

BOOTH WELSH

Integrated Engineering Services



Human-Centred Digitalisation, Industry 4.0 and AR-VR solutions for offshore & onshore

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#INDUSTRY4THOUGHTS



What we do

Booth Welsh is an integrated engineering services company providing services in process design, electrical, control and instrumentation design, mechanical & piping design, systems integration and asset management services. **Uniquely** we offer our clients the **complete project lifecycle** in house, from front-end engineering design through detailed design to installation, testing, commissioning and close out documentation



“Booth Welsh is a technology business.
We add value to our clients assets by applying our
multi-sector experience.
As thought leaders in digitalisation we collaborate to
continuously develop solutions for our clients using
new but robust technologies.”



Part of the



family

**BOOTH
WELSH
TODAY**

30

YEARS IN BUSINESS

Working Internationally



Committed workforce of

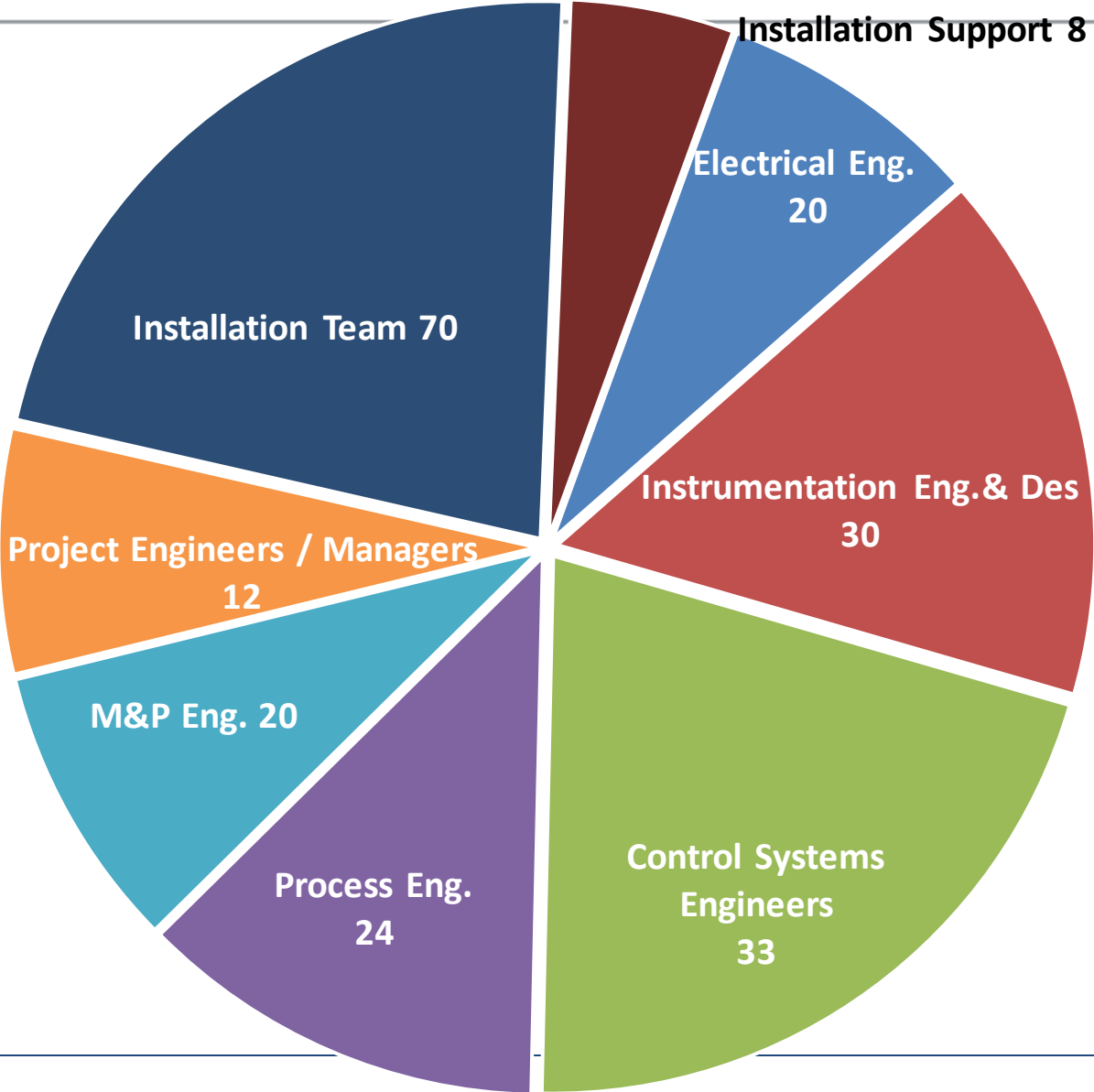


Annual Revenue
£18m



Engineering Capability

230+



Alumni

70+

Apprentices Trained

50+

Graduates Trained



Clough works with some of the world's largest energy and resources companies to engineer, construct, commission and maintain a comprehensive range of infrastructure for energy and resources projects. The company was established in **1919**, and today utilises a workforce of nearly **3000** people from operating centres across Australia, Papua New Guinea, UK, North America and Asia, with a Turnover of circa **\$1B Aus**



Murray & Roberts is South Africa's leading engineering and construction services company. M&R has delivered infrastructure throughout South and Southern Africa for more than **110 years** and is today recognised as an international engineering and construction group underpinned by world-class companies. The group employs a workforce of over **25,000 people**, with a Turnover of circa **7B Zar**.

Where We Work



Technology - Our Ever Changing World

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BOOTH WELSH - OUR JOURNEY

Booth Welsh Associates
Providing I&E Teams to Projects

1989

Panel Building Added
Diversification 1 – Panel Building
Diversification 2 – Field Installation

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Installation

85%

Engineering Services
In response to customer demand we add detail design to deliver Design & Build Projects

1991

1995

Control Systems
Digital Technology / Remote I/O threatens to reduce our scope, we invest in Control Systems

1998

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Integrated Engineering Services

BOOTH WELSH - OUR JOURNEY

Project Management EPC
As our projects increase in complexity we add Project Management Capability.

2001

Process Engineering
We increase our portfolio by adding a Process ability and growing a Process Engineering Team.

Management buyout

2010

Engineering

85%

Resource Division
Going full circle we add a full time resources team.

2013

CLOUGH
Joined Clough
Business acquired for its Technology by Australian Engineering Business Clough.

2014

Relocated Our HQ
After 25 Years in Stevenston we relocate to Irvine.

Industry 4.0 Digitalisation

Developing Industry 4.0 Solutions

Developing Digital Products

2016

Engagement & Innovation
Working on Staff Engagement develops a strong culture of innovation

2018

a **CLOUGH** companyany



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Field Bus Systems

Open Configurable Control Systems

Web based access

IoT Connectivity

3D Printing

Virtual Reality

Cyber Security

Data Analytics

Augmented Reality

Cloud Computing

Robotics & Autonomous Systems

Artificial Intelligence



Pneumatic Control - I.S. Technology

Large Mainframe Systems

PLC Systems

Remote I/O Systems

Wireless Instrumentation

Traditional buttons and lamps

SCADA Systems

Direct Digital Control

Industry Multi-Sector Experience & Knowledge Transfer = Our Experience & Differentiator

- **Current** Strong market
- **Future** increased investment in digital eco-system
- **Areas of Interest;**
- Mobile Paperless records, inspection readiness
- Equipment utilisation and flexible manufacture
- Process Performance analytics
- Production scale-up
- Modularisation

Pharma & Lifescience



- **Current** Shoots of recovery
- **Future** Recognise significant benefits
- **Areas of Interest;**

Oil & Gas



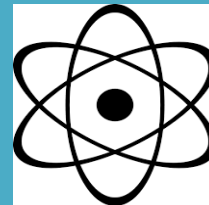
- Technology
- Remote support
- Root cause analysis
- Reduction in plant downtime and turnarounds

- **Current** Diverse levels of automation
- **Future** Deployment of cost effective digitalisation
- **Areas of Interest;**
- Mobile data visualisation
- Data analytics to optimise line efficiency
- Operation diagnostics and equipment performance
- Knowledge based systems for optimisation and production flexibility

Food & Beverage

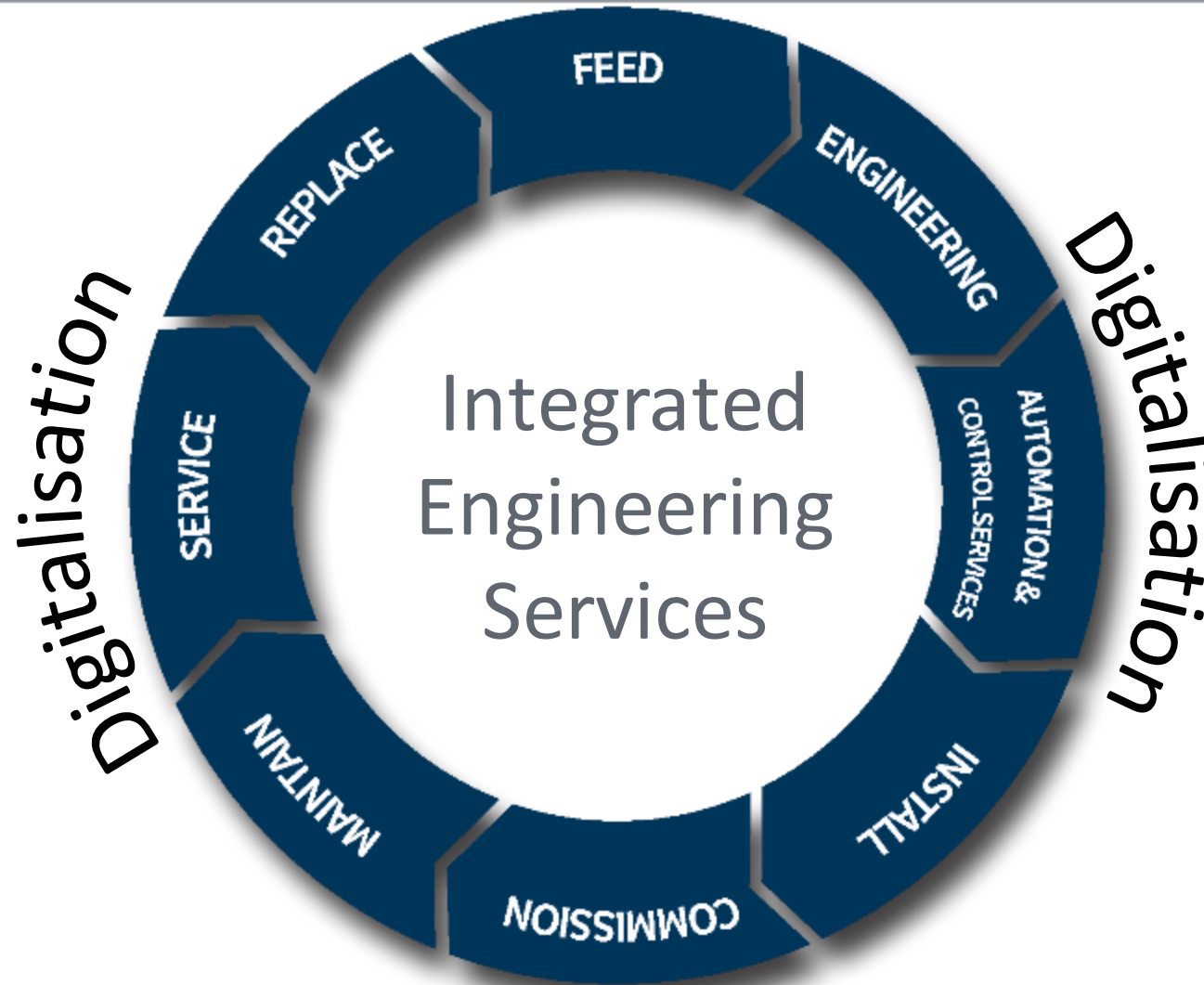


Nuclear



- **Current** Existing and New Build
- **Future** Decommissioning
- **Areas of Interest;**
- Remote access and maintenance
- Asset utilisation
- Device calibration
- Paperless documentation

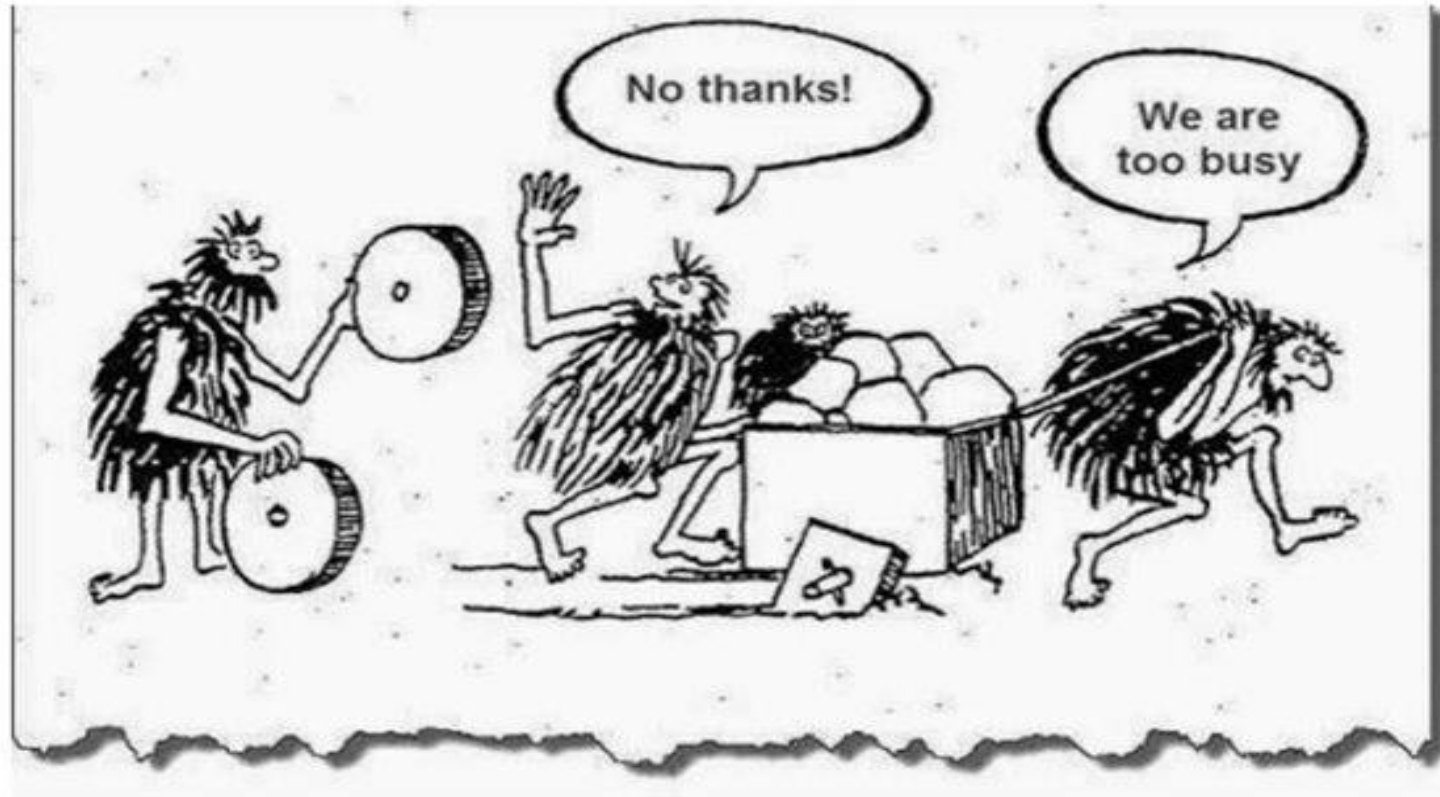
Value Proposition



Culture Change: Human-Centred Digitalisation

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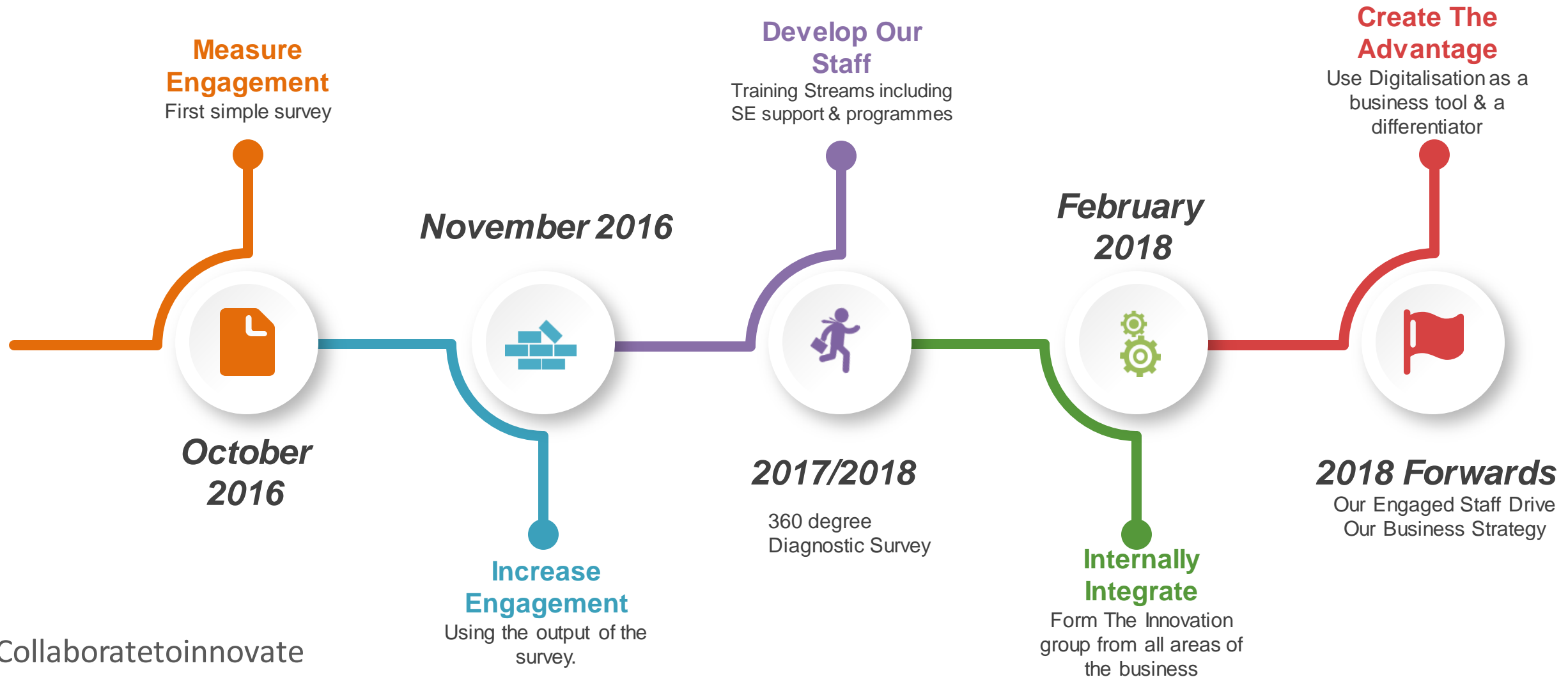




Companies that focus on culture when going through a digital transformation are 5x more likely to achieve breakthrough performance*

*Statistic taken from BCG Consulting Group

Building Our Culture for Digitalisation



#Collaboratetoinnovate



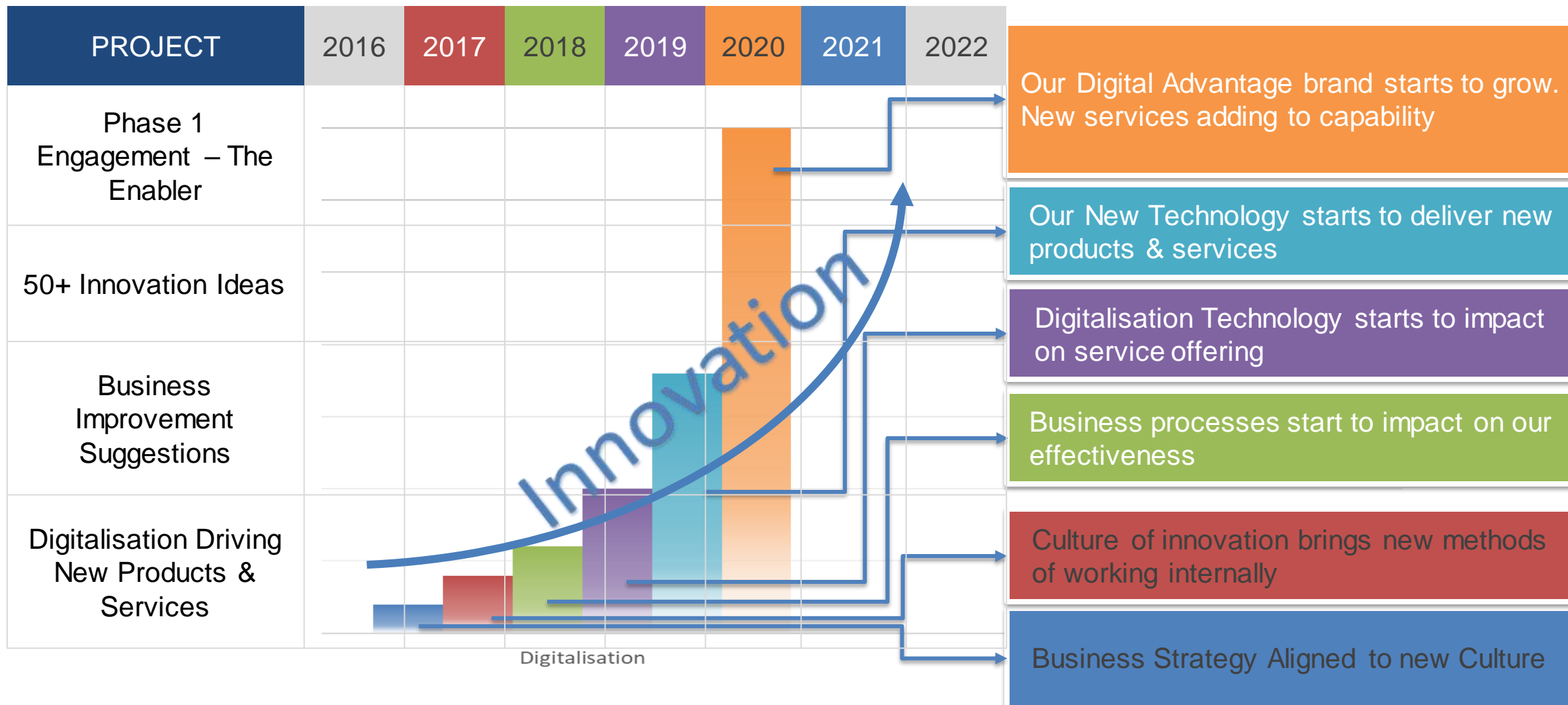
- Engagement when rolling out new 5-year strategy
- Branded Workplace - Vision, Mission & Values across common areas
- Create environments that embraces creativity
 - Innovation room & Café Zero
 - Provides space and autonomy to teams and individuals for idea generation and creative problem solving
- Create a culture of Innovation – EDI & Improvement
- Internal & External Co-Labs (Collaborations)
- Reward innovative behaviours (including fail fast)
- Encourage 'Intrepreneurship'!
- Focus on 'Human-Centered' Digitalisation
- Developing our "Digital Advantage" solutions



#Collaboratetoinnovate



"People support what they help to create." (Dannemiller Tyson 2000)



Industry 4.0 and Digitalisation for onshore & offshore

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Analogue to Digital to Industry 4.0



Analogue



Digital



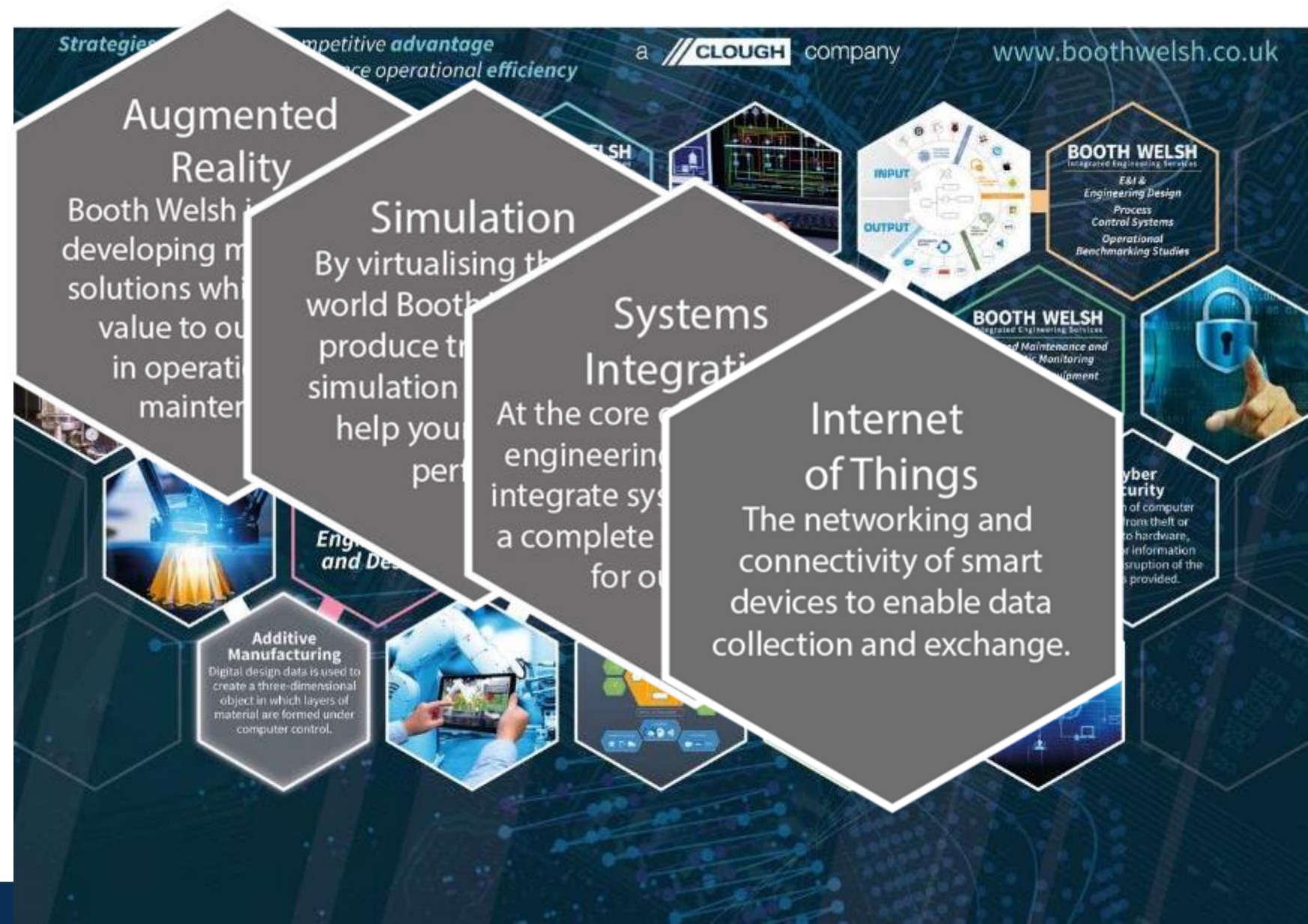
Industry
4.0



- Augmented Reality
- Dashboarding
- Asset Management
- Passive Control System Integration
- AI Control System Integration
- Mobile tech, wireless, tablets
- QR Codes, RFID & Beyond
- 3 scenarios - Proof Of Concept
- Cloud based asset monitoring
- Cobots



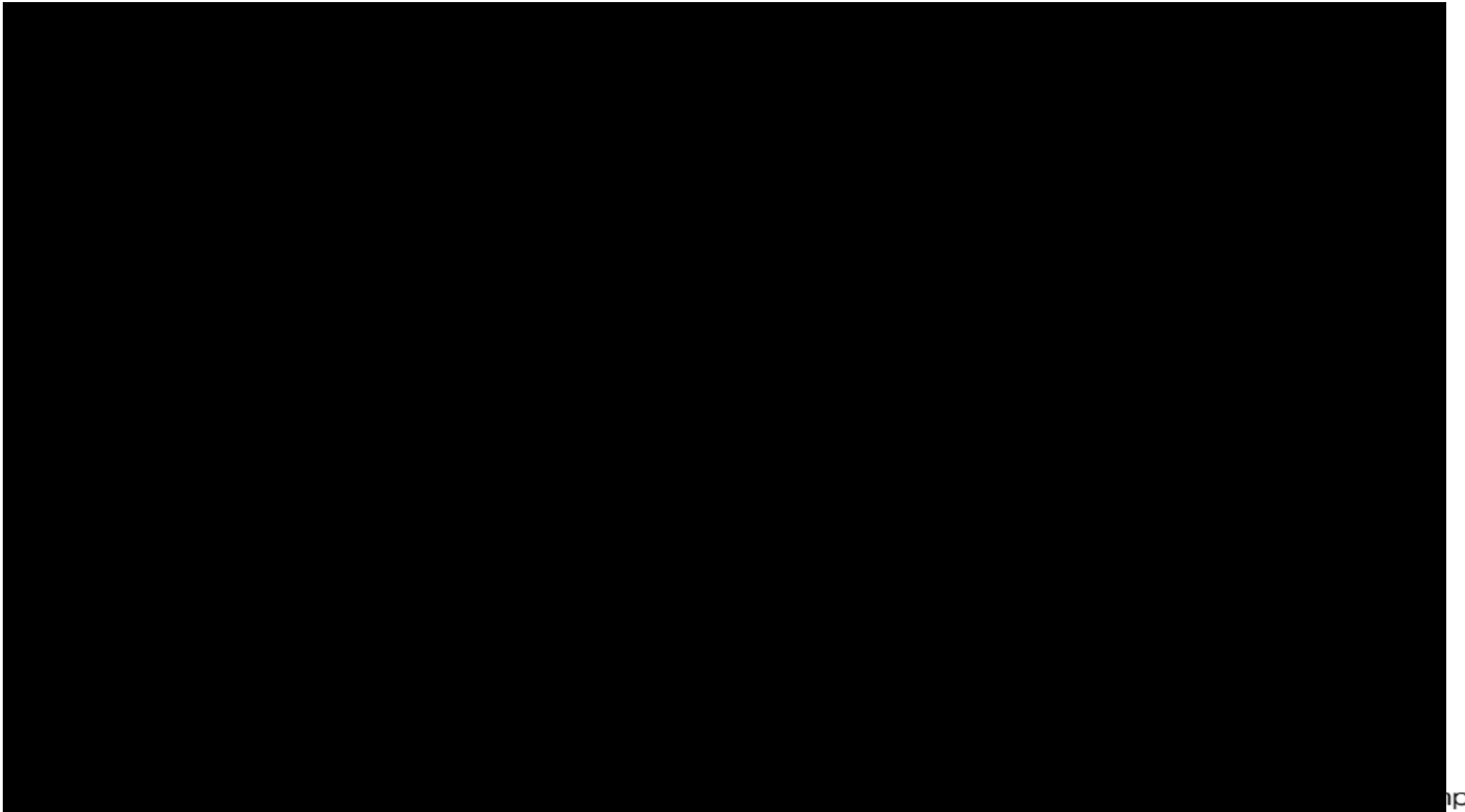
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Building Our Capability



- Innovation and Digitalisation is a BW Strategic Pillar built in to our strategy for growth
 - Multi discipline team focused on driving innovation and Digitalisation through engagement and collaboration
- Growing resource fit for the future
 - Graduates (IT, Data, Process Analytics, 3D Modeling / Mechanical)
 - Collaboration with academia (PhD Students / AFRC)
 - Cross functional / Crossing traditional lines capability
 - **Gamification Engineers Recently Employed**
 - **VR/AR Technicians**
- Technology Platform Agnostic
- Building relationships with the right partners (Honeywell, Siemens, Emerson, Wyoming...)
- Internal and external Engagement and collaboration e.g. co-lab, industry events, concept studies
- Permanent innovation room and development environments
- Continually evaluating new technologies (AR, VR, Simulation, Cobots...)
- Presenting at Industry events and STEM involvement, thought leadership..





- A blend of AR/VR/Mobile Technologies
- Handheld and handsfree operation
- Tracked field operations
- Digital operator rounds and inspections
- Intelligent workflow instructions and paperless records
- Embedded documentation and live plant information
- Remote Support / Remote Expert

Customer benefit

- What you need at point of use, through information sharing and collaborative working
- Right first-time approach, eliminate errors
- Workforce upskilling and empowerment

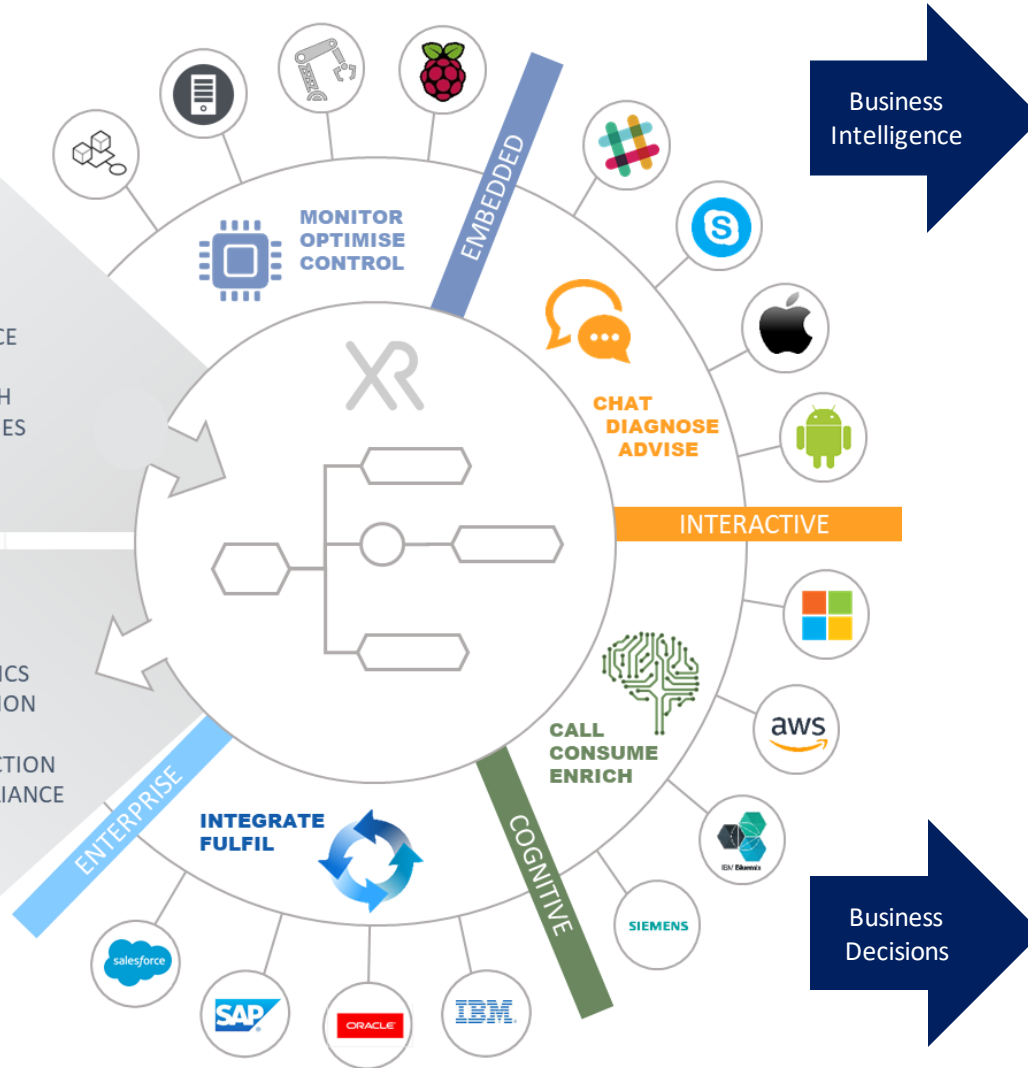
Here Now - Digital Data Decision Making

INPUTS:

- HUMAN INTELLIGENCE
- MACHINE LEARNING
- VOICE / TEXT / TOUCH
- KNOWLEDGE LIBRARIES
- BUILD TOOLS

OUTPUTS:

- BUSINESS DECISIONS
- ADVICE & DIAGNOSTICS
- PROCESS OPTIMISATION
- CONTROL ACTIONS
- CUSTOMER SATISFACTION
- REGULATORY COMPLIANCE



Data Visualisation - ADNOC



- **UNIFIED DIGITAL COMMAND CENTRE**
- **200,000 SENSORS**
- **50m SCREEN**
- **SINGLE VIEW OF COMPLETE OPERATIONS ACROSS 14 BUSINESS UNITS & 60+ SITES**
- **INTEGRATED DATA MODEL AND PREDICTIVE ANALYTICS**
- **ENABLES REAL TIME DECISION MAKING ACROSS SUPPLY CHAIN**

Customer benefit

- 10% Reduction in maintenance costs
- Centralised resource pool
- \$60-\$100M operation savings



Digitalisation – Why ?



Right First Time



Remote Assistance



Productivity Increase



Cost-Saving



Electronic Workflow



Safety & PPE Information



Insights



Time-Saving



Drawing & Data Sheet Access



Flexible Manufacture & Improved Agility



Real Time Quality Data



Artificial Intelligence For Diagnosis



Training & Data Driven KPIs



Real Time Performance Analysis



Enabling Next Best Action



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