

ISSUE 04 | BY CONCORD PROJECT TECHNOLOGIES INC.

# VELOCITY

INNOVATION AND LEADERSHIP FOR CAPITAL PROJECTS

**THE ADVANCED WORK  
PACKAGING (AWP) ISSUE**

## KNOW YOUR PATH OF CONSTRUCTION

**AWP business, project and technology considerations**

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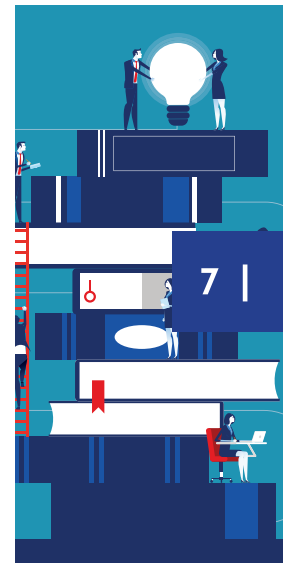
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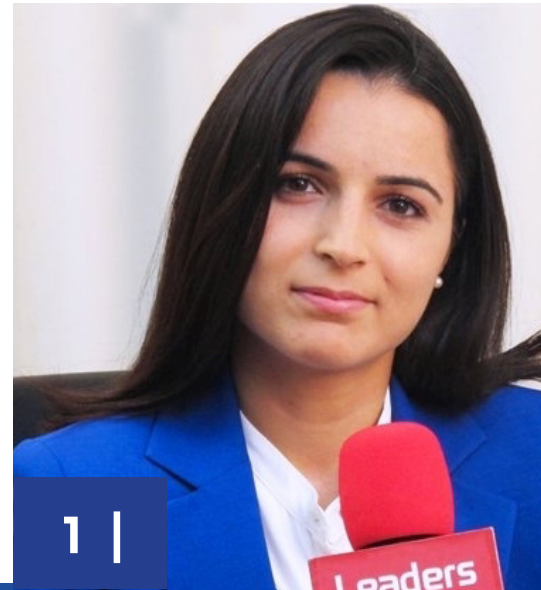
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## EDITORIAL

# Toward An Integrated Project Management Office (IPMO)

The future of your EPC organization will depend on your company's ability to deliver PREDICTABLE projects. An IPMO can ensure that.

BY OLFA HAMDİ

Why are EPC IT departments separate from our Project Management Offices?

Most capital project management professionals don't have the expertise to evaluate platforms and software/hardware solutions from a technical perspective, and most information technology teams don't have the experience to evaluate capital project technology from a project execution standpoint.

I believe this disjuncture between the PMO and the IT department is a foundational problem in our EPC industry. I'm calling for the establishment of Integrated Project Management Offices, or IPMOs, which amalgamate the work of both project management and IT under the direct supervision of business, and with the clear mandate to serve capital project needs. Gartner predicts that half of all large organizations will have such integrated (or enterprise) project management hubs by 2021.

The IPMO must have a powerful integration agenda. The foundational charter of the new IPMO will be to refine the system for efficient digital project delivery, and to set up that system for your teams. Here's how:

### Independence and authority

The IPMO must have its own substantial budget and report directly to the CEO -- not the CIO, CTO or VP of Projects, as none of these positions capture the breadth and depth of the project work undertaken by the IPMO. Fiscal independence gives the IPMO the power to lead and act beyond departmental boundaries.

### Provision of comprehensive, end-to-end support

The work of the IPMO will extend through the entire lifecycle, from business development to hand-over. Crucially, the IPMO holds a centralized dashboard of all active projects in the organization as well as monitor all paths of construction (POCs). Using this

comprehensive data, it publishes reports on the state of integration for each project, which obviate the need for outside assurance and supplant stage-gate and other contemporary processes that dictate the release of project funds.

### A distributed team

The centralized IPMO has an integration advisor on every major project. This person supplies information and guidance around implementation of the systems the IPMO has established for project work.

### Creation of the digital ecosystem required for Advanced Work Packaging

The chief practical undertaking of the modern IPMO is to create the digital ecosystem for project delivery requirements. Advanced Work Packaging, now widely regarded as an industry best practice, should be at the top of the IPMO agenda. I'd recommend that your AWP lead be the very first seat on your IPMO. Creating the digital ecosystem for any project practice means that the IPMO becomes the source for technology procurement across the entire organization.

### Development of a strong knowledge architecture

One key benefit of an IPMO is that it creates an ideal environment for the development and execution of enterprise knowledge management. A meaningful and cohesive application of best knowledge management practices helps facilitate better project decision-making and risk management.

In sum, I believe that, in the midst of the EPC digital transformation, integration is key to keeping costs under control, delivering projects on time and creating a healthier capital project economy. We must abandon our old paradigms and reimagine the way we form our capital project organizations, not just the way we staff our projects. The IPMO is part of the solution. 🌐



# DEFINING ADVANCED WORK PACKAGING

Comprehensive definitions for teams that are new to Advanced Work Packaging

BY THE CONCORD AWP SUPPORT TEAM



Early in the journey to implementing Advanced Work Packaging, many companies struggle to find a clear, easy-to-understand explanation of key concepts. In another article we'll explain the most important new roles in an AWP team, and here we'll define key terms. We'll start with the basics and get more in-depth as we go.

## i. Advanced Work Packaging

Advanced Work Packaging is a construction-driven planning and collaboration system for building capital projects that is sharply focused on creating a constraint-free work environment in the field. It requires that detailed work packages be created early in the project lifecycle; i.e., in advance. These work packages must be informed by a Project Execution Plan and a detailed Path of Construction and supported by a comprehensive and disciplined stakeholder integration. Removing field constraints -- ensuring that people have the equipment, materials, and instructions to complete their work -- reduces idle time, increases labor productivity and improves project outcomes. For these reasons, AWP is currently considered a best practice in the field of capital construction.

### How is AWP different from standard work packaging?

Standard work packaging is not construction-driven. Standard systems bring in construction leaders just before the shovels go into the ground, whereas AWP requires that construction leaders be involved in planning from the outset. Standard systems organize work packages around engineering, design or a myriad of other drivers, whereas AWP requires that work packages be organized solely around the Path of Construction.

## ii. Construction Work Package (CWP)

A Construction Work Package is comprised of roughly 40,000 hours of project work, but different companies may set this benchmark higher or lower, depending on the size and scope of the project. The CWPs are created by the project and construction management teams in collaboration with the project Owner and then delivered to the Workface Planners in accordance with the established Path of Construction. The Workface Planners then divide the work into Installation Work Packages (IWP).

## iii. Installation Work Package (IWP)

An Installation Work Package is the smallest type of work package on an AWP project.

It contains a scope of work that allows a specific trade crew to operate independently for a specified period of time. The length of time is flexible: Some companies size their packages at a week, others size them to a day. Workface Planners aim to create a constraint-free work environment by ensuring that crews have all the materials, equipment and information they need to execute an IWP. Achieving this requires highly integrated project delivery system in which engineering, procurement, and construction professionals are working in concert.

## iv. Workface Planning (WFP)

The workface is the point at which the project execution plan evolves into executable tasks. Workface Planning is the process of breaking down the high-level Construction Work Packages into discrete Installation Work Packages for execution in the field. The goal of the Workface Planner is to ensure that field crews have everything they need to complete their work, including tools, materials and construction specifications. The role of Workface Planner is critical to AWP and typically executed by a civil, structural or mechanical engineer with field experience, or a tradesperson with engineering experience.

## v. Integration Management (IM)

Integration Management is the work required to standardize data collection and streamline information sharing among project stakeholders, in service of project goals. The overarching objective of IM is to improve stakeholder collaboration by breaking down information silos and facilitating timely access to accurate, up-to-date information. This work involves all data (engineering and non-engineering), extends across all stakeholder organizations (from owner to contractor to supplier), impacts operations in all areas (office and field) and continues through the entire project lifecycle. Integration management is sometimes called information or knowledge management.

How is integration management different from document control? Unlike document controllers, integration managers have the mandate and authority to question, redesign, assess and improve everything from established data flows to the organization of unstructured data. In other words, integration management goes well beyond the identification and storage of key records and works to improve the company's knowledge architecture and collaborative systems. Integration management is about sustainable knowledge management across all stakeholder groups.



# Advanced Work Packaging: Who Does What?

**Implementing AWP is a process. It will bring changes to long-standing roles, and silos will have to be connected.**

**BY CONCORD RESEARCH TEAM**

"How will my job change if my company adopts Advanced Work Packaging?" In nearly a decade at the forefront of AWP research and training, this is the question we hear most often from people working on the front lines in capital construction.

Change can be challenging, even for the most progressive and ambitious thinkers in your company. Some of these people will see changing organizational structures as an opportunity, but just as many -- perhaps many more -- will greet AWP with worry and resistance.

So the first step is to consider where you're starting from. Only then can you establish a baseline for understanding how AWP will impact your organization -- and the jobs of those who work there.

## **Traditional Roles vs. AWP Roles**

A traditional capital construction team will typically have a project manager at the center surrounded by discipline leads, construction, and procurement professionals. There will be operations and maintenance teams, assurance teams and a host of supporting functions. These critical core positions make up the

backbone of every good, integrated project team.

When adopting AWP, many companies find they already have the skills in-house to staff for AWP roles and put AWP into practice. Others find they need to hire from outside. Regardless of where you fall on the spectrum, these are the three most important AWP-specific roles you'll want to create as you embark on your first AWP implementation:

## **1 | The AWP Champion**

The person you choose as your AWP champion is at the epicenter of your new work packaging program and the key to its success. She is the central point of contact for AWP implementation: She'll be the main driver behind all of your integration efforts, and the person responsible for fostering a spirit of collaboration that encourages the entire team to get on board.

Implementing AWP is a process. It will bring changes to long-standing roles, and silos will have to be broken down. Your AWP champion needs to be both a resource for information, a source of practical assistance, and a skilled motivator - a true servant

leader. Ultimately, the measure of your champion's success is how well your team implements AWP -- a tall order.

This can be a challenging role to fill, and many companies find themselves looking to the project manager, the construction manager or experienced members of the engineering team. Another option is to hire an outside advisor who specializes in the transition to AWP. In the latter case, it is critical you assign someone within your project organization to accompany the AWP champion to learn from them and ensure the transfer of the know-how. AWP needs to be owned and piloted from within.

Regardless of who you choose for this critical role, the person must have real, formal authority across the entire project team and throughout the entire project lifecycle. An AWP champion cannot simply be an "advisor" who makes "recommendations" -- people won't change. The reality is that old habits die hard. You brought in your AWP champion to slay them. Give her a sword.

The most common way to do this is by creating a reporting structure that makes the AWP champion a direct report to the project sponsor -- or, at the very least, the





project manager. As a direct report, she'll have default authority.

## 2 | The WorkFace Planner

The WorkFace Planner is another critical position that is unique to AWP organizations. He sits between the office and the field and is responsible for planning your work packages.

To do this, the WorkFace Planner receives and organizes all of the materials and information coming in from multiple office teams, including engineering and procurement. He then uses this information to develop comprehensive, actionable work packages that can be efficiently executed in the field. It's some serious heavy-lifting and requires a deep understanding and a strong skill set.

When looking to hire a WorkFace Planner, many companies find themselves looking to site planners and engineers with a lot of experience and a good understanding of the construction sequence, along with planning experience and competencies. This is a critical link -- you'll want to make it a strong one.

One of the key benefits of AWP, overall, is that many companies realize for the first time that they don't have anyone actively coordinating communication between the office and the field. This alone can have a powerful impact on

productivity and efficiency across the entire project lifecycle.

## 3 | The Integration Manager

The Integration Manager role is not defined in CII's formal practice model for AWP, which was developed in 2013. However, in the intervening years, technology has come to play a much a bigger role, and we've noticed that the lack interoperability in our industry is preventing AWP from reaching its full potential. In short, it has become clear that this new and evolving role is critical to making AWP implementation a success.

The fact is that on a multi-billion dollar project, there will be millions of gigabytes of information exchanged between hundreds of people. AWP is about integration, and about establishing and maintaining a single source of truth. If we're going to achieve that lofty goal, someone has to make it their full-time job.

Known variously as information manager or data manager, we advocate for the Integration Manager role as being the person responsible for the day-to-day flow of information, the integration of data sources to the 3D model as well as consistent documentation of both the engineering and non-engineering information.

Her goal is to ensure not only that the information available to all teams is

accurate and up-to-date, but that the right information is being shared at the right time, which is consistent with being a gatekeeper for the information workflows. Like a document manager, the Integration Manager will be responsible for keeping track of thousands of documents exchanged during the course of a project and ensuring their content is consistent with the success requirements of a project. However, she'll also intervene to facilitate the exchange of information she deems critical, and to open up communication where she deems it necessary.

Ultimately, your Integration Manager is responsible for streamlining the exchange of information and fostering collaboration between departments, beyond the traditional corporate boundaries. It's a key function that stretches between and among departments, contractors, and other key stakeholders. She'll have the mandate and authority to question everything from established workflows to the organization of unstructured data, and she'll provide sustained knowledge management across all departments, throughout the project lifecycle.

Establishing these three roles will get you well on your way to implementing Advanced Work Packaging, and benefiting from the tremendous efficiencies the methodology offers. Start today! 🚀

# 6 Signs You've Lost Your Way on the Path of Construction

Your Path of Construction has the power to drive incredible efficiencies. Are you making the most of it?

BY CONCORD RESEARCH TEAM

Most owner companies now acknowledge that the most efficient project delivery systems are driven by the demands of construction.

This realization has prompted many Owner and EPC companies to embrace practices that support construction-driven delivery. Many continue to refine the Path of Construction efforts by honing the sequence of construction work areas and packages with improved construction execution logic and smarter installation planning.

Still, the practice is still in its infancy and many companies aren't doing all they could to improve efficiencies. Here are six signs you've lost your way on the Path of Construction:

## 1 | You don't have a construction manager on board from the start.

Even companies that understand the importance of construction-driven project delivery continue to hire the construction manager two or three months before construction starts. It's a seminal mistake. Construction-driven engineering and procurement work packages require the application of deep construction expertise -- from the very beginning. Hire your construction

manager early. Get them engaged in the front-end loading phase. They should be a key contributor to your construction execution strategy or plan.

If you don't have your construction manager on board early on, your Path of Construction may not hold. And that is a recipe for cost overruns and delays.

## 2 | You haven't identified the major equipment constraints on-site.

Many companies still set out a Path of Construction without fully accounting for site constraints, particularly as they apply to major equipment. What is the availability of major engines, and how will they access the site? We've written before about how understanding site conditions is key to front-end definition, and it's critical that these learnings be incorporated into the Path of Construction. Otherwise, it may not hold.

## 3 | You don't know key supply chain dates.

Most equipment and materials are delivered in accordance with a schedule monitored by your

procurement team. We are always surprised by how many companies haven't taken these delivery dates into account when defining the Path of Construction. If you don't know your key supply chain dates, you can't evaluate the impact on your POC, and you're bound to run unnecessary risks as a result. Run your Path of Construction by your procurement teams and make sure your assumptions are aligned with the availability of material and equipment on site.

## 4 | Your Path of Construction isn't aligned with your contracting matrix.

On most projects, the Path of Construction and the contracting strategy are developed simultaneously, but that's no excuse for a POC that fails to take the contracting matrix into account. In practice, contract scopes often influence (or even determine) the definition of construction work packages, and vice-versa. Developing a POC without considering your contracting strategy is a recipe for disaster.

Make it a priority to incorporate your contracting matrix into your Path of Construction, even if both are still in draft form. Later, when everything



starts to firm up, go back and make sure the Path of Construction still holds. Schedule regular POC updates every two or three weeks, and make sure your project manager, engineer, construction manager and AWP representative are all there. The key is to stay in risk identification and interface clarification mode at all times. That's the recipe for success.

## **5 | You think Constructability Analysis and Path of Construction are the same thing.**

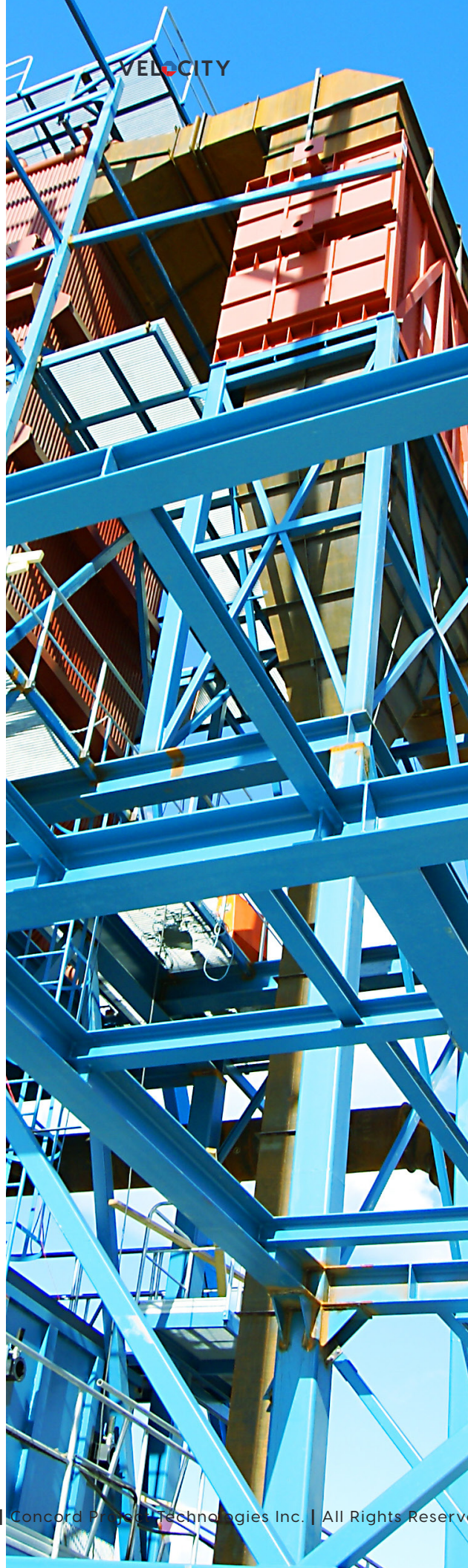
Constructability is a foundational component of construction management theory, and chances are you're already doing constructability reviews as a Value Improvement Practice. It's important, but it's not the same thing as a Path of Construction.

Fundamentally, constructability is about "how to" and POC is about "when to." Your constructability analysis helps you to figure out which construction techniques are relevant to your scope. What material will you need? What technique will you use? Are we welding on-site or off-site? By contrast, Path of Construction is about when you will take each step, and in what sequence. What date will the materials arrive? Will the required engines be on-site at the correct time? When will the welded materials be ready for installation?

## **6 | Your POC is sitting on a shelf. Somewhere.**

In Velocity's third issue, we wrote about the incredible organizational benefits of a live Project Execution Plan, and The Path of Construction is a key component of this critical document. It should be updated and consulted regularly by both office and field teams. Your project manager should be meeting with your construction manager and engineer at least once every week or two, to review and refine the POC (and the live PEP).

A Path of Construction is only as useful as the information contained within it - keep it alive! 🇺🇸





# Managing Project Requirements for **Advanced Work Packaging**

**Leverage the benefits of effective requirements management with these three easy steps.**

**BY KHALIL AISSAOUI**

Project requirements are constantly changing, and managing those changes is one of the most challenging tasks in capital project management. We've written before about change control processes, but we've never pulled together some basic change control guidelines specifically for managing project requirements and helping capital project managers who are practicing Advanced Work Packaging (AWP). It's long overdue.

Our industry could benefit from a standard widely used in the Information Technology industry: the Capability Maturity Model Integration (CMMI) standard. CMMI was developed at Carnegie Mellon University as a training and appraisal program that is used to guide companies in improving their processes.

In this article, we've distilled some of the most important CMMI concepts into three steps that any project manager can take to make AWP even more practical and efficient. Apply them, and you'll become a superhero to your team.

## **1 | Formally define your change-request process.**

When your change request process is out of whack, the entire project is at risk of cost overruns and major delays. How do you know if your change request process is weak? Well, if your scope statements have different technical requirements, that's a big red flag. Other signs include inter-departmental confusion about basic project requirements and team members wasting time trying to track down specifications for their work. The solution is a formal change request process.

First, you need a single source of truth (SSOT) -- a place where you keep the most up-to-date answer to key questions about requirements (and everything else). Second, you need a formal change control process in place, which defines how changes are requested and who must approve them. Third, you'll need a system for propagating the change across stakeholders, from client to contractor. Finally, make sure you're tracking changes throughout the entire lifecycle of the requirement, so you can look back and see who made which decisions, when, and why.



## **2 | Measure the impacts of change.**

You need a system to measure the impacts of change. The foundation of this system is creating consensus on the definition of done.

Here's how it works. Before you break ground on a new project, establish a checklist that answers this simple question: "How will we know when we are done?" Identify the requirements that must be met -- from both a technical and from a project execution perspective -- in order for the work package to be considered complete. Get all of your key stakeholders to sign off on this list and voila, you have consensus around the definition of done.

How does this help you measure the impacts of change? When you've achieved alignment around what "done" means, you've created a definitive list of requirements for your project. A well-oiled change control process will allow you to consider proposed changes in light of these requirements, providing



clear insight into the impact your changes will have on timelines, costs and other variables that matter to you.

The result is a simple, effective way to understand how changes are impacting your timeline -- and your bottom line.

### 3 | Establish fully traceable decision-making.

Fully traceable decision-making means tracking five key variables:

- Who made the decision
- When they made the decision
- Why they made the decision that they did
- The impact of the decision
- Who needs to take action

The goal of traceable decision making is to be able to explain why decisions are made and how they affected the project as a whole -- with precision, and in real time. This is an integral part of your overall change request process, and while it looks a lot like the risk register, this "decision register" is a different beast entirely.

Whereas your risk register captures and assigns responsibility for project-related risks, a decision register is a concept taken from CMMI in which you capture responsibility for decisions that are made concerning project requirements -- both technical and execution-related. Tracking changes across both of these domains gives unrivaled visibility into

### Pro tip:

Many companies only track changes for technical requirements, and that's a mistake. Smart companies also track and manage changes to project execution requirements. For example, what requirements need to be met in order for a work package to be considered "complete?"

the project, so everyone from owners to sub-contractors fully understands what is changing and why. This allows teams to be proactive, nimble and more effective in their work, especially if they can gather this information with ease from a SSOT.

In addition, your decision register will provide a powerful tool for learning down the road -- about what works, and what doesn't. 🇧🇪



# Knowledge Architecture, Defined

Pioneering knowledge architect David Meza of NASA shows you how to transform your organization with connected knowledge.

**David Meza | Chief Knowledge Architect, NASA | Velocity Contributor**

Our world is awash in digital information. Your team generates a tremendous amount of raw data every day, and if you're like most organizations, you're not leveraging that data in ways that can meaningfully support your goals.

It's not that you don't understand the importance of data -- most organizations do. They have IT professionals and data scientists and perhaps even a knowledge manager or two. Still, the vast majority of organizational data remains locked away in disconnected silos, and the information that does trickle out fails to provide the insight you need. Fundamentally, this is because our thinking around knowledge management is stuck in the pre-digital age. We need to update our knowledge management paradigms to reflect the realities faced by modern, complex organizations in a digital world.

You can't solve a problem with the same kind of thinking that created it.

## **Connect your data with a knowledge architecture**

The solution is to develop, implement and institutionalize a knowledge architecture (KA). Simply put, a knowledge architecture is a framework that allows you to turn raw data into actionable knowledge. More broadly, knowledge architecture is a system that allows you to connect all the bits and pieces of data scattered throughout your organization, and transform them into a powerful tool that can help you make smart effective decisions that support your priorities.

Developing a strong knowledge architecture gives you an opportunity to look at what kind of data you're generating across the organization, why you're

creating it, and how. Looking at data generation from a 10,000-foot perspective allows you to resolve interoperability issues in advance. More importantly, it allows you to create a meaningful plan to leverage your data in new and powerful ways that will serve your organization and your partners in the long term.

I've been working in this field for more than 20 years, and the fact is that most organizations still aren't doing a very good job at this. Many businesses have people working in knowledge management, informatics and data science groups, but we still see data silos that don't communicate with each other. In some cases, these groups even throw data over the wall to one another, but too often they're speaking different languages.

Unfortunately, miscommunication around data can cause big problems. Companies



end up making decisions with old, incomplete information that is riddled with errors. In fact, surveys show that up to 54% of our decisions are made with poor-quality information. If you can't find data, utilize it or analyze it, you lose the ability to make decisions that can significantly lower your risks. We also lose time: We can't make decisions quickly enough, and so our projects take longer. A weak or failing knowledge architecture costs you money and dulls your competitive edge.

A strong knowledge architecture rests on three pillars, or disciplines, which builds upon the structures you already have in place. Here's a brief introduction to each one.

### 1. Knowledge Management

Knowledge management is the strategy that underpins our decisions about how we create, identify, store, analyze and visualize data, including the systems and processes we use to find information.

For example, most organizations already have a process for collecting lessons learned and case studies, which provide some degree of direction and guidance to individuals and teams and constitute a form of knowledge documentation. A strong knowledge architecture would expand this list to include things like dashboards, business intelligence, interviewing and storytelling.

The overarching goal of a knowledge strategy is to collect this data in a way that we can both organize and present it in a meaningful way. In many cases, companies will need sophisticated, purpose-built technology to do this well.

### 2. Knowledge Informatics

Knowledge Informatics are the systems through which we access the data; the pipelines that allow us to transmit data across an enterprise to the organizations and people who need it. The tools and techniques we use to get information to end users can include everything from expert finder systems to repository search capabilities and beyond.

A discussion about informatics typically begins with storage, which can range from traditional SQL datasets to newer,


noSQL databases or graph databases that allow us to see relationships. Knowledge informatics is also about the various APIs -- the application program interface -- within your organization's digital ecosystem. These APIs dictate how we actually access, connect to and interface with the data, so we can begin analyzing it.

### 3. Knowledge Analysis

Knowledge Analysis is the development and application of algorithms and methodologies that help us process and analyze the information we want, also known as data science. Some organizations will benefit from commercial, purpose-built, off-the-shelf options, but many others can get the same benefits and answers from lower-cost or open-source options. The goal is to find the right tool for the job, always beginning with the purpose.

For example, we might perform a regression analysis to determine factors that impact our delivery schedule, we might build a neural network for decision analysis or cluster analysis on discrepancy reports. We'll do this with structured data -- that is, the numbers you've collected in a spreadsheet and have defined in a database. We'll also do this with unstructured data, which are the documents, projects and social media that can be collected and analyzed for meaningful extraction.

Don't miss out on new opportunities and challenges because you can't find or make sense of your data. A knowledge architecture can provide you with a framework to work through the plethora of data and make actionable decisions that benefit your organization.

In my next article for Velocity, I'll talk about the role of a knowledge architect in an organization. 

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*David Meza is the Chief Knowledge Architect at the National Aeronautics and Space Administration, or NASA. His work has been published in leading industry journals and he holds a Masters in Engineering Management and is pursuing a Doctorate in Education, both from the University of Houston.*

54%

of decisions are made with incomplete, inconsistent and inadequate information

Source: Infocentric Research

46%

of workers can't find the information they need half of the time

Source: IDC

30%

of total R&D spend is wasted duplicating work and research previously done

Source: National Board of Patents & Registration

“Simply put, a knowledge architecture is a framework that allows you to turn raw data into actionable knowledge.”



# 4 Steps to Technology-Driven Advanced Work Packaging

How smart companies are setting a new, higher standard for capital projects technology

## BY THE CONCORD TECHNOLOGY TEAM

Any discussion about a technology acquisition and implementation program must begin with this foundational truth: Technology is a potent ally, but it cannot save an inefficient capital project.

The foundation for technology-driven AWP is not the technology, it is the AWP methodology. You don't need technology to implement AWP, especially on small projects; what you do need is a team that understands and embraces the AWP approach. So before you invest in technology, invest in training around AWP. Help your people understand why AWP is an industry best practice, how it can make the project run better, and make their jobs easier. Sell your team on the process -- not the technology.

Once your people have embraced AWP, then it's time to think about technology that will support their work. If you're there already, we're ready for you, with four critical guidelines for establishing an AWP-driven technology acquisition program.

### 1 | Store all data in a central, searchable location

Most capital project organizations have inherited their data storage practices from a bygone, paper-based era. Compounding this problem is the fact that digital storage is typically dictated by your IT department, which not only serves the project's organizational needs, but also the needs of the sales, human resources and other key departments. This doesn't work anymore.

Implementing technology-driven AWP means designing a data management and storage system that is purpose-built to support AWP. By definition, AWP

relies on information generated by multiple departments and stakeholders operating in distinct, discipline-based silos. A technology solution that truly supports AWP must consolidate all of this data in one place, and make it searchable by everyone involved. This will require that your organization embrace big data, which has the power to amalgamate everything from text files and spreadsheets to SQL datasets and sensor data, and to make it all searchable in real time. It will also require that you integrate your project management and IT teams in a Integrated Project Management Office (IPMO).

### 2 | Establish and defend a baseline interoperability standard

Capital projects are enormously complex and no one technology application will meet all your needs. Multiple stakeholders need tools for collaboration and interface management, contract management and productivity analysis; document, photo and video storage; 3D modeling tools, training tools and metrics dashboards -- the list goes on and on. The solution is not a single application to meet all needs; the solution is an ecosystem of tools that talk to each other.

Many other industries, including manufacturing and marketing, have embraced this and created an ecosystem of tools that work with one another using Application Programming Interfaces, or APIs. Simply put, APIs allow one program to share data with another program. For example, when you search for a plane ticket on Expedia, the website uses APIs to aggregate data from multiple air carriers. Why doesn't capital projects technology work like this?

The simple answer is that technology providers won't have any incentive to

provide open APIs, until Owner companies start demanding it. As of this writing, there are only a handful of capital project technology products that offer APIs. The solution: Every Owner company must establish and defend baseline interoperability standards. You don't want to be owned by your technology company any more than you want to be owned by your consultants or your contractors. Your IPMO should establish this standard, based on the basic assumption that your data belongs to you.

### 3 | Ensure that AWP technology integrates within existing enterprise system solutions

Every technology solution you adopt must have the ability to integrate with your Enterprise Resource Planning (ERP) and Project Lifecycle Management (PLM) systems, and these two systems must integrate with each other, just as they do in many other industries. While it is eminently possible to share data between these two critical systems, providers don't have any incentive to make that happen.

Owner companies must demand software integration options, in precisely the same way they demand that contractors work with one another on key projects. Adopting the AWP methodology is an excellent opportunity to make this demand.

### 4 | Consider how your technology costs impact your overall office costs

If you're adding more staff to work on the administrative side of the project, then something is wrong with your technology choices. If your new technology means your engineers are doing more manual data entry, then you've chosen the wrong application.

While it's true that AWP comes with more deliverables to manage, this doesn't mean capital projects organizations need to hire more administrative or data entry staff. The right technology will minimize non-essential tasks and allow everyone from the Owner to the field supervisor to focus on the work at hand. 🚀





## VELOCITY INTERVIEWS

# AWP: A Wellness Plan For Your Capital Project

**University of Texas professor Bill O'Brien explains how Advanced Work Packaging has the power to create healthy, sustainable capital project organizations.**

*Professor Bill O'Brien is a professor at the University of Austin at Texas and has long worked with both Fiatech and the Construction Industry Institute (CII). He was a member of the CII research team that produced IR-272, and is now leading a team of researchers working to improve integration of supply chain in materials planning and work packaging. This interview has been lightly edited and condensed for clarity.*

## **Why do we need Advanced Work Packaging?**

The complexity of the modern construction site has made it very easy to get away from good management practice. This is in part due to silos and the difficulty of aligning all the stakeholders and processes needed to accomplish a project. In response, AWP is a holistic program that enforces good fundamentals by bringing all the project pieces together in one place, so you can make effective decisions and engage in effective planning all the way from the front end through execution. To me, that's AWP in a nutshell.

## **What are the impediments to adopting AWP?**

People who don't know a lot about AWP are under the mistaken impression that it will be new and difficult. They hear the consultants saying: "That's just a start, there are all these other things you need to do," and they start talking about PWP's and turnover work packs and more new concepts. For people on the outside, it

looks like a great big complex mystery. What does that do? What does it mean? The reality is so much simpler: The whole point of AWP is to enforce what we all know to be good practice, and what we all know is good for the project. It's just gotten out of control on a lot of modern projects, and we need extraordinary measures to put it back into place.

## **How did we get to a point where we need "extraordinary measures" to put best practices in place?**

There's no simple answer to that. We've made projects more complicated, we haven't invested in our workforce as much as we should, and we've not been very good about adopting technologies that deal with that complexity. At some level we've accepted poor practice. It has become the norm.

## **Why have capital project organizations been slow to adopt technology?**

I don't think there's an easy answer. People are interested in adopting technology that's clearly going to help them. Because capital projects are so complex, it has been difficult for software solutions to issue a complete solution... Every company has its own systems, its own ways of working, and new technology is seldom a complete replacement. It can make things more complicated, rather than less complicated.

## **Why do capital project organizations need to invest in technology as part of their AWP strategy?**

AWP in practice forces a consumption of information. Particularly on the workface planning side, for an Installation Work Package, requires pulling together information from a lot of sources: contract status, drawing status, material status, equipment status, labor status. It's forcing all that information together, combining it from multiple systems. AWP requires information integration. Ideally integration is automatic -- particularly during construction execution, on the front-end perhaps it can be done more manually. But it still requires all the stakeholders to come to the table and share information. For AWP to be successful, a prerequisite is being able to make information available for successful decisions.

## **How common is miscommunication on capital projects?**

It happens all the time. It's more the norm, rather than the exception, and that's both within and across companies. You see siloed information, and siloed areas of expertise. Some people talk about breaking down silos, but perhaps a more nuanced way is to say that we need to connect the silos better. That's a huge challenge.

We've got some self-assessment data from organizations that show they're not satisfied with their visibility into project information, and they are not satisfied with their ability to trust that information, either. So there are two issues: One is the difficulty of accessing the information, and the second issue is, once you have it, do you really trust it? ... There are so many different places that information can reside, and different versions, that without a single source of truth (SSOT) it is hard for anyone to trust that what they have is really up-to-date.



“The whole point of AWP is to enforce what we all know to be good practice, and what we all know is good for the project. It’s just gotten out of control on a lot of modern projects, and we need extraordinary measures to put it back into place.”



### Who should be responsible for integrating information on capital projects?

Ideally that lies somewhere with the EPC contractor. The Owner has to participate in that as well. Contracts need to promote information sharing, and that needs to be the standard as opposed to the exception. When a project is formed, it needs an information plan. That plan needs to be aligned with the contractual expectations as well. When either of those is not there, it’s not going to go well.

In addition, there does have to be some mindset change in the industry, so people come to believe that sharing information is good. At some level you have people worried about losing power or losing control -- there is some culture shift required around that as well.

### What are the top four actions a company can take to start moving in the right direction with AWP?

First realize that it’s a journey, it’s not just a destination. These are systemic problems we have in the industry, and it requires systemic solutions. AWP is an overall wellness plan.

#### 1 | Do a self-assessment and pick things that can be early wins for your organization.

It’s likely you’ve got various improvement programs going on anyway, if you can wrap these things up together with AWP, that’s good. Figure out what the low-hanging fruit is for your organization.

For a contractor, a low-hanging fruit is just getting your own site together, putting in installation work packages, getting the AWP champions in place. I don’t want to trivialize this -- it will be a challenge -- but if it’s largely in the contractor’s control they’ll see some immediate benefit. You might see 10% gains, because you’ve done better planning, and that should more than pay for itself. Then you’ll realize that to get the next level of gains, you’ll have to tie together with other organizations upstream and downstream, and that’s much harder.

So choose an implementation path where your company has the span of control to be successful. For different companies, it will be different things.

#### 2 | Realize that anything new you do is going to cost some money, so make sure it’s funded and resourced well.

A lot of attempts at AWP are bootstrapped, and they don’t work well. If you’re going to give it a try, resource it correctly. Make sure people have it in their job description -- you can’t just add things on to a project and expect it to happen. You’re going to have to make a corporate investment, it will probably pay for itself in your first project. However, because of the way we do accounting, it’s not very obvious.

We can always see the cost of something, we can’t always internalize the benefits very easily. ... That’s often why we say that the AWP needs to be owner-led, because the owner can help people get around those issues and ensure they are working for the good of the project.

#### 3 | Identify your champions and make sure they’re backed by your executive

team.

The skunk-works type of projects only go so far without some kind of official investment. ...Good champions have passion, belief, influence and time to make things work. It’s always difficult to make changes and upper-management support is so important. Champions need to be somebody that people will listen to -- at some level they need to have the power to make changes, but really they need the skills to be able to get others to invest in the system.

#### 4 | As an owner who wants this to happen, you want to level the playing field contractually.

You just don’t want to say: “Do AWP.” You want to think through what your requirements are, and that allows for the firms to bring you their best. A few years ago I was at a conference, and an executive from a major oil company was speaking, and he said what they’ve done with their external contractors is they’ve tried to make it very explicit what they want and that they’re willing to pay for the up-front planning and staffing costs that come with Advanced Work Packaging because they know that they’ll see the benefit.

He said that without that kind of levelling the playing field by being explicit to what they want, what would happen is that some firms would be hesitant to put AWP in bids, because that would be a little bit more expensive in the staffing costs, and they didn’t want to be disqualified.

Really, Owners are the ones that should see the most benefit out of this. If you want

## Where is the capital projects industry heading?

Folks coming out of school today are more tech-savvy, so this information-sharing culture is going to be a lot easier than it has been for earlier generations. I do think AWP is a wellness program to improve how we work now. AWP is also a path towards more holistic execution. That said, a path forward for our industry is to reduce the complexity of the various interfaces that we have on projects. One concept there is more extensive use of standardization (which still can allow for customization). ... Similarly, you're probably going to see some realignment of industry structure to firms that are much more integrated. ... You see hints of that in the industry already. Technology – physical parts and information bits – is going to fit together in a much more standardized way, and that's going to reduce a lot of the management oversight and associated complexity.

You see a few firms out there that are doing things like that. ... A much more aggressive use of technology using it in a very integrative and thoughtful way to really connect the building design with the actual construction. ... The model-based world is coming. One thing you hear about now is the concept of the digital twin – a facilities model that supports design, construction and operations. Operations utilizing and demanding digital models is going to help pull good information deliverables from concept and that can only help projects.

## Any closing thoughts?

There's a need for the industry to really step back and make improvements. Sometimes we feel like we're charging forward so fast all the time, people don't take the time to actually improve. AWP forces that introspection, and that can be really valuable. 🌐

“At some level, we've accepted poor practice. It has become the norm.”









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