Planning and Scheduling Basics

Define a Project

- A project is a set of activities and their associated information that constitutes a plan for creating a product or service. A project has a start date and finish date, WBS, resource assignments and expenses. It can also include risks, work documents and project-specific codes and calendars.

Characteristics of a Project

- 5 Aspects of a Project
  - Schedule, Resource, Cost, Quality and Risk (HSE)
- For a Project Management Software, It covers
  - Schedule: Timeline (core)
  - Resource: Man, Material, Plant
  - Cost: Money
  - Risk: Identify, classify and quantify
- Life Span of a Project
  - Planning: establish baseline when project starts
  - Controlling: monitoring, updating during project execution
  - Managing: changes, variations and revision
  - Closing Out: Administrative closure, documentation

Define an Activity - In SMART Way

- Specific: scope of work to be clearly defined
- Measurable: able to measure progress (%), resource (MH) and cost ($)
- Achievable: realistic based on current productivity
- Resource Availability: make ready for man, material and plant
- Time-bound: have start and finish date

Procedures to Set up a Project

- Add a project to EPS and assign one of OBS
- Set up project calendar, resource pool, cost account, duration type, percent completion type – Project environment
- Set up project WBS
- Add a list of activities
- Determine activity's duration based on volume of work, production rate and past work experience
- Assign a WBS to activity
- Link activities
- Allocate resources to activity from resource pool
- Allocate cost to activity
- Schedule project, review and establish baseline

When a Project is on the way...

- Record progress, manhour and cost and update plan
- Analyze and report project status using earned value method
- Revise baseline when there are substantial changes and the programme can not reflect the actual construction any more
- Manage changes
- Lean construction (last planner) application

Performance Measurement with Earned Value Method : 3 Parameters

- Planned Value PV (BCWS, Budgeted Cost of Work Schedule): Budget x Schedule completion % (% of original duration, time elapsed)
- Actual Cost AC (ACWP, Actual Cost of Work Performed): Actual cost up to data date
- Earned Value EV (BCWP, Budgeted Cost of Work Performed): Budget x Actual completion % (PCT)

Performance Measurement with Earned Value Method : Measurement Index

- Schedule Variance (SV): SV=EV-PV > 0, ahead of schedule as of statused date
- Cost Variance (CV): CV=EV-AC > 0, spending less than planned as of statused date

Performance Measurement with Earned Value Method : An Example

- Suppose we plan to finish an activity by June 1 with a budget of $10,000 (PV or BCWS). It is now June 1 (data date, or measurement date), and we have spend $9,000 (AC or ACWP), but only 70% (PCT) of the work is complete (EV, or BCWP=$10,000 x 70%=$7,000). We are not only behind schedule (SV=EV-PV=$7,000-$10,000= -$3,000), but over budget (CV=EV-AC=$7,000-$9,000= - $2,000.

Manage Changes

- Record and control budget changes
- Record and track issues
- Define and monitor thresholds
- Manage risks: identify, categorize and prioritize
- Catagorise and track activity-related work products (deliverables) and documents

Lean Construction Concept

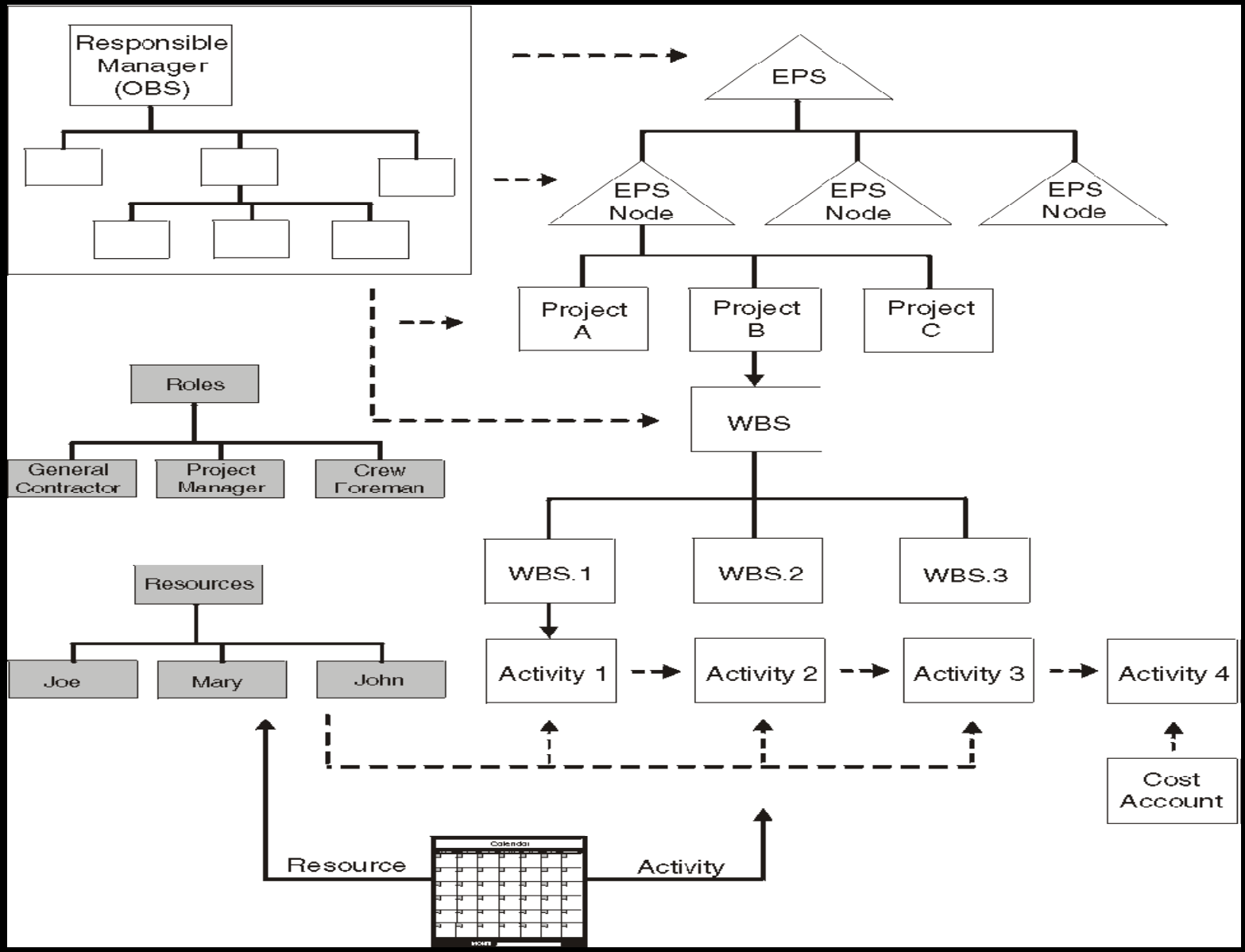
- It is weekly execution plan
- Executed under trade-based production unit
- What Jobs to Execute?
  - Constraints removed, resource sufficient, material on hand, prerequisite work completed, working area available
- Production rate achievable
- Who is the last planner?
  - Design team leader; Production unit head; Area superintendent; Crew foreman
- Job Assignment
  - No overloading. Prefer slightly under-loading to ensure smooth work flow from production unit to production unit.
- What if the plan fail?
  - Find out root reasons. Go alternative work from the backlog (backlog: incomplete make-ready works from previous period)

Master Schedule, 6 weeks Lookahead and Last Planner

	Master Schedule	Lookahead Schedule	Last Planner's Weekly Work Plan
Purpose	Baseline	CPM sequence, match labor & resource	Execution of ready activities
Detail Level	Level 2	Level 3	Level 4
Time Frame	Entire project	6 Weeks	Weekly
Data Date	-	W1 past. Plan for W2 to W6	W1 past. Plan for W2 and W3
Certainty	Low	Middle	High
Constraints	Existing	Inherited from master schedule	Removed

About Primavera Project Management P6

P6 Module Overview



Global (Enterprise, root of EPS) -> EPS -> Project -> WBS -> Activity

P6 Project Management Module: Features

- Centralised database for all project data (data resides on server)
- Layout presentation and grouping based on Work Breakdown Structure (WBS)
- Hierarchal structure on EPS, OBS, projects, activities, resources and costs with codes and values

Before Add a Project, Establish the Environment

- Enterprise Project Structure (EPS)
- Organisation Breakdown Structure (OBS)
- Global Calendars
- Resource pool
- Budget structure
- Coding structure like project code and activity code (for filtering, grouping and data analysis)

EPS and OBS

- Enterprise Project Structure (EPS)
  - Company-wide hierarchical project breakdown Structure
- Organisation Breakdown Structure (OBS)
  - Company-wide hierarchical responsible managers for the projects

EPS and OBS: Work Side by Side

OBS

	PM1	PM2	PM3
PJ1			
PJ2			
PJ3			

EPS

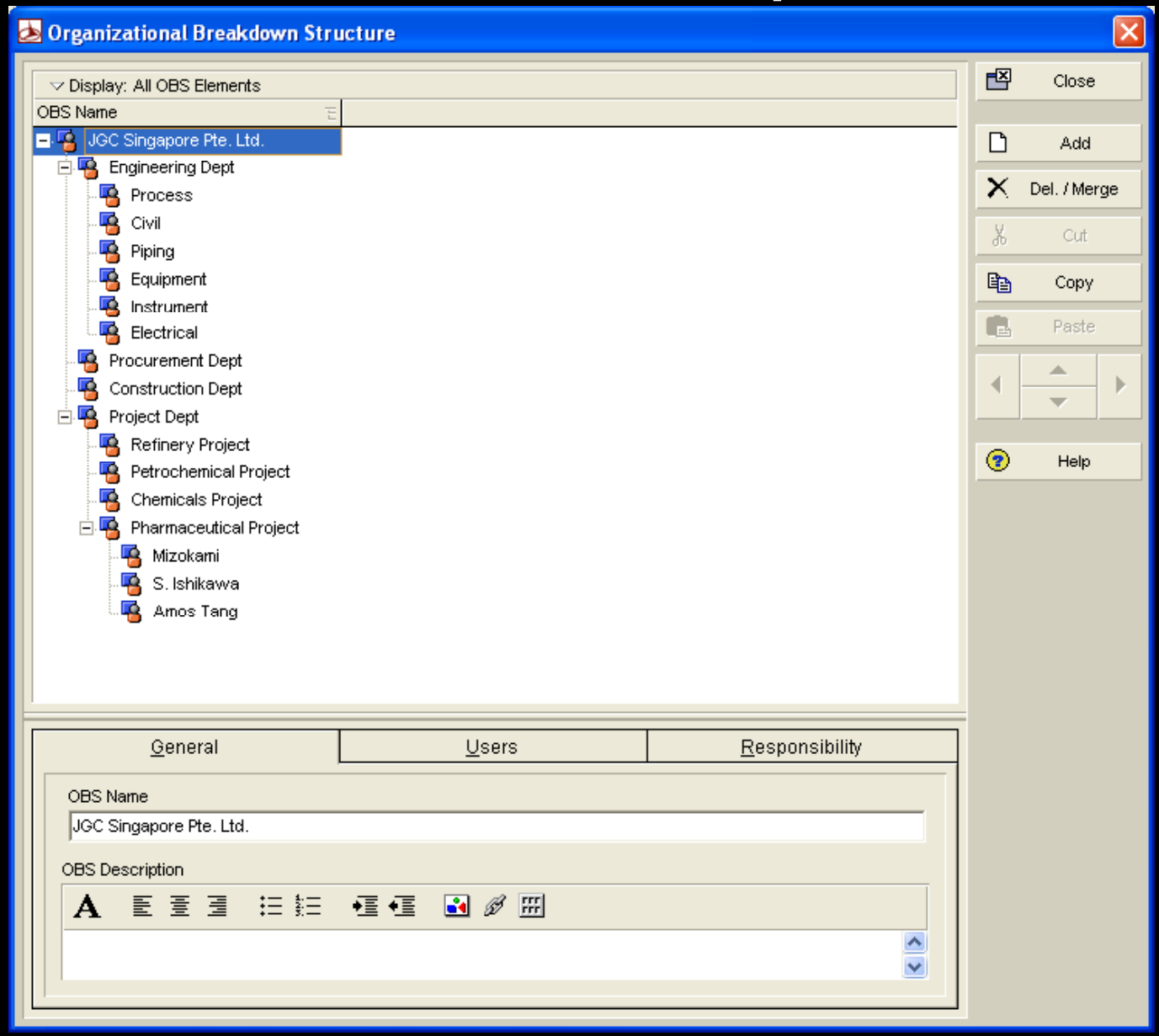
EPS and OBS: An Example

OBS

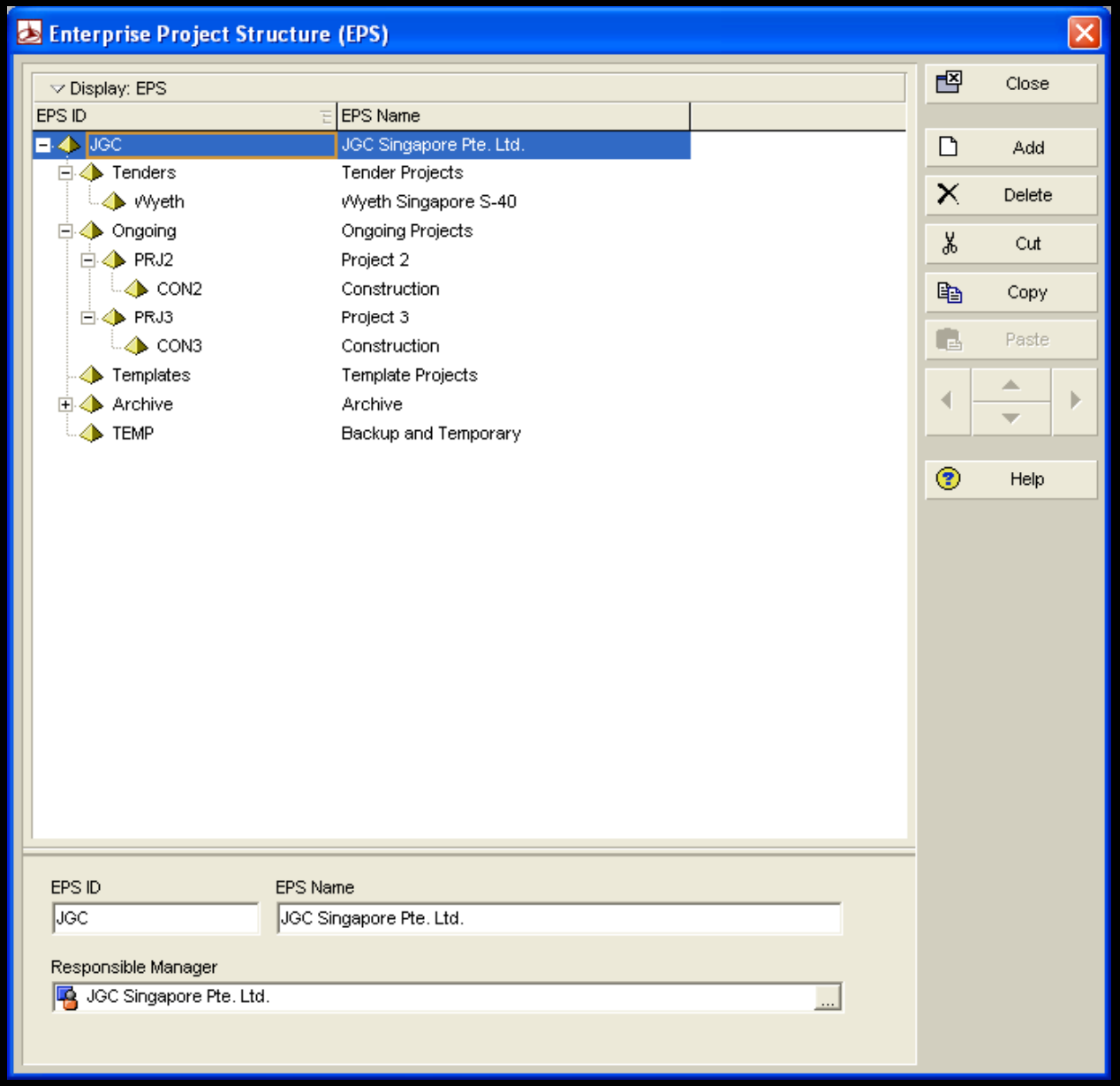
EPS

	Process	Civil	Piping	Equip ment	Instru ment	Electrical	Construc tion
Project A							
Project B							
Project C							
Project D							

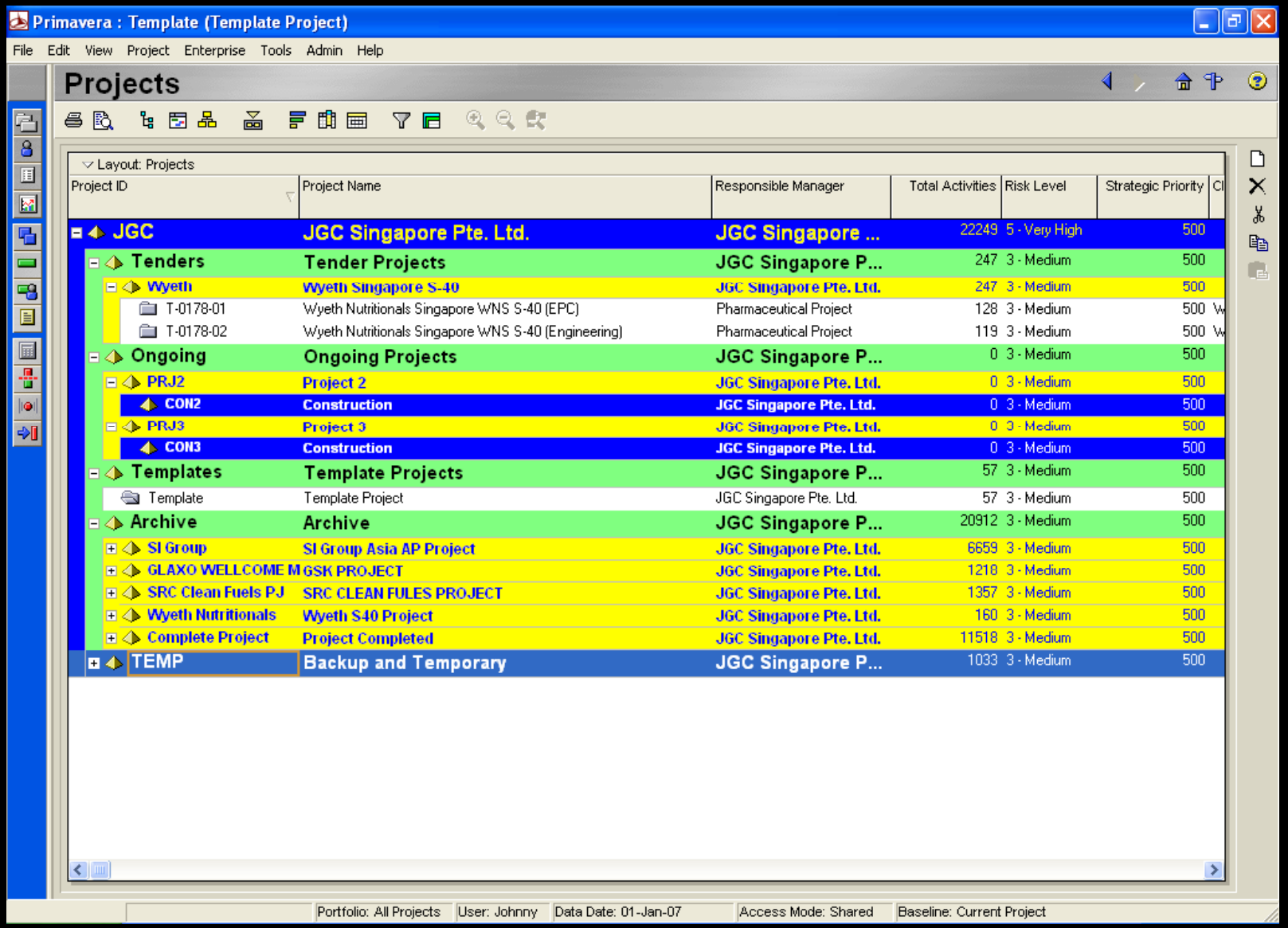
OBS Example


Organizational Breakdown Structure
Display: All OBS Elements
OBS Name
JGC Singapore Pte. Ltd.
Engineering Dept
Process
Civil
Piping
Equipment
Instrument
Electrical
Procurement Dept
Construction Dept
Project Dept
Refinery Project
Petrochemical Project
Chemicals Project
Pharmaceutical Project
Mizokami
S. Ishikawa
Amos Tang
Close
Add
Del. / Merge
Cut
Copy
Paste
Help
General
Users
Responsibility
OBS Name
JGC Singapore Pte. Ltd.
OBS Description

EPS Example


Enterprise Project Structure (EPS)
Display: EPS
EPS ID
EPS Name
JGC
JGC Singapore Pte. Ltd.
Tenders
Tender Projects
Wyeth
Wyeth Singapore S-40
Ongoing
Ongoing Projects
PRJ2
Project 2
CON2
Construction
PRJ3
Project 3
CON3
Construction
Templates
Template Projects
Archive
Archive
TEMP
Backup and Temporary
Close
Add
Delete
Cut
Copy
Paste
Help
EPS ID
JGC
EPS Name
JGC Singapore Pte. Ltd.
Responsible Manager
JGC Singapore Pte. Ltd.

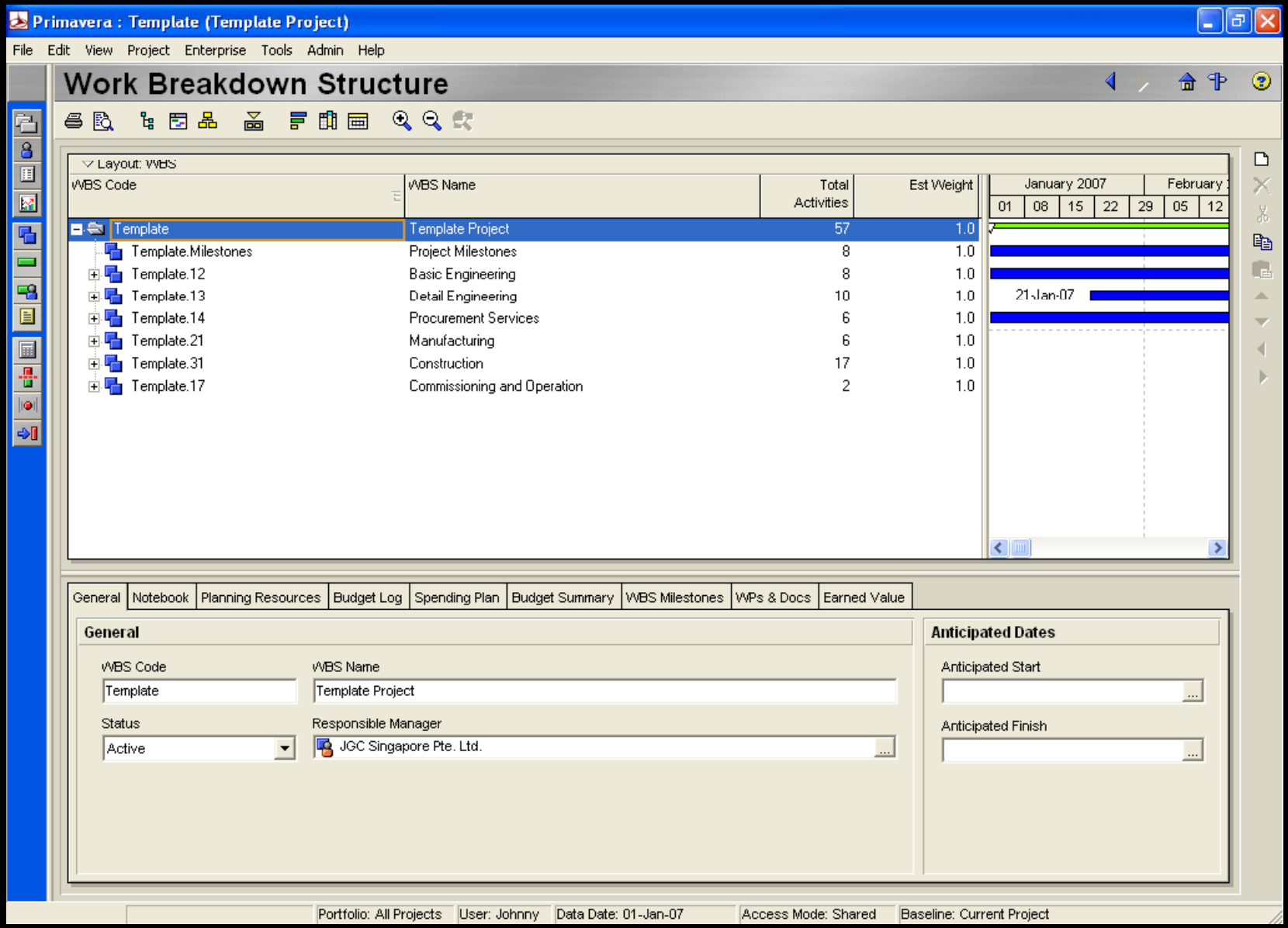
EPS -> Projects Example



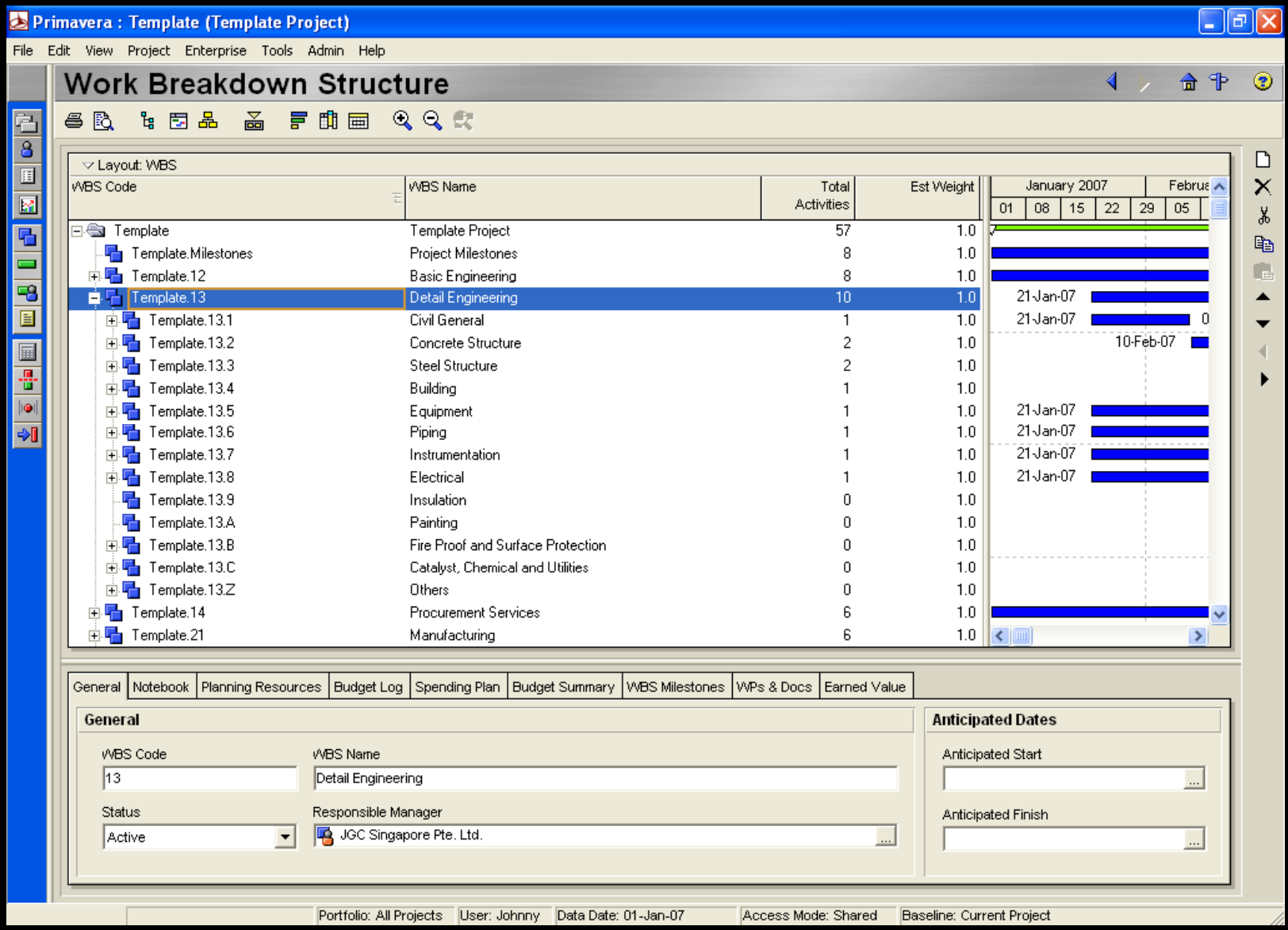
Work Breakdown Structure (WBS)

- Deliverable-oriented hierarchy
- Continuation from EPS, with project the highest level, followed by strings of deliverables and decomposing to the bottom level of work package
- Company-wide standard WBS template Vs. customised project-specific WBS
- Play an essential role in P6. It can be assigned OBS, resource, budget and tracked by earned value for the progress

WBS Example


Primavera : Template (Template Project)
File Edit View Project Enterprise Tools Admin Help
Work Breakdown Structure
Layout: WBS
WBS Code
WBS Name
Total Activities
Est Weight
January 2007
February
01 08 15 22 29 05 12
Template
Template Project
57
1.0
Template.Milestones
Project Milestones
8
1.0
Template.12
Basic Engineering
8
1.0
Template.13
Detail Engineering
10
1.0
21-Jan-07
Template.14
Procurement Services
6
1.0
Template.21
Manufacturing
6
1.0
Template.31
Construction
17
1.0
Template.17
Commissioning and Operation
2
1.0
General
Notebook
Planning Resources
Budget Log
Spending Plan
Budget Summary
WBS Milestones
WPs & Docs
Earned Value
General
WBS Code
Template
WBS Name
Template Project
Status
Active
Responsible Manager
JGC Singapore Pte. Ltd.
Anticipated Dates
Anticipated Start
Anticipated Finish
Portfolio: All Projects
User: Johnny
Data Date: 01-Jan-07
Access Mode: Shared
Baseline: Current Project

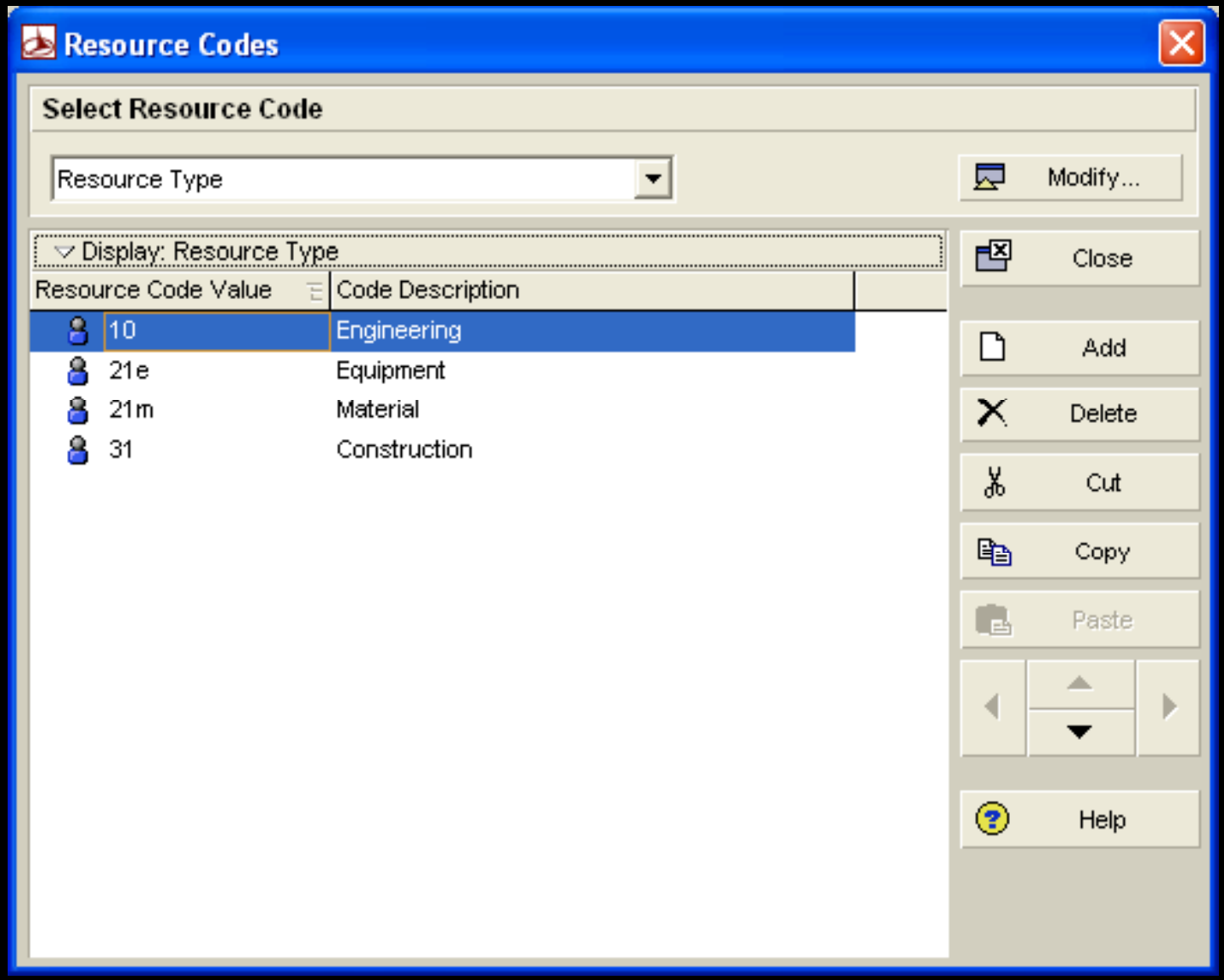
WBS Example


Primavera : Template (Template Project)
File Edit View Project Enterprise Tools Admin Help
Work Breakdown Structure
Layout: WBS
WBS Code | WBS Name | Total Activities | Est Weight
Template | Template Project | 57 | 1.0
Template.Milestones | Project Milestones | 8 | 1.0
Template.12 | Basic Engineering | 8 | 1.0
Template.13 | Detail Engineering | 10 | 1.0
Template.13.1 | Civil General | 1 | 1.0
Template.13.2 | Concrete Structure | 2 | 1.0
Template.13.3 | Steel Structure | 2 | 1.0
Template.13.4 | Building | 1 | 1.0
Template.13.5 | Equipment | 1 | 1.0
Template.13.6 | Piping | 1 | 1.0
Template.13.7 | Instrumentation | 1 | 1.0
Template.13.8 | Electrical | 1 | 1.0
Template.13.9 | Insulation | 0 | 1.0
Template.13.A | Painting | 0 | 1.0
Template.13.B | Fire Proof and Surface Protection | 0 | 1.0
Template.13.C | Catalyst, Chemical and Utilities | 0 | 1.0
Template.13.Z | Others | 0 | 1.0
Template.14 | Procurement Services | 6 | 1.0
Template.21 | Manufacturing | 6 | 1.0
January 2007
01 08 15 22 29 05
21-Jan-07
10-Feb-07
General Notebook Planning Resources Budget Log Spending Plan Budget Summary WBS Milestones WPs & Docs Earned Value
General
WBS Code
13
WBS Name
Detail Engineering
Status
Active
Responsible Manager
JGC Singapore Pte. Ltd.
Anticipated Dates
Anticipated Start
Anticipated Finish
Portfolio: All Projects
User: Johnny
Data Date: 01-Jan-07
Access Mode: Shared
Baseline: Current Project

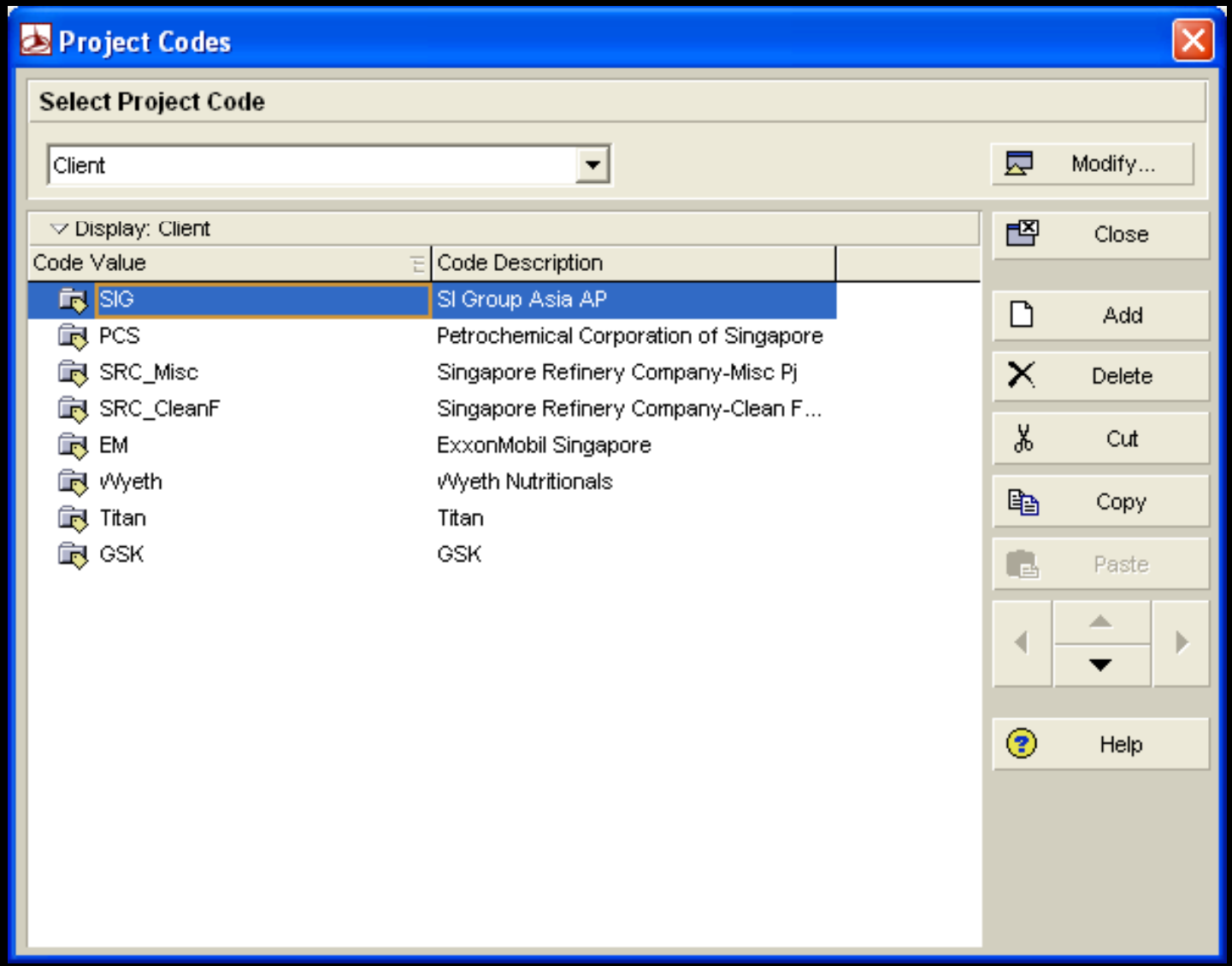
Calendars

- Global
- Project specific
- WBS specific
- Resource specific

Coding Structure: Resource Code



Coding Structure: Project Code



Resource and Role

- Resource includes
  - People
  - Material
  - Plant
- Role
  - Required personnel skill and proficiency level -> Job title and function
- Resource calendar
- Resource limit (availability) (MH / day)
- Resource cost ($ / MH)

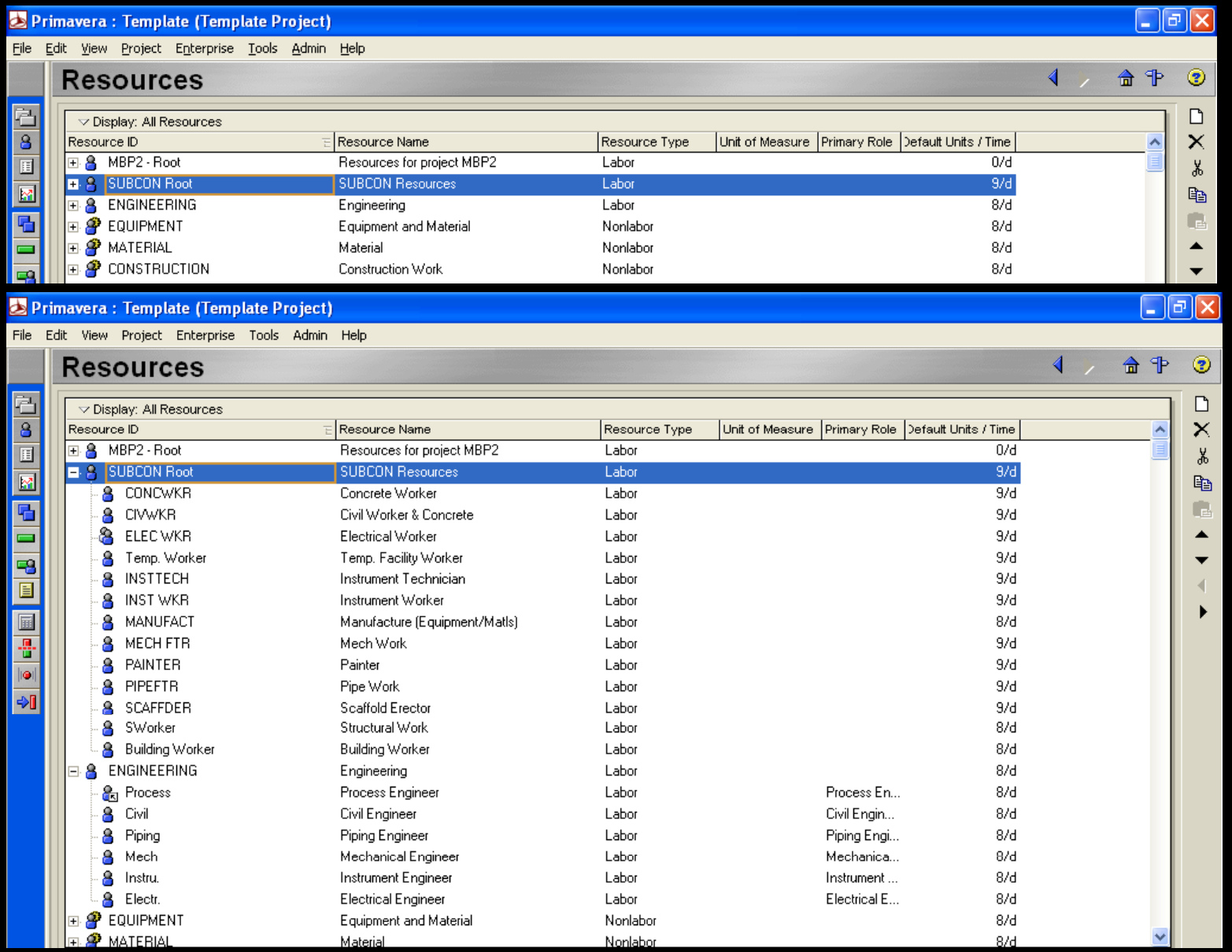
Resource and Role

Role

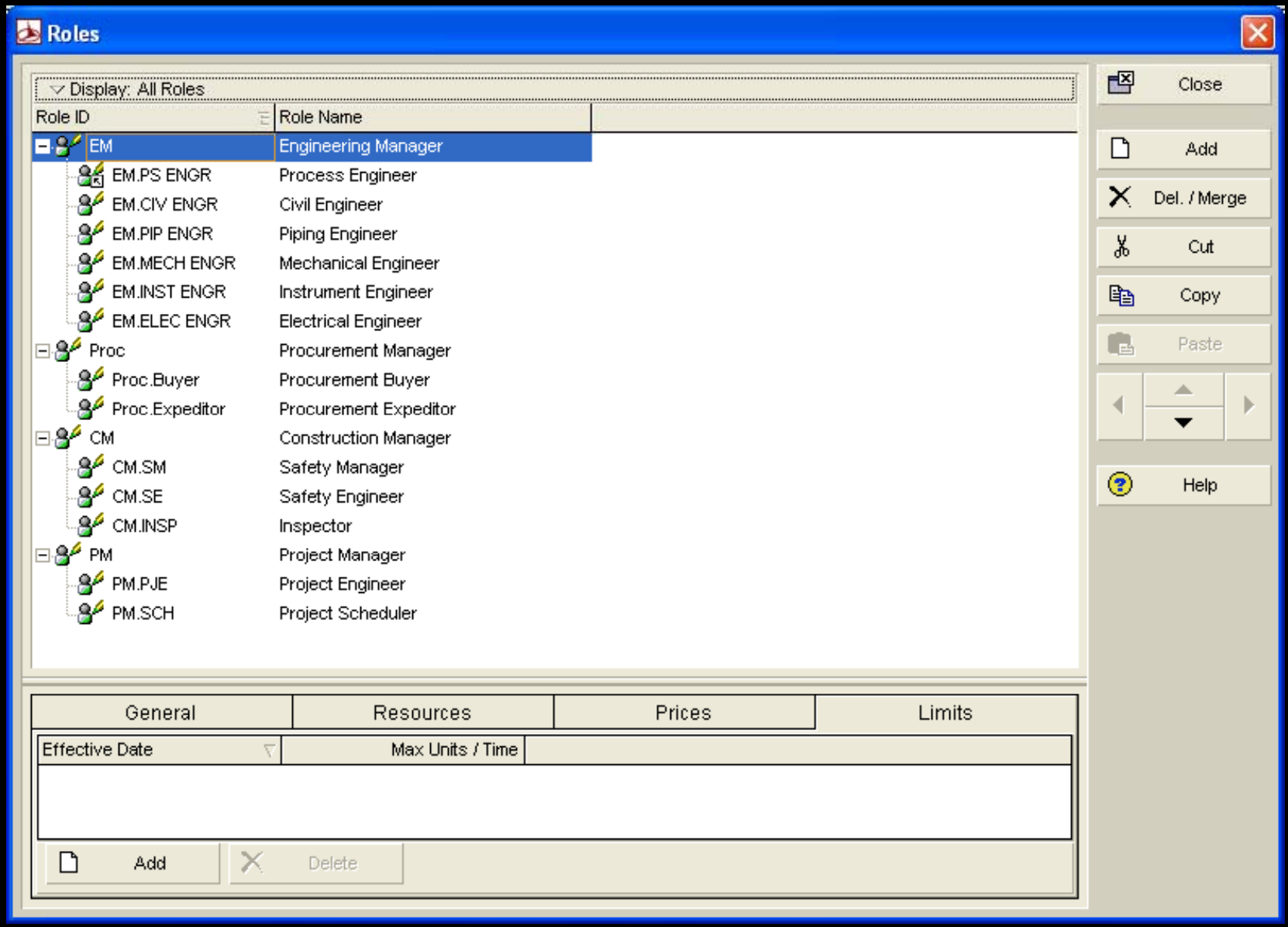
Resource

	Role 1 (Job Title)	Role 2 (Job Title)	Role 3 (Job Title)
Resource 1 (Personnel)			
Resource 2 (Personnel)			
Resource 3 (Personnel)			

Resource Example



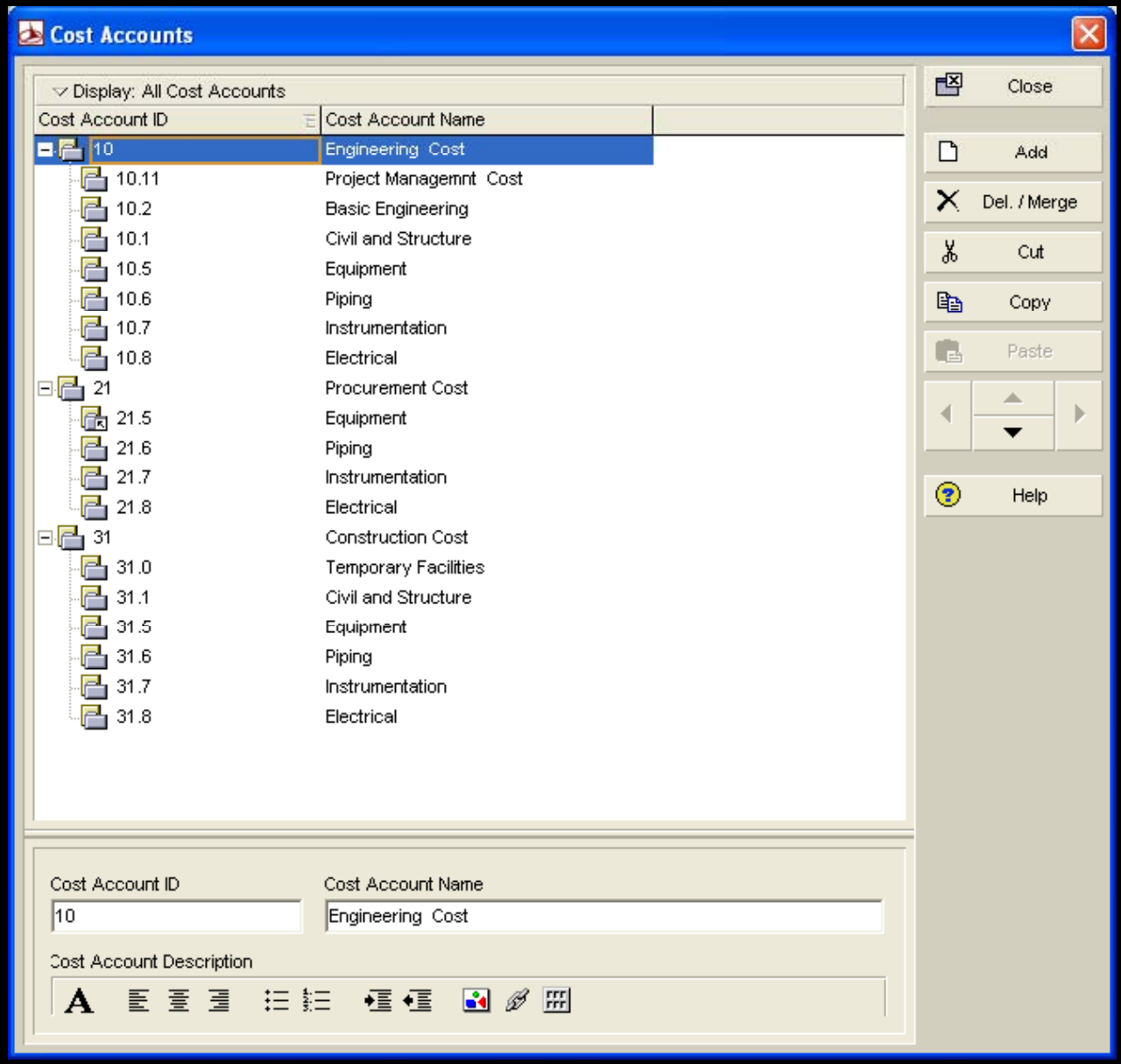
Role Example



Budget and Cost

- Top-down approach: for upper management
- Bottom-up approach: for accurate estimate
- Budget (total) and spending plan (monthly distribution)
- Resource dictionary and cost account
- Budgeted cost=Budgeted unit (man-hour) x Price per unit ($/MH) for each activity
- Roll up to Project, EPS or WBS level

Cost Account Example



Summary

	Global	EPS Node	Project-specific	Resource-specific	Remarks
WBS			✓		Level 1 is project. Level 2 and down are deliverables. The lowest level is the work package (or activity)
Resource	✓				
Cost	✓				
Calandar	✓	✓	✓	✓	
Layout	✓	✓	✓		

Global (Enterprise, root node of EPS) -> EPS -> Project -> WBS -> Work Package or Activities

P3 Vs. P6

P3 Vs. P6

	P3	P6	Remarks
Scope	Project based project management	Enterprise-wide project management	
Project Structure	Single	Multiple (EPS), Global (Enterprise)	Hierarchical Enterprise Project Structure (EPS)
Work Reposibility	Project manager	Project managers for multi-projects. OBS.	Hierarchical Organisation Breakdown Structure (OBS)
WBS	Optional	Have more weight than P3	Level 1: project; Level 2 and down: deliverables (measurable products and services); Lowest Level: Work package
User	Usually single user	Multiple users	
Database	PC based 16-bit Btrieve database	Server based Oracle or MS SQL server	For standalone, use MS SQL Server Desktop Engine (MSDE)
File Structure	Multiple files	Single file (.xer)	
Architecture	PC based. Programme and data residing on PC	Database on server; Programme on station	
Activity Code	Main features	Have less weight than P3	Part of category, grouping and filtering function replaced by EPS
Driven Predesessor	with * before an predesessor	Solid relationship line	