

PSP CERTIFICATION

Overview

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Girish P Dhavalikar



- 30 plus years of experience in Cost Engineering & Project Management for Oil & Gas, Power & Industrial Projects
- PMI ATP Instructor, Level 3 Assessor, Facilitator, Visiting Faculty, SME (Oil & Gas and Power) (Since Oct 2018)
- Certified Cost Professional (2004)
- Project Management Professional (2010)
- Level 3 CAVA (2021)
- AACE India, Region 8 (Asia Pacific)
- PMI Pune Deccan India Chapter

About AACE



AACE

- Established in 1956
- AACE International is the Association for the Advancement of Cost Engineering.
- It serves over 10,000 members and certified professionals in 100 countries.
- Cost Engineering is a field of study using integrated means and methods to enable sound decision making in enterprise asset management.
- AACE's Body of Knowledge is developed, refined, and deployed by industry professionals worldwide.

Certification Offered

Three Levels of Certification



Certification Offered

Three Levels of Certification



Planning & Scheduling Professional Certification (PSP)



AACE's Certification

- Tests and Certified that a PSP meets :
 - Minimum experience and knowledge criteria
 - Required expertise in Planning & Scheduling Professional
 - Professional experience requirement
 - Documented education criteria
 - Ethical standards
 - Passing Examination
 - Acceptable standards for best management practices

PSP Certification

- Recognizes specialists who meet a demanding set of planning and scheduling expertise
- Distinguishes planning and scheduling professionals who have the knowledge and skills
- PSP designation is mark of expertise
 - Is a mark of distinction
- Accredited by Council of Engineering & Scientific Specialty Boards (CESSB)

Requirements

- Experience requirement
 - 8+ full years of professional experience (4 years may be substituted by college/university degree)
- Application & Fees
 - AACE members \$500 / Non-members \$625
- Submit application 45 days in advance of exam
 - Documented experience / education is reviewed and verified
 - Must take exam within 6 months of registration
 - Resit fee \$250 applicable up to 6 months from registration

Requirements

- Examination
 - Closed book
 - Computer based online test at Kryterion exam center
 - 119 Questions (Basic Knowledge (56 Q), Practical Exercise (29 Q), and Planning & Scheduling applications (34 Q))
 - Pass / Fail : 70%
 - Overall 5 hours duration
 - 1 Memo writing assignment
 - Validity 3 years

Preparation Guidance

- AACE's reference materials
 - Total Cost Management Framework, 2nd Edition (Ch 3,7&8)
 - Skills & Knowledge of Cost Engineering, 6th Edition
 - PSP Certification Study Guide, 2nd Edition
 - Recommended Practice 11R-88, Required Skills & Knowledge of Cost Engineering, 2006 (As applicable)
 - Cost Engineering Terminology 10S-90
- Supplemental reading
 - Professional Practice Guide #4: Planning & Scheduling

Preparation Suggestions

- Examination
 - Apply sound test-taking tactics
 - Read through exam & do problems of greatest comfort first
 - Allocate time proportionally to value of problem
 - Study & work example problems in all areas
 - Master financial calculator before exam
- Memo Writing Assignment
 - Memo to simulate reporting on planning & scheduling analysis to a project manager
 - Key is clearly communicating issues & proposing solutions

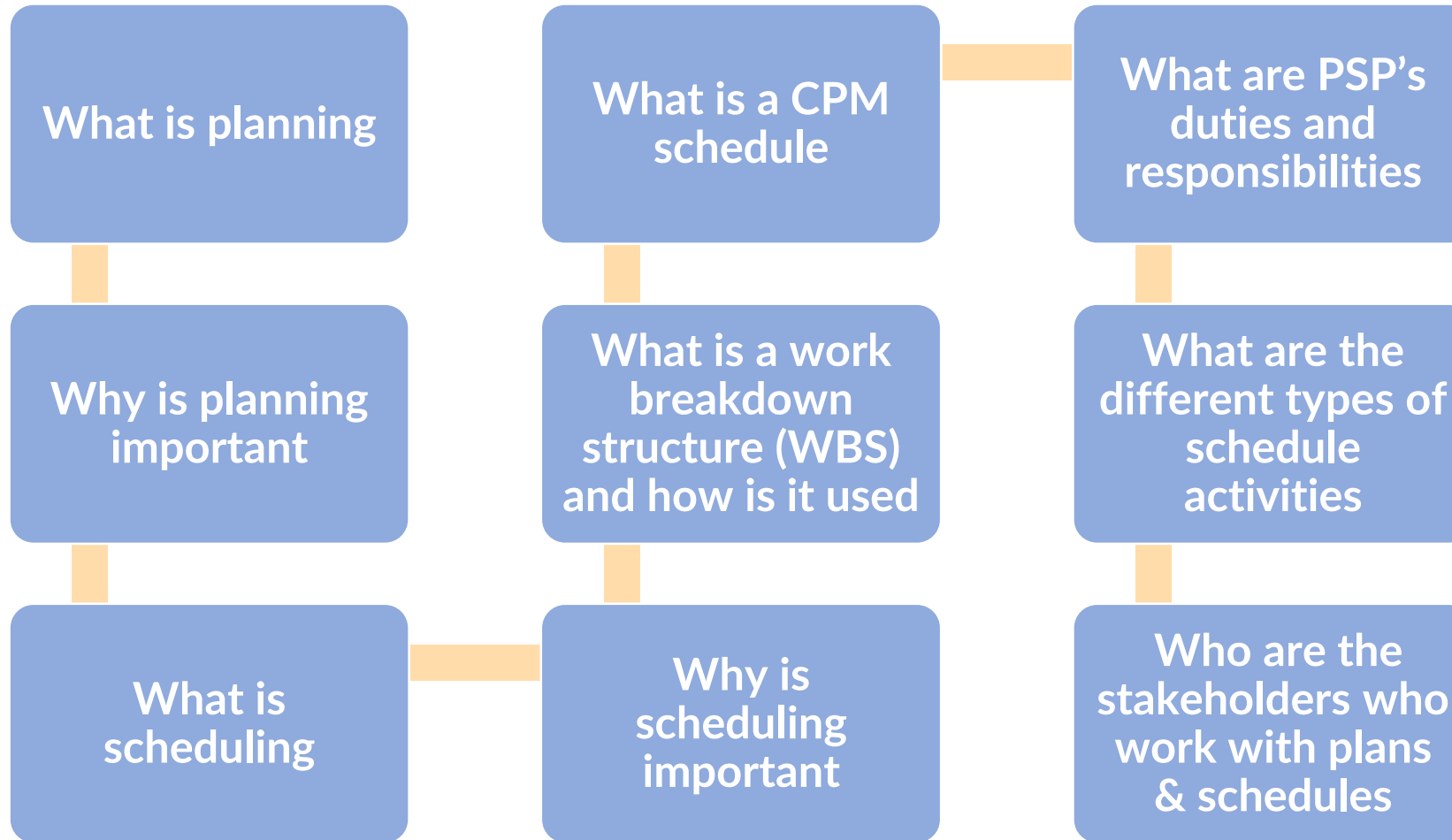
Recertification Process (Every 3 years)

- Designed to ensure that professional has maintained continued expertise through
 - Work experience
 - Continued education
 - Professional development
 - Active involvement in the profession
 - Earning 12 CEU (Continuous Education Unit)
- Re-examination
- Single point credits and fees for multiple certifications

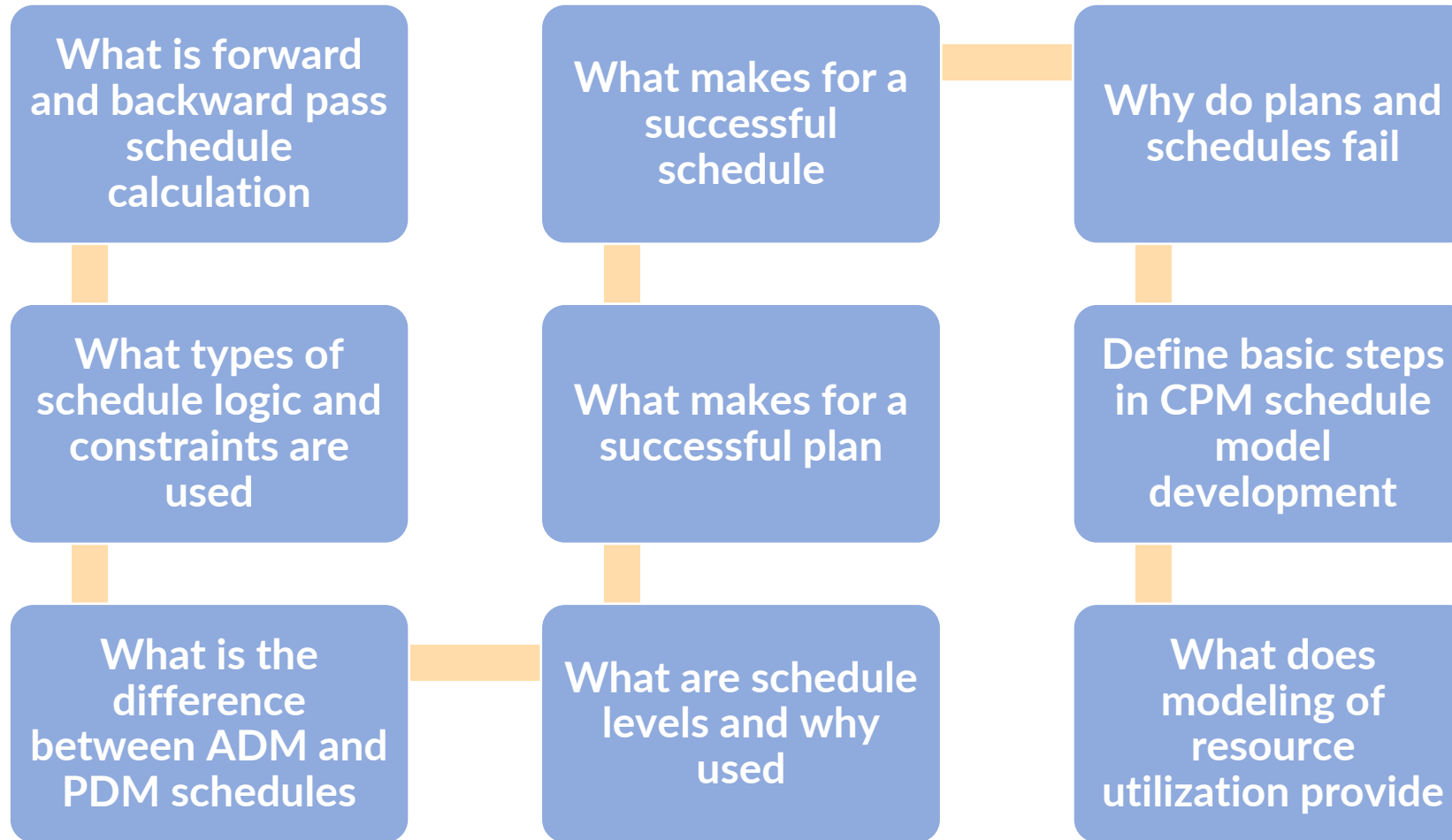
SKILLS AND KNOWLEDGE OF PLANNING AND SCHEDULING



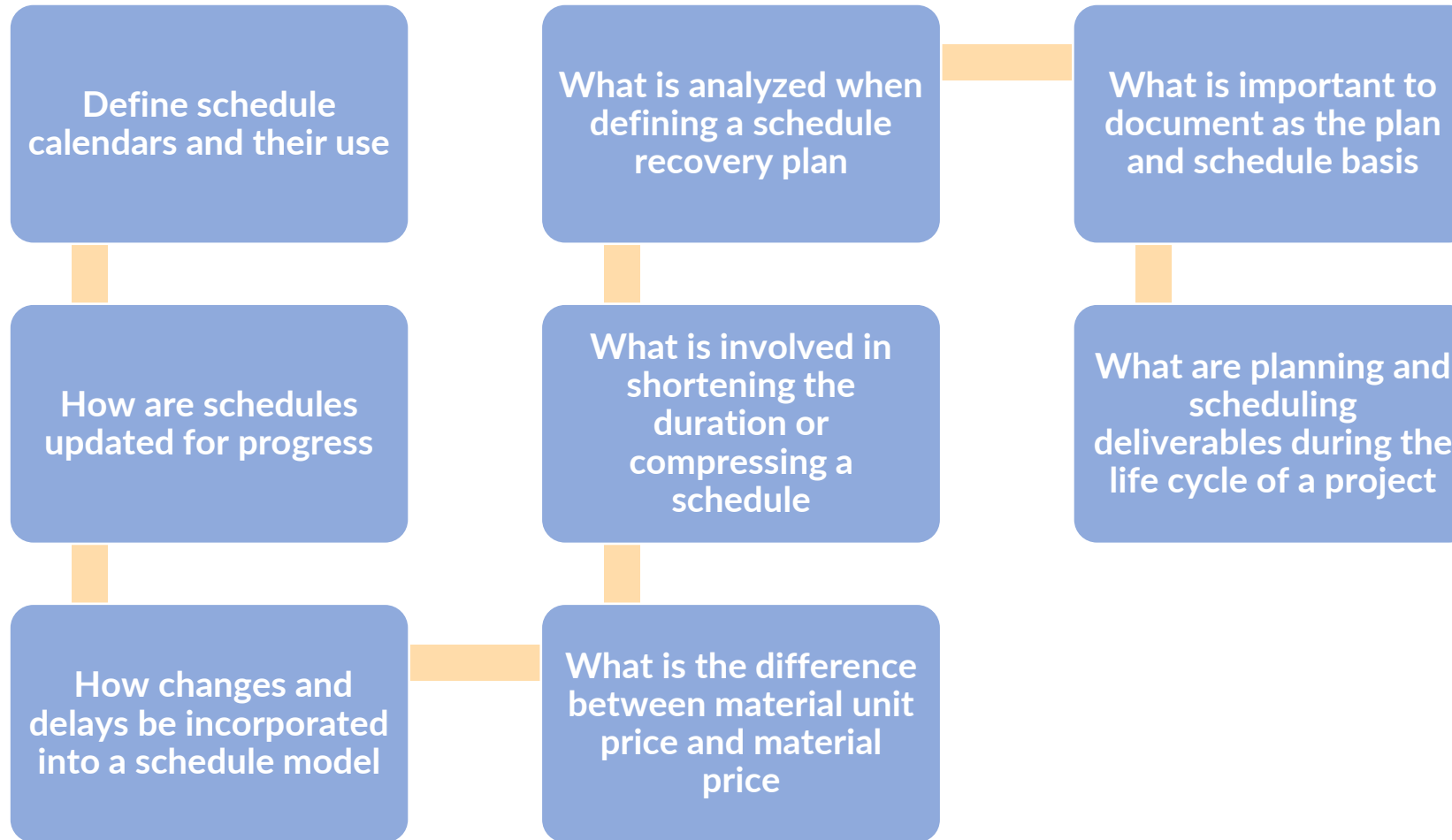
TEST YOUR PSP KNOWLEDGE



TEST YOUR PSP KNOWLEDGE



TEST YOUR PSP KNOWLEDGE



PLANNING

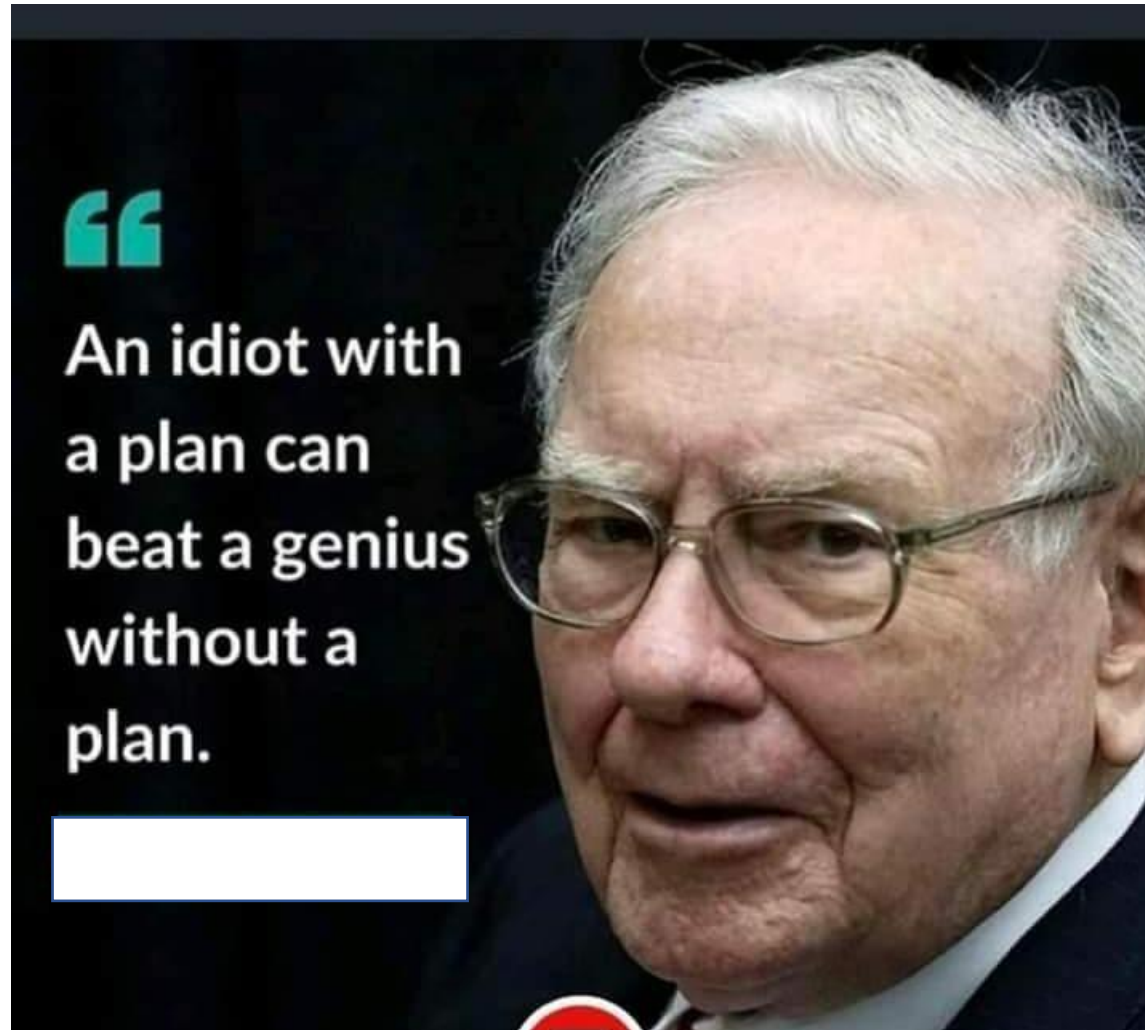


PLANNING



*« If you fail to
plan, you are
planning to
fail »*

PLANNING



PLANNING

- Present day strategy to achieve desired goal in future
- Planning helps to achieve the desired goal with the highest quality in the shortest possible time and by consuming fewer resources and cost
- Project planning is a process comprised of a series of integrated steps
- Planning defines the actions & activities, the time & cost targets and the performance milestones that will result in successfully achieving objectives

PLANNING

- Planning Culture
 - Organisation that encourages a proactive, structured approach to planning will reap significant benefits
 - Preparing a clear scope definition minimizes the potential for overlooking an aspect critical to success
 - Team effort permits various viewpoints and ideas
 - Documenting the resultant plan provides a means and structure for communication between the participants
 - Baseline plan prepares for managing the execution phase and basis for measuring progress and controlling change

PLANNING

- Planning Tools
 - The most fundamental and useful planning tool is the experience gained by planning team on previous assignments
 - Commercial handbooks and software programs
 - Standard, company-wide, policies and operating procedures
 - Model plans (referred to as “go-bys” or “templates”)
 - Checklists
 - Historical databases
 - Codes of Accounts

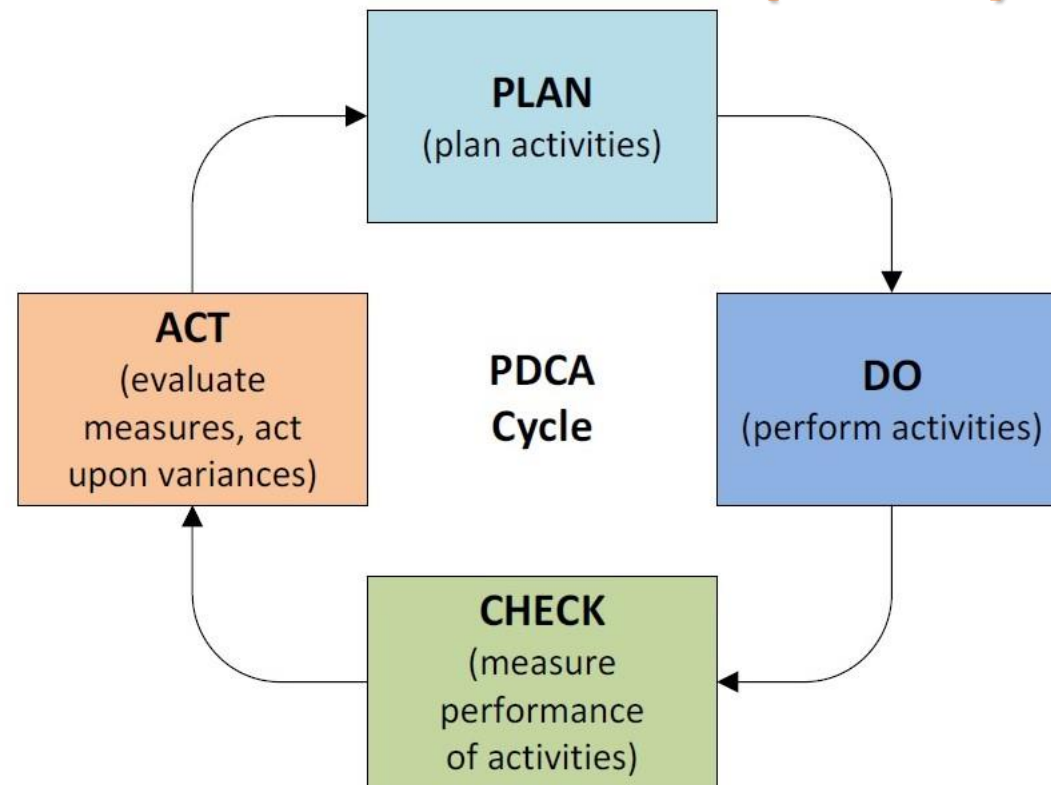
PLANNING

- Planning Process
 - Project plan provides the specifics of;
 - WHAT (Objective, scope, statement of work)
 - HOW (Approach, work breakdown structures)
 - WHO (Project organization and resource schedule)
 - WHEN (Schedule and milestones)
 - WHERE (Facilities required)
 - WHAT-IF (Contingency plans in the event of risk)

PLANNING

- Planning Process

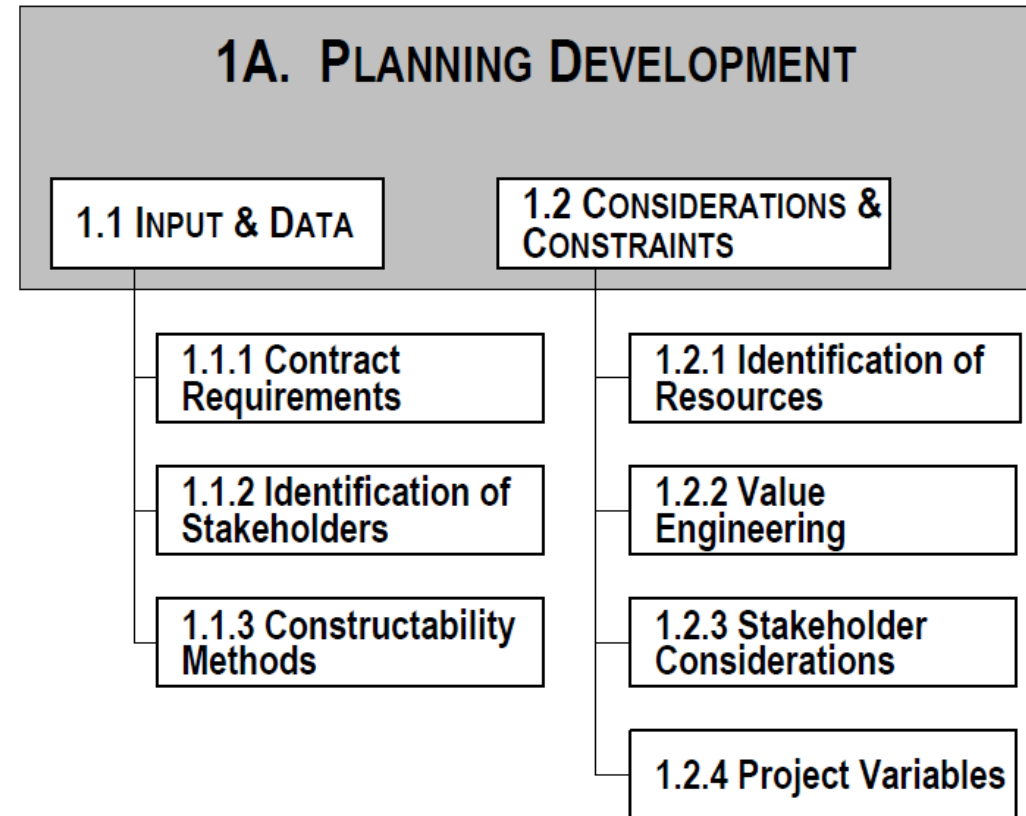
Plan-Do-Check-Act (PDCA)



PLANNING DEVELOPMENT



PLANNING DEVELOPMENT



Input and Data

- Contract Requirements
 - Contract types
 - Fixed price
 - Cost reimbursable contracts
 - Unit rate contract
 - Time and Material (T&M)
 - Delivery methods
 - Design-Bid-Build / Design-Build
 - Turnkey / JV / EPC
 - BOOT / Design-Build-Operate-Maintain

Input and Data

- Identification of Stakeholders
 - Identify every stakeholder
 - Stakeholders can be internal or external to the Project
 - Stakeholders, whether major or minor, have a significant influence on the success or failure of the project
 - Identify stakeholder's influence and interest levels
 - Each stakeholder's concerns and limitations must be identified, evaluated, and reconciled
 - Manage effective interface (engagement) with stakeholders

Input and Data

- Constructability Methods
 - Constructability is concerned with technology, methods of installation and the associated costs
 - Constructability tends to optimize time and cost performance by considering alternate installation methods
 - Constructability can involve changes to the design details to optimize physical performance of the work
 - Construction Driven Scheduling as Key to CPM Program - schedule is structured around the construction schedule, assuming that it has been developed on best economic basis

Considerations and Constraints

- Identification of Resources
 - Resource Planning
 - Resource Planning is a critical aspect of the planning process, and if not considered, may adversely impact the project
 - Resources includes;
 - People
 - Equipment
 - Materials
 - Technology
 - Capital funding

Considerations and Constraints

- Value Engineering
- Stakeholder Considerations
- Project Variables
 - Physical location and space
 - Transportation limitations/restrictions
 - Productivity restrictions
 - Funding methods, timing and phases
 - Contracting and project delivery method
 - Historical data

PLANNING PRODUCT



PLANNING PRODUCT

1B. PLANNING PRODUCT

1.3 OUTPUT & DELIVERABLES

- 1.3.1 Define Scope of Work
- 1.3.2 Define Project Goals
- 1.3.3 Define Project Plan
- 1.3.4 Phase Definition
- 1.3.5 Establish Work Breakdown Structure
- 1.3.6 Establish Organization Breakdown Structure
- 1.3.7 Establish Cost Breakdown Structure
- 1.3.8 Sequencing & Phase Relationship
- 1.3.9 Review by Stakeholders
- 1.3.10 Cost Estimate Development
- 1.3.11 Baseline Plan
- 1.3.12 Periodic Forecasts
- 1.3.13 Risk & Recovery Plan

Output and Deliverables

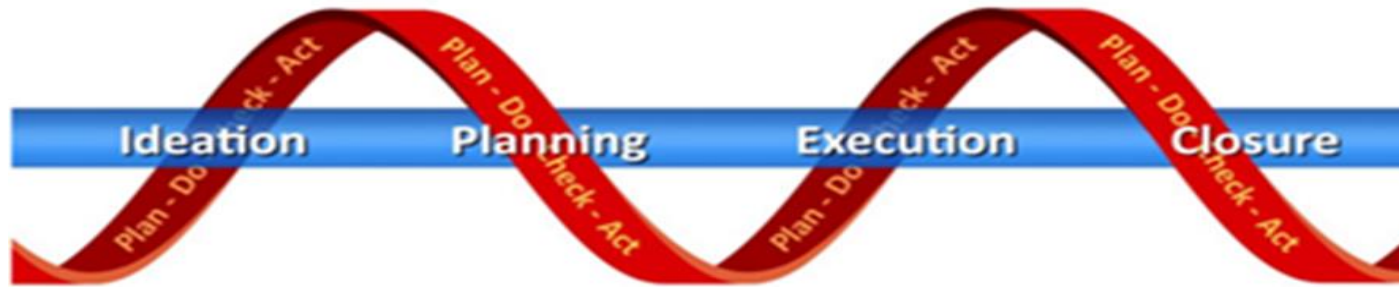
- Define Scope of work / Project Goals
 - Scope definition is a matter of project discipline and design control necessary to identify and prevent scope changes that are all too common on fast track projects
 - The purpose of the feasibility study is to define the scope
 - The major deliverable of the feasibility study is the basic design package—Statement of Requirements (SOR)
 - Scope document includes : Project description
 - Project objectives
 - Project justification / Economic justification

Output and Deliverables

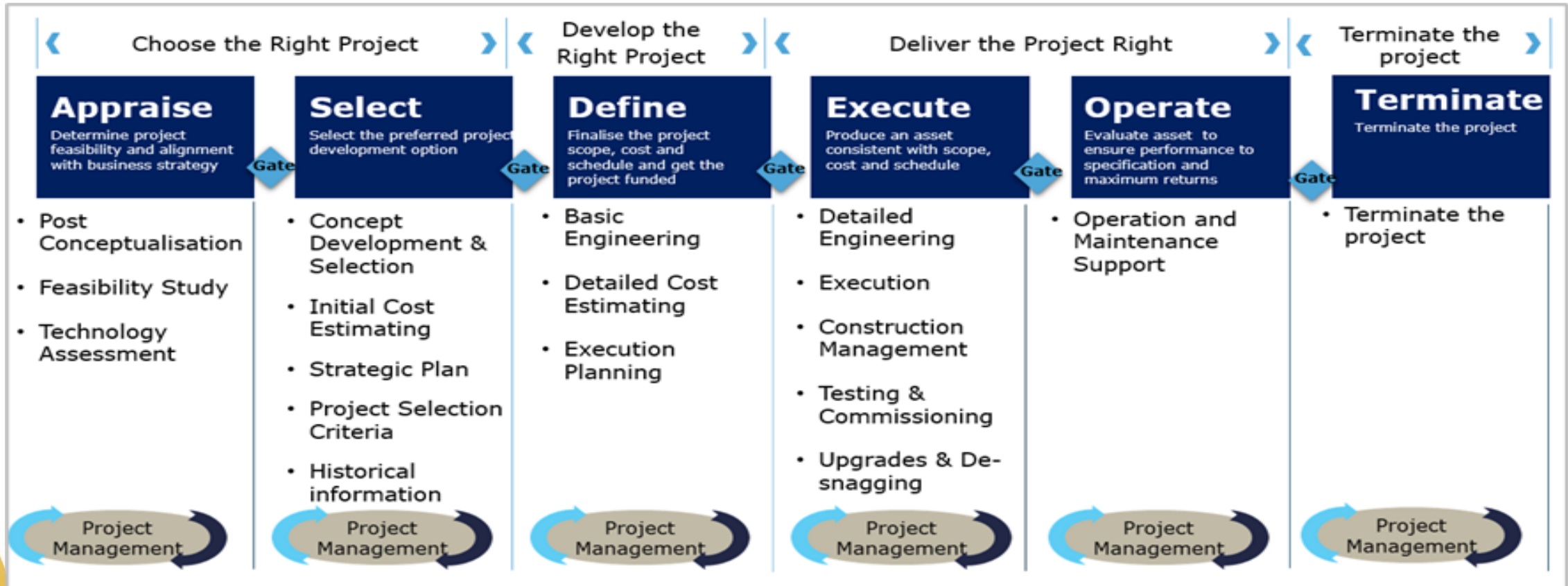
- Define Scope of work / Project Goals
 - Scope document includes: Design basis and specifications
 - Process definition: PFD, Heat & Material balance
 - Mechanical definition: P&ID, Plot plan, GA's, equipment list
 - Electrical definition: SLD, cable schedule, panel diagrams
 - Instrumentation definition: IO's, control points, set points
 - Safety definition: HAZOP, safety devices, Interlock logic
 - Project location: Logistic review, infrastructure requirement
 - Project conditions: Site access, operational restraints
 - Estimate definition: WBS, BOQ, budget, risk, contingency
 - Schedule definition: Sequence and phase relationship, constraints

Output and Deliverables

- Define Project Plan
 - A project execution plan is the most significant output of the planning process
 - Phase relationships are the foundation for developing the framework used for monitoring, analyzing, controlling and reporting project execution
 - Sequencing is the part of the planning process that begins to bring together the interrelated phase of the project, using simple logic relationships
 - Breakdown structure is a mechanism that helps to organise scope, resources, cost and schedule



Project Life Cycle



Output and Deliverables

- Establish Work Breakdown Structure
 - The Work Breakdown Structure (WBS) is a hierarchical division of the work elements to be performed on a project
 - WBS divides the scope of work into manageable parts that correspond to key deliverables, phases and/or milestones
 - Use of WBS ensures no omission of key elements and assist in the communication of cost, schedule, and resource performance data to stakeholders and team members
 - WBS deliverable elements decompose the scope down to work packages, for effective management of scope

Output and Deliverables

- Establish Organisation Breakdown Structure (OBS)
 - The Organization Breakdown Structure (OBS) is a hierarchical division of the producers of the work
 - The function of the OBS is to identify the entity responsible for performing each deliverable of the scope of work as identified in the WBS
 - The lowest level of an OBS is the organizational entity performing the work package
 - level of breakdown is a balance between convenience and effectiveness

Output and Deliverables

- Establish Cost Breakdown Structure (CBS)
 - At the highest level these are; labor, materials, direct & indirect costs
 - The CBS is a key element of control for a project which allows to track the cost for the project to meet control and reporting needs
 - The development of the CBS allows tracking and forecasting of estimated costs versus actual costs
 - CBS allows effective capture, accurate estimation and monitoring & control of costs

Output and Deliverables

- Cost Estimate Development
 - Scope is decomposed, the WBS, OBS, and CBS for each work package are identified and this integrated structure forms the basis for the preliminary cost estimate and the initial schedule model
 - Cost estimate, plus contingencies, along with other risk factors, should lead to the final cost estimate
 - Budgetary process development provides underlying basis of cost and schedule baselines for project monitoring, controlling, and reporting

Output and Deliverables

- **Baseline Plan**
 - Baseline Plan is the final output of the planning process for a project
 - Baseline provides framework for all progress and measurement evaluation and basis to exercise control of ongoing work in order to achieve successful outcomes
- **Risk and Recovery Plan**
 - Risk planning includes the development and implementation of risk response plans to mitigate cost/schedule/technical impacts caused by risk and/or change

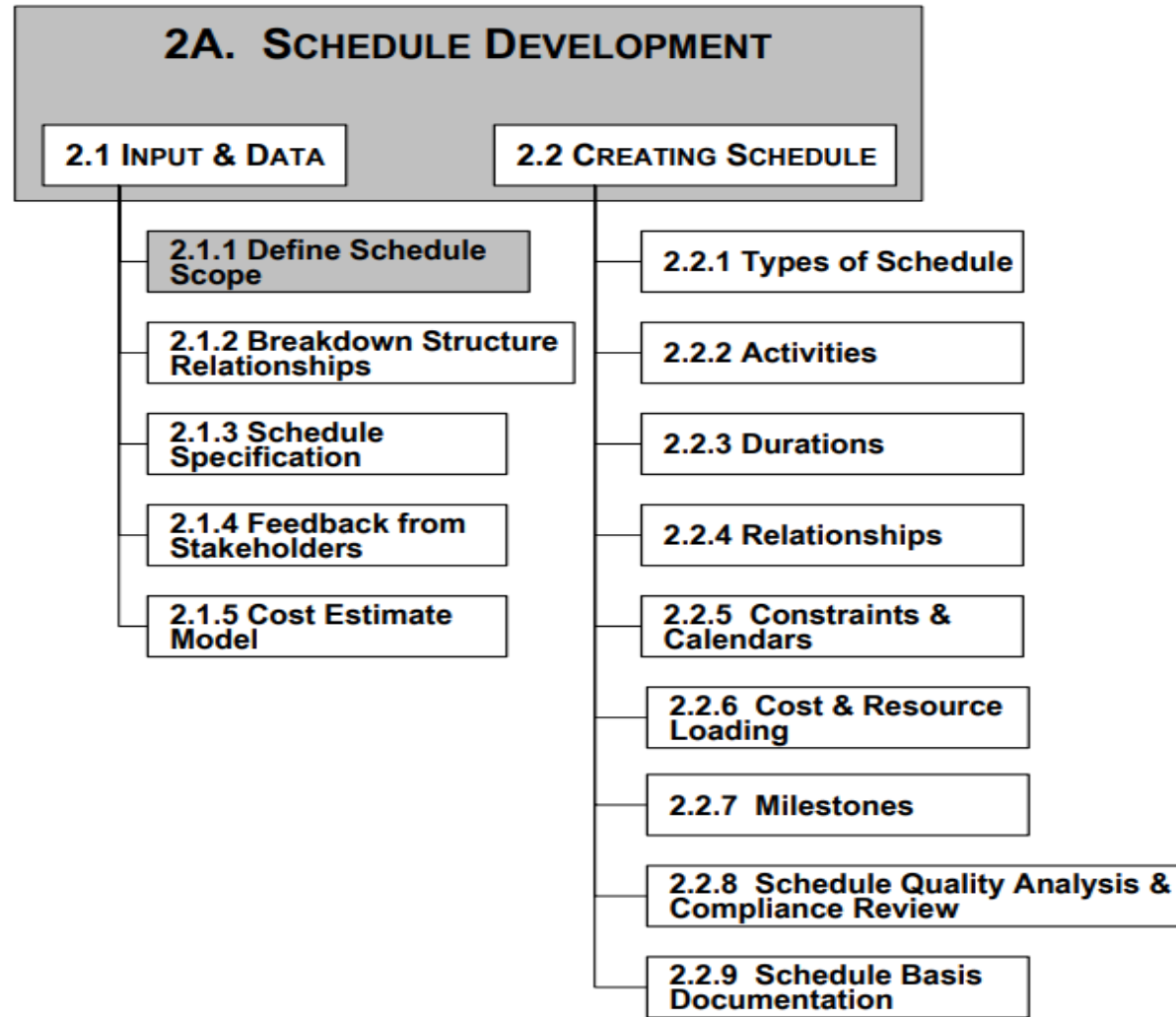
SCHEDULING

Scheduling

- Scheduling is the process that converts the project work plan into a road map, that if followed, will assure timely project completion
- Scheduling is one of the tools used for monitoring and controlling projects to ensure that objectives of cost, time, resources, and quality are met
- Schedules provide the baseline against which progress is measured and reported
- Schedule improves effective use of resources to ensure

SCHEDULE DEVELOPMENT

Schedule Development



Input and Data

- Define Schedule Scope
 - Goals, Objectives, WBS, Deliverables, Milestones
- Breakdown Structure Relationship
 - WBS, OBS, CBS, RBS, intersection points
- Schedule specification
 - Milestones, sequencing, duration, resource loading
- Feedback from Stakeholders
- Cost Estimate Model
 - Cost loading

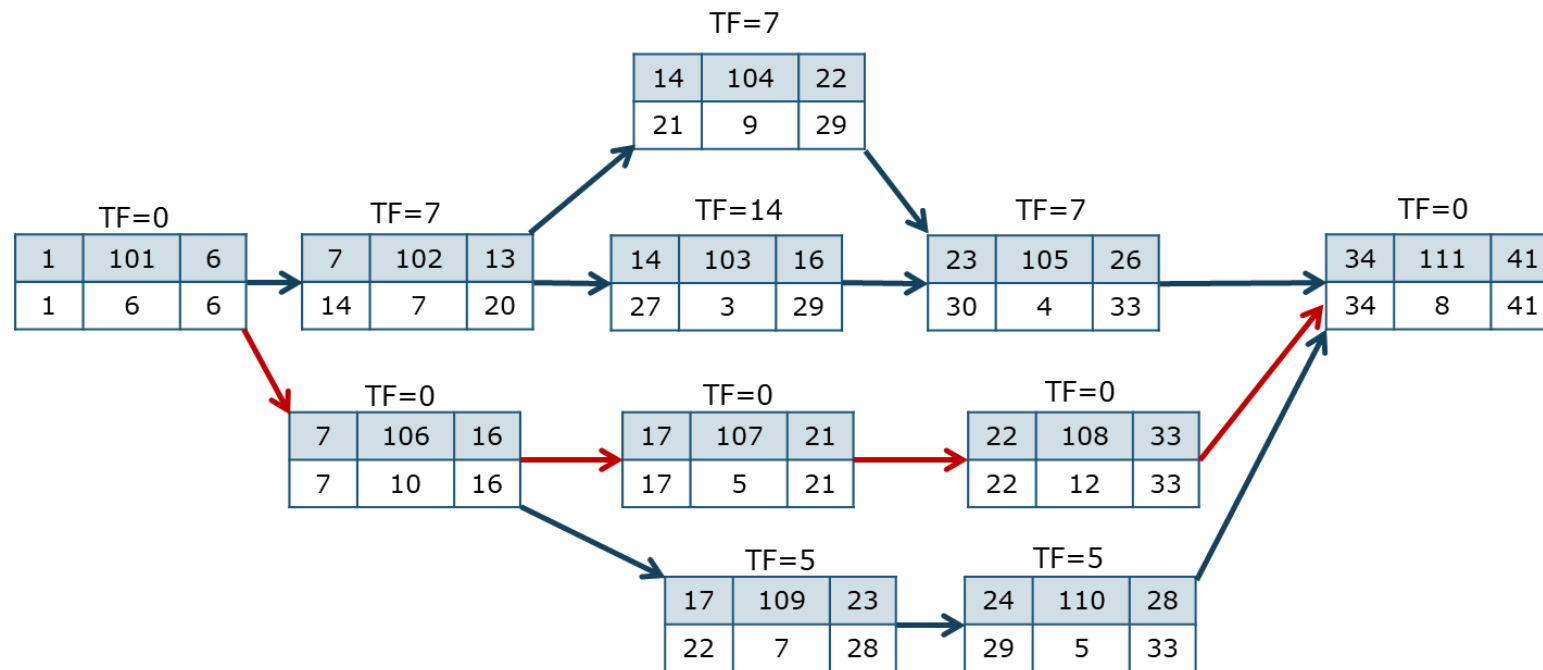
Creating Schedule

- Types of Schedule
 - Bar charts (sometimes referred to as Gantt charts)
 - Critical Path Method (CPM).
 - Arrow diagram method (ADM)
 - Precedence diagram method (PDM)
 - Program Evaluation and Review Technique (PERT)
 - Linear schedule
 - Rolling wave
 - Milestone
 - List

Creating Schedule

PDM activity boxes comprised of:

- Activities are represented by boxes or nodes
- Arrow represent direction of relationship / dependency
- Each box has attributes such as activity duration, description, early start, early finish, late start, late finish etc. etc.



Activity Identifier

ES	9	E	12	EF
LS	14	4	17	LF

Duration

Creating Schedule

- Activities
 - Unique alphanumeric identifier.
 - Unique descriptive name, optimally phrased as verb-object.
 - Duration
 - Milestone – An activity with '0' duration
 - Sequence
 - Relationship
 - Cost and resource loading
 - Constraints

Creating Schedule

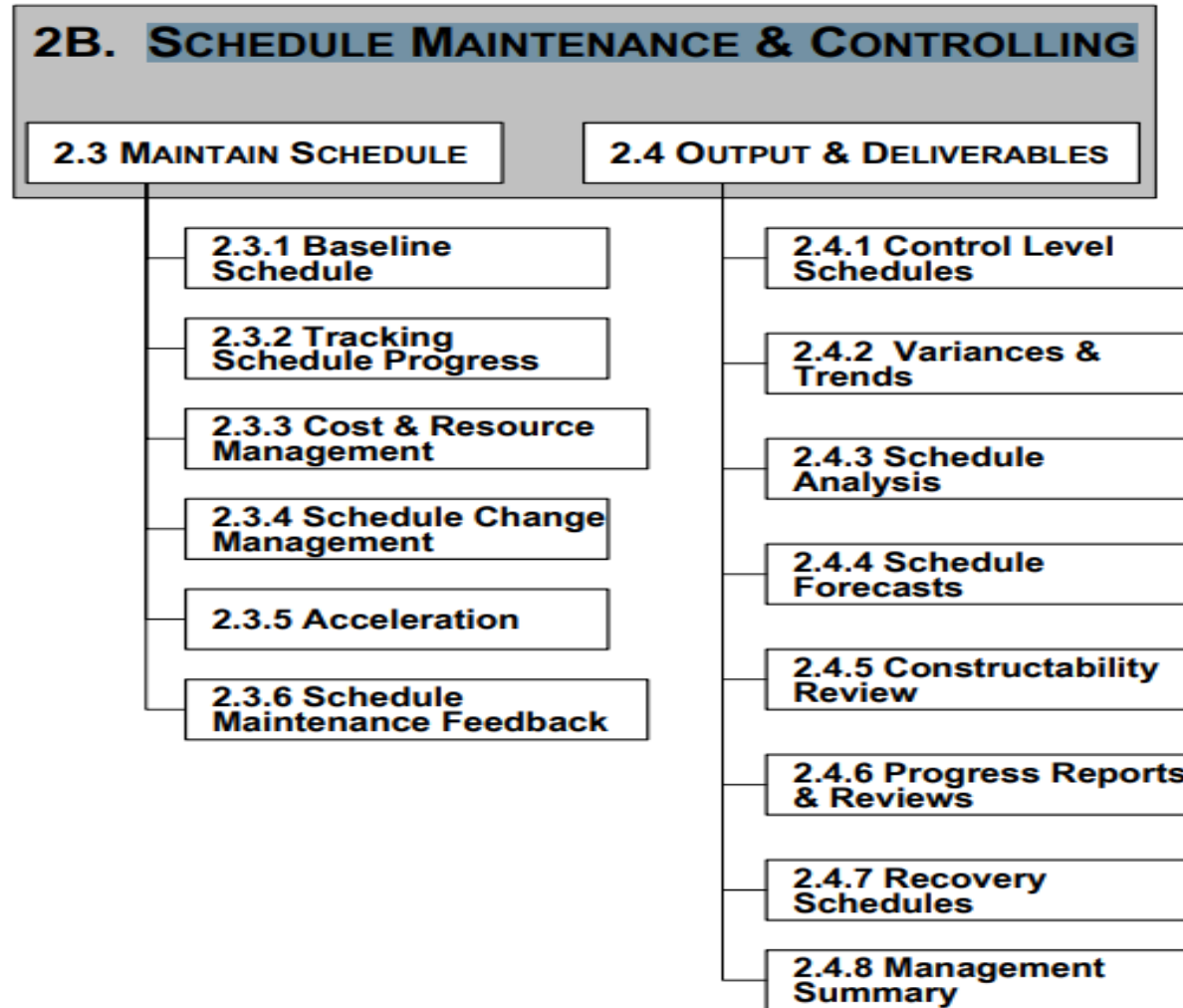
- Schedule Quality Analysis and Compliance Review
 - Is the critical path reasonable?
 - Are there multiple critical paths
 - What activities are near-critical
 - Does the work flow as planned
 - Are there conflicts between concurrent activities
 - Is there excessive amount of work done at any one time?
 - Are there resources enough to support all concurrent activities?

Creating Schedule

- Schedule Basis Documentation
 - Assumptions, constraints, and parameters used to build the schedule is put into a narrative, with supporting materials to form a complete baseline package.
 - If changes occur to the schedule and significantly impact the critical path or completion date, the schedule and supporting documentation may be referenced and the necessary action taken to support status updating, changes, and rebaselining, as appropriate.

SCHEDULE MAINTENANCE & CONTROLLING

Schedule Maintenance & Controlling



Maintain Schedule

- Baseline schedule
 - Used to measure progress and identify trends and changes
 - It identifies the initial critical path and provides the basis for measuring progress
 - Foundation for cash flow planning, resource managing, trending for cost and schedule forecasting, and reporting
 - Analysis of the updated schedule against the baseline will show the impact of any milestone or completion date variance. May trigger rebaselining

Maintain Schedule

- Tracking Schedule Progress
 - Original schedule should be updated to reflect current status
 - Updating is a control process, which implies that adjustments may be necessary and forewarns of major consequences
 - Four major reasons a schedule should be updated regularly
 - Reflect current project status
 - Keep the schedule as an effective management tool
 - Document performance
 - Provide documentation to plan for changes and support delay analysis

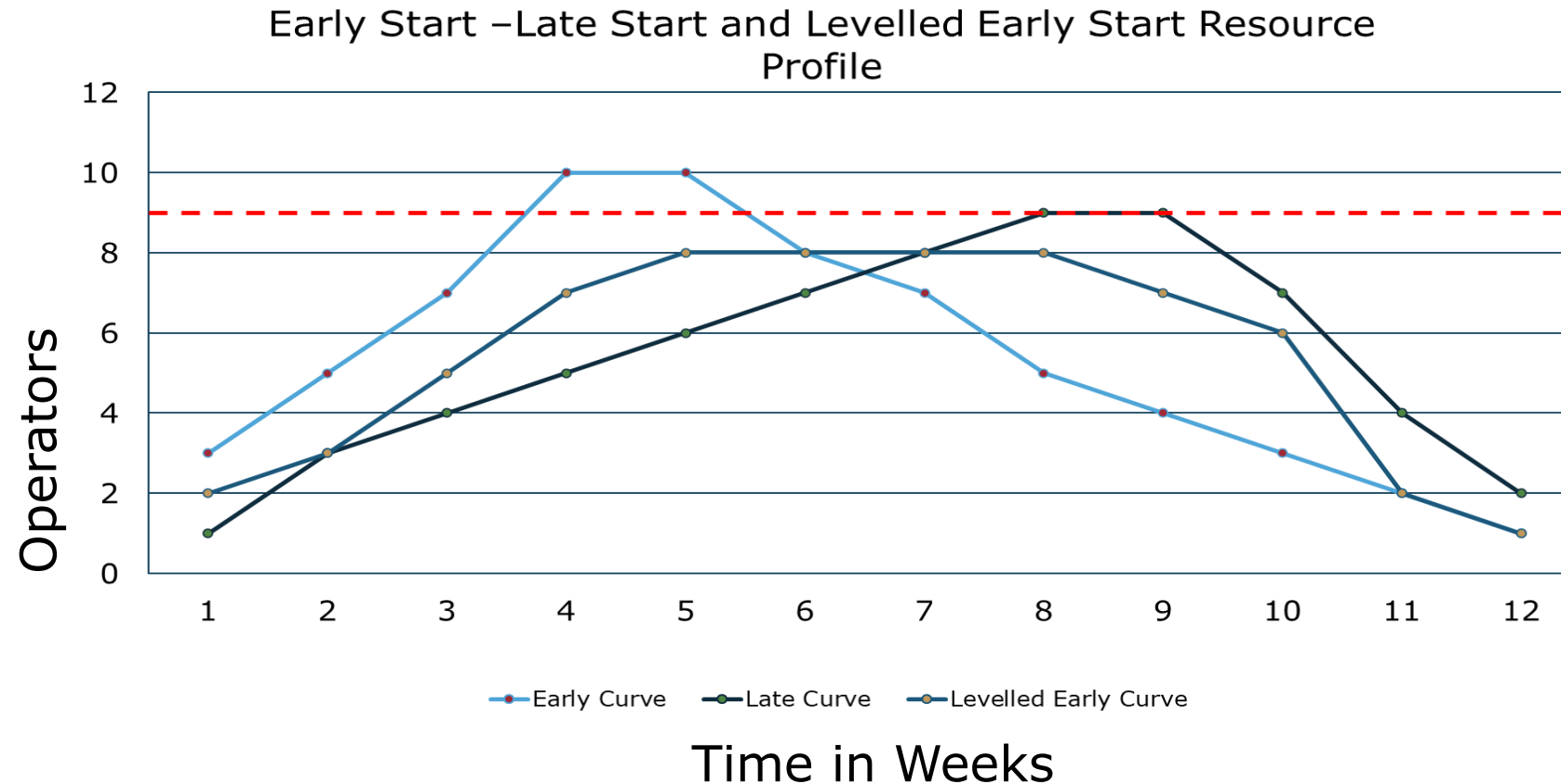
Maintain Schedule

- Cost and Resource Management

Resource Optimisation Techniques	
Resource Levelling (Resource Limited Scheduling)	Resource Smoothing (Time Limited Resource Scheduling)
Resource levelling is used when limits on the availability of resources are paramount.	Resource smoothing is used when the time constraint takes priority.
It answers the question 'With the resources available, when will the work be finished?	The objective is to complete the work by the required date while avoiding peaks of resource demand.
This can be applied only for schedules prepared by using critical path method.	A technique which adjusts the activities of a schedule such that the requirement for resources on the project do not exceed certain predefined resource limits.
This is a means of balancing over-allocated or under-allocated resources across different activities.	Resource smoothing is about utilising free and total floats in order to juggle resources between different activities.

Maintain Schedule

- Cost and Resource Management



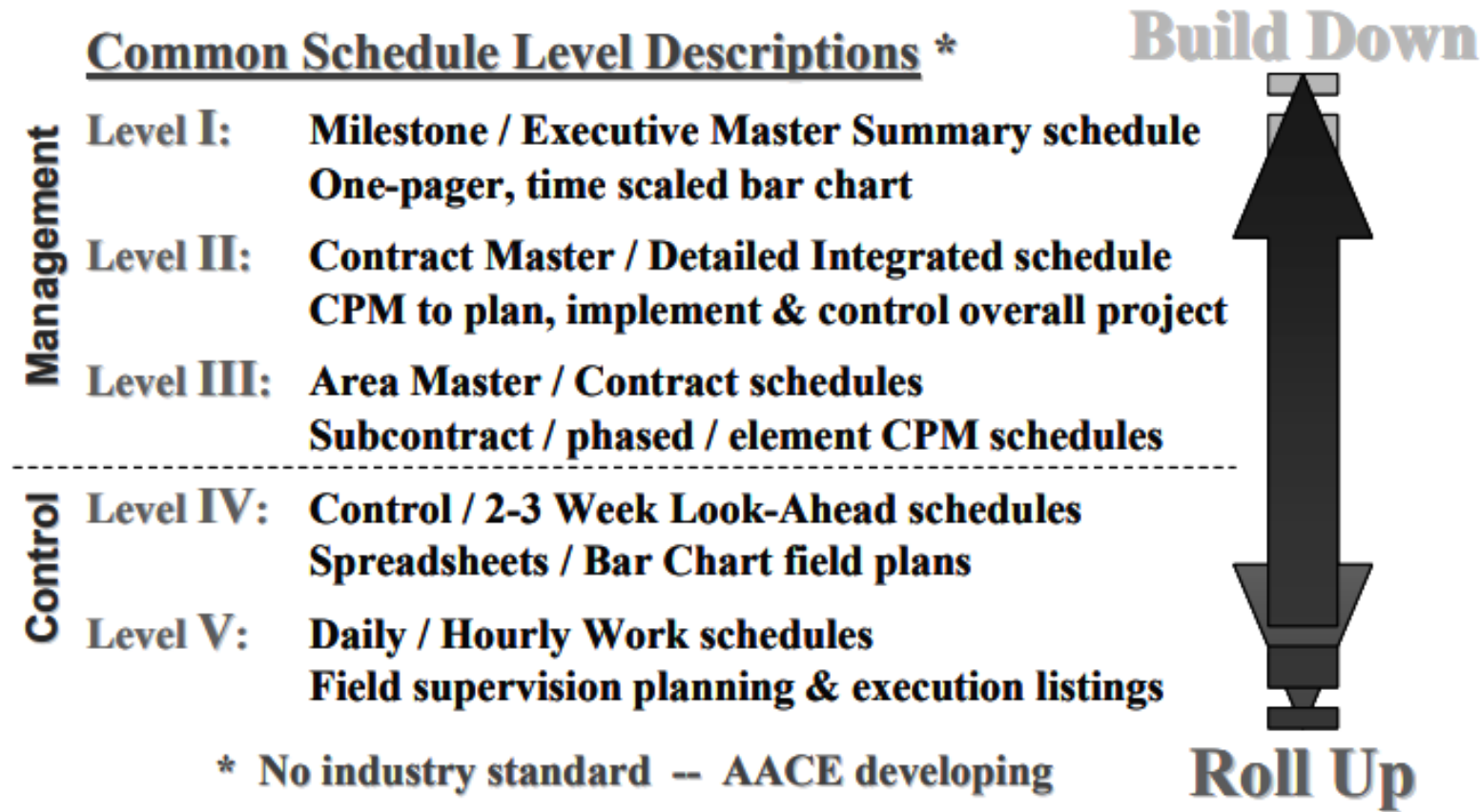
Maintain Schedule

- Schedule Change Management & Acceleration

Strategies for Recovery and Acceleration		
Technique	Description	Side Effects
Crashing	Add resources to time-dependent activities to complete work faster	Requires additional resources and thus increases costs; may also reduce quality if activities are executed faster and with less-experienced labour
Fast-tracking	Reduce the sequential dependencies between activities to partial dependencies. For example, F-S logic is reduced to S-S logic to force parallel work	Resources may become overallocated; quality may also be reduced, and risk introduced if activities ideally executed in a sequence are now executed in parallel
Split long activities	Split long activities into shorter activities that can be worked in parallel	Resources may become overallocated
Review constraint and lag assumptions	Reassess assumptions related to forcing activities to begin on certain dates	If the original date constraint or lag is justified, removing the constraint or lag may not be realistic
Review duration estimates	Revisit duration estimates using progress records as actual effort is recorded	

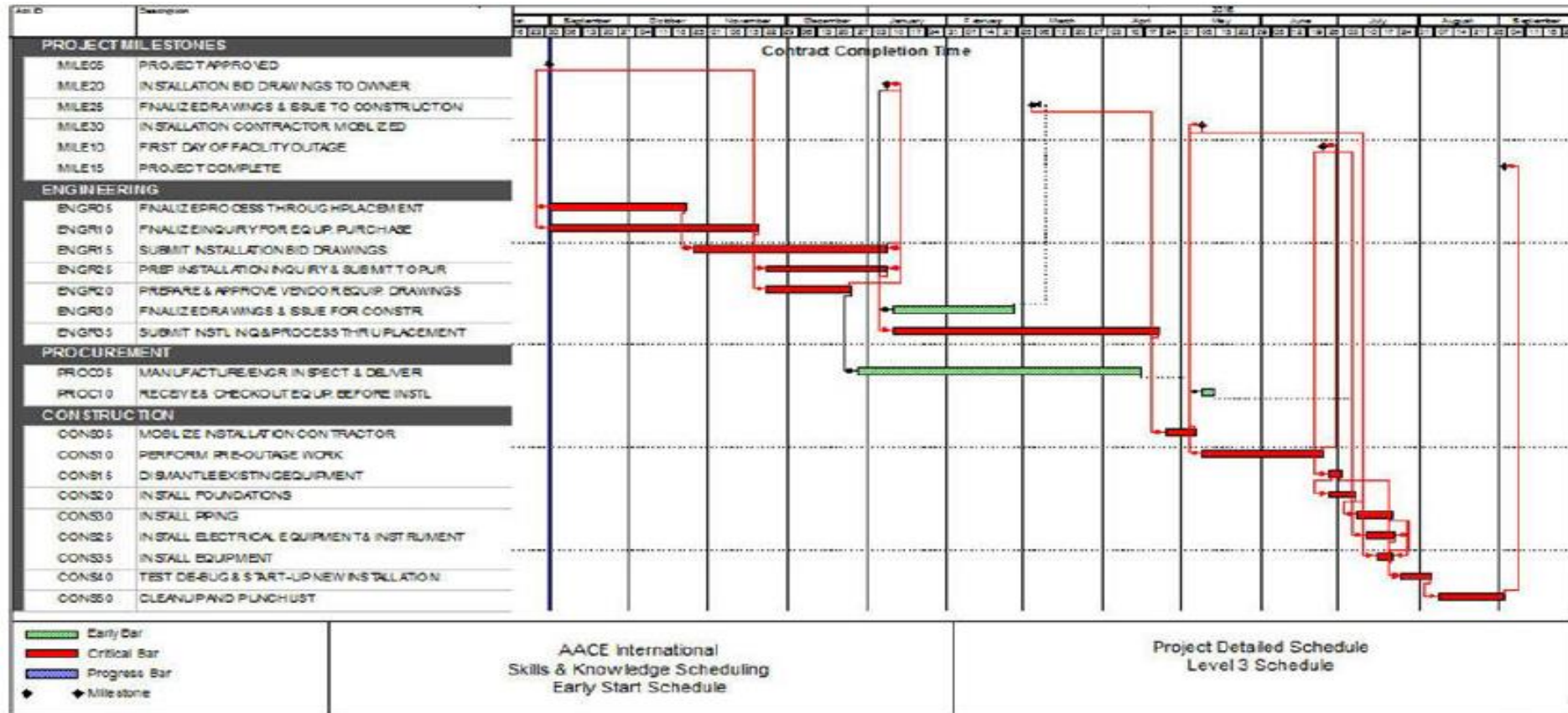
Output and Deliverables

- Control Level Schedules



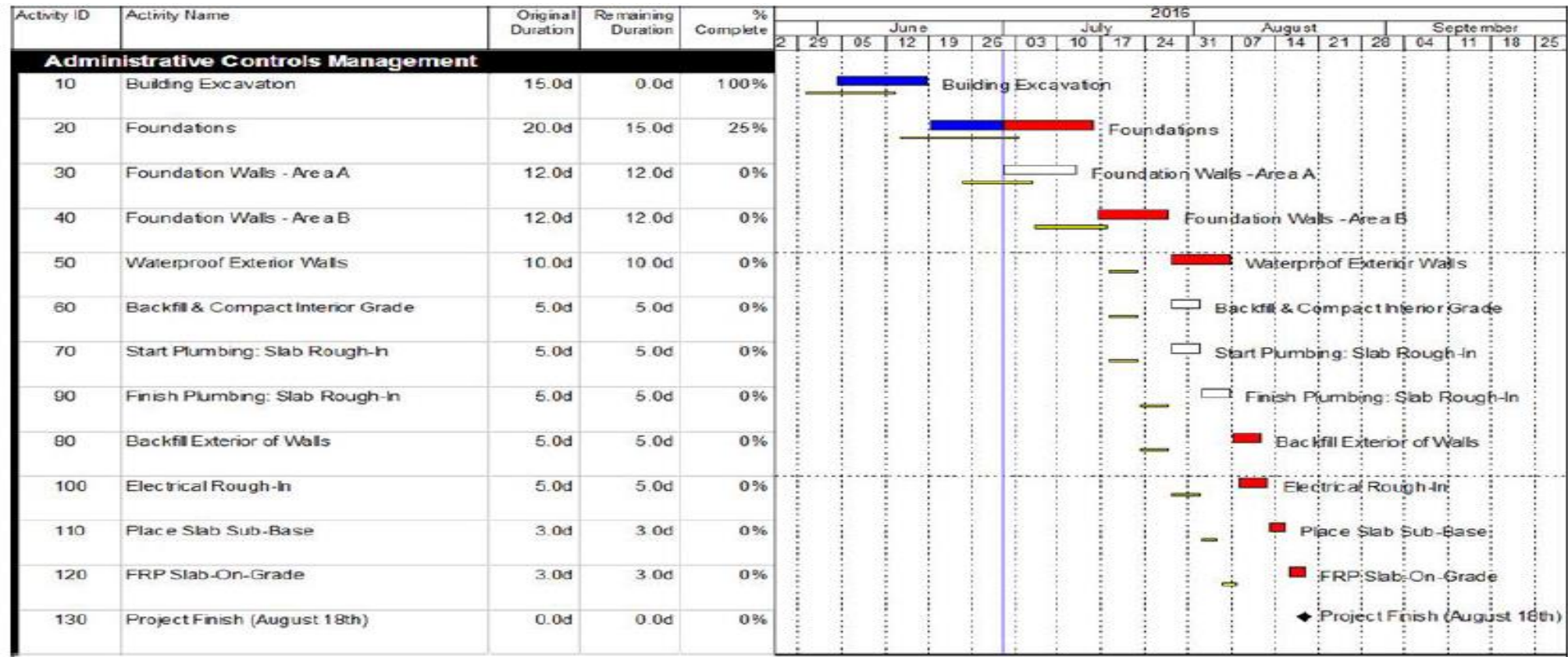
Output and Deliverables

- Control Level Schedules



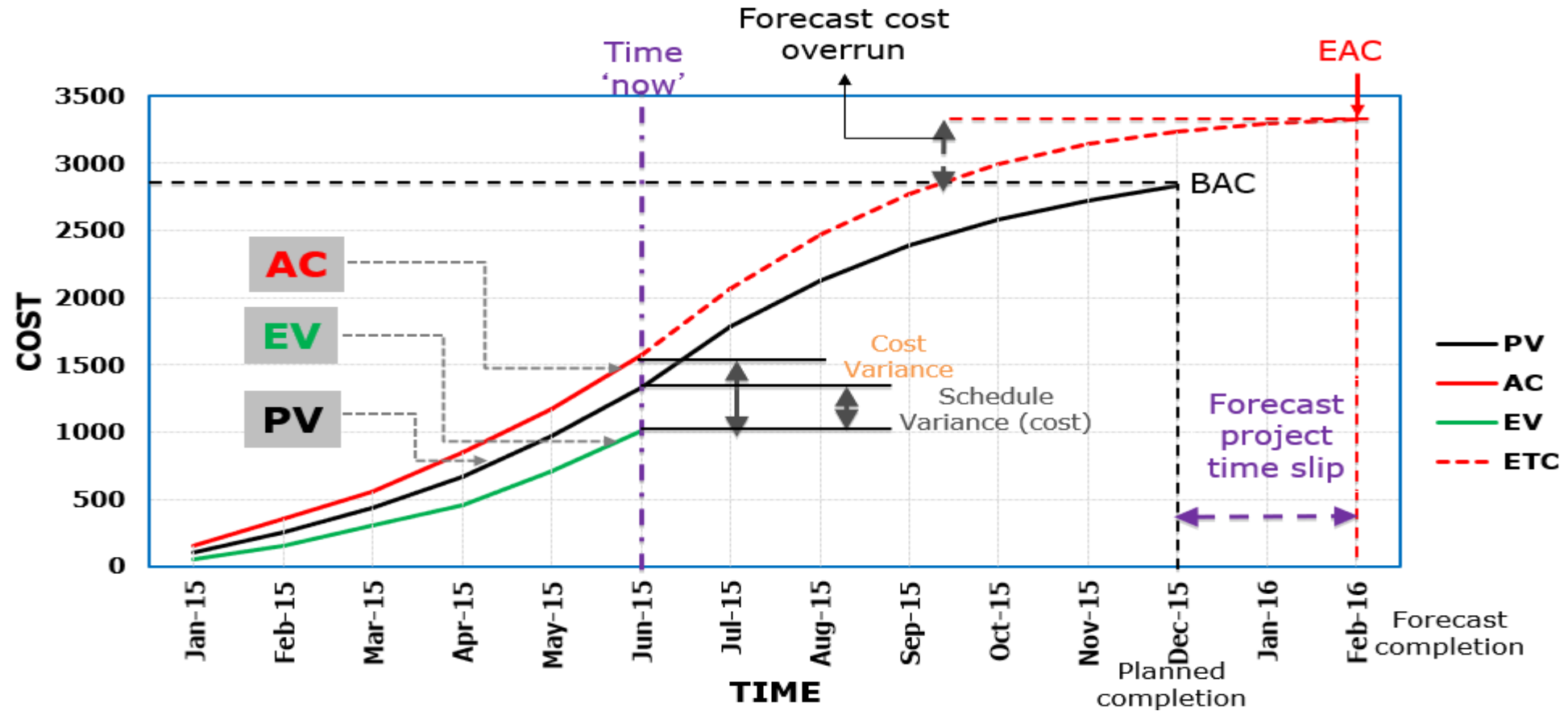
Output and Deliverables

- Schedule Forecast



Output and Deliverables

- Schedule Forecast



Maintain Schedule

- Scheduling Pitfalls
 - Poorly defined activities & structure
 - Inadequate work package definitions
 - Inappropriate level of scheduling detail
 - Poor duration estimating
 - Poor updating procedures & lack of information
 - Long information processing time
 - Failure to disseminate the proper information to all parties
 - Application of hard logic to a soft logic situation



THANK YOU