



CII COMMUNITY FOR BUSINESS ADVANCEMENT

# AWP EDUCATION PRIMER

# Purpose Statement

This resource should be used as a primer to educate organizations on the definition, function, components, benefits, and use cases for Advanced Work Packaging (AWP).

The information contained in this resource is introductory, and can be shared with teams that have zero to little education in AWP.

Additional resources beyond the data here can be accessed on [CII's website](#).

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# What is Advanced Work Packaging?

## Definition

The Construction Industry Institute (CII) defines AWP as “the overall process flow of all the detailed work packages (construction, engineering, and installation work packages). AWP is a planned, executable process that encompasses the work on an EPC project, beginning with the initial planning and continuing through detailed design and construction execution. AWP provides the framework for productive and progressive construction and presumes the existence of a construction execution plan.”

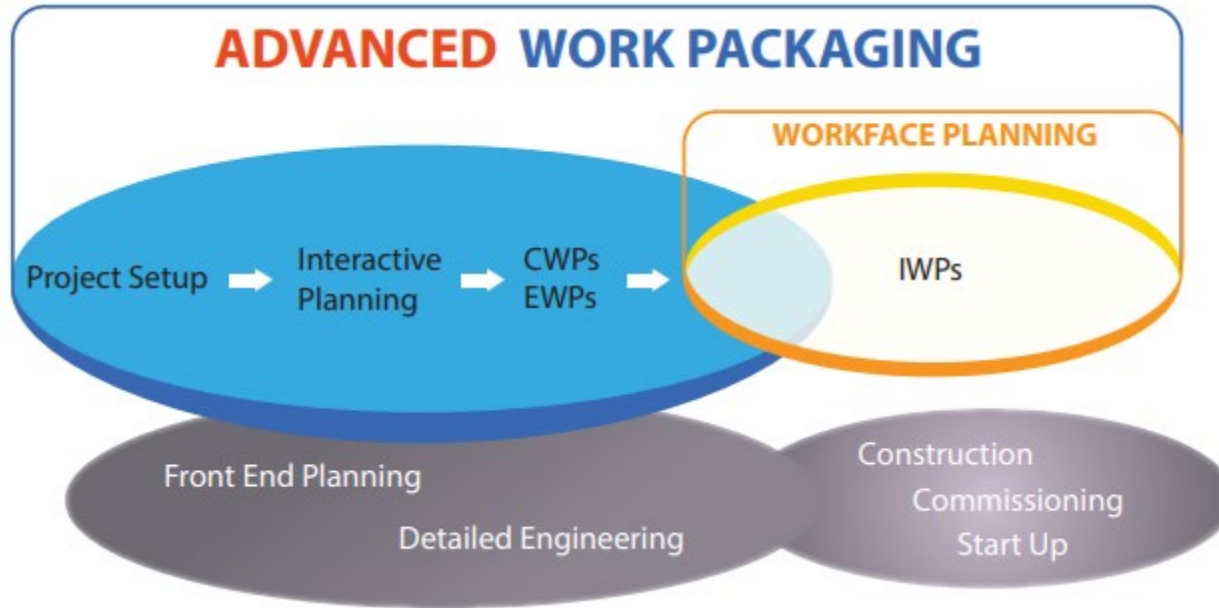


# But what IS it?

AWP is a project **delivery method** which flows from Front End Planning through Commissioning and aligns Engineering & Procurement deliverables with the Construction Sequence.

It's a disciplined approach to improving project delivery which provides a structure for **focused execution planning** and production control that is directed at the construction work front.

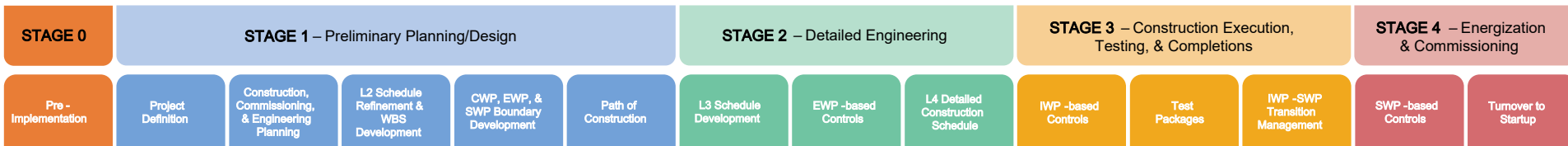
# ADVANCED WORK PACKAGING



ASSET LIFECYCLE INFORMATION MANAGEMENT

# ADVANCED WORK PACKAGING (AWP)

## Integrated Advanced Work Packaging Flow Chart





# AWP Maturity

Research demonstrated that increasing levels of Advanced Work Packaging maturity were associated with consistent improvements in each project performance dimension.

This pattern roughly describes an S-curve, with moderate performance improvement during the introduction phase, followed by fast-growing performance during the middle stage, after which comes continuous improvement, but at a slower rate, as the company becomes more mature in implementing the methodology



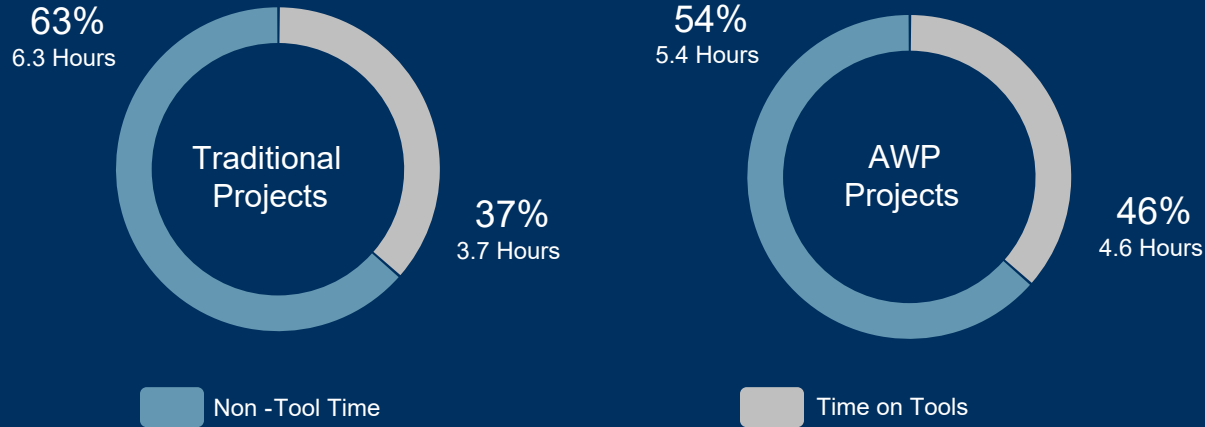
Source :

[RT319.1](#) *Transforming the Industry: Making the Case for AWP as a Standard Best Practice*

# Benefits & Value of AWP



# AWP Proven Results



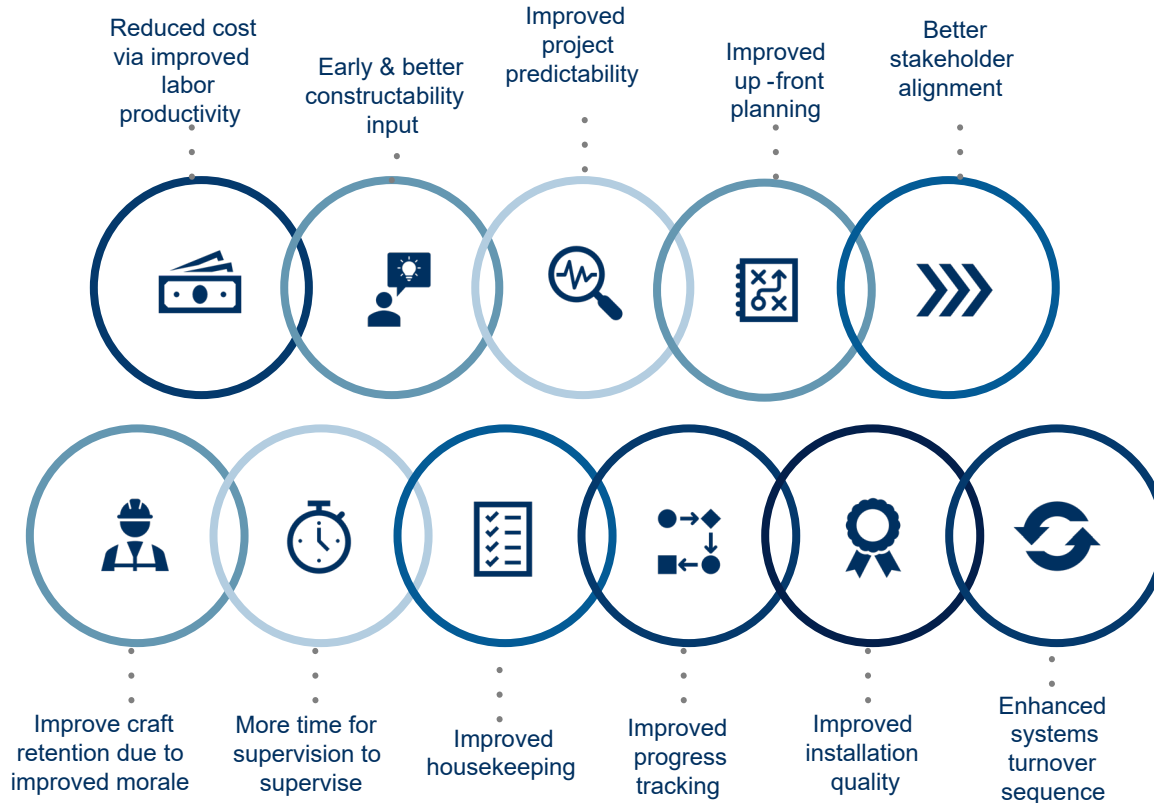
**↑ 25%** increase in productivity

**↓ 10%** reduction in TIC

**↑** increase in safety

*\*percentages are improvements over historical norms*

# Additional Benefits of AWP



“Even projects with low maturity of AWP implementation garner significant benefits.

At the same time, benefits increase as AWP implementation matures.”

Source: RT 319

# Origin & History of AWP



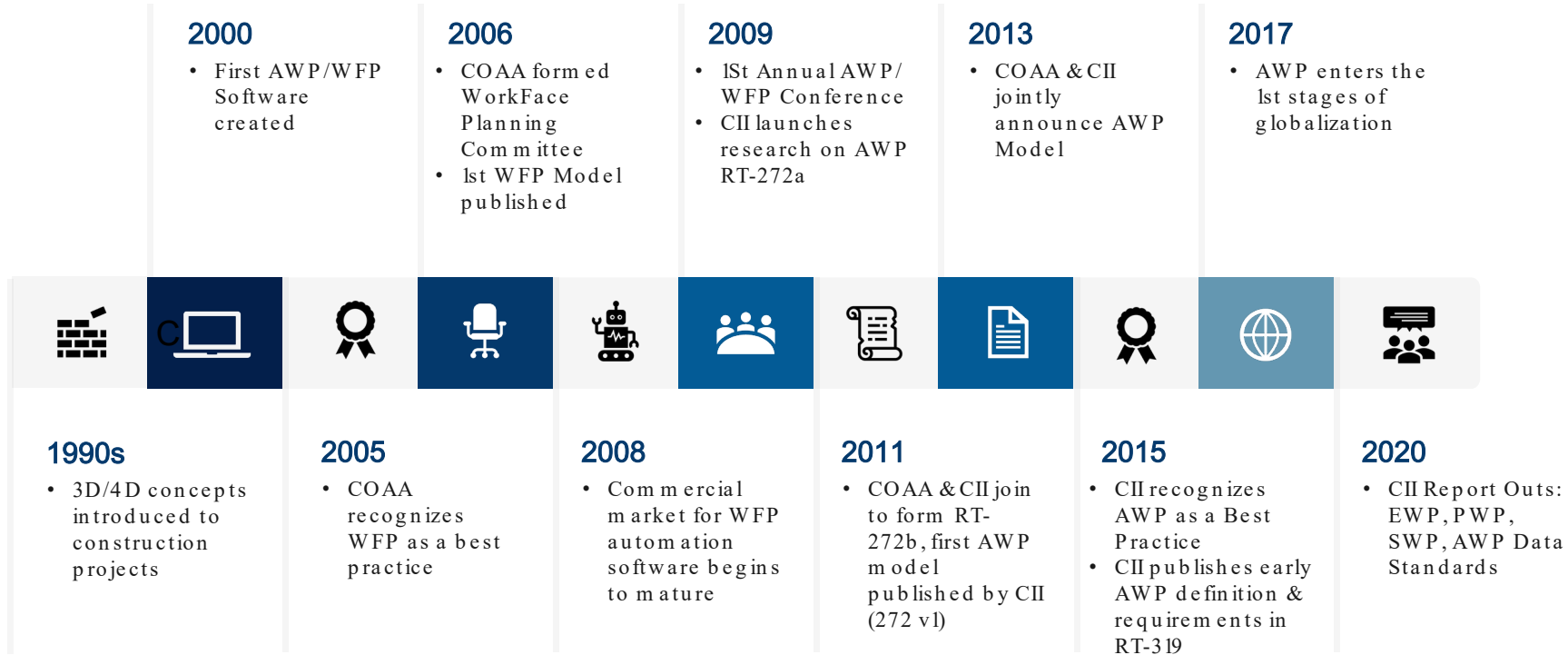


# Myth Busted!

**MYTH:** AWP is just a buzzword.

**FACT:** It works and has been used successfully on projects for a decade.

# Origin & History of AWP



# AWP by Project Phase





## Interactive Project Planning

### Stage I – Preliminary Planning / Design

Define :

CWAs

CWPs

EWPs

POC

### Stage II - Detailed Engineering

Created:

CWPs

EWPs

### Procurement

Optional:

PWPs

### Stage III – Construction Execution, Testing & Completions

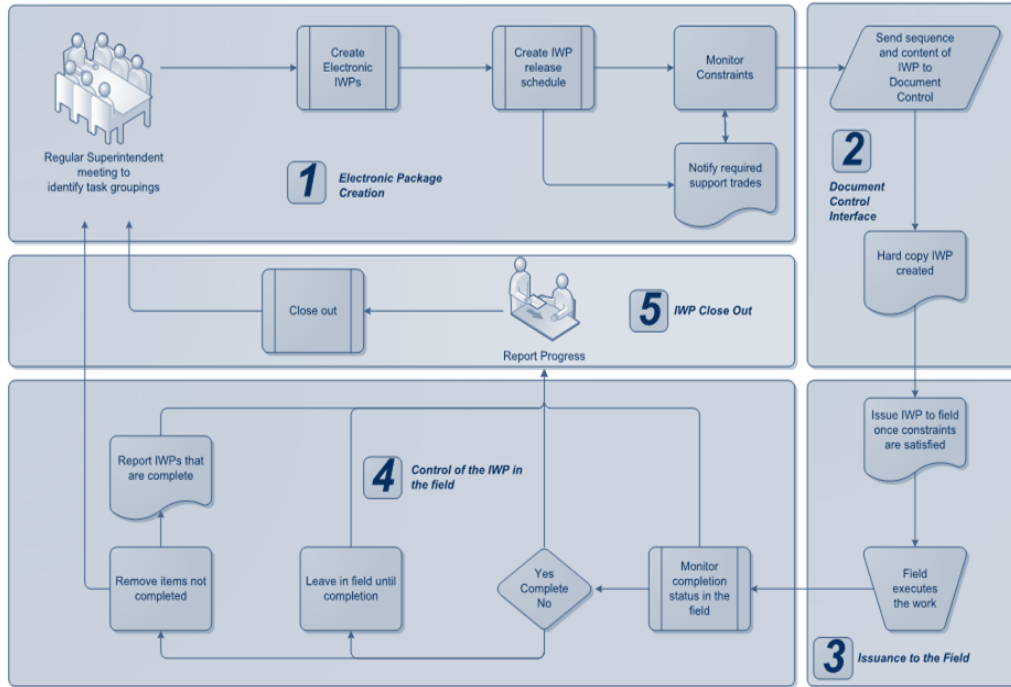
IWPs

### Stage IV – Energization & Commissioning

SWPs

CWA – Construction Work Area  
CWP – Construction Work Package  
POC – Path of Construction  
EWP – Engineering Work Package  
PWP – Procurement Work Package  
IWP – Installation Work Package  
SWP – System Work Package

# LIFECYCLE OF AN INSTALLATION WORK PACKAGE



SAMPLE LIFECYCLE  
OF AN INSTALLATION  
WORK PACKAGE

# Stage I – Preliminary Planning / Design

## Value of AWP

- Increase ENG Productivity by establishing an early Path of Construction (PoC)
- Increase Construction Productivity by establishing well -defined Construction Work Areas (CWAs)
- Ensure alignment on plan & methodology for using AWP & how it will impact the project

## Major Activities

- Alignment across stakeholders for AWP scope / WBS
- Define AWP data responsibility matrix & data mgmt. plan
- Develop preliminary AWP plan (key activities, milestones, etc.)
- Constraints definition & process for long lead items
- AWP Champion onboarded for EPC + Owner organizations
- Secure Construction representative to be involved in decisions
- Prep for Path of Construction meetings
- Begin incorporating AWP activities in Level 2 schedule
- Develop Engineering Work Package & Construction Work Package boundaries
- **Complete delineation of CWAs**
- Structure the project into an optimal sequence of CWP

## Example Deliverables

- AWP organization chart
- AWP project plan, goals & objectives
- Initial plot plan by CWA
- AWP RASCI Chart
- PoC meeting Terms of Reference
- CWA Index
- CWP Index

# Stage 2 – Detailed Engineering

## Value of AWP

- Set up project for effective EWP program
- Align stakeholders with PoC development
- Optimize ENG hours by establishing a framework that can reduce "wait" times
- Increase field Time -On-Tools by aligning project schedule with CWAs & Construction Work Packages (CWPS)

## Major Activities

- Identify long lead Procurement items by CWA
- Align Engineering Work Packages (EWPs) with CWPs
- Hold Constructability reviews
- Hold Interactive Planning session for PoC development
- Build short list of contractors & subcontractors with knowledge of the Owner or EPC's AWP procedures
- Define PoC with Level 3 Schedule
- Set up effective EWP Execution Program
- Identify constraints against EWPs

## Example Deliverables

- Project estimation by CWP
- Vendor data review prioritization by CWP
- CWP release plan (fully developed with "clashes" identified)
- Asset lists encoded by CWP
- Initial EWPs release plan
- Constrained Path of Construction
- Level 3 loaded schedule

# Procurement in the Early Stages

## Value of AWP

- Optimize Procurement planning to align with the PoC, ensuring early alignment of critical equipment and material delivery for Construction

## Major Activities Preliminary Planning / Design

- Identify items best to purchase in FEP
- Sequence Procurement by EWP's & ROS dates
- Build out procurement tracking & reporting system to measure EP 30/60/90 & incorporate into weekly meetings

## Major Activities Detailed Engineering

- Organize purchase orders by CWP
- Complete Procurement Work Packages (PWP's) prior to the planned start date
- Develop a procurement Execution Plan that support the PoC
- Begin weekly procurement coordination with ENG & Construction

## Example Deliverables

- Vendor data requirements to support AWP (including update frequency standards)
- Defined PoC with Level 3 schedule & ROS dates for major equipment
- Level 3 Schedule in Early Stages

# Detailed Engineering

## Value of AWP

- Optimize ENG hours through identifying & removing EWP constraints
- Increase field Time -On -Tools by organizing, tracking & expediting the hand -off of ENG deliverables to Construction by CWP

## Major Activities

- EWPs have complete associations with CWPs, drawings, mechanical equipment, specifications, etc.
- Construction reviews CWPs & EWPs and how they support the project schedule
- Continue Constructability reviews
- Assign WP owners early to allow enough time for reviews & changes
- Begin regular CWP readiness review meetings & hold well in advance of CWP planned start date
- Conduct AWP maturity assessments: Early Works, civil, etc.

## Example Deliverables

- EWP release plan & EWPs delivered in accordance with that plan (in -sequence and on -time)
- Sequence Procurement by EWPs
- CWP Readiness Review Meeting Terms of Reference
- Complete list of EWP constraints

# Procurement in Detailed Engineering

## Value of AWP

- The direction of procurement efforts to support overall execution rather than just procurement goals.

## Major Activities

- Purchase of all Engineered Equipment
- Expedite Vendor Data by Engineering Need Date
- Expedite Deliveries by Field Need Dates
- Purchase all Fabrication in accordance with the Procurement Strategy – if any prior to Construction
- Purchase and Manage Long Lead Valves

## Example Deliverables

- Purchase of all Engineered Equipment
- Expedite Vendor Data by Engineering Need Date
- Expedite Deliveries by Field Need Dates
- Purchase all Fabrication in accordance with the Procurement Strategy – if any prior to Construction
- Purchase and Manage Long Lead Valves



# Stage 3 - Construction Execution, Testing & Completions

## Value of AWP

- Improve field safety & quality through enhanced planning and clear scopes
- Increase Time -On -Tools by improving the coordination of field constraints management & shared services across multiple Contractors
- Increase Time -On -Tools by debottlenecking constraints on Installation Work Packages (IWP)

## Major Activities

- Finalize IWPs release plan & schedule
- Determine how to manage & measure exceptions to releasing only IWPs to the field that are 100% constraint free
- Conduct final Constructability reviews
- Begin weekly constraint review meetings
- Conduct AWP maturity assessments: electrical, mechanical, pipe, steel, contractors, subcontractors, suppliers, etc.
- Bag and Tag by materials IWP
- Initiate Test Work Packages (TWPs)
- Complete TWPs, Punchout & Complete by System

## Example Deliverables

- Constraint review meeting Terms of Reference
- Owner & EPC IWP completion and status report (by week)
- Materials list by IWP
- Mechanical equipment associations list by CWP & IWP



# Procurement in Construction

## Value of AWP

- Increase field Time - On -Tools by ensuring all materials to support a CWP are delivered to construction before ROS date

## Major Activities

- Establish Field Procurement at Site: site support, tools, equipment, consumables, shorts, etc.
- Initiate materials management, warehouse & preventative maintenance efforts
- Purchase of all materials & fabrication in accordance with the Materials Responsibility Matrix
- Purchase fabrication in accordance with the Procurement strategy
- Expedite equipment, materials, & fabrication to support field need dates

## Example Deliverables

- Subcontractor Packages

# Stage 4 – Energization & Commissioning

## Value of AWP

- Increase field work efficiency by improving the transition from construction to CSU through clearer line of sight on sequencing of construction completion to support the CSU schedule
- Increase field Time -On -Tools through early, iterative input of Operations and Commissioning into the PoC & linkage of an optimal CSU sequencing
- Improved visibility of completions & Testing

## Major Activities

- Right -size the workhours required to execute each TOP (mechanical, instrument engineers, etc.)
- Associate Test Work Packages (TWPs) and TOPs to applicable CWAs, CWP, EWPs, & IWPs
- Conduct regular turnover execution readiness reviews
- Assign the TOP Owner at least 12 weeks prior to the planned start date
- Create Start -up Work Packages (SWPs)

## Example Deliverables

- TWP release plan by IWP
- TOP release plan by TWP
- Final, consolidated AWP Master Index

# Roles & Expectations



# Stakeholder Roles



# AWP Specific Roles

## Corporate AWP Manager

- Responsible for the development of AWP program across an organization
- Program development
- Procedure creation
- Staffing
- Education and promotion
- Determine technology needs
- Define data requirement needs

## EPC AWP Manager

- Responsible for implementation of AWP program on a project
- Project Execution
- Organizational Procedures
- Attending/Contributing to Project Management
- Collaborating
- Developing Training Plans
- Mentoring project stakeholders

## AWP Champion

- Project Specific
- Establishes project expectations
- Audits performance
- Detailed reporting
- Capturing lessons learned
- Ensure data requirements are met

# WorkFace Planning Specific Roles

## WorkFace Planning Lead

- Plans and oversees the development of Installation Work Packages
- Provides input on Construction Work Packages
- Selects and trains team members
- Performs quality checks
- Produces reports for management
- Mentors WorkFace Planners

## WorkFace Planner

- Produces work plans to more efficiently execute construction
- Completes Constructability analysis
- Handles RFIs
- Understands the Path of Construction
- Dissects Construction Work Packages into Installation Work Packages
- Handles Quantity take offs
- Maintains project database
- Identifies constraints
- Manages Installation Work Package Release Plans

# Stakeholder Deliverables Related to AWP

Optimized Preliminary Plot Plan	IPP Session - Schedule
Construction Work Areas	Work Packages
Defined Startup Priorities	Construction Execution Plan
Path of Construction (PoC)	-15 / 30% Estimate
Work Breakdown Structure & Work Packages	Commissioning & Validation Plan
Project Organizational Chart	Turnaround Requirements



# Work Package Types





# Types of Work Packages



## Construction Work Area (CWA)

A location specific, multi-disciplinary representation of process units, major areas throughout the construction site.



## Procurement Work Package\* (PWP)

A complete list of supplied material and equipment for an EWP/CWP. The scope of a PWP can be specific to an engineered piece of equipment or to a group of bulks supply. A PWP does not have to be a physical package —a PWP can also be a scheduling or tracking exercise. Must support the Path of Construction.

*\*Optional, some may consider this a process rather than a package*



## Construction Work Package (CWP)

Created by the key stakeholders in accordance with the Path of Construction. Serves as a proposal for executives to ensure the construction of a given project or production is well-planned out. The better Construction Work Packages are prepared, the better chance that the project will be accepted by a company. CWPs are subsets of CWAs. Prepared by discipline or craft.



## Engineering Work Package (EWP)

Engineering deliverable that is used to develop (CWP) Construction Work Packages and that defines a scope of work to support construction in the form of drawings, procurement deliverables, specifications, and vendor support. The EWP is released in an approved sequence that is consistent with the CWP schedule. The scope of work is typically both by discipline and by area. Prepared by discipline or craft.



## Installation Work Package (IWP)

Contains constraint free scope of work that allows trade to complete tasks independently for a specified time duration in a safe, predictable, measurable, and efficient manner. This includes supporting documents such as BOMs, tasks, and man-hour estimates to complete the task. IWPs are subsets of CWPs. Prepared by discipline or craft.



## System Work Package (TWP)

A deliverable that enables a commissioning work crew. An TWP should be scoped to be manageable and progressable and is typically scoped in a way that maps to existing commissioning zones, systems, subsystems, or subsystem components. The TWP should be mapped to predecessor IWPs to ensure the Path of Construction enables an efficient startup sequence.

## Construction Work Area (CWA)

Geographically Identified

Multi-disciplinary

Represents all major areas

## Procurement Work Package (PWP)

List of all Material, Equip, & Vendor  
Data Required by Engineering

Linkage to a Specific CWP/EWP

Roles of Buying & Receiving Process

List of Associated Purchase Orders  
with ROS Dates

Field Info – Tags, Material MGMT

Dependencies with other PWPs

Supports POC

## Construction Work Package (CWP)

Subset of a CWA

Discipline Specific

Estimated Man Hours

Planned Start & Finish Dates

CWP Release Plan

Constraints Identified

## Engineering Work Package (EWP)

Subset of a CWA and aligned  
to a CWP

Discipline Specific

Technical Specifications

Engineering Data & Drawings IFC

Vendor Data & Drawings IFC

Constraints Identified

## Installation Work Package (IWP)

Subset of a CWP	Constraint List & Verification
Work Scope/Task List	BOM's
Man Hour Allocation	Screenshots from Model
Specialty Tool & Equip Requirements	Technical Docs & DWGs

# Work Package Constraints



## What is a Constraint?

Any information, tools, materials, equipment, access issues or otherwise that prevent or delay the safe and successful execution of work in its entirety.

## What is Constraint Management?

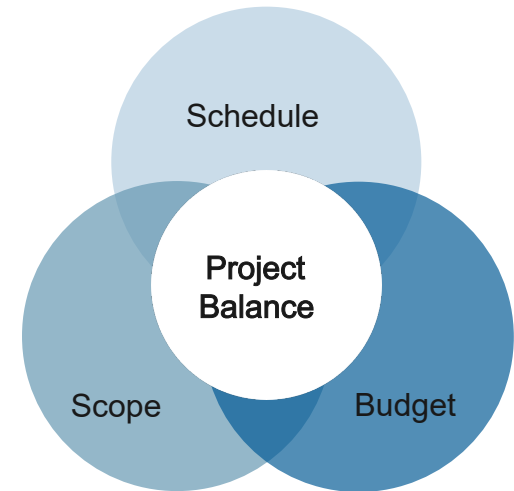
A process used by supervisors and other management personnel to help employees maintain task focus.

“Work Packaging and the Constraint Management process remove the guesswork from executing at the work face by acutely defining the scope of all work involved and ensuring all things necessary for execution are in place. It ensures to a much greater degree that the work will be done in the time allotted.”

- CII RT272 , page 35

# Benefits of Constraint Management

- Alignment around priorities
- Information visibility
- Identification & mitigation of design issues
- Safety Issues
- Ability to productively perform work
- Reduced scaffolding costs
- Cleaner, more organized jobsites
- Increased project morale



# Common Constraints by Work Package Type

Construction Work Area (CWA)	Construction Work Package (CWP)	Engineering Work Package (EWP)	Procurement Work Package* (PWP)	Installation Work Package (IWP)
<ul style="list-style-type: none"> <li>Equipment</li> <li>Access</li> <li>Concurrent Projects</li> <li>Area -Based Safety Requirements</li> <li>Predecessor Completion</li> <li>PWP Constraints</li> <li>EWP Constraints</li> <li>CWP Constraints</li> <li>IWP Constraints</li> </ul>	<ul style="list-style-type: none"> <li>Quality</li> <li>IFC Drawings</li> <li>Open RFIs</li> <li>Company Materials</li> <li>Contractor Materials</li> <li>Predecessor Packages</li> <li>Safety Requirements</li> </ul>	<ul style="list-style-type: none"> <li>Predecessor Packages</li> <li>Vendor Data</li> <li>Geological Survey</li> <li>Geotechnical Investigations</li> <li>Modularization Strategy</li> <li>Vendor Support Requirements</li> <li>Execution Plan</li> <li>Constructability Review</li> <li>P&amp;ID Input</li> <li>Site Drawings</li> <li>Owners Approvals</li> </ul>	<ul style="list-style-type: none"> <li>Predecessor Packages</li> <li>Data Requirements</li> <li>Scope of Material Finalization</li> <li>Vendor Documentation</li> <li>Vendor Hold Points</li> <li>Interdependent Packages</li> </ul> <p><i>*Optional, some may consider this a process rather than a package</i></p>	<ul style="list-style-type: none"> <li>Drawings</li> <li>Open RFI</li> <li>Company Materials</li> <li>Contractor Materials</li> <li>Predecessor Packages</li> <li>Clear Workface Permitting</li> <li>Equipment</li> <li>Tools</li> <li>Crew</li> <li>Scaffolding</li> <li>Quality Requirements</li> <li>Work Package Rework</li> <li>Safety Requirements</li> </ul>



# Who is Involved in Constraint Management?



**Discipline / Team Lead**

- Keeps track of the planned vs. actual start dates for work packages
- Monitors the quantities being held up by constraints to help with prioritization
- Understands the impact and criticality of all open constraints



**Constraint Owner**

- Anyone working in any capacity on the project
- Responsible for clearing their assigned constraints such as permits, materials, safety gear, or equipment
- Provides details and updates on the constraint removal process

## Specific for WorkFace Planning / Construction Execution:



**WorkFace Planning Lead**

- Runs the weekly constraint review meeting with the Owner & Contractors
  - Discusses any new constraints
  - Provides updates on existing constraints
- Manages the escalation of unresolved constraints that may impact the project




**WorkFace Planner**

- Identifies constraints for specific work packages
- Drives clearing of constraints for work packages
- Status packages for release if work is impacted by an uncleared constraint

# Path of Construction & Interactive Planning Meetings

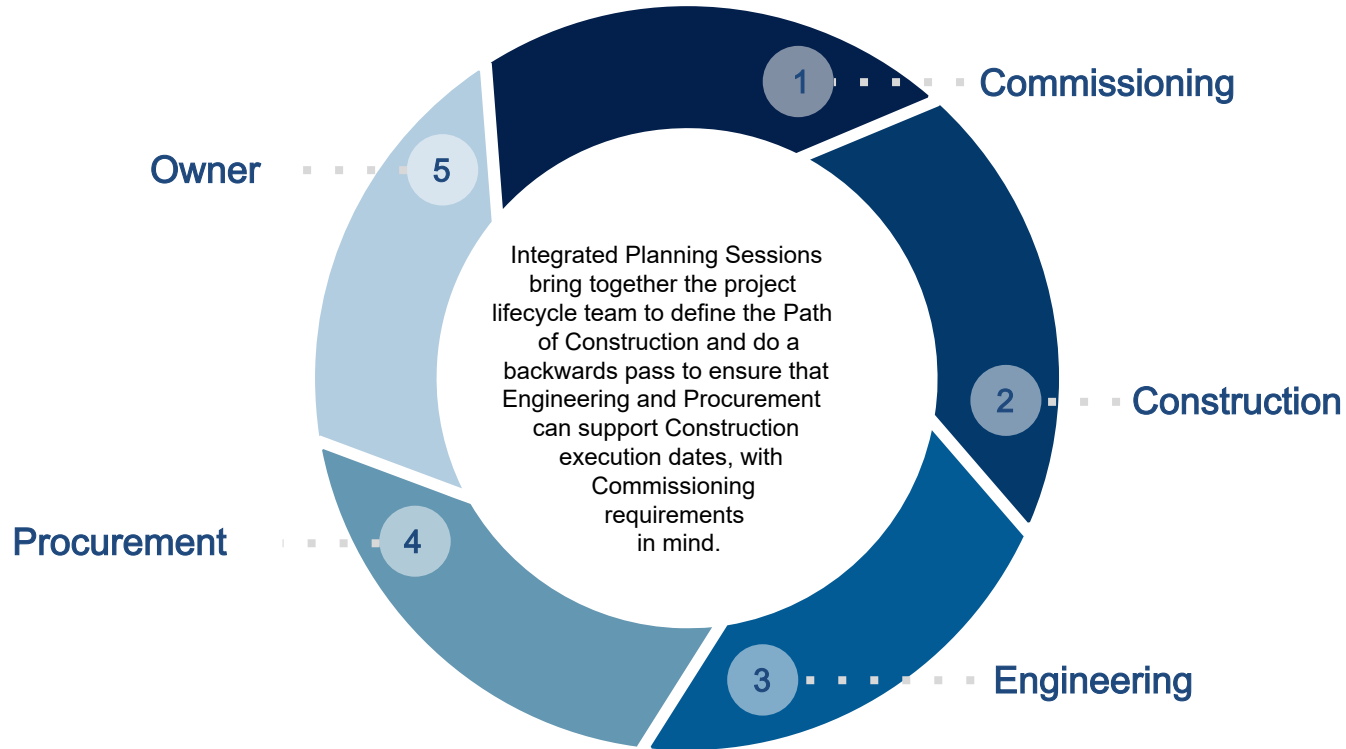




In a traditional project, Engineering is performed by  
System , Procurement in bulk, Fabrication by size, and  
Construction by area.

AWP is designed to align Engineering, Procurement, and  
Fabrication with the Path of Construction so deliverables  
are managed and disseminated in the correct sequence to  
support the Construction plan.

This process is initiated during the  
Integrated Planning Sessions.

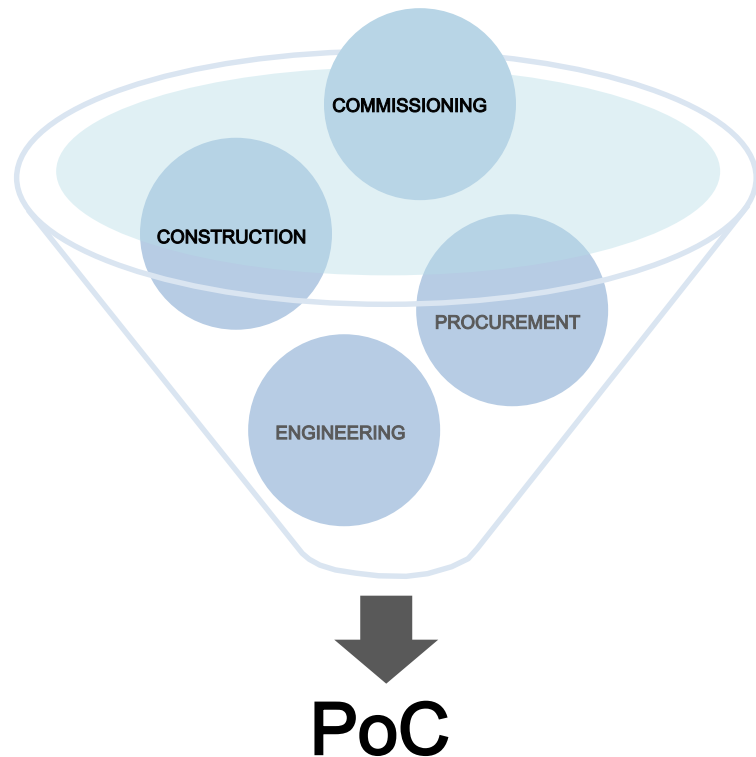


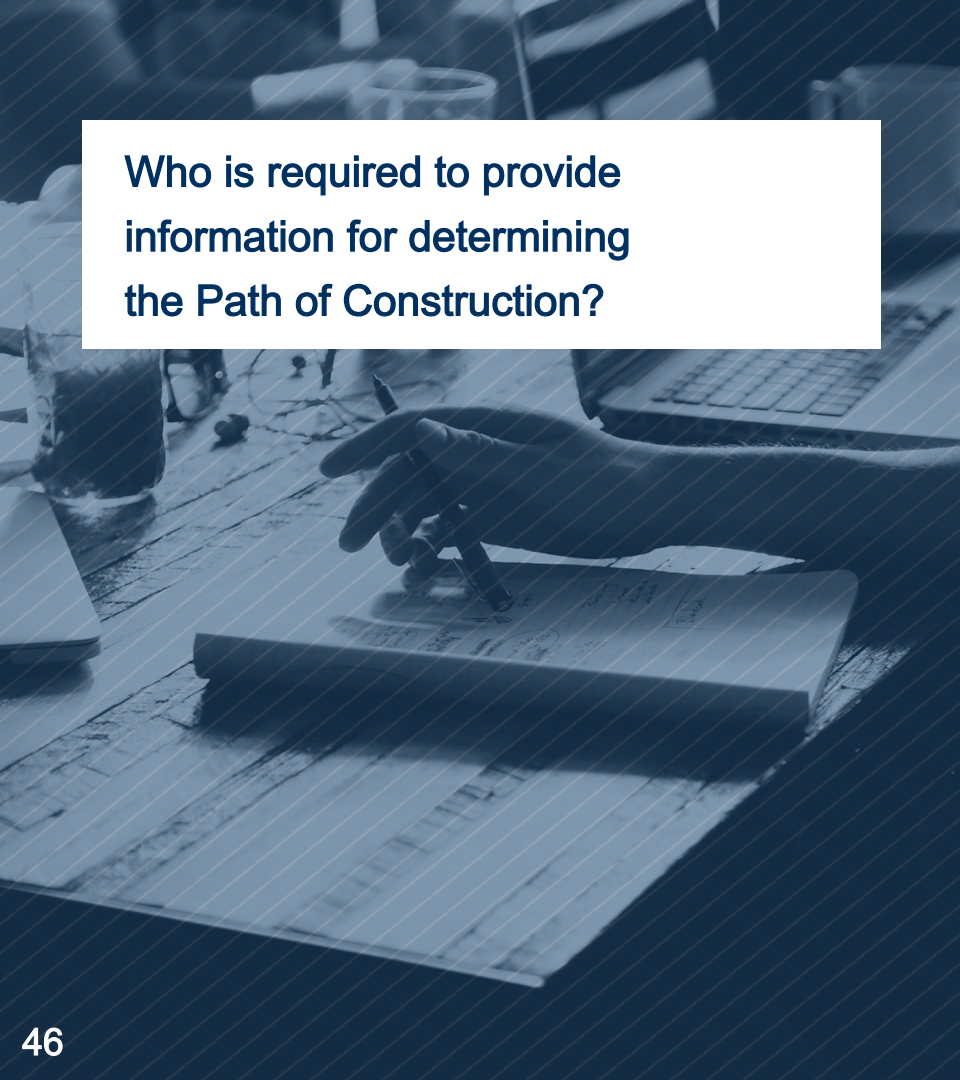
# PATH OF CONSTRUCTION (PoC)

The PoC is the strategic sequencing of Construction (and Commissioning) execution activities by Construction Work Areas.

The PoC identifies the Construction approach for project delivery and how Engineering and Procurement deliverables will support construction sequencing.

*\*Commissioning and plant startup operations set the priority and sequence for the project*





Who is required to provide  
information for determining  
the Path of Construction?

## EXAMPLE OF ATTENDEES THAT WOULD BE PART OF THE PATH OF CONSTRUCTION DEVELOPMENT

- ENGINEERING
- PROCUREMENT
- PROCESS
- CONSTRUCTION
- COMMISSIONING
- PROJECT CONTROLS

# What information is required by each discipline after each meeting?

Engineering	Procurement	Process	Construction	Commissioning	Project Controls
<ul style="list-style-type: none"><li>• Vendor data delivery dates</li><li>• Design hours</li><li>• Identify and set boundaries for Engineering Work Packages</li></ul>	<ul style="list-style-type: none"><li>• Long lead delivery times</li></ul>	<ul style="list-style-type: none"><li>• Specifications</li></ul>	<ul style="list-style-type: none"><li>• Heavy haul routes</li><li>• Heavy lift crane requirements</li><li>• Deep foundations</li><li>• Identify and set boundaries for Construction Work Packages</li></ul>	<ul style="list-style-type: none"><li>• Startup sequence</li></ul>	<ul style="list-style-type: none"><li>• Start / finish dates</li></ul>

# Deliverables from the Integrated Project Planning Meeting

- ☒ Construction Work Area boundaries defined on plot plan(s)
- ☒ Construction Work Areas prioritized
- ☒ Engineering and Construction Work Packages identified
- ☒ Path of Construction by Construction Work Areas
- ☒ Engineering and Construction Work Packages sequenced within Construction Work Areas



# Getting Started with AWP



## Where Should You Start?

- Review Your Project List
- Identify Potential Projects to Pilot AWP
- Develop an Implementation Strategy
- Get Buy -in Early from Leadership to Support Change Management
- Apply fundamentals across limited resources to achieve a quick win!
- Check out the AWP Concierge for ideas, tools, and tips to get started.

Visit the CII [AWP Concierge](#) to go deeper into objection handling & resources!



# AWP Maturity Stages & Project Performance

Maturity Stage			
Performance Dimension	1. AWP Early Stage	2. AWP Effectiveness	3. AWP Business Transformation
<b>Productivity</b>	Around 10% increase	Around 25% increase	Around 25% increase
<b>Cost</b>	Project on budget	TIC 10% below estimates	TIC 10% below estimates
<b>Safety</b>	Zero lost time incidents (TRIR below company average)	Zero lost time incidents (TRIR improves with sporadic first-aids and near misses.)	Zero lost time incidents (TRIR improves with sporadic first-aids and near misses.)
<b>Predictability</b>	Significant deviation from baseline estimates	Minor changes to execution schedule	Execution schedule to plan
<b>Quality</b>	Rework in line with previous quality performance	Rework slightly below company's average	Rework substantially below company average; substantial reduction of RFIs
<b>Schedule</b>	Project on schedule or experienced minor delay	Project slightly ahead of schedule during execution	Project slightly ahead of schedule during execution

Source : [RT319-1](#) Transforming the Industry: Making the Case for AWP as a Standard Best Practice

# Overcoming Common AWP Objections



# Common Objections

1. “I don’t have enough people.”
2. “This will slow down engineering.”
3. “This is too hard.”
4. “Our current process is just fine.”
5. “I don’t have the technology or tools for this.”
6. “AWP is just a buzz word.”
7. “AWP is not right for my project.”
8. “I don’t have time to learn something new.”
9. “My project is too small.”
10. “My project is too far along.”
11. “I have a lump sum job.”
12. “We already do AWP, kind of.”



Visit the CII [AWP Concierge](#) to go deeper into objection handling & resources!

# WHAT's NEXT?

Join the  
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CII AWP  
Research

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AWP Team







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