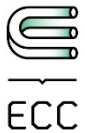


53rd Annual ECC Conference

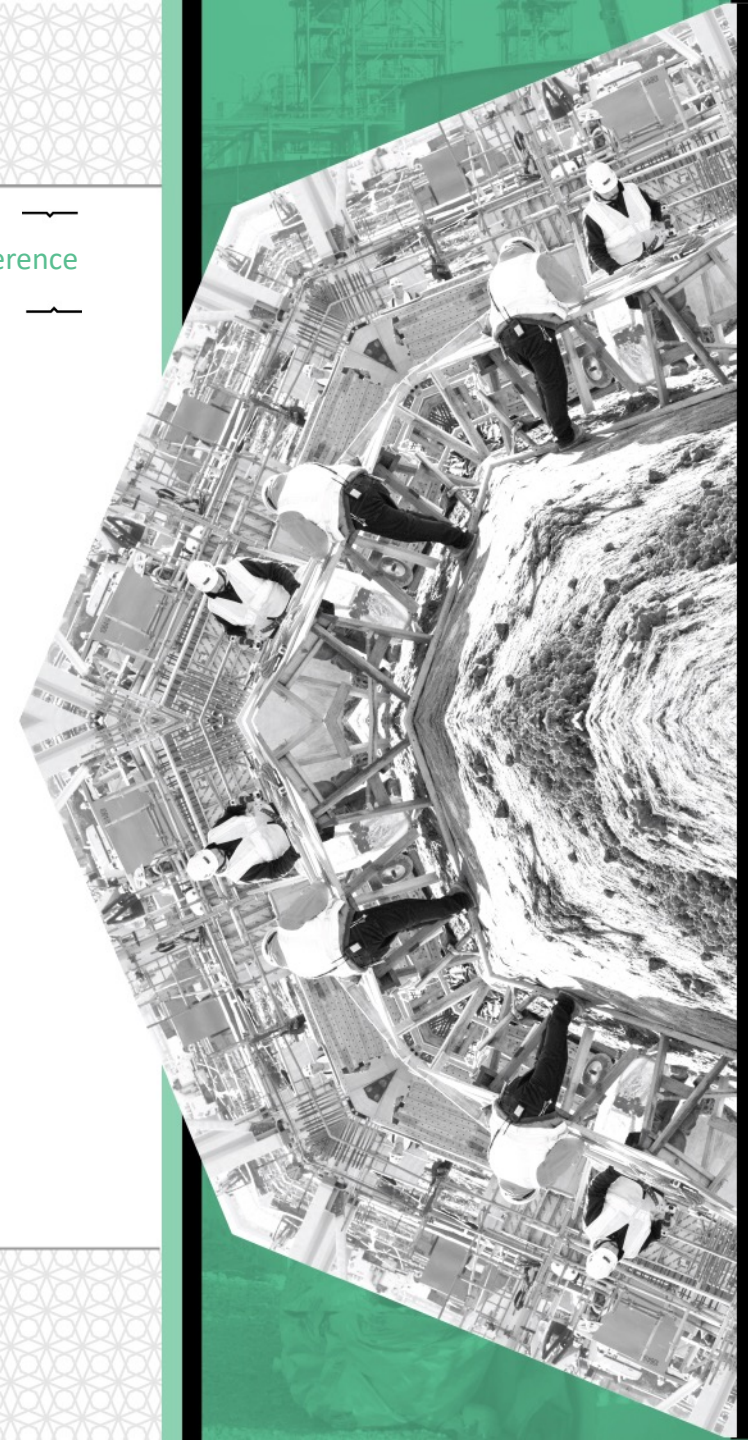
Advanced Work Packaging & 4D Planning: Implementation Learnings



Team Members:

**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!

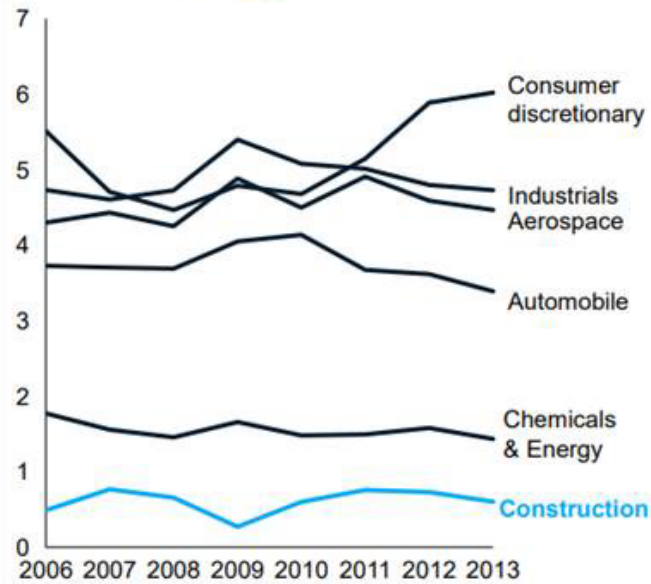
Level of digitization

MGI industry digitization index,
2015 or latest available data



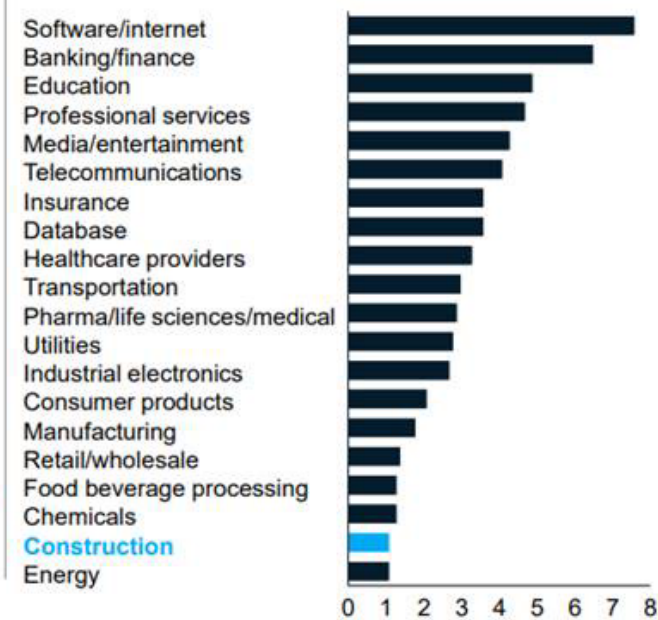
R&D investment

% of revenue spent on R&D



IT spending

% of revenue spent on IT



1. Based on data of top 20 E&C companies by market value Globally 2 Top 20 companies by market value

Source: Capital IQ, Gartner IT key metrics data 2012

McKinsey & Company 7

Source: McKinsey & Company

Multiple Levers to Maximize Benefit

Technology is the most promising lever for productivity improvement

Productivity challenge can be solved by using all seven levers¹

Impact on productivity² (%)



Regulation
Enabler



Collaboration & contracting
8-9%



Design and engineering
8-10%



Procurement and supply-chain management
7-8%



On-site execution
6-10%



Capability building
5-7%

1. The impact numbers have been scaled down from a best case project number to reflect current levels of adoption and applicability across projects, based on respondents to the MGI Construction Productivity Survey who responded "agree" or "strongly agree" to the questions around implementation of the solutions.
2. Range reflects expected difference in impact between emerging and developed markets.

Source: McKinsey Global Institute analysis | Reinventing Construction: A Route to Higher Productivity



Technology
14-15%



McKinsey & Company 6

Source: McKinsey & Company

AWP Journey: ExxonMobil Center of Excellence

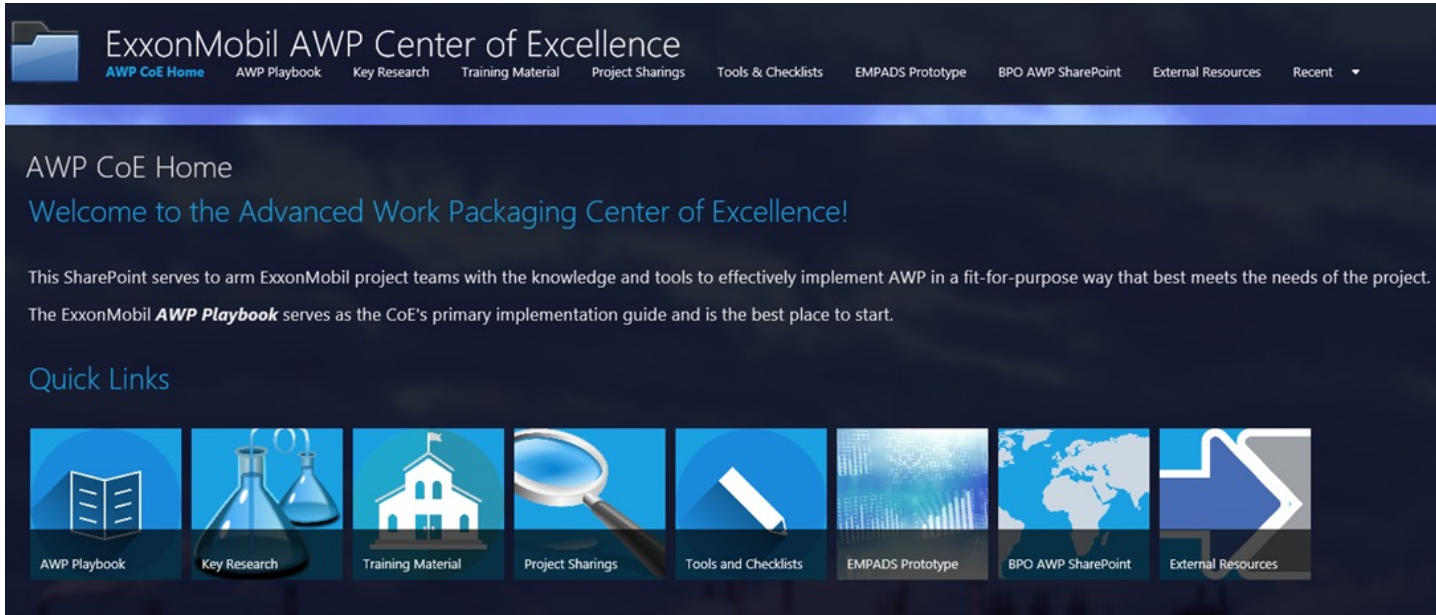
Mission

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

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

And second... Instituting a *Strong Planning Culture* across the venture

Results. . .

+25% “Time on Tools” improvement

+30% Productivity gain on steel installation

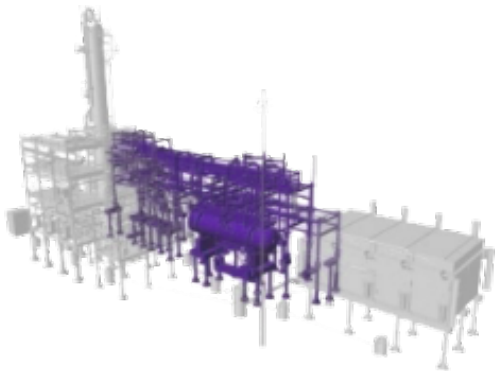
+30% Overall productivity–to-date vs. recent USGC experience



Dow AWP & Integrated Materials Management (IMM) Strategy

Project Execution & Integration

- >30 Projects Engaged w Strategy
- Engagement Criteria Implemented
- Pathway of Construction Planning in FEL
- Constructability and Optimization

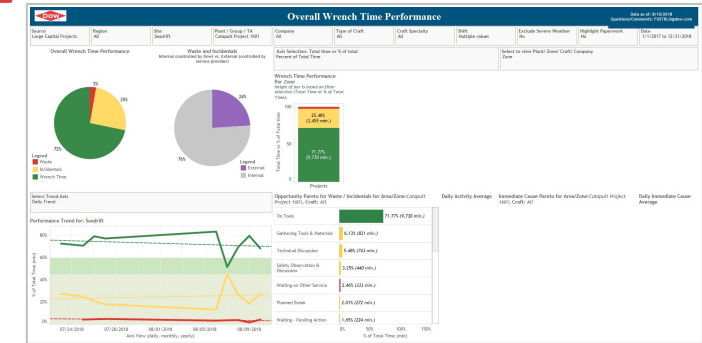


Tools

- 4D Construction Modelling
- Materials Management ERP & Reporting

Metrics

- Time on Tools Improvement
- FCO Reduction

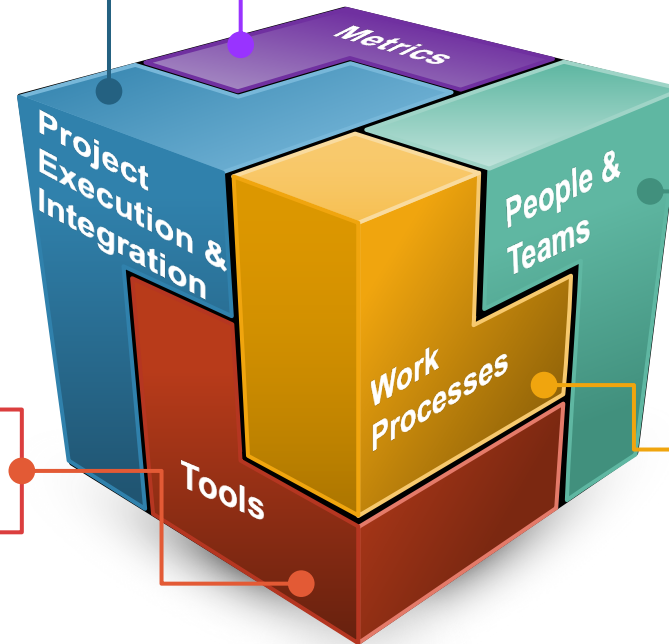


People & Teams

- AWP Workforce Planning
- Integrated Materials Management

Work Processes

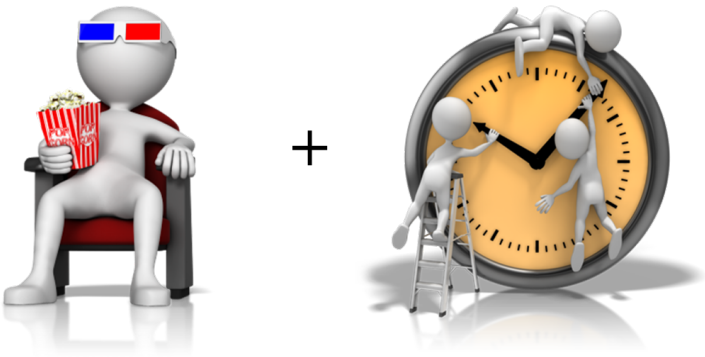
- Dashboards
- Contract Language Updated
- Work Process Integration
- Training



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



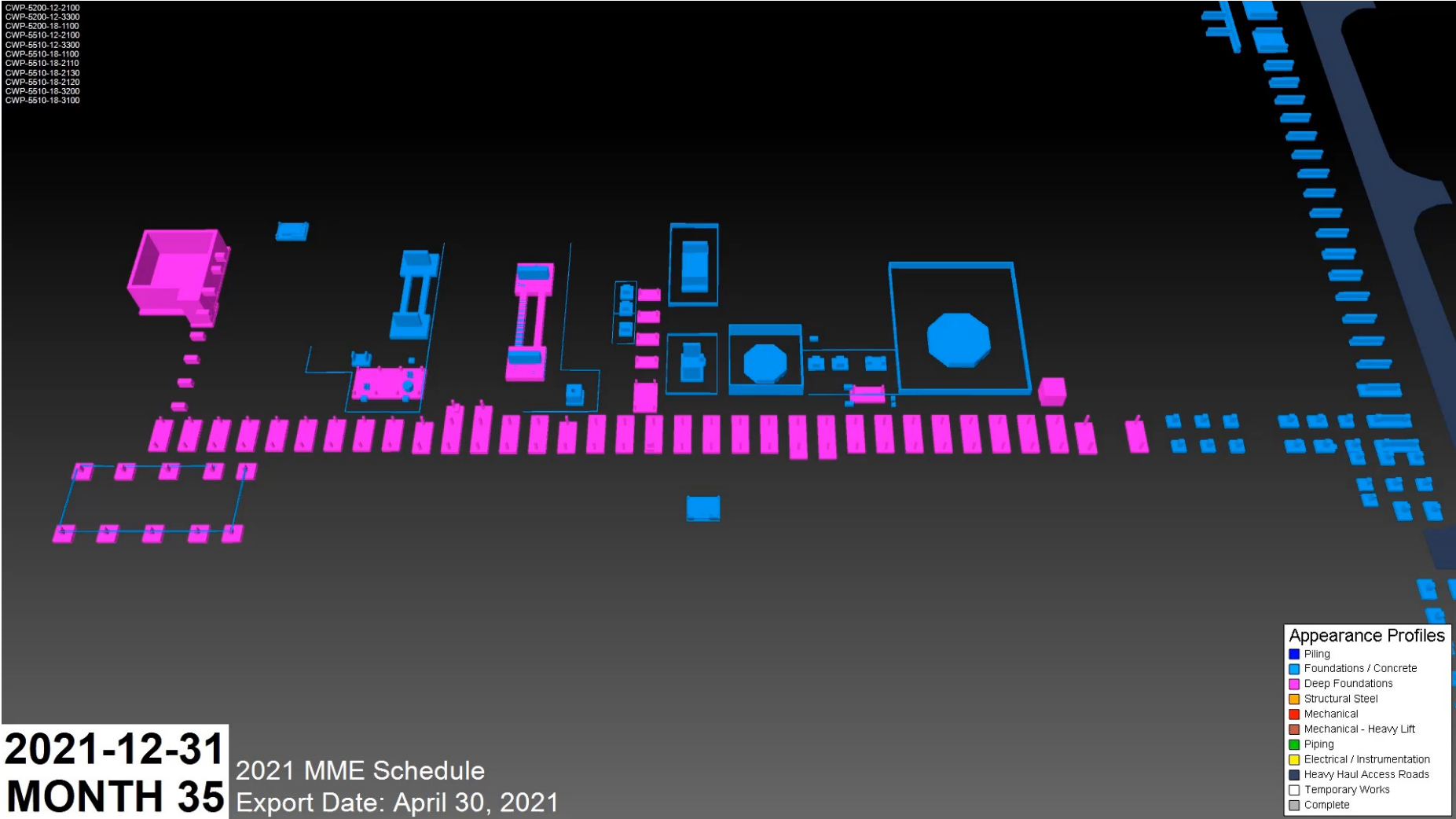
How It Works

- 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**

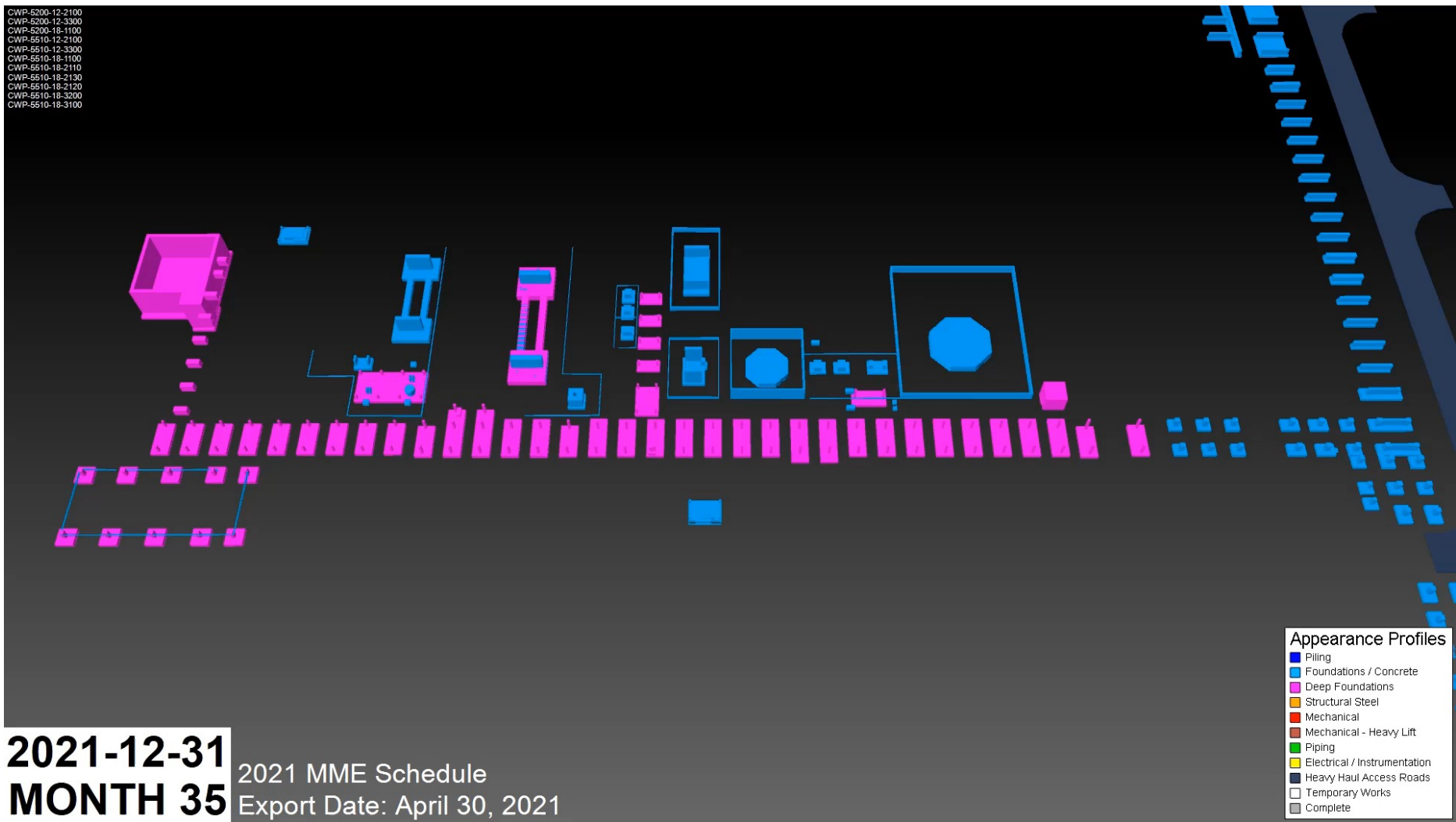
Why Use 4D

- 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)

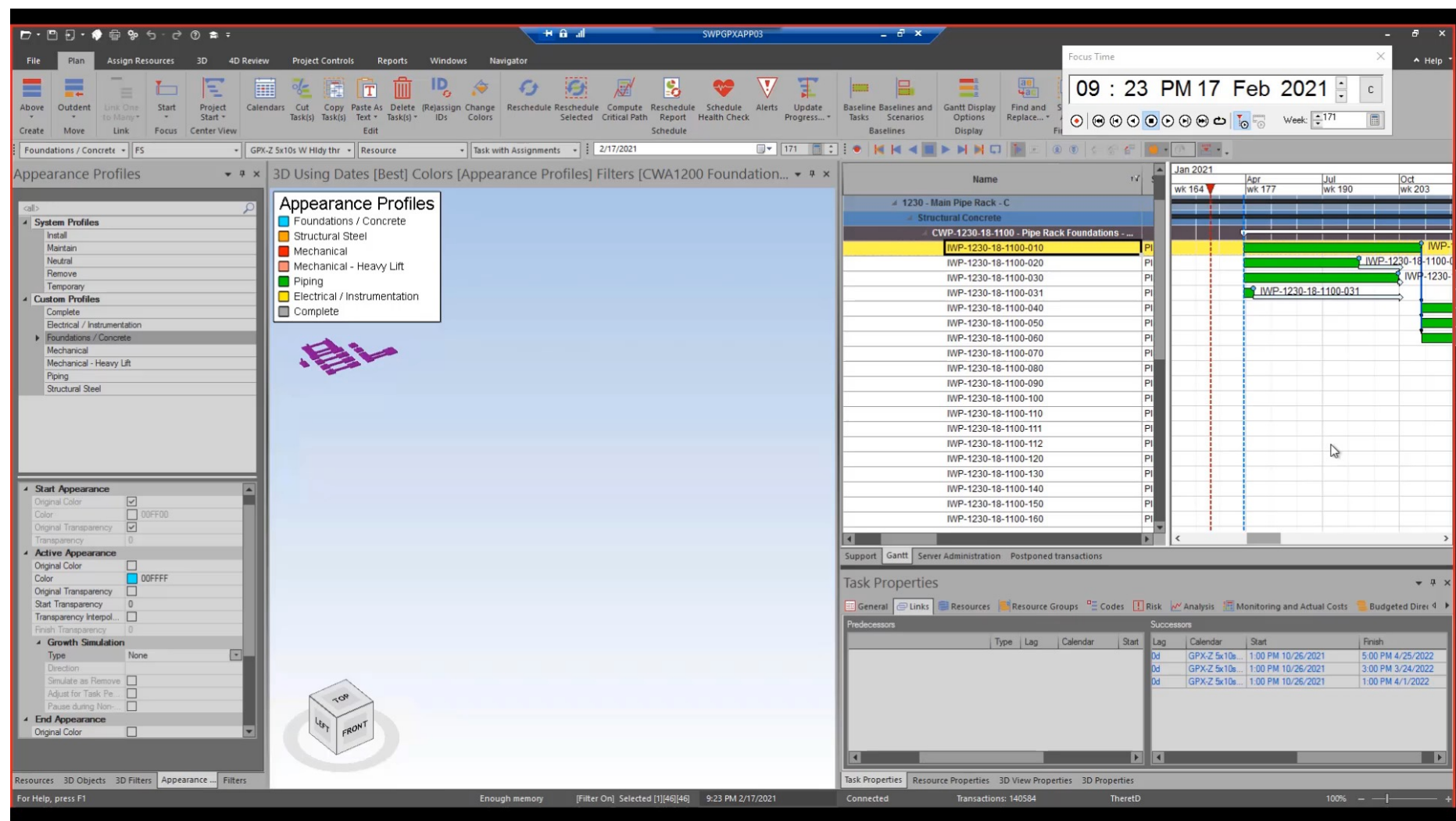
4D of CWP packages



4D of CWP packages



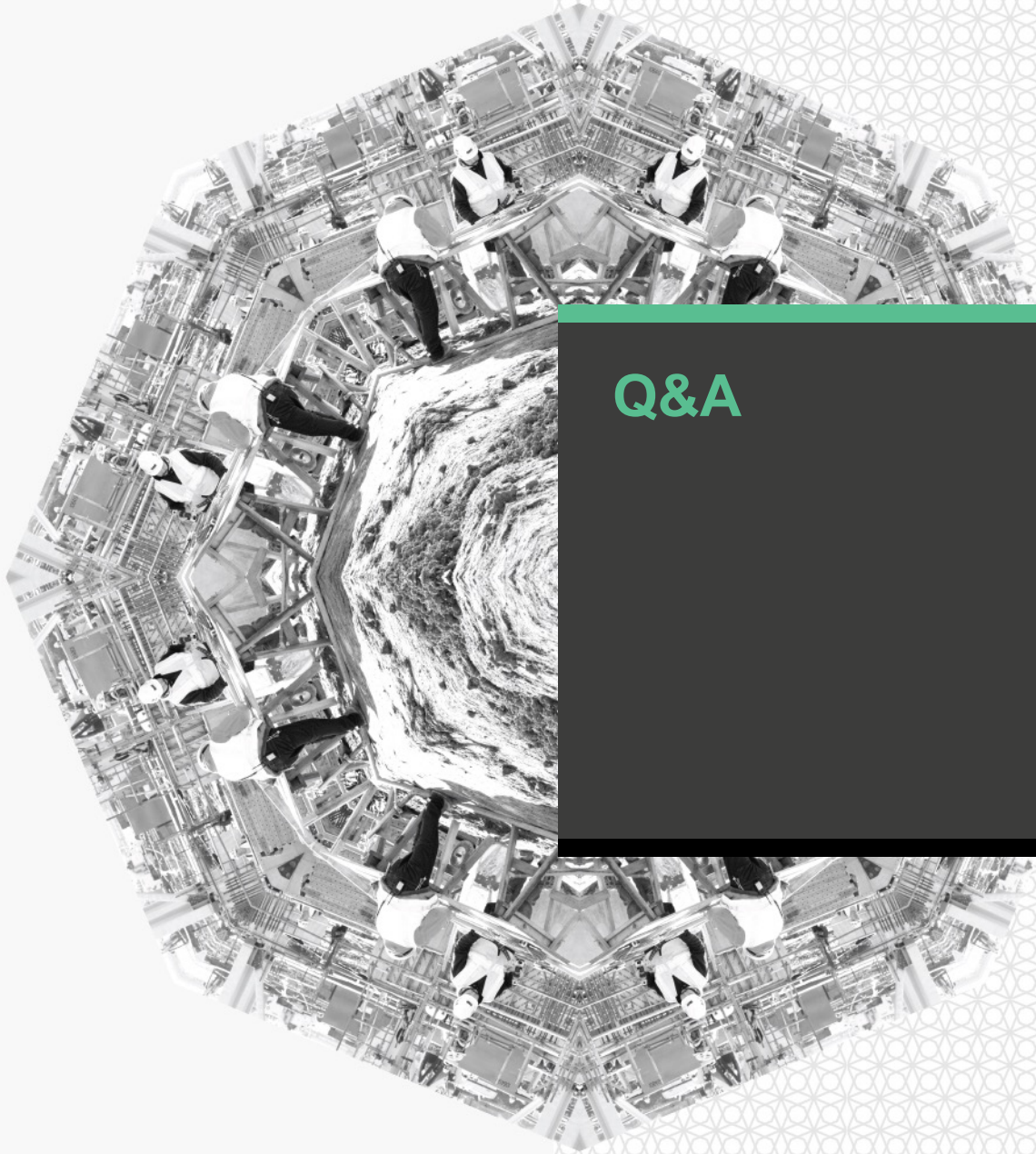
4D of IWP Packages



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