

**Day 1**  
**Session 1**

**Introduction to Cost Engineering**

**Topics: Introduction and Context of course**



**Introduction**

- **Name**
- **Organisation**
- **Profession & years of experience**
- **Project Experience**
- **Course Expectation**



## Course Objective



**By the end of this course, participants will be able to understand:**


- Relate to the terms “Cost Engineering”, Cost Management and “Cost Control”
- The importance of Cost Engineering in Project Management.
- The structure and responsibilities of the Cost Team
- Key Cost Engineering Processes
- The relationships between Cost Engineering, Finance and Accounting.
- How Cost Engineering can be used to predict and audit project Cost.
- How Cost Engineering can be used in measuring Local Content.
- The importance of contracting in Projects




## How Do IOCs Deliver Successfully




- IOCs successfully achieve business value through efficiently delivering projects.
- Project Management plays a very important part in Oil and Gas activities.
- Integrated Project Management Team approach is used (all disciplines work as an integrated team to deliver projects).
- Expectations are set upfront.
- Processes are standardized (in most organisations), common tools and processes will be used to deliver projects). Standardization provides simplification and efficiency.
- Performance is monitored diligently.
- Strict control processes are adopted.

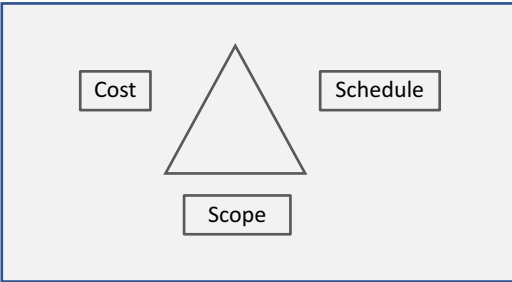



## Course Context – What are Project







- The work delivered by IOCs in the industry are generally of two types:
- Projects – Projects are temporary
- Operations – Operations are ongoing and repetitive
- Both Operations and Projects have similar requirements:
  - Both require human resources to deliver their mandate.
  - Both are constrained by the triple constraints of Cost, Schedule and Scope.



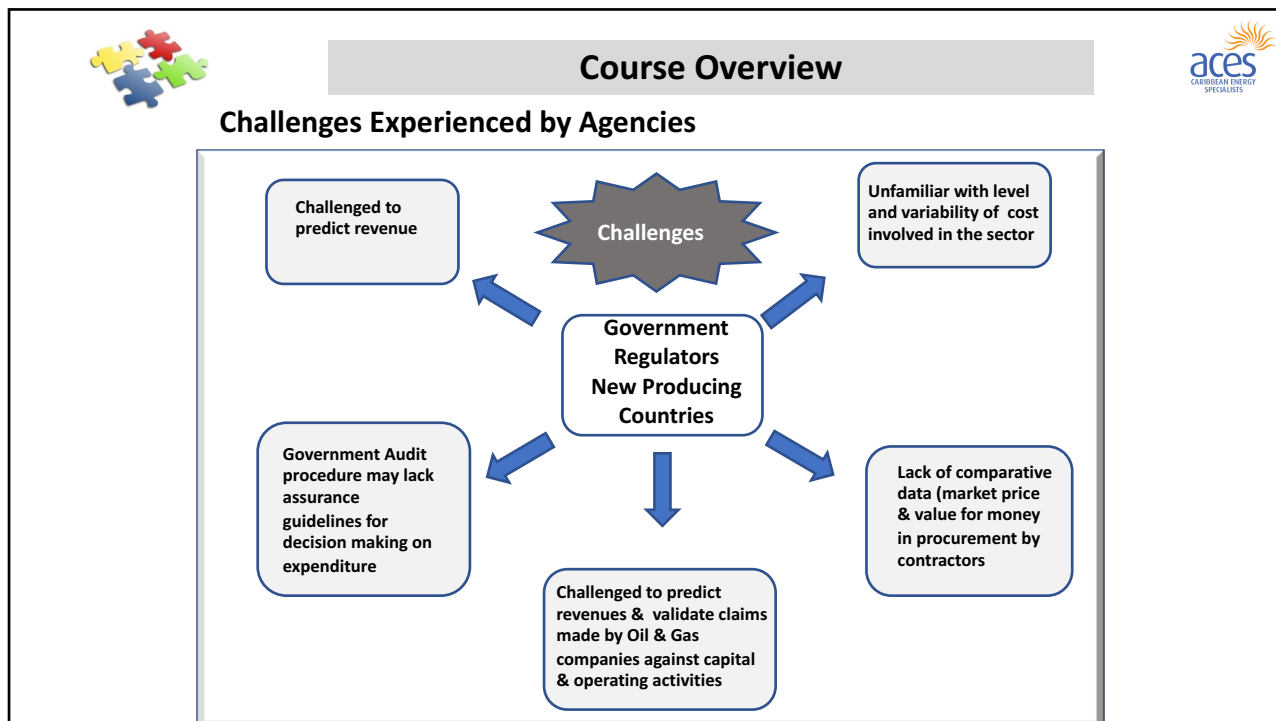
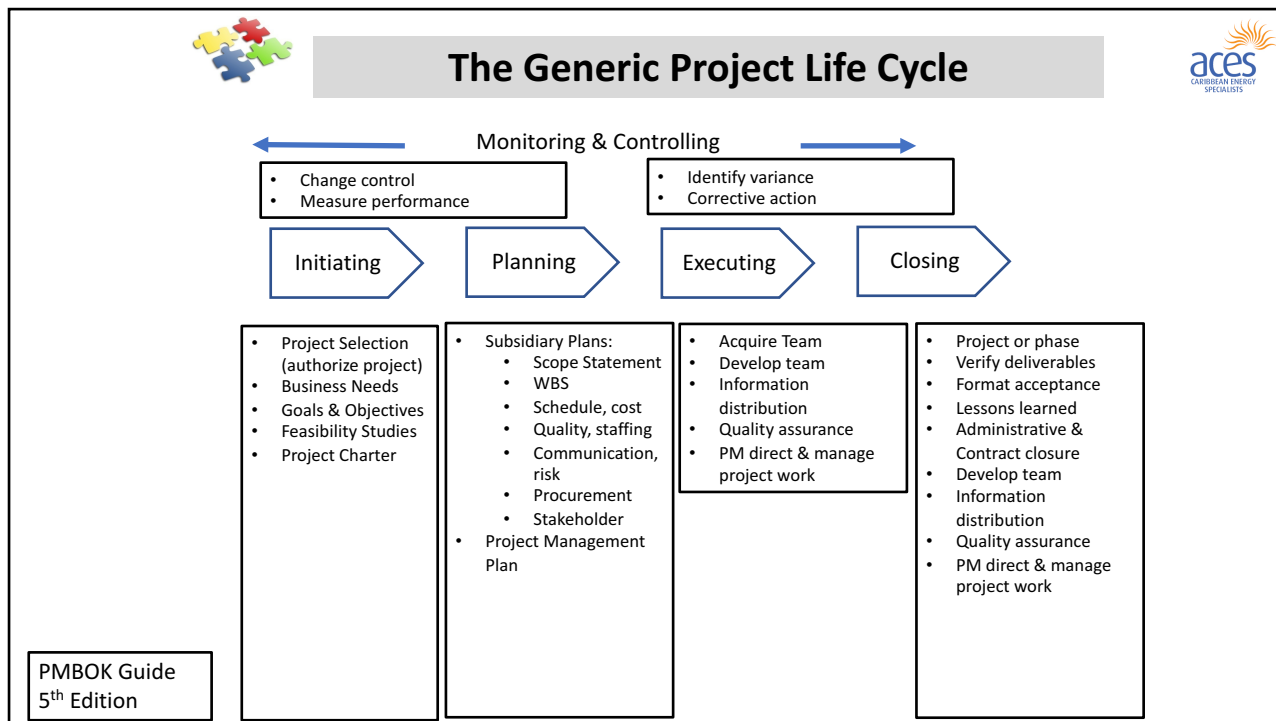


## The Project Life Cycle





- The phases of Project Management are referred to as the Project Life Cycle. Each sector utilizes industry Project Life Cycles specific to that sector.
- In the Energy Sector, a number of different Project Life Cycle nomenclatures are utilised. They include a generic process developed by the Project Management Institute (PMI) and Project Life Cycles terminology utilized by the various IOCs.





## Benefits of a Structured Approach



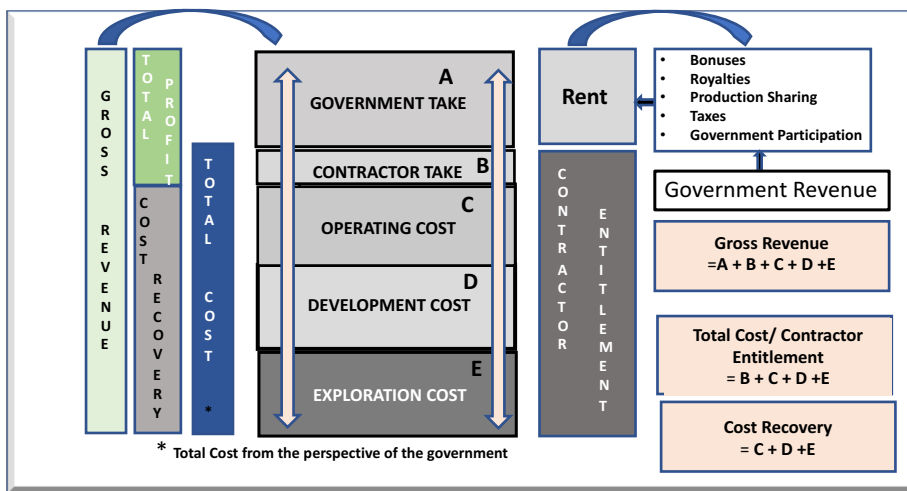
- Well established Project Management procedures.
- Robust Projects
  
- Enablers:
  - Control Procedures
  - Guidelines & standardization of Processes
    - Estimation/Prediction
    - Scheduling
    - Validation
    - Tracking
    - Internal & External Cost Benchmarking
    - Accountability for:
      - Procurement Decisions
      - Value Received
      - Cost Expended


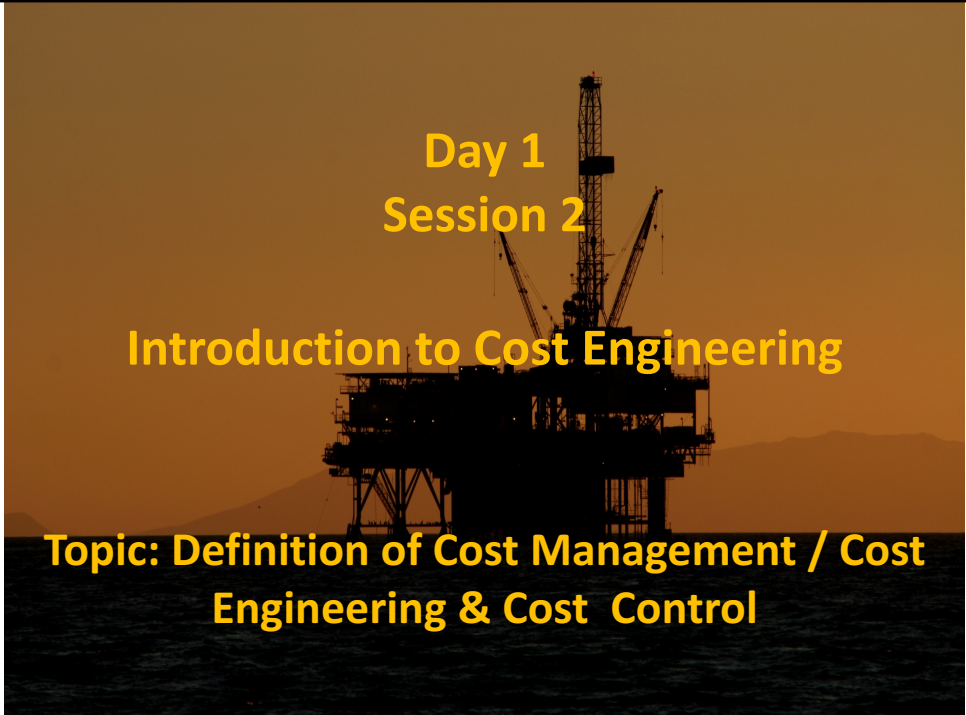


## Forecasting of Government Revenue



Allocation of Revenues from production







**Day 1**  
**Session 2**

**Introduction to Cost Engineering**

**Topic: Definition of Cost Management / Cost Engineering & Cost Control**



**Definition**

**What is Cost Engineering?**

“Cost Engineering is the engineering practice devoted to project cost management, involving such activities as estimating, cost control, cost forecasting, investment appraisal, and risk analysis” (ACostE)

“Cost Engineers budget, plan, monitor investment projects. They seek the optimum balance between cost, quality and time requirement” (AACE)



## Definition



### What is Cost Control?

“A project management function that involves comparing actual performance with planned performance and taking appropriate corrective action (or directing others to take this action) that will yield the desired outcome in the project when significant differences exist.”

PMBOK.



## Definition



### What is Cost Control (continued)?

Cost Control is concerned with:

- Influencing the factors which create changes to the cost baseline and to ensure changes are beneficial to the organisations.
- Determining whether the cost baseline has changed, and
- Managing the actual change when and as it occurs
- Cost Control includes:
  - Monitoring cost performance and detecting variance from plan
  - Ensuring that all appropriate changes are recorded accurately in the cost baseline
  - Preventing incorrect, inappropriate, or unauthorized changes from being included in the cost baseline
  - Informing appropriate stakeholders of authorized changes

(PMBOK)



## Definition



### What is Cost Management?

“The area of engineering practice where engineering judgment and experience are utilized in the application of business program planning; cost engineering; cost estimating; economic & financial analysis; program and project management; planning and scheduling; cost and schedule performance measuring and change control”

(AACE)

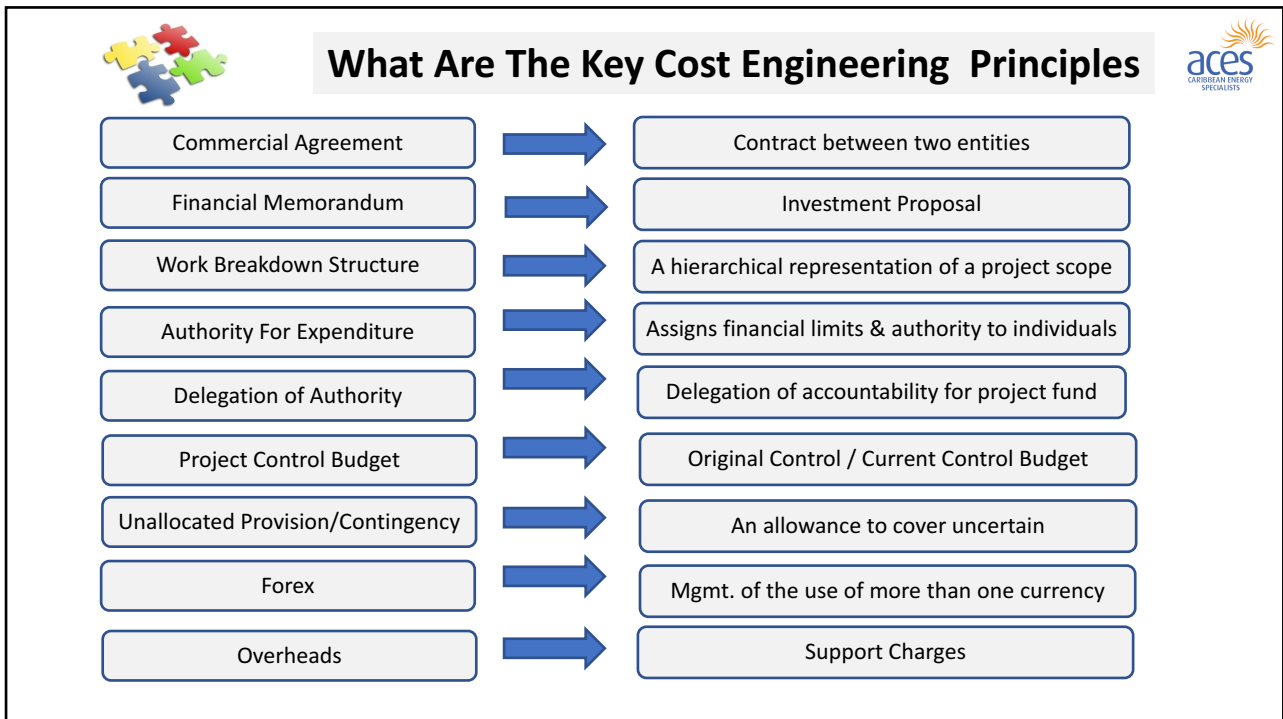
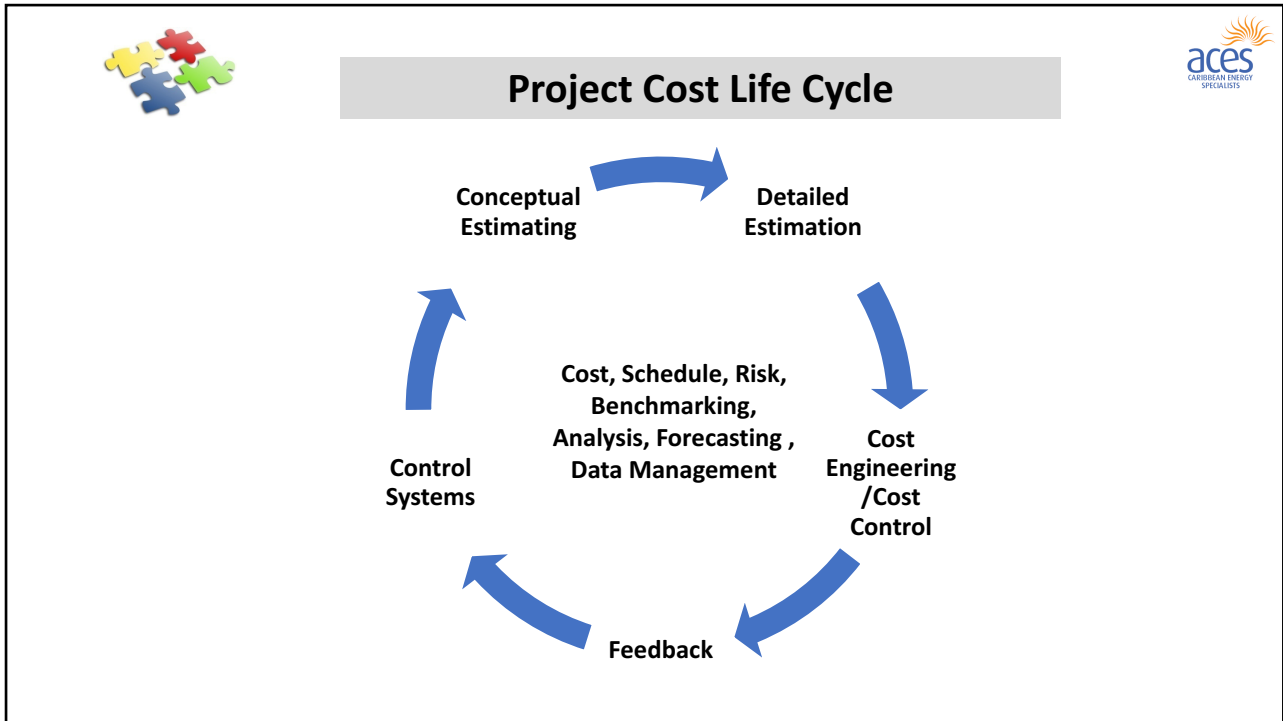


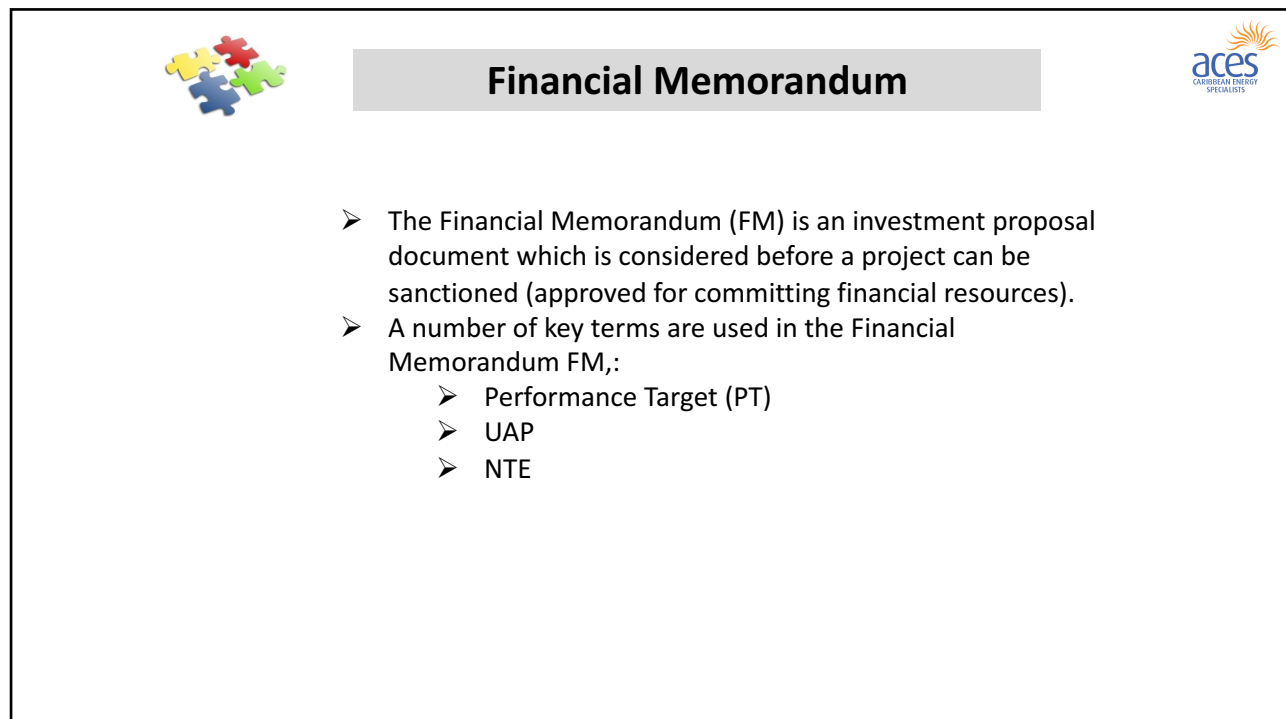
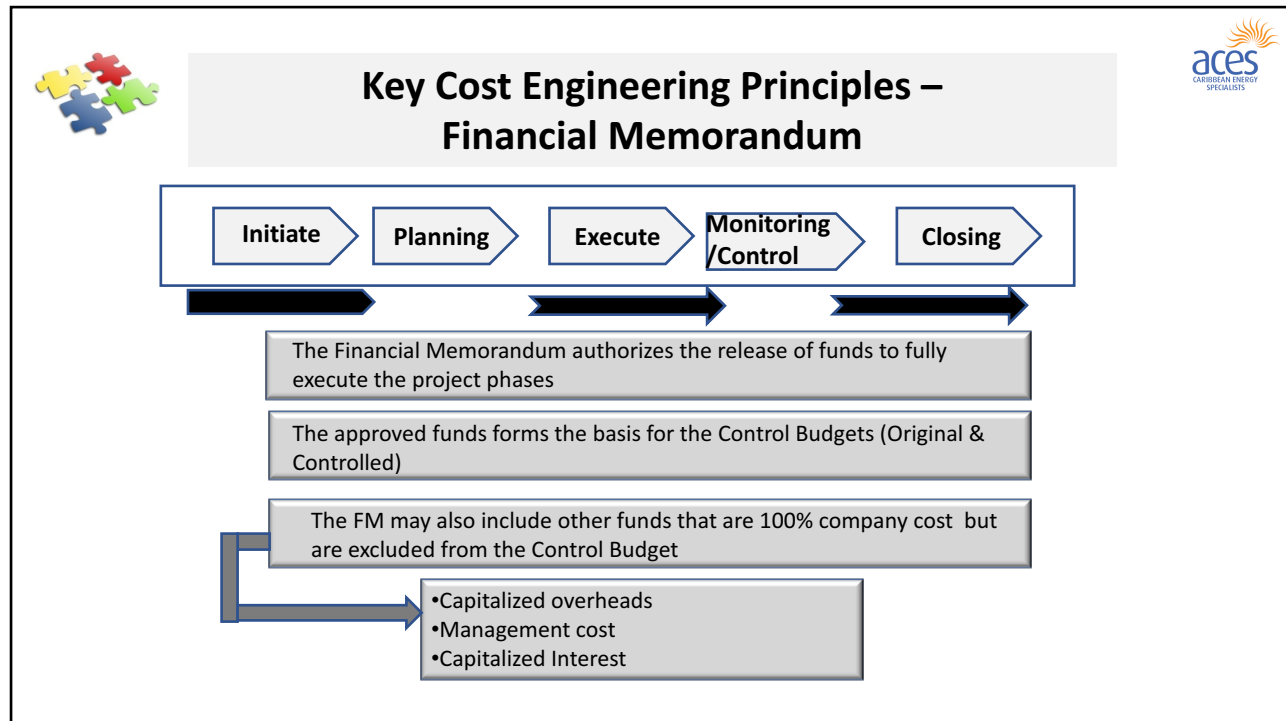
## Day 1 Session 2



### Introduction to Cost Engineering

**Topic: Overview of Cost Engineering Principles  
(Funding & Budgeting)**









## Financial Memorandum

- At least 3 Financial Memorandums are required during the Project Life Cycle.
- The Financial Memorandum includes both Performance Target (PT) & Not to Exceed (NTE)
- At the end of Planning phase of the project, any surplus funds are returned
- The costs of long lead items committed during the Planning Phase of the project are included in the Financial Memorandum
- The VOWD generated at the end of the Planning phase is used to generate the Financial Memorandum for the Execute phase.

## Key Terms & Definition for FMs

<div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">Project SPA</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">Performance Target (PT)</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">UAP</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">Exceptional Performance Target (XPT)</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">Not to Exceed (NTE)</div> <div style="border: 1px solid gray; padding: 5px;">Additional UAP</div>	<div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">A Single Point of Accountability (SPA) is identified for each project.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">The PT represents the value for which the SPA is held accountable, in the delivery of the project.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">This is an allowance for goods and services which, at the current state of the project, cannot be quantified.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">XPT represents tough but attainable targets based on continuous improvement vs relevant historical benchmarks.</div> <div style="border: 1px solid gray; padding: 5px; margin-bottom: 10px;">The value that was sanctioned, plus Additional Unallocated Provisions, cannot be exceeded.</div> <div style="border: 1px solid gray; padding: 5px;">This is the provision beyond Performance Target and up to the Not-to -Exceed (NTE).</div>
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## Performance Target



- The Performance Target (PT) is used to performance manage projects.
- The Performance Target (PT) formally sets the value which the Project Manager is accountable for, during the delivery of the project.
- A Cost Risk Analysis (Benchmarking) is done to support the Performance Target.
- The Cost Team is charged with Managing the instructions of the Financial Memorandum (FM).



## Commercial Agreements



Commercial Agreements are applicable to projects which involve funding from partners and government, e.g.. (PSA/PA, JOA & JV)

- The Commercial Agreement may be managed by the Finance (or Commercial) Department which briefs the project team on issues and necessary requirements.
- The Cost Team is required to understand Commercial Agreements governing the project in order to understand the requirement for cost recovery and reporting.
- The Projects Annual Work plan and Budget is prepared , approved , reported and updated on a regular cycle in accordance with internal timetables and the equivalent PSA and JOA timetables.



## What are AFEs?



- AFEs are used to formally delegate accountability for the Financial Memorandum (FM) funds.
- AFEs are used as an assurance that both company and partners work in alignment with the same overall budget.
- Some smaller projects may utilize AFEs instead of an FM as the source of funding.
- The Project's Cost Engineer is responsible for preparing the Project's AFE. The AFE is then endorsed and approved by the Budget Responsibility/Accountability Officer (BRO).
- An AFE shall be raised to cover all expenditure over the life of the project's Work Breakdown Structure.



## What are Unallocated Provisions (UAP)



- UAP is built into the Performance Target and controlled by the Project.
- The UAP/Contingency is determined by the results of a Cost Risk Analysis of the Estimate.
- The UAP allows for uncertainties including political or partner risk.
- The budget holder approves or endorses the movement of UAP on a project.
- Each project should report on the UAP drawdowns.



## Not to Exceed (NTE)



- The Not-to-Exceed (NTE) forms the request basis for the FM approval.
- The Not-to-Exceed (NTE) includes allowances for uncertainties (allows for increases for extraordinary events).



## Additional Unallocated Provisions



- Additional UAP (AUAP) provides additional allowances to the project team.
- The Project team is not allowed to exceed Additional UAP without a supplemental FM
- The AUAP is controlled by an employee, senior in rank to the Project Manager.



## Foreign Exchange (FOREX) Hedging




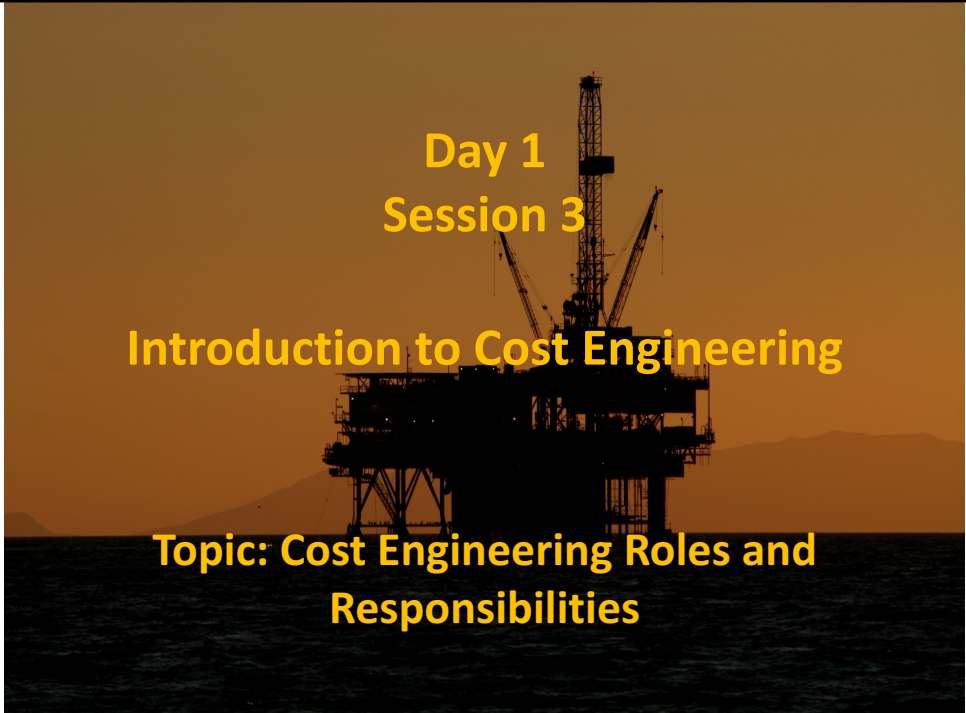
- The Project's foreign exchange is managed by the organization's Finance department/Treasury department .
- In order to facilitate locking in of currency exchange rates following the FM approval, projects are expected to implement their own currency risk management program in conjunction with the organization's Finance or Treasury department.



## Overhead Charges





- Some office and support charges for non-specific shared services are charged to projects through an allocation process.
- Overhead charges may include man-hour charge out rates etc.
- Agreement will be made and accepted by the project on how Overhead Charges will be incorporated into the WBS and how charges will be processed and shown in the accounts.
- JOA, JV and PSA may permit international overhead to be charged by the operator to cover corporate and other overhead support charges generated at head offices.
- It is the responsibility of an organization's Finance team to ensure that overhead charges are not covered for cost recovery.
- Overhead charges are usually non-specific support and should not be confused with other intercompany charges such as Service Work Orders or Upfront Agreements



**Day 1**  
**Session 3**

**Introduction to Cost Engineering**

**Topic: Cost Engineering Roles and Responsibilities**



### Importance of Cost Engineering

- **One of the key metrics used by Project Leadership to measure project performances is Cost.**
  - Cost Engineering provides Project Management with:
    - Forward looking information and
    - Facilitates the identification of expected performance and comparisons against performance targets.
- **Project Cost Engineering is about:**
  - Maximizing project value with effective planning and execution of each project activity, especially those in the early project definition and planning stages of the project life cycle.





## Importance of Cost Engineering



- The management of a project to meet the performance targets is a fundamental expectation and responsibility of a project management team.
- The project management team requires the ability to accurately forecast capital expenditure.
- Costs need to be managed against the overall project targets.
- Forecast provides the basis for expected in-year phasing of costs, enabling a company to plan and allocate capital efficiency and to maximise the cost of capital.



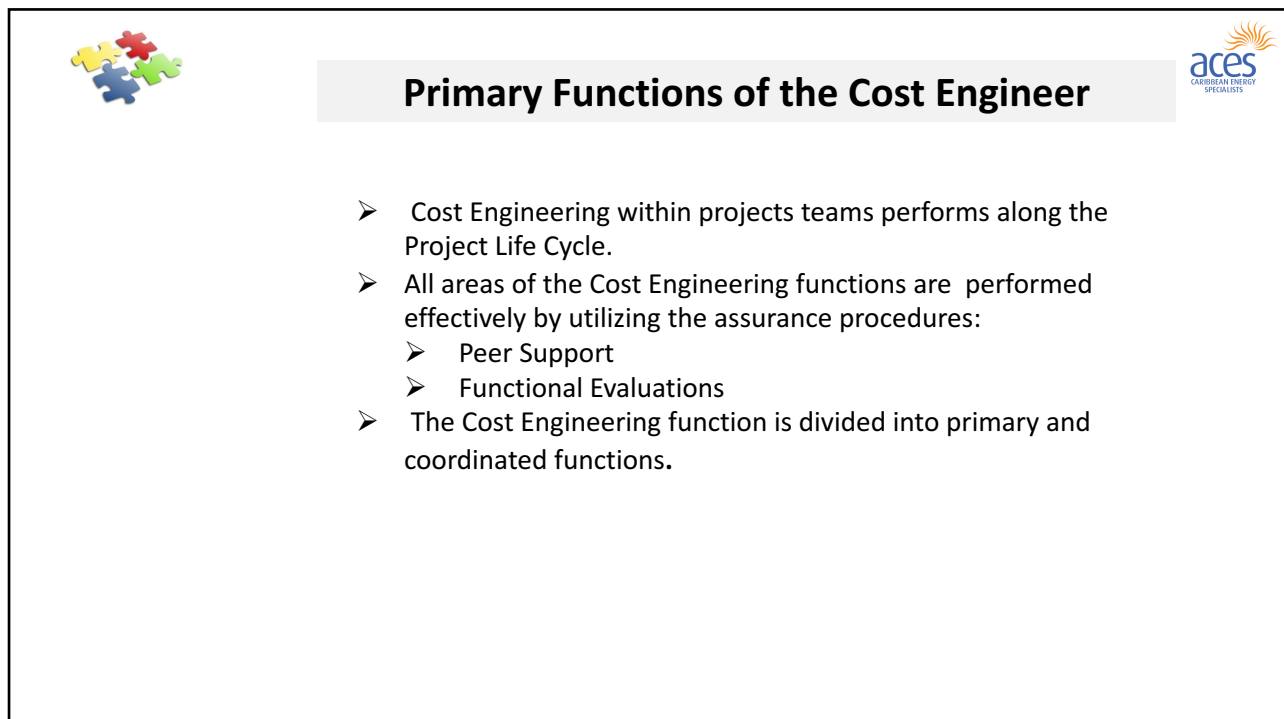
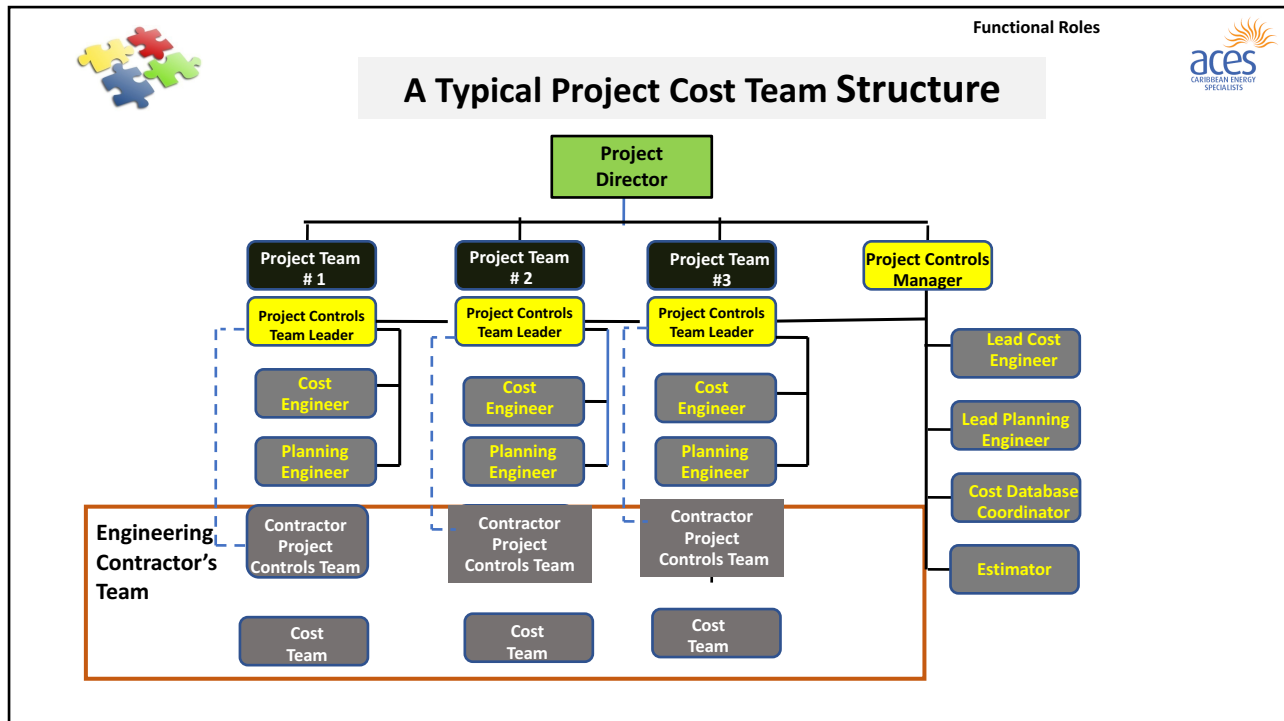
## Cost Engineering Role Defined

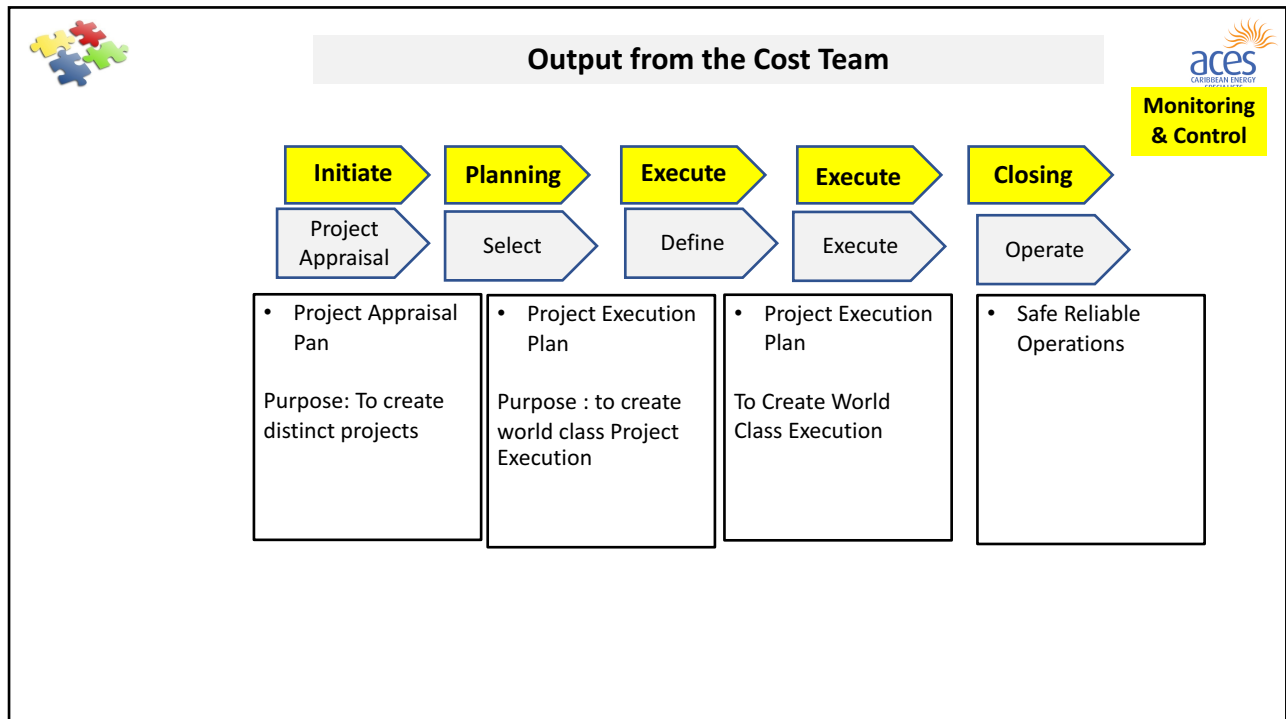
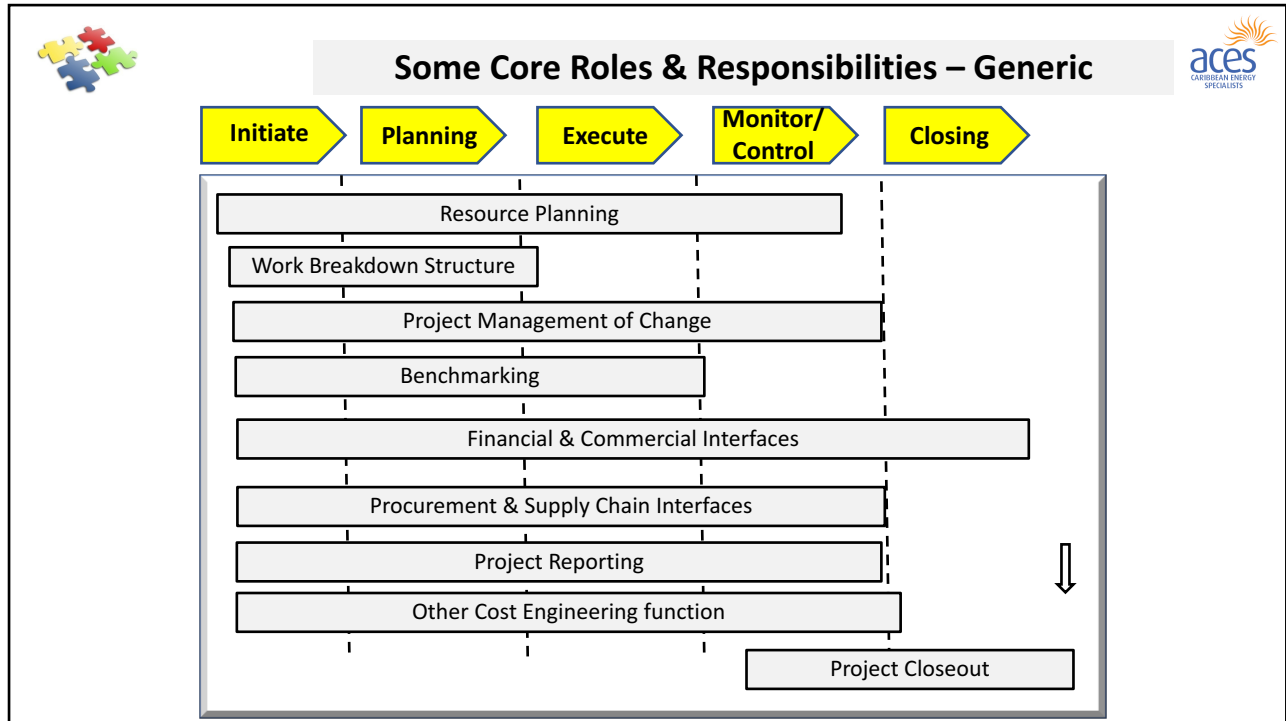


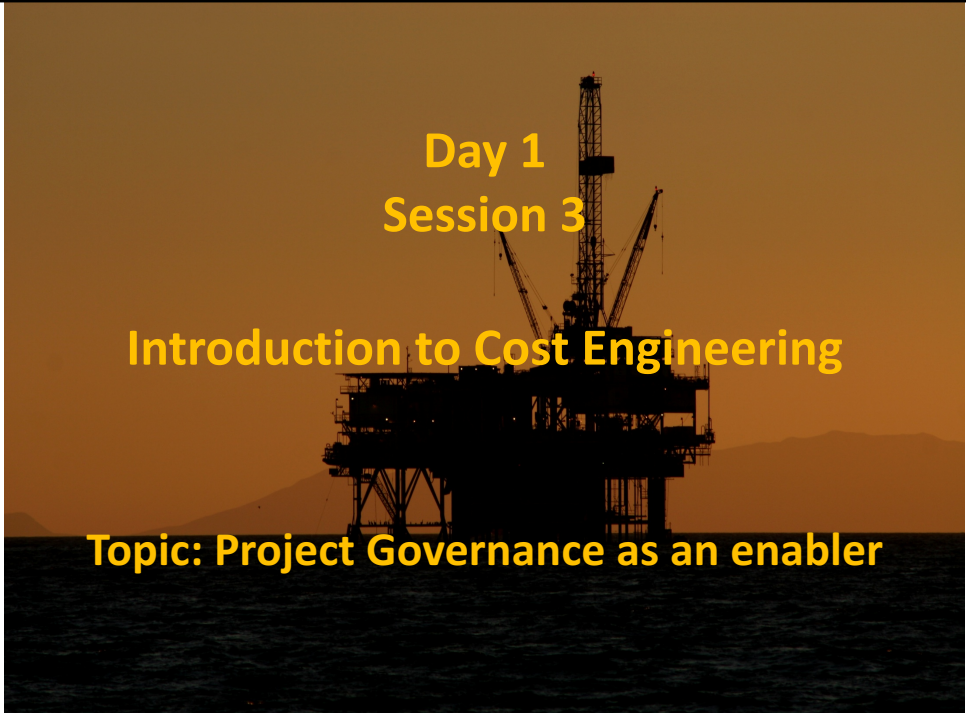
- Cost Engineers manage the triple constraints of a project.

“Cost Engineers budget, plan and monitor investment projects. They seek the optimum balance between cost, quality and time requirement” (ACE International)

- ✓ ACE International – Association for the Advancement of Cost Engineers
- ✓ ACostE – Association of Cost Engineers










**Day 1**  
**Session 3**

**Introduction to Cost Engineering**

**Topic: Project Governance as an enabler**



### Governance Structure for Major Project

- The Project Governance is established upon approval of a Project's Appraisal Plan and the Supporting Financial Memorandums (FMs).
- Before Appraisal Plan is approved, rigorous methods of independent reviews are conducted for assurance and validation.
- The use of Independent reviews on projects provides an objective view of the project.
- Centers of Excellences aligned to each discipline needed in the execution of projects are developed by large organisations, to develop and ensure adherence to guidelines and procedures.
- If transition from one phase to another is denied, proper justification and recommendations are given to the Project Manager.



## Governance at Principal Stages of the Project (cont'd)

- Upon the sanction of a project, changes to the design or execution plan must first be sent to an organisation's senior leadership team for review and endorsement.
- Additional review and approval are needed for the change in proven & non-proven reserves, for instance
- To support project teams, planned functional reviews are facilitated and included in the project's Decision Support Package. These reviews help to mitigate risks and uncertainties.
- Project Execution progress is monitored closely for verification and progress reports are provided to Leadership



## Governance – Tools Used

- Dashboards:
- Coaching Sessions
- Workshops
- Performance Reviews
- Supporting Services



## Governance – Dashboards



- Project Dashboards are developed upon the approval of the Project's Appraisal Plan.
- The Dashboard is a high level summary of the status of the project at each stage of the Project Life Cycle.
- The Project's status provides information on how the project is progressing against established expectations and the requirements that are needed to enter the next phase of the Project's Life cycle.
- Dashboards are an important tool used by the Project Teams to support routine internal progress reviews.
- The Project Dashboard is owned and resides with the Project Manager.



Functional Roles

## Governance – Coaching



- Project teams engage in coaching workshops and training sessions prior to the start and during the course of the Project's Life Cycle.
- The purpose of the coaching workshop is to assist the teams in achieving established expectations and for effectively transferring knowledge, establishing best practices.



## Governance – Workshops



- A number of workshops are facilitated by Project teams, these workshops are held in the following phases of the project:
  - Appraisal/Initiate Phase
  - Planning/Select Phase
  - Start-up/Operate Phase



## Governance – Appraisal/Initiate Workshops

- These are multi-disciplinary workshops facilitated in the Appraise/Initiate phases of the project.
- The **Project Work Plan** is generated at the Appraisal/Initiate Plan Workshop
- The **Resourcing Plans** for the Appraisal/Initiate phases are defined at this workshop.
- The Project's **contracting strategies are considered during** this phase of the project; they are agreed but not approved; the contracting and commercial uncertainties are considered
- **Risk and Opportunities** are considered.



Functional Roles



## Governance – Select/Planning Coaching Workshop

- During the Select/Planning Workshops, the project’s contracting strategies are defined.
- During this phase of the project, preparatory work is done on the FM for the next phase of the project.
- During this phase, one project option is selected from among the many options being considered by the project team.

Functional Roles



## Governance –Start-up Workshop

- The Project Team facilitates a workshop at least 12 months prior to hand-over to the Operations Team for Start-up.
- The purpose of this workshop is to review plans and status of all project activities.





## Governance –Performance Reviews

- On the first year anniversary of the project completion, a multi-discipline performance review is held, to compare actual project performance against the sanctioned targets.
- A report on performance deviation is developed as lessons learned for future projects.



Functional Roles



## Governance –Key Governance Documents

### Decision making processes are identified, they include:

- Procedures for annual budgets.
- Procedures for the release of Project funds.
- Estimates are developed in accordance with guidelines.
- All estimates are develop based on benchmarks.
- Level 1 schedules covering the entire project are developed
- Level 3 schedule integrating all functions are developed.
- A procedure detailing how cost will be managed is developed.
- A Change Management Process is developed for the project.



## Governance –Key Governance Documents

- Contingency provisions (UAP) developed.
- Budget Holders are assigned to each element of the estimate.
- Estimates are tied to the WBS.
- Cost Estimates are benchmarked both internally and externally
- The project's critical paths are identified in the schedules
- Schedule Risk Reviews reports
- Foreign Exchange Hedging strategy developed.
- Insurance Strategy developed.
- Contractor control and reporting systems developed.
- Document Management system developed.
- Financial control procedure developed to manage expenditure, change orders, and changes to cost estimates and forecast.



## Day 1 Session 4

### Structures

**Topic: Work Breakdown Structure (WBS)/  
Resource Breakdown Structures (RBS)/ Cost  
Breakdown Structure (CBO)/ Gantt Chart**



## Breakdown Structures



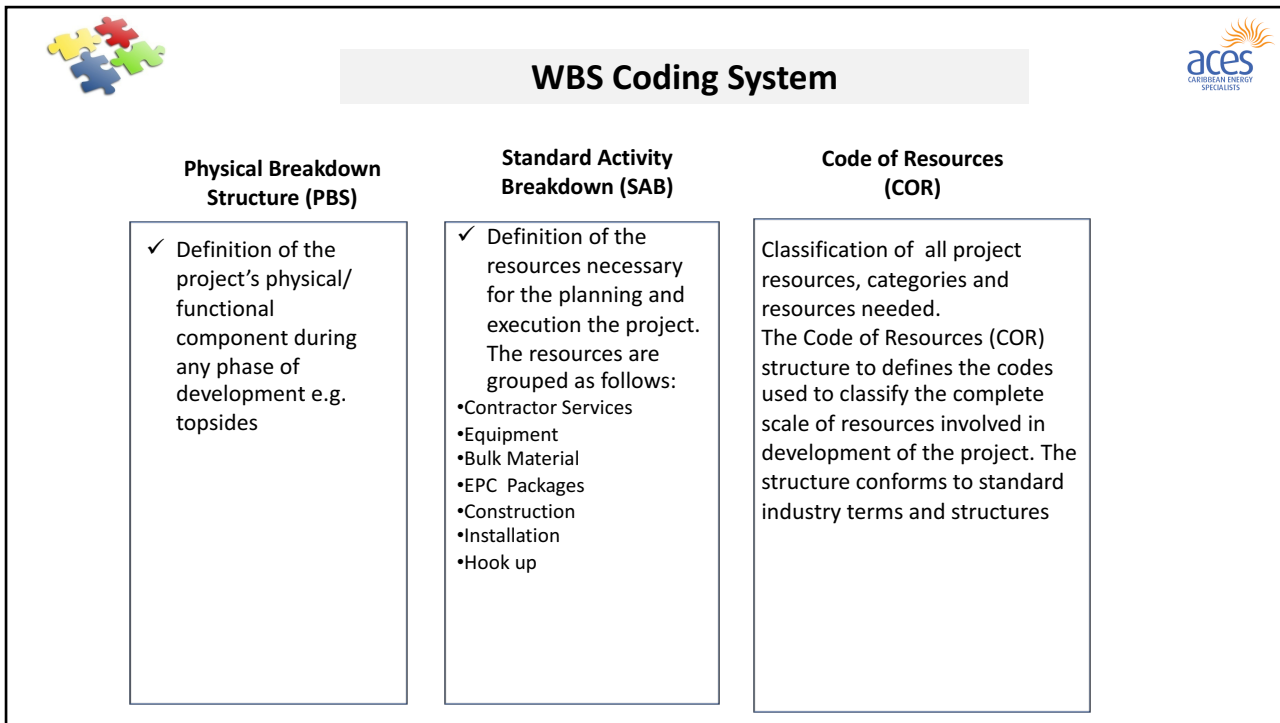
- Breakdown structures are commonly used in Project Management
- The key structures used in Project Management are:
  - WBS – Work Breakdown Structure
  - OBS – Organisational Breakdown Structure
  - RBS – Resource Breakdown Structure
  - CBS – Cost Breakdown Structure



## Importance of a WBS



- WBS structures are used to decompose a project in a hierarchy via a project
- The WBS provides the foundation for estimating, planning, reporting, tracking, forecasting, and close out
- The WBS is used to benchmark the project cost and schedule data
- The WBS acts as a conduit between the cost and schedule function.
- Time, cost and performance can be tracked and measured (Progress Measurement).
- Resource requirements can be more easily understood.
- Status reporting procedures can be estimated.
- Responsibilities for each element can be established



**WBS Coding System**

**Physical Breakdown Structure (PBS)**

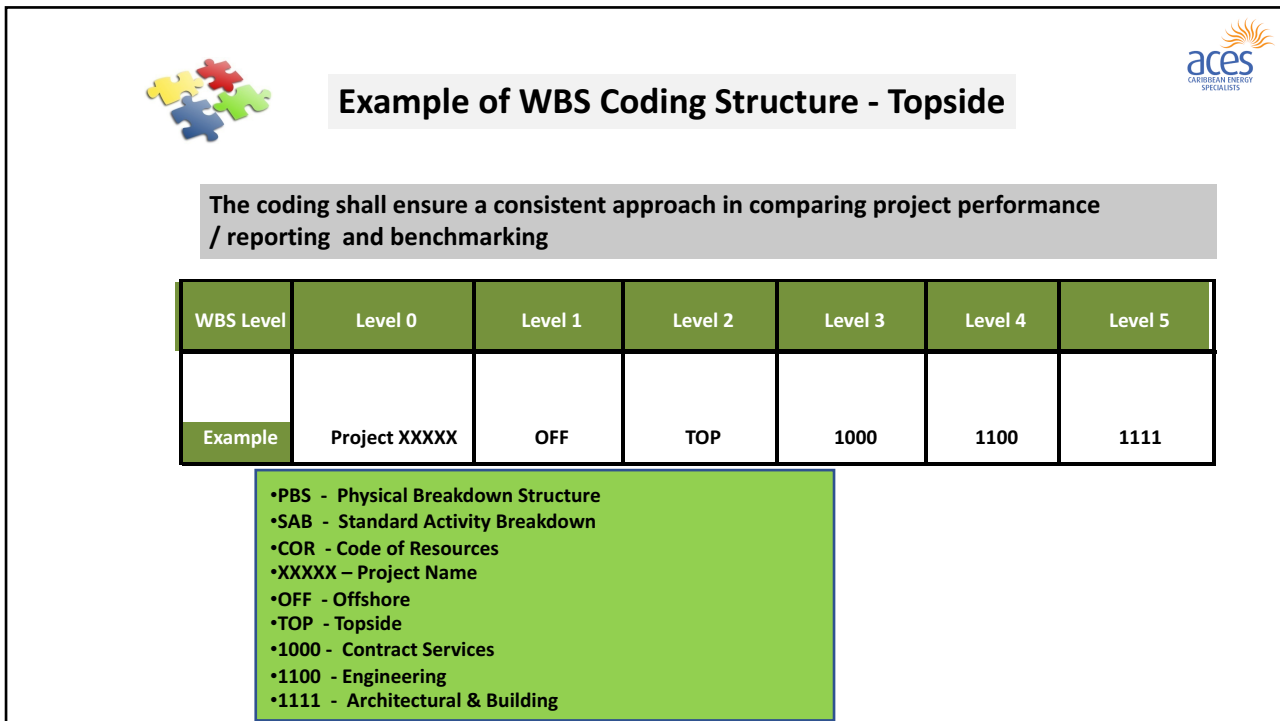
- ✓ Definition of the project's physical/ functional component during any phase of development e.g. topsides

**Standard Activity Breakdown (SAB)**

- ✓ Definition of the resources necessary for the planning and execution the project. The resources are grouped as follows:
  - Contractor Services
  - Equipment
  - Bulk Material
  - EPC Packages
  - Construction
  - Installation
  - Hook up

**Code of Resources (COR)**

Classification of all project resources, categories and resources needed. The Code of Resources (COR) structure to defines the codes used to classify the complete scale of resources involved in development of the project. The structure conforms to standard industry terms and structures



**Example of WBS Coding Structure - Topside**

The coding shall ensure a consistent approach in comparing project performance / reporting and benchmarking

WBS Level	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Example	Project XXXXX	OFF	TOP	1000	1100	1111

- PBS - Physical Breakdown Structure
- SAB - Standard Activity Breakdown
- COR - Code of Resources
- XXXXX – Project Name
- OFF - Offshore
- TOP - Topside
- 1000 - Contract Services
- 1100 - Engineering
- 1111 - Architectural & Building



## Code of Resource Summary



**1000 - Contractor Services - Summary Level**

Primary Level Code		Secondary Level Code		Tertiary Level Code	
Resource Code	Standard Activity Breakdown Description [SAB]	Code of Resource [COR]	Code of Resources [COR]	Code of Resource	Code of Resources Description [COR]
1000	Contractor Services	1100	Engineering	1111	Achiteccural & Building
				1112	Civil Engineering
				1113	Drilling
				1114	Electrical
				1115	HVAC
				1116	Instrumentation
				1117	Marine Engineering
				1118	Material Engineering
				1119	Mechanical Engineering
				1120	Pipelines & Risers
				1121	Piping
				1122	Process Engineering
				1123	Safety Engineering
				1124	Structural
				1125	Subsea Engineering
				1126	Telecommunications
				1127	Weight Control

Z1000-1100-1112



## Uses of the WBS



- The WBS is implemented immediately after the project organizational structure and control requirements are defined.
- To be used for coding of all purchase orders, contracts, invoices, estimates and other items related to cost.
- A data dictionary develop to provide guidance on the proper use of the individual codes.
- The WBS is used for all data entry into an internal benchmarking database.
- Cost estimates are provided for each section, using a Cost Breakdown Structure (CBS); this makes it easier to calculate the budget for the entire project
- Time estimates are usually provided for each section of the WBS. In doing so, it becomes easier to develop the project's schedule or GANTT chart for the entire project



## Resource Breakdown Structure



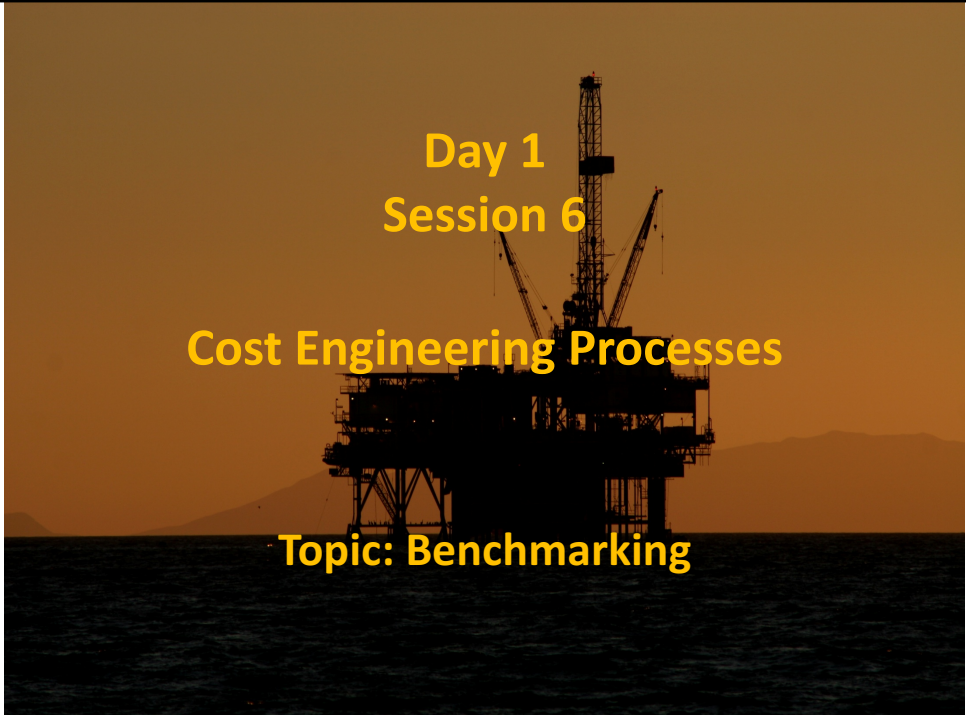
- A hierarchical list of human resources related by function and resource type:
  - Level 1 – Business Unit
  - Level 2 – Manager the resource reports to
  - Level 3 – The resource
- The RBS is used in conjunction with WBS for the planning and control of project work.



## Cost Breakdown Structures





- The Cost Breakdown Structure (CBS) classifies costs into cost centers and cost elements.
- Creating a cost structure assists in cost planning and controlling.
- The CBS can be instrumental in reducing the cost of the project.




Day 1  
Session 6

Cost Engineering Processes

Topic: Benchmarking



## Benchmarking



**Objective:**

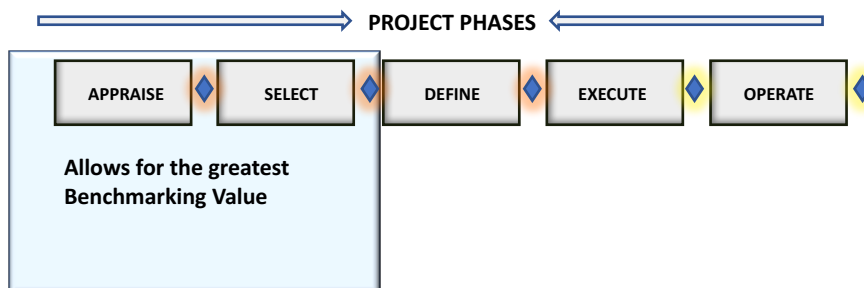
- To identify project best practices and possible improvement based on knowledge gained from internal and industry experience.
- To build and understand the specific actions necessary for underpinning predictable delivery.



## When to Benchmark



- Benchmarking is utilised throughout the Project stages
- The most value to the project is gained during the Appraise and Select stages.
- During these phases of the project , the project team has more time & space to learn from others and incorporate changes in the development plan or the design basis.



## What is Benchmarking



- The benchmarking process is common to projects globally; it occurs in a very systematic and timely fashion.
- Benchmarking is a continuous improvement tool for learning from world class organisations.
- It is an analytical process that enables learning from experience, rigor in preparedness and competitiveness in delivery.





## Why Benchmark?



- To provide confidence in a project's performance promise.
- To provide assurance to project teams of realistic, achievable targets and identify gaps and practices required to achieve best practice.
- It allows for close monitoring of project performance against realistic targets.
- To capture and transfer lessons learned for continuous system improvement.



## Types of Benchmarking



Application of knowledge is a source of industry competitive advantage and means by which risk can be mitigated.

- **Internal Benchmarking** compares the potential performance with real out-turn performance of historical company projects.
- **External Benchmarking** compares new projects against historical company projects and industry peer organisations.

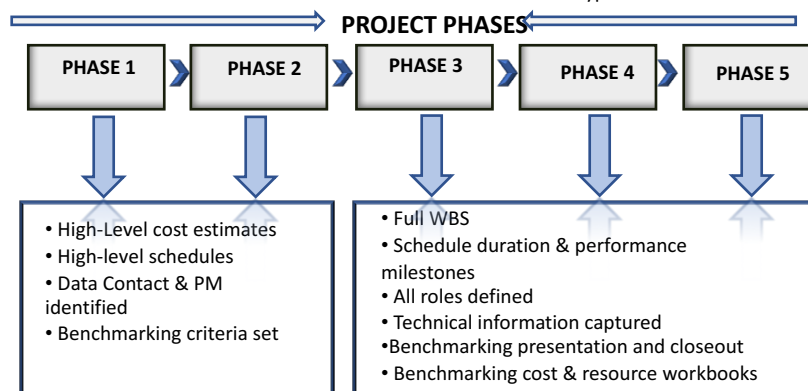


## Example of an Internal Benchmarking System



### Common Project Information Across All Phases of the Project

- Project Name
- Business Location
- Location
- Project abstract
- Partners & operator
- Build type



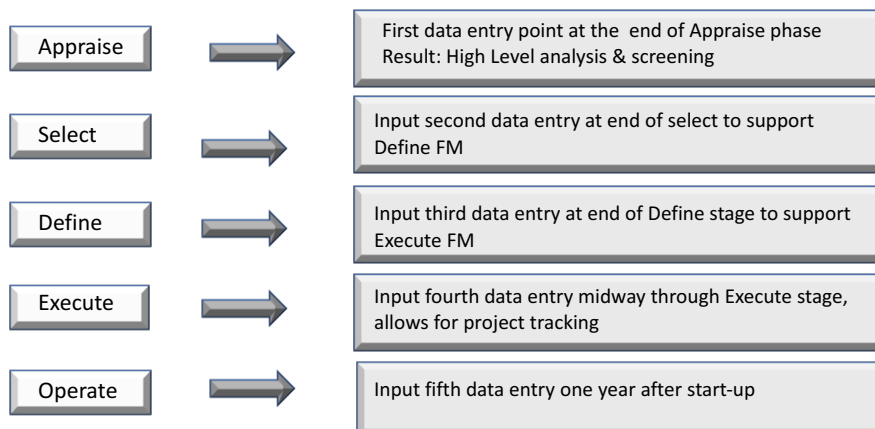
## External Benchmarking



- The process of comparing new projects with historical projects , both internal and industry projects with common features.
- A 3<sup>rd</sup> Party firm is contracted to facilitate the benchmarking process.
- An external view of both the project system and project performance is used to produce industry comparisons.




## Benchmarking Through The Project Life Cycle

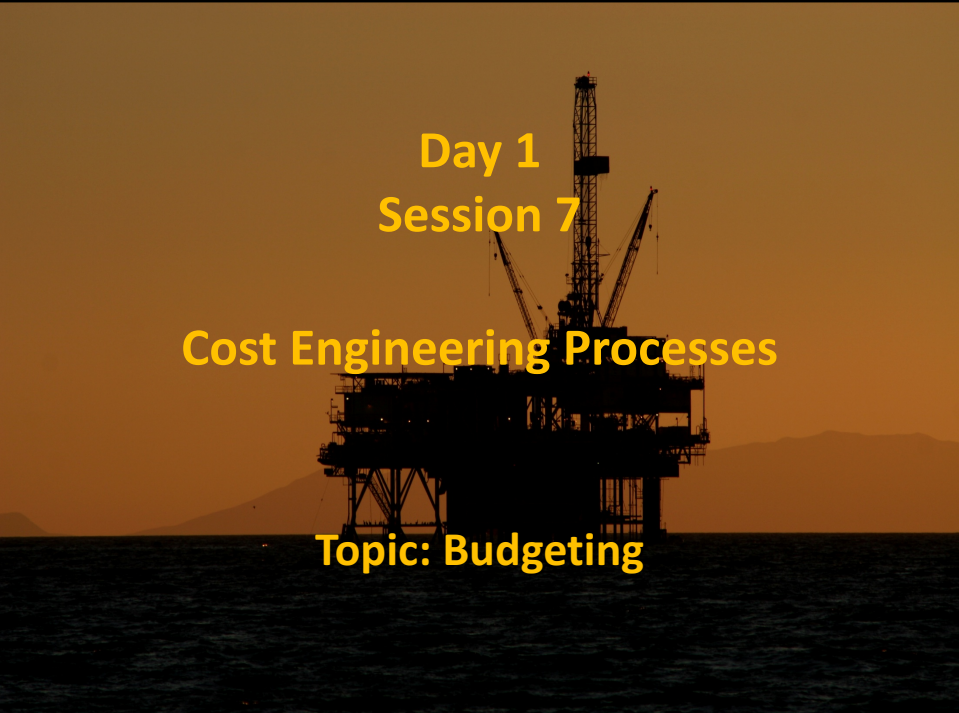


## Examples of Benchmarking Companies



*IPA* Independent Project Analysis



- <http://www.ipaglobal.com/>
- **QUESTOR**
- <https://www.ihs.com/products/questor-oil-gas-project-cost-estimation-software.html>
- **Solomon Benchmarking**
- <https://www.solomononline.com/benchmarking>
- Bain & Company
- **BAIN & COMPANY** 
- <http://www.bain.com/index.aspx>




Day 1  
Session 7

Cost Engineering Processes

Topic: Budgeting



## Budgeting



- The budgeting process establishes the control plan for the management of costs within the budget created based on the sanction FM
- The budget forms the basis for measuring project performance and the identification of potential overruns .

**There are three main activities within the budgeting process:**

- Setting up the Control Budgets and UAP drawdown plans
- Managing Changes or supplemental against the Control Budgets and UAP
- Allocating budget funds using the commitment process



### Cost Team Budget Deliverables

- Create Budget Items in multiple currencies.
- Raise AFEs to release the Control Budget.
- Breakdown of Original Control Budget by Budget Item.
- Facilitation of the project’s annual Budget Cycles.
- Develop the project’s Annual Budgeting and Forecasting processes.
- Raise and issue AFEs to release the Control Budget
- Develop a UAP Drawdown Plan for the Project
- Establish Cost Control Procedures for the Project Management Team’s Costs
- Maintain the Current Control Budget
- Establish and set up the Exceptional Performance Target (XPT)
- Manage Partner Equivalent Targets & Control Budget

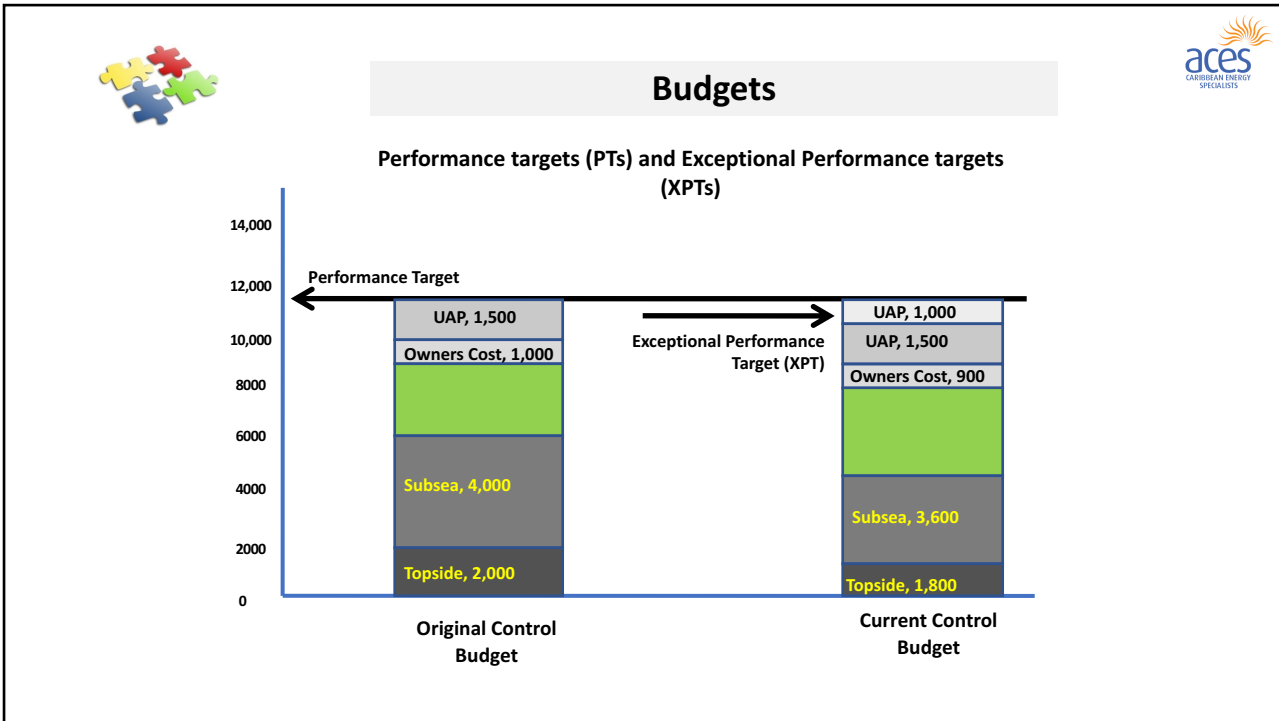


### Budgets

#### Operationalizing Performance Targets

US\$ Million	Original Control Budget (OCB)	Budget Changes	Current Control Budget (CCB)
Topside	2000	-200	1800
Subsea	4000	-400	3600
Drilling and Completion	3000	-300	2700
Owner's Costs	1000	-100	900
UAP	1500		1500
<b>Subtotal - Performance Target</b>	<b>11500</b>	<b>-1000</b>	<b>10500</b>
Exceptional UAP		1000	1000
<b>Total Project Costs</b>	<b>11500</b>	<b>0</b>	<b>11500</b>

PT = Performance Target; XPT= Exceptional Performance Target  
 Note: Budget Change shown is the first change to be made to the project, and is required to align the CCB and the XPT



**Budgets – Budget Items**

- The Budget Item represents the lowest level of the WBS.
- Has a unique code with defined scope, budget, timeframe and responsibility.
- It is the key control element for budgeting purposes in the Cost Database

**Budget Item Rules**

- A single Budget Item may only be funded from a single FM
- The Budget Item should mirror the summary remuneration schedule within the contract documents
- Different items of work scope may be combined if the work is similar in nature
- Major contract may have multiple Budget items while smaller commitment may only require one Budget Item
- Budget Items should only contain one currency of expenditure
- Budget items should not contain cost for more than one budget holder

**Budget Items in Multiple Currencies**

The Budget is set up and maintained in the Project Cost Database in an equivalent currency, usually US\$



## Raise & Issue AFEs



### Authorization for Expenditure (AFE)

- An AFE is a control instrument, initiated when a project is endorsed.
- The main purposes of an AFE are to delegate financial authority from the Financial Memorandum to an accountable budget holder.
- To Release funds to allow the project to place Commitments and incur costs.

### Release of the Control Budget

- Facilitates approval for the release of project budget funds.
- A listing of proposed AFEs is created during the at the beginning of the project. The information contained within AFEs includes when the instrument should be raised, as not all AFEs will be raised at the start of the Project.
  - The Cost Engineer shall work with Finance to update the Accounting system with AFE data and/or accounting code data for the scope covered in the AFE, and to enable only those codes needed for current work.



## A Typical Annual Budget Process



- Although the ability to manage a project against a single budget may be the most efficient process, consideration must be taken into account that the company's budget cycle may differ from that of the partners and determined by PSA/JOA/JV
- A six-monthly bottoms-up forecast is performed to inform Partner or Company's budgets for the following year.
- The six-monthly forecast reviews are done twice per year, with the first taking place in the 2<sup>nd</sup> quarter and the next in the 4<sup>th</sup> quarter (4Q - December)
- The company's zero annual budget is subjected to reviews and adjustments by management, but may not be reflected in either the Partners budget or the gross project budget.
- The project's Cost Database is used to capture and report on the budget for comparison against annual forecast.



## UAP Management



### UAP

- The UAP is intended to fund changes that are within the scope of the project in alignment with the Statement of Requirement (SoR) and Basis of Design (BoD).
- Each Project needs a UAP Management Plan & a UAP Drawdown Plan.

### UAP Management Plan:

- The Project's UAP is set-up as a separate high level Budget Item and utilised with the formal approval of the budget holder.
- The utilization of UAP is captured in the Change Register as a budget transfer from the UAP budget to other lines to fund scope changes.
- The Cost Engineer is responsible for developing the UAP Management Plan that sets out the process and timing of drawdowns.

### UAP Drawdown:

- The Cost Engineer is responsible for creating the UAP Drawdown Plan.
- The Benchmarking analysis should be used as a guide in developing the UAP Drawdown plan.
- UAP is preserved for the Risk which generated it in the RISK analysis.



## Budget Management



### Annual Budget Cycles

Establishment of the budget cycles which ties in with the six-monthly forecast, the company's Long Term Plan (LTP), and Partner/other stakeholders' annual budget cycles.

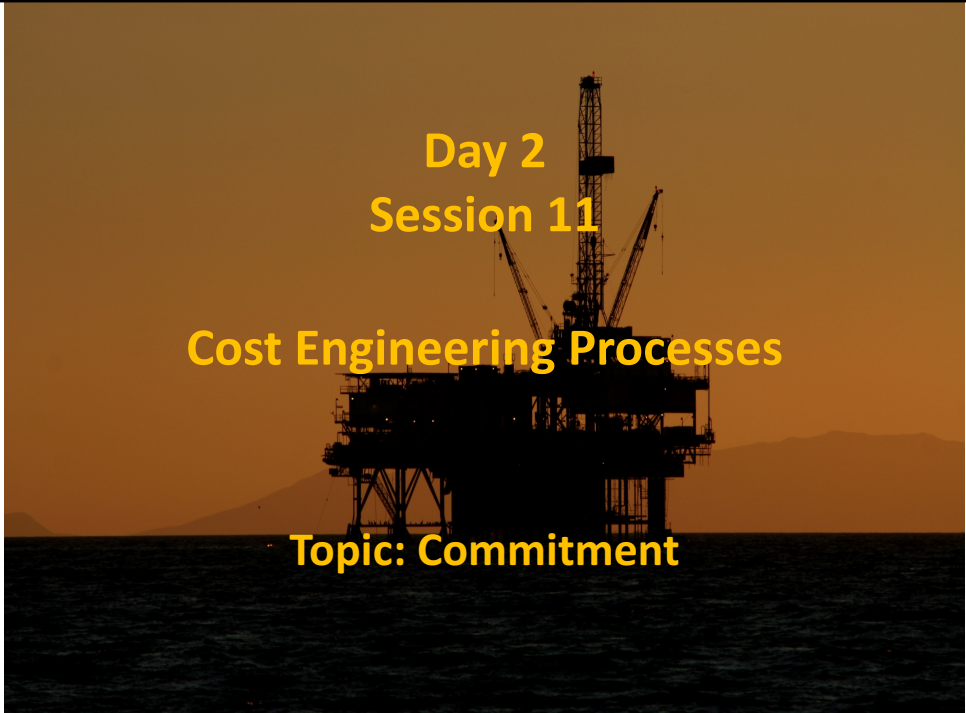
### Maintain Current Control Budget

- The Project is managed to the Current Control Budget which is a calculated value that adds all approved changes to the Original Control Budget .
- Changes which affect the budget include
  - Within Scope Changes
  - Scope Change

### Create Additional Budget Items

- It may not be possible to fully recast the performance target into the detailed levels of the Control Budgets..
- More granularity is achieved when contracts are awarded and increased definition is available; new Budget Items are created to enable control for each new commitment, using budget transfers.






**Day 2**  
**Session 11**

**Cost Engineering Processes**

**Topic: Commitment**



**Commitments**



**What are Commitments?**

- The total value of all 3<sup>rd</sup> Party obligations to provide goods and services.

**Commitment Controls?**

- Provides assurance to Project Management and budget that appropriate due process has been undertaken.
- Ensures that the company does not enter into commitments where approved budget funding is not available.
- Commitments and subsequent expenditure are properly recorded in the accounts and cost reports.
- The correct Cost Codes are utilized.



## The Commitment Process



- Requisition
- Commitment
- Amendment Variation & Change Orders
- SWOs
- UAFs
- Direct Costs
- Commitment Close-out
- Multiple Currency Commitments



## Requisition Process



### What is a Requisition?

- ✓ A financial authority on behalf of the Budget Holder to authorize procurement or amend contract or PO with a 3<sup>rd</sup> Party for the provision of goods or services.

### Who is Responsible?

- ✓ Budget Holder
- ✓ The responsibility may be delegated to the Cost Engineer who supports the Budget Holder



## The Requisition Process



- Requisition formats vary, some projects utilize paper documents, some use the electronic systems (such as SAP)
- The Cost Engineer upon receiving a request, verifies availability of funds
- The Cost Engineer provides the appropriate Cost Code
- The Cost Engineer provides assurance to the Budget Holder, that approval, if given, will be within their delegated authority.
- The Requisition should be recorded in the Cost Database
- If the Requisition is not budgeted, a project budget change will be required
- The Cost Engineer will refer the originator of the Requisition to the Change Coordinator



## Amendments: Variations & Change Orders



### What are Change Orders?

- Result of amendments to Requisitions and Commitments (Purchase Orders & Contracts)

### Change Order Process?

- On approval of a contract change, a contract variation order or Amendment is issued.
- The Budget Holder authorizes the change in cost.
- The Cost engineer will provide assurance to the Budget Holder that there are sufficient funds to facilitate the change.
- The original Requisition or Commitment value should not be adjusted.
- The Variation order will be entered into the system.



## Amendments: Variations & Change Orders



### Who is Responsible?

- The Cost Team and Procurement interface to ensure project control requirements are identified in all contracts.
- The Cost Team ensures Commitment from requisition processes are recorded in the Cost Database



## Close-out of Commitments



### What is Commitments of Direct Cost?

- ✓ The process of closing out PO and Contracts

### Process

- The final cost of the Purchase Orders & Contracts are reviewed and reconciled if necessary in both the Accounting (SAP system) and the Cost Database
- The adjustment in the value of the commitment should be entered as a change and NOT by adjusting the original value
- The timely formal closure of contracts helps to release surplus funds that can be utilised elsewhere and reduce pressure on forecast.



## Multiple Currency Commitments



### What are Multiple Currency Commitments?

- The event where expenditure is incurred in two or more currencies even if one contract is awarded to cover the entire scope of work

### Process

- Separate commitments must be set up for each currency utilized.
- Only one requisition and commitment entry into the Cost Database to cover the full multi-currency scope.
- If approval for the Commitment has been given by Partners at an agreed value in the project currency, then that value shall also be reviewed as part of the assurance process.
- The Budget Holder shall be informed and corrective actions taken in relation to the treatment of multi-currency transactions.
- If the project is not hedged against currency fluctuations, the Current Control Budget, Requisition and commitment may require adjustment to capture invoice exchange rate gains or losses.




## Multiple Currency Commitments



### Who is Responsible?

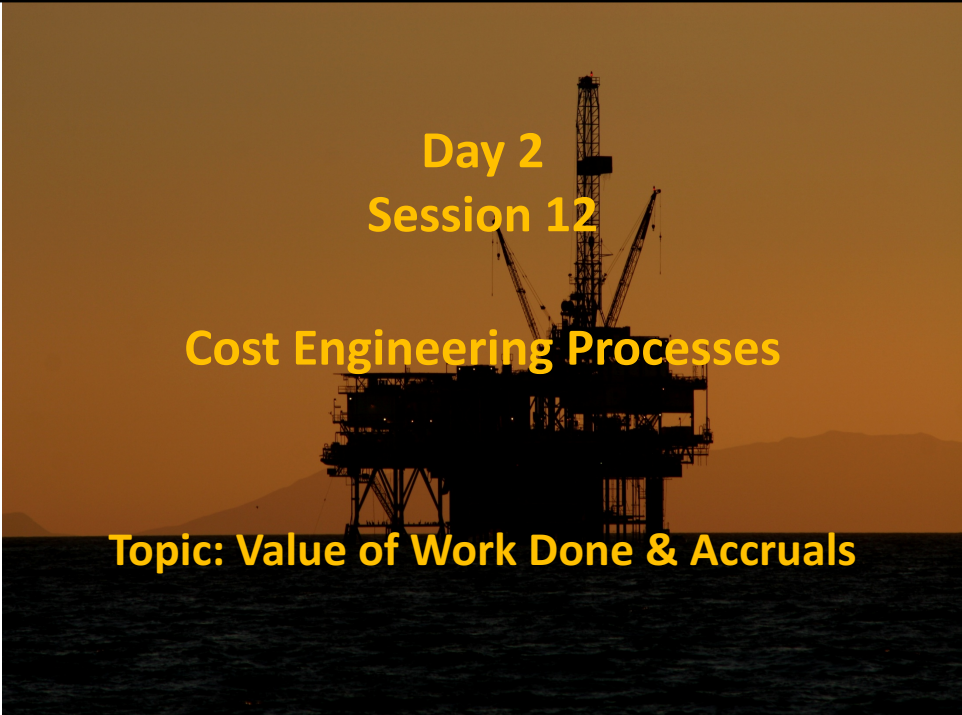

- The Cost Engineer is responsible for verifying the currency values for proposed contracts and convert to a budget currency




**Day 2**  
**Session 12**

**Cost Engineering Processes**

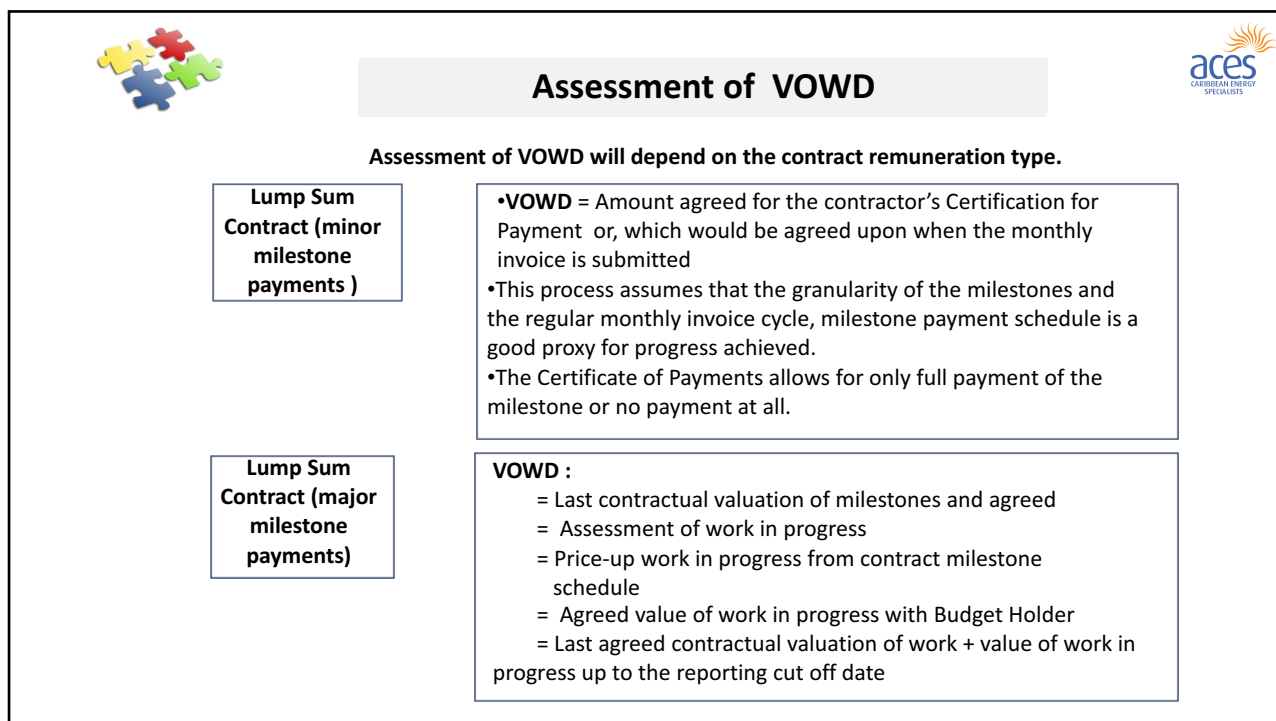
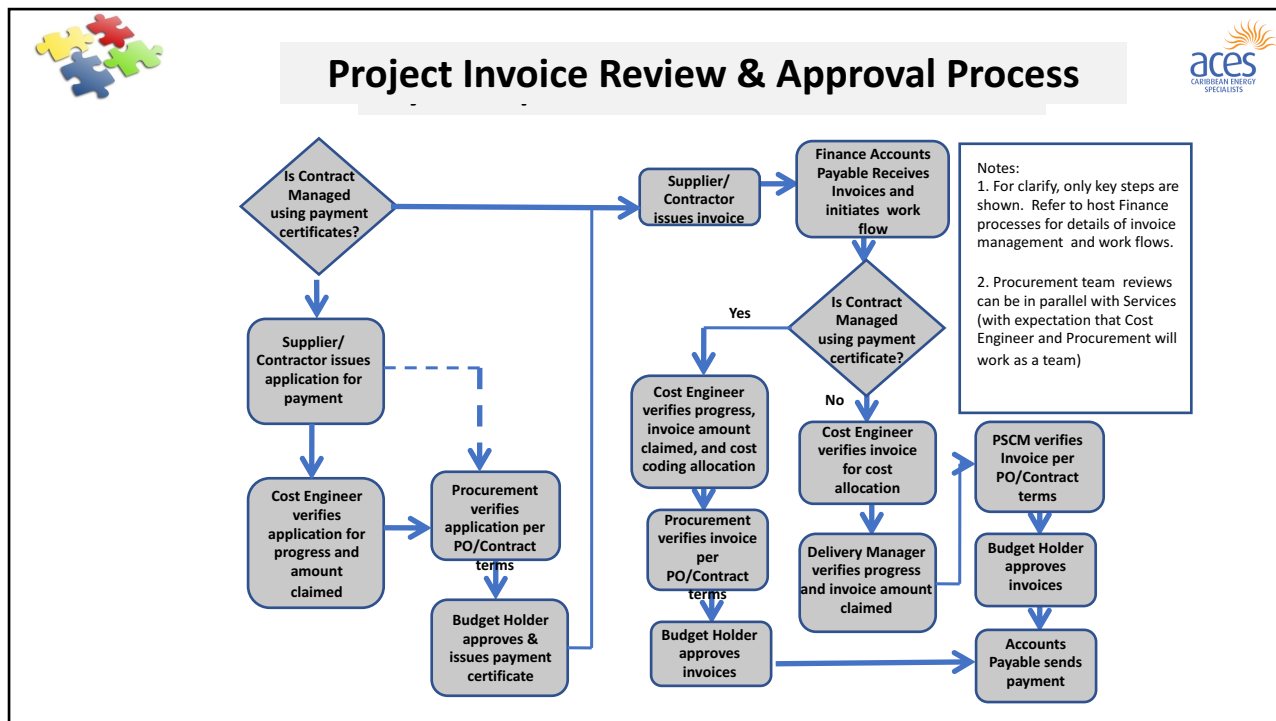
**Topic: Value of Work Done & Accruals**

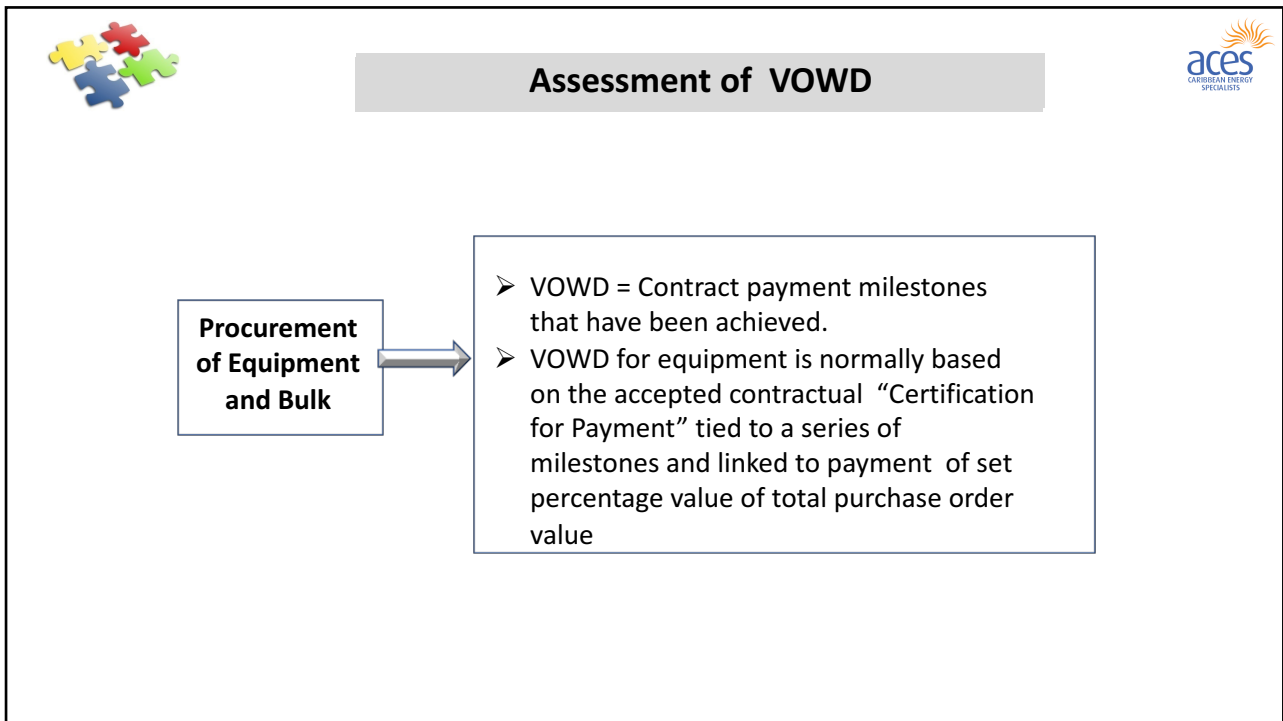
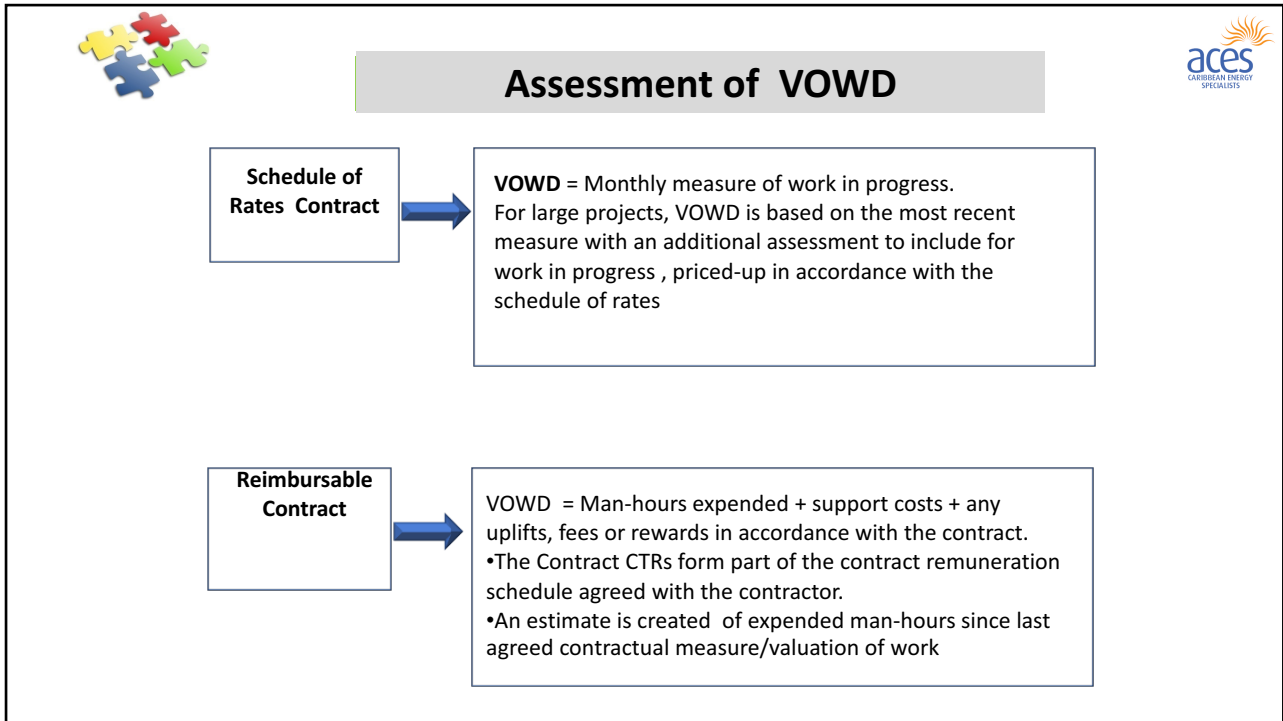



**Value of Work Done & Accruals**

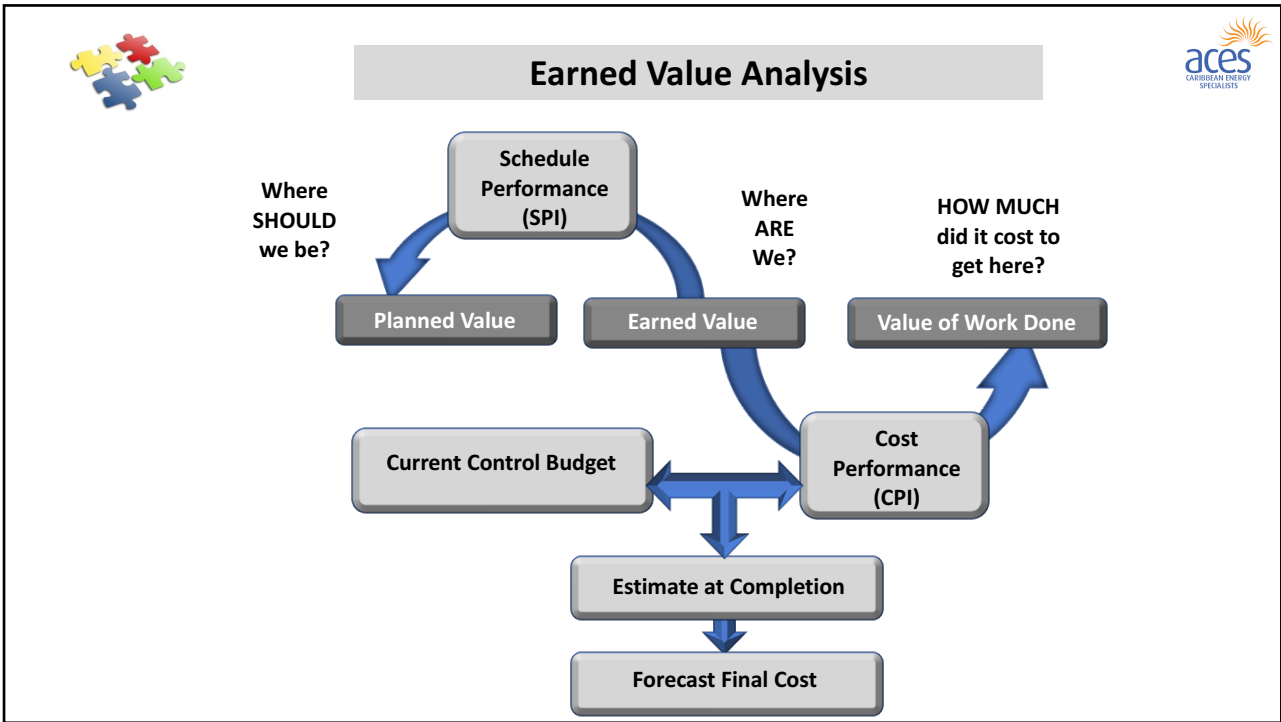
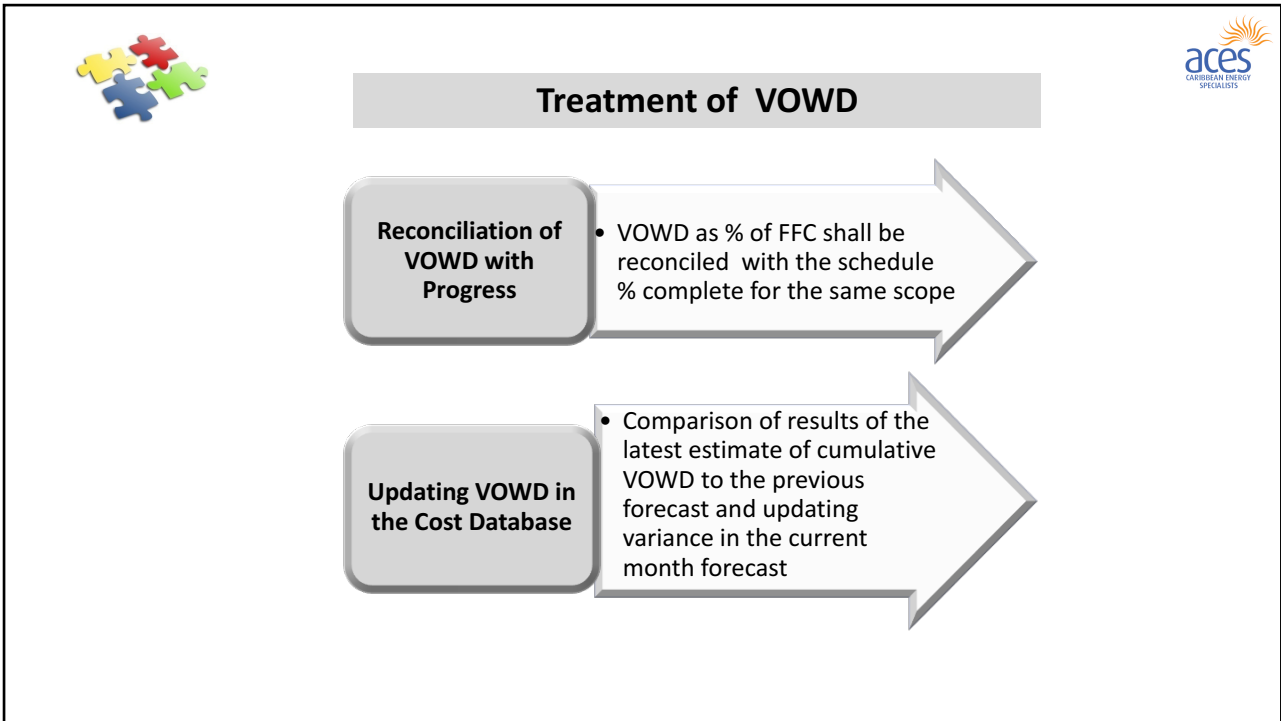


<p><b>What is Value of Work Done?</b></p> <ul style="list-style-type: none"> <li>• It is the value of work incurred to date , estimated by project progress and expressed in terms of cost.</li> </ul>
<p><b>What are Accruals?</b></p> <ul style="list-style-type: none"> <li>• It is the amount booked in the Accounting System to represent the value of work in progress that has been completed (VOWD) but not yet posted in the Accounting system</li> </ul>
<p><b>Key activities in the VOWD &amp; Accrual Process?</b></p> <ul style="list-style-type: none"> <li>• Invoice Processing</li> <li>• Treatment of Direct Costs</li> <li>• Assessment of VOWD</li> <li>• Reconciliation of VOWD with Progress</li> <li>• Updating VOWD</li> <li>• Calculation of recommended Accruals</li> <li>• Provide VOWD and Accruals data to Finance</li> <li>• Treatment of Actuals and Accruals for Foreign Currency Expenditure</li> <li>• Earned Value</li> <li>• External Audit requirements</li> </ul>











## Earned Value -Variances

**What are Variances?**  
 •The difference between what was accomplished and that which was planned

**Earned Value Calculation:**

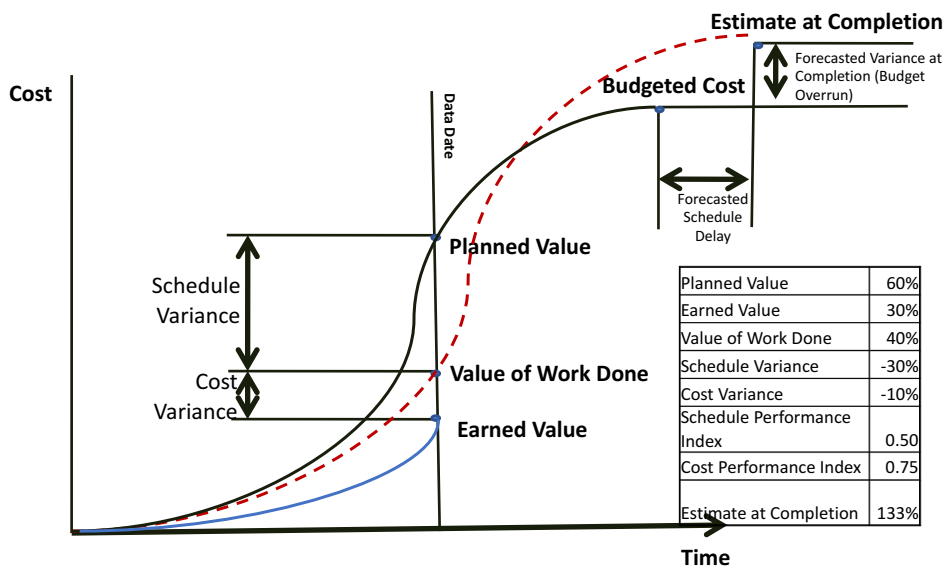
<p><b>Cost Variance</b>  <math>CV = EV - AC</math></p> <p><b>Cost Performance Index</b>  <math>CPI = EV/AC</math></p>	<p><b>Schedule Variance</b>  <math>SV = EV - PV</math></p> <p><b>Schedule Performance Index</b>  <math>SPI = EV/PV</math></p>
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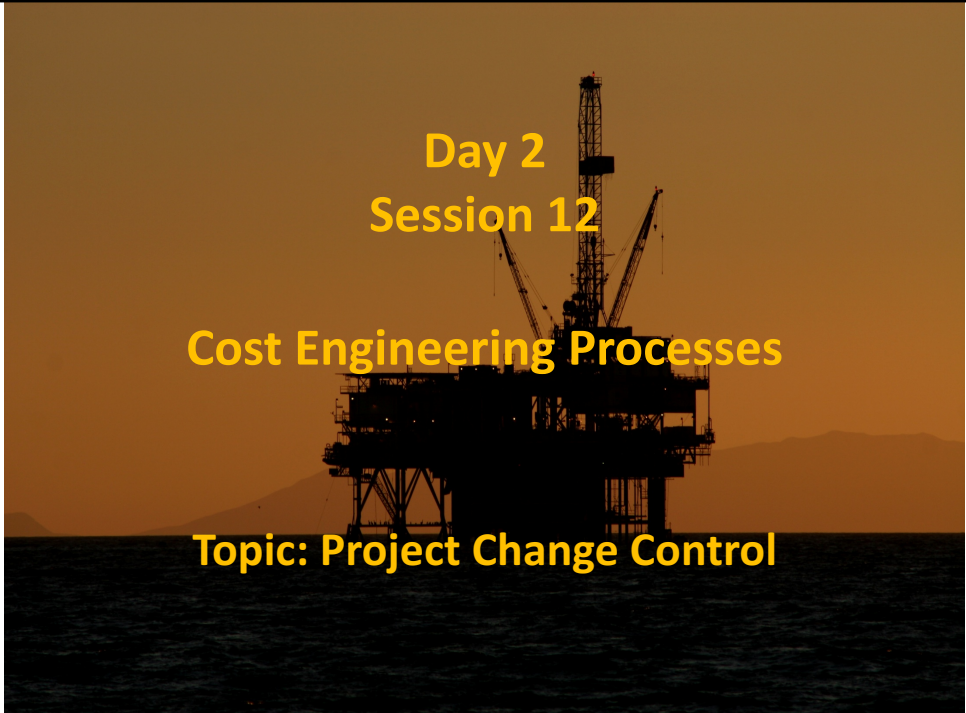
**Interpreting Variances:**

- Positive values for CV and SV – Cost under-run, ahead of schedule
- Negative values for CV and SV – Cost over-run, behind in schedule
- Ratio greater than 1 for CPI and SPI – Cost under-run, ahead of schedule
- CPI and SPI ratio less than 1 – Cost over-run, behind schedule



## How Earned Value Metrics relate to Each Other








**Day 2**  
**Session 12**

**Cost Engineering Processes**

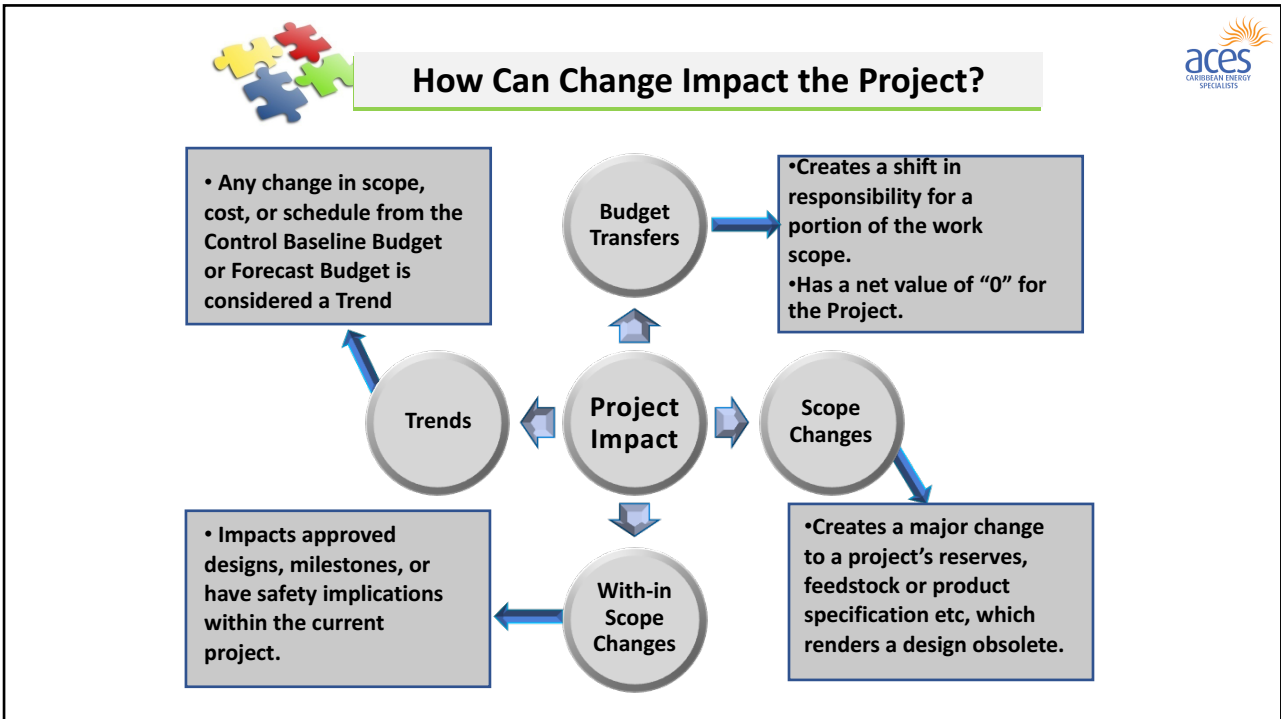
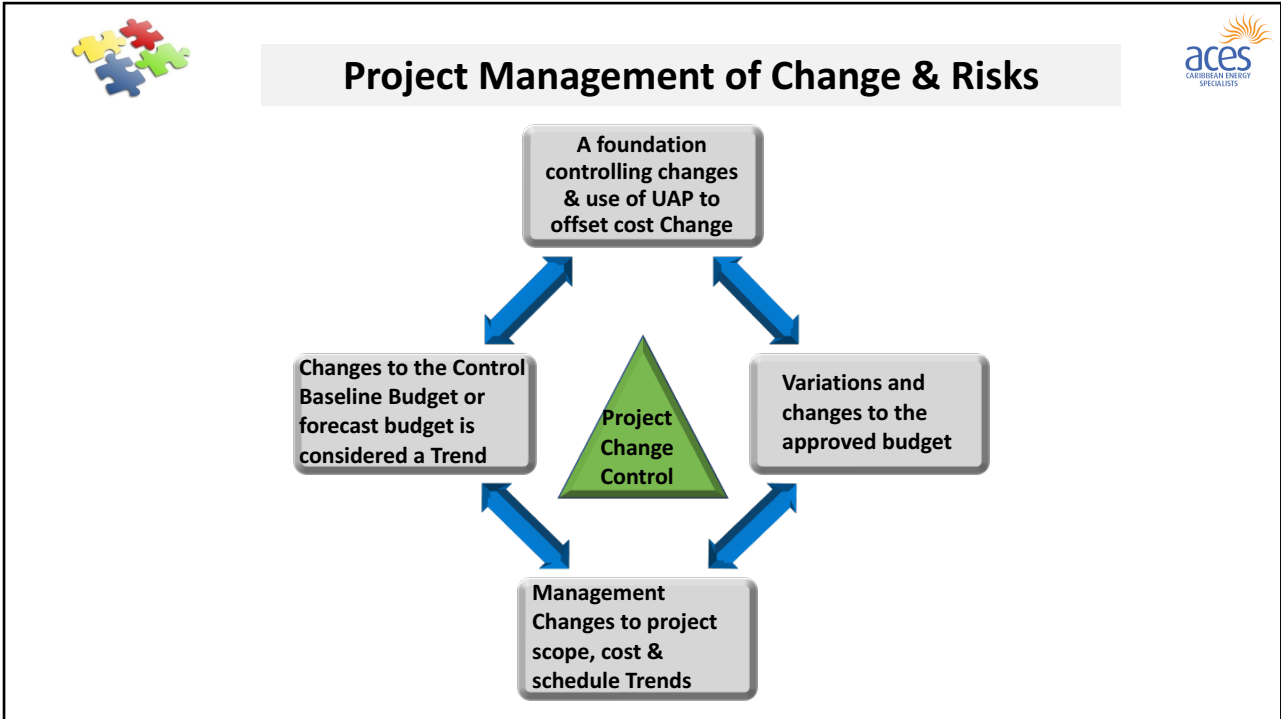
**Topic: Project Change Control**

**Project Management of Change & Risks**



- The objective of Project Change control is to manage the changes to project scope, cost and schedule trends.
- Ensures each project utilises a common process
- Provides a foundation for controlling changes and managing the use of UAP to offset the cost of the changes
- The Change process starts from the Appraise stage through to the Execute stage.
- Changes to cost, schedule and scope from the Control Baseline Budget or Forecast Budget are considered a Trend.
- Trends may develop into Change Orders and all Change Orders begin as a Trend.
- An approved change in scope Trend becomes a Change Order which affects the Baseline Budget





## How Can Change Impact the Project?



### Scope Change

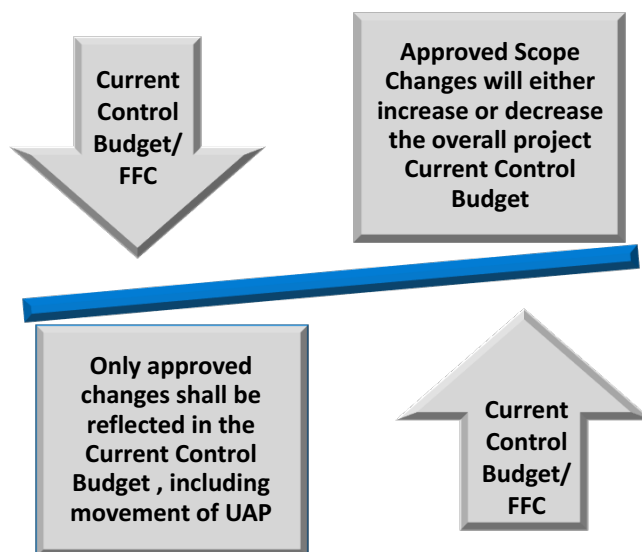
- A scope change is a major change to a project’s reserves, feedstock or product specifications and addition of major facilities, new legislations, or new technologies that render existing design obsolete.
- Scope Change is a different project for which a different budget and schedule applies and the approval of stakeholders is required
- Change Scope impacts project boundaries e.g. of Scope Change is – an increase in the facility throughput (barrels per day, bpd). This change would impact the SoR and other documents. It will require extensive review and assessment by a multidisciplinary group of people. It requires approval by the PGM, Business Unit Leader and the Partners.
- Changes within Scope:
  - These changes do not alter the fundamental concept, but may affect approved designs, intermediate, milestone dates, or have safety implications within the current project scope.
- Changes within Scope can be classified in Three ways:
  - Modification changes alter existing designs or execution strategies.
    - Require robust challenge and evaluation process prior to being submitted for approval
    - Projects will avoid modification changes in the Execution stage of the project
    - An example of a modification – a change to facility equipment specification
  - Budget Transfers – A shift in responsibility for portions of the scope of work or reallocation of unused funds
  - Price or delivery variance – Such changes do not impact scope or safety, despite being significant.
    - Eg. of a price or delivery variance - delivery slippage of a critical item or equipment

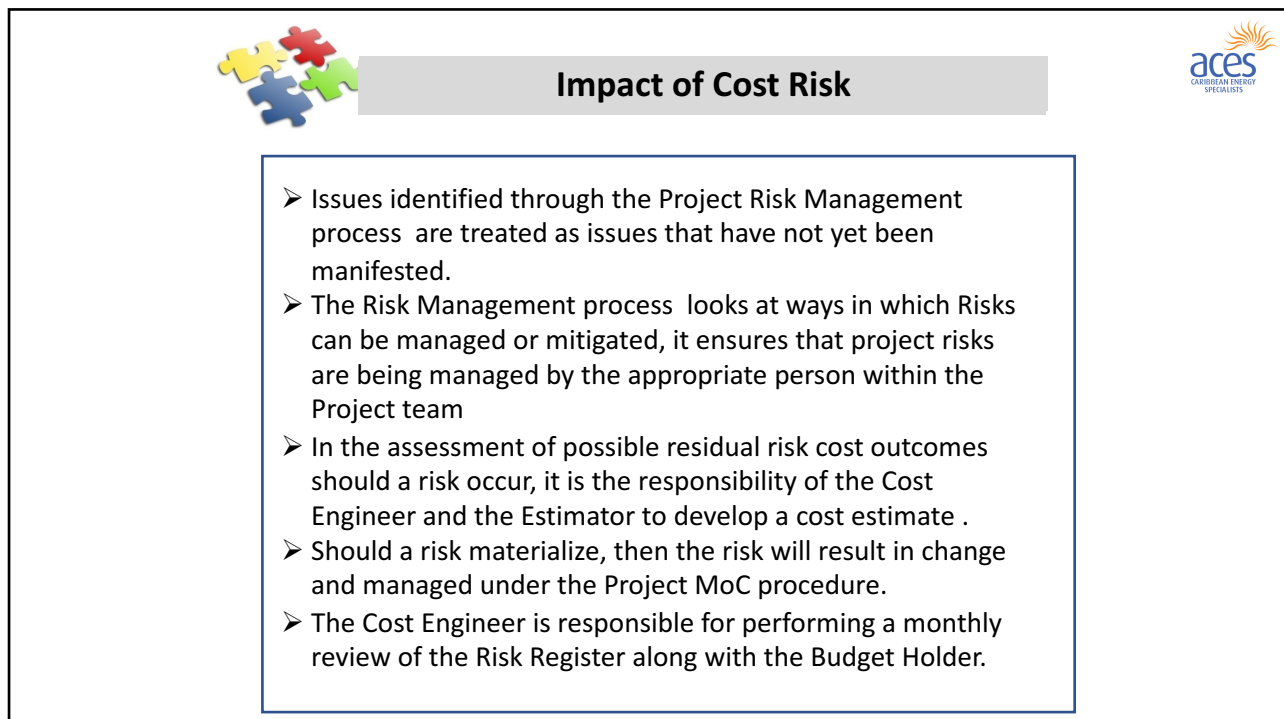
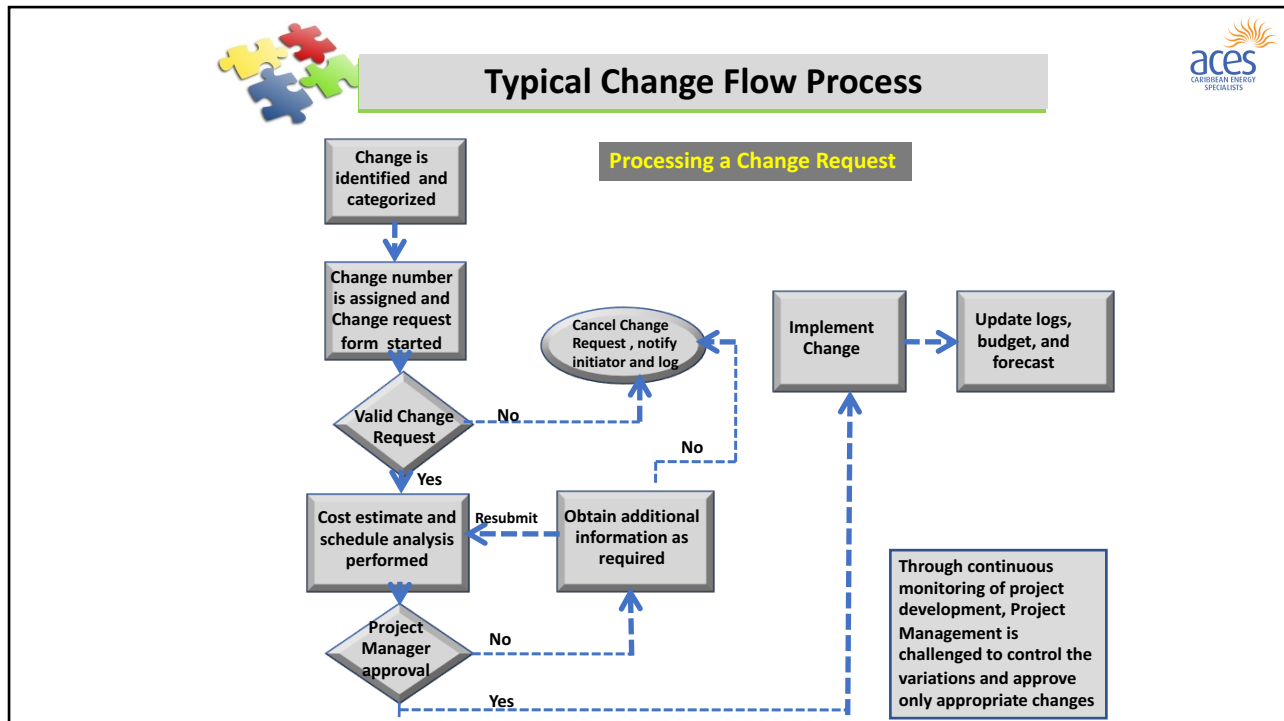
### What is MoC?

- The process where health, safety, security, environment, and regulatory aspects of a proposed change are identified, evaluated and approved.
- This system is technical in nature and is usually administered by the HSSE Group or Engineering.
- MoC is initiated after HazOp or HazId



## Cost Impact Project Changes







The diagram illustrates the Project Change Control Stakeholders. At the center is a blue circle labeled "Project Change Stakeholders". Surrounding this central circle are six grey circles, each representing a stakeholder role, connected by a light blue ring. The roles are: Change Control Team Leader (top), Cost Team Manager (top-right), Change Coordinator (right), Cost Engineer & Planner/Scheduler (bottom), Change Committee (bottom-left), and Delivery Team Manager (left). In the top-left corner of the slide is a logo of four interlocking puzzle pieces in yellow, red, green, and blue. In the top-right corner is the logo for "aces CARIBBEAN ENERGY SPECIALISTS".

**Project Change Control Stakeholders**

**Cost Team Manager:** - Provides assurance to the Project Manager

- All project Changes are being processed according to the Project Change Control process
- Change information is correctly and accurately reported

**Change Control Team Leader:** - Reports to the Cost Team Manager

- Performs overall coordination of Change Control process/tool and leads individual Change Coordination
- Arranges monthly Change Review with Change Committee, Delivery Managers, and other required team member.

**Change Coordinators:** Sits on every delivery team, depending on the complexity of the Project

- Administers the change control process on behalf of the Delivery Manager
- Processes Change Request Forms
- Issues sequential numbers
- Maintains the tracking system.

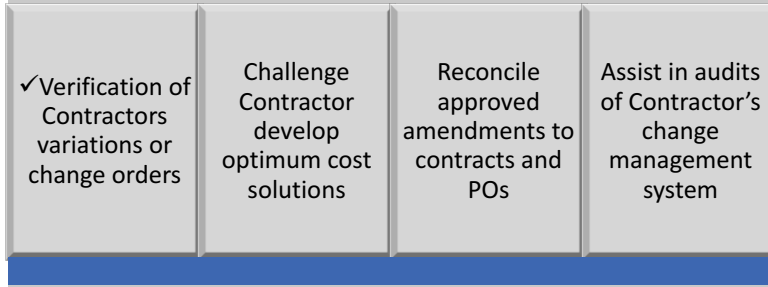
**Change Committee:** Consists of Project Manager, Cost Team Manager, Change Control Team Leader, Engineering Authority, Operations Manager, with h Delivery Managers participating as required

Either the Cost Team Leader or the Cost Control Team Leader should facilitate the review and approval of changes



### Contractors Change Process

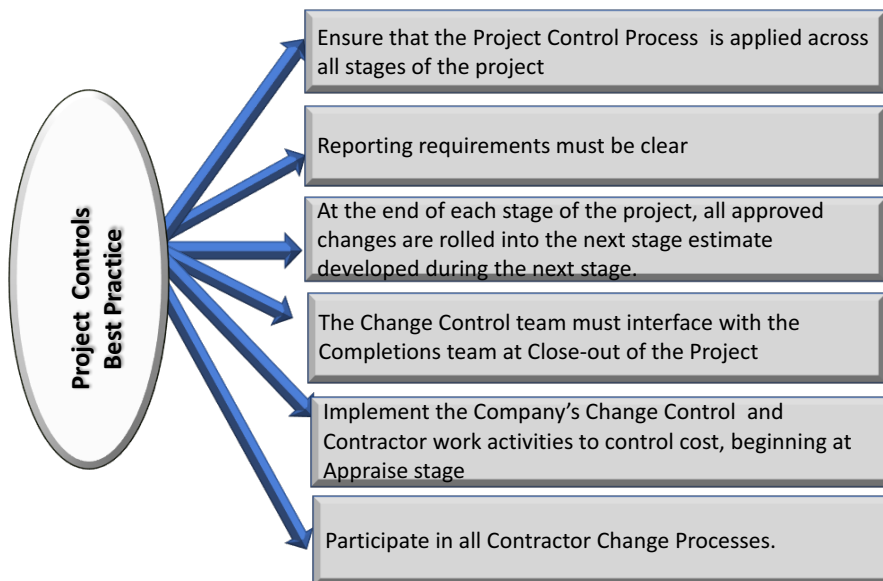
**The Cost Engineer will work with the Project's Change Coordinator, Procurement and Project Management to support the process employed by the Contractors**



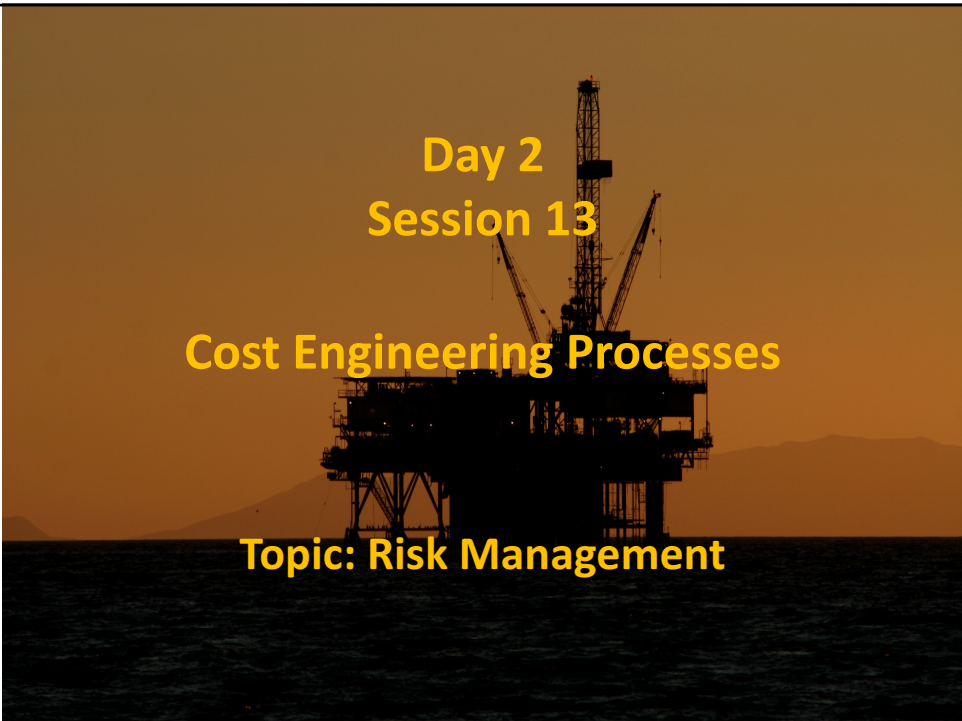
1. Verification will be done against the contractual terms and to validate Contract estimates
2. The contractor needs to develop optimum cost solution for the change, in addition to providing input the discussion and agreement related to funding and categorization of changes.
3. Updating the commitments and revising the forecasting are important to reflect the changes.
4. The Contractor change management system needs to enable interface with the project's MoC system




### Change Control Expectations & Good Practice

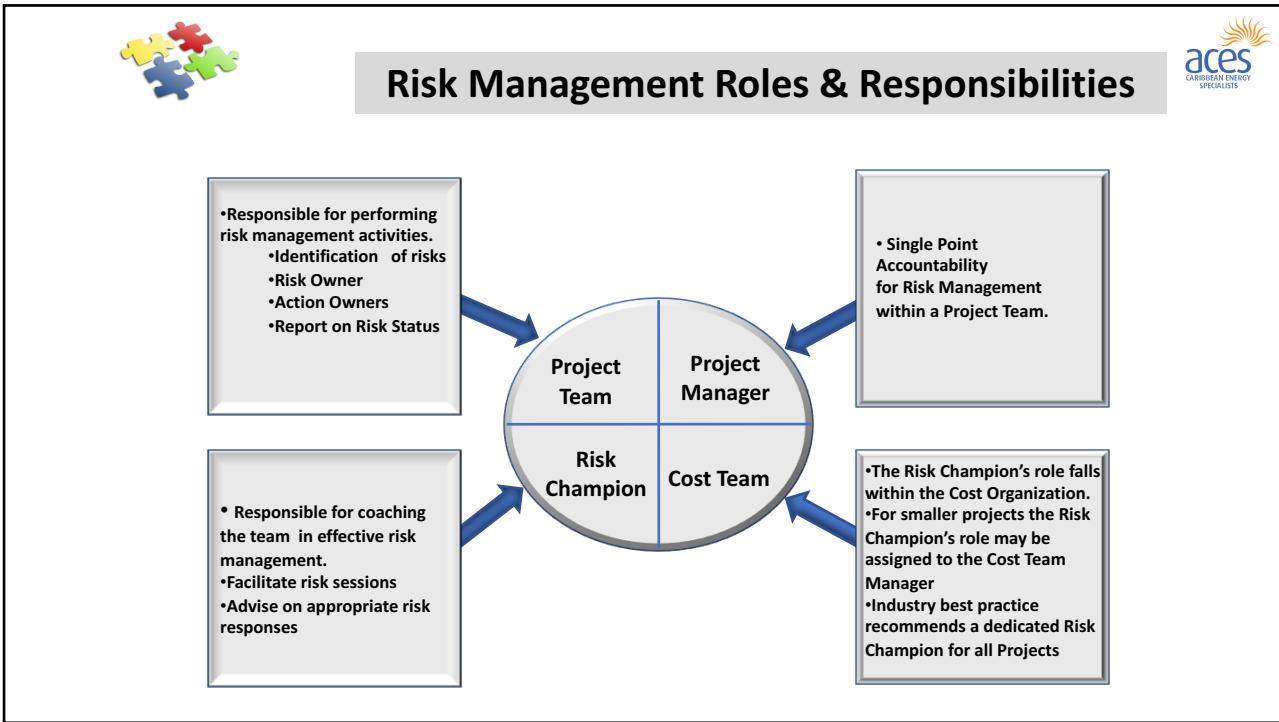


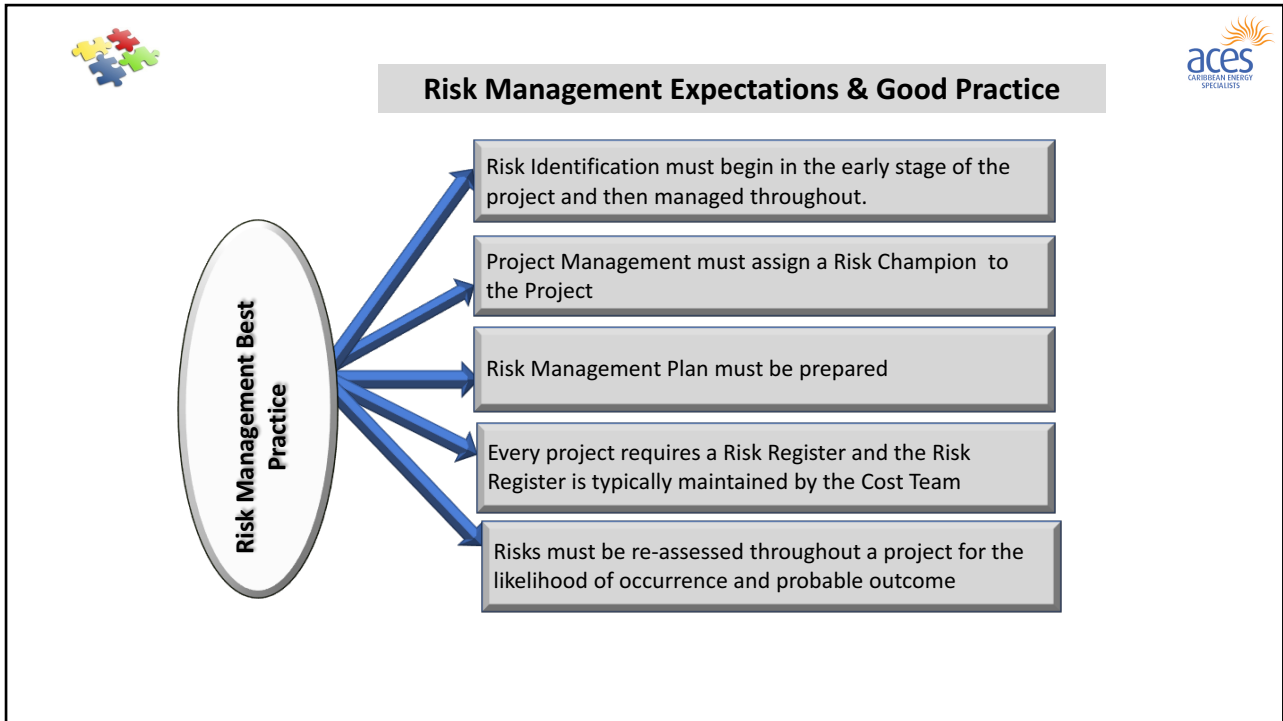




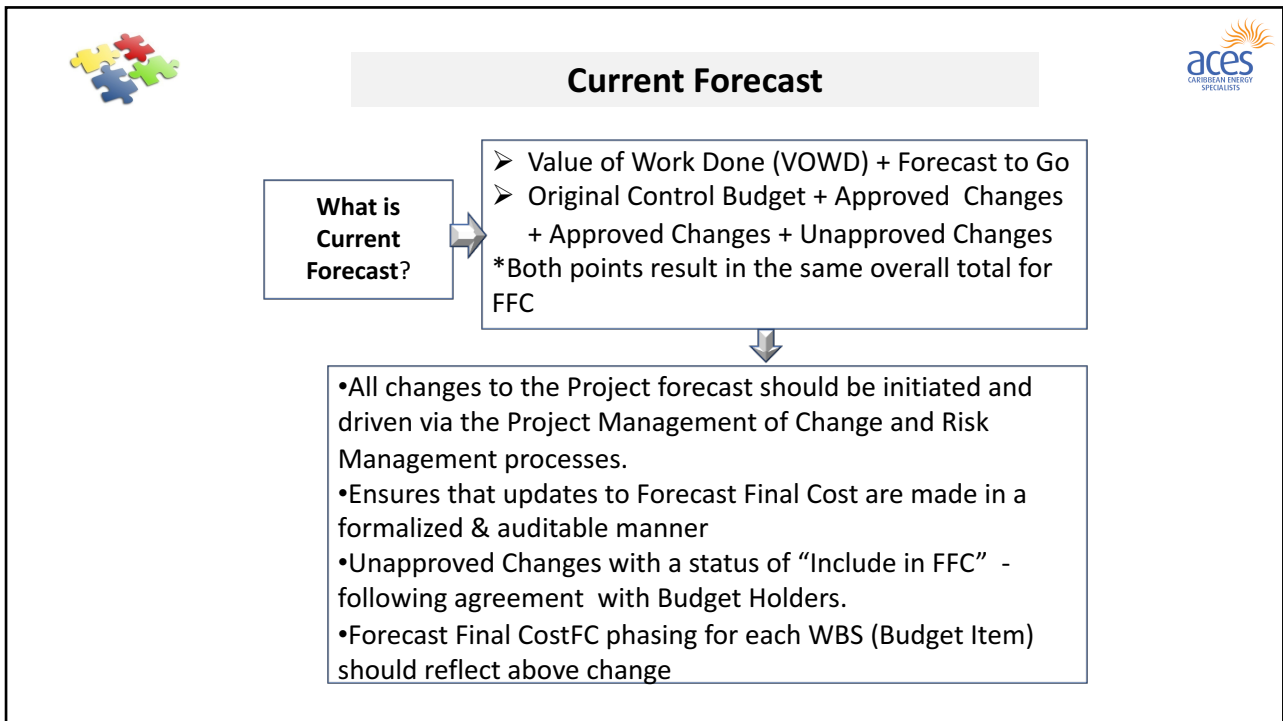
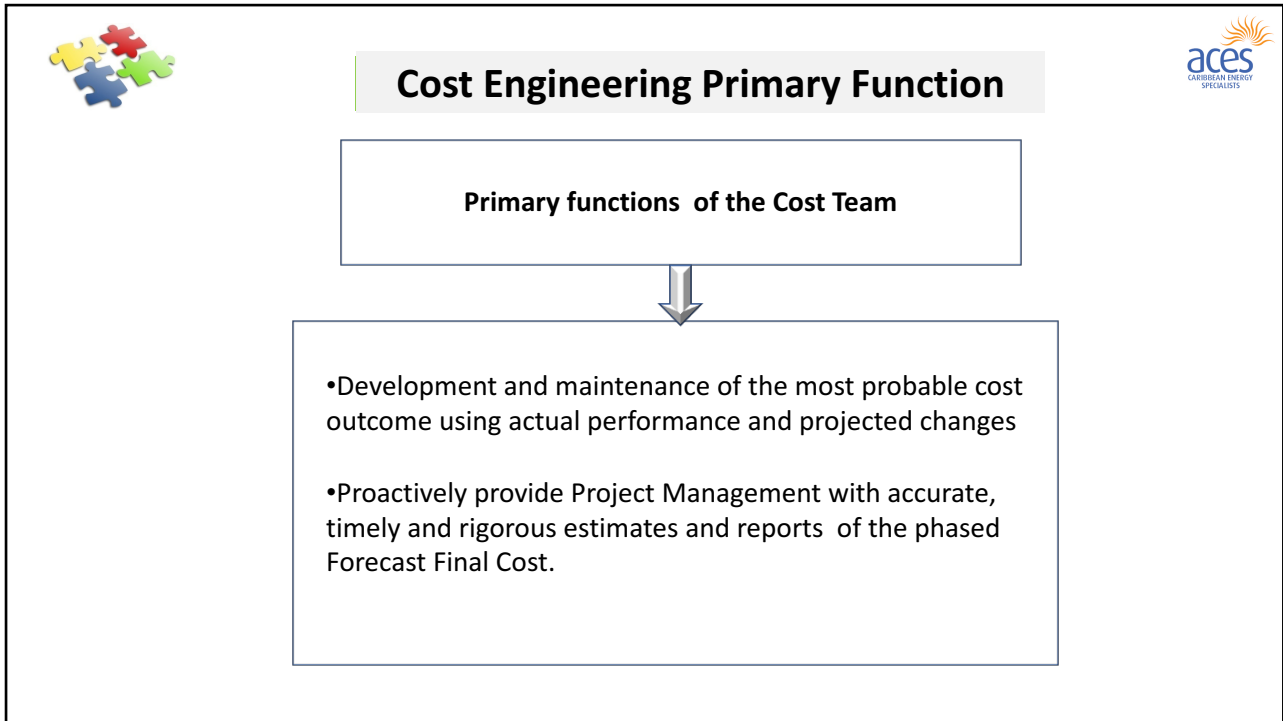
**Day 2**  
**Session 13**  
**Cost Engineering Processes**  
**Topic: Risk Management**





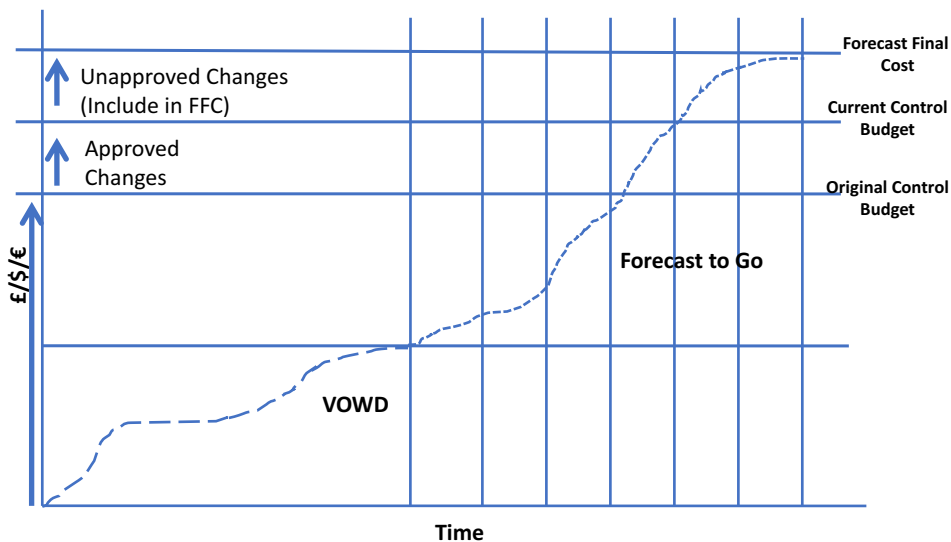


**Day 2**  
**Session 13**  
**Cost Engineering Processes**  
**Topic: Forecasting**





### Determining Forecast Final Cost



### Cost Report



Cost Code Description	A	B	C=A+B	D	E	F=G-E	G	H=G-C
	Original Control Budget	Approved Changes	Current Budget	Commitment	Value of Work Done	Forecast To Complete	Forecast Final Cost	Variance +/-
FM01: Facilities FM AFE05: Pre-Sanction								
<b>M-OG-O-05-01 - Project Management - Studies Pre-Sanction</b>	1,300,000	0	1,300,000	1,258,000	1,258,000	42,000	1,300,000.00	0
Pre-Sanction Study	1,300,000	0	1,300,000	1,258,000	1,258,000	42,000	1,300,000.00	0
<b>AFE10: Management Team</b>								
E-WM-O-01-01 - Drilling Project Management	2,100,000	0	2,100,000	250,000	250,000	1,850,000	2,100,000	0
F-SS-M-01-01 - Facilities Management	7,000,000	0	7,000,000	944,444	944,444	6,055,556	7,000,000	0
M-MT-O-01-01 - Co. Owner Project Management	600,000	(155,000)	445,000	18,750	18,750	426,250	445,000	0
M-MT-O-01-02- Labor Escalation	600,000	0	600,000	0	0	600,000	600,000	0
M-MT-O-04-01- Project Services - Consultants	600,000	155,000	755,000	285,000	23,750	731,250	755,000	0
S-SF-O-01-01- Subsurface Project Management	900,000	0	900,000	76,111	76,111	823,889	900,000	0
Management Team	11,800,000	0	11,800,000	1,574,305	1,313,055	10,486,945	11,800,000	0
<b>AFE20: Onshore Terminal</b>								
P-TL-C-01-01 - Onshore Terminal - Foundations	3,000,000	15,000	3,015,000	2,800,000	480,000	2,535,000	3,015,000	0
P-TL-C-01-02 - Onshore Terminal - Plant	21,000,000	0	21,000,000	0	0	21,000,000	21,000,000	0
P-TL-C-01-02-C0123 - Plant Contract #1	0	0	0	0	0	0	0	0
P-TL-E-01-01 - Onshore Terminal Engineering	3,700,000	0	3,700,000	3,400,000	230,000	3,470,000	3,700,000	0
P-TL-P-01-01 - Onshore Terminal - Land Acquisition	10,800,000	530,000	11,330,000	10,800,000	300,000	8,330,000	11,330,000	0
P-TL-P-01-01 - SUPP. FM - Land - Northern Access route	0	0	0	0	0	0	0	0
Onshore Terminal	38,500,000	545,000	39,045,000	17,000,000	3,710,000	35,335,000	39,045,000	0

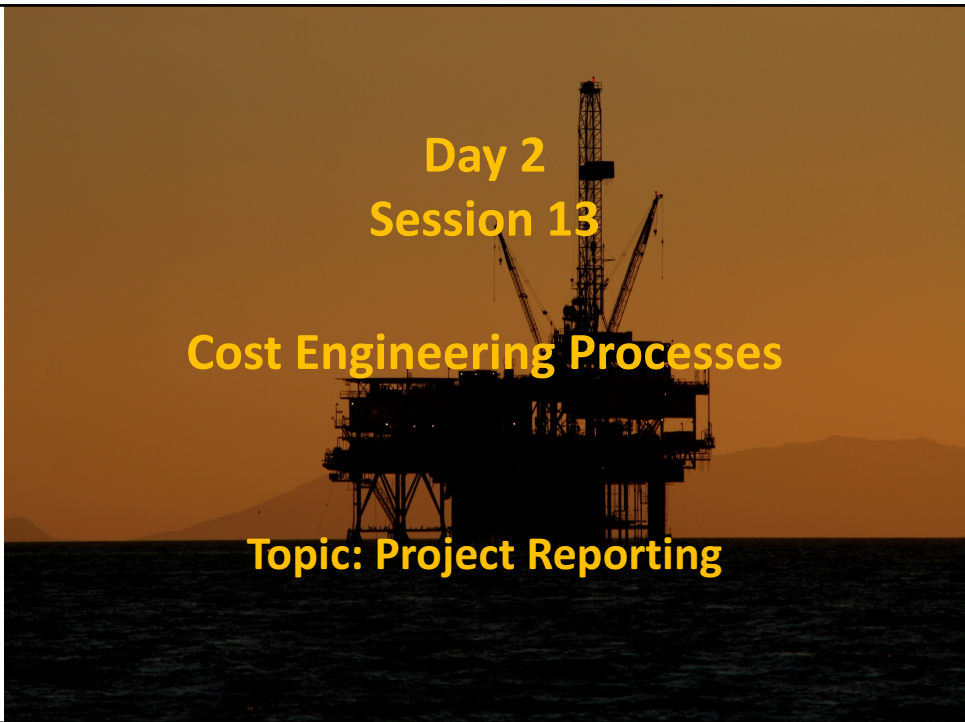


# Forecast Analysis

**SUMMARY COST REPORT ANALYSIS**

Project: Tank 123 Revamp Report for March 2007  
 Project No: 2134-AU-2004 Data at 28 Mar. 2007

	Control Budget	Expenditures		Commitment		Estimate to Complete	Current Forecast	Variances	
		Cumulative	This Period	Cumulative	Outstanding			Cumulative	This Period
	A	B	C	D	E	F	G	H	I
<b>Capital</b>									
Project Management	50,000	21,000	2,000	22,000	1,000	31,000	52,000	2,000	0
Engineering	200,00	130,000	12,500	140,000	10,000	80,000	210,000	10,000	2,500
Procurement	400,000	50,000	11,000	250,000	200,000	370,000	420,000	20,000	7,500
Construction	370,000	2,500	1,500	5,000	2,500	387,500	390,000	20,000	0
Sub Total	1,020,000	203,500	27,000	417,000	213,500	868,500	1,072,000	52,000	10,000
UAP Contingency	100,000					80,000	80,000	-20,000	
<b>Total</b>	<b>1,120,000</b>	<b>203,500</b>	<b>27,000</b>	<b>417,000</b>	<b>213,500</b>	<b>948,500</b>	<b>1,152,000</b>	<b>32,000</b>	<b>10,000</b>
<b>Expenses</b>									
Co. Costs	40,000				0	39,000	39,999	-1,000	
Other	10,000	2,000	500	2,000	0	7,000	9,000	-1,000	-500
<b>Total</b>	<b>50,000</b>	<b>2,000</b>	<b>500</b>	<b>2,000</b>	<b>0</b>	<b>46,000</b>	<b>48,000</b>	<b>-2,000</b>	<b>-500</b>
<b>Total Project</b>	<b>1,170,000</b>	<b>205,500</b>	<b>27,500</b>	<b>419,000</b>	<b>213,500</b>	<b>994,500</b>	<b>1,200,000</b>	<b>30,000</b>	<b>9,500</b>



**Day 2  
Session 13**

**Cost Engineering Processes**

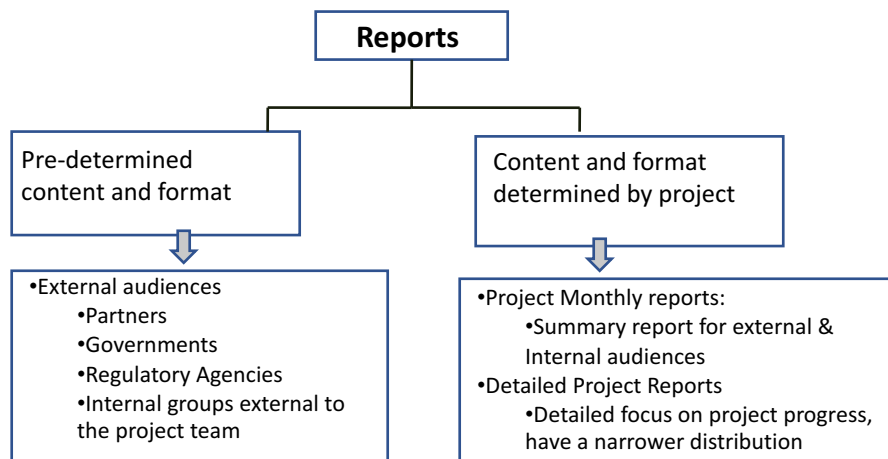
**Topic: Project Reporting**





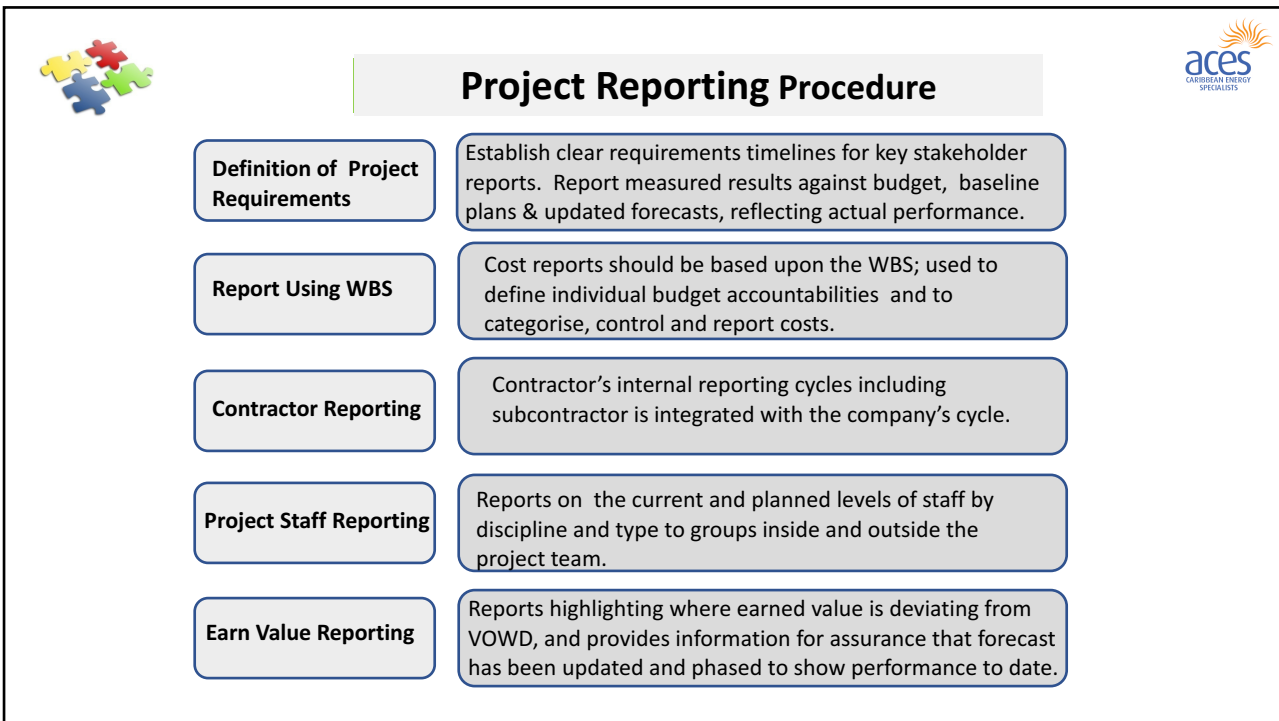
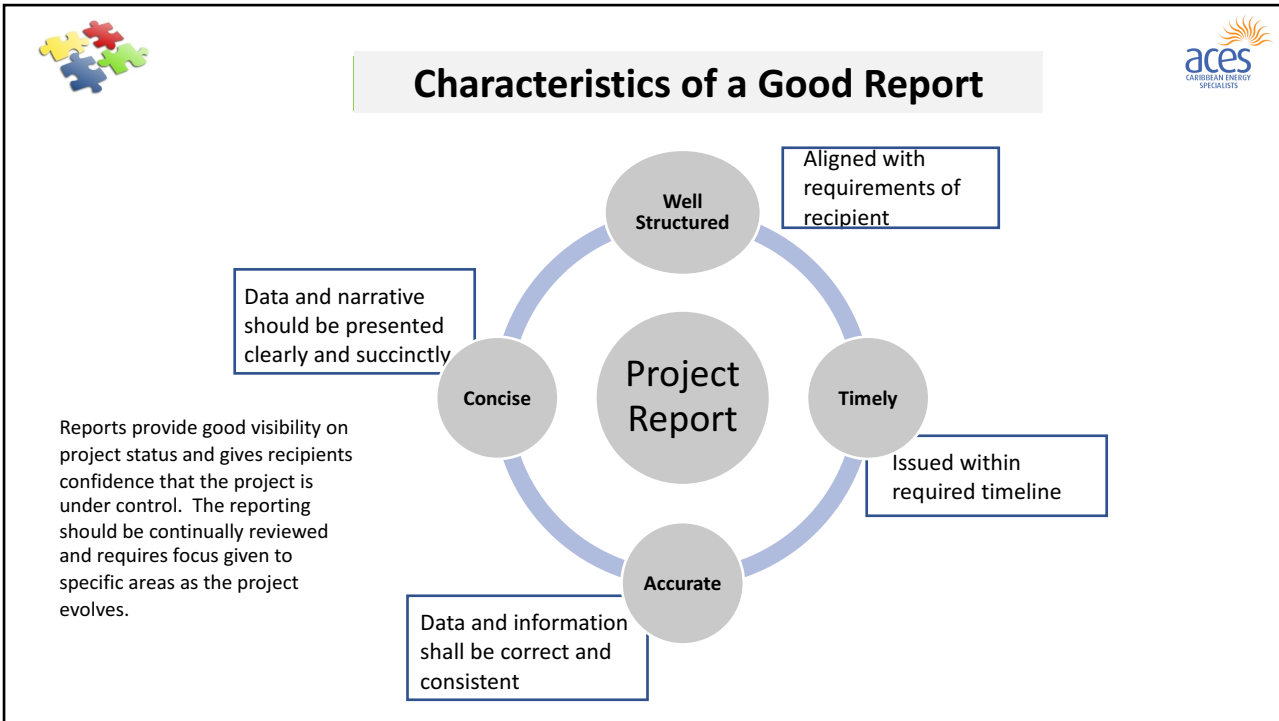
## Monthly Reporting

Project Reporting is the primary method used in communicating with project management teams and stakeholders, reporting is the primary method used for key information.

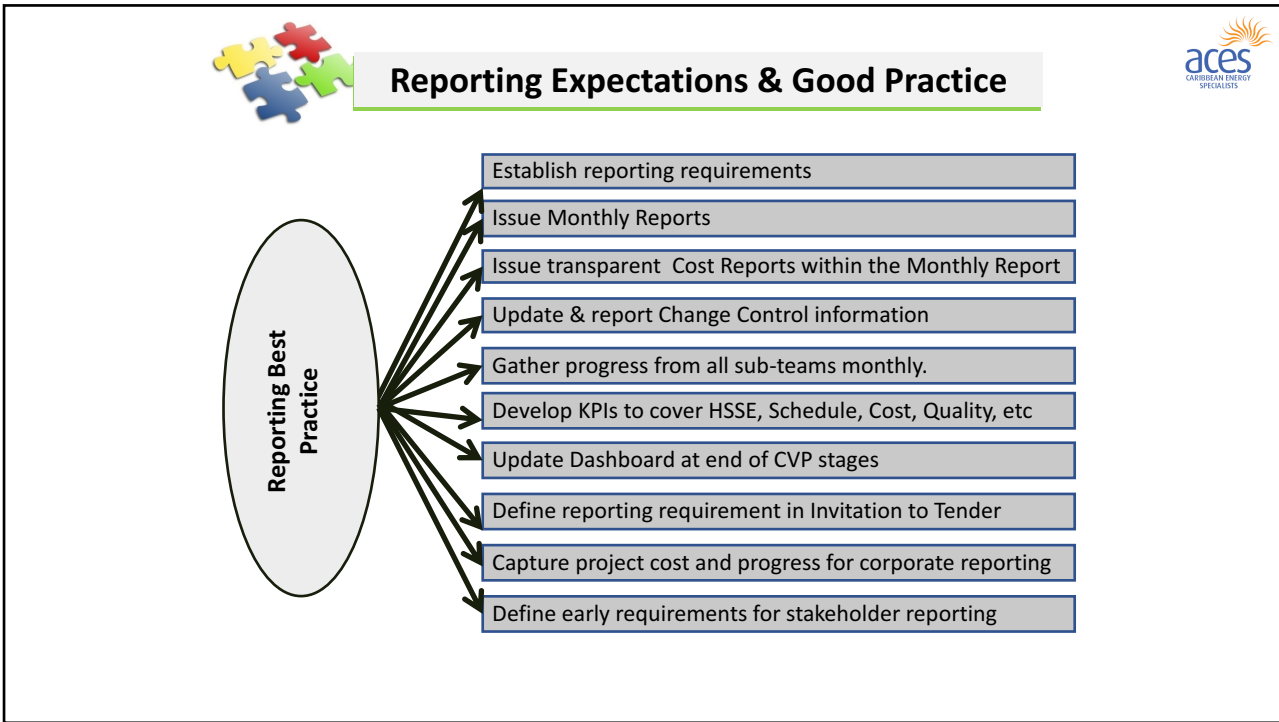
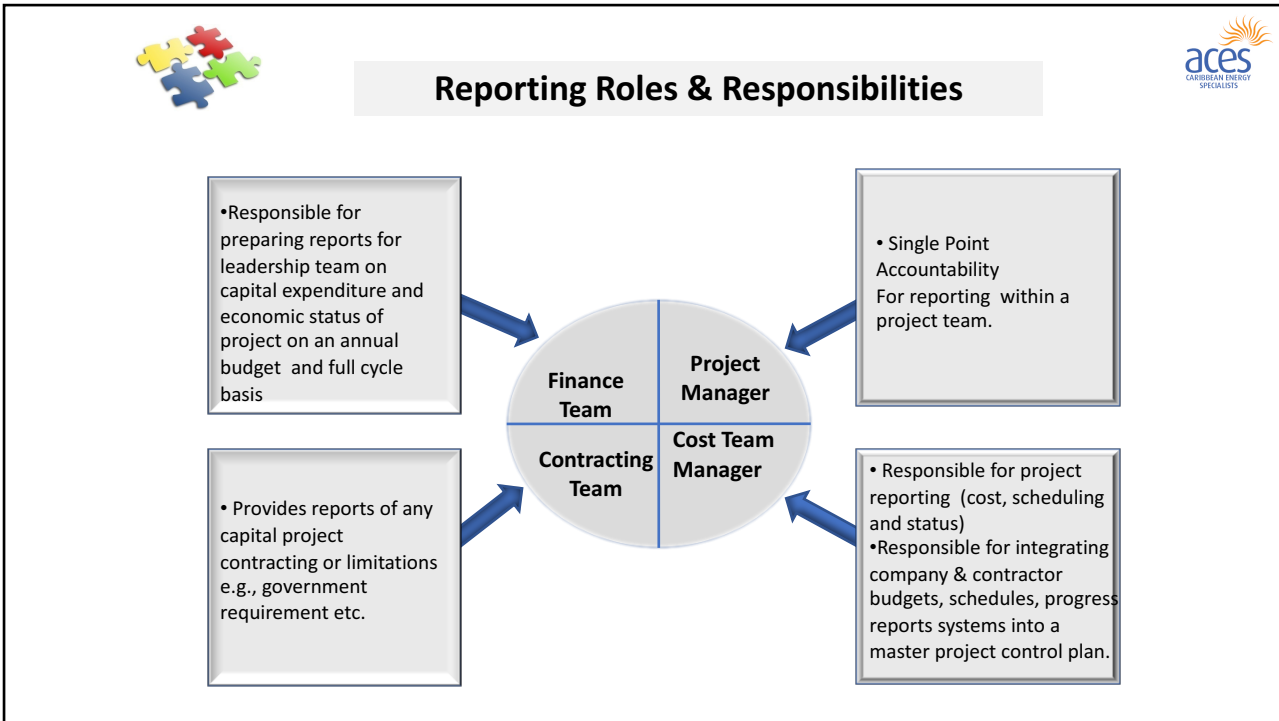


## Overview of Project Reporting

- The most important objective of project reporting is the proactive and timely communication to project teams and stakeholders.
- To achieve successful project execution and project controls, there must be effective reporting.
- Having the right reporting mechanisms in place to collect and analyse project data is important.
- Timely project status must be communicated to the project and business management teams, in an accurate, concise, and easy to understand manner.









### Cost Report Analysis Sample



Cost Code Description	A	B	C=A+B	D	E	F=G-E	G	H=G-C
	Original Control Budget	Approved Changes	Current Budget	Commitment	Value of Work Done	Forecast To Complete	Forecast Final Cost	Variance +/-
FM01: Facilities FM AFE05: Pre-Sanction								
<b>M-OG-O-05-01 - Project Management - Studies Pre-Sanction</b>	1,300,000	0	1,300,000	1,258,000	1,258,000	42,000	1,300,000.00	0
<b>Pre-Sanction Study</b>	<b>1,300,000</b>	<b>0</b>	<b>1,300,000</b>	<b>1,258,000</b>	<b>1,258,000</b>	<b>42,000</b>	<b>1,300,000.00</b>	<b>0</b>
<b>AFE10: Management Team</b>								
E-WM-O-01-01 - Drilling Project Management	2,100,000	0	2,100,000	250,000	250,000	1,850,000	2,100,000	0
F-SS-M-01-01 - Facilities Management	7,000,000	0	7,000,000	944,444	944,444	6,055,556	7,000,000	0
M-MT-O-01-01 - Co. Owner Project Management	600,000	(155,000)	445,000	18,750	18,750	426,250	445,000	0
M-MT-O-01-02- Labor Escalation	600,000	0	600,000	0	0	600,000	600,000	0
M-MT-O-04-01- Project Services - Consultants	600,000	155,000	755,000	285,000	23,750	731,250	755,000	0
S-SF-O-01-01- Subsurface Project Management	900,000	0	900,000	76,111	76,111	823,889	900,000	0
<b>Management Team</b>	<b>11,800,000</b>	<b>0</b>	<b>11,800,000</b>	<b>1,574,305</b>	<b>1,313,055</b>	<b>10,486,945</b>	<b>11,800,000</b>	<b>0</b>
<b>AFE20: Onshore Terminal</b>								
P-TL-C-01-01 - Onshore Terminal - Foundations	3,000,000	15,000	3,015,000	2,800,000	480,000	2,535,000	3,015,000	0
P-TL-C-01-02 - Onshore Terminal - Plant	21,000,000	0	21,000,000	0	0	21,000,000	21,000,000	0
P-TL-C-01-02-C0123 - Plant Contract #1	0	0	0	0	0	0	0	0
P-TL-E-01-01 - Onshore Terminal Engineering	3,700,000	0	3,700,000	3,400,000	230,000	3,470,000	3,700,000	0
P-TL-P-01-01 - Onshore Terminal - Land Acquisition	10,800,000	530,000	11,330,000	10,800,000	300,000	8,330,000	11,330,000	0
P-TL-P-01-01 - SUPP. FM - Land - Northern Access route	0	0	0	0	0	0	0	0
<b>Onshore Terminal</b>	<b>38,500,000</b>	<b>545,000</b>	<b>39,045,000</b>	<b>17,000,000</b>	<b>3,710,000</b>	<b>35,335,000</b>	<b>39,045,000</b>	<b>0</b>



### Cost Report Analysis



#### SUMMARY COST REPORT ANALYSIS



Project: Tank 123 Revamp  
Project No: 2134-AU-2004

Report for March 2007  
Data at 28 Mar. 2007

	Control Budget	Expenditures		Commitment		Estimate to Complete	Current Forecast	Variances	
		Cumulative	This Period	Cumulative	Outstanding			Cumulative	This Period
	A	B	C	D	E	F	G	H	I
<b>Capital</b>									
Project Management	50,000	21,000	2,000	22,000	1,000	31,000	52,000	2,000	0
Engineering	200,00	130,000	12,500	140,000	10,000	80,000	210,000	10,000	2,500
Procurement	400,000	50,000	11,000	250,000	200,000	370,000	420,000	20,000	7,500
Construction	370,000	2,500	1,500	5,000	2,500	387,500	390,000	20,000	0
Sub Total	1,020,000	203,500	27,000	417,000	213,500	868,500	1,072,000	52,000	10,000
UAP Contingency	100,000					80,000	80,000	-20,000	
<b>Total</b>	<b>1,120,000</b>	<b>203,500</b>	<b>27,000</b>	<b>417,000</b>	<b>213,500</b>	<b>948,500</b>	<b>1,152,000</b>	<b>32,000</b>	<b>10,000</b>
<b>Expenses</b>									
Co. Costs	40,000				0	39,000	39,999	-1,000	
Other	10,000	2,000	500	2,000	0	7,000	9,000	-1,000	-500
<b>Total</b>	<b>50,000</b>	<b>2,000</b>	<b>500</b>	<b>2,000</b>	<b>0</b>	<b>46,000</b>	<b>48,000</b>	<b>-2,000</b>	<b>-500</b>
<b>Total Project</b>	<b>1,170,000</b>	<b>205,500</b>	<b>27,500</b>	<b>419,000</b>	<b>213,500</b>	<b>994,500</b>	<b>1,200,000</b>	<b>30,000</b>	<b>9,500</b>




**Day 3**  
**Session 18**  
**Contract Processes**  
**Topic: Contracting for Major Projects**

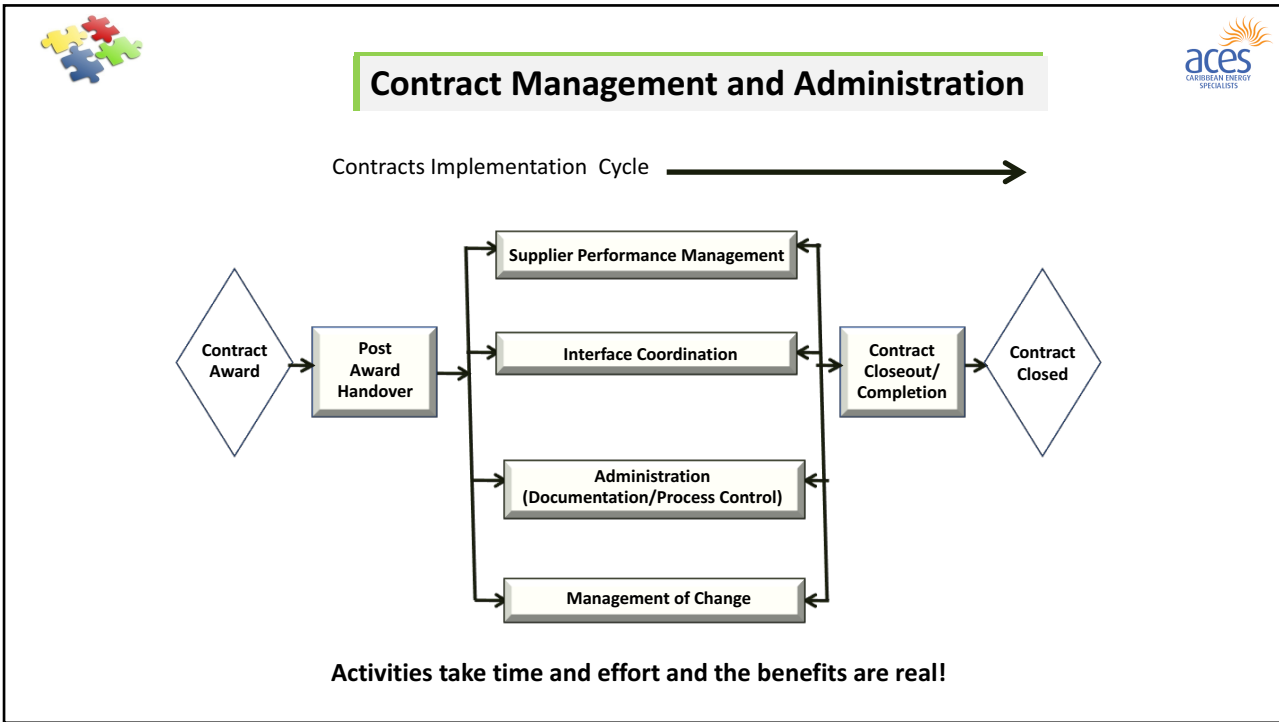
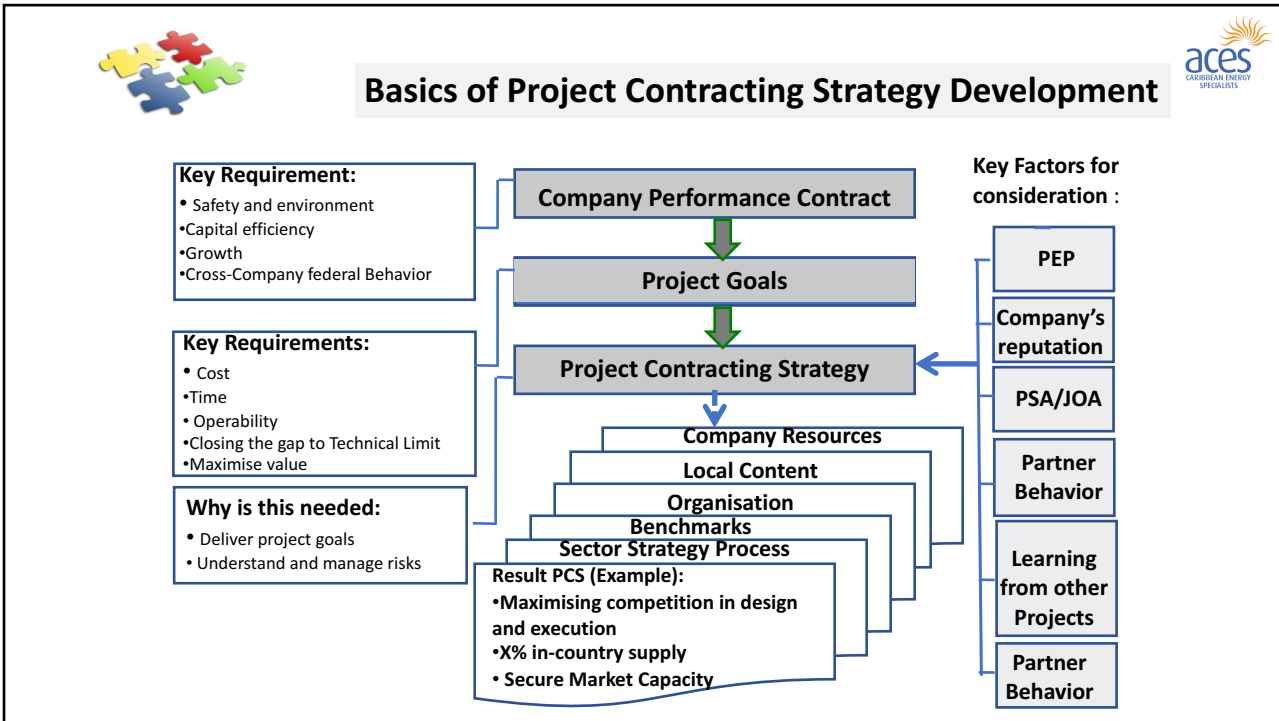


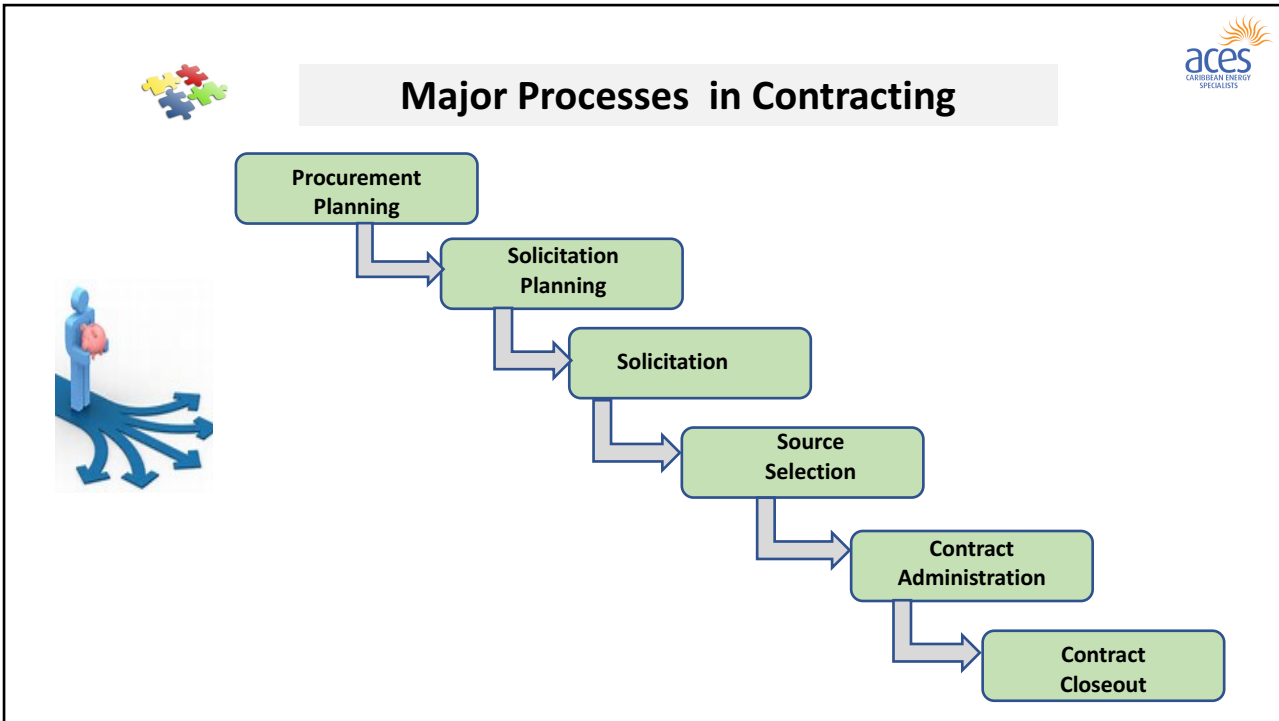
## **Contracting for Capital Projects**

**What is Contracting for Capital Projects ?**

It involves the “processes necessary to purchase or acquire the products, services, or results needed from outside the project team” PMBOK







**Procurement Planning**

**What is it?**

- Identification of the project needs which are to be met.
- Determination of whether to procure, how to procure, what to procure, how much to procure and when to procure.
- Consideration of potential sub-contracts.

**What is needed for proper Procurement Planning?**

- Scope statement
- Product description
- Procurement resources
- Market Conditions
- Constraints
- Assumptions



## Procurement Planning



<b>Scope Statement</b>	<ul style="list-style-type: none"> <li>• Description of the project boundaries</li> <li>• The project needs and strategies to be considered</li> </ul>
<b>Product Description</b>	<ul style="list-style-type: none"> <li>• Description of what is being constructed</li> <li>• Details on technical issues or concerns for consideration</li> </ul>
<b>Procurement resources</b>	<ul style="list-style-type: none"> <li>• Assessment of team capability and plans to fill gaps</li> </ul>
<b>Market Conditions</b>	<ul style="list-style-type: none"> <li>• Assessment of availability of goods and services</li> </ul>
<b>Constraints</b>	<ul style="list-style-type: none"> <li>• Consideration of factors which limit buyers options, e.g. budget</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>• For planning purposes, what factors are considered true, real or certain</li> </ul>



## Procurement Planning

Contract Type Selection



### What are the techniques employed in Procurement Planning ?

- Make-or-buy analysis
  - Expert Judgement
  - Contract type selection
- Make-or-buy Analysis**
- A technique used to determine whether a required goods of service can ne procured internally or externally.
- Expert Judgement**
- The use of Subject Matter Experts in the contracting and procurement and Industry groups.
- Contract Type Selection**
- The type of contracts utilized will be based on the goods or services to be procured



## Examples of Contract Types

**Lump sum:**  
Pays a fixed amount to the contractor(s) for the scope

**Mixed strategy:**  
e.g.. Using reimbursable for engineering work and lump sum for construction

**Reimbursable:**  
Pays agreed-to rate for contractor's labor, materials, etc

**Unit Rate:**  
Pays a fixed amount for a unit of work e.g.. \$/ton, \$/foot etc.

**Day work:**  
Contract labor assigned with scope of work and direction provided by company.

**Cost-plus-fixed-fee:**  
Reimburse contractor for actual cost of labor and material plus a fixed fee

**Incentive based:**  
Incentives may be used for any kind of contract



## Procurement Planning Deliverables



- A Procurement Plan
  - This document describes how the procurement process will be managed. The document answers these questions:
    - What type of contracts will be used?
    - Will independent estimates will be used?
    - How will multiple contractors be used?
    - How will scheduling and performance reporting be done?



## Procurement Planning Deliverables



- ✓ A Statement of Work
  - This document describes the procurement items in great detail to allow suppliers and contractors to determine if they are capable of delivering the goods or service
  - The document will be revised at various stages of the contracting process
  - The document should be clear, concise and complete
  - The document should include all requirements



## Solicitation Planning



### What is it?

- Requesting information from suppliers and contractors on how project needs can be met.
- There is no cost to the project during this process.

### What is needed for proper Solicitation Planning?

- Procurement documents
- Qualified sellers lists





## Solicitation Planning



### What are the techniques Employed in Solicitation Planning

- Bidders Conference
- Advertising



#### Bidders Conference

A meeting between perspective suppliers and contractors prior to bid preparation of bid proposals. This process ensures that all participants have a clear understanding of the procurement needs

#### Advertising

This is used to expand the list of potential suppliers and contractors






## Solicitation Planning Deliverables



- ✓ Proposals  
These are documents prepared by the suppliers & contractors which describe their capabilities and willingness to provide the requested service






## Source Selection

**What is it?**

- The receipt of bids or proposals
- Application of the evaluation criteria to select a supplier or contractor

**What is needed for proper Source Selection?**

- Proposals
- Evaluation criteria
- Organisational policies

## Source Selection

**What are the techniques employed in Source Selection?**

**Contract Negotiation**  
Clarification and mutual agreement on the structure, terms and conditions/requirements, prior to the signing of the contract.

**Weighting System**  
Develop a method to assign a numerical figure/weight to each evaluation criteria, to allow for qualitative data assessment.

**Screening System**  
The establishment of minimum requirements of performance for one or more evaluation criteria.

**Independent estimates**  
To obtain a second opinion on estimates for comparison



## Source Selection Deliverables



### ➤ **Contract**

A mutually binding agreement between the organisation and the Supplier/contractor.



## Contract Administration



### **What is it?**

- Ensuring the supplier/contractor's performance meets the contractual requirements
- Application of appropriate project management processes to the contractual relationship
- Coordination of financial management component, i.e. payment terms

### **What is needed for proper Contract Administration?**

- Contract
- Work Results
- Change Request
- Sellers Invoice



## Contract Administration

### What are the techniques employed in Contract Administration


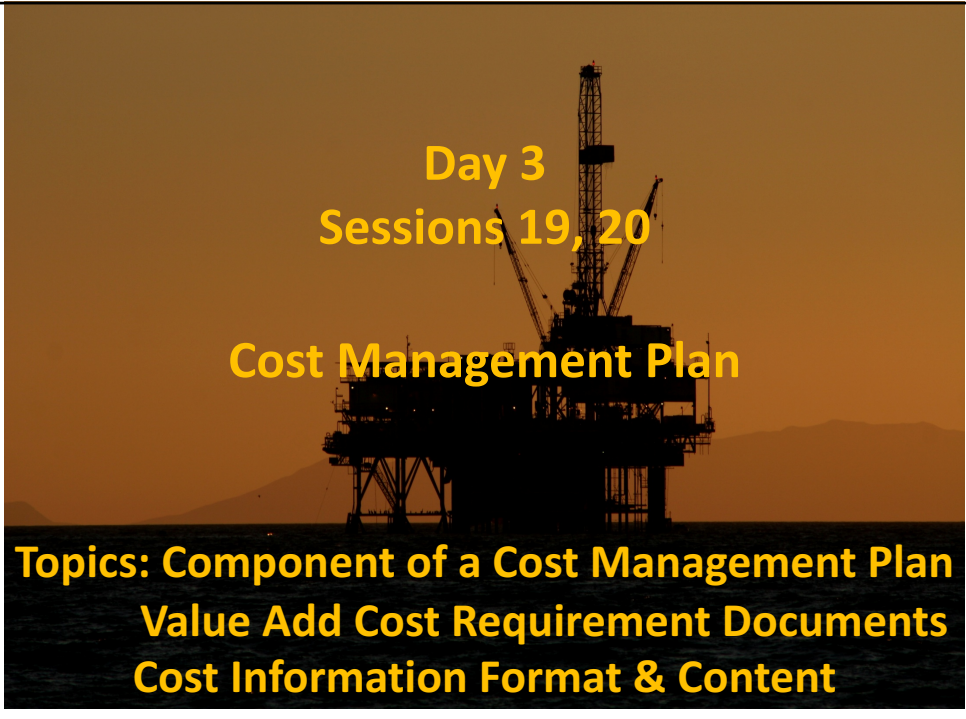
- Contract change control system
- Performance Reporting
- Payment System



## Contract Administration Deliverables

- **Correspondence**  
Written documentation of communications e.g. Warning, unsatisfactory performance etc.
- **Contract Change**  
Approved changes are fed through the appropriate channels
- **Payment Request**  
Payment of invoices







**Day 3**  
**Sessions 19, 20**

**Cost Management Plan**

**Topics: Component of a Cost Management Plan**  
**Value Add Cost Requirement Documents**  
**Cost Information Format & Content**



**What is a Cost Management Plan**

- A Cost Management Plan:
  - documents the processes involved in managing a project’s financial resource throughout the project’s Life Cycle.
  - Tracks costs for all resource types needed to deliver the project
  - Sets the format and standards by which the project costs are measured, reported and controlled



## What is does a Cost Management Plan Entail

- Establishment of the the management activities required to ensure that project activities can be completed with the defined budget.
- An outline of the overall project cost management approach.
- Description of how the project budget and source of funding were determined.
- Identification of the key persons responsible for managing costs on the project, including who has the authority to approve changes to the project.
- Identification of the methods to be used for measuring and reporting cost performance.
- Identification of the reporting format to be used.



## Components of a Cost Management Plan

- Cost Management processes and their associated tools and techniques along with the following components are documented in CMP:
  - Units of measure: Needed to measure project in terms of time, cost, labour, etc.
  - Level of precision: The degree to which activity costs will be rounded up or down.
  - Level of accuracy: The acceptable range example, (+5% to -5%) used in determining realistic activity cost estimates.
  - Amount for contingencies: Amount kept for any emergency situations.
  - Rules of performance measurements
  - Reporting formats



## Cost Management Plan key documents

- Estimating Plan
- Budgeting Plan
- AFE Plan
- Resourcing Plan
- Cost Control Plan
- Change Control Plan
- Reporting Plan
- Coding Dictionary
- Risk Management Plan
- Approval & Authorization Plans
- Contracting Plan
- Project Governance Documents

- Cost Review Plan
- Delegation of Authority (DoA)
- Forex Plan
- UAP Plan
- Project Calendar
- Project's Cost Management Procedure
- Contractor Report
- Project Team RACI (Responsible, Accountable, Consult, Inform)



## Key Project Staff for Validation

- Project General Manager
- Budget Accountable Manager
- Cost Engineer
- Planning Engineer
- Finance Advisor
- Contracts Manager
- Estimator



## Key Baseline Documents



- Basis of Design
- Budget
- AFE
- Original Control Budget
- Level 1 Schedule

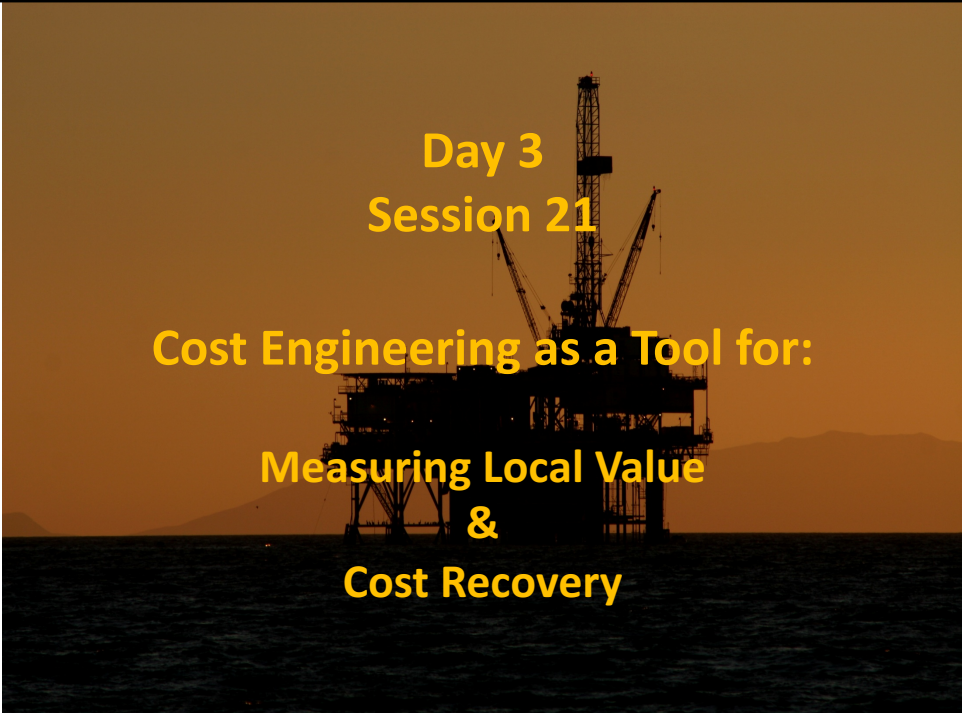


## What are Value Added Cost Requirement Documents




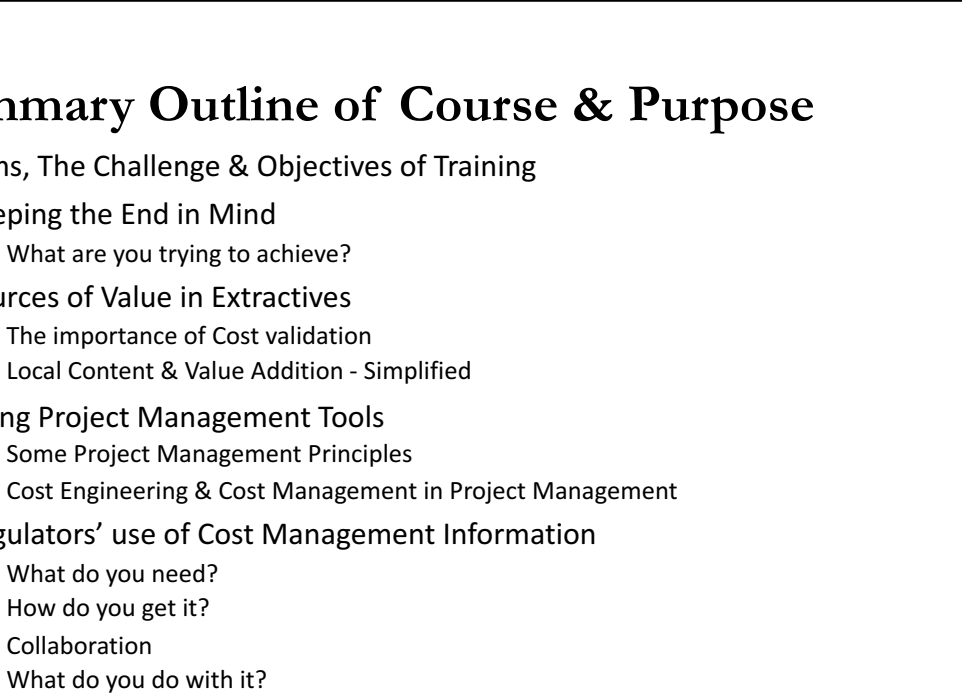
- Value Added Cost Requirement documents refer to those documents/statements identified in the PSC /PSA/PA Accounting Guide as required for assessing/validating project cost recovery.
  - Cash Call Statements
  - Production Statement
  - Value of Production Statement
  - Allowable Cost Statement
  - Statement of Expenditure and Receipts
    - Exploration Expenditure
    - Development Expenditure
    - Production Expenditure
    - Service Cost Expenditure
    - General and Administrative expenditure
  - Final End-of-Year Statement
  - Budget Statement
  - Project Long Term Plan and Forecast






**Day 3**  
**Session 21**

**Cost Engineering as a Tool for:**  
**Measuring Local Value**  
**&**  
**Cost Recovery**

**Summary Outline of Course & Purpose**

- Aims, The Challenge & Objectives of Training
- Keeping the End in Mind
  - What are you trying to achieve?
- Sources of Value in Extractives
  - The importance of Cost validation
  - Local Content & Value Addition - Simplified
- Using Project Management Tools
  - Some Project Management Principles
  - Cost Engineering & Cost Management in Project Management
- Regulators' use of Cost Management Information
  - What do you need?
  - How do you get it?
  - Collaboration
  - What do you do with it?





## Aims & Challenges

### Aims:

1. How to validate costs claimed by operators
2. How to predict revenues?
3. How to monitor value retained in the local economy, via local content

### Challenges:

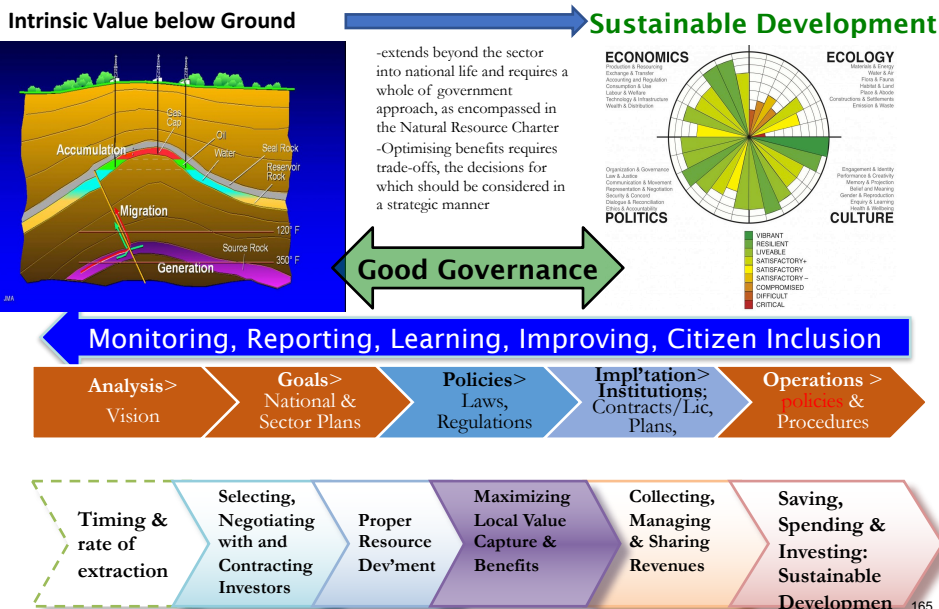
- Goods or services involved are unique to the sectors
  - Government agencies unfamiliar with the level of costs
  - Variability of costs involved in the sector
- How to validate claims against capital and operating activities
  - lack of comparative data to ascertain market prices and value for money
- Government accounting/audit procedures may lack guidelines for assurance for decision making on expenditure
- Operating companies follow robust, well established project management procedures which enable internal
  - cost benchmarking / estimation/ prediction > Cost build-up,
  - Cost scheduling, tracking,
  - validation
  - accountability for procurement decisions made, costs expended and value received.



## Objectives of Training

1. Overview of Project Management Systems and Controls employed by IOCs
  - how they are integrated to monitor, control, predict and report on project costs
2. Overview of Cost Engineering processes, tools and behaviors used to track expenditure, validate claims and value for money:
  - To understand Cost Management, including decision procedures, information flows and documentation/evidence
    - Benchmarking & Estimating > Budgeting > Delegations of Authority > Authority For Expenditure (AFEs) > Purchase Orders > Invoicing > VOWD certification > Close-out & reconciliation
  - To understand how processes can be utilised to validate the Cost Recovery Claims:
    - By getting access, in a timely manner, along the project life cycle
  - To understand how operators manage costs and cash flows for Project activities including cash flows to local providers
    - To enable measurement of value retained through local content.
3. Roles, responsibilities and importance of Cost Engineering to the Project Management Team;
4. Interfacing of the key department responsible for Cost Control - relationship of Cost Engineering Team with Project Management, Accounting & Finance Teams

# Converting Extractives to Sustainable Development



## Increasing Value from Extractives

– Local content & Cost Control important factors



1. **Operations:**
  - a. Extracting more of the resource commercially
  - b. Improving operational efficiency & reducing costs
  - c. Increasing participation and value addition by locals
  - d. Getting a higher price
2. **Fiscal & Monetary Policies:**
  - a. Increasing in-country activities and investments
  - b. Improving revenue collection
  - c. Increasing taxes
3. **Adding Value to Raw Materials:**
  - a. Local content and equity participation
  - b. Mid- & Downstream in-country activities
  - c. Multiplier effect and cross-sector impacts of operations
4. **Good Governance:**
  - a. Policies, legislation, strategies, contracts, etc.
  - b. Institutional capacity & administrative efficiency
  - c. Reducing risk or the perception of risk
5. **Multiplier Effect in the Economy:**



## Definitions - Local Content

- **Local Content** is the sum of the **inputs of local goods and services**, including employment, provided in oil and gas operations.
  - This only occurs when operators hire **locals as employees or contractors**.
  - Local content therefore is the **outcome of companies' hiring and procurement activities**.
  
- **Local** pertains to:
  - In the case of **individuals**, "local" relates to **Nationals** (citizens and legal residents);
  - In the case of **companies**, "local" refers to companies **beneficially majority owned** by nationals. Beneficial ownership is defined in terms of the person(s) who **ultimately benefits from the proceeds** of the company

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## Definitions - Local Content

- Local content is only possible when locals (individuals and firms) are able to **provide goods and services, including employment**, to the industry.
  - Any policy should address **giving locals a fair (or advantageous) chance** at providing goods, services and becoming employees.
  - For countries new to oil and gas, the indigenous capacity will be limited, so **increasing local content will require enhancing the ability of locals to participate (Capacity Development)**

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## Value Addition

- Two types of Value Addition sought

### 1. Beneficiation –

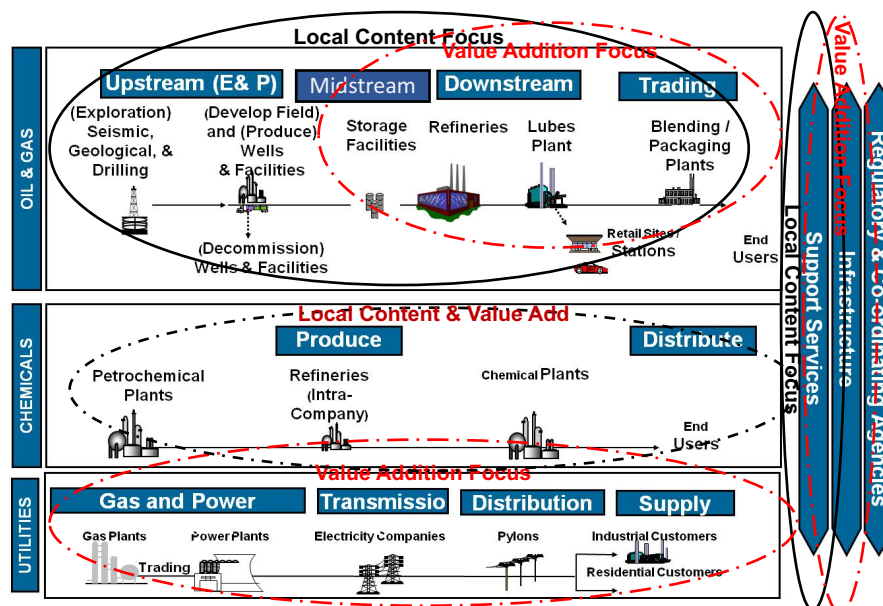
- **mid- and downstream** activities involved in converting raw materials into final usable products and delivering them to users.
- Doing this **in country**, is referred to as **Local Value-Add**

### 2. Knowledge & Technology Transfer -

- **Foreign to Local:** Building and enhancing capacity in people, companies, government or other services, utilities, institutions, infrastructure or facilities to support the oil and gas sector
- **Petroleum Sector to other Sectors to:**
  - enhance the **productivity of other economic sectors,**
  - **improve national competitiveness,**
  - **reduce imports and**
  - **generate export opportunities.**

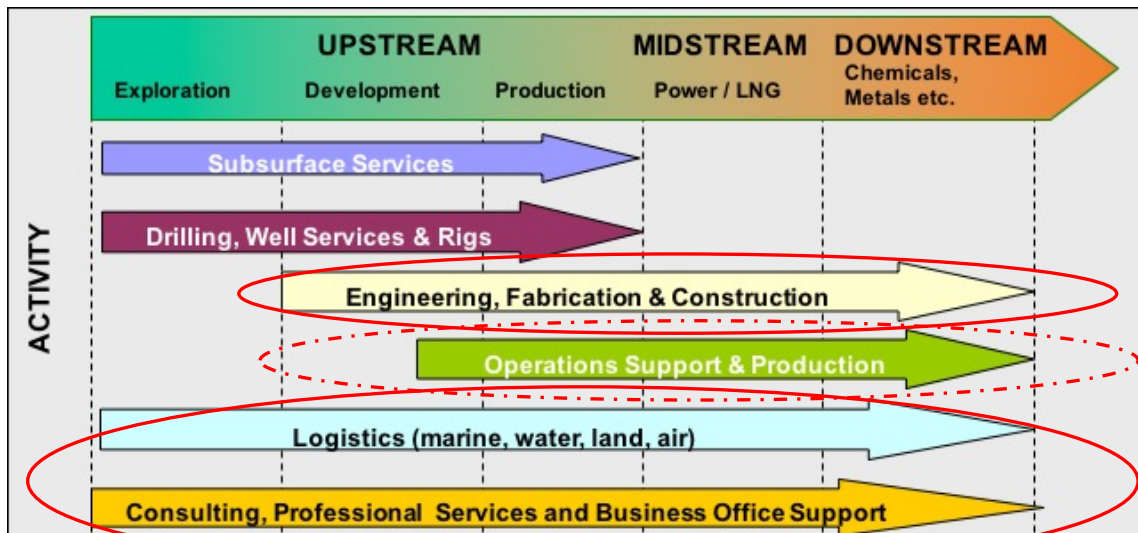
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## Oil & Gas Activities - The “Full” Value Chain



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## Major Upstream Third Party Service sub-sectors - Some Services enable transfer to other sub-sectors and industries



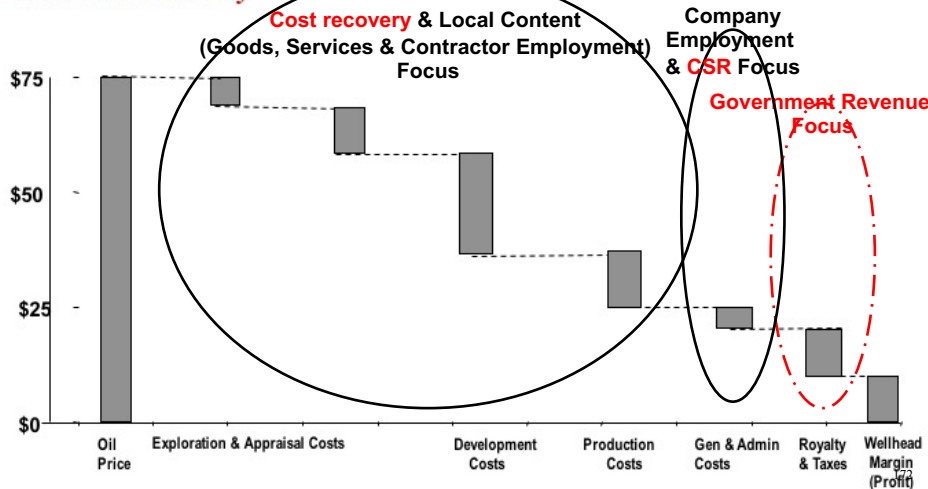
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## Exploration & Production - Where is the value?



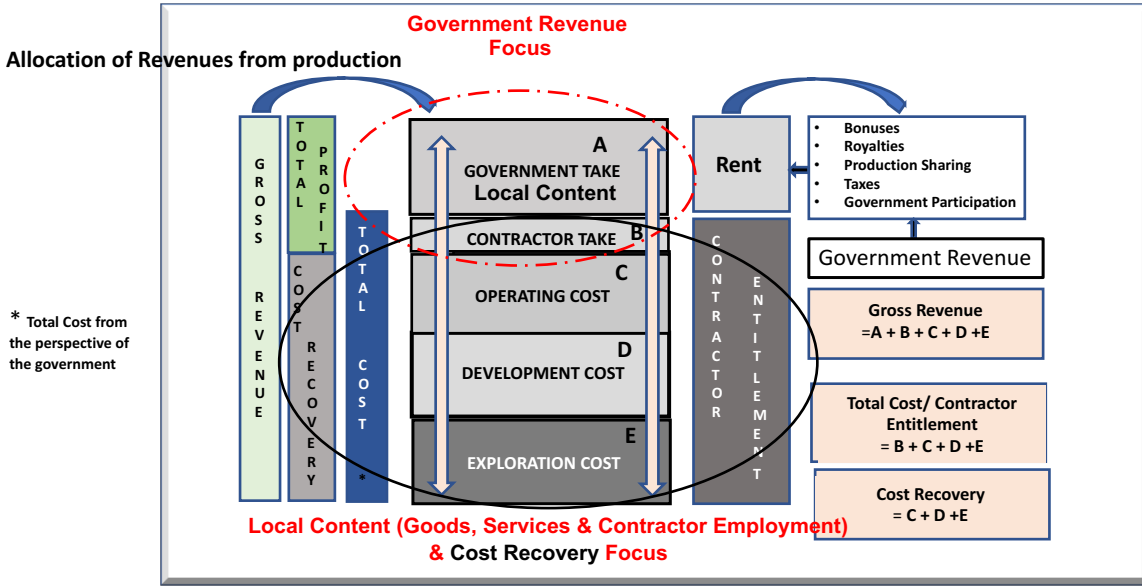
There is much more value potentially available to a country, other than taxes, especially in the cost side of the equation. **Up to 80% of Upstream spend is on 3<sup>rd</sup> Party Goods and Services**

*Illustrative costs only*

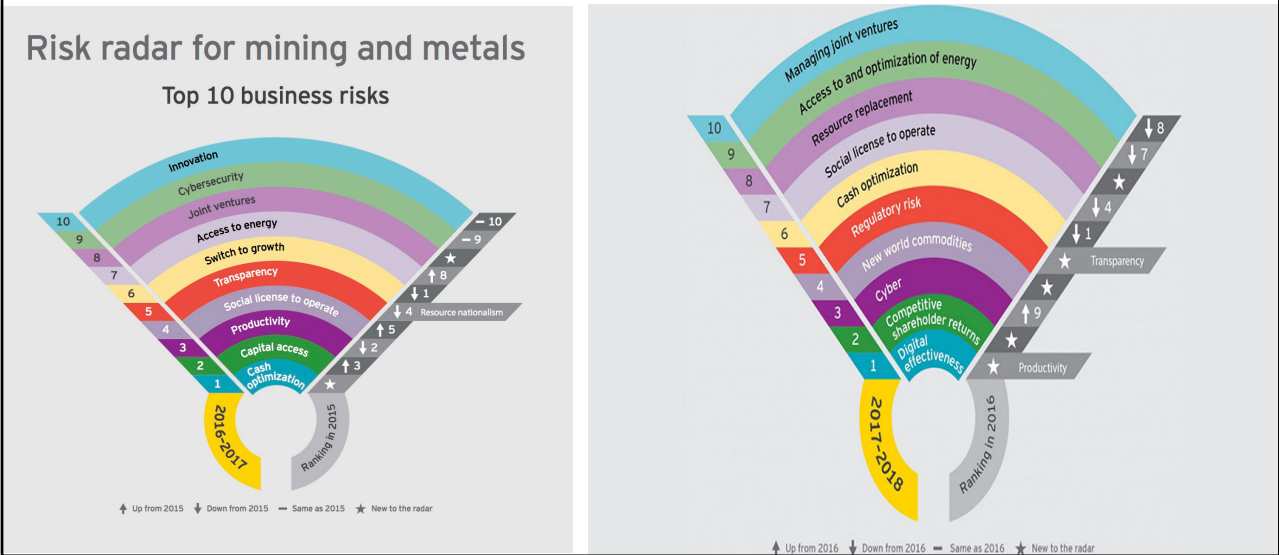




## Exploration & Production - Where is the value? - Ghana Production Sharing Agreement



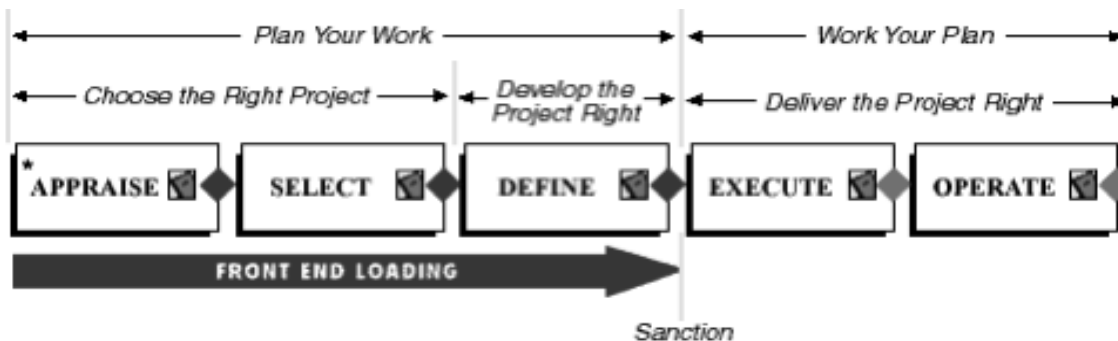
## Social Licence to Operate continues to be an important business risk and factor in valuing extractives companies







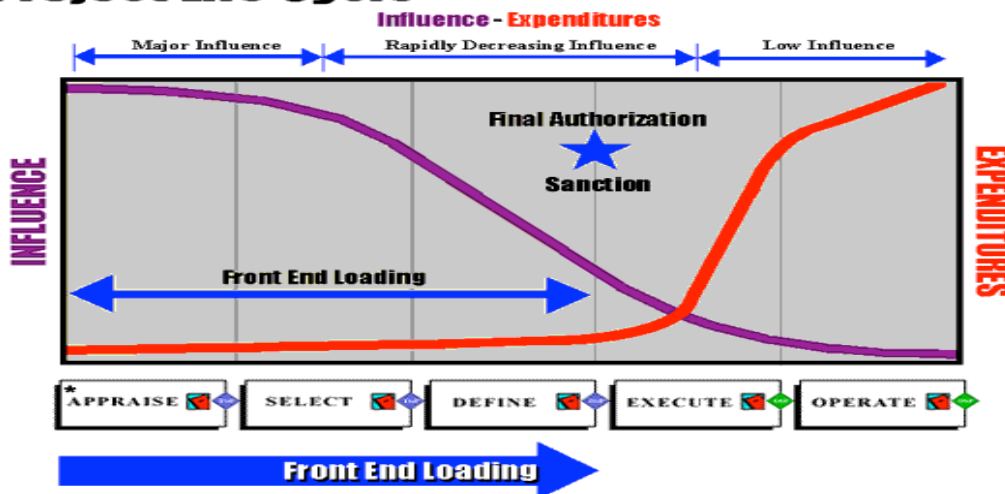
## Managing Costs & Local Content in the Project Cycle



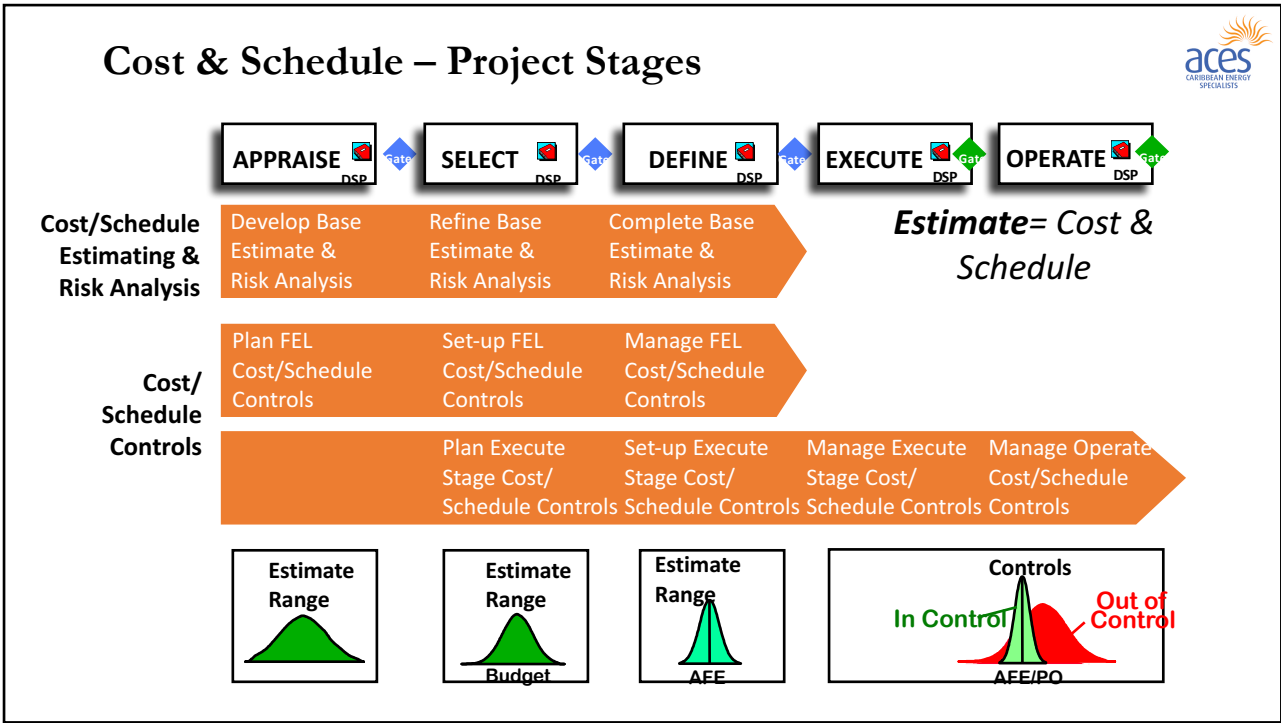
## Managing Costs & Local Content in the Project Cycle



### Project Life Cycle







- ## Breakdown Structures
- Breakdown structures are commonly used in Project Management
  - The key structures used in Project Management are:
    - WBS – Work Breakdown Structure
    - OBS – Organisational Breakdown Structure
    - RBS – Resource Breakdown Structure
    - CBS – Cost Breakdown Structure

# Work Breakdown Structure



A work breakdown structure (WBS) is a framework containing the basic building blocks for defining the work to be performed on a project.

The basic building blocks in the WBS are called work elements or WBS elements -- they represent logical and manageable groups or compartments to structure cost and schedule information.

A well-designed WBS allows the project participants to analyze and report the project's cost, schedule and financial status from various perspectives, such as by control area, by contract, by system, by responsibilities, etc.

The hierarchical and organized framework of the WBS enables an "apples to apples" comparison of project data for:

- Cost Estimating
- Planning & Scheduling
- Capturing Cost/Schedule Data
- Cost/Schedule Controls, Analysis, Forecasting & Reporting
  - Progress Evaluation
  - Productivity Analysis
- Integration of Cost & Schedule Information
- Project Data Feedback and Final Analysis
- Cost Accounting – allows for cost codes to be allocated at lowest level, enabling tracking by any category required, including source, so Local Content can be measured.

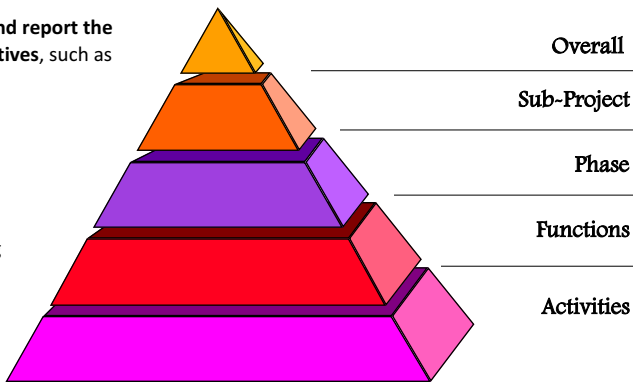


Illustration of WBS as Pyramid of Information

# Cost Breakdown Inputs (examples f levels of detail)

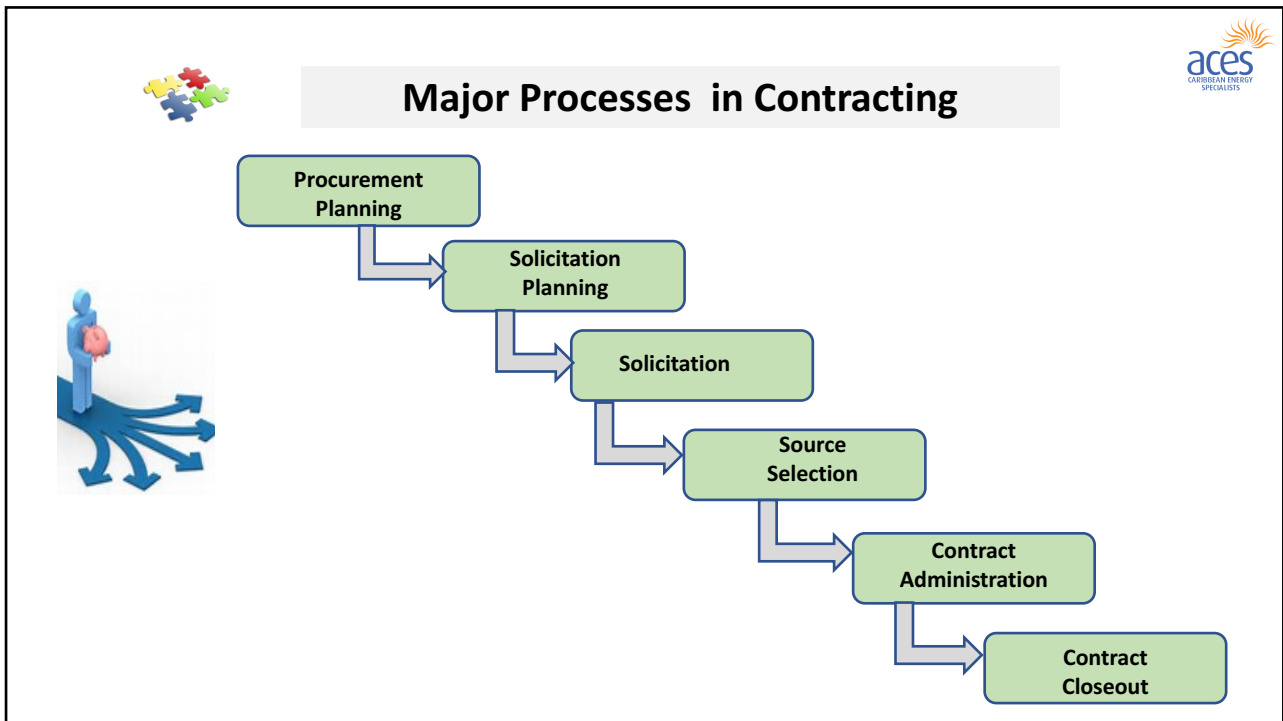
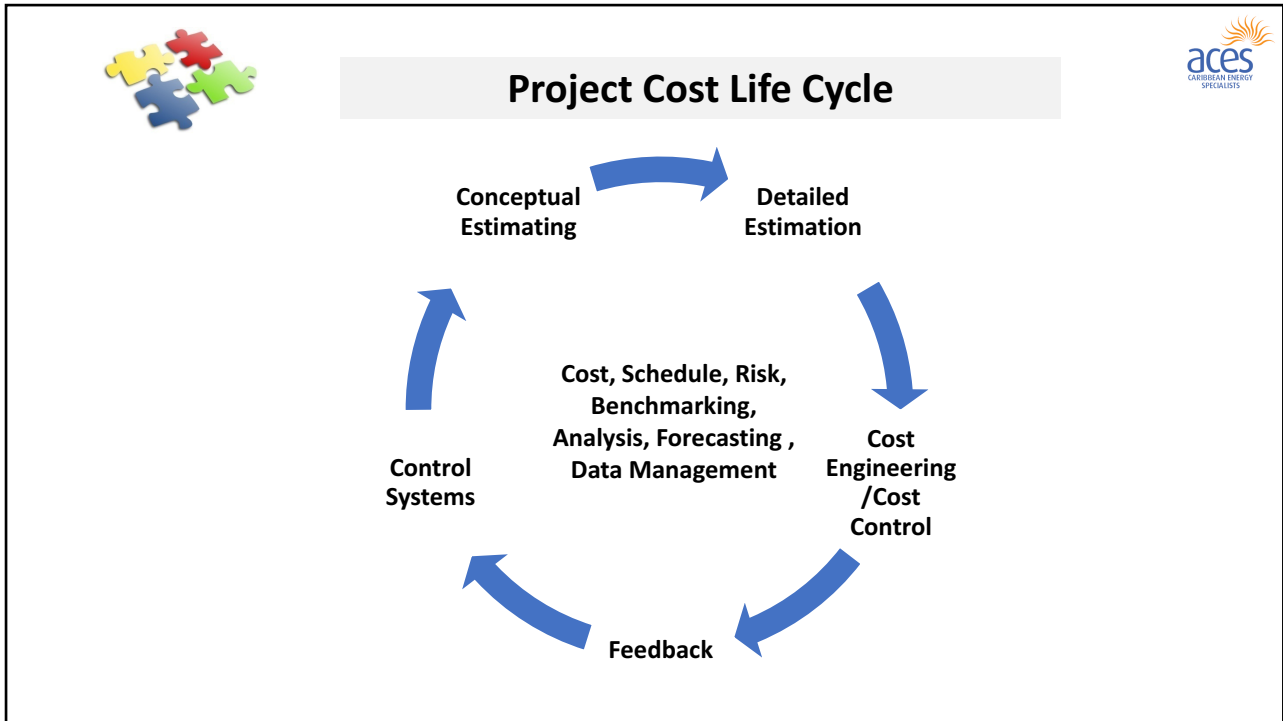


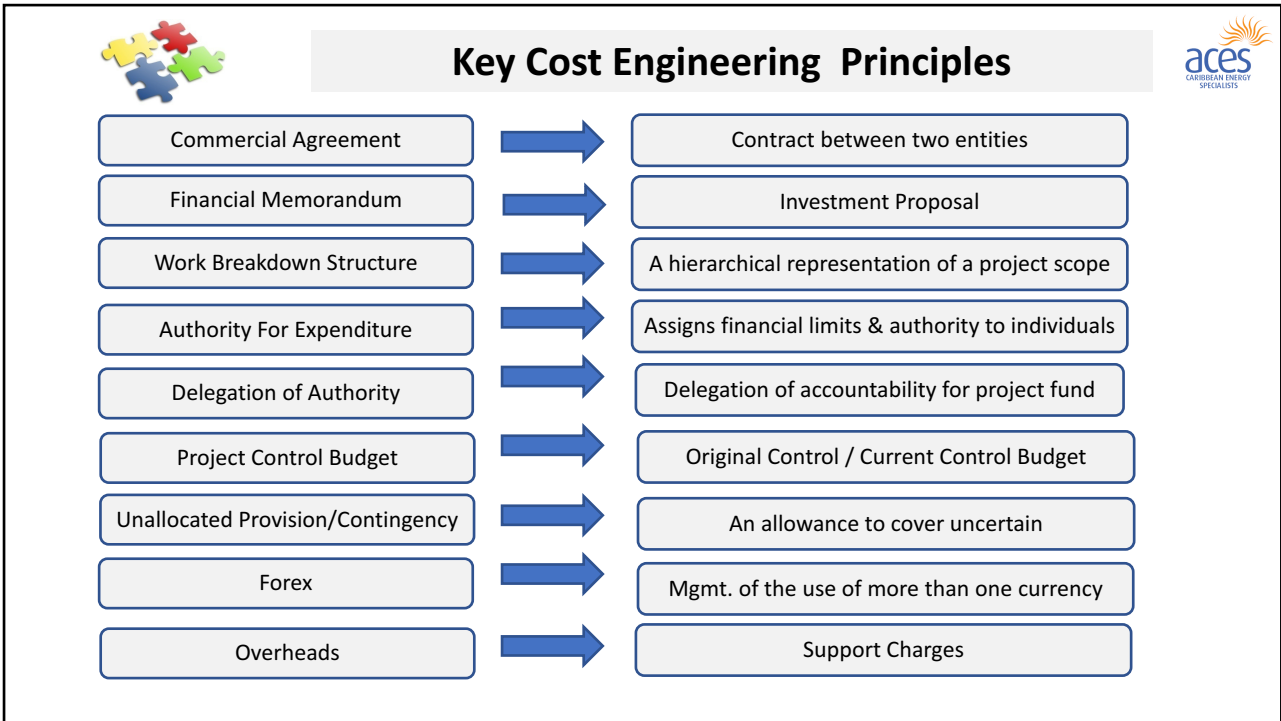
**COST AND RESOURCE DATA COLLECTION FORM**  
PAGE 1 - Enter ALL Project Costs (includes capital and expense)

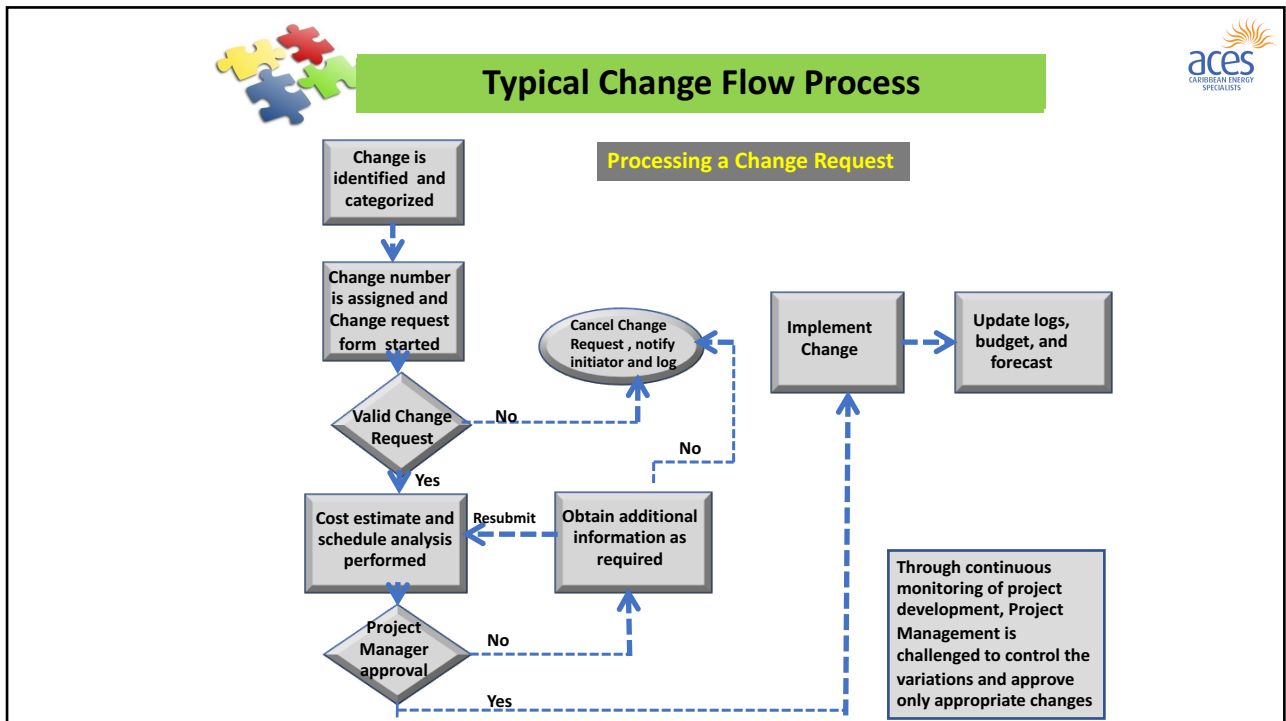
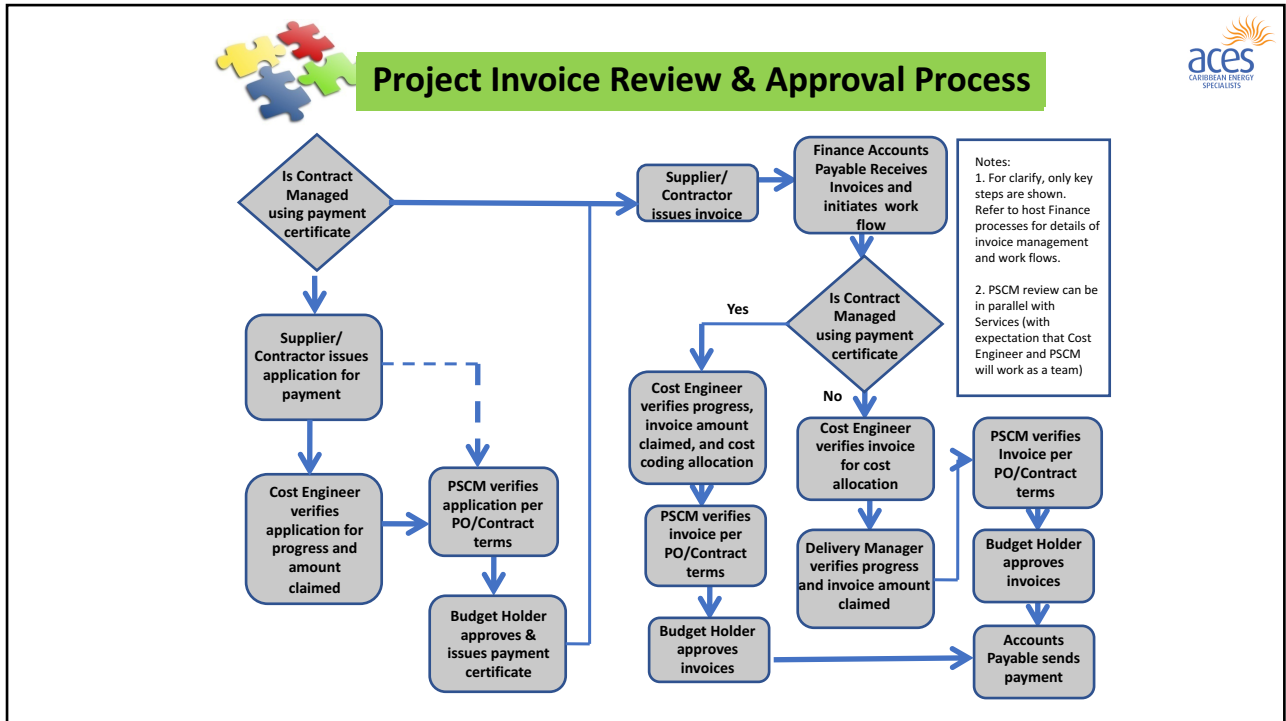
Enter Project Name>>: \_\_\_\_\_

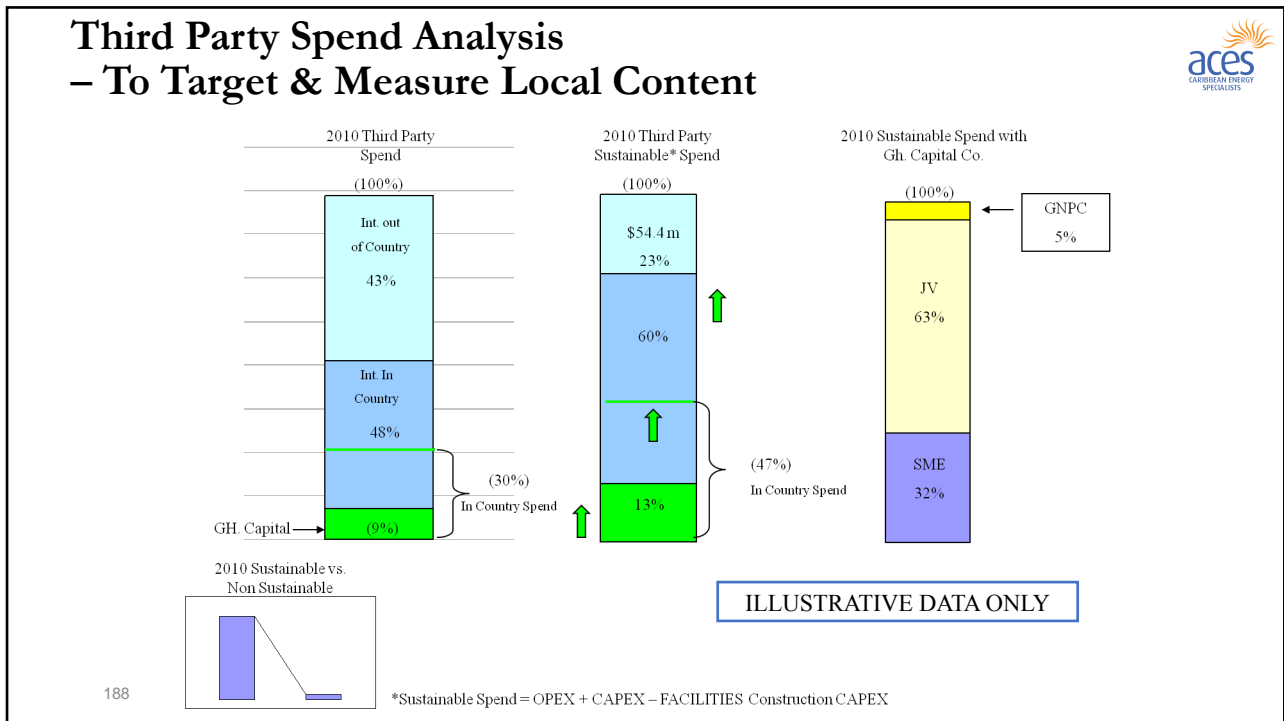
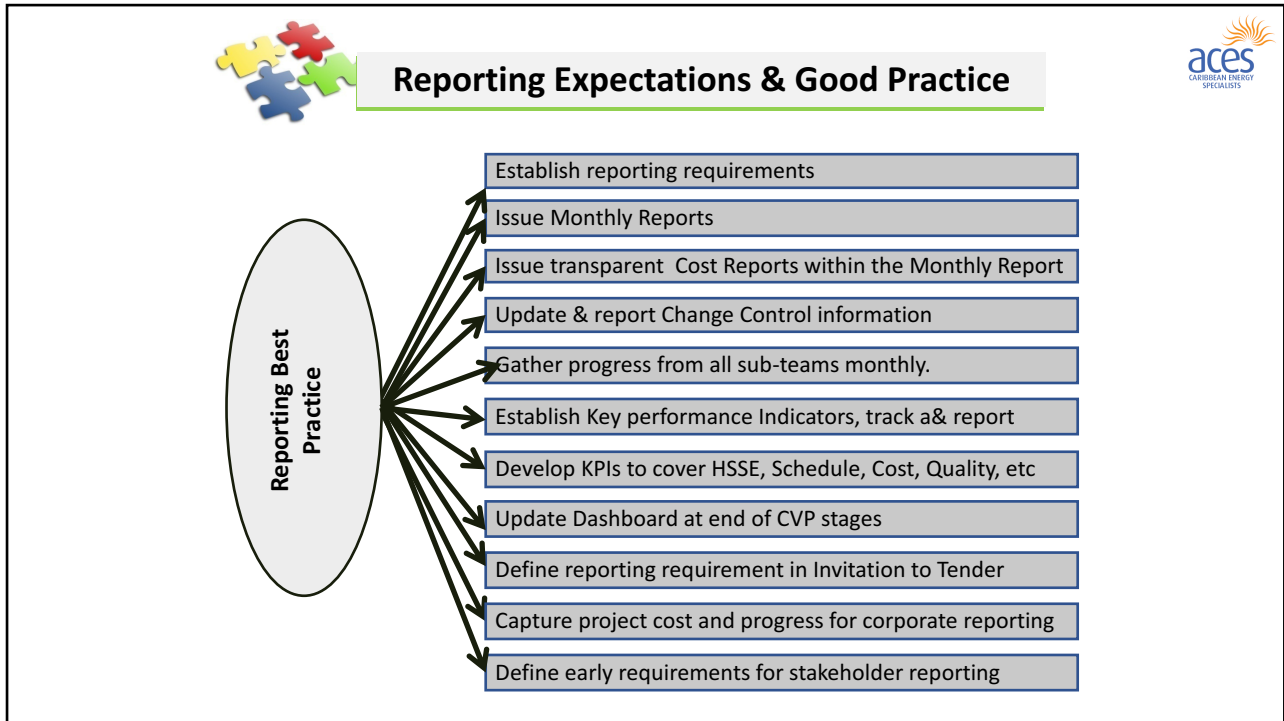
Enter Currency Used: \_\_\_\_\_

COST ITEM	HOURS	OWNER COSTS			CONTRACTOR COSTS			
		in Lab	Material	Total	in Lab	Material	Total	
<b>1 PROJECT MANAGEMENT</b>								
1	Project & Eng. Management			\$0.000			\$0.000	
2	Cost/Sched/Est/Acctng/Clerical			\$0.000			\$0.000	
3	Procurement/Contracts			\$0.000			\$0.000	
4	Misc Proj. Mgmt. Services/Expenses			\$0.000			\$0.000	
<b>TOTAL PROJECT MANAGEM</b>		0	\$0.000	\$0.000	\$0.000	0	\$0.000	\$0.000
<b>2 ENGINEERING</b>								
1	Civil			\$0.000			\$0.000	
2	Structural			\$0.000			\$0.000	
3	Architectural			\$0.000			\$0.000	
4	Piping			\$0.000			\$0.000	
5	Mechanical			\$0.000			\$0.000	
6	Process - Machine			\$0.000			\$0.000	
7	Process - Chemical			\$0.000			\$0.000	
8	Electrical			\$0.000			\$0.000	
9	Process Control/Instrumentation			\$0.000			\$0.000	
10	Misc Eng. Services/Expenses			\$0.000			\$0.000	
<b>TOTAL ENGINEERING</b>		0	\$0.000	\$0.000	\$0.000	0	\$0.000	\$0.000
<b>3 CONSTRUCTION INDIRECTS</b>								
1	Construction Mgmt (incl CM fee)			\$0.000			\$0.000	
2	Constr. Eqmt (not provided by subs)			\$0.000			\$0.000	
3	Temp. Facilities/Services/Utilities			\$0.000			\$0.000	
<b>TOTAL CONSTR. INDIRECTS</b>		0	\$0.000	\$0.000	\$0.000	0	\$0.000	\$0.000











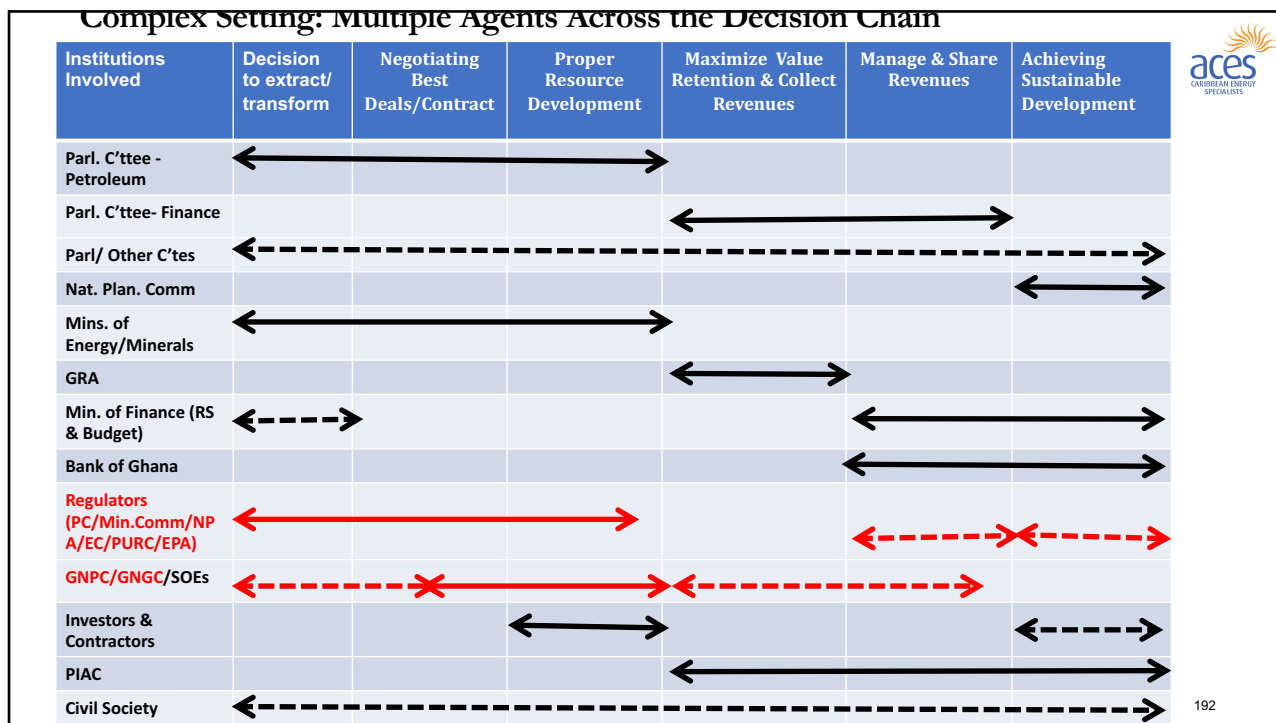
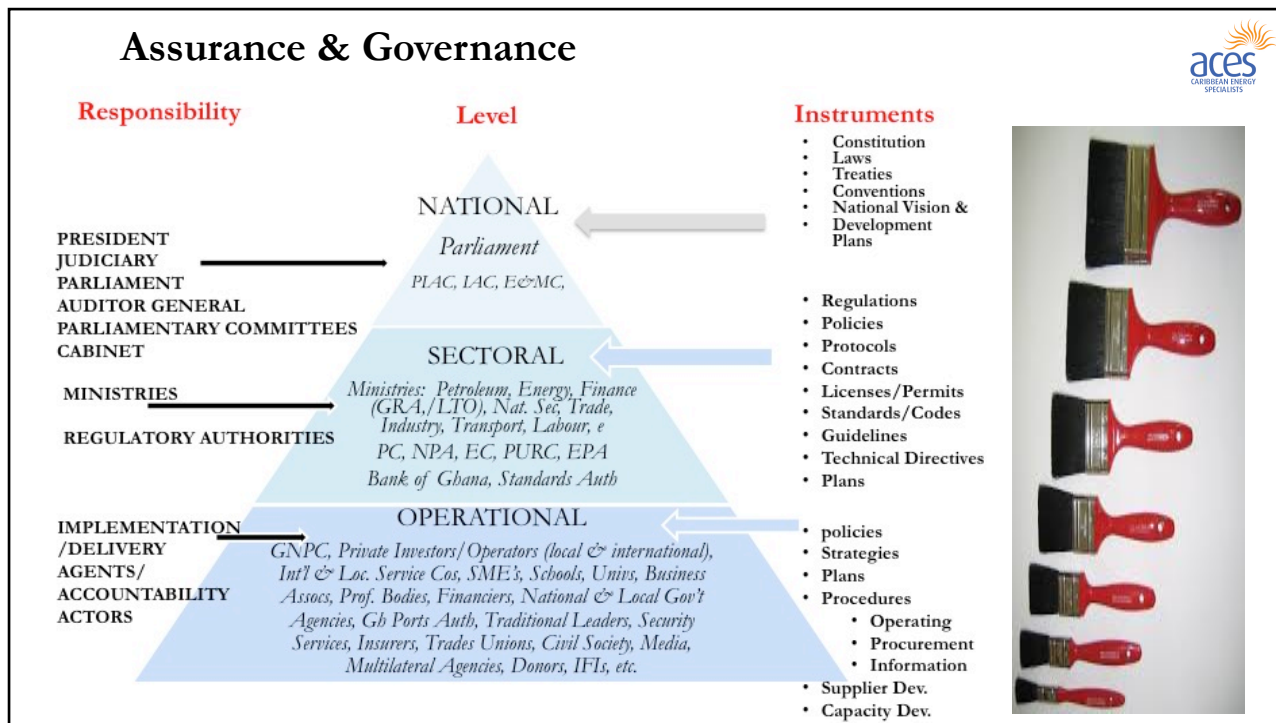
## Governance –Key Governance Documents

- Partner decision making processes are identified
- Procedures are developed for Partner-operated JV Operations annual budgets
- Procedures are developed for release of funds
- Estimates are developed in accordance with guidelines
- All estimates are develop based on benchmarks
- Level 1 schedules covering the entire project are developed
- Level 3 schedule integrating all functions are developed
- A procedure detailing how cost will be managed is developed
- A Change Management Process is developed for the project



## Governance –Key Governance Documents

- Contingency provisions (UAP) developed
- Budget Holders assigned to each element of the estimate
- Estimates tied to WBS
- Cost Estimates are benchmarked internally and externally
- Critical paths are identified in the schedules
- Schedules Risk Reviews
- Foreign Exchange Hedging strategy developed
- Insurance Strategy developed
- Contractor control and reporting systems developed
- Document Management system developed
- Financial control procedure developed to manage expenditure, change orders, and changes to cost estimates and forecast.





## SOPs (Standard Operating Procedures)



The Standard Operating Procedure Document:

- Brings Consistency, transparency, accountability and standards to an organization
- **Enables and supports identification and delegation of individual levels of authority and accountability**
- Records employees' processes:
  - creating a central authoritative reference for all stakeholders to use as a guide;
  - enabling new hires and inexperienced employees to properly function within the organisation.
- Lessens the negative impact of role changes
- Enables organisations to preserve information that employees obtain at the expense of the organisation
  - Institutional knowledge remains
- Shapes and stirs the organisation in an effective path.
- Permits all to understand the processes of the various roles within the organisation and the departments

Anthony E. Paul August 2015



## Cost Management Plan key documents



- Estimating Plan
- Budgeting Plan
- AFE Plan
- Resourcing Plan
- Cost Control Plan
- Change Control Plan
- Reporting Plan
- Coding Dictionary
- Risk Management Plan
- Approval & Authorization Plans
- Contracting Plan
- Project Governance Documents

- Cost Review Plan
- Delegation of Authority (DoA)
- Forex Plan
- UAP Plan
- Project Calendar
- Project's Cost Management Procedure
- Contractor Report
- Project Team RACI (Responsible, Accountable, Consult, Inform)

## What do you need? - Examples

For each Stage in the Project Life Cycle:

- Decision Making Policies & Procedures
  - Flow charts
  - Responsible persons
  - Approval Processes
  - For procurement and cost management chain in project cycle
- Documents generated
  - What?
    - Purpose
    - Contents
  - Where?
  - How to access?
- Procurement decisions & documents/evidence:
  - Budgets
  - Procurement strategy (incl LC)
  - AFE
  - Contracts (plus any changes)
  - Purchase orders & commitments (including change orders)
  - Invoices (to be checked to validate/reconcile with order)
  - Receipts/certifications of VOWD (to validate/reconcile with order)
  - Close out (including insurance payments, refunds, disputes, etc.)

## What you Should do - Examples

- Identify and communicate needs
  - Among yourselves
    - Coordinate data flows (in both directions)
      - Who has access to data/process/documents?
      - Who needs to use it/them?
        - How/Why?
        - What authority do you use to demand it?
- Provide Guidelines, Formats & Templates
  - For standardisation
  - For ease of assimilation/analysis, comparison, etc.
  - Amend contracts, accounting & audit procedures appropriately
- Prioritise
  - On a value basis (is it worth the effort, given your limitations?)
  - Using a risk management approach
    - High risk items: Overheads? Transfer pricing? Under-invoicing?
- As far as possible, re-use industry standard approaches, tools, etc.
  - To reduce the burden on all parties
  - To mitigate avoidance/exceptions/side-stepping
- Be Sure to include Reconciliation and Close-out

## Next Steps: Implementation, Monitoring & Evaluation (examples)

The diagram illustrates a process flow from bottom to top. On the left, a vertical bar labeled 'Implementation' (green) spans the bottom three boxes: 'Inputs', 'Activities', and 'Outputs'. Above it, a vertical bar labeled 'Results' (blue) spans the top two boxes: 'Outcomes/Objectives' and 'Impacts/Goals'. Arrows indicate the upward flow from Inputs to Activities to Outputs, and from Outcomes/Objectives to Impacts/Goals.

- Long-term, widespread **improvement in society; competitive Local firms, increased revenue collection efficiency & reduced leakage**, exporting services
- Systems and procedures implemented and functioning, with continuous improvement; local firms **contracted**, goods and services **delivered**; other sectors **positively impacted**; more **revenues & forex**; improved transparency & accountability, etc.
- **Implementation tools: databases**, strategies, plans, programmes; initiatives, metrics, targets, **timelines**, incentives, **Guidelines, templates, SOPs**, etc.
- **Capacity:** People trained & certified; **procedures established and integrated into accounting & audit procedures, PODs, etc;**
- **Oversight:** enhanced regulatory (capacity, regulations, (internal procedures - operating, accounting, audit, etc.), appropriate terms; infrastructure/facilities - collaboration portal. Protocols, behaviours, etc
- Training, data collection, analysis, planning, drafting, communication/ engagement, etc.
- Financial, human, and material resources

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## Thank You

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