Maximize performance from capital project to operations

SESSION ID: EPC-01

Amish Sabharwal
Polling Questions...

- Are you an
  - A. Owner
  - B. EPC
  - C. Supplier
  - D. Other

- Where do you believe digitalization can provide the most value?
  - A. Capital projects
  - B. Plant Operations
  - C. Supply Chain

- With Capital Execution, Where do you think the most value is possible to unlock by digitalization?
  - A. Engineering
  - B. Procurement
  - C. In the Field
  - D. Construction
  - E. Commissioning
Very Low Adoption of Technology in our Industry

<table>
<thead>
<tr>
<th>Level of digitization</th>
<th>R&amp;D investment</th>
<th>IT spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGI industry digitization index, 2015 or latest available data</td>
<td>Percent of revenue spent on R&amp;D</td>
<td>Percent of revenue spent on IT</td>
</tr>
</tbody>
</table>

- **ICT**
- **Media**
- **Professional services**
- **Finance and insurance**
- **Wholesale trade**
- **Advanced manufacturing**
- **Oil and gas**
- **Utilities**
- **Chemicals and pharmaceuticals**
- **Basic goods manufacturing**
- **Mining**
- **Real estate**
- **Transportation and warehousing**
- **Education**
- **Retail trade**
- **Entertainment and recreation**
- **Personal and local services**
- **Government**
- **Healthcare**
- **Hospitality**
- **Construction**
- **Agriculture and Hunting**

**IT spending**

- Software/internet
- Banking/finance
- Education
- Professional services
- Media/entertainment
- Telecommunications
- Insurance
- Database
- Healthcare providers
- Transportation
- Pharma/life sciences/medical
- Utilities
- Industrial electronics
- Consumer products
- Manufacturing
- Retail/wholesale
- Food/beverage processing
- Chemicals
- Construction
- Energy

Source: McKinsey Global Institute, Capital IQ, Gartner key metrics data 2012
Digital transformation priority – Owner Operators

• Plant, Cloud and Intelligent Information Management

TOP PRIORITY
Plant Digitalisation (Digital Twin) is a top priority in the process industry

BIGGEST IMPACT
Cloud and Intelligent Information Management has the biggest impact
Intelligent Information Management

DIGITAL ENGINEERING DATA
- 1D/2D/3D Data
- Physical Structure
- Process Behaviour

DIGITAL MAINTENANCE DATA
- Non-transactional data
- Vendor/catalogue data
- Procurement/Spare Parts
- Maintenance/EAM/APM

DIGITAL OPERATIONS DATA
- Transactional data
- Real or Historical Operations data
- Sensors, IOT
- DCS/SIS/PLC/HMI etc..
Engineering

The Consumer World

Industrial World
What is Engineering Information?
Customer Challenges

Project execution

“75% of major projects are over budget by 40% or more and late by 20 Months”
– Independent Project Analysis

Handover

“Unbudgeted costs of poor Engineering Information Handover is 4% of Capex”
– National Institute of Standards and Technology

Operations

“25-50% of Plant engineers’ time is spent searching for Master Data (engineering information) to support production, maintenance, reliability, safety and compliance programs”
– Owner Operators

Approx. $21m on a $500m project

Inefficiency
How you get it depends on your contracting strategy with EPC...

15% Project TIC Savings

Data Centric Project Execution

Document Centric Project Execution

Trusted Engineering Information

4% Handover TIC Savings

Contracting Strategy / Technology Mandate

YES

NO
Typical Capital Project Handover Strategy

EPC

HANDOVER

Owner

Document Centric
A Digital Handover Strategy

EPC

Data Centric

Operations
Project Director
False confidence
Capital Project Execution Problem

Historical performance for projects with budgets >US$1 billion
N=274

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost overrun</th>
<th>Schedule overrun</th>
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</thead>
<tbody>
<tr>
<td>O&amp;G Downstream</td>
<td>53%</td>
<td>38%</td>
</tr>
<tr>
<td>Mining</td>
<td>53%</td>
<td>41%</td>
</tr>
<tr>
<td>Other Infrastructure</td>
<td>43%</td>
<td>63%</td>
</tr>
<tr>
<td>Transport</td>
<td>40%</td>
<td>63%</td>
</tr>
<tr>
<td>O&amp;G Upstream</td>
<td>34%</td>
<td>41%</td>
</tr>
<tr>
<td>O&amp;G Midstream</td>
<td>28%</td>
<td>69%</td>
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<tr>
<td>Real estate</td>
<td>24%</td>
<td>85%</td>
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</table>

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Capital Project Business Models of the Past...

EPC 1.0

Drafting Table

EPC 2.0

CAD

EPC 3.0

Global Execution
Capital Project Performance Issues

10 Root Causes

External Forces
1. Increasing project and site complexities
2. Regulatory Environment
3. Informality and corruption

Industry Dynamics
4. Project teams are opaque and highly fragmented
5. Contractual structures & incentives are misaligned
6. Bespoke/suboptimal owner requirements

Operational Factors
7. Design Processes are inadequate
8. Poor project management and execution basics
9. Insufficiently trained labour
10. Under investment in tools/digitalization/innovation

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How to improve productivity? What about an EPC 4.0 Strategy...
EPC 4.0 Strategy – “CREATE COLLABORATION”

Contracting Strategy/Project Execution Plan
- Accountability definition (WBS)
- Workflows
  - Data Management
  - Data Flow
  - Data Accountability
  - Data Relationships

Shared Information Management Strategy & Environment (Cloud)

Owner & Stakeholders

Vendors

Licensees/Package Vendors

Vendors

EPC 1 ISBL
- Process
- Piping
- Civil/Struct
- Mech
- Instr
- Elect

EPC 2 ISBL
- Process
- Piping
- Civil/Struct
- Mech
- Instr
- Elect

EPC 3 OSBL
- Process
- Piping
- Civil/Struct
- Mech
- Instr
- Elect

Fabricators

Constructors

Commissioning

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EPC 4.0 Performance Opportunities

How to improve Productivity

1. Reshape regulation
2. Rewire contracts (Create Collaboration)
3. Rethink Design & Engineering
4. Improve procurement & supply chain
5. Improve on site execution
6. Infuse technology & innovation
7. Reskill workers

1. Source: McKinsey Global Institute analysis

**Action in seven areas can boost sector productivity by 50–60%**

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AVEVA Addresses 6 out of the 7 EPC 4.0 Opportunities

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<th>MANAGE</th>
<th>SIMULATE</th>
<th>ENGINEER</th>
<th>DESIGN</th>
<th>EXECUTE</th>
<th>LEARN</th>
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<tr>
<td></td>
<td>AVEVA 3D Visualization</td>
<td>AVEVA Information Management</td>
<td>AVEVA Standards Manager</td>
<td>Project Lifecycle Management</td>
<td>AVEVA Unified Project Management</td>
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- Promote Return on Capital
- Improve Return on Capital
- Improve Project Execution
- Project Execution
- Project Cost Control
- Commissioning

- Reduces Project Execution Risk by 15%
- Win more and improve Margin by 50%
- AVEVA Unified Engineering
My Questions

Digital Technology

1. What are the top 1 or 2 Digital transformation initiatives you are driving to maximize performance in Capital Projects in your organization?

2. With the 3 major business processes of Capital Project execution: engineering, procurement and construction, where do you feel digitalization can provide the most value and why? Everyone.

   1. What is the value of modernizing engineering and design as part of a digital transformation and acceleration program?
   2. What are the value opportunities to digitize project delivery within procurement, fabrication and onsite execution functions?
   3. What is the importance of unification and seamless information transfer across the capital project lifecycle to operations?

3. What sort of ROI would you expect from a digital transformation program?

4. How do you measure success of your digital transformation initiatives?
My Questions

Digital People and Business Processes

• What do you think is the biggest bottleneck to your digital transformation journey in capital projects: your people or business processes?

• How do you encourage people to rethink ‘how’ it could be done?

• How do you prevent your staff from suffering change fatigue?