Best Practices in Engineering, Construction Planning & Management

Presentations & Panel Q&A

Steve Furze, AVEVA
Dr. Ted Blackmon, Construct-X
Ray Paulk, Project AI
INTRODUCTIONS & SESSION FRAMING

**Stephen (Steve) Furze**
Global Director of Project Execution Sales for AVEVA

Steve participates in the development of solutions strategies and is responsible for the sales enablement of the portfolio of Project Execution solutions.

Over 20 years of experience, developing and leading sales, services and “Go To Market” (GTM) teams focused on engineering, fabrication, construction and O&M solutions in the Process, Power, Marine, Mining and AEC industries.

Steve is a member of CII Board of Advisors.

Stephen.Furze@AVEVA.com

**Ted Blackmon, PhD**
Founder and CEO

Dr. Ted Blackmon, PhD, helped to pioneer the entire market for Advanced Work Packaging (AWP); with the invention of the ConstructSim™ and OpSim™ platforms that drew upon his success with the Mars Pathfinder Mission at NASA.

His software platforms were so highly recognized in the marketplace, their acquisition became the industry’s cornerstone for many years.

Ted.Blackmon@Construct-X.com

**Ray Paulk**
Senior Business and Project Advisor

Ray specializes in enterprise transformation and the structuring and governance of capital investment programs.

With over 20 years experience in the Oil & Gas, Resources and Engineering & Construction industries; he has advised project teams of all sizes (minor, major and mega-projects) on six continents, and led global business transformation, technology implementation and functional standardization initiatives for some of the world’s largest companies.

Ray.Paulk@ProjectAi.com
According to a study by EY, 64% of complex projects face cost project overruns and 73% report delays. Completion costs were, on average, 59% higher than initial cost estimates – an increase in total of US$500bn. Cost overruns of 50% are common and overruns of 100% are not uncommon.
About the Construction Industry Institute (CII)

CII, based at The University of Texas at Austin, is a consortium of more than 130 leading owner, engineering-contractor, and supplier firms from both the public and private arenas. These organizations have joined together to enhance the business effectiveness and sustainability of the capital facility life cycle through CII research, related initiatives, and industry alliances.

CII – Home (construction-institute.org)
Work Packaging Threaded Throughout AVEVA Applications

CONTRACT RISK MANAGEMENT

Unified Engineering

Bills of Material

Unified Project Execution

Status

Materials Management & 4D Construction Planning By WorkPacks

Schedule

Work Pack development via 3D & List based UI's

Work Pack Structure

CWA

CWP

EWP

IWP

Document Management

View, Navigate, Search, Report, Check via Work Pack UI

Asset Information Management

Open, Flexible, Configurable

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Driving BUSINESS TRANSFORMATION LEVERAGING ADVANCED WORK PACKAGING (AWP), LEAN CONSTRUCTION, AND DESIGN FOR MANUFACTURING AND ASSEMBLY (DFMA) through strategic consulting and implementation services.
BEST PRACTICES IN ENGINEERING, CONSTRUCTION PLANNING & MANAGEMENT

That Yield Proven Results

BUILDING A GREAT AWP EXPERIENCE
AWP COMMERCIAL WITH REFERENCES

→ THE PROCESS @ 250K FEET
→ WHAT DOES GOOD LOOK LIKE
→ CLIENT ADOPTION
Advanced Work Packaging (AWP) with constraint management is a construction project management approach that combines the principles of breaking down projects into manageable work packages with the systematic identification and management of constraints.
THE PROCESS @ 250K FEET
BRING TOGETHER A BLEND OF SOLUTIONS

AWP Benefits

- **25%** Increase in Productivity
- **10%** Reduction in Cost
- **Improved Safety**
- **Cost and Schedule Predictability**

63% Time on Tools
37% Non-Tool Time

CII - Home (construction-institute.org)
BUILDING A GREAT AWP EXPERIENCE

THE PROCESS @ 250K FEET
BRING TOGETHER A BLEND OF SOLUTIONS

AWP BUILDS & LEVERAGES YOUR DIGITAL TWIN THROUGH PROJECT EXECUTION
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THE PROCESS @ 250K FEET
BRING TOGETHER A BLEND OF SOLUTIONS
THE PROCESS @ 250K FEET
BRING TOGETHER A BLEND OF SOLUTIONS
The Science Behind Optimizing the Project Delivery Experience

People

Process

Technology

Culture

RELIABILITY

REPEATABILITY

SCALABILITY

SUSTAINABILITY

Achieving optimal benefits requires ...

ALIGNMENT

ALIGNMENT

ALIGNMENT
WHAT DOES GOOD LOOK LIKE
FUNCTIONAL & INTEGRATED TEAM

Electrical Contractor

Civil Structural Contractors

Mechanical Contractor

Specialty Contractors

Operations

Other Subs / Fabricators / Vendors

Equipment Vendors

Other Stakeholders
“The vision of leveraging the 3D design model as a project management tool has now been realized.”
- Hiroyuki Mogami, Chiyoda Section Lead, IT Digital Business Intelligence

“Good things happen to those who work package early.”
- User at major EPC Organization

“This is next-level capability in AWP.”
- User at major Owner Operator

2-for-10
• **Strategic Initiative** - NFE Project is a significant endeavor by Qatar Petroleum with a $28.75 billion investment in the LNG sector.

• **Global Standing** - The project enhances Qatar's position as a leading LNG exporter, leveraging the third-largest gas field globally.

• **CCC’s Role** - Focused on onshore LNG Mega trains, integrating advanced AWP solutions with digital EPC tools to achieve project objectives efficiently, involving significant quantities of various construction materials and commodities.
• **Safety Improvements** - The 90-day lookahead feature provided transformative visibility, enabling proactive safety measures and optimized resource allocation for a safer project environment.

• **Quality Enhancement** - With a significant focus on quality, WorkPacks facilitated transparent tracking, dual-role tagging, and integration of quality measures into construction processes, resulting in remarkable improvements in quality benchmarks.

• **Efficiency in Time Management** - WorkPacks provided crucial features for time management, including 90-day visibility, proactive constraint management, and efficiency trend analysis, supporting the project’s ambitious efficiency improvement goals.
3. AWP ROLL OUT CHALLENGES

→ MANAGING DATA & CHANGES - DIGITAL THREADS
→ CONTINUOUS DESIGN MODEL UPDATES – VCM
→ GETTING THE ORGANIZATION TO DO CONSTRAINTS – CLOUD CONSTRAINTS
→ BRINGING IT ALL TOGETHER
MANAGING DATA & CHANGES - DIGITAL THREADS

PROJECT SCHEDULE

VIRTUAL WORK PACKAGE DEVELOPMENT

VIRTUAL CONSTRUCTION MODEL ASSEMBLY

PROCESS DESIGN
SITE LAYOUT
EQUIPMENT DESIGN
INSTRUMENT DESIGN
3D MODELING
PIPING DESIGN
CIVIL STRUCTURAL DESIGN
ELECTRICAL DESIGN
OTHER ENGINEERING DATA

SUPPLIERS

ESTIMATING / COST CONTROLS
PROCUREMENT / SITE MATERIALS

QUALITY TRACKING / PROGRESS
QUALITY / COMPLETIONS

STRUCTURAL DETAILING
STEEL FABRICATION
PIPE DETAILING
PIPE FABRICATION
MODULE DETAILING
MODULE FABRICATION

DOCUMENT CONTROL

CONTRACTOR MTOS
AWP ROLL OUT CHALLENGES
MANAGING DATA & CHANGES - DIGITAL THREADS

BUILDING A GREAT
AWP EXPERIENCE

AWP DEMANDS
NEW ROLES & DIGITAL USERS
ON PROJECTS NOT TYPICAL PROJECT BUDGETS
BUILDING A GREAT AWP EXPERIENCE

AWP ROLL OUT CHALLENGES
MANAGING DATA & CHANGES - DIGITAL THREADS

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GETTING THE ORGANIZATION TO DO CONSTRAINTS

BUILDING A GREAT AWP EXPERIENCE

AWP DEMANDS
NEW ROLES & DIGITAL USERS
ON PROJECTS NOT TYPICAL PROJECT BUDGETS
AWP ROLL OUT CHALLENGES
CONTINUOUS DESIGN MODEL UPDATES –VCM

CWP Readiness Summary

Material Allocation Status by CWP

Material Status
- A: Material Issued
- C: Mat'f Fully Allocated
- E: Mat'f Not On Hand
- F: Material Shortage

Engr MTO QTY: 61,574.32
Site MTO QTY: 62,391.32
QTY Issued: 2,099.60
QTY Reserved: 1,113.97
QTY Allocated: 58,022.11
On Hand QTY: 33,933.72
Not On Hand QTY: 25,244.03
QTY Short: 2,229.61

Overall  Engineering  Procurement  Fabrication  Construction
AWP ROLL OUT CHALLENGES
BRINGING IT ALL TOGETHER

- Fit-For-Purpose AWP/LPD Program
- Implementation Strategy
- Education, Training & Coaching
- Implementation Support & Staffing
- Continuous Improvement
THANK YOU!
BUILDING A GREAT AWP EXPERIENCE

BEST PRACTICES IN ENGINEERING, CONSTRUCTION PLANNING & MANAGEMENT

That Yield Proven Results
The Intelligent Project: Digital Execution & AWP in Capital Portfolios

Ray Paulk
Founder / CEO, ProjectAI
AVEVA World 2023 - San Francisco

projectai.com
Today’s Speaker

Ray Paulk
Founder / CEO, ProjectAI

• Senior business and portfolio advisor specialising in capital investment/venture structuring, project strategy, technology strategy, portfolio optimisation, growth & international expansion.

• Over 20 years experience in major- and mega-projects and portfolios for the Oil & Gas, Natural Resources and EPC industries.

• Expert in major project governance to inform capital investment decisions, execution phase reviews, and forensic reviews.

• Led large multi-disciplinary teams, overseeing project controls for projects and programs ranging from $4m to $15bn, and portfolios ranging from $60 to $100bn. Advised numerous project and portfolio teams on six continents.

• Recognized innovator and thought leader in Project & Portfolio Management, specializing in advanced analytics, automation, systems integration, reporting and artificial intelligence for projects.
Why do Owners and EPCs still struggle with digital transformation in capital projects?
Problem 1: Projects are human.

Problem 2: Projects are temporary.

Problem 3: Projects are unique.
A new team comes together...

They learn a lot of things...

They create a lot of data...

The project ends...

Everyone leaves.
the single project mindset
Every project is **temporary** ... but the knowledge we gain from them **does not have to be**.

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**the single project mindset:**

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**the portfolio mindset:**

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Projects are temporary... but we keep doing them. Projects are unique... but not special.
Humans and machines are already quite good at converting data into information they can understand and use. Humans are good at learning from experience, and machine learning is getting better all the time … both depend on relevant context.

What's missing?

meaning
Intelligent project execution is not achieved with a new dashboard …but through the combination of human and artificial intelligence to meaningfully predict future outcomes and optimize actions and decisions in the face of emerging conditions.
Why ProjectAI?

- We use AI to convert unique project data into universal concepts - unlocking faster reporting, portfolio optimisation, predictive analysis and decision making across any application landscape or execution strategy.

- We capture human expertise in a form that AI can access, interpret, re-use and improve upon.

- We use explicit enterprise knowledge, inferred model-driven knowledge and large language models (e.g. GPT).

- We use AI to bring people in to the project... not to push them out.
The value benefits from AWP are an excellent catalyst for cross-functional project & asset lifecycle data integration.
AWP in the EPC

EPCs / EPCMs use AWP to tie a digital thread through a project.

But the value of AWP is amplified for the EPC by connecting the data across their portfolio... using common systems to facilitate the needs of multiple clients simultaneously.
### Why is AWP important for the EPC?

<table>
<thead>
<tr>
<th>Safety</th>
<th>Win Rate</th>
<th>Margin &amp; Cash Flow</th>
<th>Learning</th>
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</thead>
<tbody>
<tr>
<td>• Planning for Safety</td>
<td>• Competitive Tenders</td>
<td>• Lump Sum Margin</td>
<td>• Enabling Knowledge Retention</td>
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<td>• Control of Work</td>
<td>• Demonstrate Reputation for Successful</td>
<td>• Incentive Attainment</td>
<td>• Mitigating for Resource</td>
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<td>• Competency Verification</td>
<td>Delivery</td>
<td>• Protect Margin via Scope</td>
<td>Attrition / Departure</td>
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<td>Control</td>
<td>• Lessons Learned / Risk</td>
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<td>• Reduce Overhead / Indirects</td>
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<td>estimates</td>
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- **Safety**
  - Planning for Safety – Assuring HSE risks have been controlled, and HSE constraints eliminated
  - Control of Work – Assuring permitting regime is applied.
  - Competency Verification – Assuring resources are deployed with appropriate qualifications and training.

- **Win Rate**
  - Competitive Tenders – Stronger basis for lower estimates / faster schedules.
  - Demonstrate Reputation for Successful Delivery – backed up by data.
  - Competitive Advantage / Differentiation – clients expecting maximum leverage of project data for win/win outcomes.
  - Provide Transparency to the Client – clients expecting transparent performance management and proactive intervention

- **Margin & Cash Flow**
  - Lump Sum Margin – via productivity, delivery assurance and minimal rework.
  - Incentive Attainment – via predictable cost, schedule, quality, and other delivery KPIs
  - Protect Margin via Scope Control – strong control of data provides clear support for variations and claims defense
  - Reduce Overhead / Indirects – via data driven approach / eliminating spreadsheets and data handover points

- **Learning**
  - Enabling Knowledge Retention across disparate customer sectors
  - Mitigating for Resource Attrition / Departure
  - Lessons Learned / Risk Reduction
  - Data Normalisation for meaningful benchmarking / future estimates
AWP in the **Owner**

In the same way EPCs / EPCMs need to aggregate data across a variety of stakeholders... and for a variety of clients.

**Owners** need to do the same across a variety of EPCs... across different project types and contracting strategies.
Why is AWP important for **the Owner**?

**Safety**
- **Planning for Safety** – Assuring HSE risks have been controlled, and HSE constraints eliminated.
- **Control of Work** – Assuring permitting regime is applied.
- **Competency Verification** – Assuring resources are deployed with appropriate qualifications and training.

**Competitiveness**
- **Optimised Design** – Assuring resultant facility concept is not over-/under-designed for its use, while remaining operable, maintainable, reliable, etc.
- **Optimised Investment Alternative & Business Case** – reflecting outstanding risk and uncertainty profile.
- **Capital Intensity via Benchmarking** – cost / schedule / productivity Estimates in line with industry / regional benchmarks.
- **Optimized Resource Utilization** – optimal deployment of capital / human resources.

**Predictability**
- **Scope Definition / Change Prevention** – and associated optimised execution / contracting strategy.
- **Constraint Elimination & Resource Staging for Productive Execution**
- **Assuring Productivity / Course Correction for Root Causes of Delay / Non-Productive Time**
- **Project Performance and Value-Focused Leading Indicators**

**Learning**
- **Enabling Knowledge Retention for both Projects & Operations**
- **Mitigating for Resource Attrition / Departure**
- **Lessons Learned / Risk Reduction**
- **Data Normalisation** for meaningful benchmarking / future estimates
AWP & Digital Execution capability is already a key differentiator / qualifier of EPC capability

“The Role of the Owner” argument continues...

- **EPCs bringing their own systems and processes?**
  - EPC capability not always as advertised.
  - Too dependent on capability of individuals?
  - Owners should trust but verify... i.e. prequalify
  - How do Owners get the transparency they want, the predictability they need, and retain the knowledge they paid for?

- **Owners mandating their own systems and processes?**
  - Mitigates for variable EPC capability, but costs more / takes longer for EPC to learn new way of working.
  - Fundamentally erodes the value of EPC people / process / systems
  - Limits leverage of EPC experience from other projects

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**The best of both worlds:**

- EPCs acquire / build / sustain strong capability in digital delivery around:  
  - Capable People
  - Streamlined Processes
  - Enabling Technology
  - Strong Governance / Performance Management
  - Culture of Transparency and Win-Win

- Owners:
  - Prequalify EPC Capability in AWP & Digital Delivery
  - Include Detailed Data Requirements in Invitations to Tender / Head Contracts
  - Establish pipelines to EPC(M) data sources
  - Normalise incoming data to ensure it is retained as sustainable knowledge.
Rio Tinto is one of the world’s largest metals and mining companies, investing in a large portfolio of complex capital projects around the world.

ProjectAI is supporting the Rio Tinto Projects team to deliver the phased implementation of AWP ... unlocking value for individual projects, and the portfolio as a whole.
Implementing AWP across a Global Portfolio

- design and implement data standards underpinned by a preferred internal systems architecture.
- applies to data requirements throughout the project lifecycle, as well as the ultimate handover data & deliverables.
- data standards are mandated in related contracts, with controls to ensure quality / completeness.
- use of data pipelines (e.g. endpoints / APIs) is preferred over manual file transfer.
- contractor capability to meet these standards using their own systems architecture should be validated, and gaps filled where necessary.

**EPCM using selected Owner Systems**
Amplifying AWP
Cortex is a revolutionary semantic knowledge platform for the asset-intensive enterprise.

- By adding **meaning** to technical and commercial data, Cortex enables disparate data across a diverse portfolio to be integrated, normalised, optimised and personalised for the people who need it.

- This allows **data** to be converted into sustainable **knowledge**, making analysis more rapid, relevant and reusable to optimise business performance in context.
Cortex Knowledge Domains & Linked Data

Don’t reinvent the wheel. Grow and re-use organisational knowledge with Cortex.

Global
- Universal concepts, facts and relationships which apply to every industry.

- Basin: Carnarvon is a Basin located in Australia, which has a population of 25,690,000.

- Country: Australia has a Basin named Carnarvon.

- Finland

Industry
- Concepts that are consistent across specific industries or sectors.

- Subsea Equipment: Equipment is subclass of Subsea Equipment.

- Subsea Umbilical Termination Assembly: SUTA

- Hydraulic Distribution Module: HDM-1245

Company
- Your organisation’s value chain, terminology / taxonomy, processes and enterprise data.

- Organisation: Contoso

- Funding Request

- Investment Approval Request

- Investment Committee

- Scope Element

- Project: Alpha Phase 1

- Subsea Equip Fab

- Contract: Contract 5345

- IAR #7375

Project
- Data describing the work being done to build / buy / modify an asset.

- Board

- Alpha Phase 1

- Bravo West Subsea

- BW-4

- Well: BW-4 produces from SUTA-3A.

- Reservoir: SUTA-3A is a Zone 22A.

Asset
- Data describing the decomposition of physical assets.

- Bravo

- Investment Approval Request

- Funding Request

- Investment Committee

- Project: Bravo West Subsea

- Subsea Equip Fab

- Contract

- IAR #7375

- Bravo

Object
- Detailed information about specific asset components / tags / items.

- Documents

- Operational Data

- Planned Maintenance

- Properties: Height, Width, Depth, Rating, Material, Etc.

- Invoice 3218513

- Drives with party: Acme

- Material: HDM-1245

- Invoice: 3218513

- Invoice 3218513

- Invoice 3218513

- Invoice 3218513

- Invoice 3218513

- Invoice 3218513

- Invoice 3218513
Panel / Q&A

Please wait for the microphone.
State your name and company.
For More Information
Visit Ted & Ray at the WorkPacks Booth in the Exhibit Hall

Ted Blackmon ted@construct-x.com
Ray Paulk ray.paulk@projectai.com
Steve Furze Stephen.Furze@AVEVA.com

Please remember to...
Navigate to this session in the mobile app to complete the survey.

Thank you!