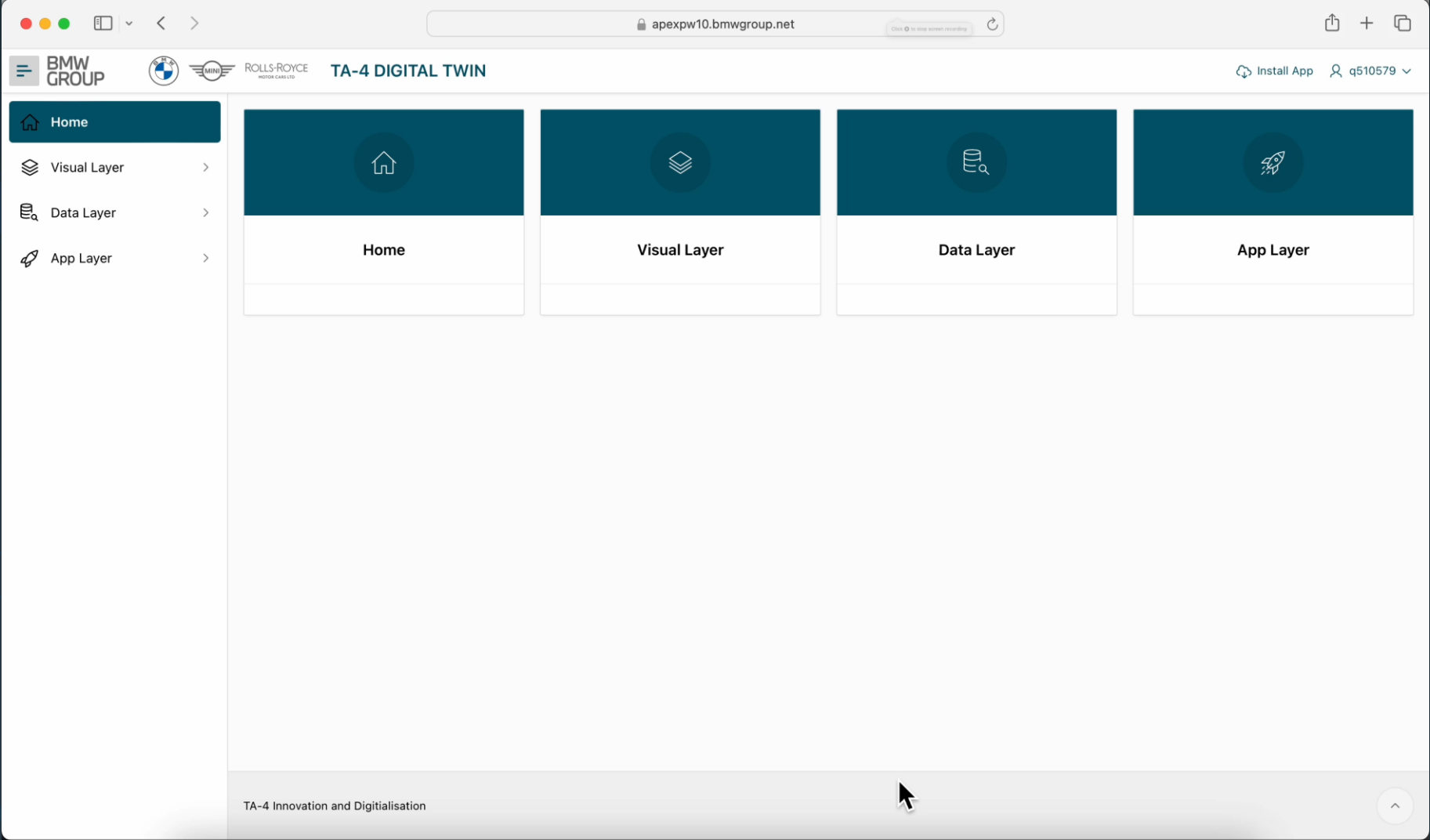
> Annual component production circa 1.3 million

➢ Plant opened in 2001.

➢ High-volume engine assembly production:
  ➢ 3 & 4-cylinder petrol engines
  ➢ V8 & V12 engines.

➢ Precision Machining; Crankshafts, Cylinder Blocks, Cylinder Heads.

➢ Workforce of circa 1,600 – employees and agency, contractor and supply partner support.
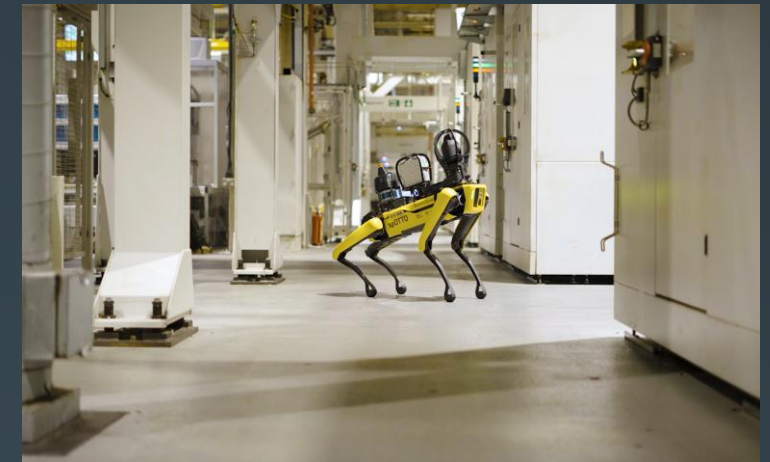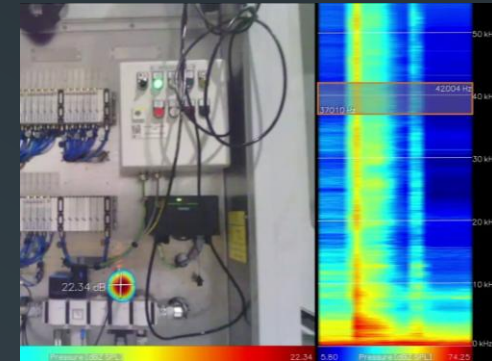
FULLY CONNECTED DIGITAL TWIN

Internet of Things

Data Sources

KUKA	SAP	FeNATA
PUMA	IPST	IPM
PQM	IPSQ	GDMS
VTS	PSS	DLSS
AWHS	WCS	...

Data Broker
Isolating an app developer from data engineering complexities

Self-Service App Development
Low/No-Code

Live 3D Models (Omniverse)

Generative AI (GenNext)

Static 3D Models

FULLY CONNECTED DIGITAL TWIN

SPOT AT HAMS HALL

Autonomous mission schedule

- People and object avoidance

- Wide radius pathing and safe, intelligent response to human interaction

IMPORTANCE OF LOGISTICS

LOGISTICS VEHICLES AT HAMS HALL

~50 FORKLIFTS
- Large collection of 1.6 - 5t Counterbalances for material movement around our plant
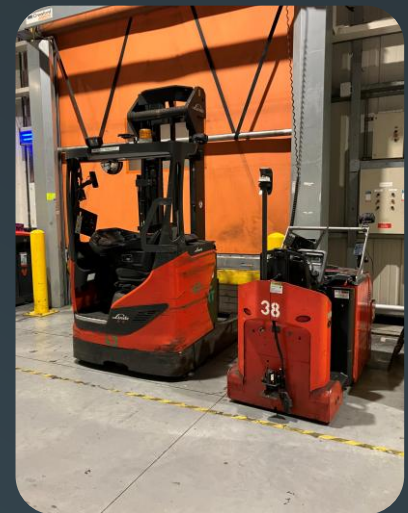
~30 TAXIS
- Tow-tug taxis allow lineside delivery of our larger parts

~20 BUSES
- Buses deliver smaller parts from the stores to lineside

~20 OTHER
- P.E.D stackers and L.L.O.P MHE are used for material movement around our lines
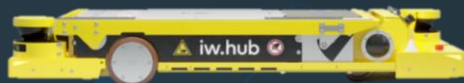
STR's AT HAMS HALL

~10 STR's Smart Transport Robot's
- Autonomous logistics vehicles transporting completed engines to final stores

~500-800 movements per day
- Truly autonomous logistics vehicles, that don't rely on tracks, obstacle avoidance.

24 Hour Operation

Introduction and Company Context

Project Overview
- Implement a platform that tracks logistics vehicles indoors.

Resources
- Existing CCTV infrastructure covering the plant (example dataset provided).

Limitations
- Any additional hardware must be priced and included in budgeting.
- Traditional GPS fails indoors and comprehensive BLE equipment is pricey. A novel solution is required.

Requirements
- Integration with Digital Twin platform to visualise, manage, and investigate logistics movement.
- The system should identify between manually driven equipment and existing STRs and Autonomous Robots.
- The system should integrate with existing autonomous fleet management software.
- Use of Computer Vision from CCTV data is expected either as the primary or supporting technology.
- Explore additional uses of this system – consider health and safety, product quality, cost reduction, and time savings.

Potential Uses of System

Vehicle Position Tracking

Developing algorithms to accurately monitor vehicle positions in dynamic industrial environments enhances tracking precision.

Visualisation of Spatial Data

Representing spatial data to allow operators to better interpret vehicle positions and movements visually. Highlight routes and potential obstacles.

Computer Vision Object Detection

Utilise CCTV streams to detect and differentiate multiple vehicles enables precise object recognition in real time.

API Development for Integration

Creating APIs ensures interoperability between tracking systems and enterprise applications for seamless data exchange.

Considerations for System

Indoor Tracking Challenges

GPS systems fail indoors causing inaccurate tracking for logistics vehicles at the plant.

Cost and Complexity of Alternatives

Bluetooth Low Energy hardware solutions add high costs and complexity, limiting deployment scale.

Impact on Operations

Lack of accurate tracking reduces efficiency and limits digital tool effectiveness on vehicle management.

Need for Scalable Solution

A reliable and cost-effective tracking solution leveraging existing infrastructure is essential.

Target Users

Primary Users - Logistics Teams

Logistics teams manage vehicle and material movement to ensure timely deliveries and efficient workflows within the plant.

Secondary Users - IT and Data Teams

IT teams maintain the system while data analysts use tracking data for performance monitoring and predictive analytics.

Secondary Users - Planning Teams

Planning teams are responsible for arranging plant layout and logistics flow. Visibility of logistics vehicle movement is useful here to assess layout and fleet needs.