BXT Session - Digital Champions in the Mining & Processing Industry
Our Digital Operations framework covers all key operations & support functions and technologies in a mine.

Enablers:
- IT/Technology Architecture
- Digital Capabilities & Culture
- Partnership & Alliances
- Governance/Processes and Data Management
- Information Risk Management

PwC's Digital Services
Digital Champions create value through integrated ecosystems with double-digit revenue boosts and efficiency gains

Benefits investing in digital technologies and Digital Champion Solutions – Process Industry

Digital Revenue Increase 2018 - 2023

Digital Novices vs. Digital Champions

- Digital Revenue Increase 2018 - 2023
  - 8%
  - 13%

- Efficiency Gains / Cost Reduction 2018 -2023
  - 11%
  - 23%

1. Digitization of product and service offerings
2. Leadership in customer-centric solutions
3. Management of a partner solution network
4. Near real-time E2E integration & planning platforms
5. Full vertical integration / MES of manufacturing operations
6. Tech innovations, e.g. AI Solutions, Collaborative Robots
7. Digital Strategy & implementation roadmap
8. Digital experts and dedicated training programs

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A large downstream manufacturer collects and analyzes operational data that allow for predictive maintenance, remote monitoring & digital repairs.

Predictive maintenance at downstream process manufacturer
Drone and robot technologies are applied to support maintenance processes in the mining and oil & gas infrastructure

Best Practice Examples – Digital Maintenance & Repair

- Maintenance of assets, e.g. **structural assessment of technical conditions** of various infrastructure elements, structural alignment validation, detection of overheating elements and corrosion
- Leak detection with **no ability to see the leakage** on often long- stretching or difficult-to-reach pipelines
- Engagement of workforce in potentially dangerous areas posing a significant **health and safety risks**
- Drone-borne infrared sensor enable **automation and acceleration** of maintenance issue identification
- **The initial assessment and correction** of the situation can be done immediately based on real-time video stream and robot tools

*Source: Desk research, Client examples, Strategy& analysis*
Augmented reality solutions have been implemented by a client in the process industry to optimize operations and maintenance.

**Objectives of Augmented Reality**

- **Connect physical assets to digital world**
  - Enable identification of equipment
  - Receive performance and quality data in real time
- **Enable equipment alarm settings and remote diagnostics**
- **Enable equipment visibility and location tracking in complex plants**
- **Provide critical service data** for equipment
- **Push work instructions** to reduce time and knowhow requirements for service
- **Establish optimized user interface, task confirmation** and **service documentation**
Digital technologies have been implemented to enable mobile communication and AR solutions.
Global Process leader trains its field operators in a 3D virtual environment to ensure higher safety procedures and reduce operations cost

**Overview**

- 3D digital asset information data capture by scanning (drones, autonomous underwater vehicle (AUV) and scanners) and providing centralized management of all available field data
- Web-based 3D view of site stored in the Single Point Of Truth database allow for Single Panoramic Images; Walkthrough / Flythrough; Asset Tagging etc. Siemens software is used to train its staff for offshore installations using a virtual 3D environment
- The simulator offers a virtual 3D environment of a plant and provides the opportunity to simulate real-life situations, allowing workers to see and experience what tasks they need to perform, and rehearse procedures and workflows associated with any number of scenarios.

**Benefits**

- Increased transparency for brownfield works
- Risk mitigation and increased safety
- Operational Cost and Downtime Reduction
- Reduction of maintenance time & cost
Advanced MES planning tools integrate and optimize all operations management functions.
MES Digital cockpits allow for real-time controlling and optimization of operations processes.

Collaborative planning solution
An integrated end-to-end planning is based on a joint platform for all planning-related activities between key functions.

**Supply**
- Integrated material requirements planning (VMI/consignment stock, visibility on inventory)
- Vertical integrated real-time planning in production incl. MES introduction
- E2E logistics visibility (Last mile notification, E2E tracking)

**Integrated planning & execution platform**
- E2E supply & demand planning
- Integrated planning and execution along the value chain
- E2E supply platform

**Customer**
- Integration into B2B and B2C ecosystem (PoS data & public data, online market places, own apps, customer ERP integration)
- Proactive demand sensing
  - Utilization of digital customer and configuration data, sales data, service needs and external data
- Dynamic real-time inventory management for a multistage SC and warehouse network

**Enabler**
- E2E data availability, utilization and analysis & efficient IT and data architecture as supply chain support

**Industry case**

Globally leading player using cloud ERP solution to create a supply chain ecosystem

- Using a cloud collaboration platform to link all stakeholders from suppliers through internal operations to customers
- Near real-time feedback on changes in customer demand or product availability assessed and communicated along the supply chain
- Integration with different legacy planning solutions and logistics platforms
Live inventory location and stock level tracking & optimization management has been installed to optimize inventory levels.
Implementation of a Smart Site Management using an Integrated Supply Chain Tower

Control Tower activities

- Just-in-time / Just-in-sequence delivery
- Detailed operations scheduling (FTEs and equipment)
- Fleet management & optimization
- Maintenance management
- Dynamic project management & scheduling
- Big data analytics for performance data
- Integration of suppliers (incl. services)
- Optimal on-site routing
- Autonomous operations (control room)
- Smart site technologies for in- and outbound logistics
- Automated and fully transparent tracking
A best practice IT architecture covers all elements to enable the implementation of digital applications

Recommended IT Architecture

<table>
<thead>
<tr>
<th>Users</th>
<th>Client management and staff</th>
<th>Client service providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access channels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web browser</td>
<td>M-browser</td>
<td>Mobile apps</td>
</tr>
<tr>
<td>Website</td>
<td>Application portals</td>
<td>Dashboards</td>
</tr>
<tr>
<td>Multi-lingual support</td>
<td>UI personalization</td>
<td>Content management</td>
</tr>
</tbody>
</table>

Business services / components layer

Client Business Enabling Solutions
- MOM (Manufacturing Operation Management)
- Inventory Management
- APM
- Procurement suite
- Condition Monitoring
- Predictive Maintenance
- Permit to work
- HSE drones
- Collaboration solution
- Workflow management
- IT service activation
- Knowledge management
- Strategy and performance tracking workflows
- HR and training solutions
- Account and finance solutions
- Legal compliance and case mgmt. solutions
- Contract mgmt. solution
- Capital – Investment management solution
- Risk assessment and management solution

Centralized data management

Data Abstraction Layer
- MDM database
- Transaction database
- Process historian
- Analytics database
- Audit database
- Reporting database

Source: Strategy& analysis

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Empowered employees and the right strategy are at the center of digital transformation

Corporate Digital Vision and Culture

**Digital Strategy**

“Our leadership has a clear digital vision and strategy for the digital future and acts as role model.” 34%

“We foster a culture of innovation with multi-disciplinary teams.” 32%

**Digital Organization**

“We are focused on providing a digital customer experience throughout the customer journey.” 35%

“Our company has flat hierarchies that facilitate agile working and quick decision-making.” 37%

**Digital Education**

“We have invested heavily in training to make our staff fit for digital transformation.” 26%

“Our employees have the required qualifications for the digital future.” 27%

Source: Global Digital Operations Study, Strategy& analysis