COAA – CII JOINT INITIATIVE

IMPLEMENTATION OF WORKFACE PLANNING THROUGH ADVANCED WORK PACKAGING

COAA BEST PRACTICE XX
MAY 16, 2012
AGENDA

1. Overview of joint venture (5 min)
2. CII RT272 Phase I Background (10 min)
3. Thrust areas
   a. Process & Functional (5 min)
   b. Contracts (3 min)
4. Survey (30 min)
5. Q&A (30 min)
6. Wrap up (10 min)
Overview of Joint Venture
WorkFace Planning is the process of organizing and delivering all the elements necessary, before work is started, to enable craft persons to perform quality work in a safe, effective and efficient manner.
Background

- Concentrated on Construction Phase of Project with goal of increasing Tool Time 25% by reducing Wait Times.
- Developed Rules and Scorecards
- Introduced Contract Language to accommodate WFP
Background

- Developed FIWP Templates.
- Developed and Delivered Training Courses.
- Developed Path of Construction Best Practice
- Introduced Concept for Designated Occupations
- Flowchart of WFP Process thru Project Lifetime
Background

- CWP Best Practice
- Introduced series of WFP Conferences.
- Flowchart updated to include Swim lanes:

COAA WorkFace Planning Project Integration
**Background**

**Why is it not working?**

- Productivity was not improving to extent anticipated with implementing WFP.

- Constructors who were getting high marks utilizing guidelines of COAA WFP Scorecards not consistently getting higher productivities.

- **Realization that problems were still occurring in transfer of Front End Deliverables complete, on time and in right sequence to Contractors.**
Overview of JV

- COAA WFP Committee was given mandate to provide guidelines for Front End Processes to support the deliverables required for successful implementation of WFP on project.

- CII had just published and presented “IR 272-2 Enhanced Work Packaging” which is their latest implementation resource.
Overview of JV

**ADVANCED WORK PACKAGING**

**WORKFACE PLANNING**

- Front End
  - Project Setup
  - Interactive Planning
  - CWP’s EWP’S
  - IWP’S

- Construction
  - Commissioning
  - Start Up
GOAL OF JV

- Work together to update RT-272 and COAA Best Practices and integrate into an industry standard Recommended Practice for Implementation of Advanced Work Packaging (of which WFP will continue to cover the Construction Phase as well as the Commissioning and Start Up.)

- Develop and Strengthen Processes and Procedures in the Front End to Support WFP.

- Integrate definitions, metrics and language.
GOAL OF JV

- Processes
- Functionality (Organization)
- Contract Language
- Maturity Assessment

- Presentation of RT272 (joint) at the CII Annual Meeting in summer 2013
CII RT272 Phase I Background: Enhanced Work Packaging Planning for Productivity and Predictability
RT 272 Team

Steve Autry, ConocoPhillips
Richard Buxo, SNC-Lavalin
Doug House, Zachry Industrial Inc.
Mark Hunter, Bechtel
John Hyland, Lauren Engineers & Constructors
Jose LaRota, Southern Company
Fernanda Leite, The University of Texas at Austin
Brendan Lynam, Kvaerner

Enhanced Work Packaging

Sarah Meeks, The University of Texas at Austin
Robin Mikaelsson, Bentley Systems, Inc
Bill O’Brien, The University of Texas at Austin
Mark Parsons, KBR
Randy Paulson, Progress Energy
Sean Pellegrino, Chevron
Jim Rammell, Wood Group Mustang
Jim Vicknair, WorleyParsons
Implementation Learning Objectives

- Learn about work packaging across project life cycle; understand terms
- Recognize benefits of enhanced work packaging
- Understand model process for project life cycle and field implementation of work packaging
- Examine case studies
- Consider recommendations for action
Traditional Work Packaging

- Has been done on every project since the pyramids
- Is a formal/informal process of understanding and performing field work
- Is accomplished inconsistently
**Enhanced Work Packaging**

- Takes a proactive, structured approach to managing constraints at the work face
- Involves deliberate, early planning to support execution
- Holistically incorporates the full project life cycle
- Gives supervisors more field time
What’s in It for Me?

- Improved productivity
- Predictable performance
- Standardized field execution practices
Construction Labor Productivity Is Key

- Direct labor accounts for 25% to 40% of construction installed costs
- Labor productivity is the cost area most influenced by engineering and construction management practices
- Increased productivity improves safety, cost, schedule, and quality

Improved labor productivity means improved, more predictable performance
Summary Benefits—Validated by Case Studies

- Cleaner, safer jobsite
- Alignment from engineering to construction
- Better craft retention
- Better turnover to commissioning/operations
- Improved project execution predictability
- Cost and schedule savings
Improvement “Opportunities” for the Industry

Current challenges:

» Inconsistent terminology

» Need for standardization of work packaging

» Lack of guidelines around implementation of work packaging

» Little documentation of work packaging practices
RT 272 Contributions: A Model for Enhanced Work Packaging

- Common Language → Definitions
- Recommended Practice Model
- Tools
- Case Studies
Common Language → Definitions

- Work Packaging
- Work Face Planning (WFP)
- Work Face Planner
- Engineering Work Package (EWP)
- Construction Work Package (CWP)
- Installation Work Package (IWP)
Work Package Hierarchy - Project Overall
Recommended Practice Model

Integrated Enhanced Work Packaging Flowchart

STAGE I
Preliminary Planning/Design
- Project Definition
- Construction and Engineering Planning
- Refine Schedule & WBS Development
- CWP and EWP Boundary Development

STAGE II
Detailed Engineering
- Schedule Development
- Engineering
- Detailed Construction Schedule

STAGE III
Construction
- IWP Development & Execution
- System Turn-overs / Start-up & Commissioning

Definitions
Practice Model
Tools
Case Studies
Stage I: Preliminary Planning/Design

STAGE I
Preliminary Planning/Design

Construction Planning
- Plan for Work Packaging
- Refine Contracting Plan
- Refine Sequence of Construction
- Plan for Procurement and Logistics
- Identify Site/Project Constraints
- Consider Weather Risks
- Deliver Construction Plan
- Consider Temporary Structures/ Utility Requirements
- Consider Options for Construction Equipment
- System Turnover Sequence

Refine Schedule & WBS Development
- Level 2:
  - E > by discipline
  - P > by commodity
  - C > by discipline
  - Preliminary IWP release plan

CWP Boundary Development
- Plot Plan or General Arrangement Drawings
- Construction Plan
- Contracting/Procurement Execution Plan
- Sequence of Installation
- Trades People Available
- WBS
- Geographical Layout of Systems/Areas
- Materials of Construction
- Client/Contractor Contract Milestones
- System Turnover Sequence

EWP Boundary Development
- Consideration for Modular Construction
- Consider Construction Feedback
- Define EWP Standard

Project Definition
- Define Overall Scope of Work/Project
- Define Contracting and Procurement Plan
- Define Construction Sequencing
- Technical Deliverable Requirements
- Levels of Design

Engineering Planning
- Plan for Work Packaging
- Review Contracting Plan
- Review Sequence of Construction
- Review Project Definition Deliverables
- Review Procurement Plan
- General Arrangement / Plot Plan
- Technology Plan
Recommended Practice Model

Integrated Enhanced Work Packaging Flowchart

STAGE I
Preliminary Planning/Design

- Project Definition
- Construction and Engineering Planning
- Refine Schedule & WBS Development
- CWP and EWP Boundary Development

STAGE II
Detailed Engineering

- Schedule Development
- Engineering
- Detailed Construction Schedule

STAGE III
Construction

- IWP Development & Execution
- System Turn-overs / Start-up & Commissioning

Definitions
Practice Model
Tools
Case Studies
Stage II: Detailed Engineering

STAGE II
Detailed Engineering

Schedule Development

Detailed Level 3:
E > by discipline, by EWP
P > by commodity,
by construction
need date

Preliminary Level 3:
C > by CWP

Engineering

Execute EWP Standard

Detailed Construction Schedule

Final Level 3
Recommended Practice Model

Integrated Enhanced Work Packaging Flowchart

STAGE I
Preliminary Planning/Design

- Project Definition
- Construction and Engineering Planning
- Refine Schedule & WBS Development
- CWP and EWP Boundary Development

STAGE II
Detailed Engineering

- Schedule Development
- Engineering
- Detailed Construction Schedule

STAGE III
Construction

- IWP Development & Execution
- System Turn-overs / Start-up & Commissioning

Definitions  Practice Model  Tools  Case Studies
Stage III: Construction

1. Create IWP.
2. Create release.
3. Send sequence and content of IWP to Document Control.
5. Close out.

- Remove items not completed.
- Leave in field until completion.
- Yes Complete No
- Monitor completion status in the field.
Tools

1. Assessment Tool
2. IWP Checklist
3. Scorecard
Case Studies

Ten case studies
» Identified current practices
» Determined ranges of implementation
» Documented lessons learned
» Performed validation

Several industries
» power
» oil & gas
» government
» commercial
RT 272 Contributions: A Model for Enhanced Work Packaging

Definitions  Practice Model  Tools  Case Studies

Productivity & Predictability
Thrust Areas:

a. Process & Functional
b. Contracts
Thrust Areas:

a. Process & Functional
CONSOLIDATING COAA BEST PRACTICE AND CII IR272-2

Enhanced Work Packaging: Design through Workface Execution

Advanced Work Packaging
COAA WFP INTEGRATION FLOWCHARTS

Integrated Enhanced Work Packaging Flowchart

**STAGE I**
**Preliminary Planning/Design**
- Project Definition
- Construction and Engineering Planning
- Refine Schedule & WBS Development
- CWP and EWP Boundary Development

**STAGE II**
**Detailed Engineering**
- Schedule Development
- Engineering
- Detailed Construction Schedule

**STAGE III**
**Construction**
- IWP Development & Execution
- System Turn-overs / Start-up & Commissioning

Advanced Work Packaging
COAA & CII FLOWCHARTS

- Thorough comparison and review of:
  - COAA WorkFace Planning Integration Flowchart
  - CII WorkFace Packaging Integration Flowchart
  - COAA CWP Chart
  - CII IWP Lifecycle Chart
- Ties to organizational functional requirements
- Ties to individual capabilities and responsibilities

Advanced Work Packaging
TEMPLATES AND GO-BYS FOR WORK PACKAGING

- CWP Template
- EWP Template
- (F)IWP Template
- Other supporting examples and templates
OTHER ENHANCEMENTS AND FOCUS AREAS

- Reviewing terminology and definitions
- Simple Project
  - Single Construction Work Area
  - Multiple CWP’s & EWP’s
  - Demonstrate Correlation between CWP/EWP & CWP/(F)IWP

Advanced Work Packaging
Thrust Areas:
b. Contracts
OBJECTIVE

The implementation of Advanced work packaging will need to be an Owner driven program. As a result it will be necessary to provide direction to contractors through bidding documents and contracts. The COAA/CII joint venture Contracts Team will:

1. Review contractual requirements and contracting strategies,
2. Suggest what issues contracts should include,
3. Determine how workFace Planning should be included in various forms of executions strategies

Advanced Work Packaging
SCOPE FOR CONTRACTS TEAM

The Contracts Team will provide the following:

1. Review requirements of Advanced Work Packaging and determine those issues that would require a directive from Owner.

2. Develop a report that will provide recommendations for the application of Advanced Work Packaging in the development of bid documents or contracts for engineering, procurement and construction.
CROSS FUNCTIONAL INTERFACES

Owner/Project Management

Engineering

Construction

Advanced Work Packaging

Procurement

Advanced Work Packaging
### Advanced Work Packaging Planning: Contractual Deliverables by Stage

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scorecard D</td>
<td>1</td>
<td>1</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contractor qualification scorecards</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1,3</td>
<td>1</td>
<td>1,5</td>
</tr>
<tr>
<td>Audit tool</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Swim lanes</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contracting</td>
<td>1</td>
<td>1</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Enhanced WP</td>
<td>1</td>
<td>4</td>
<td>2,3</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Integrative</td>
<td>1</td>
<td>4</td>
<td>1,2,3</td>
<td>3</td>
<td>1,5</td>
<td>5</td>
</tr>
<tr>
<td>CWP</td>
<td>1</td>
<td>4</td>
<td>1,3</td>
<td>3</td>
<td>1,5</td>
<td>5</td>
</tr>
<tr>
<td>EWP</td>
<td>1</td>
<td>4</td>
<td>1,2</td>
<td>-</td>
<td>1,5</td>
<td>-</td>
</tr>
<tr>
<td>WBS (Aligned schedule with WBS)</td>
<td>1</td>
<td>4</td>
<td>1,2,3</td>
<td>-</td>
<td>1,5</td>
<td>-</td>
</tr>
<tr>
<td>Organization</td>
<td>1</td>
<td>1,4</td>
<td>2,3</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Material Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workface Planning (IWP Plan)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress measurement by CWP</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>by EWP</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>by IWP</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
</tbody>
</table>
PATH-FORWARD

1. Assessment Tool
2. IWP Checklist
3. Scorecard
Survey
The questions of the survey are divided into 4 sets of questions:

A. Participants’ background
B. WorkFace Planning knowledge and resources
C. Perceptions of WorkFace Planning
D. Barriers to implementation
## A. Participants' background

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who are you?</td>
<td>1. Owner</td>
</tr>
<tr>
<td></td>
<td>2. Construction Contractor</td>
</tr>
<tr>
<td></td>
<td>3. Engineer</td>
</tr>
<tr>
<td></td>
<td>4. Vendor/supply chain</td>
</tr>
<tr>
<td></td>
<td>5. Other</td>
</tr>
<tr>
<td>What is your role in the company?</td>
<td>1. Executive</td>
</tr>
<tr>
<td></td>
<td>2. Construction Management</td>
</tr>
<tr>
<td></td>
<td>3. Engineering</td>
</tr>
<tr>
<td></td>
<td>4. Project management</td>
</tr>
<tr>
<td></td>
<td>5. Project Controls</td>
</tr>
<tr>
<td></td>
<td>6. Workface planner</td>
</tr>
<tr>
<td></td>
<td>7. Other</td>
</tr>
<tr>
<td>What is your main business?</td>
<td>1. Oil &amp; Gas</td>
</tr>
<tr>
<td></td>
<td>2. Mining and Metals</td>
</tr>
<tr>
<td></td>
<td>3. Power</td>
</tr>
<tr>
<td></td>
<td>4. Government</td>
</tr>
<tr>
<td></td>
<td>5. Infrastructure</td>
</tr>
<tr>
<td></td>
<td>6. Other</td>
</tr>
<tr>
<td>Where does your company do business?</td>
<td>1. Alberta only</td>
</tr>
<tr>
<td></td>
<td>2. North America only</td>
</tr>
<tr>
<td></td>
<td>3. Global</td>
</tr>
</tbody>
</table>
B. WorkFace Planning knowledge and resources

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your knowledge of WorkFace Planning?</td>
<td>1: None</td>
</tr>
<tr>
<td></td>
<td>2: A little</td>
</tr>
<tr>
<td></td>
<td>3: Average</td>
</tr>
<tr>
<td></td>
<td>4: A lot</td>
</tr>
<tr>
<td>Are you familiar with COAA WFP documents?</td>
<td>1: No</td>
</tr>
<tr>
<td></td>
<td>2: A little</td>
</tr>
<tr>
<td></td>
<td>3: A lot</td>
</tr>
<tr>
<td>Have you ever used the COAA WFP Scorecard?</td>
<td>1: No</td>
</tr>
<tr>
<td></td>
<td>2: Yes</td>
</tr>
<tr>
<td>Were you familiar with the CII Enhanced Work Packaging resources before today?</td>
<td>1: Never heard about it</td>
</tr>
<tr>
<td></td>
<td>2: Heard about it but did not read it</td>
</tr>
<tr>
<td></td>
<td>3: Read it</td>
</tr>
</tbody>
</table>
## C. Perceptions of WorkFace Planning

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your experience with WFP per COAA/CII definitions?</td>
<td>1 Have not used</td>
</tr>
<tr>
<td></td>
<td>2 I don’t know</td>
</tr>
<tr>
<td></td>
<td>3 Have participated in a single project</td>
</tr>
<tr>
<td></td>
<td>4 Have participated in multiple implementations</td>
</tr>
<tr>
<td>Are you already implementing WorkFace Planning?</td>
<td>1 Yes (formal/ documented process)</td>
</tr>
<tr>
<td></td>
<td>2 Yes (Informal process)</td>
</tr>
<tr>
<td></td>
<td>3 No</td>
</tr>
<tr>
<td></td>
<td>4 I don’t know</td>
</tr>
</tbody>
</table>
## WorkFace Planning perceived advantages

<table>
<thead>
<tr>
<th>Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which area do you see as the biggest benefit of WFP?</td>
<td>1 Predictability</td>
</tr>
<tr>
<td></td>
<td>2 Communication</td>
</tr>
<tr>
<td></td>
<td>3 Productivity</td>
</tr>
<tr>
<td></td>
<td>4 Quality</td>
</tr>
<tr>
<td></td>
<td>5 Safety</td>
</tr>
<tr>
<td></td>
<td>6 Alignment between stakeholders</td>
</tr>
<tr>
<td></td>
<td>7 Reduces field rework</td>
</tr>
<tr>
<td></td>
<td>8 Reduced Engineering rework</td>
</tr>
<tr>
<td>Which area do you see as the biggest benefit of Advanced Work Packaging (early planning and engineering coordination with construction plans)</td>
<td>1 Predictability</td>
</tr>
<tr>
<td></td>
<td>2 Communication</td>
</tr>
<tr>
<td></td>
<td>3 Productivity</td>
</tr>
<tr>
<td></td>
<td>4 Quality</td>
</tr>
<tr>
<td></td>
<td>5 Safety</td>
</tr>
<tr>
<td></td>
<td>6 Alignment between stakeholders</td>
</tr>
<tr>
<td></td>
<td>7 Reduces field rework</td>
</tr>
<tr>
<td></td>
<td>8 Reduced Engineering rework</td>
</tr>
</tbody>
</table>
### D. Barriers to implementation

| 1. Significant barrier/ challenge (prevents WFP implementation) |
| 2. Moderate barrier (limits effective WFP execution) |
| 3. Limited barrier (can be overcome during the WFP implementation process) |
| 4. Not a barrier |

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown Cost/ROI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Too much up-front spending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived increased indirect costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Too difficult to understand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Too big a culture shift; resistance to change;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering doesn’t work this way (tradition/culture/competition)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource capability/skills lacking in my organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owners lack skills / responsiveness to make decisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner PMO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owners cannot drive the process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D. Barriers to implementation

1. Significant barrier/ challenge (prevents WFP implementation)
2. Moderate barrier (limits effective WFP execution)
3. Limited barrier (can be overcome during the WFP implementation process)
4. Not a barrier

<table>
<thead>
<tr>
<th>Issue</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFP not in contract; lacks contractual clarity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contracts don’t support integrated teams/outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of definition around standard procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing tools and systems don’t support WFP processes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software not available</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data and information protocols prevent data sharing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Questions & Answers
Wrap up
Thank you!