Scheduling's Most Controversial Topics

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Challenging Long-held Beliefs

Controversial Topics

- Critical Path
- Schedule Visibility Tasks (SVTs)
- Schedule Margin (SM)
- NLT (On or Before) is/is not a Hard Constraint
- Milestones are/are not Activities
- Earned Schedule

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

"Time Now", "Longest Duration", and Least Float" are defining characteristics of a Critical Path

Perspective 2

An IMS built with completely compliant practices may have none of those Critical Path characteristics

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

- **Schedules in their purest form are made up of activities (representing project scope) and logic (to time-phase the execution of that scope)**
  - Constraints can override logic and may represent potential schedule health issues. Schedule health issues should not corrupt the determination of the Critical Path.
  - Multiple calendars are also a complicating factor, which has the potential to make Total Float and Duration analysis less straight-forward

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

- **The most common scheduling tool (MS Project) does not have the capability to calculate the Critical Path on its own**
  - The most common method to calculate a Critical Path in MS Project involves placing an overriding (temporary) constraint on project completion that under most circumstances forces the Critical Path activities to have the least Total Float (Slack) in the project.

    (this approach can be applied to any scheduling tool)

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

- **Schedules using (or altered to use) a single working calendar and no constraints (or only single constraint modeling the end of PoP), will:**
  - Start at Time Now (or the first working day after Time Now)
    - Since no (NET) constraint is pushing the start into the future
  - Have the Longest Duration
    - Since it will start at Time Now (earliest remaining work can begin) and run through project completion (latest discrete effort)
    - And no additional calendars that could pack more working days into the same calendar span
  - Have the Least Total Float
    - Since there will be no (NLT) constraints modeling intermediate deadline commitments

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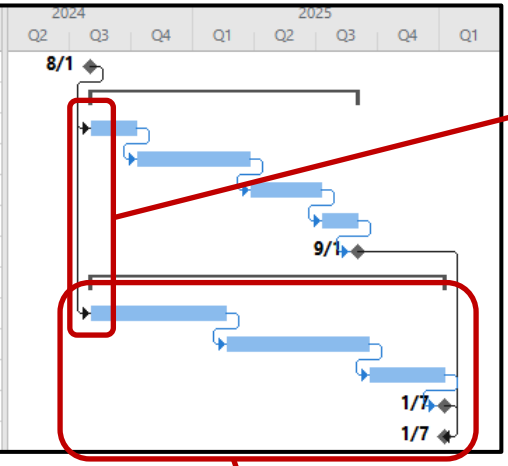
Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

With a single overriding constrained project completion and a single calendar…

Task Name	Total Slack	Constraint Type	Constraint Date
Project Start	-374 days	As Soon As Possible	NA
Test Facility	**-282 days**	**As Soon As Possible**	**NA**
Lay Test Facility Foundation	-282 days	As Soon As Possible	NA
Build Test Facility Structure	-282 days	As Soon As Possible	NA
Test Facility Electrical	-282 days	As Soon As Possible	NA
Install Furnashings and Equipment	-282 days	As Soon As Possible	NA
Test Cacility Complete	-282 days	As Soon As Possible	NA
Aircraft	**-374 days**	**As Soon As Possible**	**NA**
Design Aircraft	-374 days	As Soon As Possible	NA
Fabricate Aircraft Components	-374 days	As Soon As Possible	NA
Assemble Aircraft	-374 days	As Soon As Possible	NA
Deliver Aircraft	-374 days	As Soon As Possible	NA
Project Complete	-374 days	Finish No Later Than	8/1/24



…all paths will start at Time Now…

…have the least Total Float...

…and the Critical Path will span the entire remaining duration of the project.

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 2

- **In a textbook world, all activities would be logic-driven and all activity sequences (not just the CP) could be traced back to Time Now. In practice, there are many reasons why (soft) NET constraints are needed to supplement logic to properly time-phase work.**
  - Hardware/software/decisions (modeled with a handoff milestone) needed from the government customer are holding up project work
  - Details tracked in another system are represented in the IMS at a summary level, but an intermediate detail has slipped causing a project delay
  - Predecessor work resides in a separate (external) schedule and the handoff in the successor schedule is modeled with a constrained handoff milestone
  - Any of these (and other) conditions can result in the sequence of activities driving project completion to begin (as depicted in the IMS) after Time Now

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 2

- **The best project schedules provide the management team with a wide range of reliable and actionable information**
  - Since Baselining ALAP is generally considered an undesirable practice, being early/late to a baseline does not equate to being early/late to a contractual requirement (you can be late to the BL and still meet a contract requirement).
    - It is a common practice to place a (soft*) NLT constraint (or Deadline) on every major/contractual event (not just PoP end). And it is very common that the most delinquent event forecast (least total float) is not the last event.
  - Gone are the days of a single location creating 100% of a complex product. Subcontractor, partners, and sometimes different locations within a single company often work to different calendars

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* A constraint that will not prevent logic from delaying the forecast beyond the constraint date

Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 2

- **While MS Project does not have the capability to calculate the Critical Path on its own, many other scheduling tools (or analysis tools) can**
  - The most modern tools do not use Total Float to determine the activities on the Critical Path, but instead identify driving relationships (no need for "overriding temporary constraints"). Because of this, the forecasts that are most delinquent to a constrained due date will have the least total float. But it is common for the project completion to not be the most delinquent event. When this is the case, the activities driving project completion (the Critical Path) will not have the least total float.
  - Even if the "constraint method" is used to determine the CP, once the overriding constraint is removed, the CP (in the unaltered IMS) may no longer have the least total float

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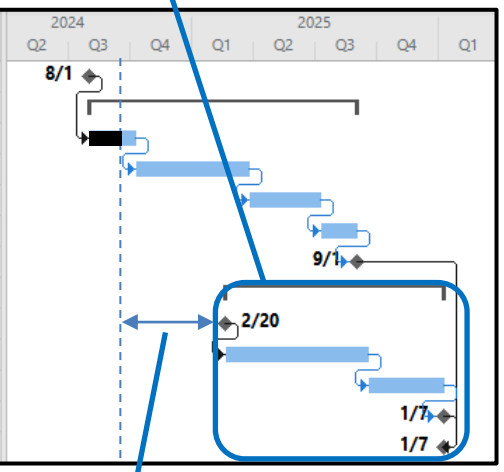
Must the Critical Path Start at Time Now?

Perspective 2

When (soft) NET constraints are used to model a handoff (like GFE) from an external source…

…the Critical Path
(the path determining project completion)

Task Name	Total Slack	Constraint Type	Constraint Date	Task Calendar	Duration
Project Start	-32 days	As Soon As Possible	NA	Standard	0 days
Test Facility	**-32 days**	**As Soon As Possible**	**NA**	**7-day Calendar**	**386 days**
Lay Test Facility Foundation	-32 days	As Soon As Possible	NA	7-day Calendar	59 days
Build Test Facility Structure	-32 days	As Soon As Possible	NA	7-day Calendar	168 days
Test Facility Electrical	-32 days	As Soon As Possible	NA	7-day Calendar	105 days
Install Furnashings and Equipment	-32 days	As Soon As Possible	NA	7-day Calendar	54 days
Test Cacility Complete	-32 days	Finish No Later Than	7/31/25	7-day Calendar	0 days
Aircraft	**-5 days**	**As Soon As Possible**	**NA**	**Standard**	**230 days**
Aircraft Design Received (GFE)	-5 days	Start No Earlier Than	2/20/25	Standard	0 days
Fabricate Aircraft Components	-5 days	As Soon As Possible	NA	Standard	150 days
Assemble Aircraft	-5 days	As Soon As Possible	NA	Standard	80 days
Deliver Aircraft	-5 days	Finish No Later Than	12/31/25	Standard	0 days
Project Complete	-5 days	Finish No Later Than	12/31/25	Standard	0 days



…may not start at Time Now

(Soft NET constraints can also cause the Critical Path to be shorter than other paths)

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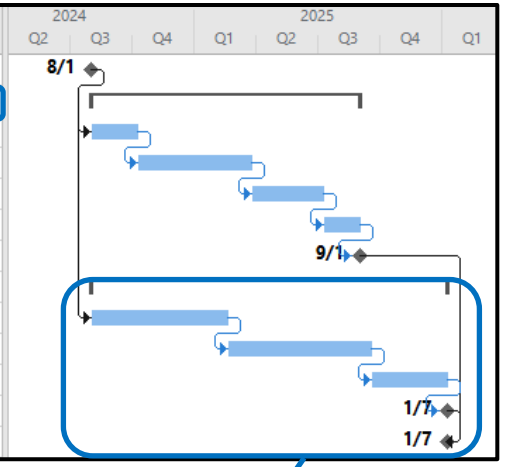
Must the Critical Path have the longest duration?

Perspective 2

When alternate calendars are utilized to model different working schedules…

Task Name	Total Slack	Constraint Type	Constraint Date	Task Calendar	Duration
Project Start	-32 days	As Soon As Possible	NA	Standard	0 days
Test Facility	**-32 days**	**As Soon As Possible**	**NA**	**7-day Calendar**	**386 days**
Lay Test Facility Foundation	-32 days	As Soon As Possible	NA	7-day Calendar	59 days
Build Test Facility Structure	-32 days	As Soon As Possible	NA	7-day Calendar	168 days
Test Facility Electrical	-32 days	As Soon As Possible	NA	7-day Calendar	105 days
Install Furnashings and Equipment	-32 days	As Soon As Possible	NA	7-day Calendar	54 days
Test Cacility Complete	-32 days	Finish No Later Than	7/31/25	7-day Calendar	0 days
Aircraft	**-5 days**	**As Soon As Possible**	**NA**	**Standard**	**375 days**
Design Aircraft	-5 days	As Soon As Possible	NA	Standard	145 days
Fabricate Aircraft Components	-5 days	As Soon As Possible	NA	Standard	150 days
Assemble Aircraft	-5 days	As Soon As Possible	NA	Standard	80 days
Deliver Aircraft	-5 days	Finish No Later Than	12/31/25	Standard	0 days
Project Complete	-5 days	Finish No Later Than	12/31/25	Standard	0 days



…the path with the longest duration (in working time)…

…may NOT be the Critical Path
(the path determining project completion)

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Must the Critical Path have the least float?

CONTRACT

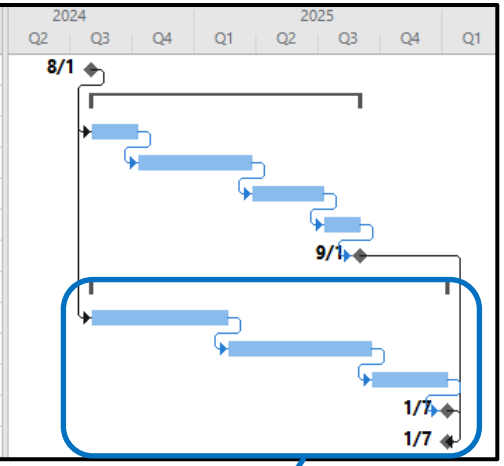
Delivery Requirements:

- Test Facility 7/31/25
- Aircraft 12/31/25
- Project 12/31/25

Perspective 2

With (soft) NLT constraints modeling deliverable commitments…

Task Name	Total Slack	Constraint Type	Constraint Date	Task Calendar	Duration
Project Start	-32 days	As Soon As Possible	NA	Standard	0 days
Test Facility	**-32 days**	**As Soon As Possible**	**NA**	**7-day Calendar**	**386 days**
Lay Test Facility Foundation	-32 days	As Soon As Possible	NA	7-day Calendar	59 days
Build Test Facility Structure	-32 days	As Soon As Possible	NA	7-day Calendar	168 days
Test Facility Electrical	-32 days	As Soon As Possible	NA	7-day Calendar	105 days
Install Furnashings and Equipment	-32 days	As Soon As Possible	NA	7-day Calendar	54 days
Test Cacility Complete	-32 days	Finish No Later Than	7/31/25	7-day Calendar	0 days
Aircraft	**-5 days**	**As Soon As Possible**	**NA**	**Standard**	**375 days**
Design Aircraft	-5 days	As Soon As Possible	NA	Standard	145 days
Fabricate Aircraft Components	-5 days	As Soon As Possible	NA	Standard	150 days
Assemble Aircraft	-5 days	As Soon As Possible	NA	Standard	80 days
Deliver Aircraft	-5 days	Finish No Later Than	12/31/25	Standard	0 days
Project Complete	-5 days	Finish No Later Than	12/31/25	Standard	0 days



…the path with the least Total Float…

…is often NOT the Critical Path
(the path determining project completion)

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Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

Constraints and alternate calendars are usually representative of "defects" in the IMS that should be removed prior to schedule analysis.

Perspective 2

Constraints and alternate calendars are valuable/compliant tools to enhance the accuracy and reliability of the IMS

Historic Critical Path Characteristic	Activity Attributes: NET Constraint (soft)	NLT Constraint (soft)	Alternate Calendar
Time Now	X		X
Longest Path	X		X
Least Float		X	X

X = Activity attribute that can cause the Critical Path to deviate from historically defining characteristics

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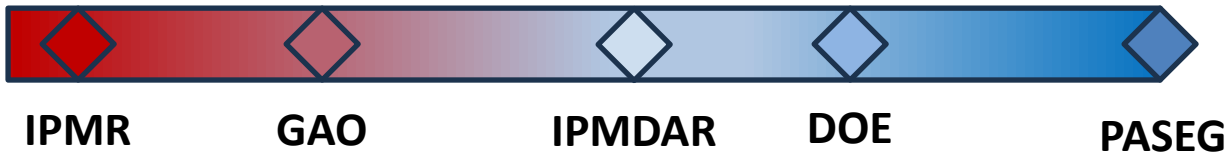
Must the Critical Path start at Time Now, have the longest duration, and be the least float?

Perspective 1

"Time Now", "Longest Duration", and Least Float" are defining characteristics of a Critical Path

Perspective 2

The Critical Path is the continuous sequence of activities that determine the project completion date *(regardless of float, duration, or start date)*



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Challenging Long-held Beliefs

Controversial Topics

- Critical Path
- Schedule Visibility Tasks (SVTs)
- Schedule Margin (SM)
- NLT (On or Before) is/is not a Hard Constraint
- Milestones are/are not Activities
- Earned Schedule

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Schedule Visibility Tasks (SVTs)

Tasks, activities or milestones in the Integrated Master Schedule (IMS) that increase management visibility and functionality of the schedule ***for non-Performance Measurement Baseline related items****. SVTs are included in the IMS to characterize potential impacts to the logic-driven network. - EVMSIG*

What tasks qualify as "non-Performance Measurement Baseline (PMB) related items"?

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What is/is not “non-PMB related”?

Perspective 1

SVTs represent a passage of time while no direct resource are expended. This makes them non-PMB related.

Perspective 2

Even when no direct resources are expended, tasks can still be “in scope” to the contract and therefore related to the PMB

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What is/is not “non-PMB related”?

Perspective 1

- Non-PMB related items = Tasks are not related to time-phased budget (PMB) in the IMS or EV Engine. Performance is not earned on these tasks
- PMB-related items = Tasks are related to time-phased budget (PMB) either in the IMS or EV Engine. That budget is earned based on performance.

Examples:

- Wait Time tasks (curing cement/ drying paint) *can* be labeled as SVTs because these tasks have no resources associated with them (have no time-phased budget) and therefore are not part of the PMB.
- Lead times on material tasks *can* be labeled as SVTs because lead times have no resources associated with them (have no time-phased budget) and therefore aren’t part of the PMB.

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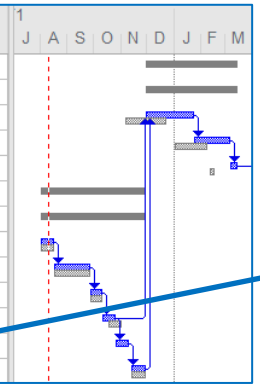
What is/is not "non-PMB related"?

Perspective 1

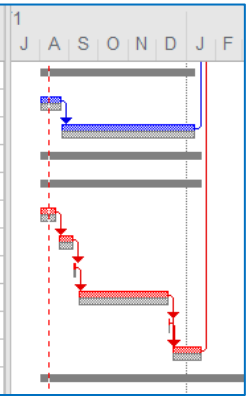
ID	Unique ID	Name	Cost
20	3	**Airframe Integration Assembly Test and Checkout**	**$187,175**
21	103	**Integrated Test and Checkout Airframe**	**$187,175**
22	104	Integrate Fuselage into Airframe	$114,859
23	105	Test Fuselage integrated with Airframe	$63,002
24	140	Checkout Airframe	$9,313
25	4	**Fuselage**	**$192,190**
26	106	**Develop/ Build new Fuselage**	**$192,190**
27	164	Conduct Requirements Review Meeting with Customer	$36,411
28	163	Design Fuselage	$108,367
29	165	Release Fuselage Drawings	$11,858
30	166	Build Fuselage	$15,554
31	173	Paint Fuselage	$20,000
32	174	(SVT) Wait for Paint to Dry	$0



Waiting for Paint to dry requires no budget, therefore it's a non-PMB related tasks.

Lead time on Landing Gear is not related to any time-phased budget (PMB)- so task can be an SVT

ID	Unique ID	Name	Cost
39	110	**Develop and Build Electrical Subsystem**	**$148,889**
40	108	Create Drawings for electrical subsystem	$39,809
41	109	Build Cables for Electrical Subsystem	$109,080
42	18	**Landing Gear**	**$543,796**
43	113	**Develop and Build Landing Gear**	**$543,796**
44	112	Create Drawings for Landing Gear	$13,378
45	170	(SVT) Customer Review/ approval of Landing Gear Drawings	$0
46	171	Order Landing Gear Material	$50
47	172	(SVT) Lead time on Landing Gear Material	$0
48	117	Receive Landing Gear Material	$504,000
49	111	Integrate Landing Gear	$26,368
50	37	**Payload**	**$1,184,411**



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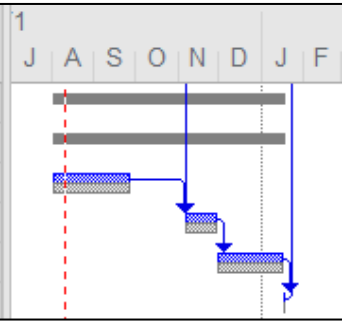
What is/is not “non-PMB related”?

Perspective 1

Even though task is NOT resource loaded, there is budget related to this task in the subcontractor’s Work Package in the EV Engine- this task could NOT be an SVT, because it is related to budget that will be earned, and is therefore related to the PMB. (Perspective 2 would agree as well)

ID	Unique ID	Name	Cost
63	43	Payload Software Release	$235,698
64	130	Payload Softare Development and Test	$235,698
65	127	Develop Payload Software (Subcontractor Work)	$0
66	129	Integrate Payload Software w/ Hardware	$121,632
67	128	Test Payload Software and Hardware	$112,787
68	131	Release Payload Software	$1,280



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What is/is not “non-PMB related”?

Perspective 2

- In scope to the program = related to the program itself, whether the work is being performed by the Prime, a Subcontractor, or a material vendor
- Any task that is in scope to the program = PMB related, and therefore cannot be an SVT
- SVTs are for things “outside” of the program

Examples:

- “Waiting for Landing Gear Material” is PMB related because the Landing Gear is in scope to the program (someone is being paid to make/deliver the material). PMB related tasks cannot be SVTs

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What is/is not “non-PMB related”?

Perspective 2

ID	Unique ID	Name	Cost
39	**110**	**Develop and Build Electrical Subsystem**	**$148,889**
40	108	Create Drawings for electrical subsystem	$39,809
41	109	Build Cables for Electrical Subsystem	$109,080
42	**18**	**Landing Gear**	**$543,796**
43	**113**	**Develop and Build Landing Gear**	**$543,796**
44	112	Create Drawings for Landing Gear	$13,378
45	170	(SVT) Customer Review/ approval of Landing Gear Drawings	$0
46	171	Order Landing Gear Material	$50
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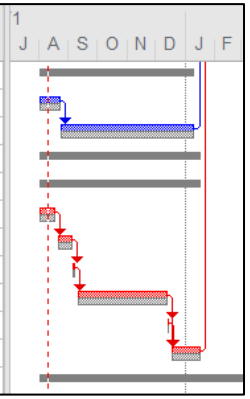

Just because part of the scope has been subcontracted out does not mean it is now not part of the Prime’s scope (PMB). There is budget associated with that “Wait” period even though it may not be loaded directly onto the task. Landing Gear is part of the program scope, making it PMB-related. “Wait” or “lead time” tasks that summarize actual project work cannot be SVTs

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SVTs

Perspective 2 (maybe 3?)

ID	Unique ID	Name	Cost
20	3	**Airframe Integration Assembly Test and Checkout**	**$187,175**
21	103	**Integrated Test and Checkout Airframe**	**$187,175**
22	104	Integrate Fuselage into Airframe	$114,859
23	105	Test Fuselage integrated with Airframe	$63,002
24	140	Checkout Airframe	$9,313
25	4	**Fuselage**	**$192,190**
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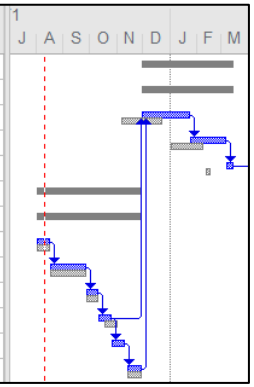

Is a “dry” Fuselage an implied requirement to complete the scope of the program?

If so, it is PMB-related and therefore cannot be an SVT

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Is Indirect work "non-PMB related"?

Perspective 1

Tasks that represent Indirect work are non-PMB related items

Perspective 2

Tasks that represent Indirect work are PMB related items

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Is Indirect work “non-PMB related”?

Perspective 1

- Tasks that represent indirect charging are not associated with time-phased resources and do not get budget assigned. Therefore, indirect tasks are not related to the PMB, because they have no budget to earn.

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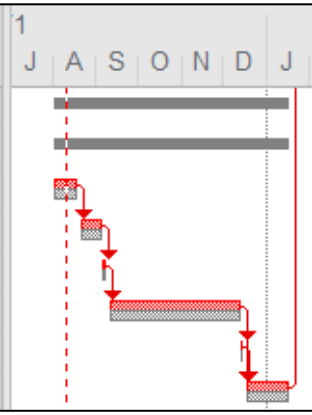
Is Indirect work "non-PMB related"?

Perspective 1

ID	Unique ID	Name	Cost
43	**18**	**Landing Gear**	**$543,746**
44	**113**	**Develop and Build Landing Gear**	**$543,746**
45	112	Create Drawings for Landing Gear	$13,378
46	170	(SVT) Customer Review/ approval of Landing Gear Drawings	$0
47	171	(SVT) Purchasing Department (indirect) Orders Landing Gear Material	$0
48	172	(SVT) Lead time on Landing Gear Material	$0
49	117	Receive Landing Gear Material	$504,000
50	111	Integrate Landing Gear	$26,368



This purchasing department is an indirect function. The Purchasing of Landing Gear Material is not charged direct to the program. Because this task is not associated with time-phased budget, it is not PMB related and *can* be an SVT.

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Is Indirect work “non-PMB related”?

Perspective 2

- Indirect Charging has an impact on rates. Rates are used to calculate the direct work that is part of the PMB. Indirect work is therefore PMB related and cannot be represented by an SVT.

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Is Indirect work "non-PMB related"?

Perspective 2

ID	Unique ID	Name	Cost
43	**18**	**Landing Gear**	**$543,746**
44	**113**	**Develop and Build Landing Gear**	**$543,746**
45	112	Create Drawings for Landing Gear	$13,378
46	170	(SVT) Customer Review/ approval of Landing Gear Drawings	$0
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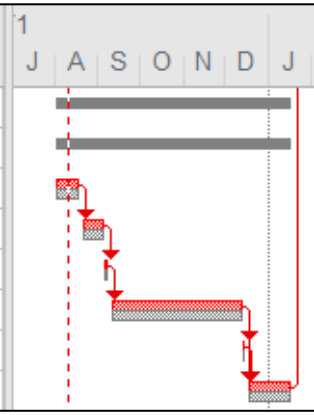

This purchasing department is an indirect function. Indirect charging impacts rates applied to direct work which makes up the PMB. This task cannot be an SVT because it is therefore PMB related.

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Should SVTs only be for Government effort?

Perspective 1

SVTs should represent customer/ government tasks only

(CDRL reviews, Gov/ Customer Testing, GFE, Gov/ Customer integration)

Perspective 2

SVTs should be used to model all activities that are considered non-PMB related

(Gov/ customer tasks, lead times, waiting times, external program dependencies, etc.)

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Should SVTs only be for Government effort?

Perspective 1

Let's make SVT definition simple. Only Government/ Customer tasks should be SVTs.

ID	Unique ID	Name	Cost
34	**11**	**Vehicle Subsystems Integration Assembly Test and Checkout**	**$43,747**
35	**107**	**Integration, Assembly, Test and Checkout Vehicle Subsystems**	**$43,747**
36	114	Integrate Vehicle Subsystems	$25,121
37	115	(SVT) Customer/Government Tests Vehicle Subsystems	$0
38	116	Checkout Vehicle Susbsystems	$18,626

Perspective 2

Ok, then what do we call everything else that isn't resource loaded- or that isn't associated with time-phased PMB/budget?

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What do we call tasks without resources that are not SVTs?

Perspective 1

We should have more acronyms to define the intent of any non-resource loaded tasks

Perspective 2

We can't agree on one term (SVT).

Now you want more?

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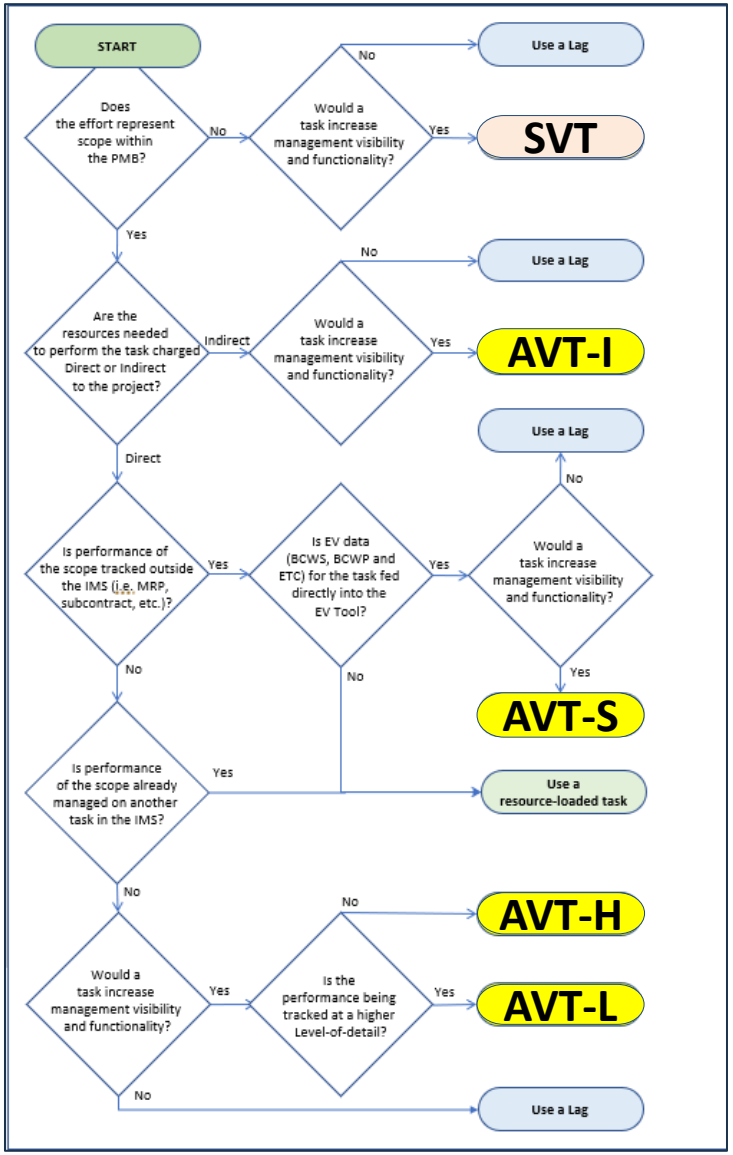
What do we call tasks without resources that are not SVTs?

Perspective 1

- Additional Visibility Tasks (AVTs)
  - **AVT- I** : for indirect
  - **AVT- S**: for MRP or Sub tasks where only EV Engine is resource loaded and not the IMS
  - **AVT- H** : when resource loading is on a higher-level task
  - **AVT- L** : when resource loading is on a lower-level task



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What do we call tasks without resources that are not SVTs?

Perspective 2

- Please No

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Challenging Long-held Beliefs

Controversial Topics

- Critical Path
- Schedule Visibility Tasks (SVTs)
- Schedule Margin (SM)
- NLT (On or Before) is/is not a Hard Constraint
- Milestones are/are not Activities
- Earned Schedule

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Is Schedule Margin a protective buffer or an estimation of schedule risk?

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Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 1

Schedule Margin duration is the time between the forecasted completion and the required completion of a significant event

Purpose:

To protect significant events from minor slippages

Perspective 2

Schedule Margin Duration is an estimate of the schedule risk to a significant event

Purpose:

To provide more likely (realistic) event forecasts

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Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 1

- **Schedule Margin is intended to protect significant events so that minor delays can be absorbed without breaching the delivery commitment**
  - Schedule Margin is inserted between the last activity leading to a significant event and the event itself
  - Schedule Margin duration is increased or decreased to hold the event to the desired commitment date
  - This will reduce the Total Float (typically to zero), so that the project team doesn't loose urgency by working to a schedule with higher Total Float
  - If the forecast slips beyond the commitment date, Schedule Margin Duration is set to zero.

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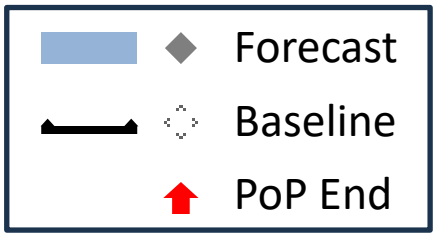
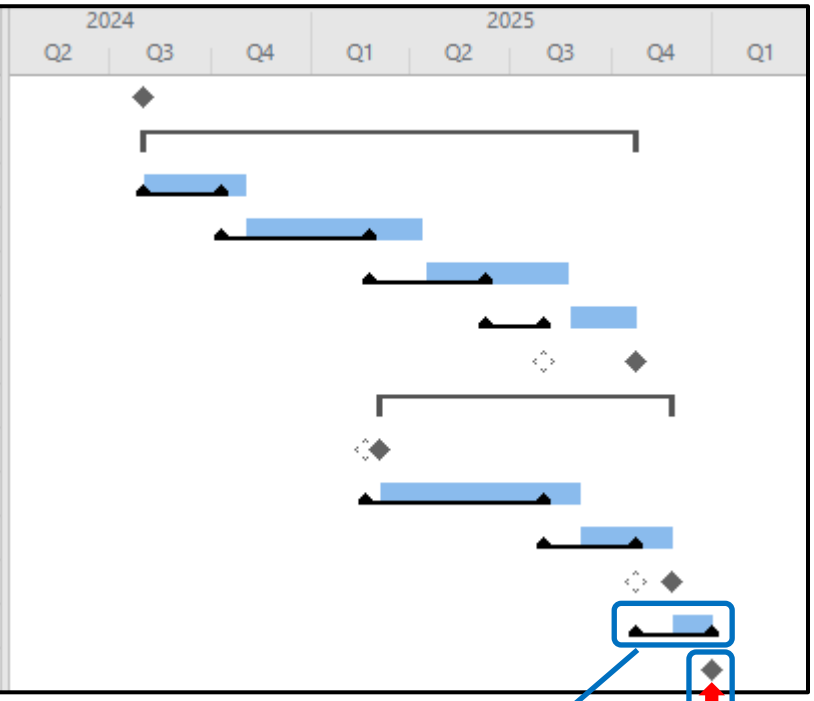
Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 1



Task Name	Total Slack
Project Start	24 days
Test Facility	**24 days**
Lay Test Facility Foundation	24 days
Build Test Facility Structure	24 days
Test Facility Electrical	24 days
Install Furnashings and Equipment	24 days
Test Cacility Complete	24 days
Aircraft	**0 days**
Aircraft Design Received (GFE)	0 days
Fabricate Aircraft Components	0 days
Assemble Aircraft	0 days
Deliver Aircraft	0 days
Schedule Margin	0 days
Project Complete	0 days



Schedule Margin duration…

…is adjusted to hold project completion stable

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Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 2

- **Schedule Margin is intended to provide a more likely (realistic) event forecast by modeling the estimated delay due to schedule risk/uncertainty**
  - Schedule Margin is inserted between the last activity leading to a significant event and the event itself
  - Schedule Margin duration is increased or decreased as the risk to that event increases or decreases respectively
  - Schedule Margin is not intended to drive an event forecast to its required due date, but to a more likely forecast
    - Which could result in positive, zero, or negative total float
  - Schedule Margin will only go to zero when there is no risk to the event (like once the event has occurred)

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Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 2

- **Schedule Margin duration can be estimated in multiple ways**
  - An ideal approach is to use the results of a recent SRA (which quantifies schedules risk & uncertainty)
    - Schedule Margin duration is typically set to the number of working days between the deterministic forecast of an event and a designated probability date (i.e. P50 date)
  - The impact and probability of risks tracked in the project's risk register can be used to underpin the Schedule Margin duration
  - Whatever approach is used should be consistent with the project's risk management system

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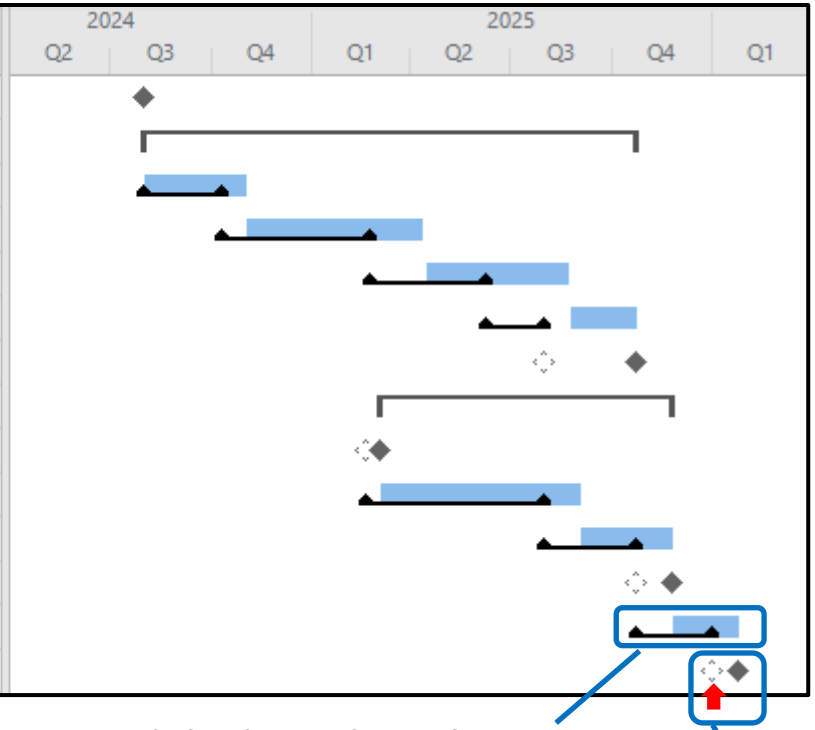
Is Schedule Margin a protective buffer or an estimation of schedule risk?

Forecast
Baseline
PoP End

Perspective 2

Task Name	Total Slack
Project Start	7 days
Test Facility	**7 days**
Lay Test Facility Foundation	7 days
Build Test Facility Structure	7 days
Test Facility Electrical	7 days
Install Furnashings and Equipment	7 days
Test Cacility Complete	7 days
Aircraft	**-17 days**
Aircraft Design Received (GFE)	-17 days
Fabricate Aircraft Components	-17 days
Assemble Aircraft	-17 days
Deliver Aircraft	-17 days
Schedule Margin	-17 days
Project Complete	-17 days



Schedule Margin duration models the risk to the event…

…which may push the forecast beyond contractual targets

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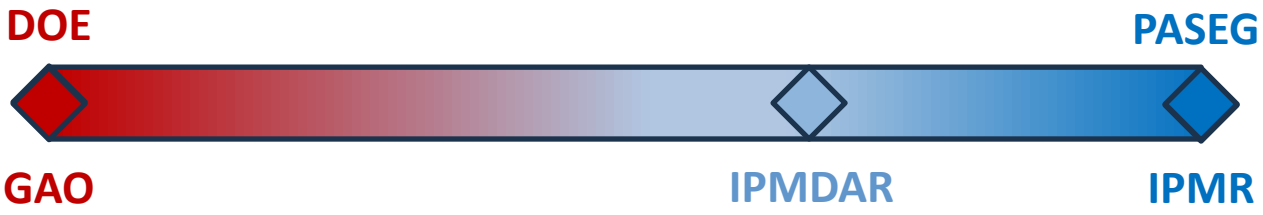
Is Schedule Margin a protective buffer or an estimation of schedule risk?

Perspective 1

Schedule Margin duration is the time between the forecasted completion and the required completion of a significant event

Perspective 2

Schedule Margin Duration is an estimate of the schedule risk to a significant event



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Challenging Long-held Beliefs

Controversial Topics

- Critical Path
- Schedule Visibility Tasks (SVTs)
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- Earned Schedule

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Is "No later Than" (NLT) a Hard Constraint?

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First…what is a Hard Constraint?

- **Guidance (industry and government) are unanimous in describing a "Hard Constraint" as one that…**

  Prevents logic from delaying an activity

  - "*prevent tasks from slipping, especially limit the IMS's forecasting ability*" (IPMDAR)
  - "*constraints which override relationship logic*" (DOE)
  - "*prevent activities from starting or finishing later than planned, essentially restricting the ability of any predecessor r delays to affect their start and finish dates*" (GAO)
  - "*prevents logic from delaying the task beyond the constraint*" (PASEG)

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Second…what is an NLT Constraint?

- **No Later Than (NLT)**
  - Terminology used in MS Project
  - Can be applied to both the Start (SNLT) or Finish (FNLT) of an activity
  - Other scheduling tools use “On or Before” (OoB)
    - Counterpart of NLT in MS Project
    - Can be applied to both the Start (SOoB) or Finish (FOoB) of an activity

Constraints that fall under the NLT umbrella include:

- Start No Later Than
- Start On or Before
- Finish No Later Than
- Finish On or Before

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Is NLT a Hard Constraint?

Perspective 1

All NLT-type constraints are Hard Constraints

Perspective 2

NLT is not always a Hard Constraint,

and OoB is never a Hard Constraint

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Is NLT a Hard Constraint?

Perspective 1

- **NLT Constraints override logic and prevent an activity from being forecasted later than the constraint date**
  - Applies to the Start of an activity (SNLT)
  - Applies to the Finish of an activity (FNLT)

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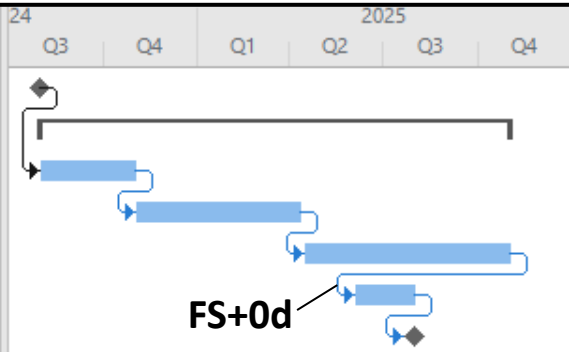
Is NLT a Hard Constraint?

Perspective 1

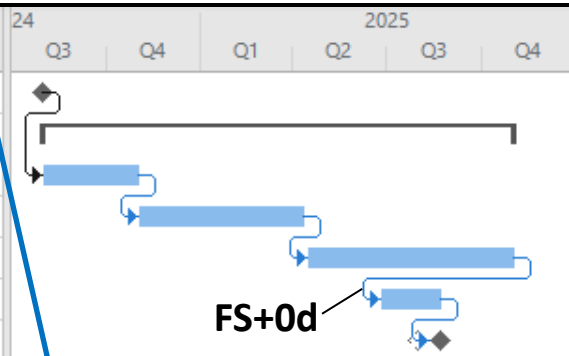
Both FNLT constraints…

…and SNLT constraints…

Task Name	Constraint Type	Constraint Date	Start	Finish
Project Start	As Soon As Possible	NA	8/1/24	8/1/24
Test Facility	**As Soon As Possible**	**NA**	**8/1/24**	**10/31/25**
Lay Test Facility Foundation	As Soon As Possible	NA	8/1/24	10/31/24
Build Test Facility Structure	As Soon As Possible	NA	11/1/24	4/11/25
Test Facility Electrical	As Soon As Possible	NA	4/14/25	10/31/25
Install Furnashings and Equipment	Finish No Later Than	7/31/25	6/3/25	7/31/25
Test Cacility Complete	As Soon As Possible	NA	7/31/25	7/31/25



Task Name	Constraint Type	Constraint Date	Start	Finish
Project Start	As Soon As Possible	NA	8/1/24	8/1/24
Test Facility	**As Soon As Possible**	**NA**	**8/1/24**	**10/31/25**
Lay Test Facility Foundation	As Soon As Possible	NA	8/1/24	10/31/24
Build Test Facility Structure	As Soon As Possible	NA	11/1/24	4/11/25
Test Facility Electrical	As Soon As Possible	NA	4/14/25	10/31/25
Install Furnashings and Equipment	Start No Later Than	6/25/25	6/25/25	8/22/25
Test Cacility Complete	As Soon As Possible	NA	8/22/25	8/22/25



…prevent logic from delaying an activity beyond its Start or Finish constraint date….

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Is NLT a Hard Constraint?

Perspective 2

- **In MS Project, the "Project Options" will determine if NLT constraints will override logic or not**
  - If 

    - NLT will override logic
    - Making them **Hard Constraints**
  - If 

    - Logic will delay the activity beyond the constraint date
    - Making them **Soft Constraints**

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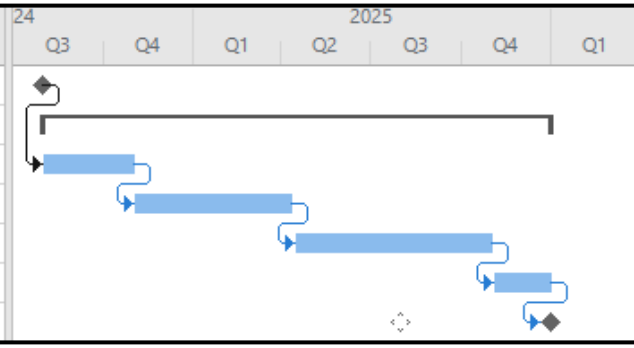
Is NLT a Hard Constraint?

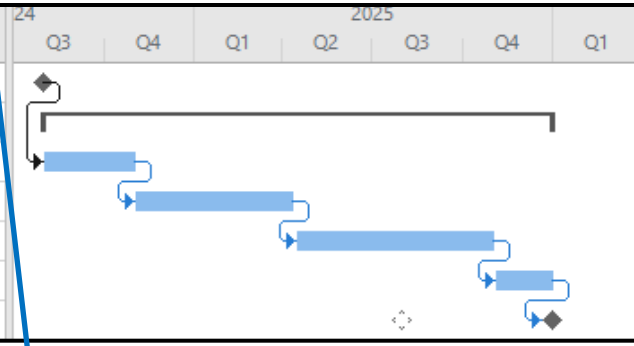
Perspective 2

When ☐ Tasks will always honor their constraint dates ⓘ …

Task Name	Constraint Type	Constraint Date	Start	Finish
Project Start	As Soon As Possible	NA	8/1/24	8/1/24
Test Facility	**As Soon As Possible**	**NA**	**8/1/24**	**12/31/25**
Lay Test Facility Foundation	As Soon As Possible	NA	8/1/24	10/31/24
Build Test Facility Structure	As Soon As Possible	NA	11/1/24	4/11/25
Test Facility Electrical	As Soon As Possible	NA	4/14/25	10/31/25
Install Furnashings and Equipment	Finish No Later Than	7/31/25	11/3/25	12/31/25
Test Cacility Complete	As Soon As Possible	NA	12/31/25	12/31/25



Task Name	Constraint Type	Constraint Date	Start	Finish
Project Start	As Soon As Possible	NA	8/1/24	8/1/24
Test Facility	**As Soon As Possible**	**NA**	**8/1/24**	**12/31/25**
Lay Test Facility Foundation	As Soon As Possible	NA	8/1/24	10/31/24
Build Test Facility Structure	As Soon As Possible	NA	11/1/24	4/11/25
Test Facility Electrical	As Soon As Possible	NA	4/14/25	10/31/25
Install Furnashings and Equipment	Start No Later Than	6/25/25	11/3/25	12/31/25
Test Cacility Complete	As Soon As Possible	NA	12/31/25	12/31/25



…FNLT and SNLT constraints… …have no impact on the forecast of the activity…

…making them **Soft Constraints**

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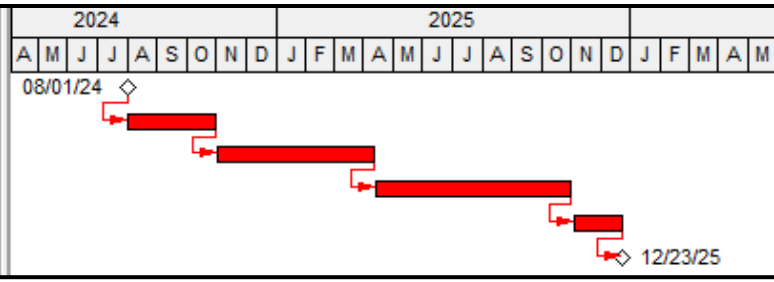
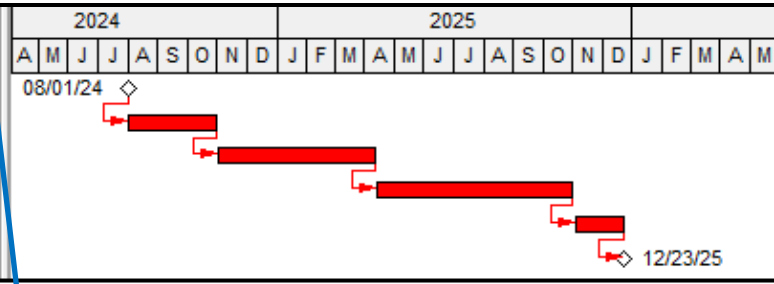
Is NLT (OoB) a Hard Constraint?

Perspective 2

Activity Name	Primary Constraint	Primary Constraint Date	Start	Finish
Project Start			08/01/24	
Lay Test Facility Foundation			08/01/24	10/31/24
Build Test Facility Structure			11/01/24	04/11/25
Test Facility Electrical			04/14/25	10/31/25
Install Furnashings and Equipment	Finish On or Before	07/31/25	11/03/25	12/23/25*
Test Cacility Complete				12/23/25



Activity Name	Primary Constraint	Primary Constraint Date	Start	Finish
Project Start			08/01/24	
Lay Test Facility Foundation			08/01/24	10/31/24
Build Test Facility Structure			11/01/24	04/11/25
Test Facility Electrical			04/14/25	10/31/25
Install Furnashings and Equipment	Start On or Before	06/25/25	11/03/25*	12/23/25
Test Cacility Complete				12/23/25



SOoB and FOoB constraints…

…have no impact on the forecast of the activity…

…making them **Soft Constraints**

(and there is no "Project Option" that would ever convert them to Hard Constraints)

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Is NLT a Hard Constraint?

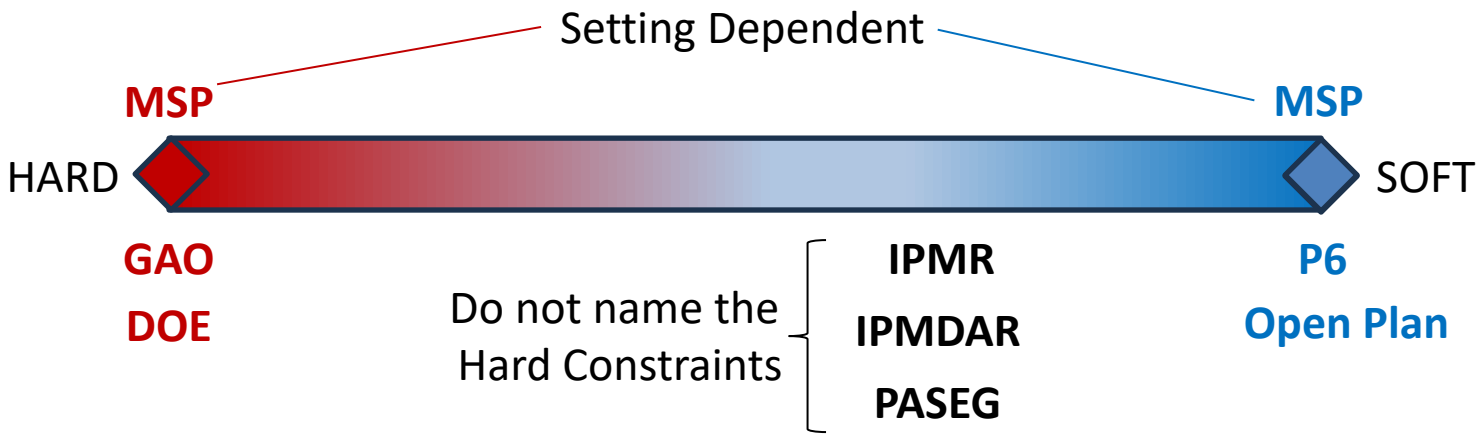
Perspective 1

All NLT-type constraints are Hard Constraints

Perspective 2

NLT is not always a Hard Constraint,

and OoB is never a Hard Constraint



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Challenging Long-held Beliefs

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- Critical Path
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Are Activities and Milestones completely different?

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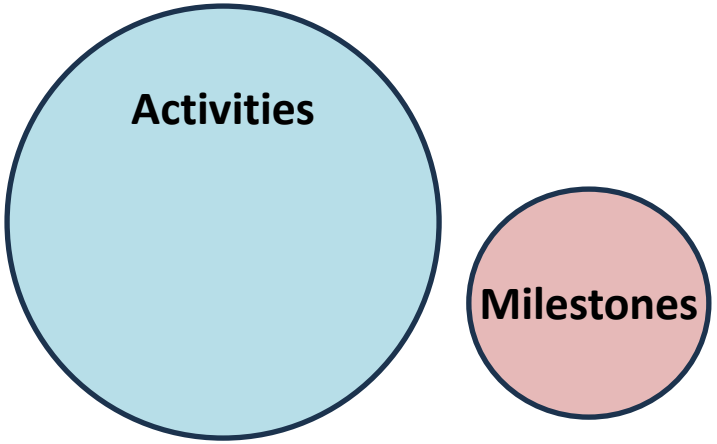
Are Activities and Milestones different?

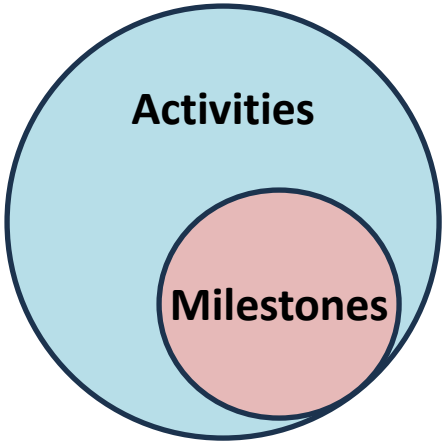
Perspective 1

Activities have a duration > 0d. Milestones are 0d.



Perspective 2

Milestones are a unique type of activity with 0d.



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Are Activities and Milestones different?

Perspective 1

- **Activities and Milestones are the building blocks of an IMS**
  - Activities model effort or waiting periods
    - Activities have a duration greater than 0 days
  - Milestones (or Events) provide increased emphasis/visibility and usually represent the beginning or ending of significant effort
    - Milestones have a duration equal to 0 days

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Are Activities and Milestones different?

Perspective 2

- **In practice, “Activity” is an umbrella term that represents at least 4 different types of elements that can be a row/line in an IMS**
  - Summary
  - Hammock
  - Normal Activity
  - Milestone

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Are Activities and Milestones different?

Perspective 2

4 Common Activity Types

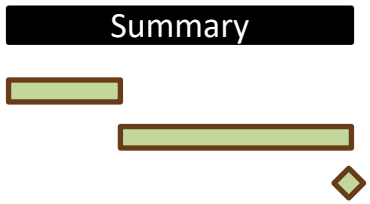
Activity
(a schedule element (row) within an IMS)

Activity Categories

Higher-Level Activities | **Detail Activities**

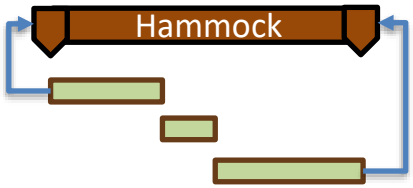
Activity Types

1 Summary



A schedule element (row) that models the time-phasing of other activities that are either at a lower level of indenture or share a common coding attribute. Summary Activities may also sum up other data, such as resource loading, from it's lower-level activities.

2 Hammock



A schedule element (row) whose start and finish are derived from the start or finish of other Detailed Activities. The duration will automatically adjust with the dates of associated tasks or milestones. The start and finish of a Hammock is determined by predecessor logic or, alternatively, may be defined by a linked date constraint from other activities.

3 Normal Activity

A schedule element (row) within the IMS that is at the lowest level of detail and has a duration greater than zero.

4 Milestone

A schedule element (row) within the IMS that is at the lowest level of detail and has a duration equal to zero. Milestones are commonly used to provide increased visibility into the beginning or completion of another Standard Activity.

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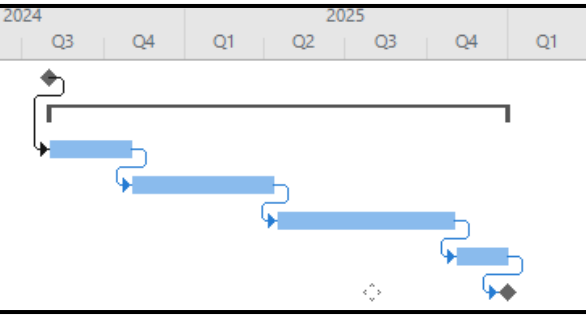
Are Activities and Milestones different?

MS Project | Perspective 2

All schedule lines/rows (including Summaries & milestones) have a “Task Name” (and “Task Calendar”, and “Task Mode”)…

Task Name	Task Calendar	Task Mode	Summary	Milestone	Finish
Project Start	Standard		No	Yes	8/1/24
Test Facility	**Standard**		**Yes**	**No**	**12/31/25**
Lay Test Facility Foundation	Standard		No	No	10/31/24
Build Test Facility Structure	Standard		No	No	4/11/25
Test Facility Electrical	Standard		No	No	10/31/25
Install Furnashings and Equipment	Standard		No	No	12/31/25
Test Cacility Complete	Standard		No	Yes	12/31/25



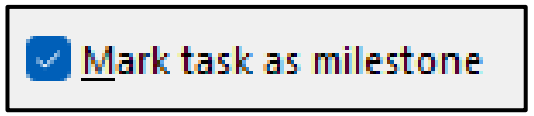
Task ID (assignment field) - Microsoft Support

Description The Task ID field contains the number that Project assigns to each task as you add it to the project. The Task ID indicates the position of the task with respect to the other tasks.

…and all schedule lines/rows (including Summaries & milestones) are assigned a “Task ID”…

…and if an Activity is a “Summary” or a “Milestone”, there are fields to identify them

(note: there is not a “Task” field, because they are all Tasks in MS Project)



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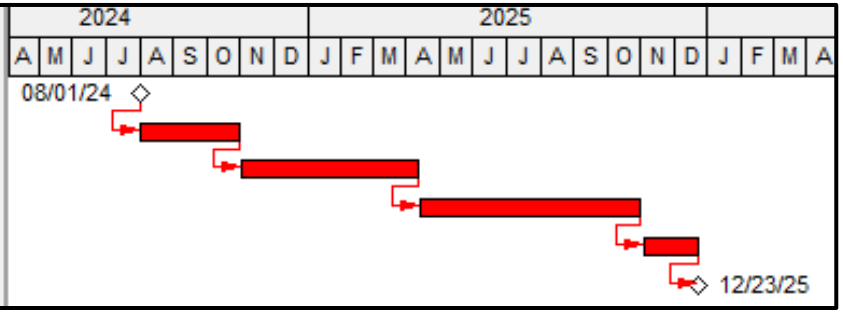
Are Activities and Milestones different?

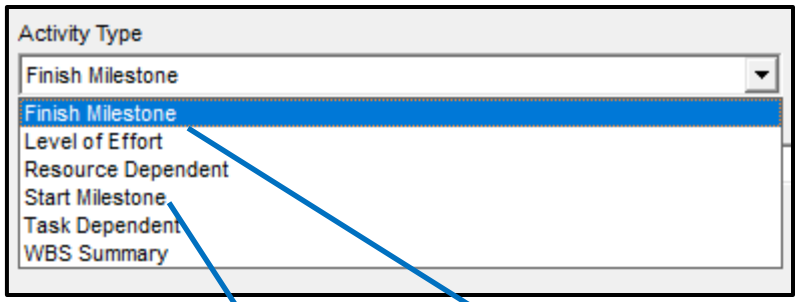
Primavera | Perspective 2

All schedule lines/rows (including Summaries & milestones)
have an “Activity ID” & “Activity Name” (and many other “Activity ____” fields).

Activity ID	Activity Name	Activity Status	Activity % Complete
A1000	Project Start	Not Started	0%
A1010	Lay Test Facility Foundation	Not Started	0%
A1020	Build Test Facility Structure	Not Started	0%
A1030	Test Facility Electrical	Not Started	0%
A1040	Install Furnashings and Equipment	Not Started	0%
A1050	Test Cacility Complete	Not Started	0%



“Activity Types”



“Start Milestone” & “Finish Milestone”
are both considered types of an Activity

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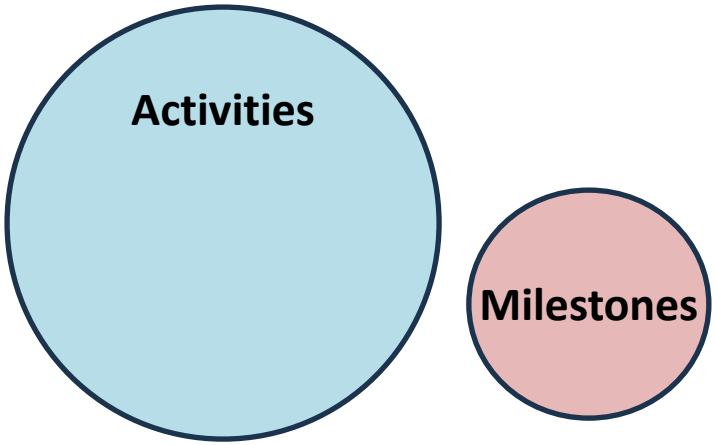
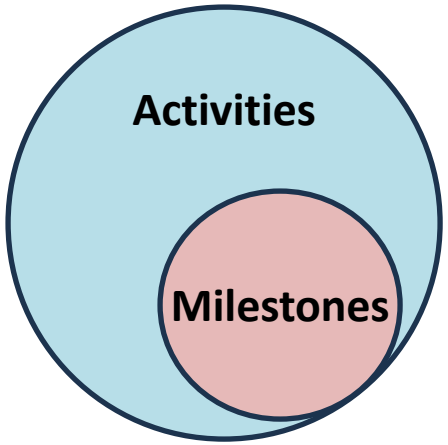
Are Activities and Milestones different?

Perspective 1



Perspective 2



IPMR
IPMDAR
GAO
DOE
PASEG

MSP
Open Plan
P6

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Challenging Long-held Beliefs

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Does Earned Schedule provide insightful and useful information?

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Is Earned Schedule useful?

Perspective 1

Earned Schedule is a pseudo-science that attempts to replace Earned Value

Perspective 2

Earned Schedule builds on Earned Value by looking at the same data from a different perspective

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Is Earned Schedule useful?

Perspective 1

- **Earned Schedule is unproven**
  - Earned Schedule adoption is fairly rare across industry and government
  - Earned Value has decades of use with an avalanche of data and studies to validate its usefulness

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Is Earned Schedule useful?

Perspective 1

- **Earned Schedule is difficult to understand and implement**
  - With a proven approach (EV) already in place, additional untrustworthy information may cloud or dilute the effectiveness of Earned Value
  - Very few analysis tools even calculate Earned Schedule metrics
  - There is a concern that some companies might try to replace Earned Value with Earned Schedule

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Is Earned Schedule useful?

Perspective 2

- **No one is questioning the power and effectiveness of Earned Value when applied properly. However, traditional EV has some interesting "features" (especially on the Schedule side) that we have become accepted as normal**
  - No matter how far ahead or behind an effort is being performed, SPI and SV will always trend to "on track" by the time everything is in the past
  - Possibly resulting in a misleading perspective on schedule performance

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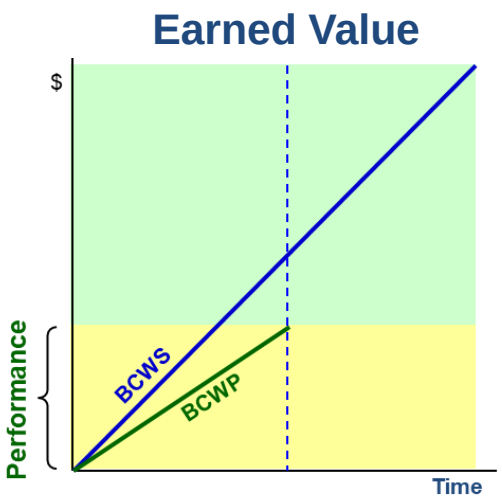
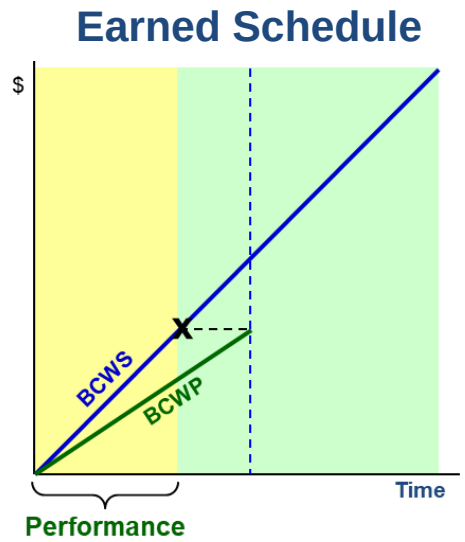
Is Earned Schedule useful?

Perspective 2

- **Earned Schedule can never eliminate Earned Value**
  - ES cannot be calculated without EV data (BCWP & BCWS)
  - ES just looks at the exact same data from a differing perspective



Measures Schedule Performance off the "Dollars" axis



Measures Schedule Performance off the "Time" axis

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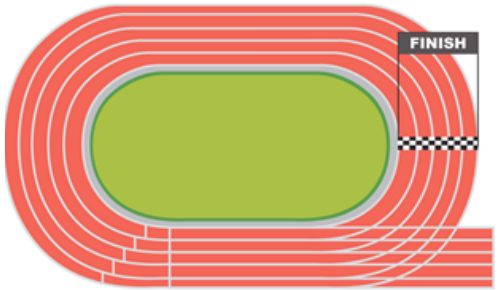
Is Earned Schedule useful?

Perspective 2

The Joshua HS girls track team has a goal of finishing the 4x400m relay in 4 minutes



			SPI		SPI(t)	
Runner	**Goal**	**Actual**	**During**	**After**	**During**	**After**
1	60s	89s (fell at start)	Unfavorable	1.0	Unfavorable	.67
2	60s	73s (handoff issue)	Unfavorable	1.0	Unfavorable	.82
3	60s	79s (handoff issue)	Unfavorable	1.0	Unfavorable	.76
4	60s	53s (personal best)	Unfavorable	1.0	Favorable	1.09
Total	**4 min**	**4.9 min**	**Unfavorable**	**1.0**	**Unfavorable**	**.82**

Is this useful information to the management team?

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Relevant in all Conditions

Slow and Late	Fast and Late	On Pace and Late
		
SPI_t = .6 SV_t = -9 days	SPI_t = 1.3 SV_t = -9 days	SPI_t = 1.0 SV_t = -9 days
Slow and Early	**Fast and Early**	**On Pace and Early**
		
SPI_t = .6 SV_t = +7 days	SPI_t = 1.3 SV_t = +7 days	SPI_t = 1.0 SV_t = +7 days
Slow and On Time	**Fast and On Time**	**On Pace and On Time**
		
SPI_t = .6 SV_t = 0 days	SPI_t = 1.3 SV_t = 0 days	SPI_t = 1.0 SV_t = 0 days

SPI = 1.0
SV = $0

Actual
BL

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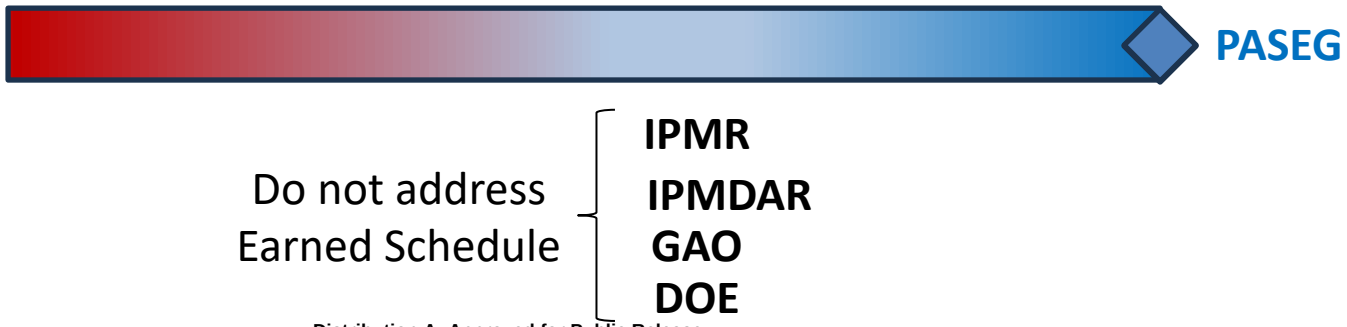
Is Earned Schedule useful?

Perspective 1

Earned Schedule is a pseudo-science that attempts to replace Earned Value

Perspective 2

Earned Schedule builds on Earned Value by looking at the same data from a different perspective



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Thank You