BAIN DIGITAL

Next generation digital organization and capabilities

Peter Parry
Head Global Oil, Gas and Energy Consulting

BAIN & COMPANY

November 2018

DIGITAL INDUSTRIALISATION - ORGANISATION & CAPABILITY IMPLICATIONS

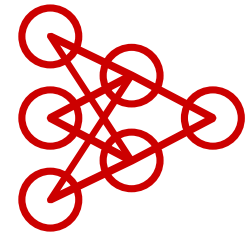
Innovation waves

- Machine and people connectivity
- Sensors generating huge analytical data sets
- Decision support computer power rapidly increasing
- Agile ways of working
- ‘Open platform’ approach
- End to end process simplification, automation
- Centres of excellence
- Increased functional collaboration

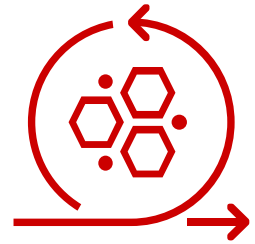
Use cases

- O&G: Automated drilling and field surveillance
- Renewables: Advanced grid planning analytics
- Coal Mining: Digital twin mine design and planning
- Power: Demand load forecasting
- Transportation: End to end supply chain visibility
- Petrochemicals: Advanced process control & predictive maintenance
- Commercial Excellence: Blockchain

Implications for…



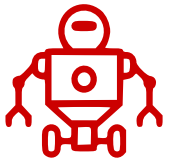
Right Organisation



Right Capabilities

TEN DISRUPTIVE O&G DIGTIAL TECHNOLOGY AREAS

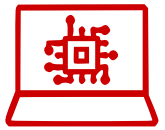
1. **Autonomous robots & vehicles**



2. **Additive manufacturing (3D printing)**

3. **Internet of things, sensors & wearables**

4. **Digital engineering and training**

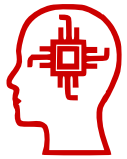


5. **Virtual and augmented reality**

6. **Cloud and Security**

7. **Big data, advanced Analytics, AI**

8. **Artificial Intelligence**



9. **Mobile & digital engagement**

10. **Process automation (RPA)**

Source: Literature search; Company websites

STEP CHANGE LEVEL DIGITAL VALUE IMPACT EXPECTED

Targets

Accidents & Injuries	Capital cost	Operating cost	Overhead	Throughput / Production	Customer Value
20% ↓	20% ↓	5-30% ↓	5-20% ↓	2-10% ↑	Top 25% ↑

Examples

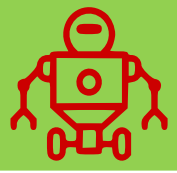
Shell
60% Completion cost savings

ConocoPhillips
30% Production increase

devon
2% Downtime reduction

COMMON RAPID DEPLOYMENT TARGETS

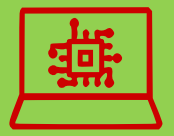
1. **Autonomous robots & vehicles**



2. **Additive manufacturing (3D printing)**

3. **Internet of things, sensors & wearables**

4. **Digital engineering and training**

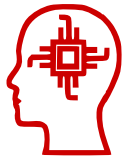


5. **Virtual and augmented reality**

6. **Cloud and Security**

7. **Big data, advanced Analytics, AI**

8. **Artificial Intelligence**



9. **Mobile & digital engagement**

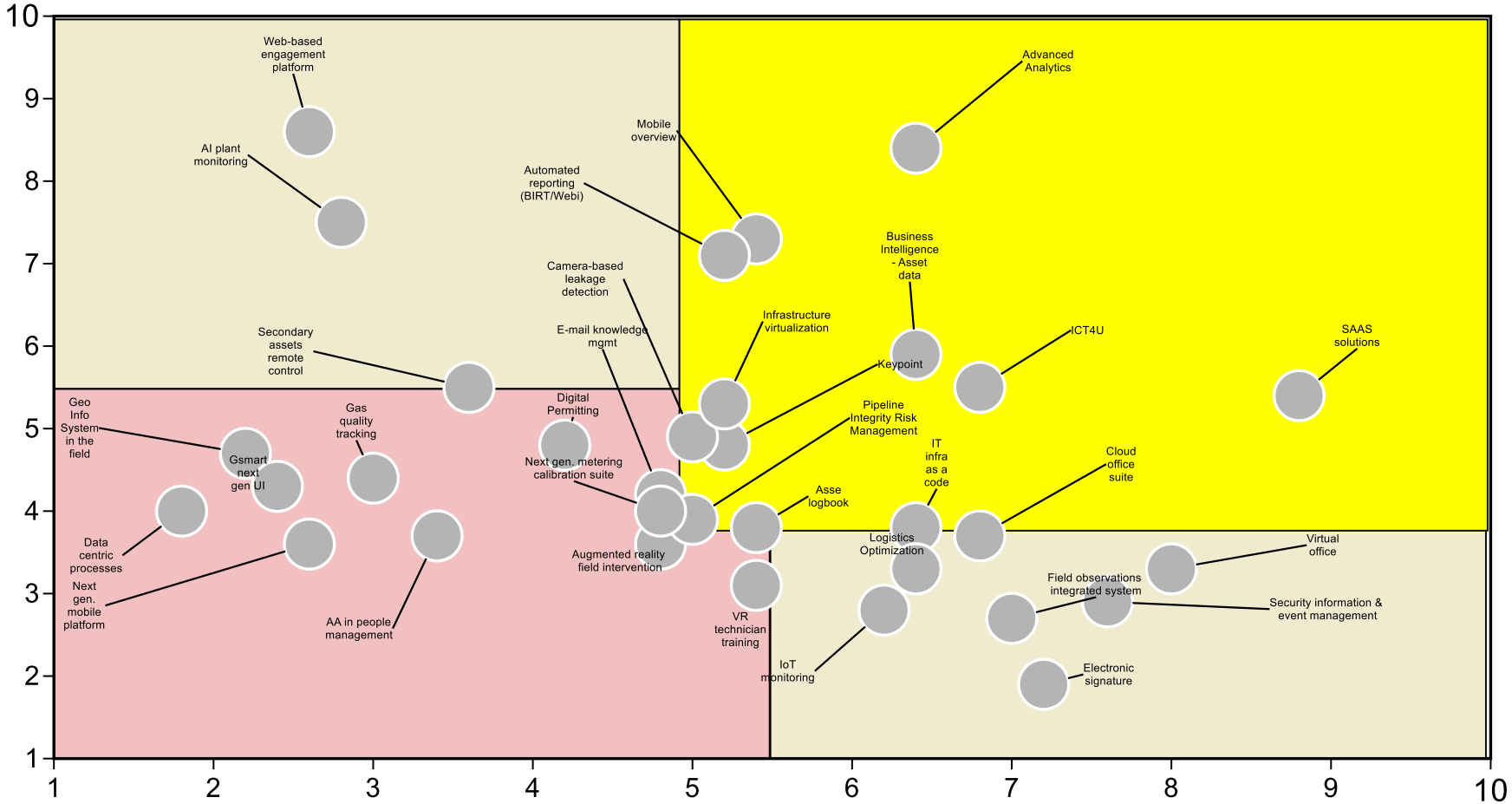
10. **Process automation (RPA)**

Source: Literature search; Company websites

RIGHT CAPABILITIES AND ORGANISATION NEEDED FOR DIGITAL DELIVERY

Right Organisation

Illustrative Digital Portfolio: Link to Capabilities and Organisation



Right Capabilities

BUILDING THE ‘DIGTIAL’ OPERATING MODEL

Mission/ strategy

- Set a target model for “Digital” – ambition and key principles
- Align governance model in Centres of Excellence vs. assets drive digital initiatives
- Incorporate Digital into KPIs and the Operating Management systems

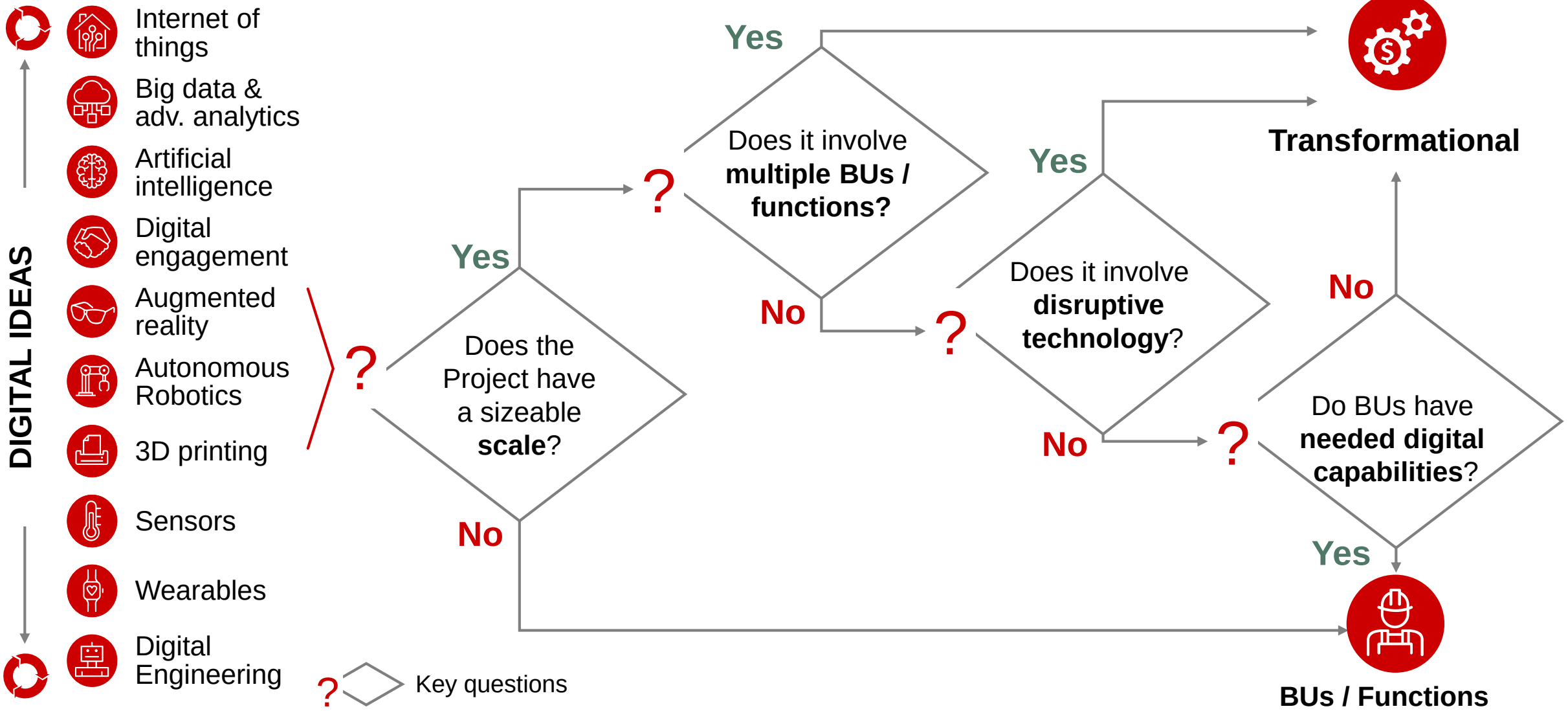
1 Organisation

- Share responsibilities for digital project portfolio results and budgets between:
  - Corporate Centre
  - Upstream
  - Regional technology centres
  - Role of Assets
- Some Digital activity driven by a centre of excellence some embedded within each asset, function

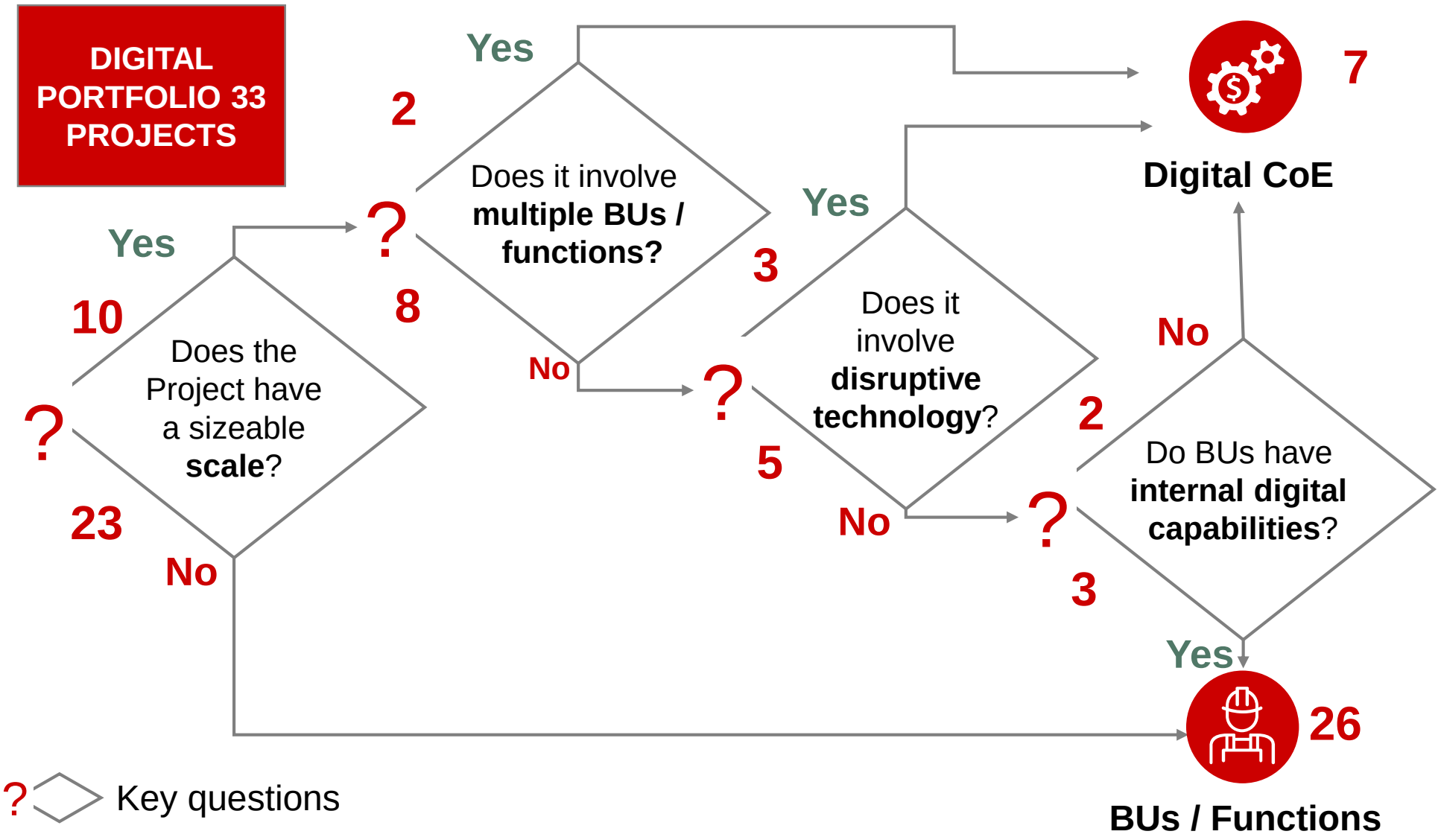
2 Capabilities

- An ecosystem needs to be developed to enable new digital solutions
- Digital capabilities need to be developed in Upstream to ensure holistic and efficient coverage of efforts vs. Corporate Centre
- An ‘open’ digital platform approach enables partners, suppliers and experts to collaborate effectively

1 ESTABLISH CLEAR DIGITAL PROJECT DELIVERY ROLES



1 DRIVE A SMALL SET OF HIGH IMPACT INITIATIVES VIA THE CENTRE



- Considered transformational
  - AI-enabled grid monitoring
  - Business intelligence – Asset Data
  - Augmented reality on intervention on the field
- Examples of digital initiatives
  - Future leakage detection in stations
  - Update of mobile hardware and software platform for maintenance activities

1 TEST MINOR PROJECTS, SOME CAN BE TRANSFOMATIOINAL

Cloud **office suite**	Use as organization wide collaboration tools, enabling and encouraging **agile ways of working**
Use of **SaaS** solutions for specific needs	Use SaaS across **entire organization**, also for more business critical applications
Automated reporting – statistical model for early stage maintenance	Implement more disruptive machine learning technology for **predictive maintenance**
Web-based **stakeholder engagement** platform incl. advanced analytics	License technology to other BUs with goal of integrating into **Company wide** system
Advanced analytics for **COMMERCIAL** opportunities	Apply to **larger markets** and new geographies
Better sensor **PRODUCT quality tracking**	**Market and promote technology** to generate additional revenues

2 EFFECTIVE ECOSYSTEM CAPABILITIES

Open Innovation

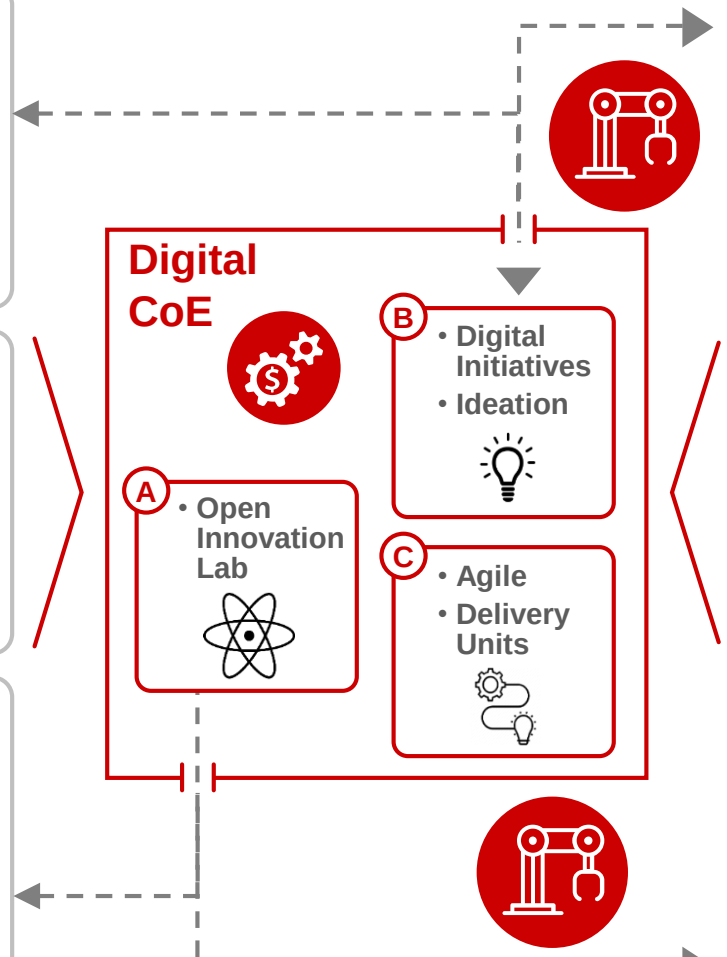
Digital Ecosystem

- Call for ideas
- Start-ups competitions
- Hackathons
- Start-ups
- Academic institutions
- Freelancers
- Incubators
- Bootcamp
- Contractors & Suppliers
- JV Partners

Scouting

Networking

Partnerships



Internal Environment

BUS/ Functions	• Provides needs, resources and sponsorship • Collaborates in defining, selecting and developing digital projects • Ownership of project responsibility after implementation
Procurement	• Support evaluation and activation of potential partners • Support identification of most suitable partnership contractual schemes
Communication	• Develop network with potential partners (i.e. realization of Hackathons)
R&D	• Coordinate on different 'Open Innovation' platform activities
CFO	• Support and track business cases preparation and delivery

2 INTERNAL CAPABILITIES REQUIREMENTS

Typical Upstream capability gaps

- Data analytics shortage, digital supply chain, digital engineering and training
- Ability to absorb agile way of working into projects and the front line
- Ability to set standards that can integrate suppliers solutions into an organization
- Ability to execute cross-functional/ cross-disciplined projects. Forward looking management systems

Key questions to address

- How do you build up capability depth and scale?
- How do we measure and track performance through to the front line?
- How do we manage the transition between operating models and realize results?
- Is our management system an anchor or accelerator?

2 NEW AND UPGRADED CAPABILITY REQUIRMENTS

STRATEGIC DIRECTION

- Digital strategy development
- Digital portfolio management

DEVELOPMENT

- Organisation and customer experience design (external and internal)
- Business analytics & insights
- Agile innovation and DevOps
- Venturing/ partnering and M&A management

SYSTEMS AND INFRASTRUCTURE

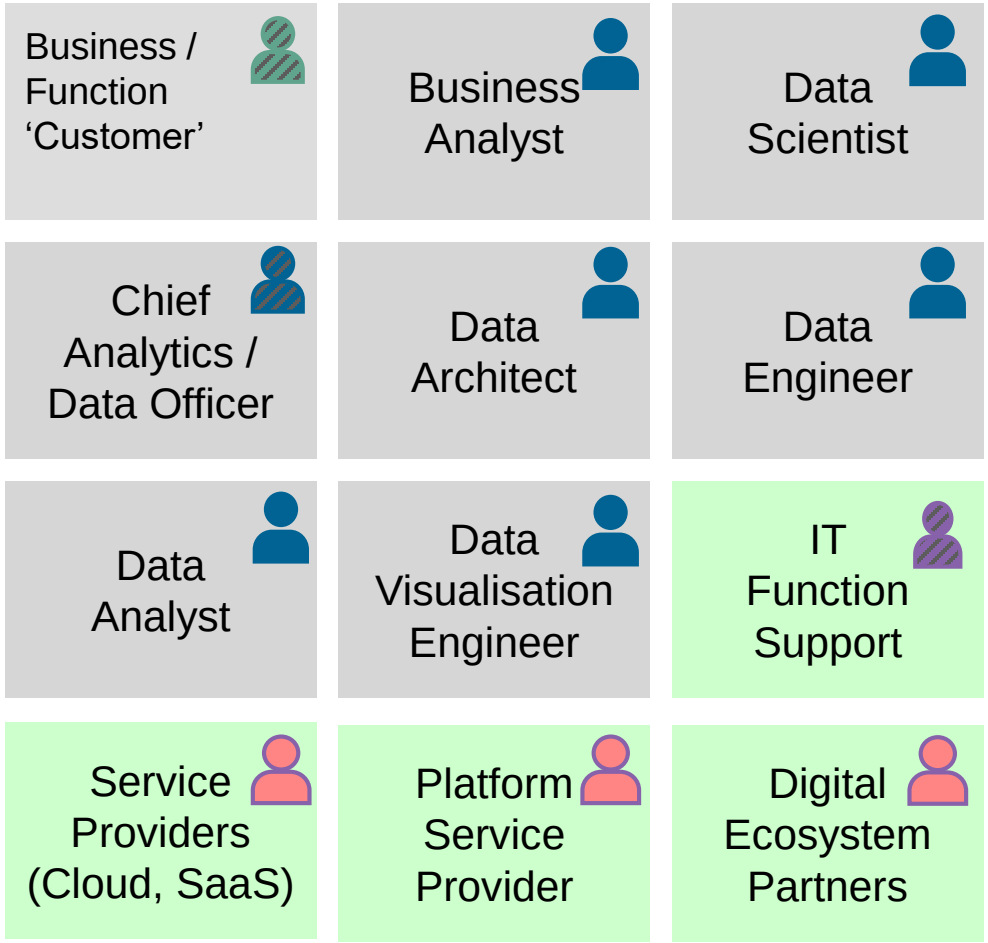
- Digital tools & platforms
- New technology develop-ment
- Data strategy and manage-ment

SUPPORT FUNCTIONS

- HR
- Finance
- Info security
- IP/legal/ regula-tory

2 DETAILED IMPLICATIONS

ADVANCED ANALYTICS TEAM, PARTNERS AND TOOLS



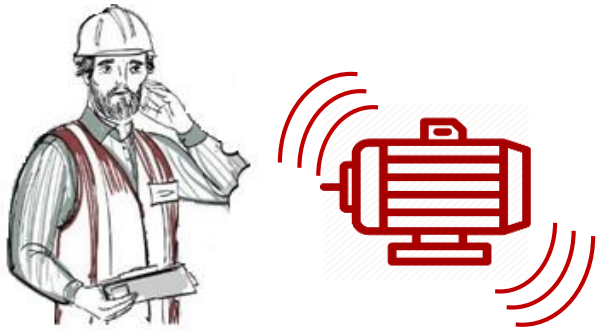
Area	Tools	Criticality
Analytics	R/SAS	Necessary
Coding	R, Python, Java, C/C++	Necessary
Databases	SQL, NoSQL, MongoDB, CouchDB, Cassandra, MemcacheDB…	Necessary
Big Data Processing	Handoop, Sparke, Flink	Preferred
Algorithms and Models	Regression models, Hidden Markov models, Support Vector Machines, Dimensionality Reduction algorithms, Ensemble algorithms, Decision Trees, Clustering	Necessary
Domain Knowledge	Company strategy, business fundamentals, performance drivers, role of data, competitor position	Preferred
Culture	External focus, curiosity, communication and listening skills	Necessary

Source: Bain analysis

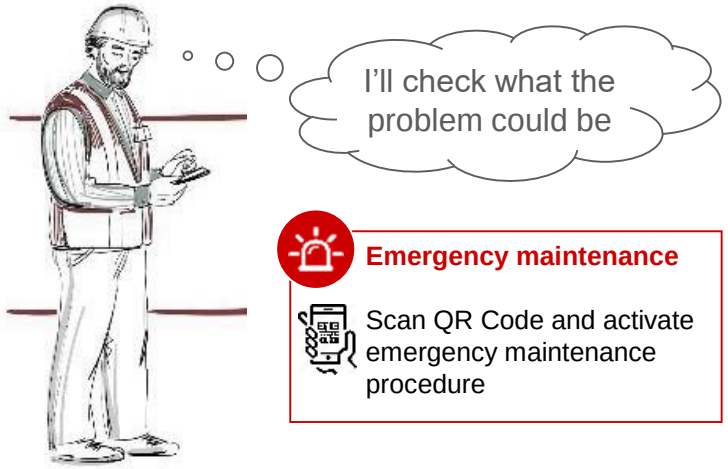
ACCELERATED OUTCOMES

/ VOICE ACTIVATED PLATFORM

Edwin walks by a machine and suspects something is wrong…



He identifies the machine and sets up diagnosis mode



Emergency maintenance

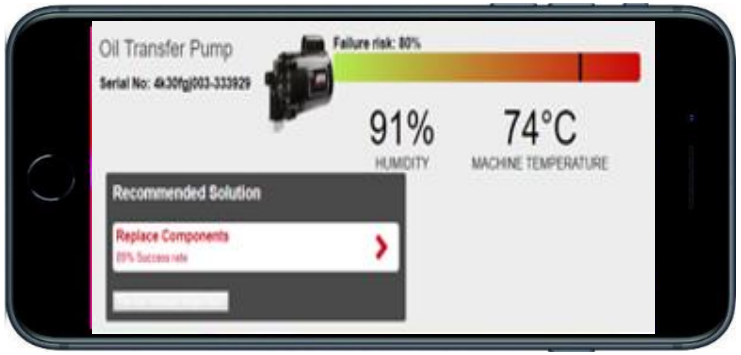
Scan QR Code and activate emergency maintenance procedure

… he gets data form the machine and likely diagnosis…

The machine will collect diagnostic information

- Directly from the machine via Bluetooth (e.g. pressure, temperature)
- Asking Edwin for additional input

With that information, the machine provides most likely diagnostic and suggests components that need to be changed



…and is able to order components required to fix

Edwin places a purchasing order for the components through the company ERP to get the pieces as soon as possible

ACCELERATED OUTCOMES

/ VOICE ACTIVATED PLATFORM

BAIN & COMPANY