INNOVATION ALLIANCE
THE WEST MIDLANDS

WELCOME

Innovative Manufacturing Working Group

28 September 2021

Welcome

Jason Aldridge – Arrowsmith Engineering (Coventry) Ltd

Virtual Housekeeping

- Please keep yourself on mute during presentations.
- We recommend you choose the ‘speaker view’ option so you can focus on who is speaking at any one time.
- During the presentations we welcome your questions via the chat function. These will be collated by the team and we will endeavour to ask as many as possible, whilst still keeping to time.
- Please update your display to show your name and organisation using the … in the top right hand corner of your picture.
- It is advisable to turn off any other webinar facilities such as Skype and MS Teams to avoid lag and strain on your data connection. It can also help if you disconnect from your VPN whilst using Zoom.

Agenda

- 14:00 Welcome to the Group (Jason Aldridge – Arrowsmith Engineering)
- 14:05 Innovative Manufacturing
  - Manufacturing Challenges: Data from the shop floor (Rob McGrail – Armac Martin)
  - Discussion on capturing and using data (Iain Collis – Metal Assemblies, Jason Aldridge – Arrowsmith Engineering, Rob McGrail – Armac Martin)
- 14:40 Update from Innovation Alliance for the West Midlands (Pam Waddell – IAWM)
- 14:45 Current Funding and Collaboration Opportunities
  - DIGI-RAIL (Al-Amin Dabo – BCRRE, University of Birmingham)
  - Advanced Engineering Show (Jeremy Whittingham, Easyfairs)
  - Microsoft Funding (Mark Crowne, Nexer Insight UK)
- 15:00 Comfort Break
- 15:10 Small Group Discussion Session
  - Data Connectivity
- 15:45 Report Back
- 15:55 Wrap Up and Next Steps (16:00 Close)

INNOVATION ALLIANCE

SOUTH WEST MIDLANDS

Innovative Manufacturing

Shop Floor Data Capture

A little Background

ARMAC MARTIN

Est.1929 · BIRMINGHAM · ENGLAND

- A Family Business, founded in 1929.
- Based in Birmingham.
- We are a manufacturer of luxury brass hardware for the KBB market (Kitchen, Bedroom, Bathroom).

A little Background

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- 2019 - almost no production data collection happening in the business.
- We could see some of the header level metrics via our ERP system based on sales and invoices/delivery notes, such as on-time delivery.
- However, the only real production metric we had was number of production orders completed and booked into our warehouse in a given day.
- But with so many processes on site this wasn’t suitable to give us an insight into any specific department.

The Need for Data

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- After some fairly reasonable growth, additional production space became more of a premium. It started to become more and more important to squeeze more juice out the orange!
- This is the case across the business, but it was most pressing in our machine shop as this largely feeds the rest of the factory with raw material.
- Our CNC milling machines are all loaded manually with billeted material. We knew there were significant time losses in this section, but could not quantify what they were or how much they needed to improve by.

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“Where there is no standard, there can be no improvement” - Masaaki Imai

What did we do?

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- Measured the volume of parts we should have been completing in a given time period vs actual for that section. Therefore quantifying the improvement we needed to achieve.
- Realised after some research that IIoT/Industry 4.0 wasn't as out of our reach as we previously assumed.
- We created a role internally for a 'Systems Development Engineer' to support this type of work and enrolled them on a relevant apprenticeship.
- Invested in SQL query training for a few members of staff to support the project.
- Connected to the machines in a way that would give us run time vs. idle time.

Machine connectivity

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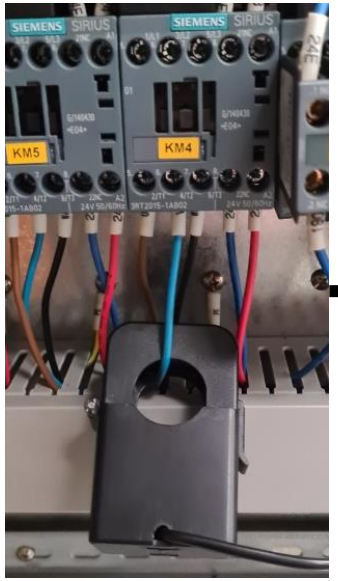

Current Sensor connected to coolant pump spindle

Wireless transmitter

Network Data Gateway

Machine connectivity

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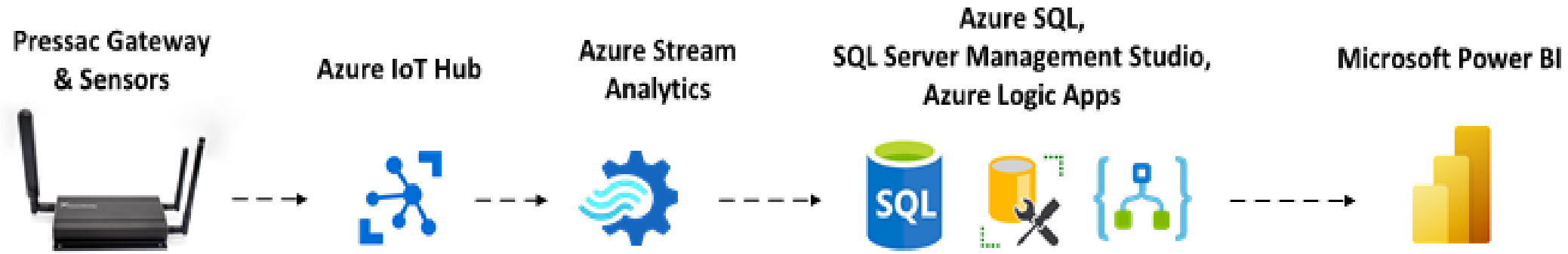
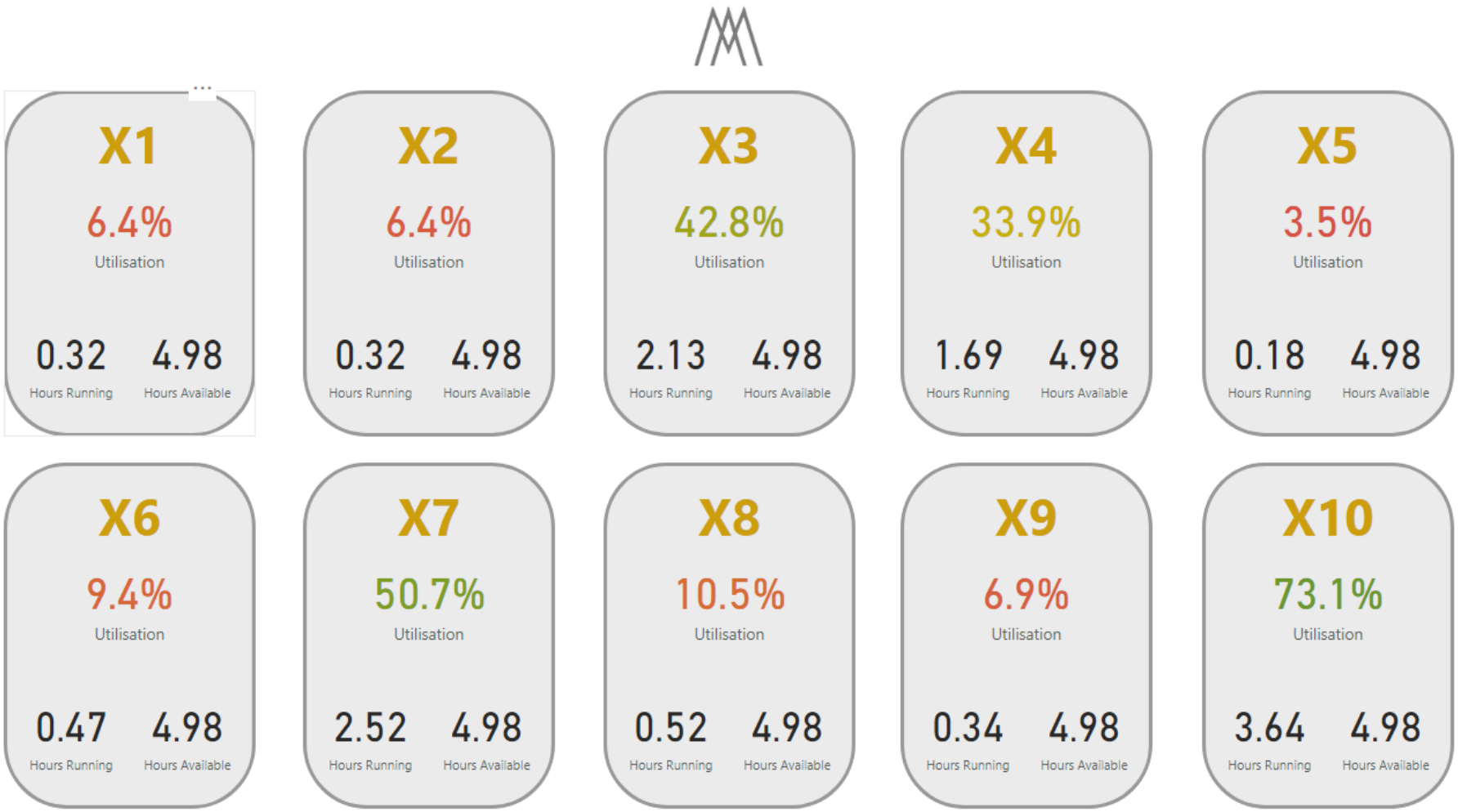


Results – Live Dashboard Example

ARMAC MARTIN



Results – Historical Report Example

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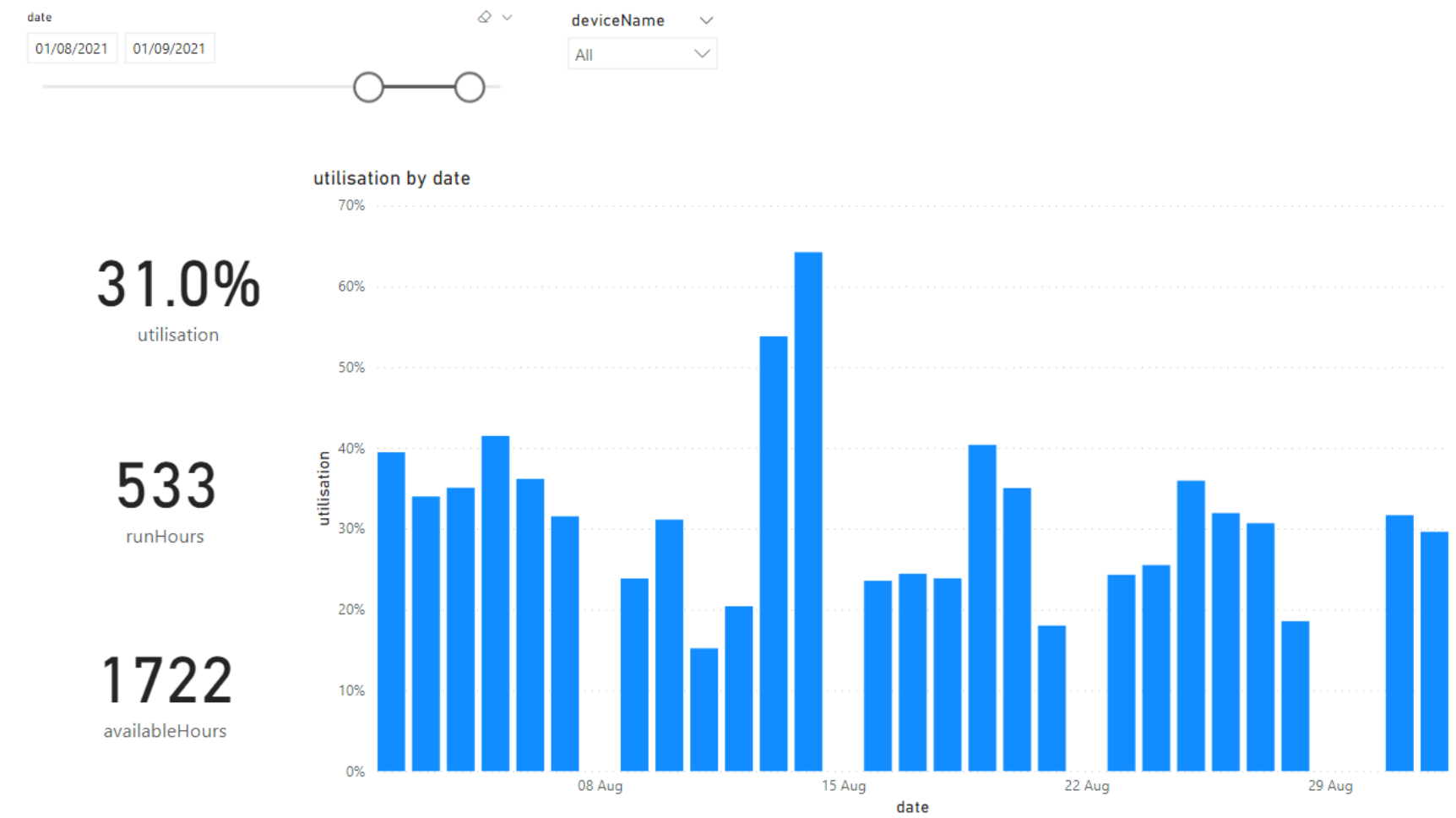

Barcode Scanning System

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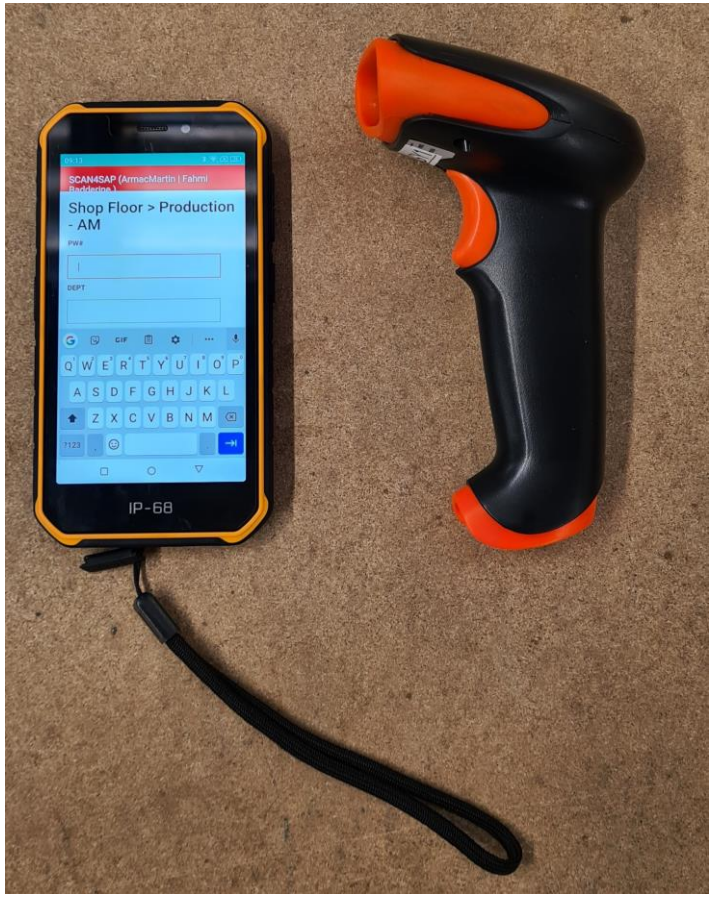
- Along with this project we have been introducing an improved system to track our work through production.
- Using a system that bolts into out ERP system we have developed a barcode scanning system.
- Each department scans the Production Order and updates it status. For example: shelf location, in progress, paused, error, etc .
- This updates live on the departments production schedule dashboard.



Barcode Scanning System

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- Each user has a unique log in.
- Each production order is scanned and the department and job status are recorded.

Barcode Scanning System

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- These scans update a live schedule displayed in the department.
- The screen is in priority order and colour coded for quick visual analysis. Green = in progress, red = error, etc.

LIVE - Factory PW Tracking (All Departments)

PW Tracking (ARMAC)

Department	Priority	Production Due ...	Sales Order	Works Order	ItemCode	Description	Open QTY	Special Instructions	PW Type	U_PWProgress2
c: Polishing	Standard	21/09/2021	313121	123206	MIX1/PULLONLY/224/SAS	224MM MIX HANDLE DIAMOND KNURL SAS	5.00		Standard	InProgress1
c: Polishing	Standard	22/09/2021	311951	120142	2301/BALL/ACP	10mm BALL FINIAL ACP	20.00		Standard	InProgress1
c: Polishing	Standard	22/09/2021	313121	123190	CRWT/55/HBB	55MM CROSSWAYS T-BAR PULL HBB	5.00		Standard	InProgress1
c: Polishing	Standard	22/09/2021	313121	123202	LIN/128/HBB	128MM LINCOLN PULL HANDLE HBB	1.00		Standard	Shelf-P05
c: Polishing	Standard	23/09/2021	312361	122060	2300/50/BEL	50mm X 38mm HINGE BEL	36.00		Standard	Shelf-P05
c: Polishing	Standard	23/09/2021	312361	122061	2301/BALL/BEL	10mm BALL FINIAL BEL	36.00		Standard	Shelf-P07
c: Polishing	Standard	23/09/2021	313121	123191	DOUK/32/HBB	32MM DOUGAN KNOB HBB	7.00		Standard	Tub-37
c: Polishing	Standard	23/09/2021	313121	123204	LINT/82/PBUL	82MM LINCOLN T-BAR HANDLE PBUL	5.00		Standard	Trolley-01
c: Polishing	Standard	23/09/2021	313121	123207	MIX1/PULLONLY/224/SBUL	224MM MIX HANDLE DIAMOND KNURL SBUL	5.00		Standard	Shelf-P05
c: Polishing	Standard	23/09/2021	313174	123278	JEF/152/SBL	6" JEFFERSON HANDLE SBL	8.00		Standard	Shelf-P05
c: Polishing	Standard	23/09/2021	313174	123279	JEF/203/SBL	203MM JEFFERSON HANDLE SBL	12.00		Standard	Trolley-01
c: Polishing	Standard	23/09/2021	313174	123280	JEFK/32/SBL	1.1/4" JEFFERSON KNOB SBL	12.00		Standard	Trolley-01
c: Polishing	Standard	23/09/2021	313174	123281	JEFK/38/SBL	1.1/2" JEFFERSON KNOB SBL	35.00		Standard	Trolley-01
c: Polishing	Standard	24/09/2021		123327	COTK/BALL/38/PNP	38MM COTSWOLD BALL KNOB PNP	10.00		Standard	Shelf-P05
c: Polishing	Standard	24/09/2021	311951	120216	2301/BALL/NBP	10mm BALL FINIAL NBP	58.00		Standard	Shelf-P07

What's next?

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- Using the data collected form the barcode scanning to generate actual "in progress" times vs. planned. Enabling us to set real-time departmental targets, specific down to each individual order.
- Combine various systems, such as HR clock in data, machine connectivity and barcode scanning to develop more complex reports with more granular insights.
- Use the scanning technology to collect reject data to help better direct our process improvement projects.

A few key things we have learned so far…

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- IIoT/Industry 4.0 is not beyond SMEs.
- Investing in people who can specialise in this side of modern manufacturing and having these resources and skills ‘in-house’ has been hugely beneficial.
- Coding in SQL, DAX, Python, etc. is not as scary as it looks! – at least a basic understanding of it can take you a long way.
- People still always come first: With increased focus on tech and data, it is easy to lose sight of this. The pace of change needed will take some real change and people management skills and getting a few smaller projects up and running and achieving that ‘buy-in’ is really important.

Discussion: Capturing and Using Data

Jason Aldridge
Managing Director

Iain Collis
Managing Director

Rob McGrail
Production Director

INNOVATION ALLIANCE

Innovation around the West Midlands

INNOVATION ALLIANCE

IAWM & WMIP Update (September 2021)

Pam Waddell – Director of IAWM

The WM Innovation Programme

INNOVATION ALLIANCE FOR THE WEST MIDLANDS

West Midlands Combined Authority

Strategy

Innovation Board

People

WMCA Programme Team

Innovation Alliance WM Executive

Virtual Innovation Team

✓ Creative ✓ Low Carbon ✓ Health ✓ Manufacturing ✓ Rail

✓ Construction ✓ Aerospace ✓ Transport

Programmes & activities

Intelligence

- ✓ MIT REAP
- ✓ LIS
- ✓ Sector Ideas
- ✓ MMO's

Talent

- ✓ Virtual Innovation Team
- ✓ Innovation Training

Networks

- ✓ Venturefest WM
- ✓ Innovation Support Forum
- ✓ Innovation Policy and Practice
- ✓ Smart City Alliance
- ✓ Innovative Low Carbon Working Group
- ✓ Innovative Health Working Group
- ✓ Innovative Manufacturing Working Group

Culture

- ✓ Innovation Tracker
- ✓ New Voices of Innovation
- ✓ 3x GH collaboration

Projects

- ✓ The Grid
- ✓ Regional Retrofit Business Case
- ✓ SCIP Innovation Pilot
- ✓ IP Enabler
- ✓ Health and Wellbeing
- ✓ Innovation Engine 3
- ✓ e4F New Start
- ✓ DIAG COMM
- • Innovation In Procurement

Innovation Alliance WM is on the move…

- From 1 September our accountable body is West Midlands Combined Authority (WMCA)
- We will go public with new e-mails from 1 October

But we are still…

A bottom-up, independent Alliance of diverse organisations active or interested in innovation across the West Midlands. Our two core aims remain to:

- Build and maintain a thriving innovation ecosystem
- Stimulate and catalyse a pipeline of innovation activity

We are recruiting!

Two posts to work with the Innovation Alliance WM as part of the WM Innovation Programme:

- Communications Assistant
- Business Innovation Support Coordinator (co-funded by GBS LEP)

Networks and events

- **Innovation Policy & Practice:** A consultation on the West Midlands response to the National Innovation Strategy – 16 September 2021
- **Working Group meetings**:
  - Innovative Zero Carbon Working Group 13 September 2021 (contact alan.carr@swm.org.uk)
  - Smart Places Working Group speed networking event on HopIn on 15 September 2021 (contact devon_geary@blackcountryconsortium.co.uk)
  - Innovative Health Working Group 22 September (contact emma@wmhtc.co.uk)
- **Venturefest WM** 24 March 2022 – sponsorship and exhibitor opportunities now available

INNOVATION ALLIANCE
SOUTH WEST MIDLANDS

Current Funding and Collaboration Opportunities

UNIVERSITY OF BIRMINGHAM | DIGI-RAIL

European Union
European Regional Development Fund

Greater Birmingham & Solihull Local Enterprise Partnership
Growth Hub

MIDLANDS ENGINE

DIGI-RAIL: Developing digital products/services for rail

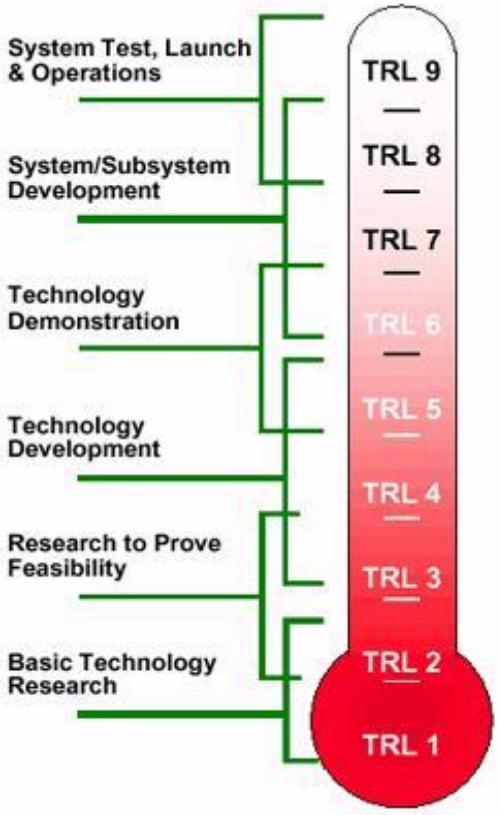
Al-Amin Dabo, PhD.

Business Engagement Manager

Birmingham Centre for Railway Research and Education (BCRRE)

DIGI-RAIL Project Overview

- ERDF part-funded SME support programme
- DIGI-RAIL will bring together railway sector buyers with West Midlands businesses and research expertise.
- The aim of the initiative is to solve challenges within the railway sector and access the increasing number of digital rail commercial and research opportunities that currently exist in the UK and internationally.
- DIGI-RAIL will showcase and offer long-term innovation support to businesses looking to develop digital products and services for the rail industry.



DIGITAL RAILWAY OPPORTUNITIES

Artificial Intelligence (AI)

what
AI can be adopted in many areas of railroad services. E.g. it enables the development of robotics & makes predictions regarding future traffic and condition of equipment.

how
fully automated railroad traffic
predicts necessary passenger capacity for train route
allows for dynamic route scheduling
improves service comfort and train safety
diagnoses train and track condition

watch out for: NEURON SOUNDWARE

Predictive Maintenance

what
Predictive Maintenance uses AI to constantly monitor and analyze data from IoT and other sources. It serves as a continuous inspection and diagnosis function, while making predictions on potential malfunctions before they occur.

how
sensors & monitoring software provide information of bearings, wheels, and bogies
supplies instructions in the form of algorithms to convert data into information on when and why a system fails
reduces maintenance cost, minimizes interruptions, improves safety

watch out for: SEMIOTICLABS

Biometric Ticketing

what
Biometric Ticketing makes payment, check-in and seat distribution processes faster and more secure. It also provides an additional layer of identification of customers to improve safety and travel comfort.

how
facial and fingerprint scans, voice verification, retina, and vein scans, among others
3D & infrared lights capture shape, texture, and orientation of a body part in immense detail

watch out for: Customer Clever

Automatic Train Control

what
A network of autonomous trains is able to communicate with each other & plan speed and route accordingly to avoid interruptions and slow-downs. They have the potential to become the most efficient means of transportation.

how
trains loaded with sensors, GPS data, cameras, and computer systems
process data in real-time, allowing for decision-making according to various scenarios
provides an alarm for any suspicious interfering object with a preliminary classification of any object nature

watch out for: Rail Vision

Internet of Trains

what
A large amount of data can be gathered through IoT for analysis and predictive algorism. Constant communication between trains and components allow for dynamic scheduling and improve traffic safety.

how
improves efficiency, safety, and quality of fleet management and services through wireless condition monitoring
enables rolling stocks, signals, rails, and stations to work cooperatively through the use of intelligent onboard devices
captures & stores data in real-time

watch out for: perpetuum

Smart Sensors

what
Smart Sensors are the basic building block of IoT that allows data-gathering and monitoring of every critical component of trains and equipment.

how
predicts the failure of trains and equipment
uses MEMS (Micro-Electro-Mechanical System) technology accelerometer sensors, among others
low-power wireless networks for acquisition systems of accelerometric signals

watch out for:

Cloud Computing

what
Cloud Computing stores and analyzes data accurately so that railroad service providers can focus on their own operations.

how
cloud solutions for smart freight rail sensors
secures undistributed repository for rapid access and big data analytics
provides all things required to connect assets, including device management tools & third-party devices

watch out for: nexiot

Drones

what
Drone technology reduces the risk, time, and cost of accessing areas through the workforce and makes the global rail infrastructure safer and more cost effective to maintain, operate and monitor.

how
monitors infrastructure, collects detailed data in remote and difficult to access areas
gathered visual, thermal, and multispectral data allows for intelligent management thus increasing the resilience and lifespan of an asset

watch out for: RAILPOD

Big Data

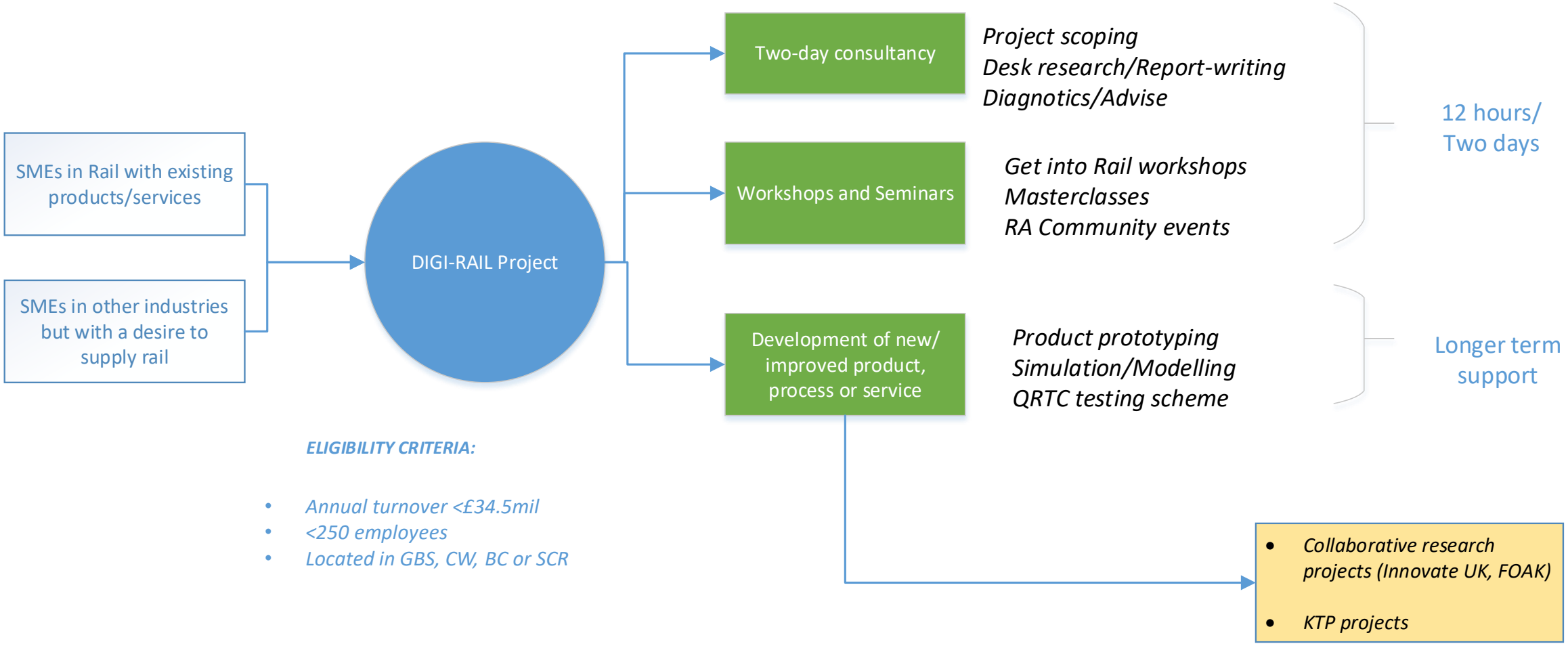
what
Essential for railway operations and maintenance; Big Data drives the future of how railroads are designed, planned and operated.

how
employs advanced data analysis tools to improve performance and safety measures
efficient measurement & real-time monitoring
remotely monitors facilities in real-time and detects abnormalities

watch out for: DELPHISONIC

UNIVERSITY OF BIRMINGHAM | DIGI-RAIL | European Union European Regional Development Fund | Greater Birmingham & Solihull Local Enterprise Partnership Growth Hub

DIGI-RAIL Client journey



Thank You!!!

Contact:

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Business Engagement Manager
A.A.DABO@BHAM.AC.UK
07447141149

EASYFAIRS
Visit the future

ADVANCED ENGINEERING

3-4 November 2021, NEC, Birmingham, UK

- UK'S LARGEST ANNUAL ADVANCED MANUFACTURING SUPPLY CHAIN EVENT
- LAUNCHED IN 2009 - NOW IN ITS 12TH EDITION
- IN 2019, APPROX. 13,000 TWO-DAY ATTENDANCE AND 550+ EXHIBITORS

Jeremy Whittingham for EasyFairs

Kat Clarke, Wing Manufacturing Engineer, Airbus

I found the event a great networking opportunity to meet industrial professionals from different backgrounds with different products

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ADVANCED ENGINEERING

November 2021, NEC, Birmingham, UK

CO LOCATING SHOW ZONES UNDER ONE GIANT

- DISCOVER NEW INNOVATION AND TECHNOLOGY FROM YOUR OWN, AND PARALLEL SECTORS

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- CONNECTED MANUFACTURING
- AERO ENGINEERING
- AUTOMOTIVE ENGINEERING
- COMPOSITES ENGINEERING
- PERFORMANCE METALS ENGINEERING
- SPACE & SATELLITE ENGINEERING

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3-4 November 2021, NEC, Birmingham, UK

Enabling Innovation

- AREA ON SHOW FLOOR SHOWCASING START UPS AND THEIR INNOVATIONS

- SPECIALLY SELECTED FROM APPLICATIONS,
- AND JUDGED BY:

UKRI Innovate UK

ktn

DB Innovation

Jeremy Whittingham for EasyFairs

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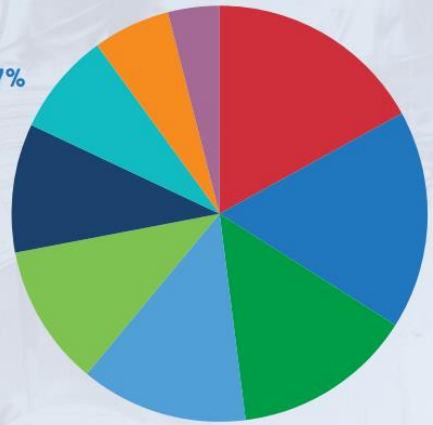
3-4 November 2021, NEC, Birmingham, UK

Job title breakdown

Engineer	32%
Manager	22%
Business Development	20%
C-Level/ Director	16%
Consultant	13%
Head of Department	12%
Manufacturer	11%
Finance/ Procurement	11%
Operations	11%
Technician	10%

Industries in attendance

- Manufacturing Technologies 17%
- General Transport/ Infrastructur 17%
- Automotive 14%
- Aerospace/ Avionics 13%
- Composites 11%
- Academia 10%
- Medical 8%
- Performance Metals 6%
- Civil Nuclear 4%



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3-4 November 2021, NEC, Birmingham, UK

5...4...3...2...1 LAUNCHING ADVANCED ENGINEERING SPACE ZONE

SPACE & SATELLITE ENGINEERING

Supported by UK SPACE AGENCY ADS

AIRBUS DEFENCE & SPACE · DASSAULT SYSTEMES · FAIR-SPACE · GKN AEROSPACE · MOOG · QinetiQ · SPHEREA TEST & SERVICES · SURREY SATELLITE TECHNOLOGY LTD · UNIVERSITY OF SURREY

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ADVANCED ENGINEERING

3-4 November 2021, NEC, Birmingham, UK

- The sparse, noisy data problem in product development, manufacturing, and beyond, *Dr Gareth Conduit, CTO, Intellegens*
- Factory+: Building the Foundations of a Modern Connected Factory, Alex Godbehere, *AMRC*
- Sensing in Your Manufacturing Process - the I4.0 Digital Advantage, Dr. Garret O'Donnell, *Trinity College Dublin, the University of Dublin*
- Using data to improve efficiency and save you money, Miroslav Stojkovic, *Airborne UK*
- Aerospace 3.0: A rallying cry for innovation and sustainable growth, Balaji Srimoolanathan, *Aerospace Growth Partnership/ADS*
- In-orbit manufacture, Tony Forsythe, *UK Space Agency*
- Sustainable Manufacturing in Aviation, Andrew Clifton, *Rolls-Royce*

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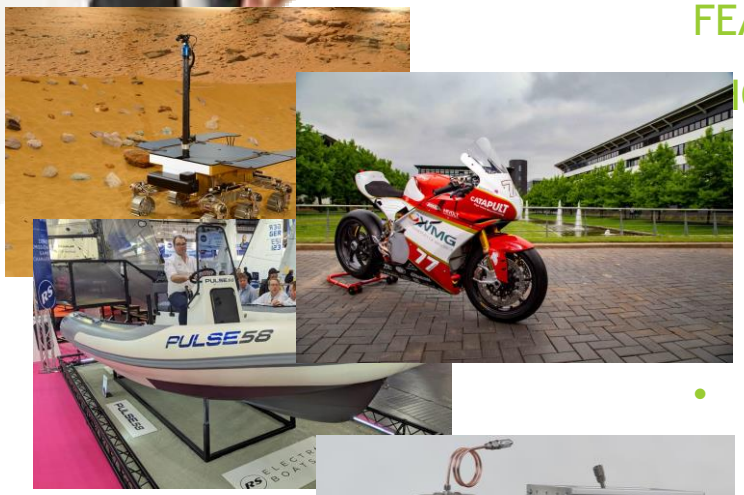

FEATURE EXHIBITS, INNOVATIONS AND TECHNOLOGIES TO BE
OWCASED IN:

- MANUFACTURING SOFTWARE
- TECHNIQUES INCLUDING AM, MOD/SIM
- ROBOTICS & AUTOMATION
- ELECTRIC, HYBRID, BATTERY – ALTERNATIVE PROPULSION
- LIGHTWEIGHT AND SUSTAINABLE MATERIALS

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November 2021, NEC, Birmingham, UK

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- VISIT WWW.ADVANCEDENGINEERINGUK.COM

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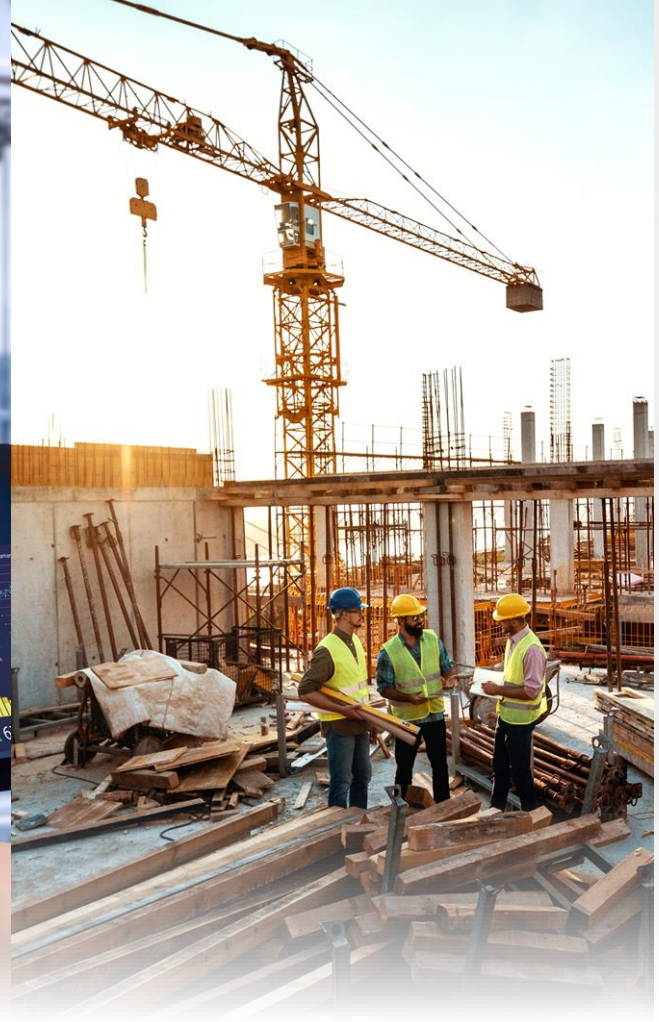
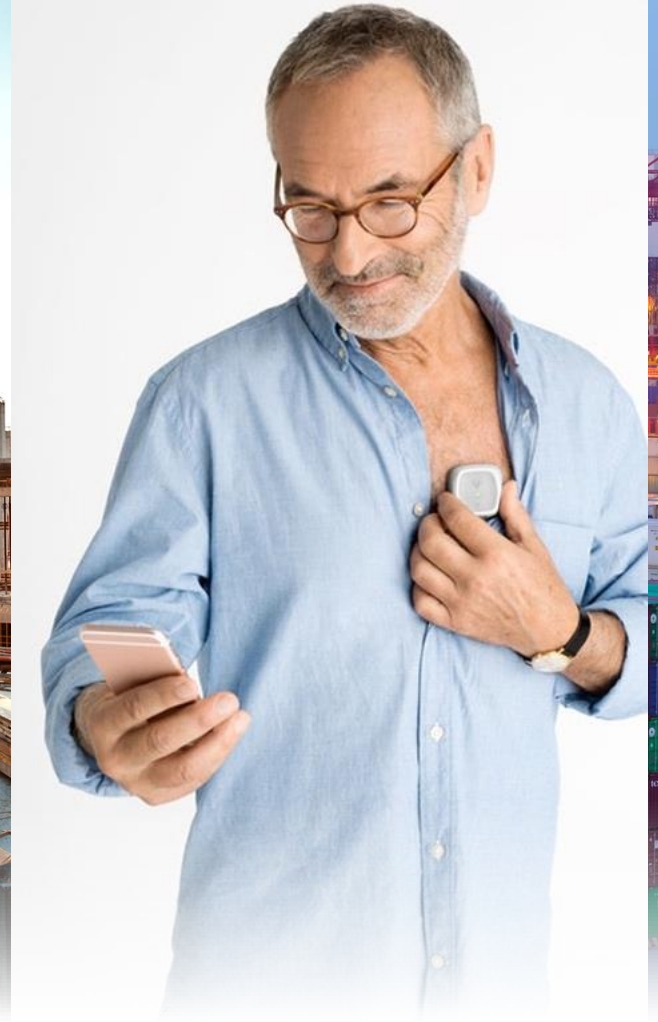




INTRODUCING NEXER INSIGHT

Mark Crowne, Managing Director, mark.crowne@nexergroup.com, September 21st, 2021

NEXER

WHO ARE NEXER?

- Private Swedish company
- Microsoft Gold partner
- 1,600 people
- £170M turnover

HOW ABOUT NEXER INSIGHT?

- Focused on manufacturing
- Specialised in IoT, Data & AI
- Expert in computer vision

NEXER GROUP

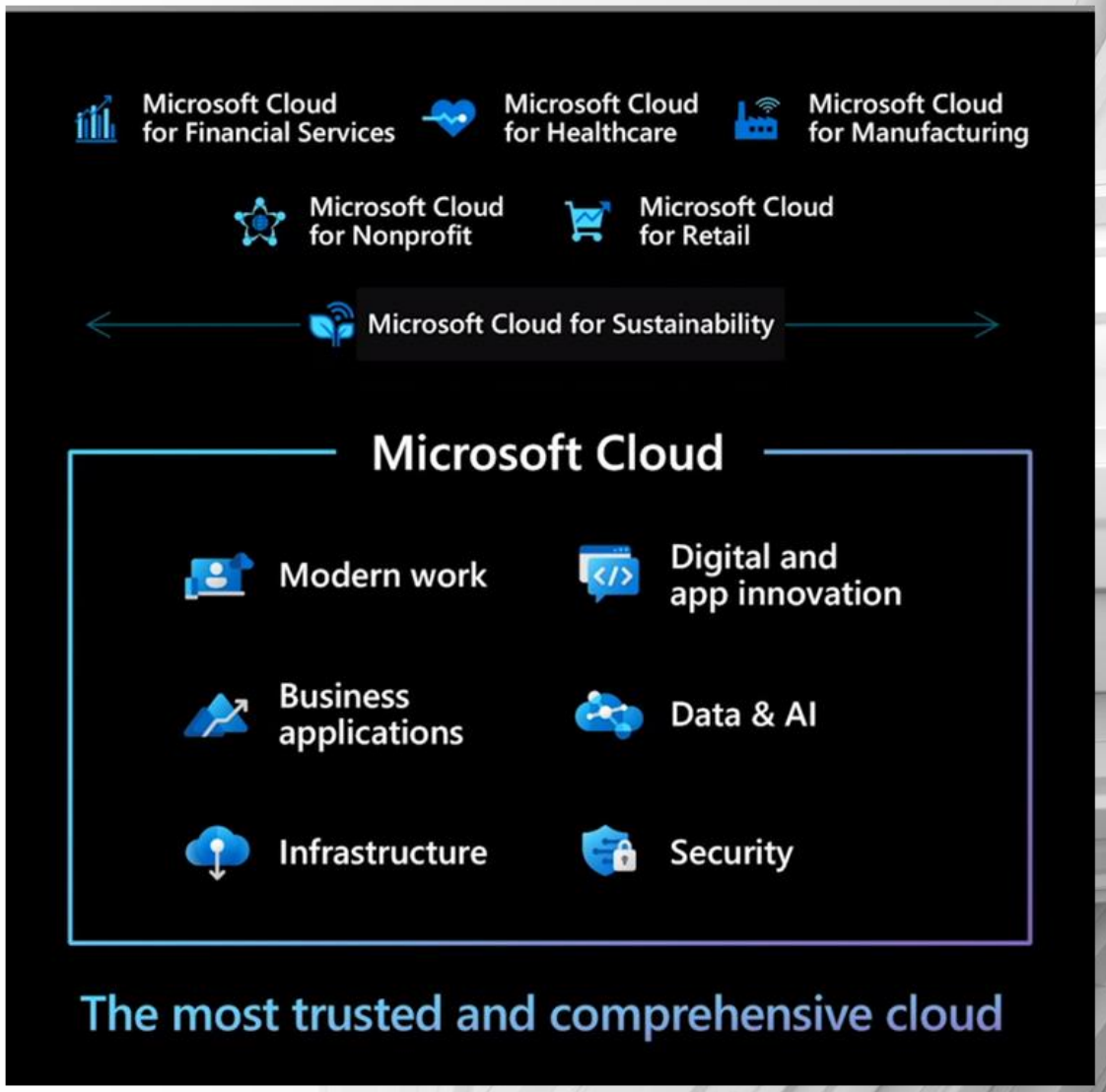
SERVICE LINES:

NEXER DIGITAL

NEXER WORKLIFE

NEXER ENTERPRISE APPLICATIONS

NEXER INSIGHT



NEXER

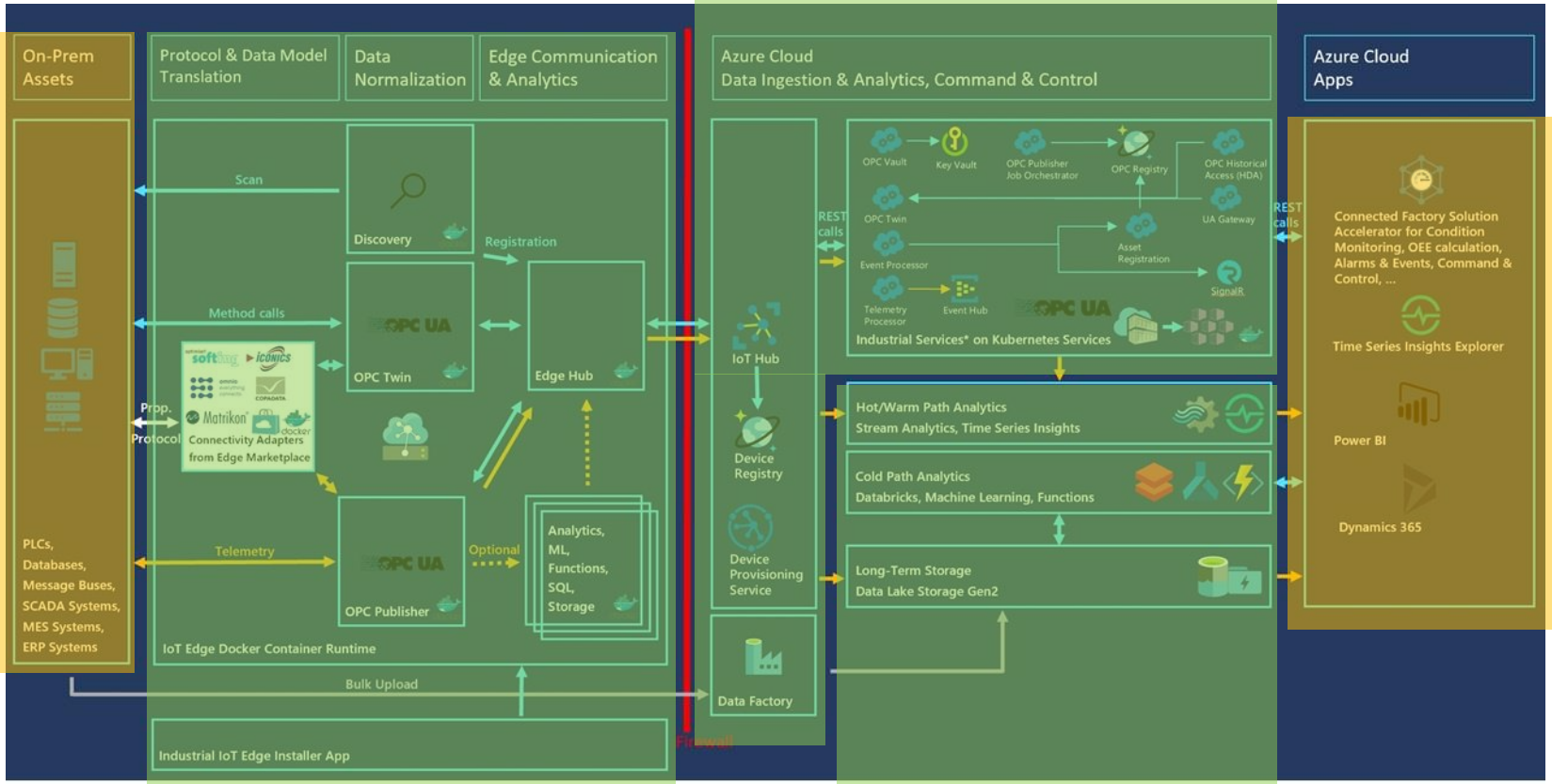
Microsoft Cloud is a complete and leading industrial IoT player

Figure 1. Magic Quadrant for Industrial IoT Platforms

Source: Gartner (October 2020)

IIoT Architecture

Data ingestion, device management, security



Existing plant, devices and systems

Reporting and Dashboards

Data capture, machine learning, computer vision

Data storage and analytics

NOW CO-SELLING WITH MICROSOFT IN UK

NEXER INSIGHT FastForward

Azure IoT : 10 week Custom Proof of Concept

Sigma AB

Takes an IoT service use case from idea to proof of concept within 10 weeks

From scratch to a working Azure IoT Platform in 10 weeks or less!

Clients everywhere recognise the benefits that can be delivered to their customers through application of IoT. Many already have strategic investments with Microsoft and want to explore Azure IoT use cases to solve key business challenges.

Contact Me

Publisher
Sigma AB

Service type
Proof of concept

Gold competencies
DevOps
Data Analytics
Application Development

NEXER FastForward for Azure IoT is a custom developed program to take a service use case from idea to proof of concept within ten weeks, creating an Azure IoT platform that can support future growth.

Analyze phase (1 week)

- Infrastructure discovery
- Azure architecture & design

[Azure IoT : 10 week Custom Proof of Concept – Microsoft Azure Marketplace]

[Azure Computer Vision: 10 week implementation – Microsoft Azure Marketplace]

NEXER

MICROSOFT SOMETIMES CONTRIBUTE...

- Matched incentive funding
- Azure consumption funding
- Start-up investment

- Ask me for details!
- mark.crowne@nexergroup.com, +44 7876 683930

NEXER


PROMISING
FUTURE
NEXXER

INNOVATION ALLIANCE

Comfort Break

Please stay in zoom to enable smooth move to discussion group

INNOVATION ALLIANCE

Discussion Groups

Discussion Questions: Data Connectivity

- Current situation of manufacturing businesses:
  - What are you currently doing about digitalisation in your business?
  - What's good and bad about it?
  - What do you want to do and when?

- Support and assistance:
  - What help have you found?
  - What help do you need?
  - What can you offer?

We will move you to your breakout room, just confirm when it asks you. We'll also bring you back to the main room.

Please put your camera on if possible for discussion

INNOVATION ALLIANCE
SOUTH WEST MIDLANDS

Discussion Groups Reports

INNOVATION ALLIANCE
SOUTH WEST MIDLANDS

Wrap Up

Looking Forward

- Poll

- Next meeting date – 13 December 2021
  - Joint with Innovative Zero Carbon Working Group
  - Product and process

- Join our mailing list for future meetings and news
  - Email e.mcardle@warwick.ac.uk