Project Control for Owner Project Portfolios

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Agenda

- Introduction
- Background
- The Impacts on Project Controls
- The impact of Advanced Work Packaging (AWP) on Project Controls
- Where Does the Industry Go from Here? The Next Steps

Biography: Stephen (Steve) Cabano, FAACE

Title: President, Pathfinder, LLC

Degrees: BS - Mechanical Engineering, **Villanova University**

Years of Experience/Professional Field: 30+ years direct project management experience for owner & government clients in the Petroleum, Petrochemical, Chemical, Environmental, Power, Pharmaceutical, Food & Beverage, Mining, Renewables, Industrial and Commercial industries. Initial career activity included 7 years with Naval Facilities Engineering Command Northern Division (NAVFAC). As Project Manager/team member has been responsible for costs, planning, scheduling, procurement, and similar project-related services with Pathfinder LLC for over 35 years.

Professional affiliation memberships/awards include:

- Association for the Advancement of Cost Engineering International (AACEI ®) - recipient of 2016 O.T. Zimmerman Founder's Award, 2021 Brian D. Dunfield Education Service Award and approved as **2023 Fellow**
- Project Management Institute (PMI)
- Construction Industry Institute (CII) & former Board of Advisors Chair and recipient of the CII 2020 Distinguished Service Award and 2021 Richard L. Tucker Leadership & Service Award
- 2004-2012 Engineering & Construction Contracting (ECC) Association Board Member, 2006-2007 ECC Board Chair
- American Institute Chemical Engineering (AIChE)
- Society of Value Engineers (SAVE)

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Introduction

Introduction

- Perspective: Owner organizations in chemical/hydrocarbon process industry
  - ‘Small’ projects = capital spending of ~ $5M or less
  - ‘Medium‘ project = $5M - $100M
  - ‘Large’ project = $100M - $1B
  - ‘Mega’ projects = over $1B
- Effective Project Controls has huge value keeping large projects on track to achieve cost/schedule objectives
- Many project managers think large project tools/techniques are overkill in multiple small project environment

Background

Background

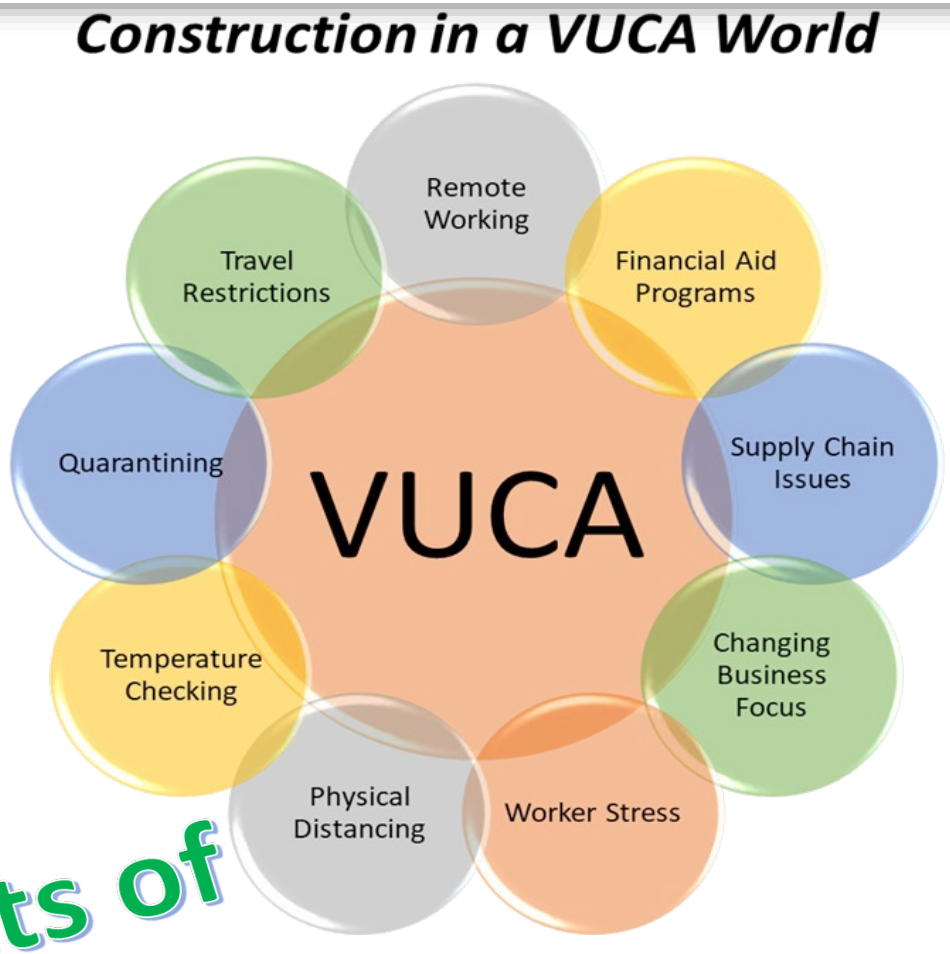
PC environment for small projects

- Site-based staff collected project status data & updated systems developed for site-based environments
  - Successful if resources were experienced & tools maintained
- Limited analysis of data & communication of deviations and recommendations
- Takes weeks to compile (from various independent systems)
  - Snapshot was 3 - 4 weeks old when published – not best approach

Background

PC environment for small projects

- Early 2020: Increased capital project funding predicted - due to next wave of US petrochemical projects
  - Shortage of engineering/construction resources continues
  - Materials/equipment already seeing price increases/delivery delays (Pre-pandemic)
- **Pandemic hit - World in turmoil!**
- Post Pandemic resulted in continued resource issues and growth in all size projects



Impacts of Carbon!

Background

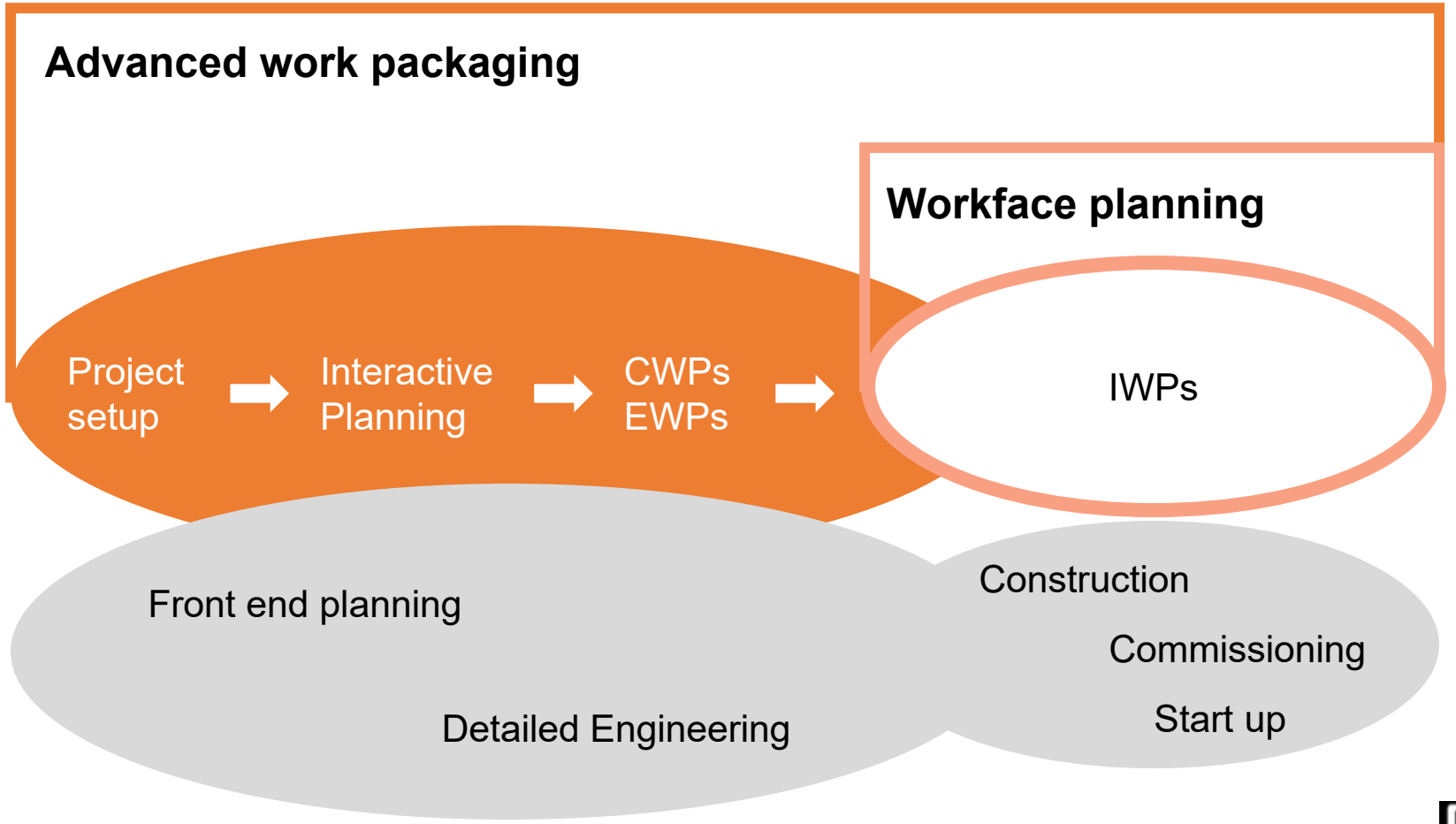
PC environment of the future

- Projects in planning/new initiatives - plastic recycling, renewable energy, all colors of hydrogen, carbon reduction & capture, etc.
  - But trend is to drive profitability across existing operating facilities
- Advancements in projects planning/delivery across EPC & commissioning/start-up process
- Advanced Work Packaging (AWP) - stronger link between engineering and construction practices
  - With focus on ‘construction driven engineering’

Background

What is Advanced Work Packaging?

Work planning that emphasizes construction requirements



Background

PC environment of the future

- Commit to digitizing various packages for better baseline setting
  - Modifying the planning/execution of projects has implications on how they are controlled
- Digital Performance Management (DPM) will have larger role in monitoring/managing projects through execution
  - Digital twin technology
  - 4D and 5D design systems (tying schedule & risk to traditional 3D models)
  - Use of robotics and drones for quantity surveying support
  - Etc. (more to come on this)

The Impacts on Project Controls

The Impacts on Project Controls

- Obvious that Project Controls of past 50 years will be different in next 20 years
  - How will remote work force be addressed?
  - How will existing/developing technology be utilized?
  - Will PC resource skill set requirements change in this ‘new normal’ world?
- What has changed?
  - Tools and systems are more robust/quicker to process data & produce reports

The Impacts on Project Controls

The Approach Across all Project Sizes

Means and Methods to Improve Small Cap & Turnaround Performance

- 'Bundling' small projects in process unit/area
- Consolidate implementation of estimating, planning, and execution similar to lean manufacturing
  - i.e., Construction/maintenance crews can be more productive by moving from one job area to next/performing repetitive tasks

The Impacts on Project Controls

The Approach Across all Project Sizes

Means and Methods to Improve Small Cap & Turnaround Performance

- Standardizing procedures, techniques, and tools is key
  - Simplified templates/procedures developed or modified from large project applications
  - Promotes learning curve for those unfamiliar with PM & PC roles

The Impacts on Project Controls

The Approach Across all Project Sizes

Issues Across all Project Sizes

- Many PC engineers are good with numbers, analysis, trending, forecasting, etc.
  - Lack good communication skills - causes rifts between PC resource & project team
- PC must provide data & analysis (good/bad) in a constructive way
  - Emphasize what is going well - target opportunities to correct deviations
  - PC needs to communicate this in a healthy, positive, constructive environment: provide options for how to bring project back on track in non-demeaning manner

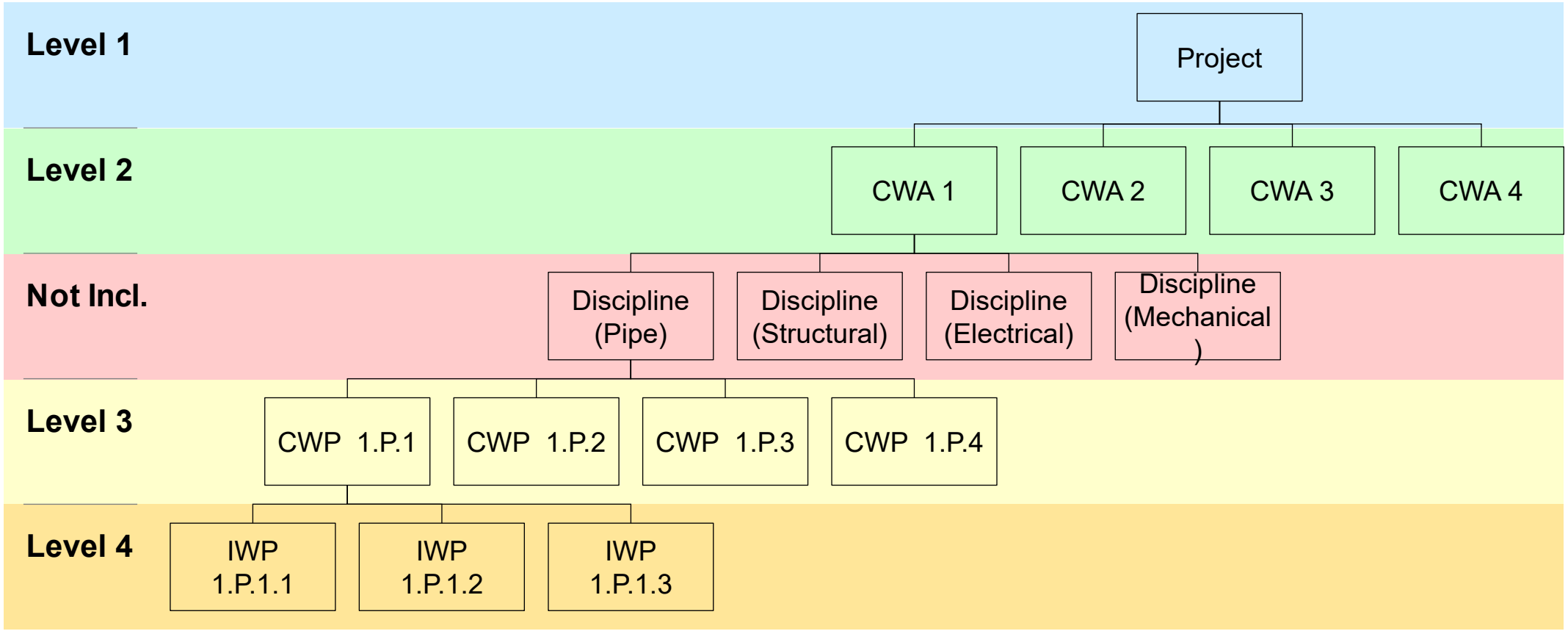
How will technology help in these issues?

Key Elements of Advanced Work Packaging

Focus on clearly defined and unrestrained Work Packages issued across the project team:

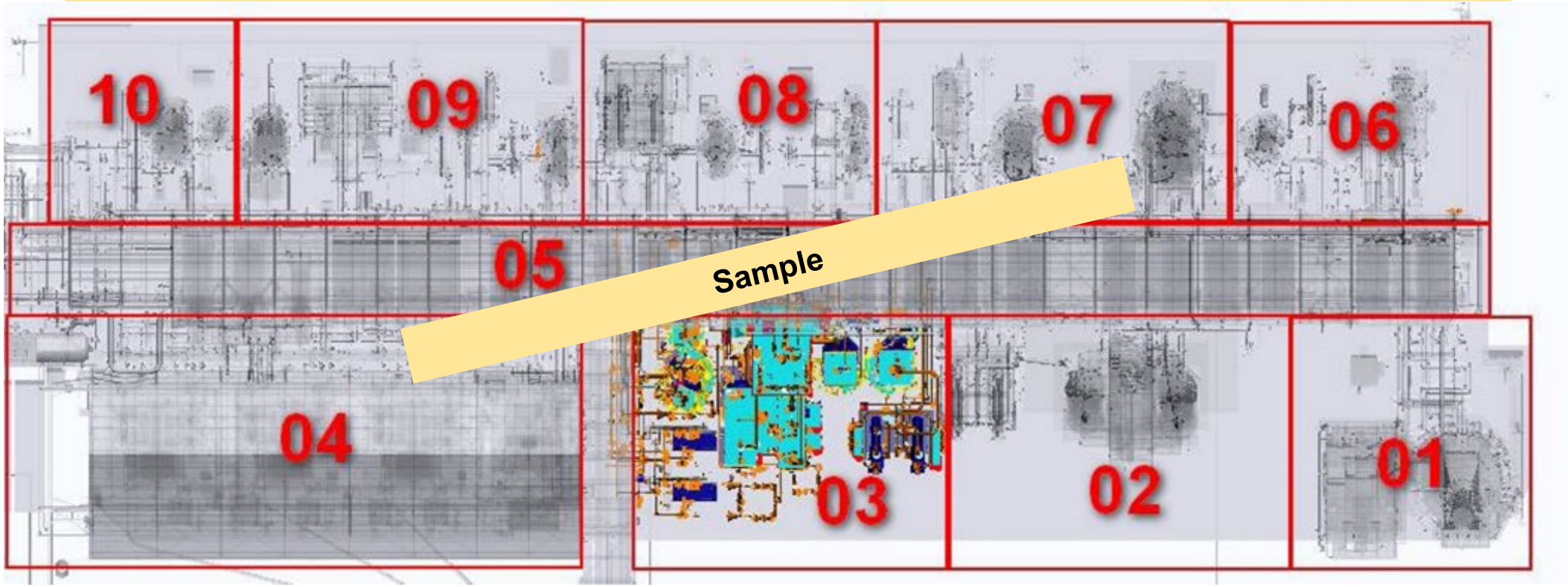
- Establish Construction Plan as basis engineering (construction driven engineering)
- Develop coding structure that carries WBS to AWP level
- Use work packaging for estimating, scheduling, cost control, etc.
- Execute Engineering and Procurement in accordance with package-based priorities
- Facilitate process for clearing work package constraints
- Track progress and productivity by Work Package

Work Breakdown Structure

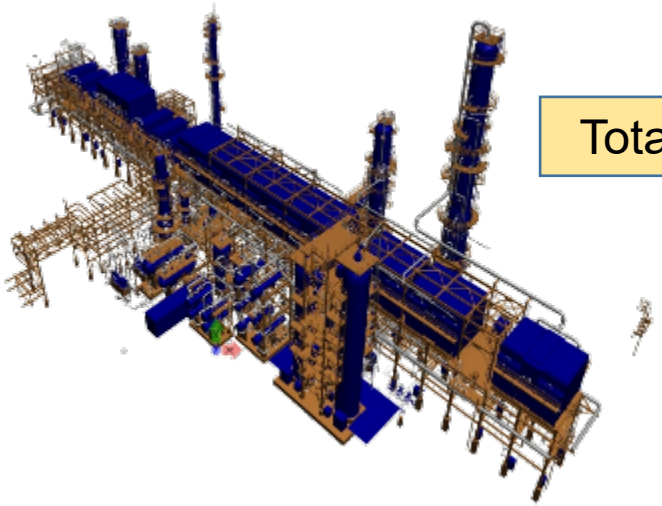


Critical First Step - Defining the Path of Construction (POC)

What is the optimum sequence for Construction

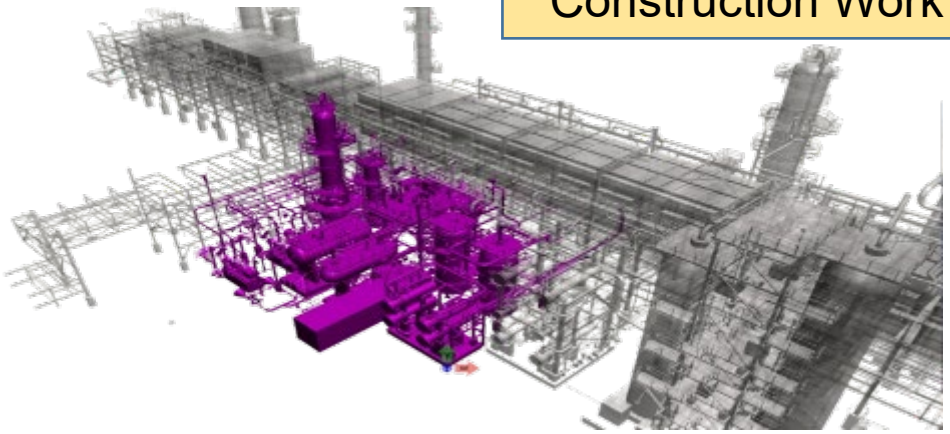


Modeling is a Key Tool in AWP

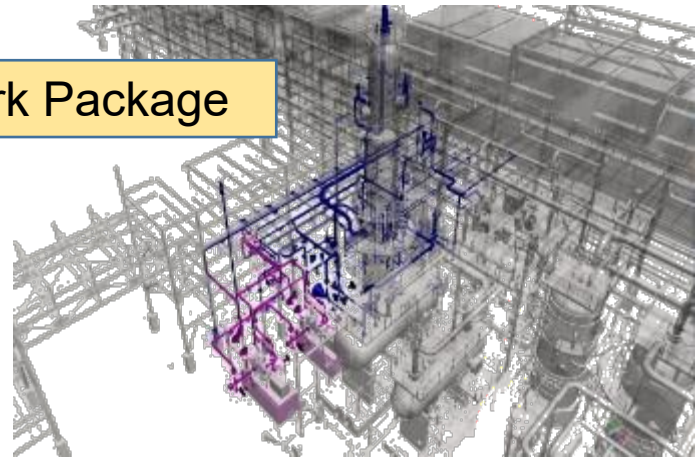


Total Project

Construction Work Package



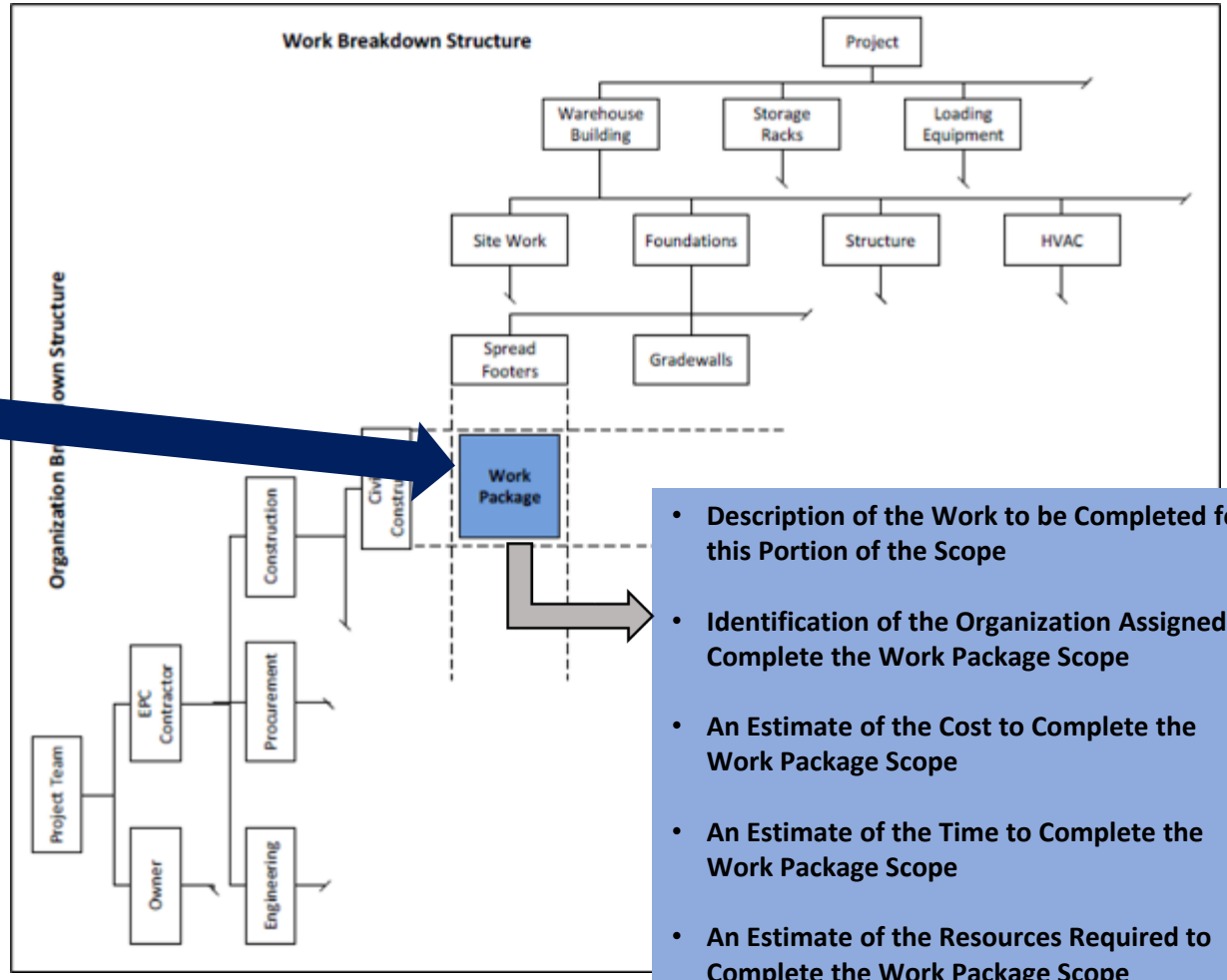
Engineering Work Package



Installation Package

Scope Definition: What is Advanced Work Packaging?

AWP uses Modeling technology to provide work package visualization and project control "PLANNED vs ACTUAL"



- Description of the Work to be Completed for this Portion of the Scope
- Identification of the Organization Assigned to Complete the Work Package Scope
- An Estimate of the Cost to Complete the Work Package Scope
- An Estimate of the Time to Complete the Work Package Scope
- An Estimate of the Resources Required to Complete the Work Package Scope

Project Control Benefits

Digital Tracking…

- Graphically represents vast amounts of data
- Allows for better real-time analytics
- Allows user to focus on a very particular piece of information
  - Ability to call up any component & drill down to the level needed
- Reduces need for multiple spreadsheets, multiple conversations, etc.
- Improves quality of decision making
- Improves speed of decision making
- Multiple apps readily available off the shelf

Progress & Status

PIPING PROGRESS for instance. 3D Progress Viewer can be controlled by Progress Tab Controller. It shows you current progress & status with important summary data and sends user action to 3D Viewer.

3D Viewer

OVERALL for instance. 3D Viewer is main function of the Web-Based 3D Progress Viewer to show you the current status filtered by Progress Tab Controller and other filtering options. It provides:

- Real-Time interworked progress and status
- Filtering Options to search the target object(s)
- ROTATE, ZOOM IN/OUT, and Touch-Screen Control

Example from Jin Graphics Systems

Success in AWP

- Programmatic AWP is a journey - establish an integration tool & core team to build upon
- It's all about the data for predictable outcomes
- 1-2% of the TIC to get an 8-10% reduction?! Takes a leap of faith; but is now measurable
- Invest the contingency in AWP and digital project delivery; proactive risk mitigation and Project Control
- Top-down commitment, bottom-up buy-in, contracts, education, measurement, tie to $/incentives
- It takes a disciplined, agile and continuous improvement approach

Other Project Control Initiatives

- Modularization/Pre-assembly/Pre-fabrication
- 4D, 5D, 6D modeling and control
- Digital Twins
- Artificial Intelligence (AI)
- Machine Learning (ML)
- Data Mining
- 3D Printing
- Robotics

Where Does the Industry Go from Here? The Next Steps

Where Does the Industry Go from Here? The Next Steps

- Understand your capital portfolio
- Recognize your Project Control resource constraints
- Develop a plan to close the Project Control gaps
- Select the appropriate digital approach that can grow with your organization
- Assure appropriate interface with your contractors
- Training of personnel necessary to support the plan
  - Basic training in proven methods & software packages
  - Assure contractors are aligned with approach and skilled in selected technology
  - Don’t underestimate need for project communication and other soft skills training
- Don’t forget about Carbon!

Where Does the Industry Go from Here? The Next Steps

- Use technology as a partner
- Key is reliance on intelligent software & distillation of data into meaningful information that users can interpret
  - Apply Artificial Intelligence (AI), Machine Learning (ML), data mining, as appropriate
    - Use your contractors' skills
    - Have vendors demonstrate capabilities 'live' prior to selection
    - Must understand data inputs needed to optimize use of AI and ML

Where Does the Industry Go from Here? The Next Steps

- Integrated contracting strategies/collaborative contracting
- Shared risk reward
- Effective option - partnership with third-party organizations specializing in project planning/control

Questions?
Comments?

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