



Advanced Work Packaging Work Face Planning



Construction
Industry
Institute®



COAA
Construction Owners
Association of Alberta

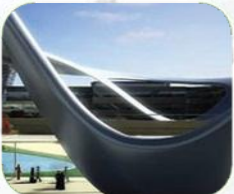


Advanced Work Packaging

Gary Orton

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Construction Evolution



RT 272 Team

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Advanced Work Packaging

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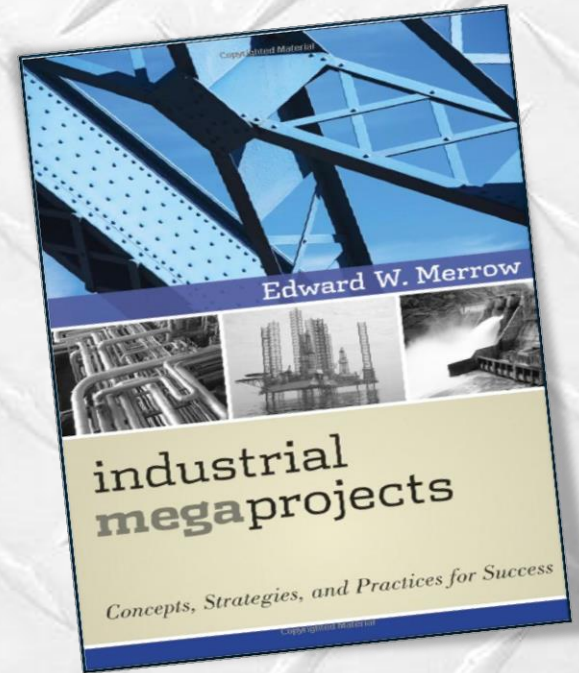
Stan Stasek, *DTE Energy*

Jim Vicknair, *WorleyParsons*

Glen Warren, *COAA*

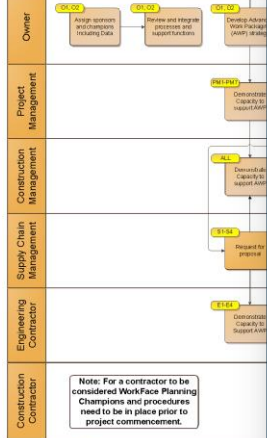
The Need For Innovation

- **Success in construction is elusive**
- Independent Project Analysis (IPA) study of 318 projects > \$2B:
- 65% of projects **FAILED**, experiencing either:
 - > 25% cost overrun
 - > 25% schedule slip
 - Significant underperformance of the asset once constructed

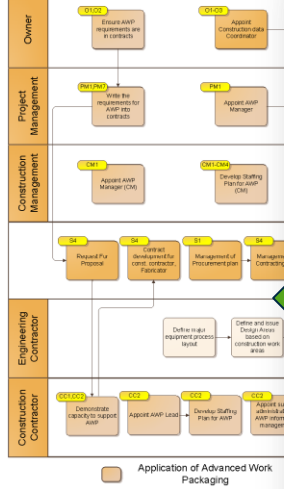


AWP/WFP Explained

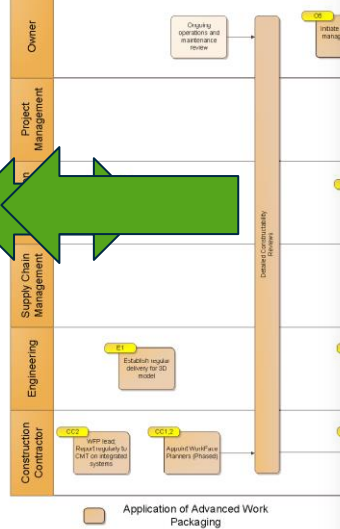
Advanced Work Packaging - Project Integration



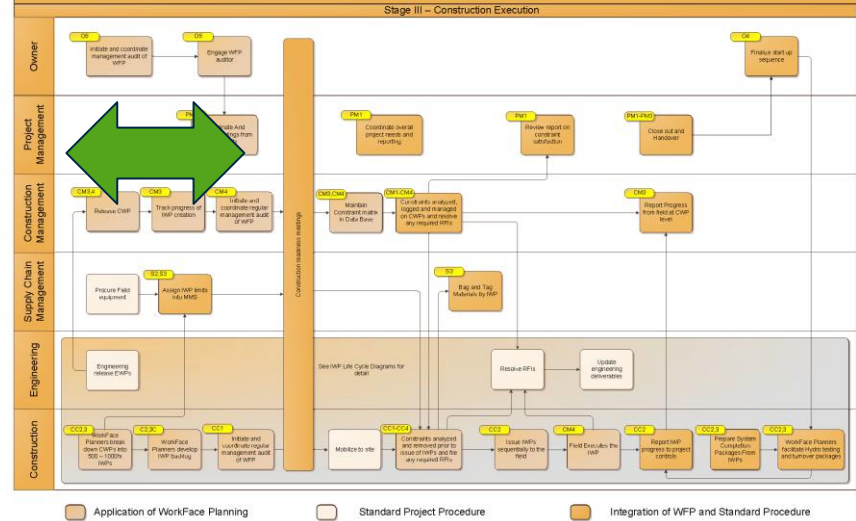
Advanced Work Packaging - Integration



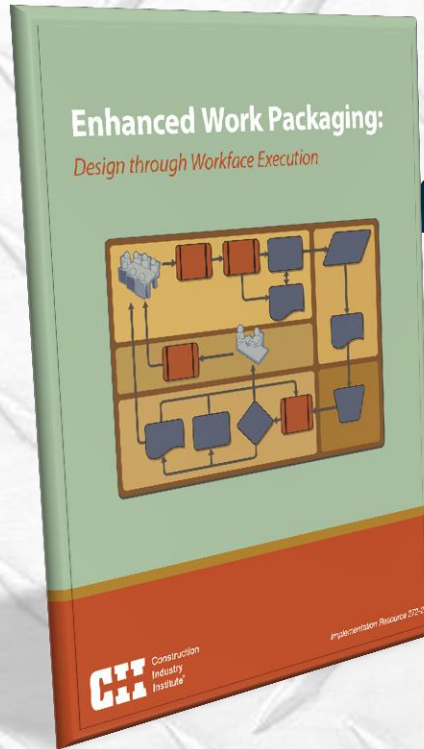
Advanced Work Packaging - Project Integration



Advanced Work Packaging - Project Integration



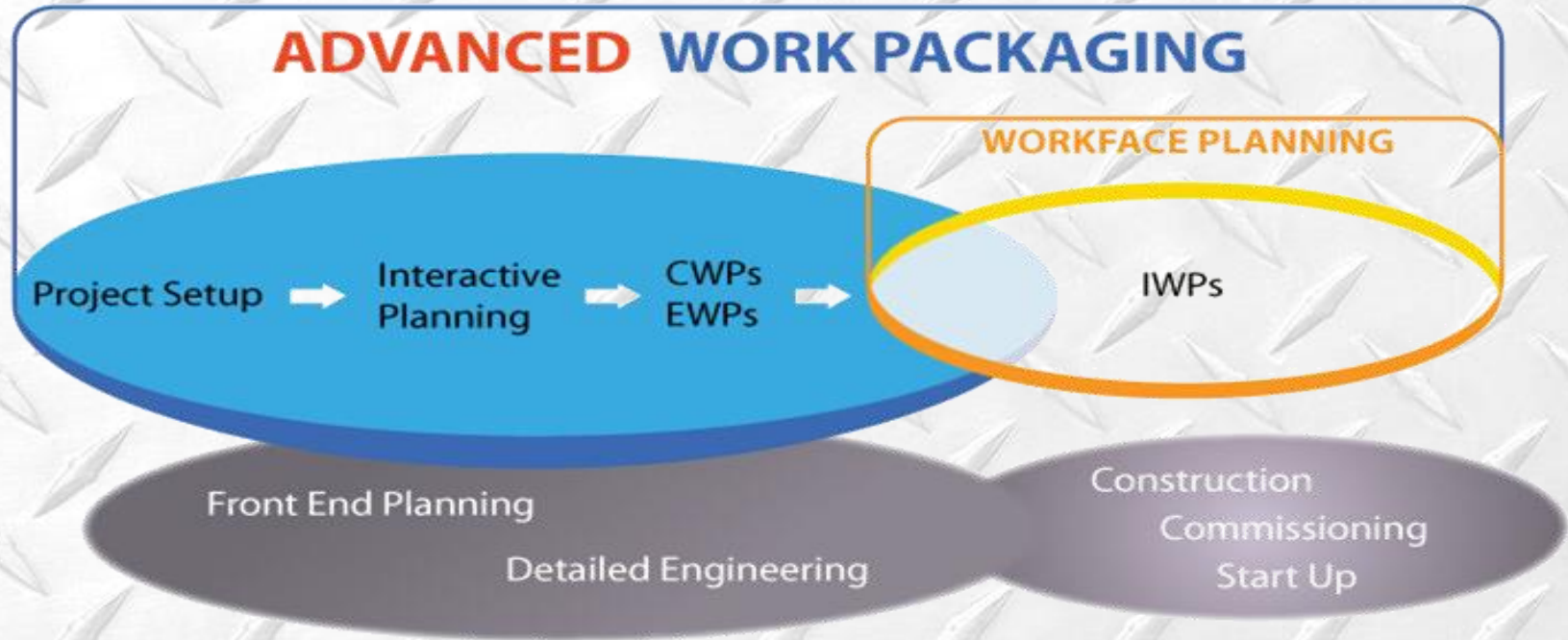
Creation of Industry best practice Standards...



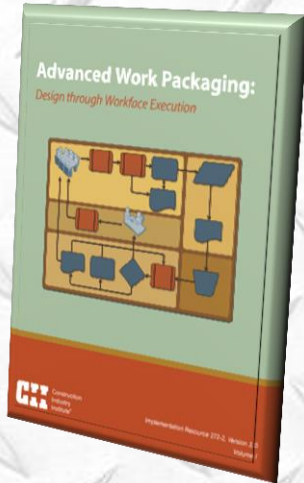
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AWP/WFP– The Industry Best Practice



Extensive Industry Research



Volume I:
Recommended
Process



Volume II:
Implementation
Guidance



Volume III:
Case Studies
and Expert
Interviews

CII/COAA AWP Implementation Resource IR 272-2

✓ 400 pages of guidance, tools, and templates

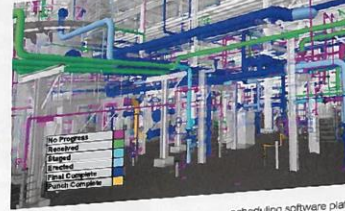
Making it Work



ALL-IN-ONE SYSTEMS SLASH PLANNING TIME

Technology platforms are evolving quickly in their ability to improve work packaging capabilities for multidisciplinary project teams. Like the rise of web-based software before it, platforms-as-a-service now enable teams to integrate project data from multiple sources as well as collaborate more easily during the planning process.

Bentley has released its ProjectWise Construction Work Package Server, which offers software and services developed around work packaging standards and best practices advocated by the Construction Industry Institute and the Construction Owners Association of Alberta (ENR 1/18/25/13 p. 30). The server platform enables consolidation of models, drawings and other types of project data. Users can create, publish, edit, manage and distribute engineering work packages and construction work packages. Planners use 3D modeling tools for package development and status reporting and can build 4D simulations, using ConstructSim V8i, to show look ahead planning and animate construction schedules.



Industrial-plant design software maker Aveva offers work-packaging capabilities as part of its suite. The modular system offers project planning, workforce planning, construction simulation and materials management capabilities that can be linked to a 3D model. The Aveva system can define materials requirements for work packages and enable visualization of data on materials status and availability. The company claims its products are interoperable with third-party business systems, including integration with

scheduling software platform Primavera. Further, users can integrate schedules for 4D simulations.

Intergraph SmartPlant Construction also offers work-packaging capabilities. The system also offers 4D visualization to help planners sequence construction and maintain a project's critical path. Field construction status can be recorded based on configured rules of credit and used for reporting. These can be reviewed in a 3D model. ■

STATUS SYMBOLS
Software offerings significantly cut planning time, Bentley's ProjectWise Construction Work Package Server enables portions of a model to be color-coded to show project status.

seers and Constructors, Houston, says producing safe and productive jobsites is critical in light of the manpower shortages forecast for industrial projects along the Gulf Coast. "I asked a craftsman, who has been with us for while, why he chooses to stay," Morrow said. "The No. 1 thing he said was safety. The second is that, when he goes out in the morning, he knows the tools and materials will all be there for him to do his job."

A COAA study shows that, on projects using traditional methods, workers spent 37% of their time on tools. By comparison, on projects that implement workforce planning, workers spend 46% of their time in tools. With billions of dollars in additional projects planned for the Gulf region in the coming years, Morrow says, "We need to be using the workforce we have today more efficiently."

Expanding Applications

As advanced work packaging is gaining momentum in the industrial market, some are looking to use it in other sectors. DTE Energy is applying advanced work packaging to projects ranging from power work to of-



"In our line, an engineering work package is a deliverable to construction."

Bill O'Brien, associate professor University of Texas, Austin

fice renovations. DTE started two pilot projects using AWP in 2013 and plans to apply it to all new projects by the end of the year. Stanley Sasek, director of quality management for major enterprise projects at DTE, says the company is expanding its in-house construction-management capabilities and sees AWP as a key component in that initiative. "We need our contractors to be as efficient as possible," he says.

One of the pilot programs involves dry-sorbent injection upgrades at multiple DTE powerplants. "They will install on two plants in parallel and then move on. Work packaging makes sense because you can build [packages] up front, then make adjustments due to location, but the core work remains the same."

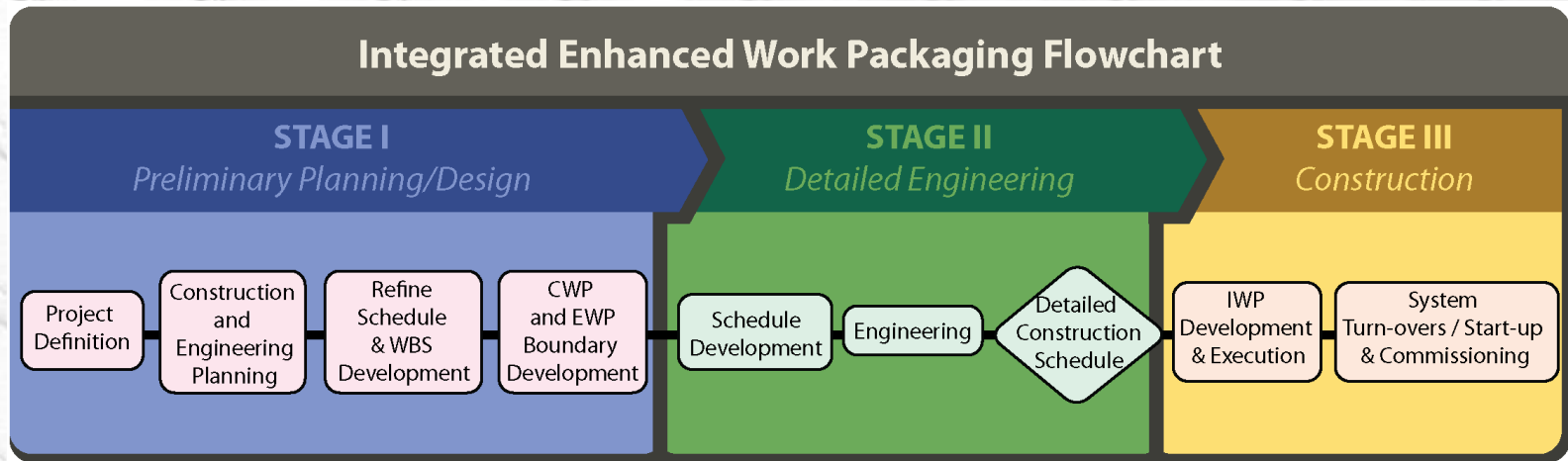
The second pilot is trending in less familiar territory. The company is employing AWP on a program that will renovate 54 floors of DTE office space in four buildings on its Detroit campus as well as numerous service centers and powerplant offices. As a new application of AWP, Sasek acknowledges it is more of a struggle. "We are working with contractors that do office renovations for a living," he says. "This is new

Advanced Work Packaging

- Takes a proactive, structured approach to managing constraints prior to the work face
- Involves deliberate, early planning to support execution
- Holistically incorporates the full project life cycle
- Gives supervisors more field time



Recommended Practice Model



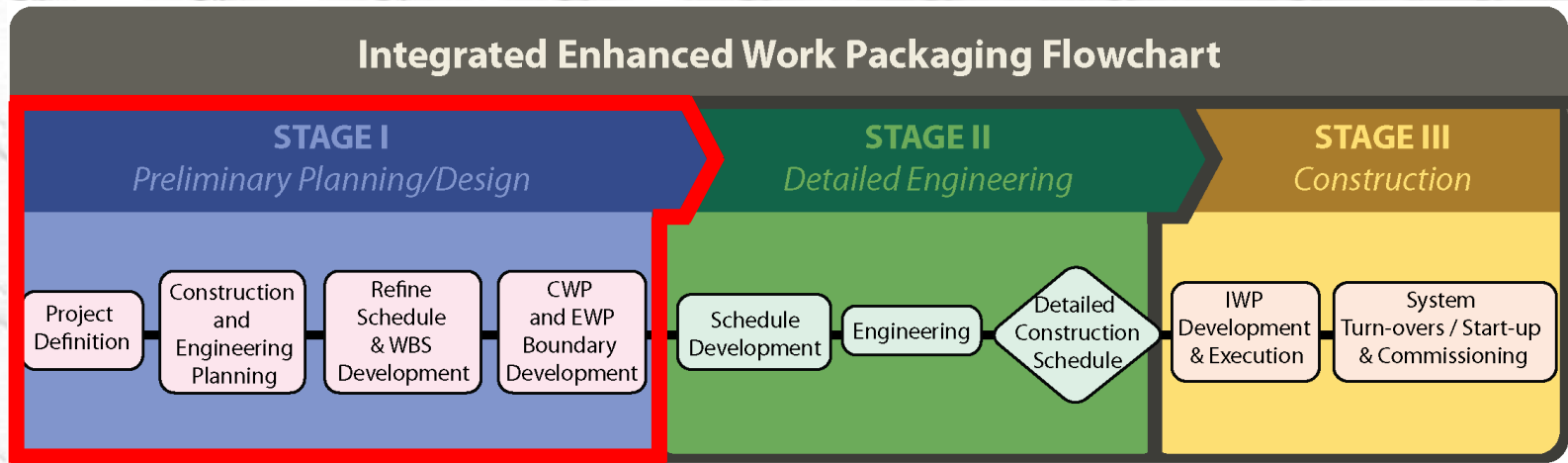
Definitions

Practice Model

Tools

Case Studies

Recommended Practice Model



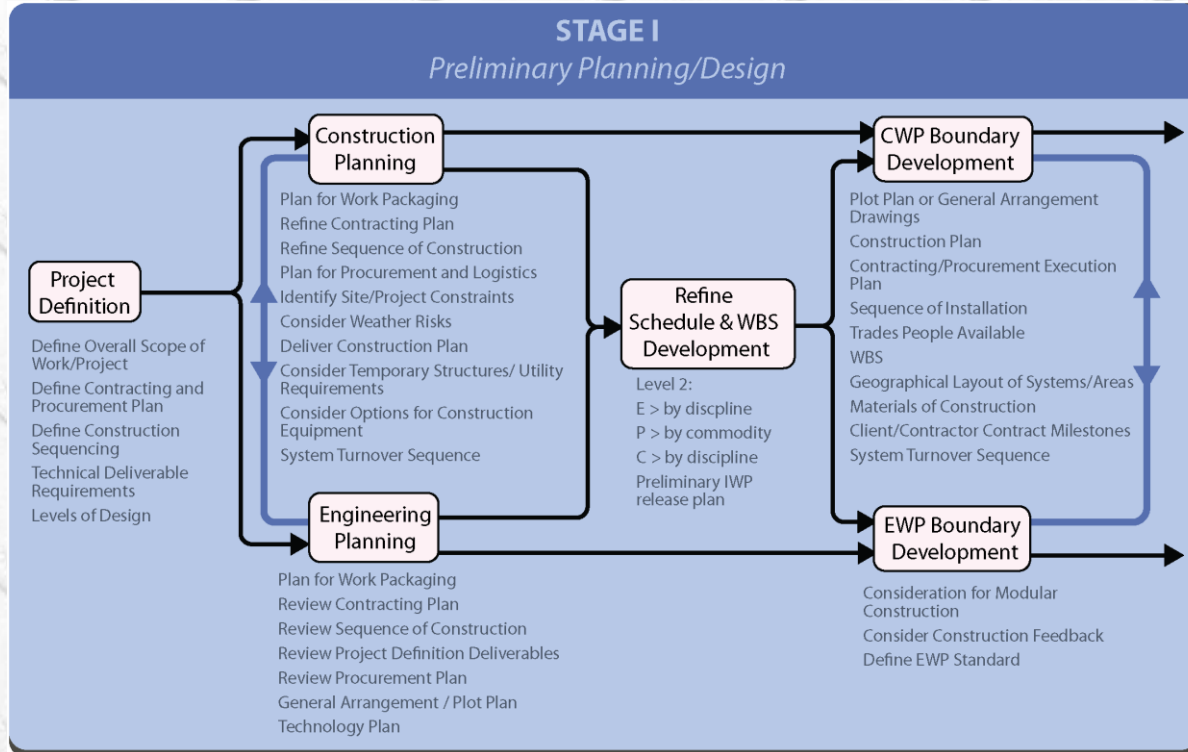
Definitions

Practice Model

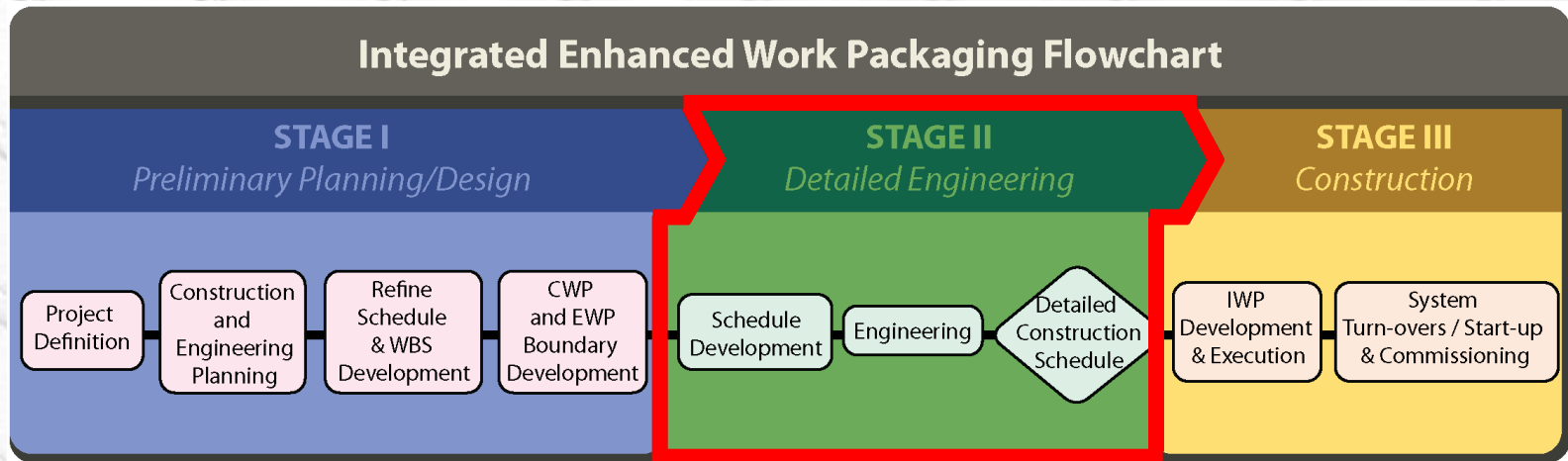
Tools

Case Studies

Stage I: Preliminary Planning/Design



Recommended Practice Model



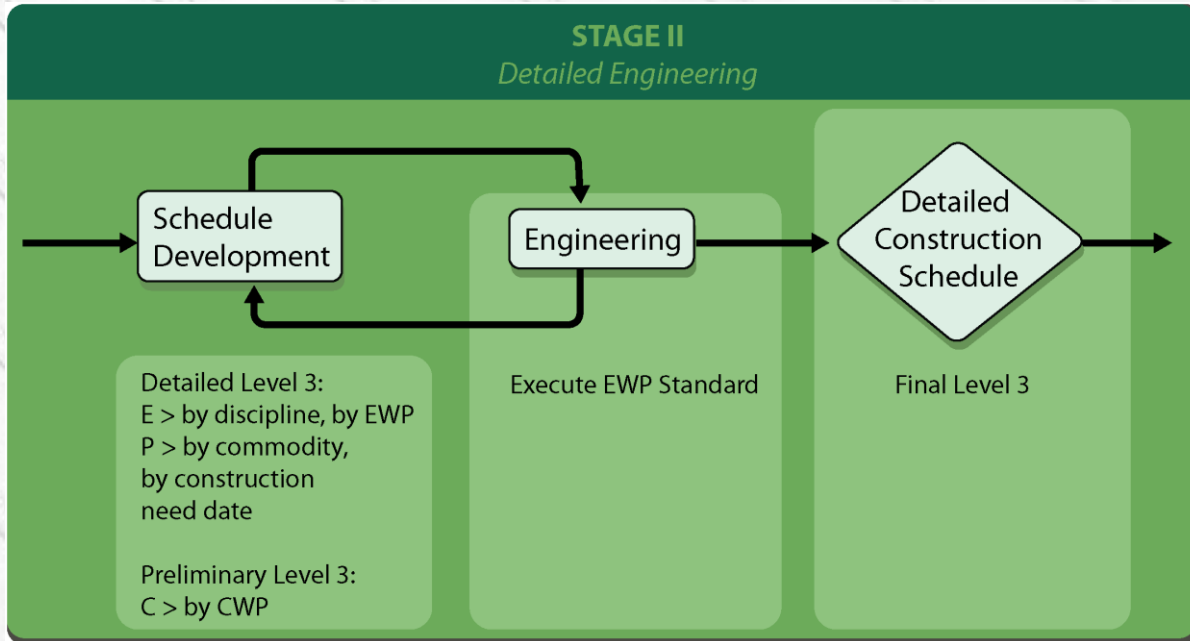
Definitions

Practice Model

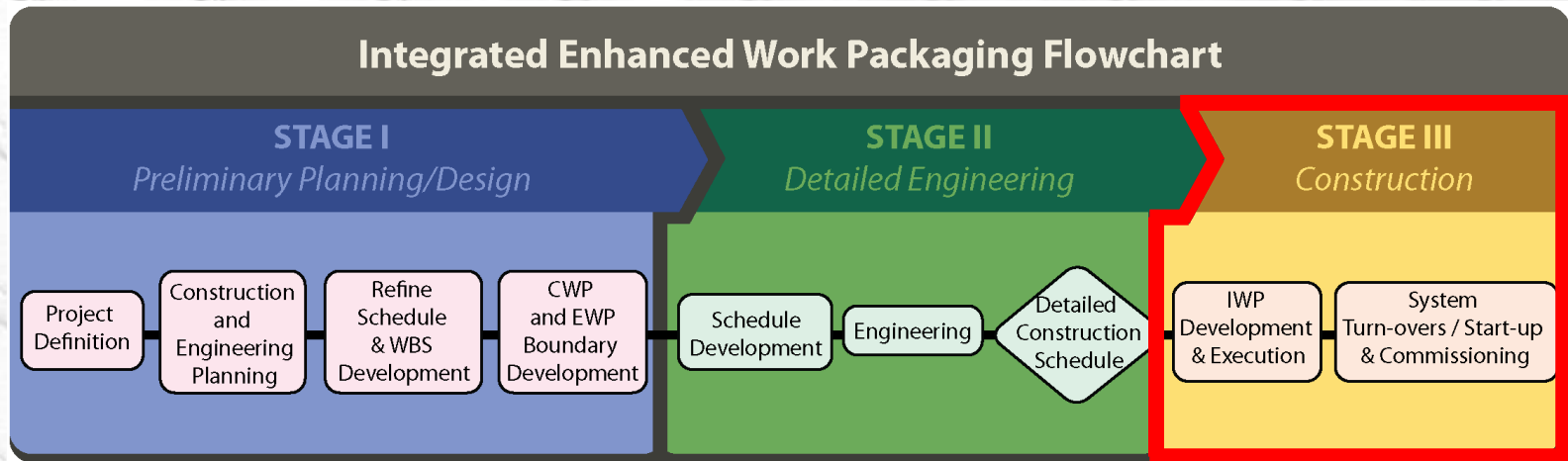
Tools

Case Studies

Stage II: Detailed Engineering



Recommended Practice Model



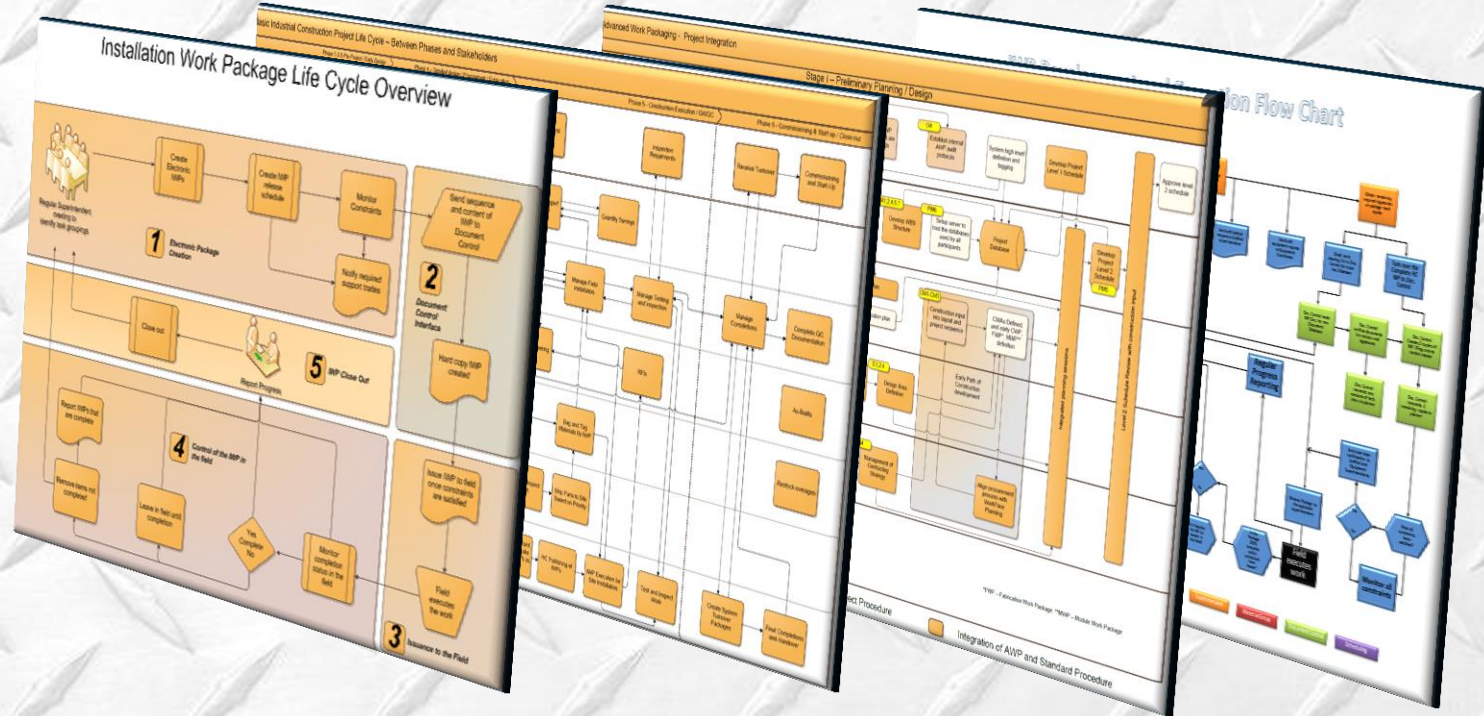
Definitions

Practice Model

Tools

Case Studies

Integrated Practice Model



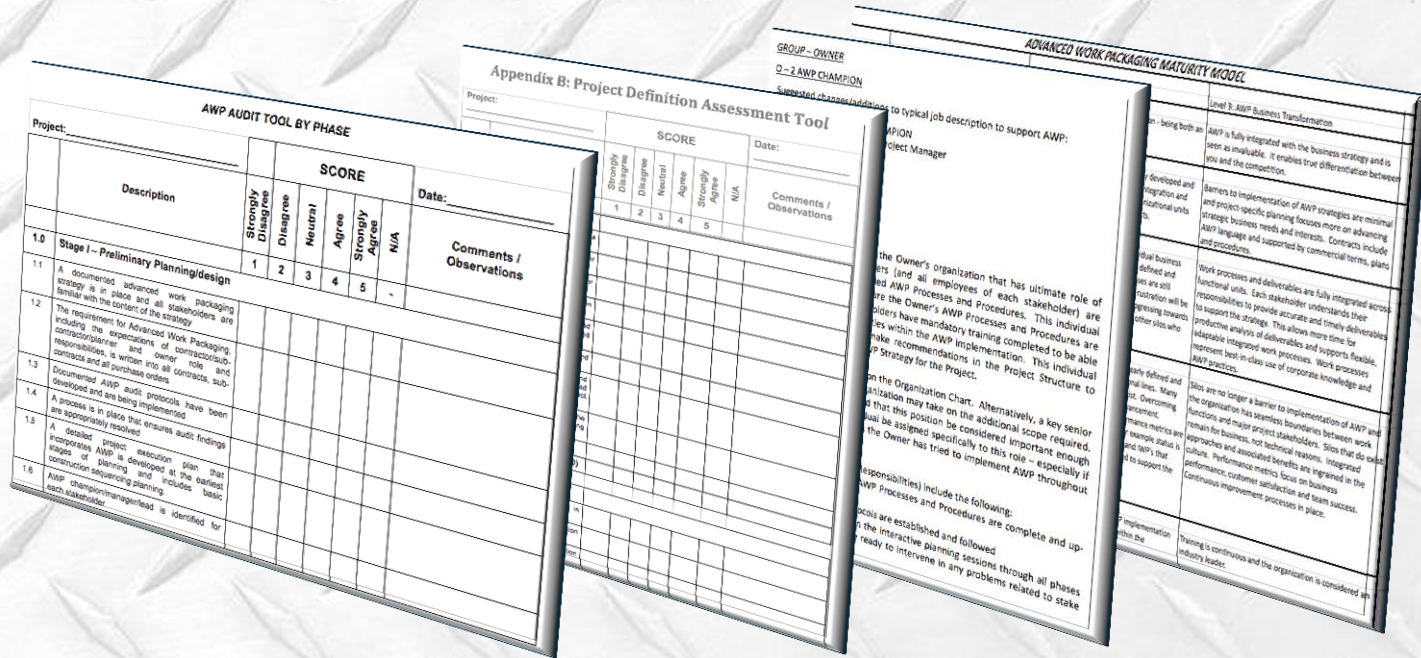
Contract Requirement

Practice Model

Tools

Example

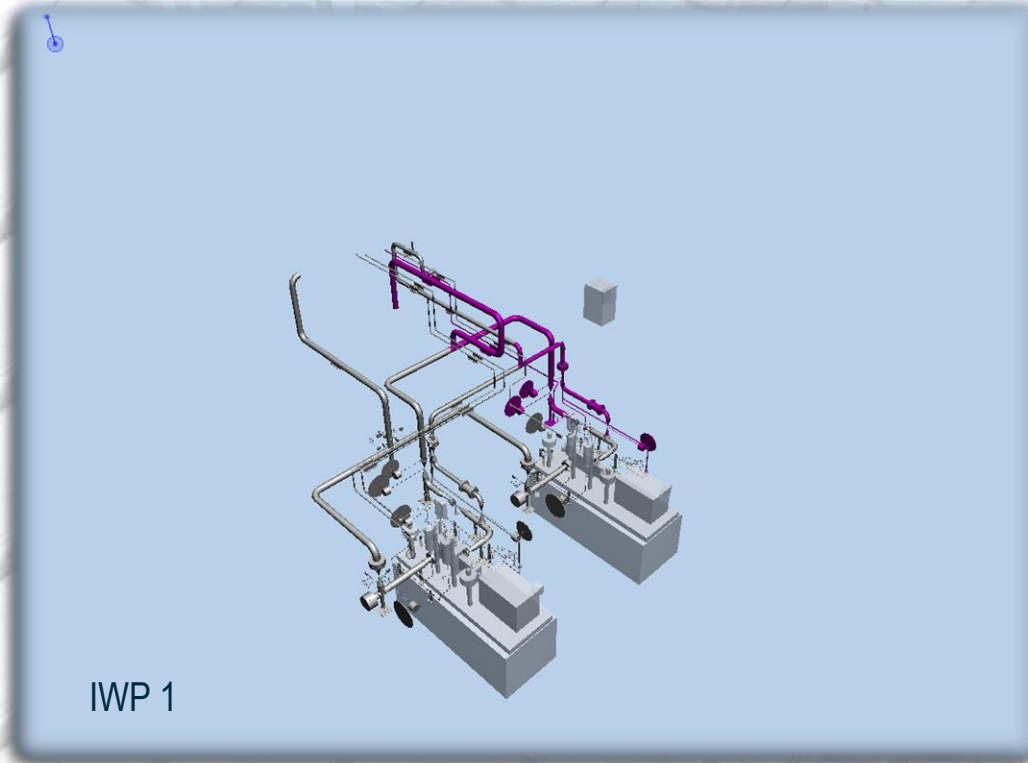
Tools



AWP Audit tool, Project Definition Assessment, Job Description, Maturity Assessment

- Contract Requirement
- Practice Model
- Tools**
- Example

Example



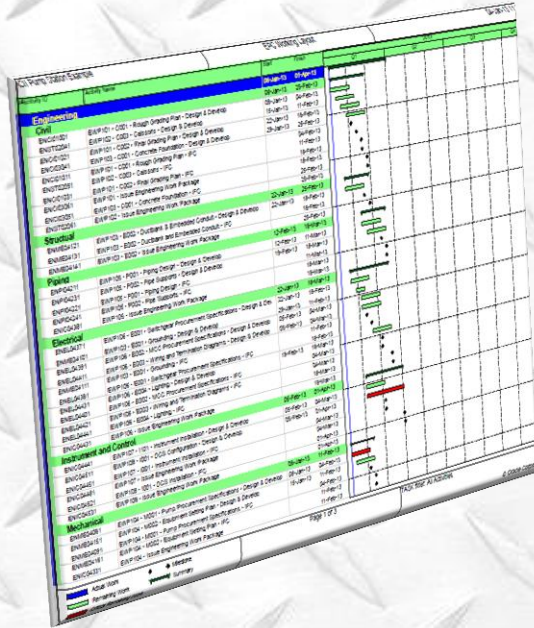
Contract Requirement

Practice Model

Tools

Example

Example



Work Area	CBS Level 1 - Package	CBS Level 2 - Responsibility	CBS Level 3 - Discipline	CBS Level 4 - Actuals/WBS	CBS Level 5 -	Work Package Description	ENGINEERING & DESIGN			PROCUREMENT				
Sub - total	Procurement	Purchasing		01.06.PU.EL.04		PKK106 - E004 - Lights	Qty	Unit	Cost	Qty	Unit	Cost	Qty	Unit
CWP107 - Instrumentation														
	Engineering	IBC		01.07.EN.IN.01		EWPI07 - 1001 - Instrument Installation								
	Construction	IBC		01.07.CN.IN.01		WVPI07 - 1001 - Install Instrumentation - Terminate & Test								
Sub - total	Procurement	Purchasing		01.07.PU.IN.01		FFV107 - 1001 - Instrumentation								
CWP108 - I&C - DCS Configuration & Installation														
	Engineering	IBC		01.08.EN.IN.01		EWPI08 - 1001 - DCS Configuration								
	Construction	IBC		01.08.CN.IN.01		WVPI08 - 1001 - DCS Configuration & Test								
Sub - total	Procurement	Purchasing		01.08.PU.EL.01		PKK108 - 1001 - DCS Configuration & Installation								

Contract Requirement

Practice Model

Tools

Example

RT 272 Contributions: A model for Advanced Work Packaging

Contract Requirement

Practice Model

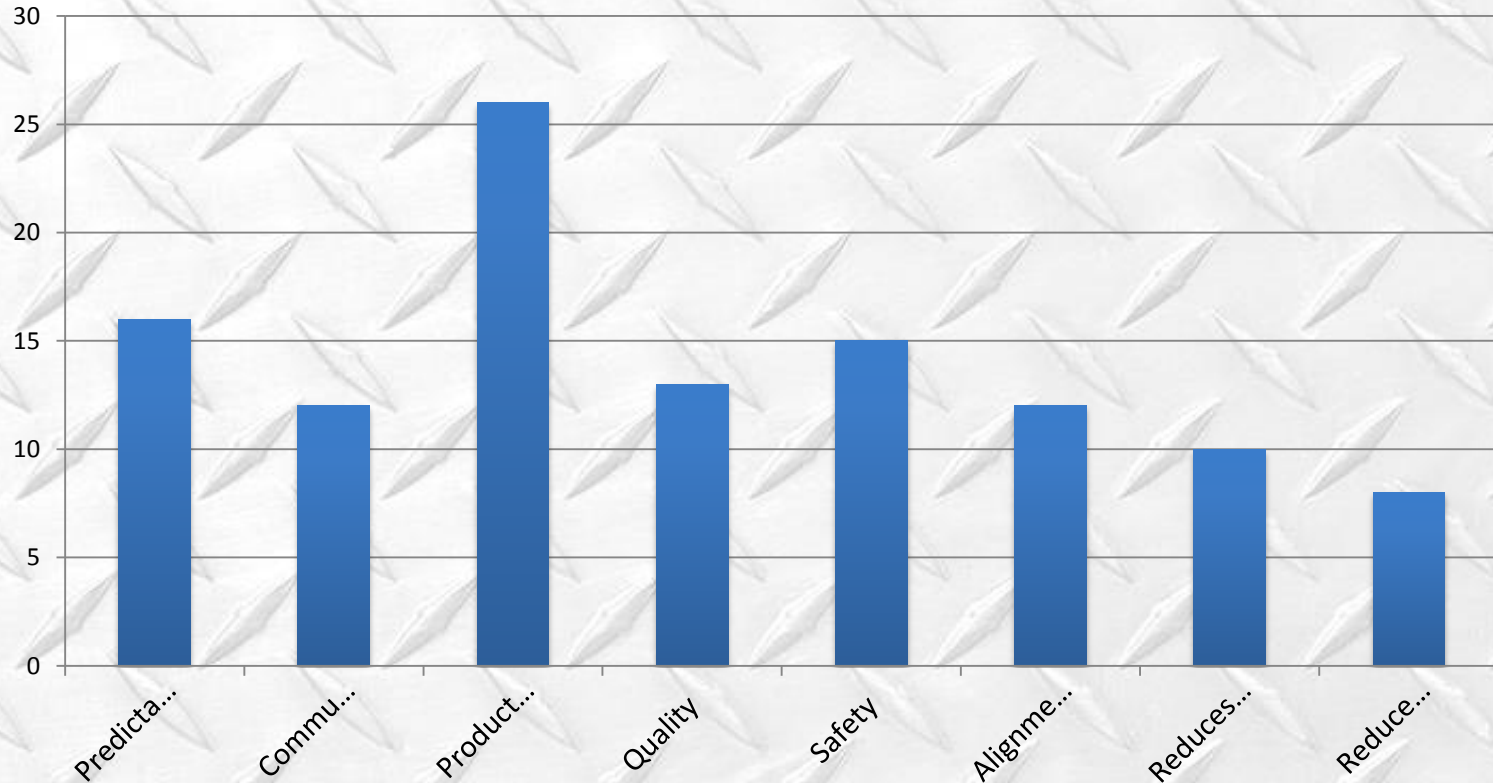
Tools

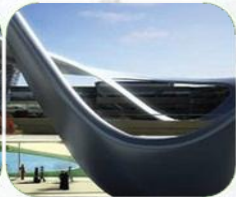
Example

Productivity & Predictability

Perceptions of workplace planning: WorkFace Planning perceived advantages

Q11: Which area do you see as the biggest benefit of WFP?





WorkFace Planning

Ben Swan

WFP - POINTS

- Define
- Requirements
- Timeline
- Resource

WFP Definition

“Installation Work Package (IWP) is a grouping of tasks targeted at one shift in duration. These IWPs will contain all of the necessary documents and descriptions required to carry out the tasks required”

COAA & CII Best Practice

PRINCIPLES are timeless “There is nothing new under the sun”

PRACTICES are timely – “Continuous improvement”

Secondary Definition

“Installation Work Package (IWP) is a grouping of tasks targeted at one shift in duration. These IWPs will contain all of the necessary documents and descriptions required to carry out the task required

Cable Pull (15 Workers)

IWP #1
850 Hrs

IWP #2
750 Hrs

IWP #3
250 Hrs

IWP #4
350 Hrs

Field Run Tray (6 Workers)

IWP #5
275 Hrs

IWP #6
325 Hrs

IWP #7
175 Hrs

Terminations (4 Workers)

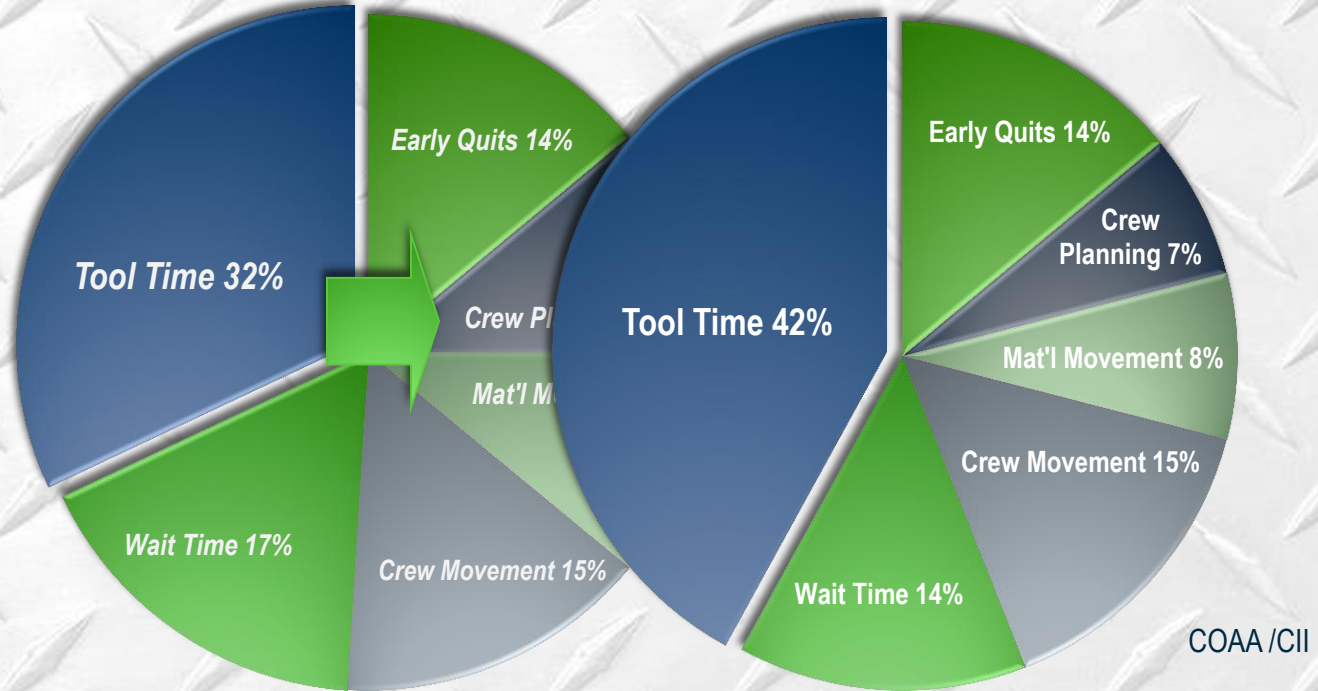
IWP #8 70 Hrs	IWP #9 60 Hrs	IWP#10 120Hrs
------------------	------------------	------------------

IWP#11 60 Hrs	IWP#12 60 Hrs	IWP#13 120 Hrs
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IWP Content

- KISS - Keep it Simple.....Don't be building books!
 - Scope
 - Drawings
 - Material
 - Safety
 - Quality
- Remember who your customer is the tradesperson

Productivity of a typical Construction Crew



10% more tool time is nearly 25% improvement in productivity
Labor is typically 40% of TIC = AWP Provides Up to 10% Reduction in TIC

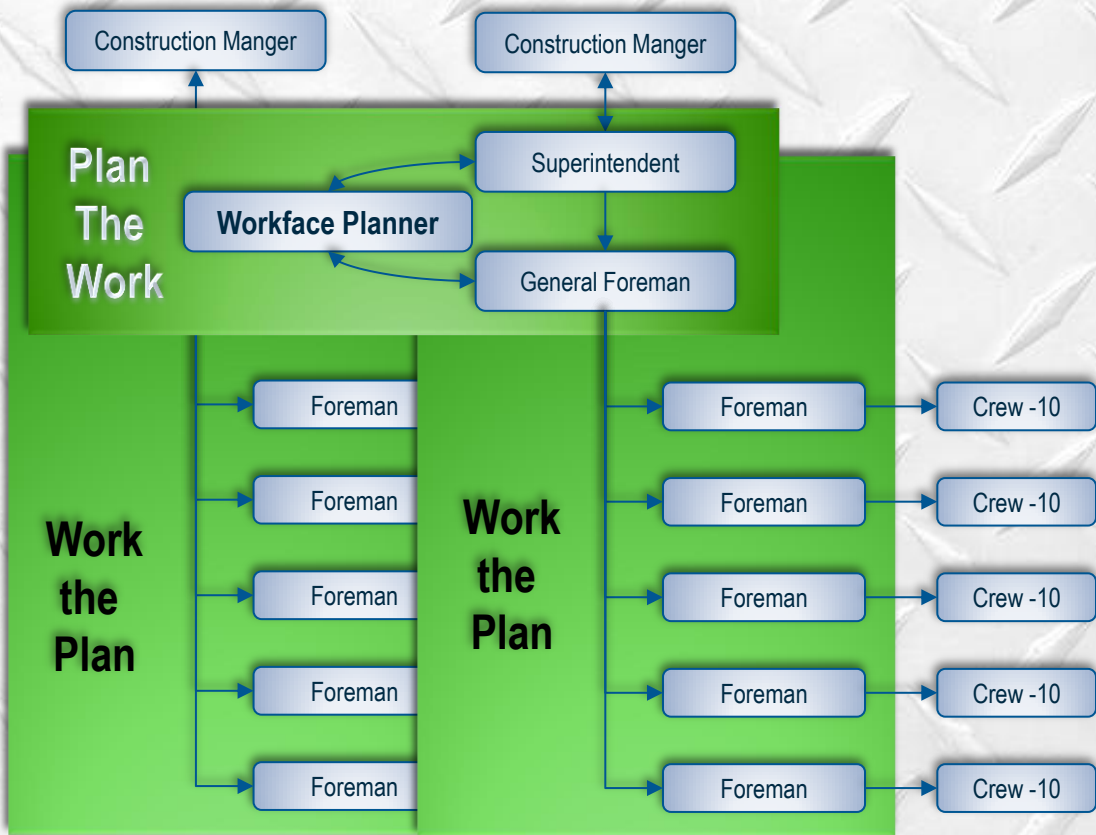
Supervisors Duties

**Excessive other duties
reduces direct supervision
and negatively effects safety.**



Model for Workface Planning

Conventional WFP Best Practice



WFP Requirements

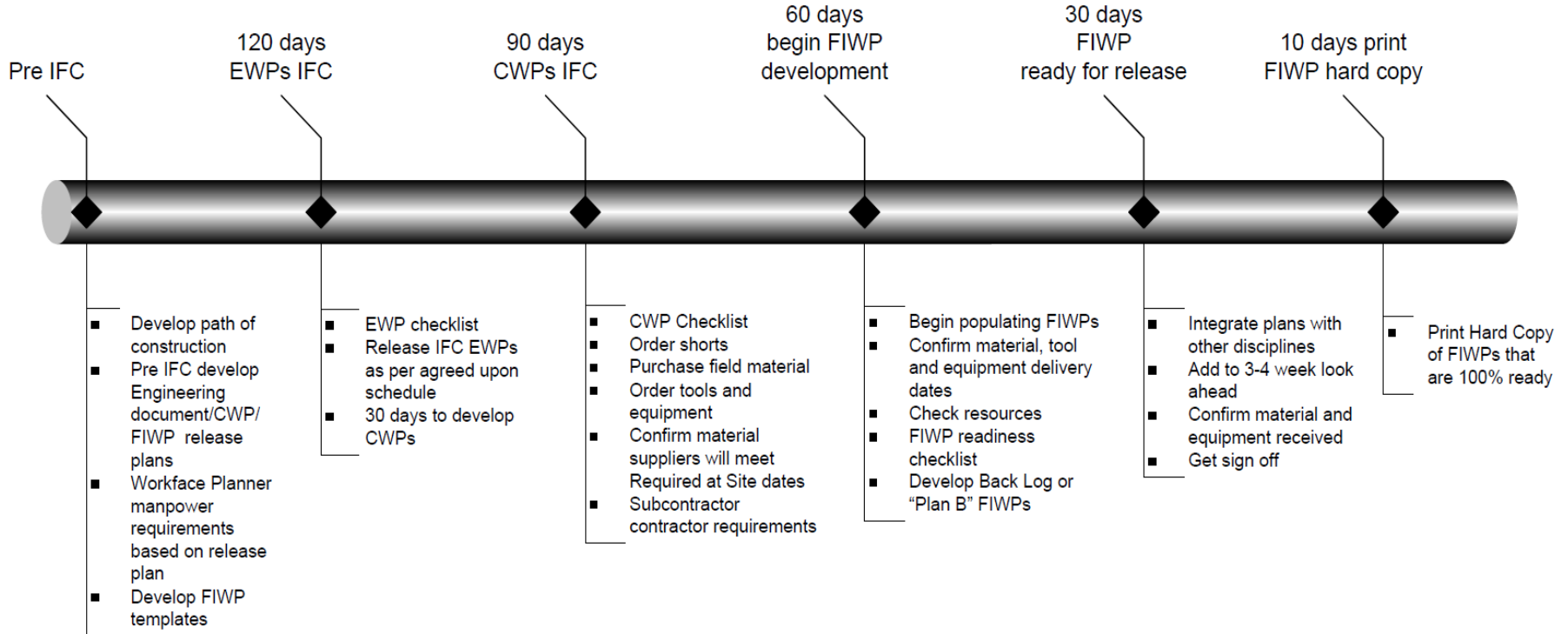
1. Appoint Dedicated Planners
2. Develop Level 3 Schedule prior to Detailed Engineering
3. IWP complete 4 weeks prior to starting actual work
4. Workface Planners have access to latest information
5. Assign Integration Coordinator
6. Assign responsibilities for signoff of IWP's

WFP Requirements Continued

8. IWP's signed off before release to the field
9. Track progress of IWP's
10. Develop backlog of IWP's
11. Include WorkFace Planning into Contract
12. Audit the process

WFP Timeline

Timeline 120 Days



Note: Initial procurement is outside the scope of this timeline

Why Implement WorkFace Planning?

- *Improved site safety*
- *Up to ~10% reduction in TIC*
- *Better Coordination of Crews*
- *Greater predictability*
- *Lower Costs*
- *Greater Quality*
- *Less Rework*
- *Improved Project morale*
- *Ability to Compare across Contractors*
- *Schedule Optimization*



Resource

www.coaa.ab.ca/construction/awpwpfp

www.coaa.ab.ca/construction/AWPWFP/Flowcharts/InstallationWorkPackageLifeCycle

Thank You