Scheduling's
Most Controversial Topics
(part 2)

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Controversial Topics

- **Critical Path**

- Schedule Visibility Tasks (SVTs)

- Schedule Margin (SM)

  } **Covered in Part 1**

- **NLT (On or Before) is/is not a Hard Constraint**

- **Milestones are/are not Activities**

- **Earned Schedule**

Potential "part 3" topics:

- **Baselining:** …ASAP (BL Date <= Contract Date)

  …ALAP (BL Date = Contract Date)

- **OTS:** …is baselining late to any (interim) contractual event?

  …or is only baselining beyond the contract PoP?

- **LOE:** …LOE should be included in the IMS

  …LOE should not be included in the IMS

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

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

NDIA

Perspective 1

Perspective 2

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

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 <u>Time Now</u>, have the <u>longest duration</u>, and be the <u>least float</u>?

<u>Perspective 1</u>

- **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

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

<u>Perspective 1</u>

- **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 <u>least Total Float (Slack) in the project.</u>

  (this approach can be applied to any scheduling tool)

Must the Critical Path start at <u>Time Now</u>, have the <u>longest duration</u>, and be the <u>least float</u>?
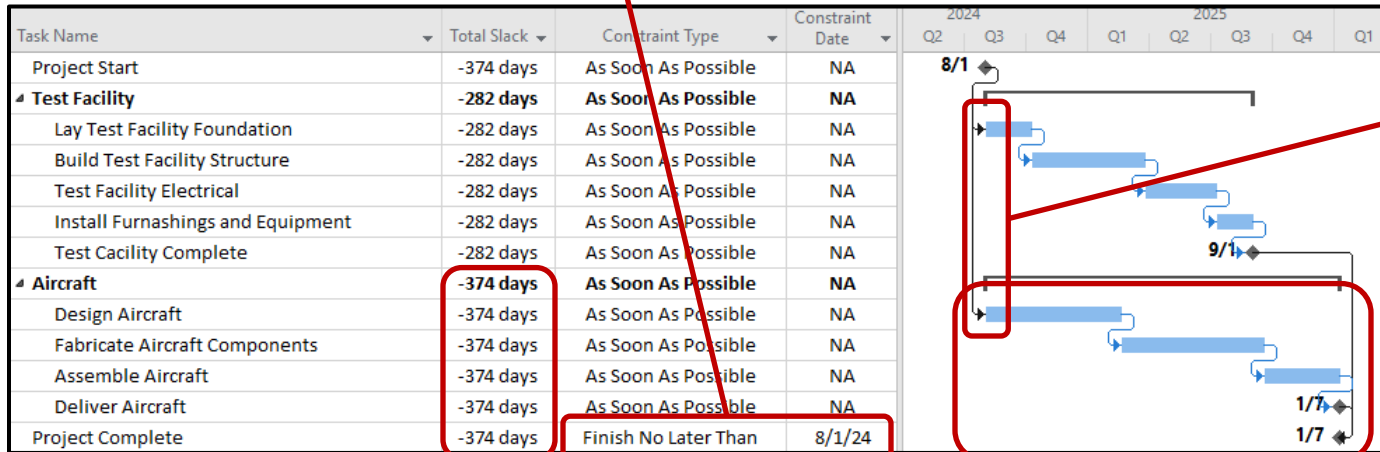
<u>Perspective 1</u>

- **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

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

Perspective 1

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

Task Name	Total Slack	Constraint Type	Constraint Date	2024 Q2	Q3	Q4	2025 Q1	Q2	Q3	Q4	Q1
Project Start	-374 days	As Soon As Possible	NA	8/1							
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			9/1					
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						1/7		
Project Complete	-374 days	Finish No Later Than	8/1/24						1/7		

…all paths will start at Time Now…

…but the Critical Path will have the least Total Float…

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

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

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) <u>after Time Now</u>

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

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<u>Perspective 2</u>

- **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

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

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

<u>Perspective 2</u>

- **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) <u>will not have the least total float.</u>

    - Even if the "constraint method" is used to determine the CP, once the overriding constraint is removed, the CP (in the unaltered IMS) <u>may no longer have the least total float</u>
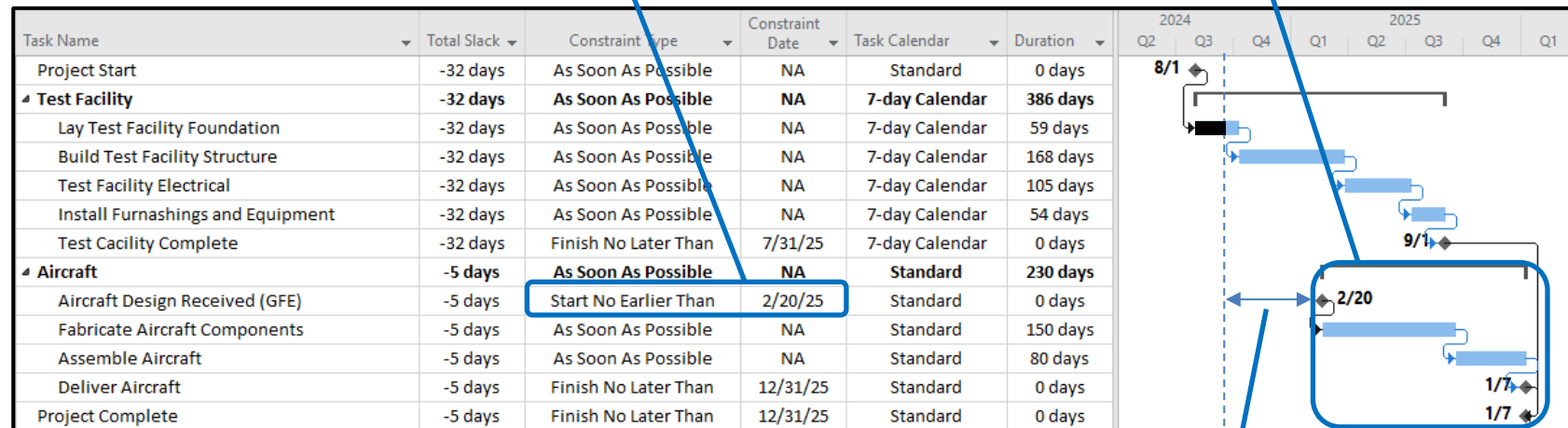
Must the Critical Path Start at <u>Time Now</u>?

Perspective 2

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

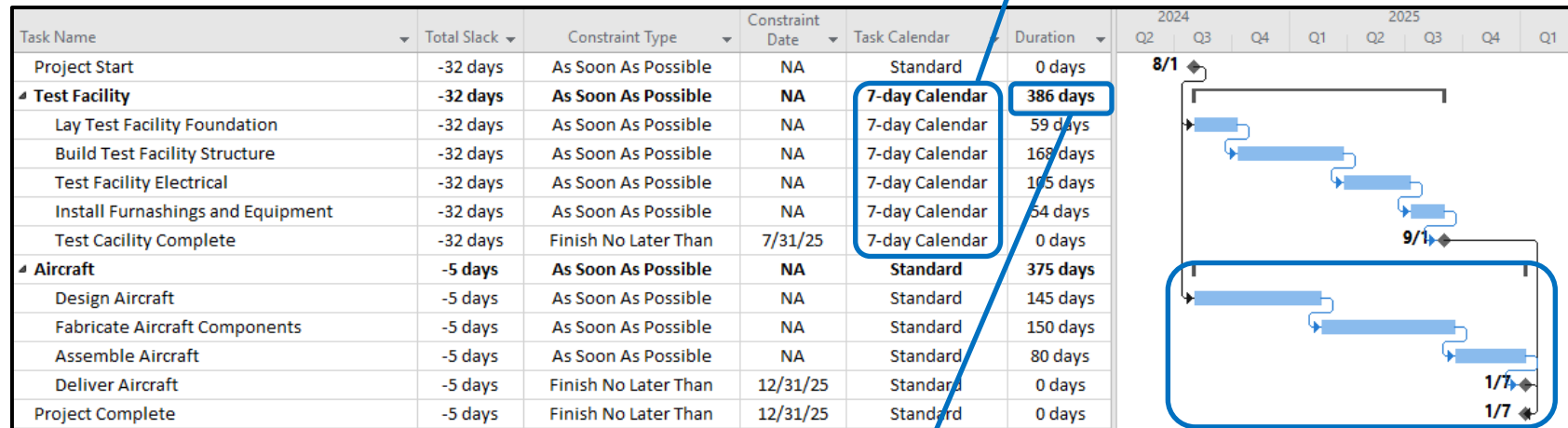…the Critical Path
(the path determining project completion)

…may not start at Time Now

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

Must the Critical Path have the <u>longest duration</u>?

<u>Perspective 2</u>

When alternate calendars are utilized to model different working schedules…

Task Name	Total Slack	Constraint Type	Constraint Date	Task Calendar	Duration	2024 Q2	Q3	Q4	2025 Q1	Q2	Q3	Q4	Q1
Project Start	-32 days	As Soon As Possible	NA	Standard	0 days	8/1							
▲ **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				9/1				
▲ **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							1/7	
Project Complete	-5 days	Finish No Later Than	12/31/25	Standard	0 days							1/7	

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

…may NOT be the Critical Path
(the path determining project completion)
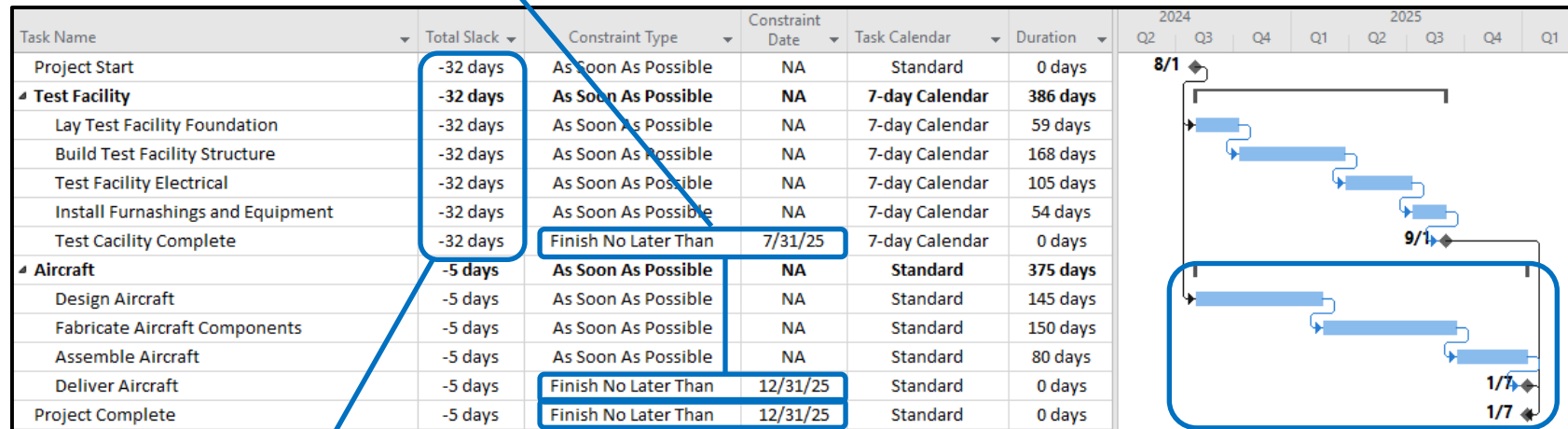
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Must the Critical Path have the <u>least float?</u>

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	2024 Q2 Q3 Q4	2025 Q1 Q2 Q3 Q4	Q1
Project Start	-32 days	As Soon As Possible	NA	Standard	0 days	8/1		
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	9/1		
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	1/7		
Project Complete	-5 days	Finish No Later Than	12/31/25	Standard	0 days	1/7		

…the path with the least Total Float…

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

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

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

Activity Attributes

Historic Critical Path Characteristic	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

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

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)*

IPMR   GAO   IPMDAR   DOE   PASEG

Controversial Topics

- [Critical Path](#)

- Schedule Visibility Tasks (SVTs)

- Schedule Margin (SM)

Covered in Part 1

- [NLT (On or Before) is/is not a Hard Constraint](#)

- [Milestones are/are not Activities](#)

- [Earned Schedule](#)

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"?

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

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

<u>Perspective 1</u>

- Non-PMB related items = Tasks are <u>not</u> 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.

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

Perspective 1

ID	Unique ID	Name	Cost	J A S O N D J F M
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	J A S O N D J F
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**	

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	J A S O N D J F
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	

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

NDIA

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
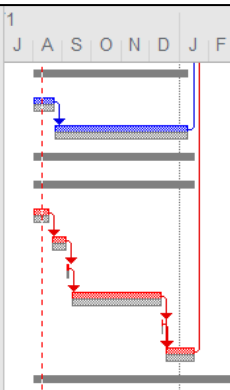
Examples:

- "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

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

Perspective 2

ID	Unique ID	Name	Cost	1 J A S O N D J F
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**	

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

Perspective 2 (maybe 3?)

ID	Unique ID	Name	Cost	1 J A S O N D J F M
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	

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

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

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.

Is Indirect work "non-PMB related"?

Perspective 1

ID	Unique ID	Name	Cost	J A S O N D J
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.

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.

Is Indirect work "non-PMB related"?

Perspective 2

ID	Unique ID	Name	Cost	J A S O N D J
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. 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.

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.)

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?

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?

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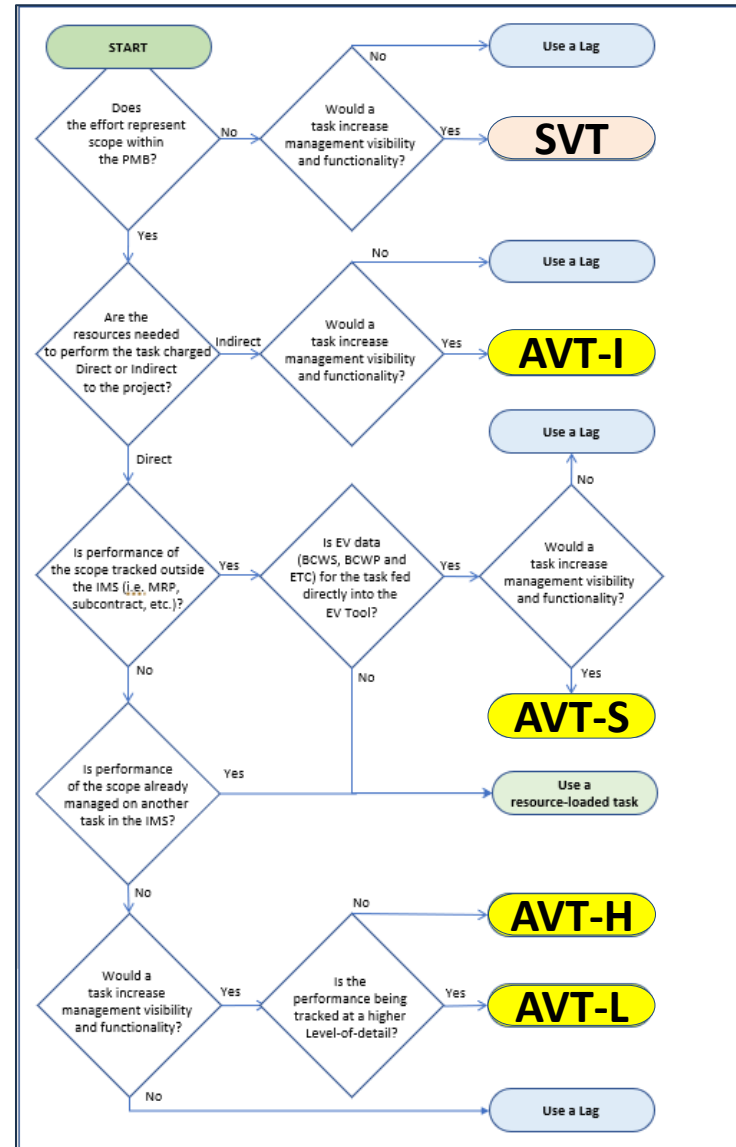
What do we call tasks without resources that are not SVTs?

Perspective 2

- **Please No**

Controversial Topics

- Critical Path

- Schedule Visibility Tasks (SVTs) ⎫
                                      ⎬ **Covered in Part 1**
- Schedule Margin (SM) ⎭

- NLT (On or Before) is/is not a Hard Constraint

- Milestones are/are not Activities

- Earned Schedule

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

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

NDIA

Perspective 1

Perspective 2

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

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

Purpose:

To protect significant events from minor slippages

Purpose:

To provide more likely (realistic) event forecasts

Is Schedule Margin a <u>protective buffer</u> or an estimation of schedule risk?

<u>Perspective 1</u>

- **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.

Is Schedule Margin a <u>protective buffer</u> or an estimation of schedule risk?

Perspective 1

Legend:
- Forecast
- Baseline
- PoP End

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

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

NDIA

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)

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

NDIA

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

Is Schedule Margin a protective buffer or an estimation of schedule risk?
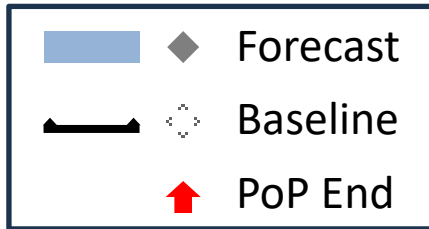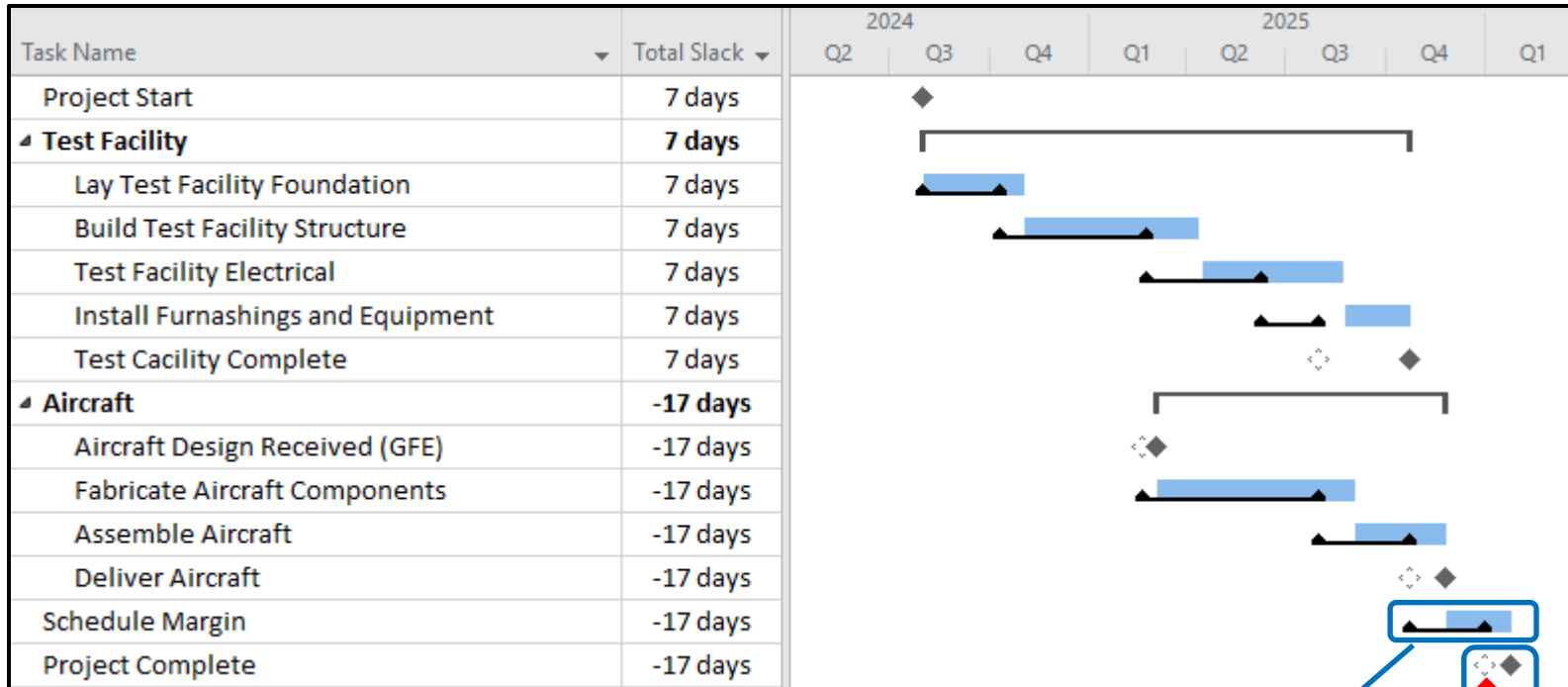
Schedule Margin duration models the risk to the event…

…which may push the forecast beyond contractual targets

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

Perspective 1

Perspective 2

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

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

DOE

PASEG

GAO

IPMDAR

IPMR
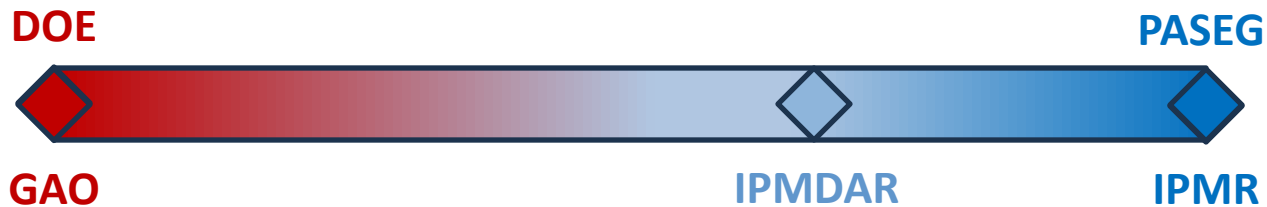
Controversial Topics

- [Critical Path](#)

- Schedule Visibility Tasks (SVTs) ⎫
                                      ⎬ **Covered in Part 1**
- Schedule Margin (SM)   ⎭

- [NLT (On or Before) is/is not a Hard Constraint](#)

- [Milestones are/are not Activities](#)

- [Earned Schedule](#)

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

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 or delays to affect their start and finish dates*" (GAO)

    – "*prevents logic from delaying the task beyond the constraint*" (PASEG)

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   - Finish No Later Than

  - Start On or Before   - Finish On or Before

Is NLT a Hard Constraint?

NDIA

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

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)

Is NLT a Hard Constraint?

NDIA

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

FS+0d

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

FS+0d

…prevent logic from delaying an activity beyond its Start or Finish constraint date….
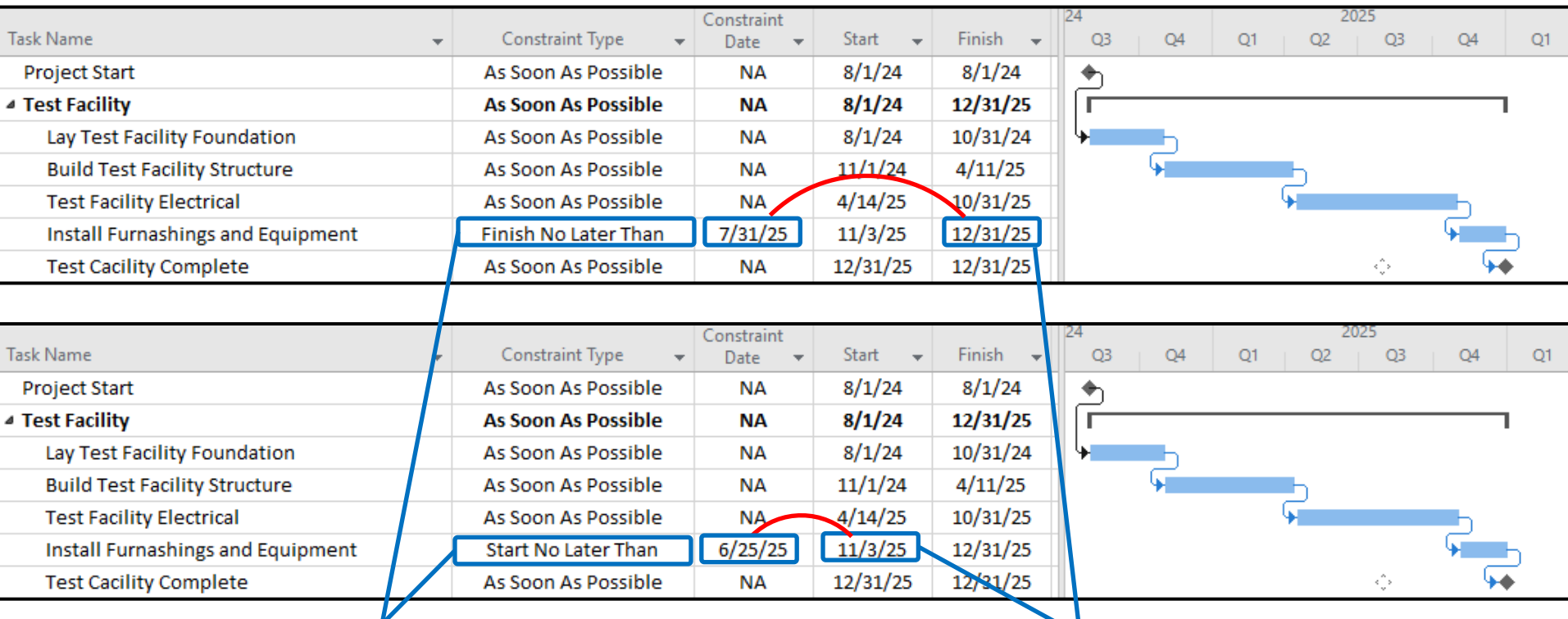
Is NLT a Hard Constraint?

Perspective 2

- **In MS Project, the "Project Options" will determine if NLT constraints will override logic or not**
    - If ☑ Tasks will always honor their constraint dates ⓘ

        - NLT will override logic

        - Making them **Hard Constraints**

    - If ☐ Tasks will always honor their constraint dates ⓘ

        - Logic will delay the activity beyond the constraint date

        - Making them **Soft Constraints**

Is NLT a Hard Constraint?

Perspective 2

When ☐ Tasks will always honor their constraint dates ⓘ ...

Task Name	Constraint Type	Constraint Date	Start	Finish	Q3	Q4	Q1	Q2	Q3	Q4	Q1
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	Q3	Q4	Q1	Q2	Q3	Q4	Q1
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**

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)

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

Setting Dependent

MSP   **MSP**

HARD   SOFT

GAO   **P6**

DOE   Do not name the   **IPMR**   **Open Plan**
              Hard Constraints   **IPMDAR**
                                       PASEG
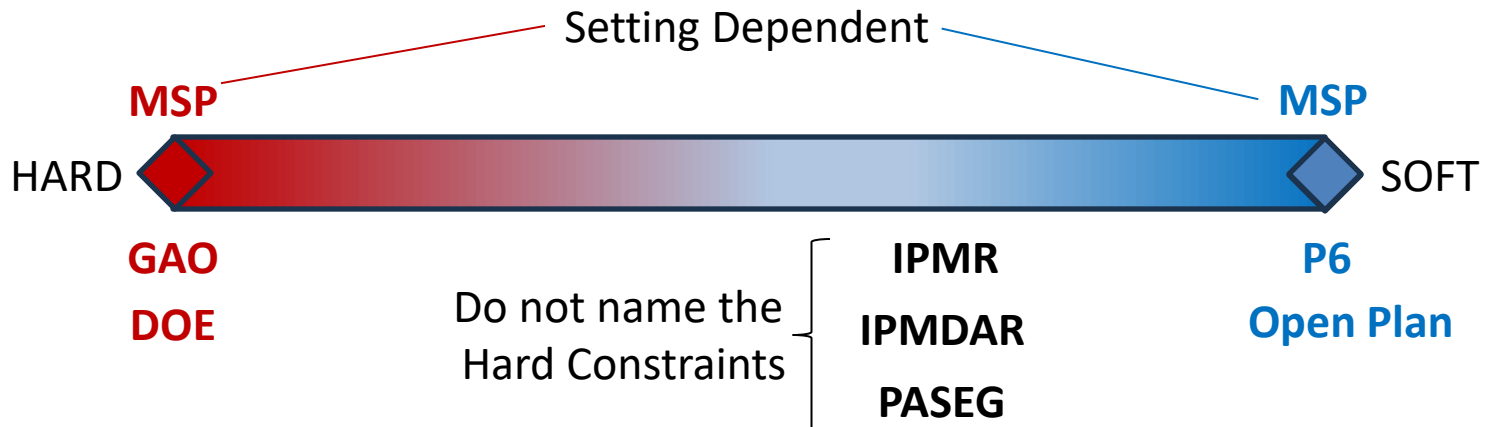
Controversial Topics

- [Critical Path](#)

- Schedule Visibility Tasks (SVTs)   ⎫
                                       ⎬ **Covered in Part 1**
- Schedule Margin (SM)   ⎭

- [NLT (On or Before) is/is not a Hard Constraint](#)

- [Milestones are/are not Activities](#)

- [Earned Schedule](#)

Are
Activities and Milestones completely different?

Are Activities and Milestones different?

Perspective 1

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

Activities
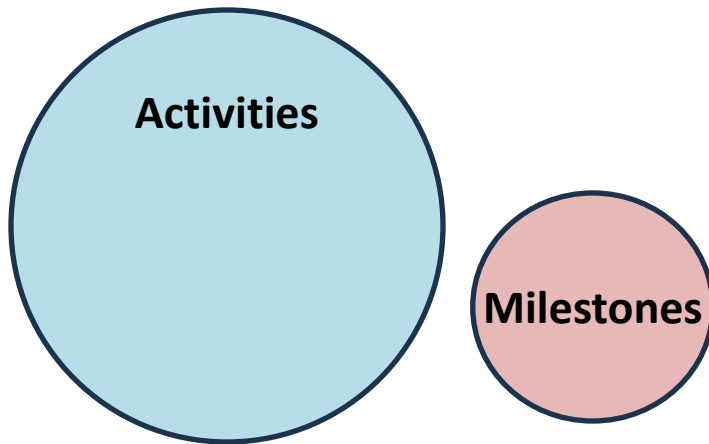
Milestones

Perspective 2

Milestones are a unique type of activity with 0d.

Activities

Milestones

Are Activities and Milestones different?

NDIA
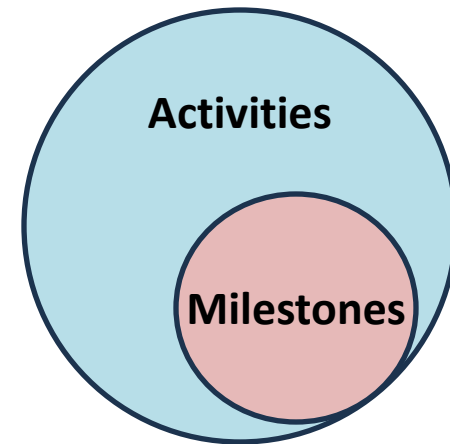
Perspective 1

- **Activities and Milestones are the building blocks of an IMS**
  - Activities model effort or waiting periods
    - Activities have a duration <u>greater than 0 days</u>

  - Milestones (or Events) provide increased emphasis/visibility and usually represent the beginning or ending of significant effort
    - Milestones have a duration <u>equal to 0 days</u>

Are Activities and Milestones different?

NDIA

Perspective 2

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

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

2
Hammock

3
Normal Activity

4
Milestone

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.

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.

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

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.

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	2024 Q2	Q3	Q4	2025 Q1	Q2	Q3	Q4	Q1
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)*

☑ Mark task as milestone

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		2024	2025	
					A M J J A S O N D	J F M A M J J A S O N D	J F M A
A1000	Project Start	Not Started	0%		08/01/24 ◇		
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%			12/23/25 ◇	

"Activity Types"

Activity Type

Finish Milestone ▼

Finish Milestone
Level of Effort
Resource Dependent
Start Milestone
Task Dependent
WBS Summary

"Start Milestone" & "Finish Milestone"
are both considered types of an Activity

Are Activities and Milestones different?

NDIA

Perspective 1

Activities

Milestones

Perspective 2
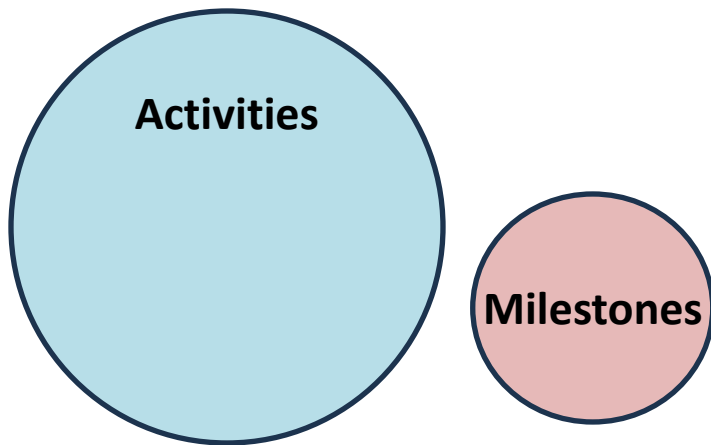
Activities

Milestones

IPMR
IPMDAR
GAO
DOE
PASEG

MSP
Open Plan
P6

Controversial Topics

- [Critical Path](#)

- Schedule Visibility Tasks (SVTs)   } **Covered in Part 1**

- Schedule Margin (SM)

- [NLT (On or Before) is/is not a Hard Constraint](#)

- [Milestones are/are not Activities](#)

- [Earned Schedule](#)

Does Earned Schedule provide insightful and useful information?

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

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

Is Earned Schedule useful?

<u>Perspective 1</u>

- **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

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 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

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

Earned Value
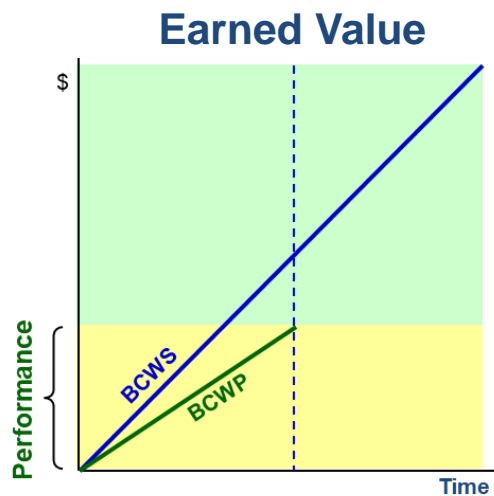
Measures
Schedule **Performance**
off the "Dollars" axis
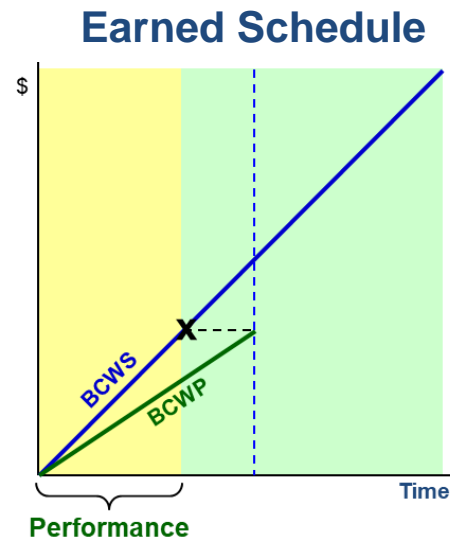
Earned Schedule

Measures
Schedule **Performance**
off the "Time" axis

Is Earned Schedule useful?

Perspective 2

The Joshua HS girls track team has a goal of finishing the 4x400m relay in 4 minutes
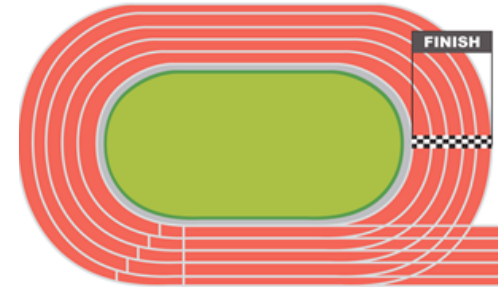
Runner	Goal	Actual	SPI During	SPI After	SPI(t) During	SPI(t) After
1	60s	89s (fell at start)	Unfavorable	1.0	Unfavorable	.67
2	60s	73s (handoff issue)	Unfavorable	1.0	Unfavorable	.82
3	60s	79s (handoff issue)	Unfavorable	1.0	Unfavorable	.76
4	60s	53s (personal best)	Unfavorable	1.0	Favorable	1.09
Total	**4 min**	**4.9 min**	**Unfavorable**	**1.0**	**Unfavorable**	**.82**

Is this useful information to the management team?

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

17448

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

PASEG

Do not address
Earned Schedule

IPMR

IPMDAR

GAO

DOE

Thank You

BACKUP

Total Float

"The amount of time a task/activity or milestone can slip before delaying contract completion or constraint date." ~IPMR DID

NDIA

GAO Schedule Assessment Guide

Ensuring Reasonable Total Float

Best Practice 7: The schedule should identify reasonable total float (or slack)—the amount of time a predecessor activity can slip before the delay affects the program's estimated finish date—so that the schedule's flexibility can be determined. The length of delay that can be accommodated without the finish date's slipping depends on the number of date constraints within the schedule and the degree of uncertainty in the duration estimates, among other factors, but the activity's total float provides a reasonable estimate of this value. As a general rule, activities along the critical path have the least float. Unreasonably high total float on an activity or path indicates that schedule logic might be missing or invalid.

COMMON BARRIERS TO A VALID CRITICAL PATH

As noted above, the critical path ideally represents the longest path, as when the schedule network is free of backward-pass constraints and activities on this path have the least float in the network. In this section, we highlight issues that prevent the critical path from being the longest path. When these issues arise, it is imperative that management recognize not only critical path activities—that is, activities with the lowest total float—but also activities that are truly driving the finish date of key milestones.

Calculating a critical path is directly related to the logical sequencing of activities. Missing or convoluted logic and artificial date constraints prevent the calculation of a valid critical path; they can cause activities that are not critical to appear to be critical.

IPMR

DI-MGMT-81861A

If a task on a driving path slips, the interim contract milestone will slip. Driving path may not be part of the contract critical path. The Government may specify which driving path is currently reportable. Without Government direction, the contractor reports the driving path to the next major event, at a minimum.

3.7.1.3.5.9. Critical Path. A sequence of discrete tasks/ the network that has the longest total duration through t or project. Discrete tasks/activities along the critical least amount of float/slack. Activities that contain "0" total float are not by default the critical path. The cri calculation is based on relationships, lead/lag times, du constraints, and status. Excessive constraints and incomp incorrect, or overly constrained logic shall be avoided b can skew the critical path.

IPMDAR Implementation & Tailoring Guide

2.4.2.13. Critical Path(s)

2.4.2.13 Critical Path(s). Shall be clearly identified in both the Native Schedule and the SPD deliveries. (Refer to SPD FFS 2.2.10)

Refer to the Earned Value System Interpretation Guide (EVMSIG), located on the AAP website (http://www.acq.osd.mil/evm), for Critical Path definition.

Critical path identification is based on relationships, lead/lag times, durations, calendars, constraints, and status. Excessive constraints (i.e., 'constraint' selections and/or tool option settings that result in constraint like impacts to tasks/milestones) and incomplete, incorrect, or overly constrained logic shall be avoided because they can skew identification of the critical path.

SCHEDULE MARGIN

DOE Scheduling Guide

7.7.5 Drawdown of SM

Ensure the duration of each SM activity in the baseline IMS equals its counterpart in the forecast IMS at the start of a project or project phase. However, as the project or project phase progresses, the contractor may change the SM based on status or subsequent SRA for the remaining scope due to revised activity duration uncertainty or estimated impacts of residual risks. When less than 10 percent of the SM in the baseline IMS remains, review the adequacy of the SRA that generated the SM.

1. *Forecast IMS:* Only the contractor may reduce a SM activity's duration. Document forecast schedule SM consumption in the Format 5 contractor performance report (CPR) or integrated program management report (IPMR). Consumption mitigates negative total float caused by a hard-constrained CD-4 milestone. Compare the percent SM consumed to the percent complete of the project. Actual risks to the project may exceed those anticipated if the ratio exceeds one. Retain a totally consumed SM activity in the schedule with a duration of zero. While the baseline SM remains under change control, the forecast SM does not.

PASEG

Description

Program teams should follow the following guidelines when using Schedule Margin:

- Schedule Margin should be represented in both the Baseline and Forecast schedules
- Schedule Margin tasks should be restricted to an appropriate number of occurrences based on managing risk to increase schedule accuracy
- Schedule Margin duration should be the Program Manager's assessment of the amount of remaining schedule risk/uncertainty to the subsequent event
- Schedule Margin duration should be justifiable and part of the program's risk management process
- Schedule Margin tasks should be clearly and consistently identifiable
- Schedule Margin should be placed as the last task/activity before key contractual events, significant logical integration/test milestones, end item deliverables, or contract completion
- The forecast duration of Schedule Margin tasks should be maintained as part of the standard status cycle

IPMDAR Implementation & Tailoring Guide

Schedule margin is under the control of the contractor's program manager. Schedule margin is an optional technique used for insight and management of schedule risks with the intent to improve program management's ability to accurately plan, forecast and manage scheduled work. As such, schedule margin task(s) cannot have assigned resources (budget or ETC), will not be used to assess earned value performance, and is/are established as part of the baseline.

GAO Schedule Assessment Guide

SCHEDULE CONTINGENCY

A baseline schedule includes margin or a reserve of extra time, referred to as schedule contingency, to account for known and quantified risks and uncertainty. The contingency represents a gap in time between the finish date of the last activity (the planned date) and the finish milestone (the committed date). When schedule contingency is depicted this way, a delay in the finish date of the predecessor activity results in a reduction of the contingency activity's duration. This reduction translates into the consumption of schedule contingency.

IPMR Implementation Guide

4.14.2 Intent Regarding Schedule Margin.

Schedule margin tasks are intended to represent the time necessary to account for schedule risks/uncertainties. As such, schedule margin tasks are not associated with any specific scope or resources, will not be used to assess earned value performance, and are intended to improve program management's ability to accurately plan, forecast and manage scheduled work. Schedule margin durations should represent the estimated schedule risk/uncertainty to the subsequent event/activity and be traceable to the program's risk management system.

HARD CONSTRAINTS

IPMR Implementation Guide

Constraints do not allow the schedule to project future events based on the logical relationships in the IMS. Hard constraints, those that prevent tasks from slipping, especially limit the IMS's forecasting ability. Common schedule tools allow a constraint override capability. This "hard" definition only applies to constraints that are prohibiting in operation the forecast schedule from reflecting schedule slips. Hard constraints must include a note field that explains why the constraint was used. This helps users of the IMS to understand which scenarios may cause distorted forecast dates or the assumptions under which the schedule is based. Rationale and constrained dates for these tasks should not change often, if at all. Therefore, maintenance of these tasks should be minimal.

MS Project Specifics

Must Start/Finish On	Affects early and the late dates
Start/Finish No Later Than	Affects the late dates
Start/Finish No Earlier Than	Affects the early dates

Open Plan Specifics

On Target/Fixed Target	Affects early and the late dates
Not Later Than	Affects the late dates
Not Earlier Than	Affect the early dates

Primavera Specifics

Start/Finish On; Mandatory Start/finish	Affects early and the late dates
Start/Finish On or Before	Affects the late dates
Start/Finish On or After	Affects the early dates

Artemis Specifics

Fix Early Start/Fixed Early Finish/Fixed Late Finish/Fixed Late Start	Affects early and the late dates
Start/Finish No Later Than	Affects the late dates
Start/Finish No Earlier Than	Affects the early Dates

DOE Scheduling Guide

- Limit, and justify in P6, the use of hard constraints which override relationship logic and may make the results of float calculations difficult to understand [GAO BP #2]. Avoid using mandatory constraints in P6. Minimize the use of finish no earlier, finish no later, and start type constraints. Use a finish on or before constraint for CD-4.17.

B.2 Schedule expectations DOE has tailored differently than the GAO or PASEG.

1. A hard constraint (Finish On or Before) is recommended for constraining the CD-4 milestone. The PASEG and GAO Guide both recommended not using such a constraint. DOE agrees that it should only be used for CD-4.

IPMDAR Implementation & Tailoring Guide

The IPMDAR DID requires identification of constraints. Constraints may not allow the schedule to project future events based on the logical relationships in the IMS. Hard constraints, those that prevent tasks from slipping, especially limit the IMS's forecasting ability. Constraints must include a note field that explains why the constraint was used. This helps users of the IMS to understand which scenarios may cause distorted forecast dates or the assumptions under which the schedule is based. Rationale and constrained dates for these tasks should not change often, if at all.

GAO Schedule Assessment Guide

Hard constraints include SNLT, FNLT, MSON, and MFON constraints. SNLT and FNLT constraints prevent activities from starting or finishing later than planned, essentially restricting the ability of any predecessor delays to affect their start and finish dates. While these types of constraint allow activities to start and finish earlier than planned, the acceleration of activities is not usually as big a concern to program management as the delay of activities.

Placing a hard constraint on an activity fixes the date and immediately causes the activity to become critical. It is therefore possible to use hard constraints as a temporary working tool during schedule development to calculate total available float up to key milestones. The temporary use of hard constraints is also valuable for assessing the realism of available resources to achieve the planned activity date. For example, a hard constraint placed on an intermediate delivery milestone may show the need for an immediate and unrealistic peak of resources, shortening the predecessor durations because it is forcing the milestone to be achieved on an unrealistic date.

- Because SNLT and FNLT constraints prevent activities from slipping, their use is discouraged. They should never appear in the schedule baseline. If they are not properly justified in working schedules, they must be immediately questioned.

PASEG

Hard Constraints (such as Must Finish On and Must Start On)	Using hard constraints prevents logic from delaying the task beyond the constraint date, thus diminishing the accuracy of downstream forecasts. The critical path and any subsequent analysis may be adversely affected.	Metric is often the percentage of each type of constraint. Some metrics measure the percentage of hard constraints. Some metrics list the number of hard constraints.
Hard Constraint		Does not allow the logic to drive the schedule (i.e., either restricts all movement or restricts movement to the right) on the constrained task.

Milestones

PASEG

Milestone	A schedule element that has zero duration and is used as a point of reference in the Integrated Master Schedule (IMS). Most scheduling tools consider a milestone to be a unique type of activity with zero duration.
Activity / Task	An element of work with duration in the Integrated Master Schedule (IMS)

GAO Schedule Assessment Guide

Milestone	Points in time that have no duration but that denote the achievement or realization of key events and accomplishments such as program events or contract start dates. Because milestones lack duration, they do not consume resources
Detail activity	Activities at the lowest level of the WBS representing the performance of actual discrete work that is planned in the project. Logically related paths of detail activities are linked to milestones to show the progression of work that is planned

"Activities and Milestones" 53
"Activities and Milestones" 7

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"Activities and Milestones" 4
"Activities and or Milestones" 3

IPMDAR Implementation & Tailoring Guide

2.4.2.2   Milestones. Provide zero duration schedule events marking the due date for accomplishment of a specified work scope or objective. Milestone may mark the start, an interim step, or the end of one or more activities. (Refer to SPD FFS 2.2.9)

2.4.2.3   Tasks/Activities. Provide elements of work with duration and logical relationships/dependencies. Task/activity names shall be concise and unique in respect to other names within the Schedule. The name of each task/activity shall clearly reflect the scope, output (e.g., deliverable), and place within the Schedule architecture so that the content can be understood without the subproject task structure, if applicable. (Refer to SPD FFS 2.2.9)