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Project Management & Project Controls

The Importance of Front-End Planning Leveraging Industry Best Practices

Session 1 - September 22, 2020
1:00 PM-2:00 PM, EST

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Introducing the Participants

Jeremy Rasmussen – Chief Technology Officer

Jeremy is a leading thinker in information and communications technology (ICT), mobile software, and open source intelligence. With both **strategic and hands-on experience** ranging from software development architecture and networking system design for the project management sector. Jeremy is consistently on the leading edge of the role of technology in business and capital projects. He co-published and presented numerous papers on the role of mobile technology in complex industrial environments at industry conferences in Canada, the United States, and China. Jeremy is also a member of the Canadian Nuclear Associations Executive Committee and Board of Directors.

Feroz Ashraf, Global Executive Advisor – Capital Projects, P.Eng (Ontario and Quebec)

Mr. Ashraf has extensive **experience** in the resource sector, including mining and metallurgy, oil and gas, infrastructure, power and related downstream industries. He is currently an Executive Advisor, Capital projects at PTAG Inc. He has **35+ years of EPC/EPC experience,** on over **300+ projects** ranging from **$10million to over $5 billion** across Canada and globally in over 25 countries. He was the Senior Project Officer, then COO and then CEO of an operating company with plants / projects in USA, Kazakhstan, Australia, and Tanzania. He is member of OIQ and PEO and is a guest lecturer on Project Management at York University- Schulich School of Mining (MBA program).

Michael Dubreuil, Managing Director, B.Math (Computer Science)

Mr. Dubreuil is the **Managing Director** for PTAG Inc., a leading global capital project/program management firm. He has 35 years of experience leading Projects and Organizations through significant development, restructuring, and process improvement. He currently serves as the **Chairman of the Sector Leadership Team of the Construction Industry Institute**. He is an Advisor to organizations on Contracting Strategies including - Industrial Integrated Project Delivery (I2PD).

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Agenda – Topics of Today's Session #1

Session One – 1:00 to 2:00 pm EDT, September 22nd:

- **Opening Remarks**
- **PTAG Overview**
- **Topics for Today's session**
  1. Top reasons why projects go off-track
  2. Failure as an Industry to Perform and Deliver Projects
  3. Front-End Planning – what, why, how ?
  4. Leveraging Industry Best Practices
  5. Why a Disciplined Stage-Gate Process is Critical
  6. Project Set-up / Project Management and Project Controls Handbook
  7. Example of Project Complexity Model and Project Delivery Model (PTAG tools)
  8. Why Defining Proper List of Deliverables and Execution Plan important
- **Summary and Q/A**

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PTAG Overview – Program & Project Management Specialists

Supporting our clients through all project phases of Major Project or Sustaining Capital Programs, PTAG Project Management experts have required experience to address complex project concerns, leverage industry best practices, provide proactive solutions to mitigate social, economic, environmental, technical and commercial concerns impacting cost, schedule, safety and quality concerns.

Our mission is to **increase project predictability and success rates** by incorporating collaborative and risk-sharing contracting strategies, foster true-partnerships focused on project objectives, proven and lean project management techniques, and state-of-the-art tools and systems adapted purpose fit for our client's projects.

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1) **Failure as an Industry to Perform!**
2) **Why Projects Go Off Track?**
3) **Underlying Root Causes.**

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Failure as an Industry to Perform!

98%

Of projects over $1 Billion exhibiting significant cost overruns.

(Source: Brenden Bechtel, CII, Annual Conference 2016)

65%

Of large scale industrial projects FAIL to meet business objectives.

(Source: Merrow 2011)

73%

Of mega-projects experience schedule overruns.

(Source: Ernst & Young 2014)

UP TO 57%

Of resources are wasted in construction, compared with 26% waste in manufacturing.

(Source: CII 2004)

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Key Reasons Projects Go Off-Track….?

***McKinsey & Company* identifies the following factors accounting for poor productivity and cost outcomes:**

- **Poor Organization and Decision-Making**
- **Inadequate Communication**
- **Flawed Performance Management**
- **Contractual Misunderstandings**
- **Missed Connections**
- **Poor Short-Term Planning**
- **Insufficient Risk Management**
- **Limited Talent Management**

Source: Changali, Mohammed, and Nieuwland "The Construction Productivity Imperative" McKinsey & Company. July 2015.

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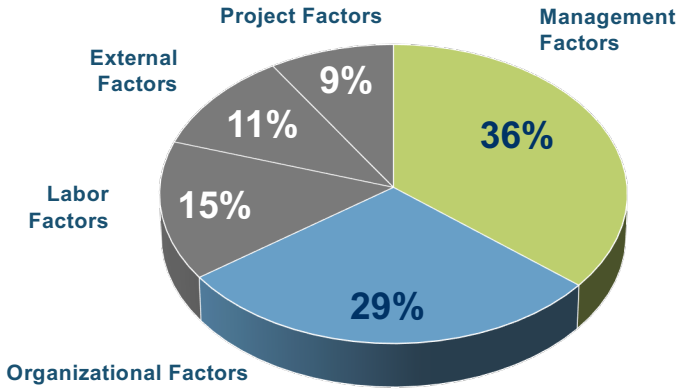
Underlying Root Causes ….

- **Lack of Front-End Planning**
  - Insufficient Requirements Definition
  - Lack of Understanding of Complexity
  - Misalignment of Objectives
- **Lack of Stakeholder Engagement**
  - Business, Operations
  - Social License
- **No Stage Gate Process**
  - No Assessment or Checks and Balances
- **Too Rigid Stage Gate Process**
  - Seen as a Barrier to the Project and Ends up as a "Ticky Box" exercise
- **Critical Scope Changes during Execution**
  - See Lack of Front End Planning

Comparing the different factors that effect productivity on large projects:



Source: Factors Affecting on Productivity of Oil and Gas Construction Projects: An AHP Analysis Khalegh Barati, Samad M.E. Sepasgozar

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3) Front-End Planning (what, why, how)

- Leveraging Best Practices for Improved Front End Planning

The Goal is to ensure we are always:

Performing the **''right project''**

Scoping the right **''things''** for a good design basis

the **''right product''**

Setting the stage for a successful execution

the **''right way''**

Documenting the scope of work into an organized basis for design

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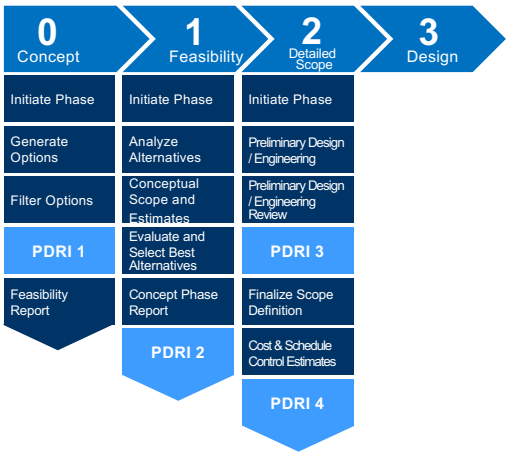
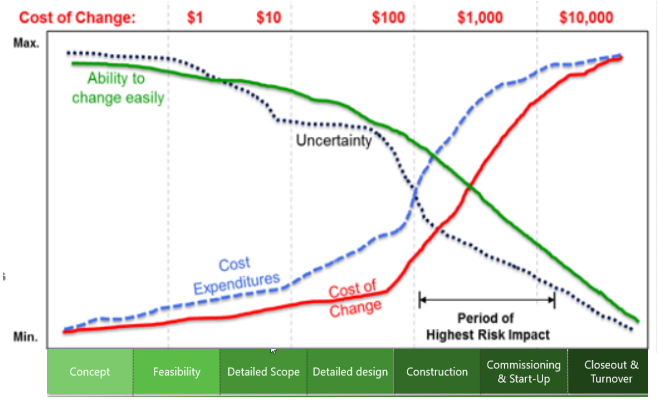
Front-End Planning

Front end planning (FEP) is the essential process of developing Sufficient Critical Information including Estimates, Schedules, Scope, Execution, and support plans so that owners can assess all the elements of a project to make a fully informed decision to commit resources to execute it.





Cost of Change Increase as Project Phases Advance

Source CII

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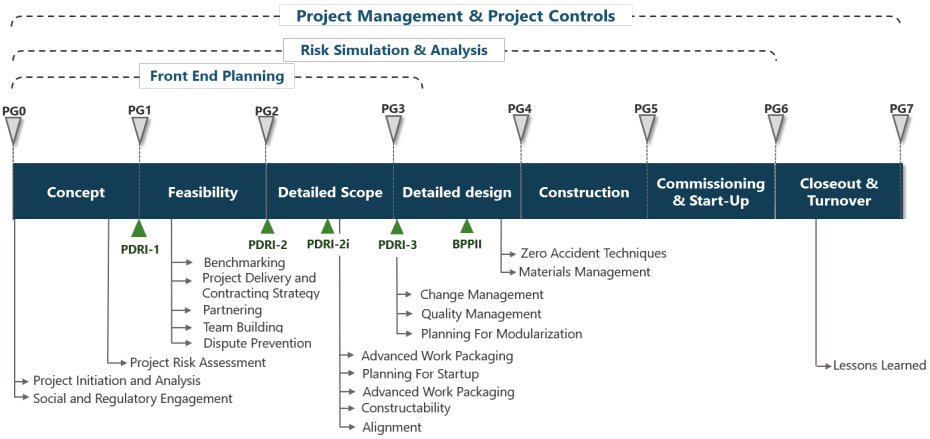
Benefits of using Best Practices in Front End Planning

- Every $1 spent on Front End Planning saves $25 in Execution & Commissioning
- High use of Constructability results in up to 6% Cost improvement and reduces project Schedule by up to 7.5%
- "Fit for Purpose" Contracting & Partnering Strategy provide Owners with up to 9% in cost improvements

Source CII Research



Best Practices That Support Front End Planning

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Teambuilding (Best Practice #1)

Definition

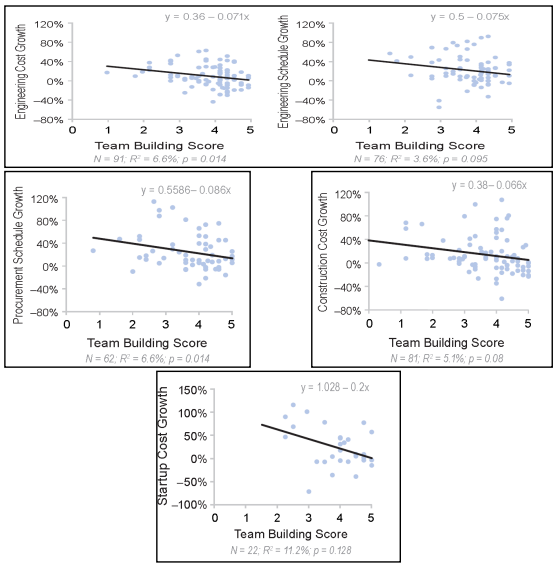
Team building builds and develops shared goals, interdependence, trust, commitment, and accountability among team members. Teambuilding seeks to improve team members' planning and problem-solving skills.

Elements

Alignment, teamwork, and team building appear to be variations of the same concept but are, in fact, three distinct concepts with different but complementary definitions.

1. **Alignment** addresses the concern of whether all team members are working toward the same, correct goal.
2. **Teamwork** involves team members' effective interaction, cooperation, and mutual support while working together.
3. **Team building** is the process used to develop and enhance teamwork.

All three concepts are critical to the success of a project.



Alignment (Best Practice #2)

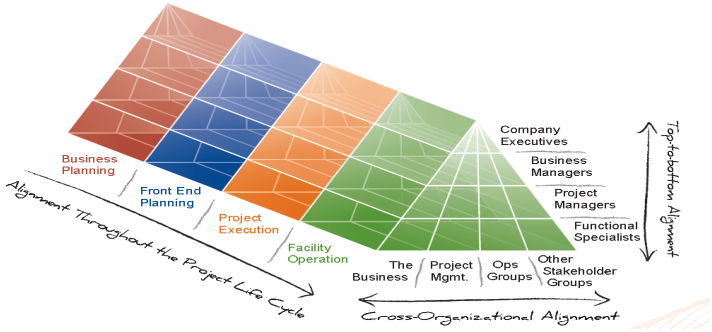
Definition

Alignment is the condition where **all project participants and stakeholders** are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives.

Elements

Aligning the project team involves:

- Developing **clearly understood objectives** for all team members and stakeholders
- **Gaining the commitment** from each to work toward those goals
- Include involvement from both owners and contractors.
- **Projects are successful when owners and contractors are actively** involved in the planning process and remain involved throughout the project.
- **Few owners now have the ability to plan all aspects of a project.** Contractors should never assume that the project has been adequately defined.



Alignment exists in three dimensions

1. **The first dimension**, vertical, involves top-to-bottom alignment within an organization. This includes company executives, business manager, project managers, and functional specialists within each stakeholder organization.
2. **The second dimension**, horizontal, involves cross-organizational alignment between functional groups within the organization. Business, project management, and operations groups as well as other stakeholder groups such as outside contractors.
3. **The third dimension**, longitudinal, involves alignment of objectives throughout the project life cycle.

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Project Risk Assessment (Best Practice # 3)

Definition

Project risk assessment is the process of identifying, assessing, and managing risk **both opportunities and threats**.

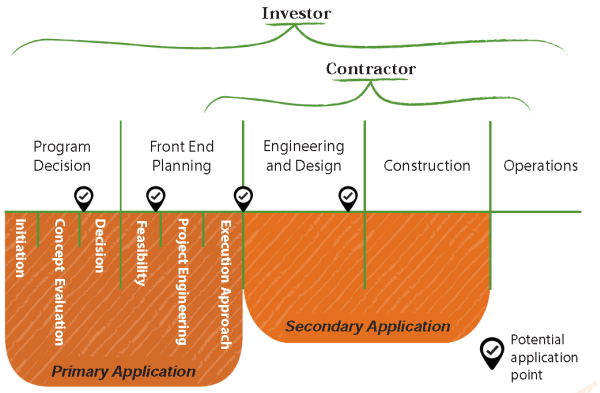
Elements

Assessing risk is a project management activity done throughout the project life cycle.

The **relative importance of any specific risk depends** on the respective stakeholders, and could be different for different stakeholders.

It is essential to **get a broad range of perspectives** when assessing risk in order to arrive at a consensus on relative importance of risks.

- Organize and **formalize a risk management** process and keep it as simple as possible
- **Begin early** at Initiation to be most effective
- Keep a broad perspective to get the **diversified input** required.
- Undertake adequate front end planning, analysis, and engineering.
- Partner with owner and contractor management.
- Recognize that **certain projects are more prone to risk** and that experience in a jurisdiction is important.
- Risk documentation is critical.



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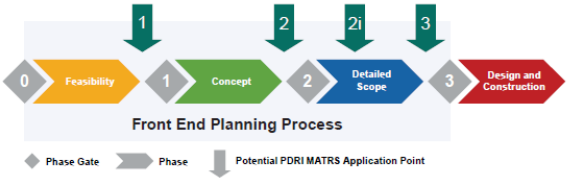
Front End Planning Assessment (Best Practice # 4)

Definition

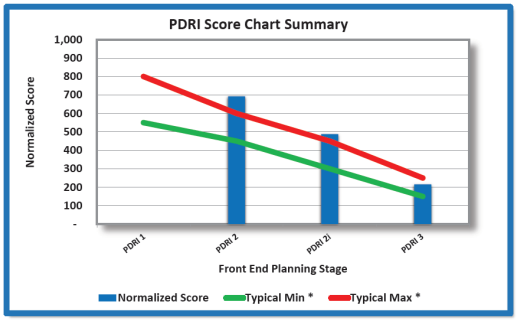
A **Front End Planning Assessment** is the structured and facilitated process for validating the maturity and completeness of the project planning process at the completion of each phase.

The tool(s) widely accepted through the Industry is the **Project Definition Rating Index** ("PDRI"). There are 9 separate tools that are specific to Industry type and project size and scale.



Elements

- A **facilitated 2 to 4 hour session**. With a series of Questions addressing:
  - Basis of Project Decision
  - Basis of Design
  - Execution Approach
- The output of the FEP Assessment is a list of action items to improve various Project Planning Elements – Designs, Plans, Permits, and Activities
- A Score is provided that ranks the maturity and completeness of the FEP at each Phase. **The lower the score the better.**
  - A low PDRI maturity score represents a project definition package that is well defined
  - Higher scores indicate that certain elements within the project definition package lack adequate definition and put the project at more risk than necessary.



Note: * Typical range of scores is based on experience on PDRI tools since 1996.

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4) Why a Disciplined Staged Gate Process is Critical

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A "Disciplined" "Fit for Purpose" Stage Gate Approach is Critical - To Ensure Well Defined Scope Definition & List of Deliverables

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1 **Validate** the investment Opportunity

Identify potential investment alternatives to be assessed during PFS;

Optimize, Develop and define the business strategy.

3 **Define** and develop the selected alternate/option and optimize the project configuration;

Finalize scope, PEP, environmental and other permitting, cost estimate, schedule;

Generate report for approval and funding.

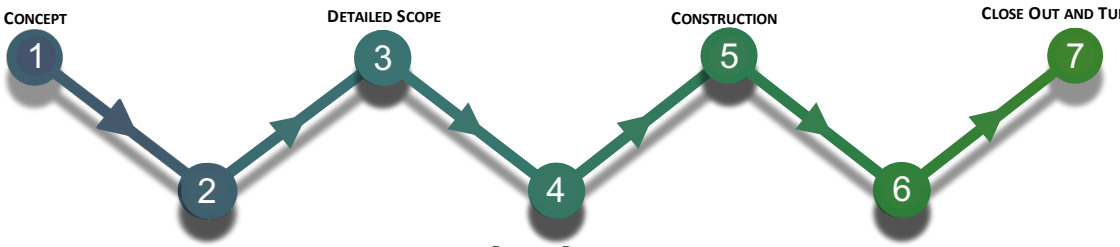
5 **Execute** procurement and construction scopes within the safety and quality criteria and to meet construction schedules and costs

Manage procurement, construction scopes, to deliver the approved scope within the approved budget and schedule; implement effective monitoring and control best practices.

7 **Normal** operations;

Sustaining capital, maintenance, and replacement activities.

Reclamation of the asset at the completion of asset usable life and Closure activities per approved EIA and closure plan.



FEASIBILITY

2 **Review** various selected alternatives/ options and recommend the best option to minimize technical uncertainty, risk, HSEC, and meet the business goals.

Ensure technical and economic viability;

Develop and define technical criteria, financial model and review NPV, IRR, PI, etc..

DETAILED DESIGN

4 **Manage** scope development and carry on detailed engineering using proven techniques to ensure safety, quality, schedule and costs goals are achieved.

Conduct comprehensive collaborative sessions with owners, project engineers, constructors, OEMS, and consultants to optimize project plans and construction readiness.

COMMISSIONING & START-UP

6 **Plan** commissioning and start up requirements in beginning in the feasibility phase

Execute pre-commissioning (also known as dry commissioning), and commissioning of the asset; Ramp up asset output to the design capacity within the approved ramp up period.

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If You Fail to Setup and Plan the Project…… …… You Will Setup to Fail

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Many things needs to be planned but there are some critical items such as

- Kick-off and Alignment
- RACI, Communication, Reporting
- Contract Strategy, Commercial Strategy
- Document Mgt system (# ing and tracking)
- Project Management Information System (PMIS)
- Resource Plan and Resource Loaded Schedules
- Contracting and Procurement Plan
- Construction Plan and Sequencing
- Risk Management and Mitigation Plan
- Ops Readiness and Handover Plan
- CSR/HSEC Plan
- Etc.

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6) Project Set-up / Project Management and Project Controls Handbook

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Complete Project Set-up and List of Deliverables

Typically Project Team Follows a Fully Defined Corporate Guidelines (Problem: 1 size does not fit all)

Develop a simple Handbook (50-70 pages) with list of deliverables based on Project Complexity

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Project Management & Project Controls Handbook

Table of Contents

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Live Links From Handbook Provides Quicker and Accurate Access to Project Deliverables

Planning and Project Control Reports: The Planning and Control group typically produces several reports / deliverables. However, all the reports are not applicable to every project. The preparation of the reports depends on how the scheduling and project control systems have been set up, what data are available to track and what information are provided by the contractors. Below are examples of some of these reports:

- **Summarized Level** Project Control Workflow Diagram (how it all flows together).
- **3-Week Look-Ahead Schedule** – A schedule showing all the activities scheduled for next 3 weeks. This is available and can be generated using P6, MS Project or Excel.
- **Physical Progress (%) Curve** –A graph showing S-curves for baseline plan, actual and forecast progress % at the project level. This curve can be produced for separate scope of work such as engineering and construction.
- **Cost Analysis Template** – A template to do cost analysis.
- **Milestone Status Table** - A table showing baseline plan, forecast and actual dates for key project milestones.

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7) Project Complexity Model and Project Delivery Model

A PTAG tool to determine the List of Deliverables based on the Project Complexity and Project Delivery Model

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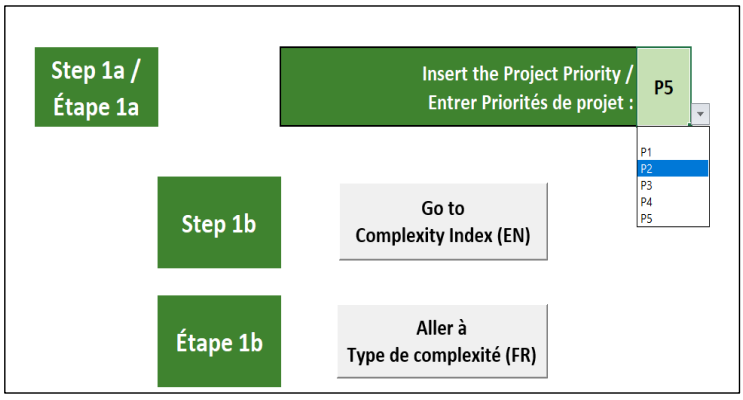
Project Complexity Model Establishes Recommended List of Project Management Deliverables - (6-Step Approach)



Legend

P1:	**High Priority** – **Must Do Safety**, **Regulatory**, and **Legislative** Requirements
P2:	**High Priority** – **Strategic and/or High Rate of Return** Project
P3:	**Mid Priority** – **Not Strategic but Good Rate of Return** Project
P4:	***Quick Win*** – **Mid Impact** Project
P5:	**Low Priority** – Low Impact Project

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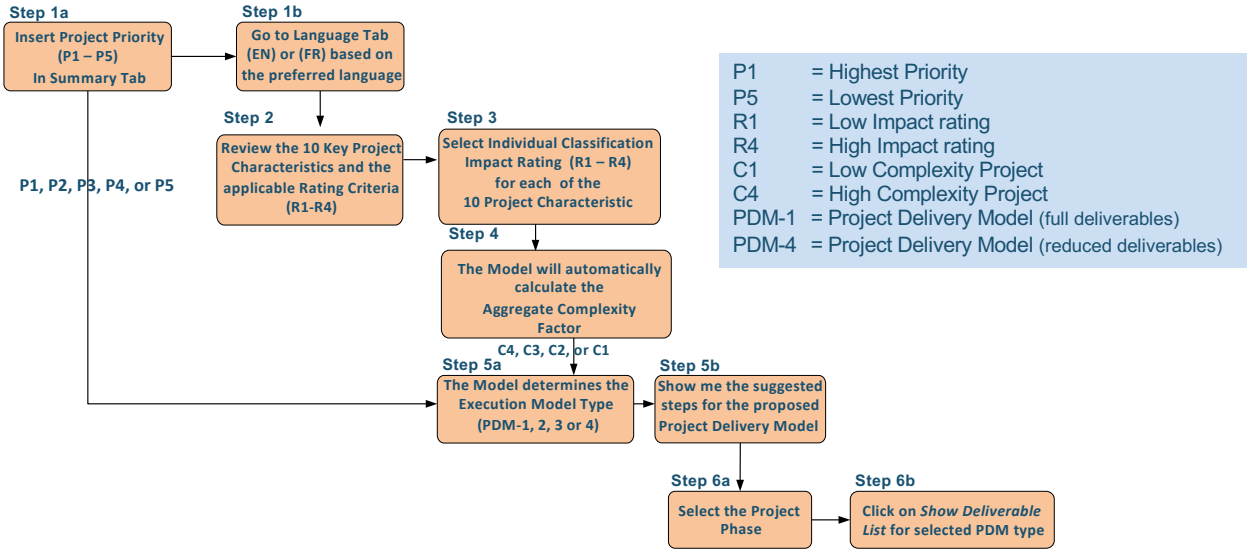
Building the "Project Delivery Model" – 6 Step Approach



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Complexity Model Predicts Which Delivery Model is Best Suited for the Project

Approach to Determine the Project Execution Model Framework

Project Priority	P1	P1 | P2	P2 | P3-P4	P5
	and	and	and	and
Complexity Factors as Determined by Project team	C4/C3	C2/C1 | C4/C3	C2/C1 | C4-C1	C4-C1
	↓	↓	↓	↓
Recommendations for	Project Delivery Type			
	PDM-1	PDM-2	PDM-3	PDM-4

Project Delivery Model ("PDM") PDM-1=High Priority, High Complexity to PDM-4= Low Priority, Low Impact

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The Project Delivery Model - Provides Requirements for Project Execution Planning

Based on the Project Priority and Complexity selected by the Project Team, the attached Table lists the key areas of focus required to plan and develop the Project Execution Plan

Recommendations for	Project Delivery Type			
	PDM-1	PDM-2	PDM-3	PDM-4
Team Structure	Owner's Managed/Dedicated team with some additional resources and dedicated Project Controls team	Owner's Managed/Dedicated team with some additional resources and/or EPCM team	Owner's Managed/non-dedicated team with some additional resources and some Project Controls support	Owner's Managed /Small project team
Capital Project Framework	Full Menu (see the table)	Full Menu with some Optional items (see the table)	Partial Menu with many Optional items (see the table)	Minimal Menu with some Optional items (see the table)
Stage-Gate Process	Full Stage-Gate Process with weekly or monthly SME/Peer reviews	Full Stage-Gate Process with monthly /Qtrly SME/Peer reviews	Stage-Gate Reviews and specified reviews (30%, 60%, 90%)	Accelerated Stage-Gate Reviews with only critical items (as applicable)
Project Management / Project Controls	Full Resource-Loaded Schedule (L4/L5) with construction driven / CPM analyses (+ full risk reviews)	Full Resource-Loaded Schedule (L3/L4) with construction driven and CPM analyses (+ periodic risk reviews)	Simplified WBS/Level 2 type schedule with risk analyses of critical milestones only	Simple WBS/Level 1 or Level 2 schedule with limited risk analyses
Commercial Structure	Fixed Price/UR/ and some T&M	Partial Fixed Price and UR/T&M	Little or no Fixed Price with more UR/T&M	Preferably T&M or as appropriate
Minimum Reporting	Weekly and Monthly	Weekly and Monthly	Monthly	Monthly or as required

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Interactive Handbook - Live Links Provides Quicker and More Accurate Access to Project Deliverables

Here is an example of **Live Links**:

- Using the Complexity Model, the User gets their list of Project deliverables by selecting the appropriate link in the table below (PDM-1 to PDM-4)

PDM-1	Link: Deliverables List PDM-1
PDM-2	Link: Deliverables List PDM-2
PDM-3	Link: Deliverables List PDM-3
PDM-4	Link: Deliverables List PDM-4

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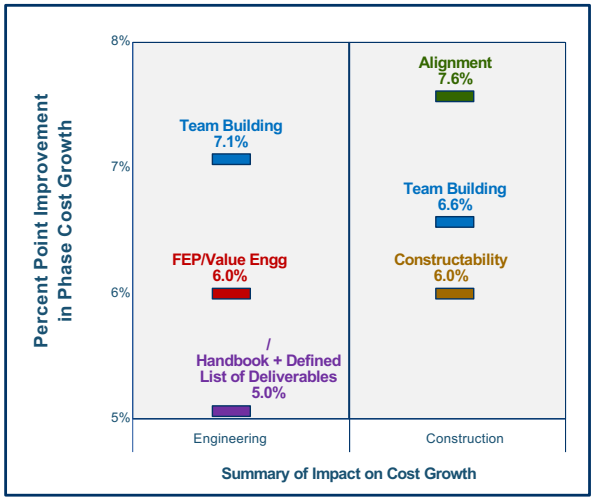
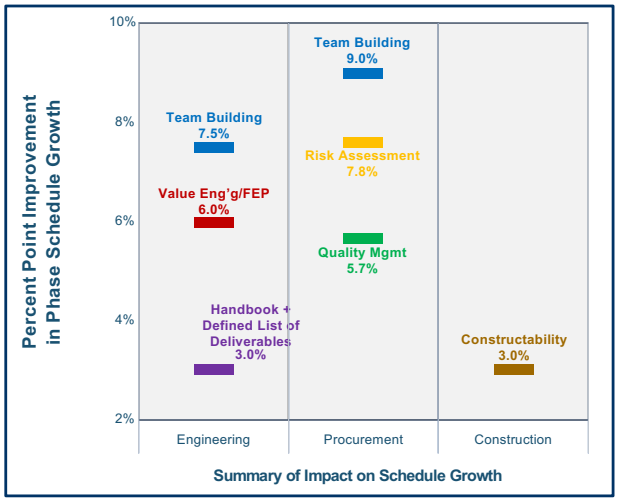
Value of Front-End Planning & Best Practice Implementation





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Summary

1. Project Set-up, Initiation, Kick-off, and Alignment
2. Stage Gate Reviews, Project Audit & Assurance
3. Team Structure & Composition (Owners Team and Contractors)
4. Governance / Policies and Procedures + Deploy & Invest in Industry Best Practices (&Tools)
5. Prioritization with the Operational / Sustaining Capital Objectives
6. Project Risk Analyses Realization and Mitigation Strategies
7. Project Management Information Management, Set-up & Integration
8. QA/QC Reviews, Permits and Stakeholder Management Plan (CSR Plan)
9. Site Planning and Logistics, Technical Issues, Operational Input & Reviews, and Handover
10. Look Ahead Plan with Project Execution Strategy and Resource Loaded Schedule with "pull planning process"

It is not all about technical deliverables but managing the BIG picture (from A-Z) – 10 steps approach

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Questions and Answers

Feroz Ashraf, Executive Advisor, Capital Project
Feroz.Ashraf@PTAGinc.com
cell: 416-587-8747

Michael Dubreuil, Managing Partner
Michael.Dubreuil@PTAGinc.com
cell: 416-500-3954

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Session 2 - 1:00 to 2:00 pm EDT, September 29th (will build on our first session)

1. Review why a consistent **Project Controls and Risk Analysis methodology** is critical
2. Quick review of **Value Engineering** and **Value Improvement Practices**
3. Look into Integrated Project Management Structure and Systems – **I2PD**
4. Understand why an **Integrated Project Execution Plan** (IPEP) is a roadmap to success
5. Learn more about, interactive **Project Management & Project Controls Handbook** – is a key to Project Management and Delivery Success

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" We can't direct the wind but we can adjust the sails" – T. Monson

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Extra slides

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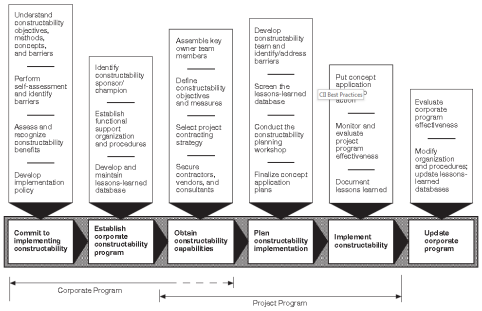
Constructability

Definition:
The optimum use of construction knowledge and experience in planning, design, procurement, and field operations to achieve overall project objectives.

Elements:
- Construction Implementation Roadmap (six steps)
- Identification/Mitigation of Constructability Barriers
- Understanding Construction Cost Influence
- Lessons Learned Database (separate BP!)
- Construction Program Maturity

Barriers:
- Complacency with status quo
- Reluctance to invest additional money and effort in early project stages
- Limitations of lump-sum competitive contracting
- Lack of construction experience in design organization
- Designers' perception that "we do it"

References:
- RT003 Constructability
- RT034 Constructability Implementation
- SD82 Project Level Model and Approaches to Implement Constructability



Constructability Program Inputs	Constructability Program Outputs
Corporate Inputs: • Corporate recognition/designation of the constructability program • Corporate commitment to constructability expressed in a written, widely-distributed policy statement • Management support of constructability efforts/activities • Corporate recognition of the barriers to constructability implementation and identification of barrier breakers • Constructability training of personnel • Designation of an executive sponsor/champion for constructability • Corporate personnel assigned to constructability efforts • Level of constructability program documentation • Corporate efforts to capture and communicate constructability lessons learned • Corporate efforts to promote awareness and implementation of advanced construction technologies • Reference to constructability in contract documents • Corporate efforts to track savings/effects of constructability efforts **Project Inputs:** • Project-level recognition/designation of the constructability program • Project-level recognition of the barriers to constructability implementation and identification of barrier breakers • Constructability training of personnel • Project personnel assigned to constructability efforts • Level of constructability program documentation • Project efforts to capture and communicate constructability lessons learned • Reference to constructability in contract documents • Project efforts to track savings/effects of constructability efforts • Nature of project-level efforts and inputs (proactive or reactive) • Implementation of constructability concepts	**Project Outputs:** • Number of constructability ideas/suggestions collected, implemented, or added to lessons-learned database • Level of constructability participation from project personnel • Project savings from constructability efforts: – Monetary savings – Schedule savings – Labor reductions • Improved performance due to constructability efforts: – Qualitative assessments of site layout effectiveness – Qualitative assessments of procurement/material planning – Qualitative assessments of relationships between parties – Reduction of errors/rework – Reduction of change orders – Reduction of claims – Higher quality of finished product • Problems that could have been prevented with proper constructability implementation: – Unrealistic budgets or schedules – Contracting or subcontracting difficulties – Double handling of material or equipment – Specification problems – Delays – Rigging or access problems – Tolerance problems – Problems with physical interferences – Avoidable weather-related problems – Not meeting client expectations • Constructability barriers/resistance encountered – Number/severity of barriers identified – Effectiveness of barrier breakers – Number of barriers broken

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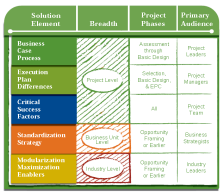
Planning for Modularization

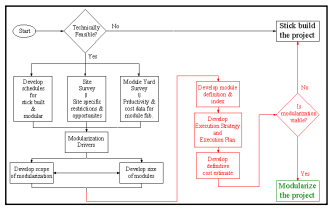
Definition:
The evaluation and determination of offsite construction in the front end planning phase to achieve specific strategic objectives and improved project outcomes. Includes developing a business case and execution strategy for large-scale transfer of stick-built construction effort from the jobsite to fabrication shops or yards.

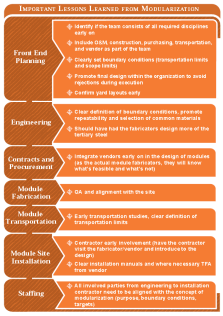
Elements:
- Substantial owner involvement must occur early
- Five distinct solution elements:
  1. Business Case Processes
  2. Execution Plan Differences
  3. Critical Success Factors
  4. Standardization Strategy
  5. Modularization Maximization Enablers
- Important Modularization Lessons Learned
- Tool: Five Solution Elements

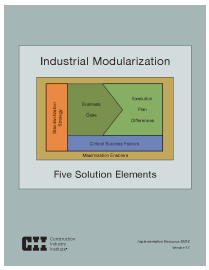
Barriers:
Reliance on stick-build delivery, traditional work processes, lack of owner planning resources/processes, no timely design freeze, lack of investment, delay avoidance awareness

References:
- RT171 Modularization and Offsite Assembly
- RT283 Modularization: How to Optimize; How to Maximize









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Cost Control Process – An Overview

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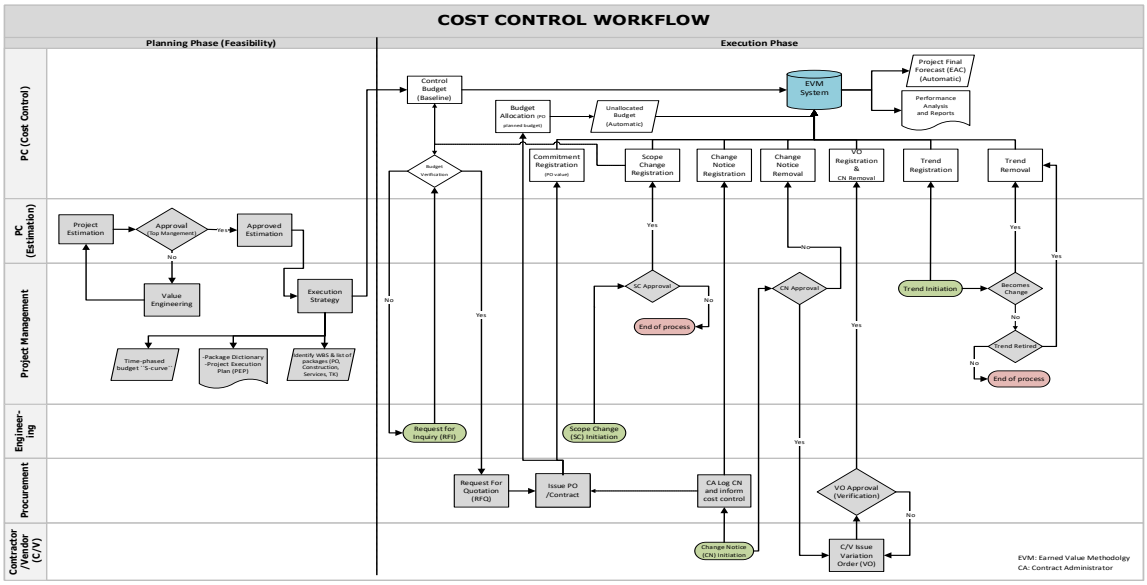

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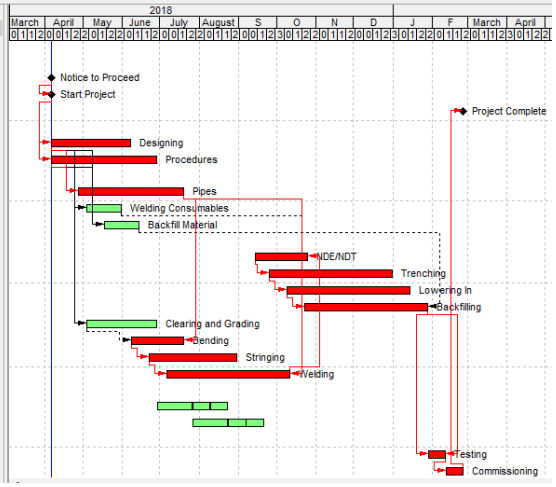
3 Week Look Ahead Schedule

Activities | Projects

Layout: Classic Schedule Layout | Filter: All Activities

Activity ID	Activity Name	Original Duration	Start	Finish
PIPELINE - ORIGINAL		232	06-Apr-18	25-Feb-19
GENERAL		232	06-Apr-18	25-Feb-19
A1110	Notice to Proceed	0	06-Apr-18	
A1120	Start Project	0	06-Apr-18	
A1130	Project Complete	0		25-Feb-19
ENGINEERING		60	06-Apr-18	28-Jun-18
A1100	Designing	45	06-Apr-18	07-Jun-18
A1170	Procedures	60	06-Apr-18	28-Jun-18
PROCUREMENT		60	27-Apr-18	19-Jul-18
A1140	Pipes	60	27-Apr-18	19-Jul-18
A1150	Welding Consumables	20	04-May-18	31-May-18
A1160	Backfill Material	20	18-May-18	14-Jun-18
PIPELINE CONSTRUCTION		192	04-May-18	28-Jan-19
A1040	NDE/NDT	30	14-Sep-18	25-Oct-18
A1050	Trenching	70	25-Sep-18	31-Dec-18
A1060	Lowering In	70	09-Oct-18	14-Jan-19
A1070	Backfilling	70	23-Oct-18	28-Jan-19
A1000	Clearing and Grading	40	04-May-18	28-Jun-18
A1010	Bending	30	08-Jun-18	19-Jul-18
A1020	Stringing	50	22-Jun-18	30-Aug-18
A1030	Welding	70	06-Jul-18	11-Oct-18
ABOVE GROUND INSTALLATIONS		60	29-Jun-18	20-Sep-18
BVS 1		40	29-Jun-18	23-Aug-18
BVS 2		40	27-Jul-18	20-Sep-18
COMMISSIONING		20	29-Jan-19	25-Feb-19
A1080	Testing	10	29-Jan-19	11-Feb-19
A1090	Commissioning	10	12-Feb-19	25-Feb-19



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Example of Cost Control Process Overview

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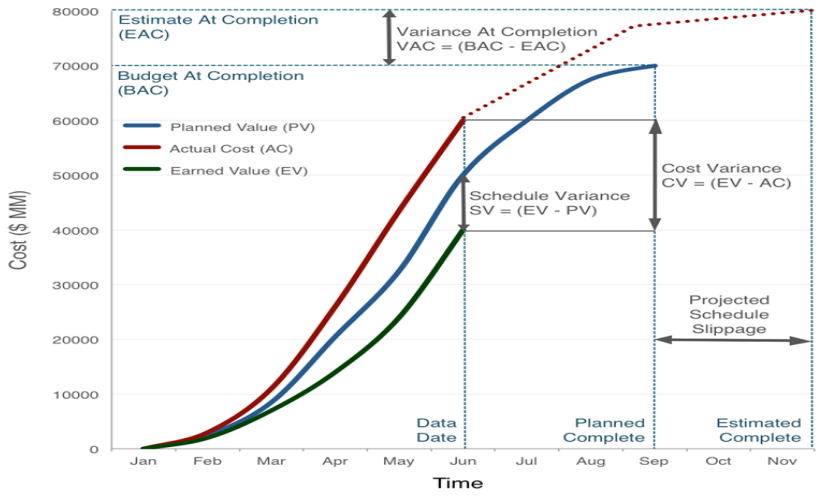

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Cost Analysis

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	Cost ($)							
Period	R.Bud	EAC (P)	CPI	Var (p)	ETC (P)	EAC (A)	Var (A)	ETC (A)
Previous	$29,932,927	$29,932,928	1.00	$0	$11,025,427	$29,932,928	$0	$11,025,427
Sep-20						$29,932,928	$0	$10,975,427
Oct-20						$29,932,928	$0	$10,925,427
Nov-20						$29,932,928	$0	$10,875,427

R.Bud	*Revised budget*
EAC (P)	*Estimated (Forecast) at completion (based on the overall performance up to the reporting period) =* ***R.Bud/CPI***
CPI	*Cost Performance Index =* ***CmEV ($) / CmAC ($)***
Var (p)	*Cost Variance (based on the overall performance up to the reporting period) =* ***R.Bud - EAC (P)***
ETC (P)	*Forecast to complete (based on the overall performance up to the reporting period) =* ***EAC (P) - CmAC ($)***
EAC (A)	*Estimated (Forecast) at completion based on the actual data (Commitments, Variations, trends, etc.) we have up to the reporting period =* ***Formula in Cost Tracking Tab***
Var (A)	*Cost variance based on the actual data (Commitments, Variations, trends, etc.) we have up to the reporting period =* ***R.Bud - EAC (A)***
ETC (A)	*Forecast to complete based on the actual data (Commitments, Variations, trends, etc.) we have up to the reporting period =* ***EAC (A) - CmAC ($)***
CmEV ($)	*Cumulative Earned Value =* ***S-Curves Tab***
CmAC ($)	*Cumulative Actual Cost =* ***S-Curves Tab***

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Milestone Status Table

Activity ID	Key Project Milestone	Planned Date	Forecast Date	Actual Date

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List of Project Deliverables For – PDM-1

	Project Delivery Type: PDM-1						
	Front End Planning			Execution			
	Concept	Pre-Feasibility	Feasibility	Detailed Scope & Eng.	EPC(M)	CSU	Handover
Business case	Business Opportunity	AAFE	AFE				
Stage Gate Planning	Pre-Feasibility Stage Plan	Feasibility Stage Plan	Project Execution Plan				
End-of-stage Review	Stage Deliverable Checklist	Stage Deliverable Checklist	Stage Deliv. Checklist			Deliv. Checklist	Deliv. Checklist
Trade-off Studies & Option(s)	Concept Stage Report	Options Assessment					
Value Engineering & VIP	Value Improv Practice Plan	PFS Stage Technical Report	FS Stage Tech. Report	IFC Design			
Project Execution Strategy			Init. Process Haz. Ass.	Final Process Hazard Assessment			
Commercial & Construction Strategy		Comparative Constr. Review	Constructability Review		Construction	Commissioning	Close-out
						Deficiency List	
						Ramp-up	
Operations Readiness		Comp. Oper. Readiness Req.	Oper. Readiness Plan	Operations Readiness Activities		Hand Over	Close-out
		Management of Change					

ORANGE are MANDATORY.

YELLOW are RECOMMENDED.

GREEN are OPTIONAL

Multiple Pages of Detailed Requirements

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List of Deliverables – PDM-4

Smaller list of Requirements

	Project Delivery Type: PDM-4						
	Front End Planning			Execution			
	Concept	Pre-Feasibility	Feasibility	Detailed Scope & Eng.	EPC(M)	CSU	Handover
Business case	Business Opportunity	AAFE	AFE				
Stage Gate Planning	Pre-Feasibility Stage Plan	Feasibility Stage Plan	Project Execution Plan				
End-of-stage Review	Stage Deliverable Checklist	Stage Deliverable Checklist	Stage Deliv. Checklist			Deliv. Checklist	Deliv. Checklist
Trade-off Studies & Option(s)	Concept Stage Report	Options Assessment					
Value Engineering & VIP	Value Improv Practice Plan	PFS Stage Technical Report	FS Stage Tech. Report	IFC Design			
Project Execution Strategy			Init. Process Haz. Ass.	Final Process Hazard Assessment			
			Constructability Review				
Commercial & Construction Strategy		Comparative Constr. Review			Construction	Commissioning	Close-out
						Deficiency List	
						Ramp-up	
Operations Readiness		Comp. Oper. Readiness Req.	Oper. Readiness Plan	Operations Readiness Activities		Hand Over	Close-out
		Management of Change					

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Multiple Pages of Detailed Requirements

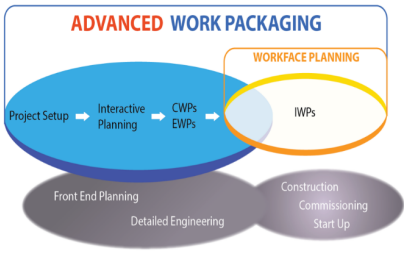
Advanced Work Packaging

Definition:
AWP is the overall process flow of all the detailed work packages (CWPs, EWPs, and IWPs). It is a planned, executable process that encompasses the work on an engineering, procurement, and construction (EPC) project, beginning with initial planning and continuing through detailed design and construction execution. AWP provides the framework for productive and progressive construction, and presumes the existence of a construction execution plan.

Elements:
- Construction-driven, "beginning with the end in mind."
- Begins during project definition, extends into planning & engineering, and continues through construction.
- Key concepts include workface planning, workface planning lead, WBS, EWP, CWP, and IWP.

Barriers:
Lack of clear implementation strategy, owner support, clarity of contractual requirements, clear descriptions of role changes among personnel, support for increased resources, compatible information systems and handover requirements

References:
- RT-272 Advanced Work Packaging
- RT-319 Transforming the Industry: Advanced Work Packaging as a Standard (Best) Practice



Planning for Startup

Definition:

Startup is defined as the transitional phase between plant construction completion and commercial operations, that encompasses all activities that bridge these two phases, including systems turnover, check-out of systems, commissioning of systems, introduction of feedstocks, and performance testing.

Elements:

- Successful project delivery and commercial operation requires successful startup.
- Start up Planning Model
- 16 critical success factors, and timing of CSF Implementation
- Indicators of CSF Achievement
- CSF links to Planning for Startup Process
- Barriers to Less Frequently Accomplished CSFs
- Innovative Commissioning Technologies
- Tools: CSU Critical Success Factors Checklist

Project Phase	Startup Planning Activities	Tools Available	Quality Gate
1. Requirements Definition and Technology Transfer	1	2	
2. Conceptual Development and Feasibility	3	3	Recognize the impact of startup on project economics
3. Front End Engineering	10	12	Update the Startup Execution Plan
4. Detailed Design	15	8	Update the Startup Execution Plan
5. Procurement	3	0	
6. Construction	7	0	Update the Startup Execution Plan & Issue for Construction
7. Checkout and Commissioning	3	1	Finalize the Operations & Maintenance organization and management systems Checkout systems Commission systems
8. Initial Operations	3	0	Finalize documentation