COAA AWP Scalability Project

Release of the Report

Featuring: The COAA AWP Scalability Project Steering Committee
(Lloyd Rankin, Randy Friesen, Jeremy Furzer, Kirk Harris, Ben Swan and Ryan Posnikoff)
• Committees and Chairs
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• AWP Update
• AWP Principles versus Practices
• Categorizing Projects
  o Type
  o Complexity
• Project Screening Tool
• Project Categories
  o Category A – Type 1 Unfamiliar/ Low Complexity
  o Category B – Type 2 Familiar/ Low Complexity
  o Category C – Type 1 Unfamiliar/ High Complexity
  o Category D – Type 2 Familiar/ High Complexity
## Committees and Chairs

<table>
<thead>
<tr>
<th>Committee</th>
<th>Chair</th>
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<tbody>
<tr>
<td>Steering Committee</td>
<td>Lloyd Rankin (Group ASI)</td>
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<tr>
<td>Owners</td>
<td>Jeremy Furzer (Enbridge)</td>
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<tr>
<td>Engineering and Supply Chain</td>
<td>Randy Friesen (Fluor)</td>
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<tr>
<td>Front-End Construction (FEC)</td>
<td>Kirk Harris (Black &amp; Veatch)</td>
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<tr>
<td>WorkFace Planning (WFP)</td>
<td>Ben Swan (Element Industrial) Ryan Posnikoff (Bentley Systems)</td>
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<tr>
<td>Writer</td>
<td>Caitlin Lopez (COAA)</td>
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The committees are composed of over 40 professionals from the owner, and engineering, supply chain and construction communities from both sides of the border.
The Challenge: Adapting AWP for smaller projects (up to 100 million)
Stages

SCALABLE ADVANCED WORK PACKAGING FLOWCHART

STAGE 1
Preliminary Planning / Design

- Project Definition and Strategy
- Construction, Engineering and Procurement Planning
- Path of Construction
- Schedule and WBS Development
- Boundary Development

STAGE 2
Detailed Engineering

- Engineering Deliverables
- Procurement Deliverables
- CWP Creation
- Detailed Construction Schedule

STAGE 3
Construction

- IWP Scoping
- IWP Creation
- IWP Execution
- Quality Control
- Turnover
AWP Overview: What Have We Done?

• 2016: Small Exploratory Team Created
• 2017: Steering Committee Established and Four Working Committees Created
• Team of 40: Owners, Engineers, Constructors, and Crafts People
• 2018: Released Draft Report
Where Are We Now?

• Identified AWP Principles
• Project Categorization based on Familiarity and Complexity
• Project Screening Tool
• Rank Assessment Matrix
• Four Project Categories
• Recommendations for Each Category
• Releasing Model
• Looking for Pilot Projects
AWP Principles: Preliminary Planning and Design

1. Determine the Project Contract Strategy “Who will design, procure, engineer, and construct the project and what contract strategy will be used?”

2. Determine the Project Scope “What will the project include and what is excluded?”

3. Determine the Path of Construction (POC) for the Project “How will the project be built?”

4. Determine how to Work Package the Project “How will the project be work packaged and managed?”
5. Determine the Project Resource Requirements
   a) Identify and supply the necessary information/engineering requirements
   b) Identify and supply the necessary permanent material requirements
   c) Identify and supply the necessary construction equipment requirements
   d) Identify and supply the necessary construction execution labor requirements
AWP Principles: Construction

6. Confirm the Project Resource Requirements are satisfied prior to execution “How will resource readiness be determined?”

7. Monitor Progress and Manage Construction “How will construction be progressed and managed including turnover, commissioning and start-up?”
AWP Practices: Must Change
Project Types:

- Project Types are Classified as Unfamiliar or Familiar Based on the following:
  - Scope of Work Familiarity
  - Project or Program
  - Project Information & Documentation
  - Permitting
  - Construction Contract Strategy
  - Equipment/Procurement Strategy
Project Types:

• Type 1 - UNFAMILAR
  o One-Off Project with More Than 50% Scope Change
  o Managed as a Single Project
  o Customized Design
  o Site Specific Regulatory Permitting Not Completed Before
  o Owner/EPC Contract Strategy
    • Formally Requests Construction Proposals, Evaluates and awards
    • Formally Requests Procurement proposals, Evaluates, and awards.
Project Types:

• **Type 2 - FAMILAR**
  - Duplicate Project with Less than 50% Scope Change
  - Managed as Program
  - Standardized Design
  - Site Specific Regulatory Permitting Has Been Done Before
  - Owner/EPC Contract Strategy
    - Partnered with Select General Contractors
    - Procurement is approved with previous Vendors
Project Complexity:

- Project Complexities Classified as Low or High Based on the following Conditions:
  - Greenfield vs. Brownfield Project
  - Number of Construction Work Areas
  - Number of Disciplines
  - Number of Work Shifts
  - Type of Tie-Ins - Hot Work vs. Shut Downs
  - Geotechnical Conditions
Project Complexity:

• Complexity - Low
  o Greenfield – No Previous Facilities Exists
  o 1 to 2 Construction Work Areas
  o Small Number of Disciplines – Less than 4
  o Tie-Ins Do Not Require a Shut Down or Loss of Production
  o Crane Lifts are Standard Operation
  o No Ground Water Dewatering or Rock Excavation is Required
Project Complexity:

• Complexity - High
  o Brownfield – New Site Development or New Development Interface with Existing Facility
  o 3 or More Construction Work Areas
  o Large Number of Disciplines – 5 to 6 or More
  o Tie-Ins Do Not Require a Shut Down or Loss of Production
  o Critical Crane Lifts are Required Operation
  o Ground Water Dewatering or Rock Excavation Required
### Project Screening Tool

#### COAA AWP - SCALABLE

**Construction Familiarity & Complexity Screening Tool**

<table>
<thead>
<tr>
<th>Level Rank Matrix</th>
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</thead>
<tbody>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Repetitive</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Question</th>
<th>Complexities (Risks)</th>
<th>Description</th>
<th>Type or Complexity</th>
<th>Screening General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is Scope of Work (SOW) similar to previously executed projects?</td>
<td>SOW Familiarity</td>
<td>Duplicate project with scope of work similar to previously executed projects and has &lt;50% scope change</td>
<td>TYPE 1</td>
<td>Record key decisions and actions</td>
</tr>
<tr>
<td>2</td>
<td>Will the development be managed as a program, portfolio or project?</td>
<td>Project execution efficiency</td>
<td>Managed as a Project</td>
<td>TYPE 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Are the work packages reusable for this project?</td>
<td>PWP/CWP production efficiency</td>
<td>Standardized design or &gt;30% engineering and construction work packages are recycled from previous projects.</td>
<td>TYPE 1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Regulatory and permitting requirements</td>
<td>CS&amp;E, Regulatory, Reputation</td>
<td>Executive team has successfully completed project specific regulatory permitting requirements.</td>
<td>TYPE 1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What type of construction contract is planned?</td>
<td>Project execution efficiency</td>
<td>Owner or EPC has partnered with select general contractors and assigns construction on a highest value basis</td>
<td>TYPE 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>How is equipment and materials purchased?</td>
<td>Project execution efficiency</td>
<td>Owner or EPC purchase equipment and material from an approved vendors list</td>
<td>TYPE 1</td>
<td></td>
</tr>
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## Project Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Complexity</th>
<th>Rank</th>
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<tbody>
<tr>
<td>Category A</td>
<td>Unfamiliar / Low Complexity</td>
<td>Medium Rank</td>
</tr>
<tr>
<td>Category B</td>
<td>Familiar / Low Complexity</td>
<td>Low Rank</td>
</tr>
<tr>
<td>Category C</td>
<td>Unfamiliar / High Complexity</td>
<td>High Rank</td>
</tr>
<tr>
<td>Category D</td>
<td>Familiar / High Complexity</td>
<td>Medium Rank</td>
</tr>
</tbody>
</table>
1. Project Contract Strategy

**Category A**
- Bid Process: Engineering Firm CM by Owner Local General Contractor
- Pre-approved contractors, no-bid
- Cost-reimbursable

**Familiar Low Complexity**
- Engineering Firm CM by Owner Local General Contractor
- Pre-approved contractors, no-bid
- Mixed: Cost-reimbursable / Lump-sum

**Unfamiliar High Complexity**
- Formal Bid Process
- Could be EPC, EP – C, E – P – C, etc
- Payment likely cost reimbursable

**Familiar High Complexity**
- Formal Bid Process: accelerated due to familiarity
- Could be EPC, EP – C, E – P – C, etc
- Payment mixed
2. Determine the Project Scope

**Category A**
- Simple Project Charter and Project Management Plan – Authority to one PM
- Simple Risk Register incl. cost impacts
- Simple summary of roles and responsibilities
- Simple, high level WBS

**Familiar Low Complexity**
- Simple Project Charter and Project Management Plan - Authority to one or two PMs
- Simple Risk Register incl. cost impacts – include program coordination
- Simple summary of roles and responsibilities
- Simple, high level WBS

**Unfamiliar High Complexity**
- Detailed project charter – authority with PM
- Detailed Risk Register
- Complex Org Chart and roles/responsibilities
- Moderately detailed WBS

**Familiar High Complexity**
- Detailed project charter – Authority with PMT
- Detailed Risk Register – reviewed for each project
- Complex Org Chart and roles/responsibilities
- Moderately detailed WBS – standardized across program
3. Determine the Path of Construction

**Category A**
- Informal process – small number of stakeholders
- Few iterations
- Bottoms up estimate

**Familiar Low Complexity**
- Informal process – small number of stakeholders
- Few iterations – Focus on adapting previous PoC
- Estimating will follow Parametric Estimating or Analogous depending on program similarity

**Unfamiliar High Complexity**
- Multi-stakeholder PoC process
- Multiple iterations
- Multi-pronged estimating process

**Familiar High Complexity**
- Multi-stakeholder PoC process
- Adaptation from prior projects
- Estimating will follow Parametric Estimating or Analogous depending on program similarity
4. Determine How to Work Package

**Unfamiliar Low Complexity**
- Formal CWPs and IWP
- EWP included within CWPs
- Multidiscipline CWPs
- PWPs not required
- Package release plan not required
- Likely lower use of technology tools in design, planning and change management.

**Familiar Low Complexity**
- Formal CWPs and IWP – Replication allows for use of templated packages
- EWP included within CWPs
- Multidiscipline CWPs
- PWPs not required
- Package release plan not required
- Likely lower use of technology tools in design, planning and change management – Replication allows for use of templated tools

**Unfamiliar High Complexity**
- Formal and multiple CWA/EWP/CWP/IWP
- PWP likely
- Single-discipline packages
- Release Plans for CWPs and PWPs to suit CWP based Engineering and Construction schedule
- Likelihood of technology tools to facilitate planning and change management

**Familiar High Complexity**
- Formal and multiple CWA/EWP/CWP/IWP
- PWP likely
- Single-discipline packages
- Release Plans for CWPs and PWPs to suit CWP based schedule
- Likelihood of technology tools to facilitate planning and change management
- Replication of efforts may allow for less WFP or even shared roles
5. Determine Project Resource Requirements

**Unfamiliar Low Complexity**
- Engineering deliverables (complete with vendor data) provided prior to Construction mobilization
- Material available prior to Construction mobilization
- Construction equipment planned during preparation of IWPs
- Detailed Construction labour planning during preparation of IWPs

**Familiar Low Complexity**
- Engineering deliverables (complete with vendor data) provided prior to Construction mobilization – Replication allows for use of templated deliverables
- Material available prior to Construction mobilization – Replication allows for use of templated material
- Construction equipment planned during preparation of IWPs – Replication allows for use of templated planning
- Detailed Construction labour planning during preparation of IWPs – Replication allows for use of templated planning

**Unfamiliar High Complexity**
- EWPs, including Engineering deliverables and vendor data, issued IFC to suit CWP based Engineering schedule
- Materials Planning: aligned with PoC and PWPs issued to suit CWP based Construction schedule
- Equipment Planning: fully planned and aligned with PoC
- People: full and comprehensive PMTs and CMTs

**Familiar High Complexity**
- Replication allows EWPs, including Engineering deliverables and vendor data, to be issued IFC to suit CWA based Engineering schedule
- Materials Planning: aligned with PoC and PWPs issued to suit CWP based Construction schedule
- Equipment Planning: fully planned and aligned with PoC
- People: full and comprehensive PMTs and CMTs, WFP may plan multiple projects in programme
6. Confirm the Project Resource Requirements Are Satisfied Prior to Execution

**Unfamiliar Low Complexity**
- All deliverables issued prior to Construction mobilization – validate during IWP creation
- All material provided prior to Construction mobilization – validate during IWP creation
- Construction equipment planned during IWP creation
- Detailed Construction labour planning during IWP creation

**Familiar Low Complexity**
- All deliverables issued prior to Construction mobilization – check during IWP creation
- All material provided prior to Construction mobilization – check during IWP creation
- Construction equipment planned during IWP creation
- Detailed Construction labour planning during IWP creation

**Unfamiliar High Complexity**
- EWP issued IFC to suit detailed CWP – time lag for verification and CRA by CWP
- PWPs issued to suit detailed CWP based Construction schedule - Time lag for verification and CRA
- Equipment and Labour requirements defined by CWP – Time lag to allow for resource verification

**Familiar High Complexity**
- EWP issued IFC to suit CWA based Engineering schedule – time lag for verification of CRA
- PWPs issued to suit detailed CWP based Construction schedule - Time lag for resource verification and CRA by CWP
- Equipment and Labour requirements defined by CWP – Time lag for resource verification and CRA by IWP
7. Monitor Progress and Manage Construction

Unfamiliar Low Complexity
- WFP utilized when generating IWPs
- Construction progress measured by IWP
- QC tracking by IWP – simple transition to systems completions due to limited scope

Familiar Low Complexity
- WFP utilized when generating IWPs
- Construction progress measured by IWP
- QC tracking by IWP – simple transition to systems completions due to limited scope

Unfamiliar High Complexity
- WFP will be utilized for planning however may plan multiple disciplines
- Standard CM and Superintendent roles regarding supervision and execution
- Project Controls to track progress and schedule
- QC tracking and transition to systems completions and turnover follow standard methodologies

Familiar High Complexity
- WFP may be utilized across multiple, similar projects, and be multi-discipline
- In highly similar projects, duplication and review of past IWPs may take place by Superintendent or designee
- Project Controls to track progress and schedule, may be by centralized PMT group
- QC tracking and transition to systems completions and turnover follow standard methodologies
Thank You!