Scalable AWP Requirements

Advanced Work Packaging (AWP) is a project execution methodology being used by owners, contractors, and engineers to improve construction efficiency and effectiveness. AWP is accomplished by deliberately aligning planning and execution activities throughout the project lifecycle—from inception through handover.

The approach is gaining traction within the industrial sector, particularly on very large, complex projects. Some AWP implementations on large capital projects have produced significant productivity improvements and cost savings, prompting firms to consider how the approach could be scaled down to smaller projects.

To this end, Autodesk organized a series of collaborative workshops with owners and engineering, procurement, and construction (EPC) firms that were early adopters of AWP. This paper summarizes the learnings from those workshops.

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Figure 1: AWP improves construction productivity by aligning planning and execution activities throughout the project lifecycle.

Graphic courtesy of Construction Industry Institute (CII)
A brief introduction to AWP

AWP is a systematic approach to planning and executing construction projects. AWP breaks down a project into a manageable series of work packages. Each of these packages need to be constraint-free prior to release.

Successful AWP processes require coordination between myriad project stakeholders, including the owner, engineering teams, supply chain (including fabricators), and construction contractors. Early collaborative project planning supports the coordinated development of the EWPs and then CWPs, which in turn are broken into IWPs (see definitions below).

A full AWP implementation requires changes to how a project is contracted, designed, procured, and built. This deliberate planning alignment reduces down time and delays during construction—leading to improved safety, schedule, predictability, quality, and labor productivity.

Over the last 15 years, the main developers of the AWP methodology have been the Construction Industry Institute (CII) and the Construction Owners Association of Alberta (COAA), representing hundreds of industry professionals with the support of academics at multiple universities.

Studies conducted by these groups have found increases of 25 percent in labor productivity and reductions of 10 percent in total installed costs for mature AWP implementations.¹

¹ CII and COAA published numerous reports, guides, and case studies that validate the AWP approach and support its adoption, including IR272 volumes 1, 2, 3 and IR319.
What is scalable AWP?

The majority of companies that have successfully implemented and benefited from AWP have used it on large projects. Those companies were interested in how they could also apply AWP on smaller projects. To address this need, COAA delivered a Scalable Advanced Work Packaging Report in September 2018 (see COAA document number COP-AWP-PBP-XX-2018-v1).

Our Mandate

- Improving smaller projects’ ($100 million and under) outcomes through the application of Advanced Work Packaging principles.
- The objective is... maximize value through the right planning at the right time to improve project performance as measured by:
  - Productivity
  - Cost
  - Safety
  - Schedule
  - Quality
  - Predictability

COAA’s report emphasized that when owners and EPCs apply proven AWP principles to projects under $100 million, the practices must change. It provided recommendations on how to implement AWP on smaller projects without compromising the principles that delivered project performance improvements.

The report provided a set of templates and tools that can be used on smaller projects, considering key factors that can change the project delivery practices, such as the greater likelihood of:

- Brownfield construction or renovations that—unlike greenfield construction—require construction coordination with ongoing operations.
- Program-driven projects. While the individual projects may be under $100 million the purchasing and management are centralized, and the total program cost often exceeds $100 million.
- Projects that may not take full advantage of 3D design and modeling approaches and therefore must accommodate 2D design approaches.
- Smaller contractors that may not have all the tools and processes of larger contractors, which may affect contract strategies and contractor requirements.

The report also included a screening tool that uses project familiarity and complexity rankings to assess risk level. Once the project category is established, the report details how the AWP model can be applied and tailored to best meet the requirements for that type of project.
Scalable AWP workshops

Although COAA’s report did not address the issue directly, Autodesk’s customers indicated the success of AWP on smaller projects requires the adaptation of both practices and technologies. To better understand the requirements of an AWP technology platform for these smaller projects, Autodesk organized a series of collaborative workshops in the fall of 2018.

A total of four workshops were held with participants from owner companies and EPCs, most of whom were well versed in AWP and had experience on AWP projects. The workshop participants included individuals from: Chevron; Dow; Enbridge; ExxonMobil; Fluor; Ford; Bacon & Davis; KBR; Shell; Suncor; Williams; Wood; and WorleyParsons.

The workshops—facilitated by Ruckus Innovation Consulting and Group ASI—utilized discussions and interactive roundtables to discover the user personas, opportunities, actions, and requirements of a scalable AWP process and its supporting technology platform.

The outcomes from each workshop included the needs, motivations, and activities of the user personas, ranking the requirements ("critical" versus "required" versus "good to have"). Then the workshop groups assessed the perceived value of the critical requirements only, based on difficulty and impact (see figure 4). The table below presents the critical requirements of the owners and EPCs.

<table>
<thead>
<tr>
<th>Table 1: Assessment Map Summary of Critical Requirements</th>
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<tbody>
<tr>
<td><strong>Owners</strong></td>
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<tr>
<td><strong>Low Hanging</strong></td>
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<td>- Minimum possible deliverable</td>
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<tr>
<td><strong>High ROI</strong></td>
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<tr>
<td>- Visible critical path (include ops)</td>
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<tr>
<td>- Vendor data is late</td>
</tr>
<tr>
<td>- Field management mobility</td>
</tr>
<tr>
<td>- Graphical/systems-based constraint notification</td>
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<td></td>
</tr>
<tr>
<td><strong>Strategic</strong></td>
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<tr>
<td>- Safety!</td>
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<tr>
<td>- Platform agnostic</td>
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<tr>
<td>- AWP process - step by step</td>
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<tr>
<td>- Data we can trust</td>
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<tr>
<td>- Single source of truth</td>
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<tr>
<td>- Easy/immediate access to information</td>
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<tr>
<td>- Digitization of corporate practices</td>
</tr>
<tr>
<td>- ROI/reduce cost of solution</td>
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<tr>
<td>- Convince people of change benefit</td>
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Key requirements

The feedback from the workshops has been distilled into key requirements of a scalable AWP technology platform. Both owners and EPCs placed a high value on adherence to well-documented AWP processes; easy access to reliable data; constraint management; tools that enabled AWP process monitoring, tracking, and visualization; and model-based visualization of key AWP elements. Owners placed a greater value on establishing a business case and field mobility.

1. **AWP process**: There must be a consistent use of well-documented AWP processes in their organizations and on their projects. EPCs were adamant that the use of AWP processes necessitates contractual changes to the project delivery structure to ensure the early engagement and input of construction managers and vendors.

2. **Data access and ease of use**: A technology platform must provide real time, easy access to high-integrity digital project data that represents a single source of truth for all project stakeholders, in the office and in the field. All tools related to AWP must be easy to install and maintain, regardless of user persona or company stakeholder affiliation.

3. **Constraints**: Construction constraints must be identified early in the planning process to help ensure that all of the things necessary for work execution are in place before the work begins. The technology platform should consolidate and visually present all constraints for management and resolution.

4. **Monitoring, tracking, and information flow**: The technology platform must help project teams monitor and track key AWP elements such as: procurement work packages (PWP), vendor performance, requests for information, construction rework, safety metrics, and so forth. This platform must also support a structured, configurable flow of project information related to the AWP process amongst all pertinent project stakeholders to support management of change.

5. **Modeling and visualization**: The technology platform must allow owners to work with modeled data from a variety of sources to support 2D, 3D, 4D, and 5D constructability modeling and reviews without requiring the source authoring applications. In addition, the platform should provide a visual status of a variety of resources on the critical path.

6. **Business case**: For owners to build a business case for AWP on smaller projects, they must be able to convince their own company and partners of the benefit and return on investment. This business case involves balancing its potential construction cost savings against the investment required to implement AWP processes and technology. In particular, owners were adamant that technology costs for scalable AWP solutions must be reduced from traditional AWP technology costs.

7. **Field mobility**: Owners recognize the importance of accessing data related to AWP processes from the field in addition to office settings. They also recognize the benefits of reducing or eliminating paper in the field, including cost, environmental impact, and practicality. As such, scalable AWP tools must support mobile access.

Figure 5: The workshops helped Autodesk discover the user personas, opportunities, actions, and requirements of a scalable AWP process and its supporting technology platform.
Scalable AWP Requirements

Vision statements

The scalable AWP workshops concluded with the creation of both owner and EPC vision statements that will help guide the companies of the workshop participants with their implementation and execution of scalable AWP. Below are the collective visions of the owners and the EPCs from the workshops in Houston on October 4, 2018.

**EXERCISE FIVE:**
**VISION STATEMENT**
Where Do We Start?

**OWNERs**

FOR ALL OF US IN CAPEX;

WHO PROVIDE VALUE BY BUILDING SAFE AND EFFECTIVE PROJECTS;

THE **SAWPS (SCALED ADVANCED WORK PACKAGING SOLUTIONS) INITIATIVE**;

IS A QUANTUM LEAP IN EFFECTIVENESS;

THAT PROVIDES MEASURABLE GAINS AND CONTRIBUTIONS TO "NAMED" CORPORATE AND SITE PROJECT GOALS/OUTCOMES AND SAFE, RELIABLE, AND PRODUCTIVE PROJECT DELIVERY;

UNLIKE THE ACCEPTANCE THAT THE "NORM IS GOOD ENOUGH";

WE REMOVE CHAOS FROM MANAGING PROJECTS, MAKE PROJECT MANAGEMENT FUN AGAIN, AND WILL POSITIVELY CHANGE OUR INDUSTRY FOR FUTURE GENERATIONS!

**EXERCISE FIVE:**
**VISION STATEMENT**
Where Do We Start?

**EPCs**

FOR EBITA AND/OR THE ORGANIZATION'S PRESIDENT;

WHO WANT TO IMPROVE MARGINS;

THE **"SMOOTH OPERATOR" INITIATIVE**;

IS A CONSTRUCTION DRIVEN, PROJECT DELIVERY PROCESS THAT ALIGNS E&P WITH POC;

THAT IS CONSISTENT, TRANSPARENT, AND WILL ENABLE THE BUSINESS TO PRODUCE PRODUCT FOR THE MARKET FASTER AND COST EFFECTIVELY, WHILE INCREASING PROFITS;

UNLIKE EPC'S NOT FULLY INTEGRATED AND REMAINING SILOED;

WE PREDICTABLY IDENTIFY THE OPTIMUM POC AND ALIGN OUR TEAMS WITH REAL-TIME VISUAL MODEL STATUS AT ALL STAGES, ACCESSIBLE TO ALL STAKEHOLDERS THROUGH WELL-DEFINED SYSTEMS AND PROCESSES THAT AUTOMATICALLY TALK TO ONE ANOTHER TO GUARANTEE ALIGNMENT.
Conclusion

The use of AWP on large industrial projects has already improved construction efficiency and effectiveness. COAA’s report emphasized that when owners and EPCs apply proven AWP principles to projects under $100 million, the practices must change.

Although COAA’s report did not address the issue directly, Autodesk’s customers indicated the success of AWP on smaller projects requires the adaptation of both practices and technologies. Autodesk’s goal for these workshops was to better understand the requirements of an AWP technology platform for smaller projects.

Thanks to the contributions of its customers and partners, Autodesk derived a tremendous amount of value and insights from these workshops. Going forward, Autodesk intends to continue working closely with industry to deliver a technology platform to support scalable AWP.

About Autodesk

Autodesk makes software for people who make things. If you’ve ever driven a high-performance car, admired a towering skyscraper, used a smartphone, or watched a great film, chances are you’ve experienced what millions of Autodesk customers are doing with our software. Autodesk gives you the power to make anything. For more information visit autodesk.com or follow @autodesk.

About Group ASI

Group ASI is one of the global construction industry's best-recognized, most accredited, and most experienced Advanced Work Packaging and WorkFace Planning implementation support companies. They provide expert AWP & WFP consulting to owners, engineers and constructors at all phases of the project - from concept to commissioning.

About Ruckus Innovation Consulting

Ruckus is a consulting company that guides individuals and organizations through innovation by utilizing experienced facilitation, research-informed visual and design-thinking methodologies, vision and value prototyping, implementation strategies, and collaboration workshopping.