Advanced Work Packaging & 4D Planning: Implementation Learnings

Rolando Garcia, Brad Reece, John Hufnagel, Dave Kafer

Presented: Sept. 9, 2021
Advanced Work Packaging & 4D Planning: Implementation Learnings

Facilitator
Dave Kafer
Global Project Delivery Director
Dow Inc.

Panel Members
Rolando Garcia
Project Implementation Manager
ExxonMobil

Brad Reece
Vice President Project Planning & Execution
Zachry Group

John Hufnagel
Senior Construction Manager
Dow Inc.
Introduction - The Case For Change

We are seeing change... but there’s still so much untapped potential!

<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>% of revenue spent on R&amp;D</td>
<td>% 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

Source: McKinsey & Company
Multiple Levers to Maximize Benefit

Technology is the most promising lever for productivity improvement

<table>
<thead>
<tr>
<th>Productivity challenge can be solved by using all seven levers</th>
<th>Impact on productivity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulation Enabler</td>
<td>8-9%</td>
</tr>
<tr>
<td>Design and engineering</td>
<td>8-10%</td>
</tr>
<tr>
<td>On-site execution</td>
<td>6-10%</td>
</tr>
<tr>
<td>Collaboration &amp; contracting</td>
<td>8-9%</td>
</tr>
<tr>
<td>Procurement and supply-chain management</td>
<td>7-8%</td>
</tr>
<tr>
<td>Capability building</td>
<td>5-7%</td>
</tr>
</tbody>
</table>

Source: McKinsey & Company
AWP Journey: ExxonMobil Center of Excellence

Mission
Advantage project teams through adoption of Advanced Work Packaging

Achieve improved safety, cost, schedule, and quality performance

Contracting language, knowledge, and tools for effective implementation

SME support for planning, implementation, and performance measurement

Education

Industry

Advisory

Process

Assessment
AWP Journey: ExxonMobil BCEP Case Study

Key AWP success factors & challenges. . .

*Early involvement* by experienced construction professionals

Plant layout optimized for logistics and *constructability*

*Pathway of construction* established before start of detailed engineering

*Data integration* between engineering, procurement, and construction

Results. . .

+25% “Time on Tools” improvement

+30% Productivity gain on steel installation

+30% Overall productivity—to-date vs. recent USGC experience

First... A strong commitment to full Deployment of *Advanced Work Packaging*

And second... Instituting a *Strong Planning Culture* across the venture
Dow AWP & Integrated Materials Management (IMM) Strategy

**Metrics**
- Time on Tools Improvement
- FCO Reduction

**People & Teams**
- AWP Workface Planning
- Integrated Materials Management

**Tools**
- 4D Construction Modelling
- Materials Management ERP & Reporting

**Work Processes**
- Dashboards
- Contract Language Updated
- Work Process Integration
- Training

**Project Execution & Integration**
- >30 Projects Engaged w Strategy
- Engagement Criteria Implemented
- Pathway of Construction Planning in FEL
- Constructability and Optimization
Zachry- 4D Planning

What It Is

● The use of the term 4D is intended to refer to the fourth dimension, *Time*

● 4D = 3D + Timed Schedule

How It Works

● 4D takes the schedule information (tasks, dates & logic), and connects them to items from the model so that individual items appear over time.

● 3D Model + Time (Project Schedule) = 4D *Simulation*
Why Use 4D

- Visual representation of the schedule.

- Identify potential issues ahead of construction start dates
  - Misalignment with schedule
  - Potentially re-prioritize tasks
  - Close proximity of workforce (construction footprint)
  - Equipment access (crane locations, SPMT delivery)
4D of CWP packages
4D of CWP packages

2021-MME Schedule

Export Date: April 30, 2021
4D of IWP Packages
Benefits & Challenges of Using 4D

- Improved **SAFETY!!!**
- Improved team collaboration
- Improvements in schedule accuracy
  - Clear schedule architecture that aligns with the work execution strategy
- Improved productivity, reduced wait time
- Improved visibility and predictability
- Reduction in ‘urgent’ requests
- Challenges: People, Processes & Tools
Q&A