

What is a Project

- ***Unique purpose***
- ***Temporary***
- ***Evolves/develops over time***
- ***Diverse people, equipment, materials***
- ***Has a primary customer/sponsor***
- ***Involves risk & uncertainty***
- ***Projects vary by:***
 - ▣ Budget, Team size, Duration, Expected outcomes

Operational Tasks

- Ongoing and repetitive tasks
- Carry out day-to-day activities
- Sustain the business

Projects

- Temporary endeavors
- Unique outcome
- Concludes when objectives are met

Operational Tasks vs. Projects

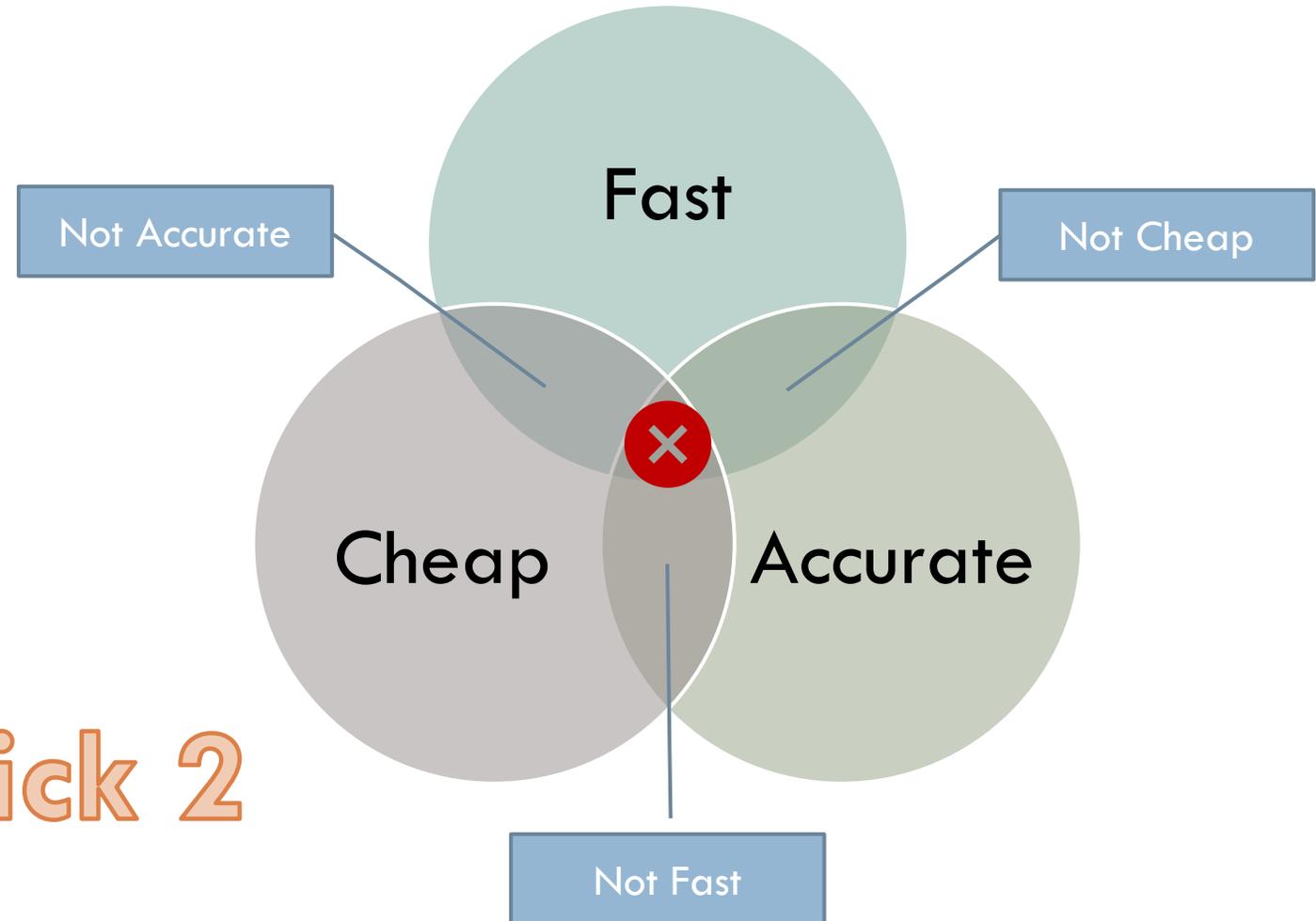
Project is Considered Finished When...

- *The objective is met*
- *The objective cannot be met*
- *The objective is no longer relevant*

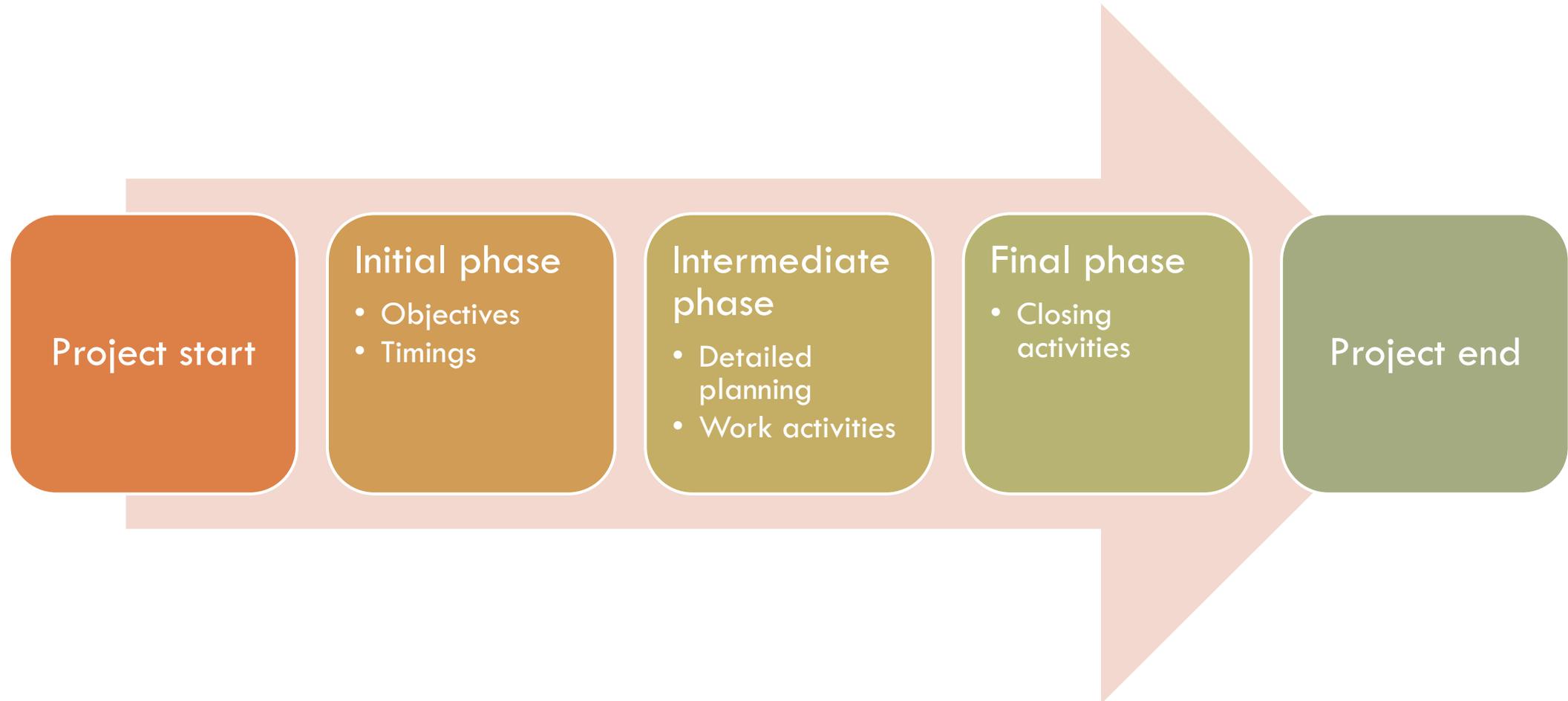
A Successful Project

- ❑ ***Accomplished on time***
- ❑ ***Within budget***
- ❑ ***According to scope***
- ❑ ***Meets expectations/quality***

Pick 2



Project Life Cycle



3 Main Project Influences

- ***Gantt Chart***
 - Developed by Henry Gantt (circa 1910)
 - Based on the harmonogram (1896)
- ***P.E.R.T. Chart***
 - **P**roject **E**valuation **R**evision **T**echnique
 - Developed by U.S. Navy in 1957 for the Polaris Submarine Project
- ***Critical Path Method***
 - Critical tasks vs. non-critical tasks

Critical Tasks

- ***Any task that contributes to the calculation of the project finish date***
- ***Any task with one of the following constraints***
 - ▣ As Late as Possible
 - ▣ Must Start On
 - ▣ Must Finish On
- ***Any task with an assigned deadline***
- ***Projects calculates a “mathematical critical path”; what is or is not critical is ultimately your decision***

Exploring Views

□ ***Sheets***

- ▣ Displays information as a table or spreadsheet
- ▣ Tables (preset combinations of columns) can be applied to the sheet view

□ ***Charts***

- ▣ Graphics, flowcharts, timetables

□ ***Forms***

- ▣ Displays information about a single task or resource
- ▣ Data is entered or modified in a “user-friendly” environment

Calendars

- ***Project Calendar***

- Settings apply to all tasks and resources unless otherwise specified in another calendar

- ***Resource Calendar***

- Used for resources that must have a different calendar from the overall project

- ***Task Calendar***

- Used for tasks that must have a different calendar from the overall project

Calendar Rules

- Task Calendars override Project Calendar
- Resource Calendars override Project Calendar
- Task & Resource calendars use what is common to both. Resource calendar wins if there is a conflict.
- Task calendar can take precedence over Resource calendar if
 - ☑ *Scheduling Ignores Resource Calendars*in Tasks → Advanced Properties is checked

Durations

- Tasks are scheduled “ASAP” or “ALAP” depending on project “Scheduled From” setting
 - M = Minutes
 - H = Hours
 - D = Days
 - W = Weeks
 - MO = Months
 - Add “e” for “elapsed”
 - Add “?” for “estimated”

Traditional		Elapsed	
7d	7 working days	7ed	7 calendar days (no days off)
40h	(5) 8-hour days	40eh	1.67 days (non-stop)

Traditional	
7d	7 working days
7d?	7 estimated working days

Constraint Types

□ **Flexible**

- As Soon As Possible*
- As Late As Possible*

□ **Inflexible**

- Must Start On
- Must Finish On

□ **Semi-Flexible**

- Start No Earlier Than
- Start No Later Than
- Finish No Earlier Than
- Finish No Later Than

* Default

Task Dependencies

- **Finish-to-Start** (Default)
 - ▣ Predecessor task must be completed before successor task can start
- **Start-to-Start**
 - ▣ Both tasks start simultaneously
- **Finish-to-Finish**
 - ▣ Both tasks finish simultaneously
- **Start-to-Finish**
 - ▣ The start of the predecessor task determines the end of the successor task

Precedence Relationships

Finish-to-Start



Start-to-Start



Finish-to-Finish



Start-to-Finish



Task Types and Logic

- **Fixed Duration**
- **Fixed Units** (*Project's default*)
- **Fixed Work**

- **Project scheduling logic**
 - ▣ $\text{Duration} \times \text{Units} = \text{Work}$

- **Define 2 and let Project calculate the remainder**

Task Types and Logic (cont.)

- **Duration**

- ▣ Length of a task measured in business or calendar day

- **Units**

- ▣ Number of resources assigned to work on a task

- **Work**

- ▣ Amount of effort a resource must expend on a task
- ▣ Usually measured in units such as hours per week

$$\text{Duration} \times \text{Units} = \text{Work}$$

Fixed Units - Guidelines

Use Fixed Unit tasks in situations such as

- ▣ When the number of resources you have for the task is the first or main thing you know
- ▣ When you can't get more resources to do the work — your resources are fixed
- ▣ When you want to change the duration or the work on a task while keeping the number of people working on the task the same
- ▣ When you want to keep the resource working on a task at a certain percentage of his or her available hours

Fixed Work - Guidelines

Use Fixed Work tasks in situations such as

- ▣ When the effort required is the first thing you estimate
- ▣ When the effort required is the easiest thing to estimate
(estimating effort is usually easier and more accurate than estimating duration)
- ▣ When your resources give you task estimates in work hours

Fixed Duration - Guidelines

Use Fixed Duration tasks in situations such as

- ▣ When the duration is the first thing you estimate
- ▣ If the duration stays the same when adding resources
- ▣ Tasks that always have a group of resources assigned
- ▣ When the deadline is so tight that it's the primary driver for the duration of the task
- ▣ When the workload isn't your problem, such as when external resources are consultants

Resource Types

□ **Work**

- ▣ People and Machines; things that can be reused
- ▣ Things that need time to perform tasks

□ **Material**

- ▣ Consumables; use and forget

□ **Cost**

- ▣ Time independent
 - Airline tickets
 - Tolls

Assigning Costs to Resources

- ***Standard Rates***

- Assigned as hourly (/h) by default

- ***Overtime Rates***

- Not automatically calculated

- ***Per-Use Costs***

- Work

- Added 1 time for each resource unit assigned to a task

- Material

- Assigned only once to a task regardless of resources

Assigning Costs to Tasks

□ ***Fixed Cost***

- The total cost for the task is known
- Resource costs have no effect on the cost of the task

Effort vs. Non-Effort Driven Tasks

- ***Effort Driven***

- Will reduce or increase duration if you assign or remove Resources to the Task

- ***Non-Effort Driven***

- Will not reduce duration if you assign additional Resources to the Task, but it will increase the total amount of work (hours)

Changing Units on Effort Driven Tasks

□ ***Fixed Duration***

- Work remains unchanged
- Distributes total amount of work across all units
- Duration is unchanged

□ ***Fixed Units and Fixed Work***

- Work remains unchanged
- Distributes total amount of work across all units
- Duration is changed

Changing Units on Non-Effort Driven Tasks

- ***Fixed Duration***
 - Work is changed
 - Duration is unchanged
- ***Fixed Units***
 - Work is changed
 - Duration is unchanged
- ***Fixed Work must be driven by effort***

Task Type Logic Matrix

How Project Calculates	If you change one of these variables:		
	Duration	Units	Work
Task is set to:	Project then recalculates:		
Fixed Duration	Work	Work	N/C
Fixed Units	Work	Duration	Duration
Fixed Work	N/C	Duration	Duration

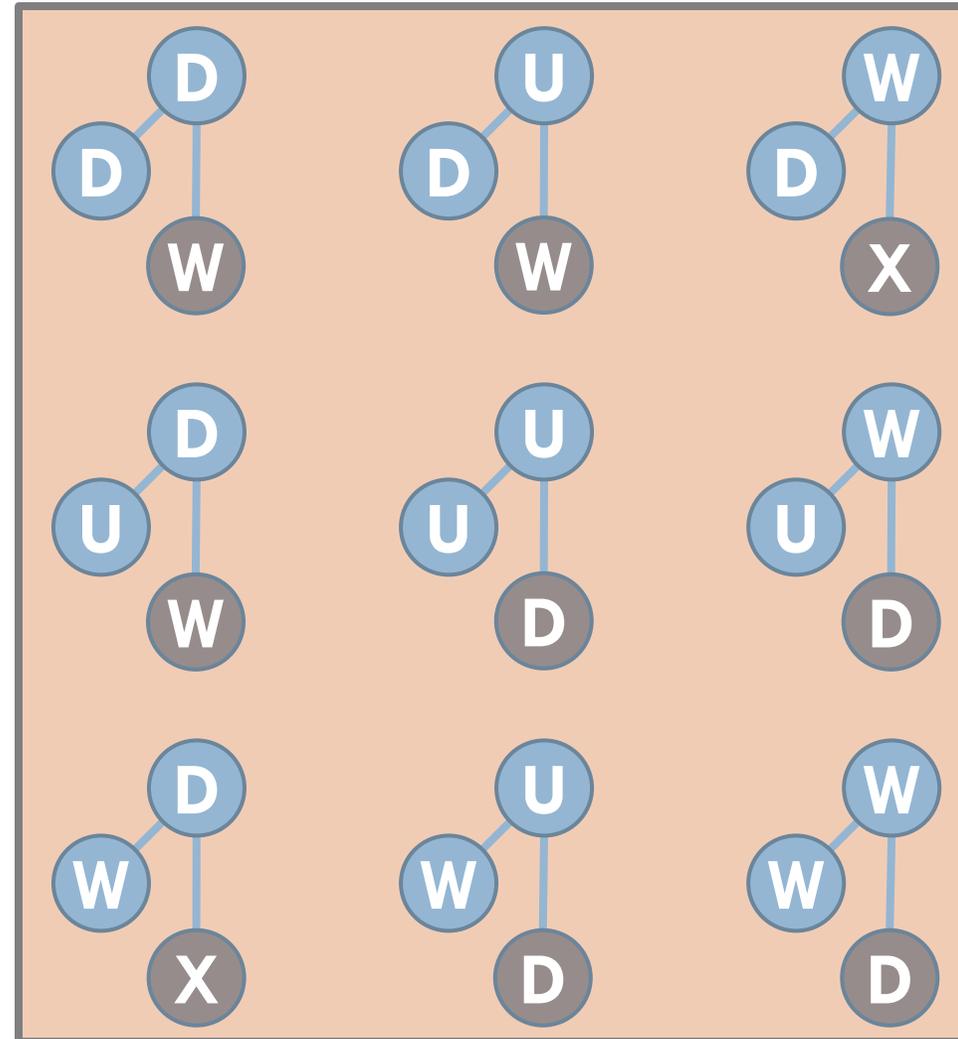
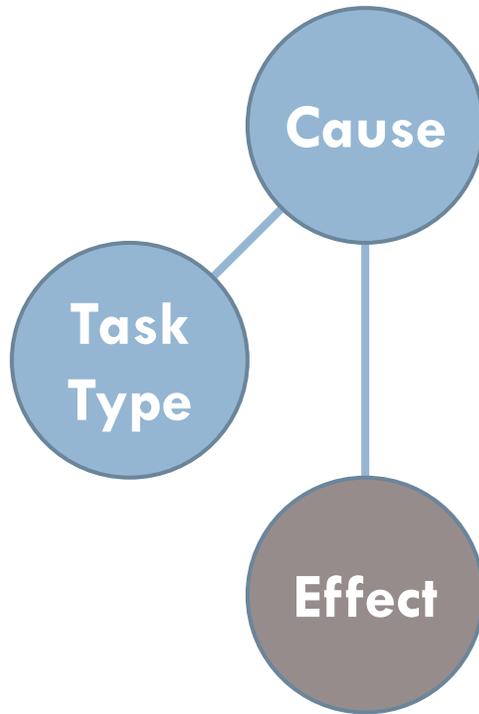
N/C = No Effect Change

Task Type Logic Matrix

D = Duration

U = Units

W = Work



X = No Effect Change

Task Type Logic Matrix

- *Any change in Fixed DURATION effects WORK*
- *Any change in Fixed WORK effects DURATION*
- *Any change in Fixed UNITS effects DURATION*
(except DURATION, it effects WORK)

Addressing Resource Overallocation



- Project schedules tasks in accordance with their specifications
 - Duration
 - Dependencies
 - Constraints
 - Resource Availability

Resolving Resource Overallocation

- Increase the number of available resources
- Add underallocated resources to the task to assist the overallocated resource (*often the best*)
- Schedule overtime hours or weekend work
- Change the resource calendar to reflect longer working hours
- Delay tasks until a resource is available (*not viable when deadlines are involved*)
- Split a task so a resource can work on it at a later time

Earned Value Analysis

- *Uses project costs to measure the performance of a project at the time of the project status date.*
- *By comparing the cost of work performed to the cost of work budgeted, you can view the rate of progress for a project and predict the trend of the project's success.*

Earned Value Analysis

- ***Based on three key measurements***
 - ▣ Budgeted cost of work scheduled to be performed
 - ▣ Budgeted cost of work actually performed
 - ▣ Actual cost of work performed
- ***Project provides 3 tables for analysis***
 - ▣ Earned Value
 - ▣ Earned Value Cost Indicators
 - ▣ Earned Value Schedule Indicators

Earned Value Indicators

Gantt Chart

View → Tables → More Tables → Earned Value

Field Name	Field Description
PV (BCWS)	Planned Value (PV) or Budgeted cost of work scheduled
EV (BCWP)	Earned Value (EV) or Budgeted cost of work produced
AC (ACWP)	Actual Cost or Actual Cost of Work Produced
SV	Schedule Variance
CV	Cost Variance
EAC	Estimate at Complete
BAC	Budget at Complete
VAC	Variance at Complete

Earned Value Indicators

Gantt Chart

View → Tables → More Tables → Earned Value

Field Name	Field Formula / Logic
PV (BCWS)	Cumulative cost (task, resource) up to status date
EV (BCWP)	Amount spent given actual duration of task
AC (ACWP)	Cost for work performed by resource up to status date
SV	$EV - PV$
CV	$EV - AC$
EAC	$BAC + AC - EV$ or $BAC \div CPI$
BAC	Estimate of total project cost
VAC	$EAC - BAC$

Earned Value Cost Indicators

Gantt Chart

View → Tables → More Tables →

Earned Value Cost Indicators

Field Name	Field Description
CV%	Percentage of cost to complete work vs. actual cost
CPI	Cumulative Cost Performance Index
TCPI	To Complete Performance Index

Field Name	Field Formula
CV%	$((EV - AC) \div EV) \times 100$
CPI	$EV \div AC$
TCPI	$(BAC - EV) \div (BAC - AC)$

Earned Value Schedule Indicators

Gantt Chart

View → Tables → More Tables →

Earned Value Schedule Indicators

Field Name	Field Description
SV%	Percentage of cost to complete work vs. actual cost
SPI	Schedule Performance Index

Field Name	Field Formula
SV%	$(SV \div EV) \times 100$
SPI	$EV \div PV$