Air Force Integrated Master Schedule (IMS) Assessment Process

Document Configuration Management Log

Version (Date)	Content Summary / Change Description
V. 1.0 (27 July 2011)	**Content:** Includes IMS Quick Look process for assessing schedule health using the first 5 of 8 Generally Accepted Scheduling Principles (GASP).
V. 1.1 (23 September 2011)	**Changes:** Revised Quick Look test table to include metrics (thresholds). Added Beginner section with scheduling concepts and terms. Revised Comprehensive Assessment Matrix for readability. Added Schedule Tool Appendix.
V. 2.0 (7 May 2012)	**Changes:** Added Performing an IMS Quick Look Assessment Using Run!23. Updated IMS Quick Look table. Updated Schedule Tool Appendix.
V. 3.0 (7 June 2012)	**Changes:** Added Run!23 installation instructions and Performing an IMS Quick Look Assessment on Open Plan Professional Schedules.
V. 4.0 (21 September 2012)	**Changes:** Updated IMS Comprehensive Assessment Section. Added Common Program Manager Questions for IMS Assessments.

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Overall Document Introduction / Purpose / Organization

Purpose and Organization

This document is written for Air Force program managers and their functional staff. The purpose of this document is to define the process of performing an IMS assessment at two levels. There are three parts to this document. The first part is for the beginner who is learning about schedules and schedule assessments. The second part is for a person with intermediate scheduling experience desiring to perform a schedule assessment. The third part is for experienced schedulers desiring to perform a comprehensive schedule assessment. Shown below is an outline of the document.

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Part 1 - Introduction to Integrated Master Schedule (IMS)

The section provides the program team with a basic understanding of Integrated Master Schedules; what they are, how they are used, background requirements, and the value and benefit they provide to managing large, complex programs. This part does not provide specific schedule analysis techniques or procedures. It does provide the background information to understand the desired characteristics of a robust Integrated Master Schedule.

IMS Composition / Use / Contractor Expectations

This section describes the IMS and it uses. It also helps the program office understand what they can expect from their contractor's IMS deliverable.

What is an IMS?

Foremost, an Integrated Master Schedule is a schedule that embodies all work effort needed to produce a product or accomplish specific goals that have an associated cost. The work effort is represented by well-defined tasks that program participants execute (expending cost) to generate the desired products (hardware, software, documents, or systems). Tasks are organized in the proper sequence that facilitates efficient execution (socks before shoes) enabling the program to know what work must be accomplished to achieve their objectives. Task sequencing occurs by recognizing the dependencies among all the tasks (gotta have them socks on before we start talking shoes).Then, by identifying the expected time to perform each task the program can project completion time.

The IMS pulls together several pieces of information to develop the program schedule through the planning process. Understanding the requirements (why) helps establish goals and objectives. The scope (what) is broken-down into manageable tasks. The approach (how) and location (where) determines the task sequences and method of execution. Identifying the required human resources (who) that perform the work and manage the effort along with the material resources often places the other characteristics in perspective that generates the timing (when). Aligning the tasks with the goals provides a visibility into the effort required to meet the program objectives. These characteristics taken collectively and through iterative planning comprise the IMS.

The IMS incorporates a program's work scope and resource planning to develop the plan, satisfying requirements and achieving cost, schedule, and technical goals and is used as an effective tool to help manage the program.

How is the IMS used?

First and foremost, the IMS is a tool to help the program team manage the program. The IMS provides program history, existing conditions, and projections to program stakeholders and customers.

The IMS incorporates many of the source documents that define the program contract. The statement of work and work breakdown structure are two more common basis documents that comprise the work scope and work organization reflected in the IMS. The IMS integrates the work scope and organization, along with basis of estimates, organizational structure and other technical source information aligning this data to meet program goals and objectives.

The IMS uses all the source information as part of the planning process to develop a time phased capability that records history, projects future outcomes, and reports remaining efforts and meaningful performance indices. The IMS is a program navigation tool, used to determine course direction and manage the inevitable changes that require course adjustment during the program's life cycle.

The program team engages in the planning process to use the source information combined with the collective specialized work knowledge and management objectives to produce the IMS.

The IMS helps the program team:

- Describe the entire known work effort at an executable level of detail
- Identify program goals and key objectives represented as milestones
- Quantify the amount of time anticipated to perform each task
- Identify the dependencies among all tasks that provides the work sequencing
- Align the sequenced work and its anticipated completion to the program milestones
- Reflect progress achieved and identify the remaining effort to complete the program
- Provide visibility into what lies ahead and which tasks have higher priority to focus attention
- Enable reliable predictions based on identified trends and remaining efforts
- Communicate progress, productivity, and predictive future to team, customer, and stakeholders

Who uses the IMS?

The primary user of the IMS is the program management team. The program manager and program management office staff along with the control account managers (CAMs), who are responsible for planning and executing the work, and other program team members use the IMS on a daily basis to manage the program work effort. Other members in the organization, but not directly related to managing the day-to-day activities, rely on information produced by the IMS to coordinate resource assignments to meet the program needs and synchronize efforts on other programs within the organization. Persons outside the organization, such as the customer, depend on valid program information to manage their responsibilities and determine priorities for providing needed assistance across all programs under their control and reporting status to their management organization.

Typical users:

- Program manager
- Contract manager
- Chief engineer
- Supply chain / subcontracts manager
- Business manager
- Earned Value Management (EVM) analysts
- Control Account Managers
- Integrated Product team (IPT) leads

- Functional Managers
- Executive leadership
- Government Program Management Office (PMO)
- Government oversight organizations such as Defense Contract Management Agency (DCMA)

The IMS and Contract Requirements

The program contract stipulates many of the requirements for an IMS. Government requirements for managing the program using Earned Value Management may also be in effect and are communicated through the contract. The contractor's own governing policies and procedures may determine the IMS construct, use, and reporting obligations. Understanding and incorporating all these requirements is paramount when assessing an IMS.

The program contract communicates the scope of work and deliverables through the Statement of Work (SOW). The SOW or other contractual documents may also establish requirements such as the level of task detail definition, quantities and lot size deliveries and related due dates, required technical and program reviews, and reserved code fields in the contractor's project management software for customer use. The contract uses a Contract Data Requirements List (CDRL) to further identify deliverables and may also tailor the government specification documents such as DI-MGMT-81650 that is required for Earned Value Management.

Expectations of Contractor-Delivered IMS Files

The contractor delivers the IMS according to the frequency defined in the program contract. The IMS must meet all the specifications as defined in the contract and in accordance with their own organization's governing policies.

Typically, the contractor delivers the IMS and other required EVM reporting information on a monthly basis, although this could be more frequent, as agreed to. The IMS is normally delivered in its native project management software format and may be accompanied by the same data in other electronic formats that the government customer specified for accessibility reasons. Hard copy reports may be produced and delivered along with the electronic data. If the format and content does not satisfy the contractual obligations, the government representative may reject the contractor submittal citing the reasons for refusal and requiring the contractor to comply with the requirements prior to resubmitting the data.

A narrative document explaining changes to the schedule should accompany the IMS submittal. The explanations should include schedule information differences between the current schedule and the agreed-to schedule. The narrative offers reasons for the differences, referred to as variances, and should address the changes encountered since the previous submittal, the potential or realized impacts from the changes, and remedies considered or employed to lessen the ill effects of the impacts, referred to as mitigation efforts. Common topics center on variances to baseline (agreed-to plan) and conditions of or changes to the critical path or near-critical path (more on this later).

Reviewing the IMS to ensure that it remains a functioning tool for program management decision-making and reporting is part of the assessment process. Performing a schedule health assessment for the recognized qualities and characteristics present in a sound IMS ensures the IMS is satisfactory or is considered deficient in specific areas that must be addressed. A poorly maintained IMS can quickly degenerate into an ineffective and unreliable tool. Routinely assessing the IMS can detect areas requiring improvements that when implemented, keeps the schedule performing reliably and providing value-added information to the program team.

Be aware that IMS data converted from its native electronic format into another electronic format may not always reflect the exact same information. The receiver should check items in the IMS to verify that they align with the contractor's published information and the receiver's knowledge of program. Differences in the data should be reconciled with the contractor.

The IMS should have the following qualities:

- Reflect the current status
- Accurately record information for completed tasks
- Not contain invalid dates (incomplete tasks in the past or completed tasks in the future)
- Tasks with proper predecessors and successors
- Accurate remaining task durations that properly forecast the future tasks
- Remaining scheduled work that is achievable
- Properly represent the impacts of the status update to the program milestones
- Ability to pass a schedule heath assessment (discussed in Part 2 of this document)

Basic Scheduling Concepts

This section discusses basic scheduling terms and concepts.

Milestones

Milestones are zero duration tasks, typically events, starting points, or end points for work.

Tasks

The task identifies the work content that is a further decomposition of the total work scope into an actionable effort. The task has a name (task description) that uniquely identifies this effort from all other tasks in the IMS and is descriptive enough for all users to understand the intent of the work and what is produced as a result of performing the work. Ideally, each task has an identified owner (CAM), someone who is responsible for its content and performance. This identification helps with obtaining status and communicating schedule issues and conditions.

Generically, "task" refers to any activity in the IMS, whose duration can range from zero days, for milestones, to several months for discrete effort, planning packages or Level of Effort (LOE). These are described in more detail below: Summary Tasks vs. Tasks, Tasks vs. Milestones, Discrete vs. Planning Packages vs. LOE.

Task Duration

Task duration quantifies the expected amount of time for executing a specific work effort under normal conditions. The duration begins with the start date and ends with the finish date and uses a working day calendar. Duration is generally expressed in days, but may be in other units such as hours, minutes, weeks, or months.

Fundamentally, the more work effort is broken down into smaller, actionable steps, the shorter the task duration becomes. Shorter duration tasks are more manageable because the work effort has been refined to its elemental steps. This makes organizing the various tasks easier and facilitates assessing progress during status updates.

There are several duration types involved in scheduling. Each has its use when discussing specific task characteristics under different conditions.

A bit more technical:

- Task / Original Duration – the anticipated amount of time from start to finish for a task to complete the scope of work. The span of time may include periods of low or no activity depending on the manner in defining the task's execution.
- Actual Duration – the realized amount of time from start to finish for completing a task. Tasks that have partial completions, started but not completed, may reflect partial actual duration.
- Remaining Duration – the anticipated amount of time to finish a partially-completed task's associated scope of work. Tasks that have not started have the same amount of Remaining Duration as Task / Original Duration.
- Baseline Duration - the planned amount of time from planned start to planned finish for a task to complete the scope of work. The span of time reflects the task's baselined amount of time for executing the work under normal conditions and is used for comparison to the task's Original / Actual / Remaining durations to help determine if execution is proceeding as anticipated. This baseline is defined before the work is started.
- Variance – the calculated time unit difference between the forecast or actual dates and the baselined dates. This is expressed in terms of duration. Values can be positive (over-running the planned dates), zero (matching the planned dates), and negative (beating or under-running the planned dates).
- Total Float –the calculated time difference between the forecast dates and the baselined need dates (to achieve the desired program end date). This is expressed in terms of duration. Values can be positive (are not affecting the end date), zero (may be affecting the end date), and negative (impacting the end date and not supporting the desired baseline date), in days duration. A task's total float value is a measure of the amount of time a task can delay before delaying the program completion. This may also be referred to as total slack.
- Free Float –the calculated amount of time a task's finish date may slip before delaying the start of its successor task. This is expressed in terms of duration. If a task has more than one successor, it is the least amount of duration, before delaying the earliest successor task's start date. This may also be referred to as free slack.

Logic Networks

The logic network refers to the dependencies that exist among tasks that make up the IMS. Listing the known tasks in an order perceived as correct and determining the related dates for their execution against a calendar may be a good idea for the moment, but things change. Tasks may start or finish earlier or later than originally planned for a multitude of reasons or new tasks may be added to reflect additional scope as directed by the customer or to better define previously generalized work. Rather than re-figure all remaining and newly added tasks when change occurs, the push and pull of the dependencies reflects the impacts of these dynamic conditions in a manner that is difficult to perform manually and the logic network automatically establishes and re-establishes start and finish dates based on the changes. The dependencies exist regardless of when in time the tasks execute and are used to determine the future forecast dates on remaining tasks giving the users immediate awareness of the impacts.

The logic network is a good forecaster of future remaining work efforts. It also has the ability to identify which tasks, and which paths of tasks, are more important than others in achieving program milestone dates and the program end date. This relative importance aids program team members in deciding on which tasks to concentrate limited resources and focus management attention.

The logic network is often viewed as a diagram where each task is a box on the chart, and read from left to right (earlier to later). The tasks appear tied together to form linked sequences of tasks. These sequences are often referred to as paths, and a viewer can follow the path forward (to the right) to see what tasks are next, or backward (to the left) to see what tasks came before. These paths represent the precedence logic of what has to happen and in what order to execute the work as planned.

Collectively, all tasks connected by predecessor and successor relationships make up the logic network. The term for constructing this logic network and the rules governing its application is called Critical Path Method (CPM) scheduling.

Dates

There are several start and finish date types involved in scheduling. Each has its use when discussing specific task characteristics under different conditions.

A bit more technical:

- Start / Forecast Start – the anticipated beginning of a task's duration to execute the associated scope of work. Generally, the dates associated with the current schedule, reflect when the task expects to begin execution.
- Finish / Forecast Finish - the anticipated conclusion of a task's duration to execute the associated scope of work. Generally, the dates associated with the current schedule, the dates reflect when the task expects to complete execution. Dates can be entered.
- Early Start – the earliest a task is able to start based on its predecessor path impacts, or applied "no earlier than" constraints. Dates are established by performing a "forward pass" calculation through the logic network (from the beginning to the end of the network) recognizing the predecessor relationships and task durations / remaining durations to determine the dates. In most cases Early Start is the same as Start / Forecast Start.

- Early Finish – the earliest a task is able to finish based on its predecessor path impacts, remaining duration, or applied "no earlier than" type constraints. Dates are established during the "forward pass" calculation through the logic network. In most cases Early Finish is the same as Finish / Forecast Finish.
- Late Start – the latest a task is able to start based on the need dates. The Late Dates are established by performing a "backwards pass" calculation through the logic network (from the end of the network to the beginning) recognizing the task dependencies and task durations and "no later than" type constraints. Delaying a Late Start potentially delays the program end date.
- Late Finish - the latest a task is able to finish based on the need dates. The Late Finish is calculated during the "backwards pass" and is determined prior to establishing the same task's Late Start. Again, the "no later than" type constraints affect establishing the Late Dates during the backwards pass. Delaying a Late Finish potentially delays the program end date.
- Actual Start - the date the task started. In-progress tasks, started but not completed, have an Actual Start date, but not an Actual Finish date.
- Actual Finish – the completed end of a task's duration indicating when the associated scope of work was concluded.
- Constraint – an imposed date used to fine-tune a task's scheduled or need start or finish dates that the logic network alone cannot effectively determine.
- Baseline Start – the planned beginning of a task's duration to execute the associated scope of work.
- Baseline Finish - the planned completion of a task's duration to execute the associated scope of work.

Predecessors

Predecessors are other tasks that must be performed before executing the focus task. The focus task therefore is dependent on one or perhaps more than one task and this dependency is identified in the IMS. The logically connected path of tasks leading up to the focus task is referred to as the predecessor path or the upstream path.

The important thing about predecessors is that they determine the date of the focus task. If a task in the predecessor path moves to the right (becomes later), this can have a chain-reaction effect on all the tasks in its path, moving them to the right, and can impact the date of the focus task, driving it to the right also. Conversely, if a task in the predecessor path moves to the left (becomes) earlier, the same chain-reaction throughout the network up to the focus task can allow the tasks to move to the left and become earlier too.

A task that is missing a predecessor may be in jeopardy of starting too early. The problem with starting too early is other work may deliver needed items or knowledge that benefits the task. Performing some or all of the work too early may result in rework or disruptions in effort. In general, starting and completing tasks early is good, when performed in the proper order, satisfying all prerequisites, and promoting a non-disruptive use of available resources.

Successors

Successors are the opposite of predecessors – or at least the view from the logic network looking in the opposite direction. Successors are other tasks that cannot be performed before executing the focus task.

The focus task therefore is a determining influence on one or perhaps more than one task and this dependency is identified in the IMS. The logically connected path of tasks leading away from the focus task is referred to as the successor path; the downstream path.

The important thing about successors is that their dates are determined by the focus task. If the focus task moves to the right (becomes later), this can have a chain-reaction effect on all the tasks in its successor path, moving them to the right, and can potentially impact the date of a program milestone, driving it to the right also. Conversely, if the focus task moves to the left (becomes) earlier, the same chain-reaction throughout the network up to the program milestone can allow the tasks to move to the left and become earlier too.

A task that is missing a successor may be in danger of not reflecting the correct deliverable date and possibly not reflecting the correct amount of time needed to meet a program milestone or program completion date.

One other item to mention about successors that is discussed in later sections is to avoid adding unnecessary successors. Assigning successors to tasks that do not have a valid rationale for creating a dependency may cause problems later if tasks are inappropriately delayed because of this false relationship.

Another type of assigning unnecessary successors is applying "redundant logic" to the network. Redundant logic is best described as Task A has a successor of Task B, and Task B has a successor of Task C. It is not necessary to assign Task C as a successor to Task A; that is redundant.

Task A → Task B
Task B → Task C
Task A → Task C

There are other scenarios that come into play resulting in redundant logic. Assigning these unnecessary relationships does not cause an improper schedule calculation, but it does present difficulties when trying to analyze a schedule for tasks that may be causing a schedule problem.

Constraints

Constraints refer to several types of restrictions that influence a task's start or finish dates and may determine a task's need date and possibly affect other tasks in the logic network. Ideally, the logic network should establish the start and finish dates for all tasks in the IMS. However, logic relationships alone cannot always reflect the conditions that exist on a program.

For example, a task may have a predecessor that determines the task's start date, but the planner may be aware of a related condition that may influence when the task may commence; such as when planning to use a test facility that is not under the program's control. The planner can

apply a documented "no earlier than" type date constraint to the task that does not permit the task to schedule earlier than a specific date (the first availability for accessing and using the test facility). This places the task in the proper time, and also correctly impacts remaining successor path tasks, and acknowledges the rationale for applying the constraint

Other types of date constraints affect the need date for tasks that are logically tied to a specific task or milestone. Recall from the logic network topic discussions, that the network can predict when tasks occur in the schedule and the impact to milestones and end date. The network also provides a prioritized value indicating tasks' criticality for achieving the identified need dates.

Again, using the test facility's availability as an example, all program test activities must be completed by a known date, as there are other programs and operations that need the test facility for their use and are planning their respective activities around reserved test facility schedule date availability. Placing a related "no later than" type date constraint on the milestone depicting the end of program test activities establishes an end date that enforces a need date for all predecessor path tasks leading up to the milestone. Each task in the path now reflects this priority for meeting the identified end date that may be earlier than the priority established by the logic network alone.

Date constraints should be continuously monitored and updated in the IMS to reflect the most current date known. These changes need to be reflected in the IMS to provide value to the users. Constraint dates should be minimized, relying on the logic network to establish dates and determine the criticality as much as practical. Overuse of constraints reduces the network's ability to be provide reliable forecasts and can negate the significance of establishing need dates and the importance of criticality values. Recording the rationale for using date constraints in the IMS is a best practice.

Float

This unusually sounding term embodies one of the more telling aspects of critical path method scheduling. Up to now, the discussion mentioned task priority and criticality. Float is the term that captures these characteristics. The two types of float commonly used are total float and free float.

Total float relates to need dates and whether the forecast dates as calculated by the logic network are going to be earlier, on time, or later than required to meet the desired end date. Fundamentally, the total float is a calculated value for each incomplete task that is expressed in the common duration time unit, normally in days, as the number of days difference between the forecasted schedule date (when a task will occur) and the need date (when a task must occur to support the end date).

The forecast start and finish dates are determined by the logic network and any applicable "no earlier than" constraints. These dates are the earliest dates a task can either start or finish and are referred to as the Early Start and Early Finish.

Technically, total float is the calculated difference between the Early Dates and the Late Dates. Total float provides a meaningful value depicting whether a task is supporting, determining, or not supporting the program end date.

For incomplete tasks, total float values can be:

- Positive - Reflecting the number of workdays that a task can delay before impacting the end date
- Zero - Determining the program end date, where negative values do not exist
- Negative – reflecting the number of workdays that a task is impacting the program end date, making it later than the desired end date

Generally speaking, tasks with the most negative total float values are impacting the end date more than any other task and are the primary focus of attention when attempting to resolve these negative impacts and reclaim the desired end date. Completed tasks have a zero total float value.

Keep in mind that the total float value is determined by several things, and not just the focus task alone. The total float value is the result of a combination of the logic network and all the tasks that are on the path to the milestone end date, their task durations / remaining durations, any constraints applied that affect their start or finish dates, and the need date established for the end milestone. Later discussions about calendars also introduce the number of working days for tasks that can also have an effect on the total float value.

Free float is the second common float type. It is slightly easier to understand than total float. Basically, free float is the amount of time a task can delay without affecting the start of its successor task. This type of information can be helpful when making trade-off decisions such as assigning scarce resources to work tasks and trying to discern where some flexibility exists to make the best choice. Awareness of free float may sway the decision knowing one task can afford the delay without affecting its successors' dates.

Critical Path

The term critical path is one of the more misused terms in scheduling, although it is quite simple to understand. The critical path is the longest sequence of logically connected tasks from the present time to the program end date. If a task on the critical path slips, the program end date will slip. The present time is the status date of the schedule or the Timenow date.

Collectively, all the tasks and their durations that comprise the critical path equate to total program duration; the span time. Understanding which group of logically tied tasks that are affecting the program end date is important to know. Maintaining control of the program's critical path is the most important single influence program management has for completing the program on time and with the best opportunity to control costs.

Generally, if discussing the critical path before commencing work on the program, the critical path is determined from all tasks in the IMS. Once execution has begun and the schedule is assessed for progress and remaining effort, the schedule reflects the progress from the date the status is taken. That date is referred to as the status date, data date, or Timenow. The critical path during execution is no longer concerned with completed tasks; it is only concerned with incomplete or remaining tasks and their potential impact to the program's completion. Therefore, determining the longest sequence of tasks from Timenow to the program end date, considers only the incomplete tasks that can have an impact to the program completion.

Reducing the Critical Path Length

When the end date moves to the right, beyond an acceptable limit, efforts to pull it back to the left involve focusing on the critical path tasks. If the program needs to end sooner, shorten the critical path.

Efforts to reduce the impact of tasks on the critical path may result in the program end date moving back to the left. Additional efforts to reduce the critical path duration may be required to bring the end date back to its desired date. Through this iterative process of reducing the total duration to program completion, the effects may be that another set of logically related tasks becomes the determining factor on the program completion date; comprising a new critical path. That is the dynamic nature of the critical path. Task durations increasing or decreasing determine which set of logically connected tasks becomes the critical path. That is why developing a clear method to determine the critical path is important and minimizing the "no later than" constraint types applied to tasks, potentially masking critical path visibility, is essential.

Resources

The IMS reflects the work to be performed. It takes resource in the form of people, tools and equipment, facilities, and materials for the work to happen. The sum of all resources employed and consumed to accomplish the scope of work equates to the total cost.

Identifying the required resources and having the correct amounts, and available at the right time, becomes the great leveler of plans and schedules. Directly allocating defined resources to tasks in the IMS provides the constant knowledge of what it takes to perform the work associated with each task and stays connected to the scope when task dates change. Knowing the resource amount required and the resource amount available provides the schedule achievability program management must know to be effective in managing the program.

Assigning resources to tasks in the IMS provides a visibility into the program's ability to execute the tasks as planned. The level of resource detail is similar to defining the level of task detail; the more well-defined the resources, the better the granularity for managing their use. Human resources defined at too high a level, for example "engineer" can reflect the amount needed throughout the IMS. But, "Test Engineer IV" defines a more specific category; reflecting the skill level and amount available for use on the program.

More specific resource categories:

- Aids decisions about assigning the correct resources with applicable skill level to appropriate tasks.
- Provides the confidence that sufficient resource amounts exist to perform tasks as scheduled by the logic network.
- Identifies where and when additional specific resource types are required to perform crucial or critical tasks.
- Helps reflect specific resource amounts in relation to all resource type amounts required on the program.

Calendar(s)

So how do tasks get their dates? Same way most everyone else does, from a calendar. The IMS uses a defined calendar for tasks to reflect their start and finish dates and to be able to calculate duration based items such as total float. Because "30 days hath September …" does not define September well enough for scheduling purposes. How many of those September days are working days, accounting for days that work can occur?

Calendars define working days so that tasks are scheduled to begin, end, and occur during working time. This is not counting weekends and holidays. A seven day task that is scheduled to start on a Tuesday should not reflect a finish date of the following Monday, if the established calendar uses a typical five day work week of Monday through Friday. The task should reflect a finish date of the following Wednesday, seven working days later. Calendars also acknowledge the length of a day, typically eight hours, comprising 40 hours for the work week.

Further calendar definition can identify non-working periods such as recognized holidays or organizational shut-down periods. By identifying non-work days in the calendar, the IMS does not recognize those days when applying task duration against the available work days and establishing valid dates for tasks.

Defining an accurate calendar that represents how the program operates contributes valuable insight into forecasting the remaining program effort. Planning to conduct work on days normally reserved as no work days can falsely permit the IMS to project a more optimistic end date than what common sense dictates is possible.

Awareness of using multiple calendars in the IMS is important for understanding how dates and duration based calculations such as total float values are determined. Sometimes it may be practical to model a portion of tasks in the IMS with a different calendar than the default calendar used by most of the tasks.

Baseline Dates

Creating the IMS involves significant planning efforts by most of the program team. The central idea around this planning is to develop an executable schedule; one that contains as much knowledge and foresight into potential difficulties and is the best tool to manage the effort during the execution stage. The team captures this IMS version prior to execution as their planned schedule. This IMS version is referred to as the baseline schedule and is used to help the program team understand how well things are going during program execution compared to the established expectations. Setting or "snapping" the baseline prior to commencing task execution is a preferred practice. Formalized baseline information maintenance is required during execution to ensure the baseline remains relevant and continues to provide meaningful feedback to program management.

Baseline dates are the planned start and finish dates as anticipated during the planning phase. Comparisons of the tasks' current forecast start dates or actual start dates to their baseline start dates and current forecast finish dates or actual finish dates to their baseline finish dates provide insight into the execution performance. The comparison indicates how specific tasks are performing against the plan. Trends can indicate where program management attention is required to determine the cause for unsatisfactory performance indicators and facilitate applying

solutions to improve the performance on remaining efforts. Understanding past performance trends provides an opportunity to learn from these conditions and apply solutions to future tasks. This action has the benefit of relaying history learned to future efforts and providing the reality that makes projected forecasts information more reliable.

For example, performance trends of conducting post-test analyses indicate that the baseline was too optimistic in estimating the amount of time required to execute the work. Program management may decide to increase the current task durations on similar future work efforts to more accurately project the required effort and any potential impacts to subsequent downstream tasks. It is also beneficial to update the baseline information for the related tasks affected by this decision, facilitating an accurate comparison on those future tasks once they are executed. It does not benefit the program and does not provide meaningful metric information to use baseline information that does not accurately reflect the method of execution. The program should update the baseline to reflect changes to the execution approach. The baseline continues providing value-added information only when it reflects the method of execution. Since the baseline comparison provides a great deal of performance information to the program, regimented process controls and procedures are established to control and manage baseline changes. Permitting unlimited and uncontrolled baseline modifications can render the comparison information meaningless.

Baselines and Planning Packages

Typically, knowledge about task definition and approaches has a higher degree of confidence in near term, than in later periods of the program. Recognizing this, planners utilize techniques to describe future periods of work in comprehensive, less detailed tasks. These tasks are referred to as “planning packages”. Planning packages contain all the related scope that must be performed, but the detailed definition effort is reserved to occur later in the program when the timing for detailing the scope into executable tasks is closer and perhaps more specifics are understood about the effort required. This approach permits developing more accurate estimates about the work without sacrificing the previous visibility of this effort represented in the schedule in the proper time period.

Planning packages still adhere to proper planning and logic network application and contribute to defining the total IMS period of performance and the critical path. Exercise care that planning packages are not so long in duration and too vague in definition that they mask visibility into their content and their part in establishing a meaning critical path. A duration that is too long may eliminate the ability to reflect proper logic ties to other tasks that may exist within the duration length, but are unable to identify because it is one single task.

Statusing

Probably the first thing to notice about this topic is that “statusing” is not a proper word, but it is a common scheduling term and one that encompasses much of what establishes the validity of the IMS. Statusing is the process of updating the IMS to reflect progress achieved and forecasting remaining work. Several derivations of the term status may be used to:

- Take status – solicit updates from tasks owners about the condition of their tasks; started, completed, or in-progress and determining the amount of completion and forecasting finish dates for partially completed tasks.
- Status the schedule – apply the collected task update information to the related tasks in the IMS and recalculate the effects on the remaining tasks and milestones through the logic network.
- Report the status – generate the reports and communicate the effects from updating the IMS with the latest performance information, highlighting the changes with the most pronounced impacts.

Recording history

Recording accurate historical information in the IMS is important for several reasons. Metrics that compare performance versus baseline information is enhanced through recording the accurate actual start and actual finish dates. Approximations of actual dates may skew the performance comparison information leading to inaccurate performance measurements and possibly indicating poor or exceptional false performance metrics. Also, the value of accurate actual dates increases the reliability of making decisions to modify future similar tasks using the historical performance information.

Avoiding Invalid Dates

It may be possible to enter an actual start date or an actual finish date in the future (to the right of Timenow) however; a task with an actual start date or an actual finish date that is later than Timenow is inaccurate. This condition is similar to saying that this task completed (past tense) in the future.

Likewise, allowing incomplete tasks that do not have the appropriate start dates and finish dates to remain to the left of Timenow is presenting invalid information. A task with a forecast start date or forecast finish date (and do not have the related actual start or actual finish dates) that is earlier than Timenow, has not been properly scheduled.

Both conditions not only represent inaccurate schedule status, but also can affect successor path task calculations, causing inaccurate forecast information in the IMS. In addition to entering accurate start and finish dates, care must be taken to recognize the existing logical relationships on tasks when performing status updates. Reflecting the actual dates as tasks are executed may possibly require modifying related logic.

Avoiding Out-of-Sequence Status Conditions

Sometimes task execution produces situations where the existing logical relationships must be modified to permit recording accurate actual date information and properly reflecting the logical impacts to other tasks.

A task that was able to commence for valid reasons, but does so without its identified predecessor completing, is said to be out-of-sequence with its logic. The remedy is to modify the

existing predecessor relationship to reflect the appropriate task dependencies. By not modifying the logic, the out-of-sequence task can produce incorrect forecast conditions on its successor path tasks and skew calculations such as total float and potential impacts to milestones and end dates. Modifying the logic relationships for these conditions keeps the IMS healthy and projecting accurate forecast information throughout the logic network.

Accurately Recording Progress

Addressing tasks that are not started is easy; they are zero percent complete. Determining the condition of completed tasks is also easy; they are 100 percent complete. Those tasks that are started, but not completed present a different situation. Determining the amount of progress achieved and the amount remaining on in-progress tasks can be a bit more involved.

Previously, the topic of task duration discussed the benefit of defining tasks with short durations, stating that shorter duration tasks are more manageable and easier to determine progress during status updates. Being able to claim a task started and completed during the same status period makes it easier to update than having to assess how much work was accomplished and how much work remains for the unfinished portion of the task. Typically, shorter duration tasks that start and are in-progress during one status period will complete during the next status period. This occurs where the status update period is monthly and shorter duration tasks are less than two months long. For programs using Earned Value Management practices, guidelines establish the methods for claiming the amount of value "earned", such as a "50-50" Earned Value Technique (EVT). Here 50% of the value is earned when the task is started and 50% of the value is earned when it is completed. The idea is to simplify the assessment because the amount of claimed progress and remaining effort is governed by consistently applying these business rules.

Longer duration tasks that span more than two status periods, have an inherent problem to determine the amount of progress achieved when not using techniques similar to "50-50" that are designed for use on tasks that span only two status periods. Tasks with estimated durations of 60 working days (3 months) for example, could realistically span four months and possibly more if encountering any delays once started. The ability to assess accurate and consistent progress is more problematic for these tasks. Typically, these tasks use a method that defines and quantifies portions of the included scope as steps. All the steps together equate to 100% of the task's included scope. Knowing which steps have been accomplished during its execution provides the objective evidence to claim progress against those steps. Totaling all the completed steps represent the percent complete achieved for these long duration tasks. Definition of steps occurs prior to task execution and is part of the task's configuration control.

Knowing how much has been accomplished and how much remains to be accomplished is important. But equally, if not more important, is projecting when the task will finish. Determining the forecast finish date for in-progress tasks takes many things into consideration. The task owner knows the work and is the best person to assess its condition and status. Understanding the task's scope, and how easy or difficult it was to achieve that progress to date, and how easy or difficult it will be to achieve the remaining scope effort is part of the assessment. Knowledge about technical challenges and possibly competing priorities that may

draw attention away from this task may have an influence on estimating the productivity expected to accomplish the remaining amount of work content in an achievable amount of time.

This remaining amount of time is the remaining duration. It is the amount of time from Timenow to accomplish the remaining work that produces the forecast finish date. This finish date projection will not only have an effect on the in-progress task, but also on the successor path tasks. Underestimating the remaining duration could project a more optimistic schedule on downstream tasks and possibly understate the impact to milestones and the program end date.

Part 1 Conclusion

In Part 1, the document has introduced the beginner scheduler to the IMS and introduced basic scheduling concepts, terms and definitions. In the process, Part 1 has also introduced the importance of having a sound schedule, one that is complete, accurate, and properly statused. With this foundation established, the scheduler can begin to perform schedule assessments.

Part 2 – Basic Integrated Master Schedule (IMS) Assessments

Introduction / Purpose / Scope

This part of the document is written for intermediate level scheduling personnel desiring to perform a schedule assessment on a contractor prepared IMS. This part contains key terms and concepts and other discussion topics. A person with a sound understanding of scheduling fundamentals may elect to skip Part 1 and begin with this part of the document.

Overview / Refresher

The IMS is a contractor-prepared schedule. It is often preceded by and aligned with program level government-prepared schedules. The government prepared program schedule may be called a Summary Master Schedule, Master Plan, Roadmap, Master Phasing Schedule or Integrated Program Schedule. As the highest, least detailed schedule, this government-prepared schedule highlights the contract period of performance, program milestones, and other significant, measurable program events and phases. This schedule is normally initially prepared in the pre-proposal phase.

The IMS is the focus of all related artifacts integrated through the planning process, establishing the program baseline and executable schedule used to manage the program. The IMS is foundational for determining performance measurement and utilizing its predictive forecasting capabilities for remaining effort toward achieving program goals.

Valid, useful, and effective schedules are an essential part of a successful program execution.

Ideally, schedules help the program team:

- Describe the entire discrete program effort to the detailed task and milestone level.
- Integrate internal, Contractor, and external organizational schedules.
- Define achievable, objective, and measureable targets or goals for key deliverables and events.
- Logically link dependent tasks and milestones to key schedule targets (control milestones) to achieve *vertical* schedule integration.
- Logically link dependent tasks within and between control accounts to achieve logical *horizontal* schedule integration. Assess and record progress that accurately depicts the program status.
- Determine remaining effort with realistic forecast dates.
- Understand the impacts of delays or changed priorities on remaining work.
- Manage weekly and monthly operations and priorities.
- Communicate status, forecast, and impacts to the program team and sponsors.
- Control changes and manage the above via a controlled, repeatable process.
- Enable fact-based decision making to effectively manage the program.

Assessing the schedule health helps ensure the IMS is supporting the above objectives and determines if the IMS needs improvement. An IMS can typically be 10,000 lines or more. Without assessment tools and techniques, it is easy for anomalies to occur and accumulate that may impact the overall schedule accuracy and predictability.

Standards for IMS and IMS Assessments

Prior to objectively assessing an IMS, understanding the standards that are used to measure a particular program IMS is important. The information below discusses the body of knowledge that should be reviewed early in the assessment process.

Contract Requirements

Review the contract to determine the requirements for the IMS. IMS requirements often exist in the Statement of Work (SOW) and may include granularity limits, definitions of custom fields and unique codes used for givers and receivers. The Contract Data Requirements List (CDRL) may also contain tailoring for the IMS Data Item Description (DID) DI-MGMT-81650.

The Data Item Description DI-MGMT-81650 is a good start for specifying an IMS. The IMS requirements may be tailored in the SOW or through DID tailoring. Requirements defined in the SOW under the program management section often have more visibility than a tailored DID. Subcontractor IMS requirements should be identified in the tailored DID when subcontractors plan to participate on the same SOW.

If there is a series of IMSs on the program, consider time-phasing the delivery of schedules for a complete rollup of all contractor progress at the top tier. If multiple schedules are involved, consider using external links across the schedules or giver-receiver fields so that the multiple IMSs can be correlated.

The DoD Integrated Master Plan (IMP) and Integrated Master Schedule Preparation and Use Guide contain recommended SOW language for an IMS. The DoD Earned Value Management Implementation Guide also contains recommended tailoring for the IMS CDRL.

If an IMP is required by the contract, it will contain the essential Events and Accomplishments that must be included in the IMS. The IMP is normally a contractual approval document and the Program Events, Significant Accomplishments, and Accomplishment Criteria in the IMP are the foundation for IMS development.

Contractor Requirements

IMS schedules, submitted as part of Earned Value Management (EVM) programs, are required to comply with the contractor's Earned Value Management System (EVMS) Description document. Unique contract requirements that conflict with the document's EVMS Process must be documented in a Program Instruction or the equivalent and are typically approved by DCMA. Requirements may include the treatment of Level of Effort (LOE), resource loading, and the use of additional custom fields in the project file.

Note: A contract requirement that is less stringent than the Earned Value Management System Description (EVMSD) should not result in non-compliance with the EVMSD. For example, a contract that only requires submitting a statused IMS once per quarter should not override the need to status the IMS monthly as defined in the EVMSD.

Agency Standards / Guidelines

There are a number of government and civilian agencies that have published guidelines for Integrated Master Schedules. Government Accountability Office (GAO), Navy Center for Earned Value Management (CEVM), Defense Contract Management Agency (DCMA), Project Management Institute (PMI), and others provide excellent insight into what constitutes a credible schedule. The chart that follows shows a comparison of several standards or guidelines.

Generally Accepted Scheduling Principles (GASP)		ANSI/EIA-748-B Earned Value Management Systems (EVMS) Guidelines	US U.S. Government Accountability Office (GAO) 10 Scheduling Best Practices	Defense Contract Management Agency (DCMA) IMS 14 Point Assessment	Naval Center for Earned Value Management (CEVM) Program Schedule Assessment (PSA)
Valid	Complete	1 - WBS 2 - OBS 7 - Interim Milestones 10 - Work Packages & Planning Packages 12 - LOE	1. Capturing all activities. 4. Establishing the duration of all activities.	8. High Duration – Tasks with Duration > 44 working days (Goal < 5%)	1. Does the schedule reflect the work to be done? 6. Are duration estimates meaningful?
	Traceable	3 - Integration 5 - RAM / Control Accounts 6 - Vertical & Horizontal Integration	2. Sequencing all activities. 5. Schedule is Traceable Horizontally and Vertically.	1. Logic – Tasks without predecessors and / or successors (Goal < 5%) 4. Relationship Types – Finish-to-Start (FS) should be the most common (Goal > 90%)	3. Is work sequenced logically? 4. Are interdependencies planned in a logical manner?
	Transparent	6 - Vertical & Horizontal Integration 10-Work Package Characteristics, Objective Techniques	2. Sequencing all activities.	2. Leads – (negative lag) Distorts the critical path (Goal 0%) 3. Lags – (positive lag) Excessive size and / or usage distorts the critical path (Goal < 5%)	5. Are constraints, leads, and lags justified?
	Statused	6 - IMS Provides Current Status for All Authorized Work	9. Updating the schedule.	9. Invalid Dates – Tasks with invalid forecast (incomplete tasks to the left of Time Now) or actual start/finish (completed tasks in the future) dates (Goal 0%) 11. Missed Tasks – Tasks not completed or forecasted to complete as planned (Goal < 5%) 14. Baseline Execution Index (BEI) – Tasks completed as a ratio to those tasks that should have been completed to date according to the baseline plan (Goal > 0.95)	10. Does the schedule provide logical status and forecasts of completion dates for all authorized work?
	Predictive	6 - IMS provides forecast of completion dates for all authorized work	6. Establishing the critical path. 7. Reasonable total float.	6. High Float – Tasks with Total Float > 44 working days (Goal < 5%) 7. Negative Float – Tasks with Total Float < 0 working days (Goal 0%) 12. Critical Path Test – Tests the logic in the critical path (Goal "Pass") 13. Critical Path Length Index (CPLI) – Measures the "realism" of the critical path (Goal > 0.95)	9. Are float times reasonable? 8. Does the critical path make sense; does the scheduling software calculate it?
Effective	Usable	6 - IMS Effective Planning, Statusing, & Forecasting for Achieving Requirements & Measuring Performance	8. Conducting a schedule risk analysis.	5. Hard Constraints – Tasks not designated as As Soon As Possible (ASAP), Start No Earlier Than (SNET), or Finish No Earlier Than (FNET) (Goal < 5%)	5. Are constraints, leads, and lags justified? 2. Are critical target dates identified; are they being used to plan the work?
	Resourced	9 - Control Account Level Budgets & Detail 10 - Control Account Plans (CAPs)	3. Assigning resources to all activities.	10. Resources – If loaded, tasks without dollars or hours assigned (Goal 0%)	7. Are resource estimates reasonable; are key resources available to support the plan? 11. Can the current program schedule be accomplished at an acceptable risk level?
	Controlled	8 - Baselined Performance Measurement Baseline (PMB) 29-32 - Documented processes for tracing authorized changes & controlling retroactive changes	10. Creating a Baseline Schedule.		

Generally Accepted Scheduling Principles (GASP)

The GASP are eight concise overarching tenets for building, maintaining, and using schedules as effective management tools. The first five GASP tenets describe the requisite qualities of a valid schedule; that is, one that provides complete, reasonable, and credible information based on realistic logic, durations, and dates. The latter three GASP tenets reflect increased scheduling maturity that yields an effective schedule. An effective schedule provides timely and reliable data, helps align time-phased resources, and is built and maintained using controlled and repeatable processes.

GASP Description

Achieving a GASP-compliant schedule indicates the schedule is a useful and practical tool for effective program management. Thus, meeting all eight GASP tenets demonstrates that the program team builds and maintains the schedule with rigor and discipline, so the IMS remains a meaningful management tool from program start through completion. The GASP were originally developed as a governance mechanism for the Program Planning and Scheduling Subcommittee (PPSS). The PPSS is a subcommittee formed by the Industrial Committee on Program Management (ICPM) working group under the auspices of the National Defense Industrial Association (NDIA). The GASP were developed collaboratively with inputs from both government and industry.

The GASP serve several purposes. First, they are high level tenets, or targets, used as guides for sound scheduling. The GASP also serve as a validation tool for the program team or organization to assess schedule maturity or schedule areas needing improvement. Last, the GASP can be used collectively as a governance tool to assess new or different scheduling approaches with objectivity and detachment.

It is essential to understand that the GASP are intentionally broad and should not limit program teams from continuous improvement and creativity when exploring tools and processes for building and maintaining robust schedules. New practices or techniques are encouraged—if and when they meet the GASP. There will be times when a given practice diminishes compliance to one principle over another. This is expected and unavoidable, but what is paramount is that the program team weighs overall benefits versus the risks and implements accordingly. The GASP provide an independent mechanism to determine the acceptability of proposed schedule practices. A description of the GASP follows:

Generally Accepted Scheduling Principles (GASP)			GASP Narrative	GASP Essential Statement
Valid	1	Complete	Schedules represent all authorized effort for the entire contract, with essential subcontracted or other external work or milestones integrated yet distinguishable from internal work. Level of Effort may be excluded from the IMS.	**The schedule captures the entire discrete, authorized project effort from start through completion.**
	2	Traceable	Schedules reflect realistic and meaningful network logic that horizontally and vertically integrates the likely sequence for program execution. Schedules are coded to relate tasks or milestones to source or dependent documents, tools, and responsible organizations.	**The schedule logic is horizontally & vertically integrated with cross-references to key documents & tools.**
	3	Transparent	Schedules provide full disclosure of program status and forecast and include documented ground rules, assumptions, and methods for building and maintaining schedules. Documentation includes steps for analyzing the critical paths, incorporating risks and opportunities, and generating schedule health and performance metrics.	**The schedule provides visibility to assure it is complete, traceable, has documented assumptions, & provides full disclosure of program status & forecast.**
	4	Statused	Schedules reflect consistent and regular updates of completed work, interim progress, achievable remaining durations relative to the status date, and accurately maintained logic relationships.	**The schedule has accurate progress through the status date.**
	5	Predictive	Schedules accurately forecast the most likely completion dates and impacts to the program baseline plan through valid network logic and achievable task durations from the status date through program completion.	**The schedule provides meaningful critical paths & accurate forecasts for remaining work through program completion.**
Effective	6	Usable	Schedules produce meaningful metrics for timely and effective communication and tracking and improving performance, mitigating issues and risks, and capturing opportunities. Schedules are robust and functional to help stakeholders manage different levels, groupings, or areas as needed. Schedules are developed and maintained at a size, level, and complexity such that they are timely and enable effective decision-making.	**The schedule is an indispensable tool for timely & effective management decisions & actions.**
	7	Resourced	Resources align with the schedule baseline and forecast to enable stakeholders to view and assess the time-phased labor and other costs required to achieve project baseline and forecast targets. Each program is unique and uses varying techniques to load, baseline, and maintain the time-phased resources at levels that are practical and produce meaningful and accurate projections. When resource-loaded schedules are used they enable flexible updates to resource requirements as conditions change. Whether or not resource-loaded schedules are used, cost and schedule data are integrated for internal and external reporting.	**The schedule aligns with actual & projected resource availability.**
	8	Controlled	Schedules are baselined and maintained using a rigorous, stable, repeatable, and documented process. Schedule additions, deletions, and updates conform to this process and result in valid and accurate results for sound schedule configuration control and maintenance.	**The schedule is built, baselined, & maintained using a stable, repeatable, & documented process.**

GASP Description

The chart below shows the GASP criteria, characteristics of a schedule that meets GASP and the artifacts observed in performing the Quick Look and IMS Comprehensive Assessments.

GASP Tenet	Characteristics	Artifacts / Examples
Complete	• Aligns to SOW • Aligns to IMP • Includes completed, ongoing, & future work • Maximizes schedule visibility	• SOW, IMP, WBS • Entire scope & budget / archived data • CDRLS / CLINS • Entire program (logic tasks, external non-program influences, supplier integration)
Traceable	• Vertically Integrated • Horizontally Integrated • Traces to key EVM artifacts • Cross-referenced to source document	• Predecessors, Successors • Program milestones • SOW, WBS, IMP codes aligned • Control Accounts (RAM, CAPs, Work Authorizations) • Responsibility identified (CAM) • Work Packages & Planning Packages • EV methods / techniques
Transparent	• WBS, SOW, IMP visibility • Auditable • Documented assumptions • Only ONE IMS	• WBS, SOW, IMP reference numbers • "Battle Rhythm" reflects discipline • Notes for caveats, assumptions, constraints
Statused	• Timely • Updated • Status Date current • Maintained	• Duration % Complete updated to status date • Physical % Complete per EV methods • All tasks statused/ rescheduled • Remaining duration for in-progress tasks
Predictive	• Achievable • Meaningful program critical path • Meaningful critical path(s) to major milestones • SRA-ready, what-if capable • Probable (likely) dates & durations	• Baseline dates, Forecast dates • Remaining duration • Total Float, Free Float • Critical path calculated / cut-offs • Variance to baseline plan • Risk-mitigations incorporated
Usable	• Managed using Total Float • Baseline, actual, & forecast dates are meaningful & accurate • Trends & metrics used to manage • Becomes indispensible management tool / feature • Consistent task naming	• Visible to program team • Used in program reviews • Impacts are visible • Meaningful metrics (“hammer down nails”) • No options to "beat the metrics" • Action verbs, clear work content, stand-alone, discrete, unique names
Resourced	• Resources aligned to IMS • Ideally, resource-loaded IMS	• Baseline dates & work (hours), costs align to BCWS • Forecast dates & work (hours), costs align to ETC
Controlled	• Stable, Repeatable process • Baselined • Additions & deletions controlled • Data entry cut-off dates • Controlled retroactive changes • "Battle rhythm" followed	• System Description, Policies, Procedures • Baseline Change Requests (BCRs) • Instructions / Directives / IMS Supplemental Guidance • Historical data / files / records • Risk mgmt process aligned • Master/ Subproject project structure (if applies)

GASP Characteristics and Artifacts

Additional Schedule References

Listed below are a number of government, non-government published documents and references that provide schedule guidance.

• **General Scheduling Guidance**
o ANSI / EIA 748B, Earned Value Management Systems, June 2007
▪ General discussion of program schedules
▪ Lists the requirement for all levels of schedules to be integrated
▪ Discusses the timing of detailed planning vice planning packages
o PMI Practice Standard for Scheduling, 2007
▪ Defines a schedule development process
▪ Contains guidelines for granularity
▪ Defines schedule maintenance process
▪ Detailed list of schedule components
▪ Comprehensive list of scheduling terms & definitions
o DMSC Scheduling Guide for Program Managers, Oct 2001
▪ General primer on scheduling in DoD environment written for Program Managers
▪ Discusses schedule types, levels of schedules, & scheduling theory
▪ Emphasizes tying risk to schedule
▪ Discusses resource constrained scheduling & schedule crashing
▪ Discusses production scheduling & Line of Balance
• **IMS Specific Scheduling Guidance**
o Air Force Instruction 63-101, 20 July 2010
▪ Establishes requirement for an IMS to be maintained by the government PM & contain the contractor's IMS
▪ Requires government PM to perform recurring analysis of contractor schedules
▪ Discusses Systems Engineering detail required in IMS
o DCMA Integrated Master Schedule Assessment Guide, Rev 7, 11 Dec 2009
▪ Provides 15 or more mechanical checks on the wellness of an IMS
▪ Provides two pages of general guidance for IMS
▪ Identifies key checks performed by DCMA during reviews
o Defense Acquisition Guidebook
▪ Requires Acquisition Strategy to include highlights from IMS
▪ Emphasizes that IMS should be event based
▪ Requires configuration control of the IMS as part of technical baseline configuration control
▪ Requires integration of SEP & IMS
▪ Requires WBS as predecessor to IMS development
▪ Recommends cross reference of CTP & TPM in IMS
o Defense Acquisition Program Support Methodology, 9 Jan 2009
▪ Stresses early industry involvement in program schedule development
▪ Emphasizes risk handling activities be included in IMS
▪ Discusses schedule reserve or schedule margin

▪ Contains IMS attribute list & IMS relationship to EVMS chart
▪ Provides focus questions for IMS evaluation
o Depicting Schedule Margin in Integrated Master Schedules, May 2009
▪ NDIA white paper on techniques to depict schedule margin in IMS
o DI-MGMT-81650, Integrated Master Schedule, 30 May 2005
▪ The DID required to be placed on EVMS applicable contracts
▪ Identifies requirement for performance measurement & SRA
o DI-MGMT-81861, Integrated Program Management Report, 21 June 2012
▪ The DID required for EVMS applicable contracts after 01 July 2012
▪ Identifies requirements for IMS and SRA
o DoD Integrated Master Plan and Integrated Master Schedule Preparation and Use Guide, 21 Oct 2005
▪ Provides guidance to government for IMS language in RFP
▪ Recommends duplicating the PE, SA, & AC from the IMP into the IMS
▪ Contains generic steps for IMS preparation
▪ Contains discussion of SRA
▪ Contains procedures to evaluate IMS submitted with proposal
o DoD Earned Value Management Implementation Guide, October 2006
▪ Contains tailoring guidance for IMS CDRL
▪ Recommends contract have procedures & timeline for rolling wave planning
▪ Discusses OTS
o GAO Schedule Assessment Guide, May 2012
▪ Ten principles for a quality schedule ▪ Stresses the importance of WBS in IMS development.
▪ Recommends WBS be outline for IMS
o Navy CEVM Analysis Toolkit, Aug 2008
▪ Contains steps for IMS analysis
▪ Contains NAVAIR 11 Point Program Schedule Assessment Methodology
▪ Contains NAVAIR SRA process
o NASA Schedule Management Handbook, January 2010
▪ Recommends schedule management plan for each project
▪ Contains best practices for scheduling
▪ Lists project documentation needed to build an IMS
▪ Contains detailed procedures for resource loaded schedules
▪ Contains schedule health metrics
▪ Contains Joint Confidence Level techniques
o NDIA PMS EVMS Intent Guide, June 2009
▪ Shows attributes of IMS
▪ Shows objective evidence of IMS complying with EVMS guidelines
▪ Shows the contribution of the IMS to multiple EVMS guidelines
o Planning and Scheduling Excellence Guide (PASEG), June 2012
▪ Practical guidance for building and maintaining schedules

▪ Contains section on schedule assessment and analysis
▪ Includes section with terms and definitions
o Prime Contractor's EVMS Description Documents
▪ Addresses preparation of IMS to establish baseline
▪ Addresses schedule maintenance
▪ Addresses baseline change procedures
o Prime Contractor's Scheduling Guidelines & Handbooks
▪ Contractors often have separate scheduling document to standardize their scheduling practices
▪ Contractors may have program unique scheduling instructions where the contract or unusual situations establish more rigorous requirements than in the EVMS Description or contractor scheduling practices

Additional Schedule References

Key Terms and Concepts

This section lists key terms and concepts for the preparation and maintenance of IMSs and is provided as a tutorial for the assessment team to facilitate understanding the basis for performing schedule assessments.

The IMS Assessment Process uses these terms synonymously:

- IMS and Schedule.
- Program and Project.
- Total Float and Total Slack.
- Free Float and Free Slack.
- Earned Value Method and Earned Value Technique (with respect to work packages).
- Planners and Schedulers.
- Supplier and Contractor.

Terminology may vary depending on which scheduling tool is used. Microsoft Project and Open Plan Professional use the following terms somewhat synonymously.

Microsoft Project	Open Plan Professional
Task	Activity
Summary Tasks	Subprojects
Constraint/Deadline Date	Target Date
Constraint Types: Start/Finish No Earlier Than, Start/Finish No Later Than, As Late As Possible, As Soon As Possible, Must Start/Finish On	Target Types: Start/Finish Not Earlier Than, Start/Finish Not Later Than, On Target, Fixed Target

Government Oversight Schedules and Supplier Schedules

The Government Program Management Office (PMO) has the challenging role of providing oversight and management of multiple contractors and major subcontractors with multiple IMS files that are integrated using a combination of electronic and manual interfaces or integration points or techniques. Program schedules may be made up of one or more IMS files. While the

supplier's PMO typically produces and maintains most schedule products provided to the government, it is the whole program team, including government and supplier members, who must claim ownership for schedule content and validity.

The government PMO is charged with managing the entire program for the Program Executive Officer (PEO). Each program is typically comprised of one or more contracts. Each development/production contract, in turn, has a single IMS that pertains to that contractor's contractual SOW. Each contract typically has one or more major subcontractors that may also have their own IMS. Each program must also have a total program schedule that includes all government responsible scope and interfaces. This content may be in a separate government schedule or part of the contractor's IMS.

IMS Hierarchy (WBS Levels, Summary Tasks, and Indentures)

The IMS typically starts with a total program task and summary tasks that may follow a number of patterns. Some IMSs use the Program Events from the IMP as an initial indenture level with supporting tasks aligned beneath. An indenture level refers to a particular level within a hierarchal structure, in this case levels of an IMS, providing a meaningful arrangement of tasks and data. Other programs may use the Work Breakdown Structure (WBS) as the initial indenture level. IMSs may contain a summary section for milestones followed by an indentured level of discrete tasks. Below each summary task level is a further breakdown until reaching the detailed task level. At the detailed level these are simply called tasks or detailed tasks and can also be milestones (tasks with zero duration).

IMS indentures, or levels, vary based on the program size, duration, and complexity. There is no hard rule that requires planning to one level (e.g., level 3) for the entire program. Instead, the program team needs to evaluate each WBS leg and determine the appropriate indenture that provides manageable Control Account and Work Package sizes (budgets) and durations. Major Subcontracts or supplier efforts typically fall under one WBS element, though it is possible that a supplier provides effort across multiple WBS elements.

Ultimately, the IMS hierarchy should help the program team to plan the work in detail to a manageable level such that each control account can be assigned to a single person (the CAM) and the work can be statused and forecast per the routine business rhythm (e.g., weekly, bi-weekly, or monthly updates) with consideration for collecting actual costs for control accounts (minimally) or work packages (ideally). This provides effective management visibility, critical path identification, analysis, and control.

This structured approach affords the program management team greater visibility and capability to plan necessary resources adequately and to ensure adequate budget is available to accomplish the work as planned.

Integrated Master Plan (IMP)

The IMP is a hierarchical, event-based program structure breakdown that defines the program's entire scope of work and approach to execute the work by Events, Accomplishments, and Criteria through successive levels of supporting detail. This structure takes the form of high-level interim Events to assess program progress, the more specific Accomplishments that define the

objectives to meet those progress points and the much more defined Criteria that are measurable indicators providing tangible evidence of meeting the objectives.

Typically, there is more than one Accomplishment per Event and more than one Criterion per Accomplishment. Event, Accomplishment and Criteria naming convention follows the practice of ending the name with a paste-tense verb. For example, the Criteria for performing test data analysis might be Static Test Data Analysis Completed.

While the IMP and IMS are inherently related, they are two separate products. The IMP answers the question "What" and the IMS "When" the scope is time phased.

IMS Supplemental Information

Any submittal of the IMS to the government should be accompanied with supplemental information. This information is normally provided in a narrative that accompanies the native scheduling software data files. This information should include schedule status date, dates of related artifacts such as IMP and risk database, and reference to any program unique scheduling procedures. The narrative should also include explanations of schedule content such as LOE, custom field use, deadline use, schedule margin, and external milestones.

Program Milestones or Control Milestones

The SOW or other contractual documents identify the customer required major events and program start and finish dates.

Typically, an IMS includes a program start milestone and a program finish milestone. The start milestone is used as a predecessor for work that begins at the start of a program. The finish milestone is the successor for the ends of all logic paths. Milestones for major events are usually included. These are Systems Requirements Review (SRR), Preliminary Design Review (PDR), Critical Design Review (CDR), and Production Readiness Review (PRR). Other major events such as important tests and demonstrations, achieving flight readiness, or first flight, in the case of an aircraft program, may also be incorporated. When milestones are included in a section at the top of the IMS, it improves readability.

Tip: Derive program milestones from the IMP Events and Significant Accomplishments. These are typically significant start, interim, or end points for major phases or efforts. Before baselining the IMS, synchronize the IMP and the IMS program milestones.

Control Account or IPT Start, Finish, and Interim Milestones

Complex programs typically have many control accounts, IPTs, or other major sections that contain internal predecessor-successor logic; that is, links among tasks within the control account or IPT. Ideally, each control account has a defined start and finish as well as interim milestones that establish natural start or break points within the work. Using these kinds of milestones is useful for validating internal logic and for creating links among control accounts or IPTs.

Planning Packages

Planning packages are groups of tasks that cannot be defined in detail at the current time that must be turned into detail planned work packages before work can begin. Planning packages have scheduled start and completion dates, determined by precedence logic. They also have associated resource cost budgets and forecasts to support the scope they represent, providing that information in the EVM System to maintain the Performance Measurement Baseline (PMB) and forecast. Because planning packages lack sufficient detail for measured progress, EV methods or techniques are not assigned until the detailed planning is conducted.

CAMs should be able to explain the content of any planning packages in their control accounts. Planning packages should have durations of six months or less, if practical. Shorter periods align with detailed rolling wave exercises where planning packages are efficiently converted to detailed work packages at one time. Shorter planning package durations facilitate enhanced critical path validity. Some programs conduct detailed planning at least once per year. Other programs require planning packages be converted one or more accounting periods before work can begin. Considering the stability of the program, it is advisable to require conversions of planning packages as soon as possible with reasonable confidence in the plans.

Task Types

Microsoft Project scheduling software is widely used in the Air Force. For this reason the discussion regarding task types will address those found in the Microsoft tool. There are three task types; fixed-units, fixed-work, and fixed-duration.

- **Fixed-units**: think resources - the assigned units or resources are a fixed value and the changes to a task's duration or amount of work do not affect the amount of units or resources.
- **Fixed-work**: think hours of work - the amount of work (usually hours) for a task are a fixed value and changes to a task's duration or amount of units (resources) do not affect the amount of work.
- **Fixed-duration:** think the span of work-time from start to finish - the task's duration is a fixed value and changes to a task's work or assigned units or resources do not affect the task's duration.

The Fixed-duration task type provides the most stable condition for establishing the task duration. When establishing the schedule; review and validate assigned resources required to accomplish the work in the stated amount of time. When changes are made to the schedule the result is dependent upon the task type. The figure below shows the result of changes by task type.

Each of the task types affects scheduling when you edit one of the three elements as follows.

In a...	If you revise units...	If you revise duration...	If you revise work...
Fixed-units task	Duration is recalculated.	Work is recalculated.	Duration is recalculated.
Fixed-work task	Duration is recalculated.	Units are recalculated.	Duration is recalculated.
Fixed-duration task	Work is recalculated.	Work is recalculated.	Units are recalculated.

Task Type Changes

Each calculation uses Duration multiplied by Units equals Work (Duration x Units = Work).

Task Names (Nomenclature)

Consistent and clear task naming conventions increase the usability and effectiveness of an IMS. For example, performing name searches for similar tasks in multiple parts of the schedule is easier when the naming structure is well-defined and constant. When naming tasks, it is important to define the task (scope) and its output (deliverable). Write descriptive task names so the user understands the content without its Summary Task structure to aid in its descriptive clarification. Task names are most effective when beginning with a present-tense action verb and describe the scope in such a manner that assists in determining its completion. An example is "Complete Flight Survivability Test Analysis."

Task Durations

Task durations reflect how much time it takes to perform the work under normal conditions. Express this most-likely task duration in working days, as the time unit appropriate for most programs. Shorter task durations are more manageable than longer task durations, complement precedence logic development, and facilitate progress measurement. A task duration goal of less than two months is desirable, normally 44 working days or fewer. Refrain from arbitrarily breaking tasks into shorter duration increments if the natural task duration exceeds this desired length. Well-defined tasks provide greater critical path assurance. In addition, planning package durations should be less than six months if practical. LOE task durations typically align with an associated period for providing the related effort, but should not encompass multiple Fiscal Years, complicating schedule administration.

Note: Use consistent time units for all task durations in the same schedule. Avoid mixing days, weeks, and months, as this makes analysis difficult.

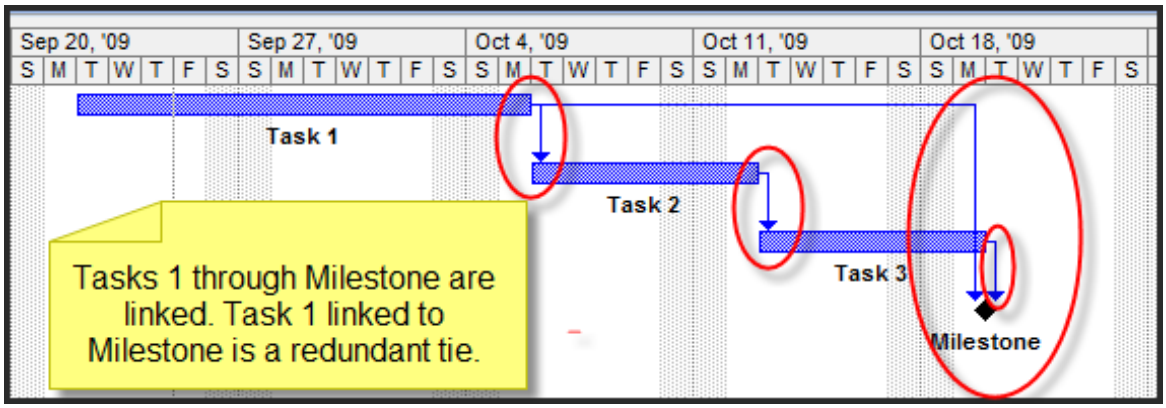
Logical Relationships Between Tasks

The logic network consists of the tasks logically tied to one another with a precedence relationship. A predecessor relationship for a task means it is dependent upon that task to determine its start or finish date. A successor relationship for a task means it determines the start or finish of the dependent task. Collectively, all tasks connected by predecessor and successor relationships make up the logic network.

It is important to identify technical and meaningful dependence among tasks when developing the network logic. Assigning realistic and meaningful network logic in building the schedule correctly because the dependence on other tasks is not arbitrary and it establishes relationships that horizontally integrate the likely sequence of work. This approach schedules the tasks for the correct timing based on the predecessor tasks and their durations and enables more accurate forecasting, as well as more efficient task execution.

Stated differently, tasks need logical relationships so the schedule as a whole moves based on status. Modeling the schedule with appropriate logical relationships and ensuring all tasks have at least one predecessor and one successor supports the schedule as a predictive tool. Any discrete activity in the network can have an impact on the total program.

Identify all required relationships, but avoid redundant ties. These are unnecessary and add confusion to understanding and analyzing the logic network. See the exhibit illustrating a redundant logic tie condition below.



Example of a redundant logic tie

Caution: Avoid assigning "any" convenient predecessor or successor to a task just to ensure it has one. For example, avoid linking tasks to the program start or finish milestones unless those are truly the most appropriate relationships. Avoid linking tasks merely because they happen to place tasks in some preconceived, ideal time period. These practices might seem to help schedule health in the short term, but ultimately increase the effort required for logic maintenance and resolving false schedule impact drivers. The problem with this approach is such tasks usually reflect excessive amounts of positive total float and become suspects of not having a proper predecessor or successor identified. The concern is that these tasks are missing a logic tie that might impact the critical path. If the more appropriate logic tie does not exist and there truly is no impact to other tasks, consider inserting a control milestone to identify the related effort completion and assign a deadline to control the amount of total float calculated. Thus, assigning valid relationships enables better schedule management and analysis—and helps create meaningful total float values.

Identify the technical outputs needed from other tasks (predecessors) to perform the effort and the tasks that need its technical outputs (successors) in order for those efforts to execute. Identify and assign at least one predecessor and one successor to all tasks in the schedule, except for the first and last task or milestone.

Some schedules depict feed-in points from external sources as milestones for Government Furnished Equipment (GFE) or material delivered to the program. These are commonly referred to as 'feed-in 'milestones. Planners may choose not to have a predecessor for these conditions, but certainly have successors identified for the tasks that require the delivered material. Likewise, some schedules may generate a deliverable to an outside source, such as a technical documents package that a supplier requires to perform their related efforts. In this case, the schedule may not explicitly reflect the suppliers' efforts and treat them as an external hand-off without a successor task. These are commonly referred to as "feed-out" milestones. These hand-

off milestones should still have predecessors identified whose efforts generate the product and determine the timing for the deliverable.

Acknowledge and explain such special conditions and the related techniques in the IMS Supplemental Guidance. Explain the feed-in and hand-off methodology; include identifying the tasks and using constraint dates for anticipated delivery dates and need dates, and the considerations for total float.

Assigning logic to tasks may require taking into consideration a preference for the order of execution. A task may not have a technical dependency to another task, but perhaps the same person (or resource) is required to perform both tasks and both have the same predecessor. Instead of scheduling both tasks in parallel with the knowledge that the same person cannot execute both parallel scopes simultaneously, make one task the predecessor to the other, so one occurs prior to the other.

Caution: Avoid assigning too many predecessor or successor relationships to a single task or milestone. Having more than ten relationships makes analysis difficult. For example, employ toll–gate milestones as a method of collecting the common predecessor ends into a single toll-gate milestone whose name describes the related tasks. Make successor ties to the toll-gate milestone, thereby reducing the number of individual logic path relationships.

Logical relationships

Logic relationships define how predecessors and successors interface. The predecessor task must start and / or finish before the successor task according to the following conditions. There are four possible types:

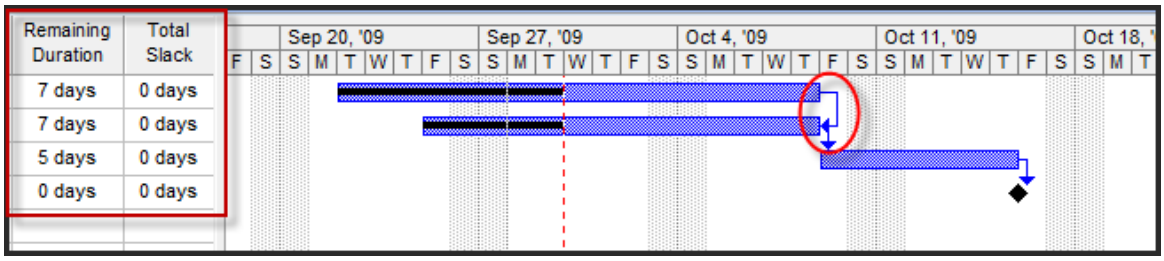
- **Finish-to-Start (FS)** – The predecessor task must finish before the successor task can start.
- **Start-to-Start (SS)** – The predecessor task must start before the successor task can start.
- **Finish-to-Finish (FF)** – The predecessor task must finish before the successor task can finish.
- **Start-to-Finish (SF)** – The predecessor task must start before the successor task can finish (rare condition).

Always read the relationship from left to right to avoid confusion, from predecessor to successor task.

Caution: Tasks with start-to-start successor relationships should also have a finish relationship to another task, so that there is a consequence to the task's completion.

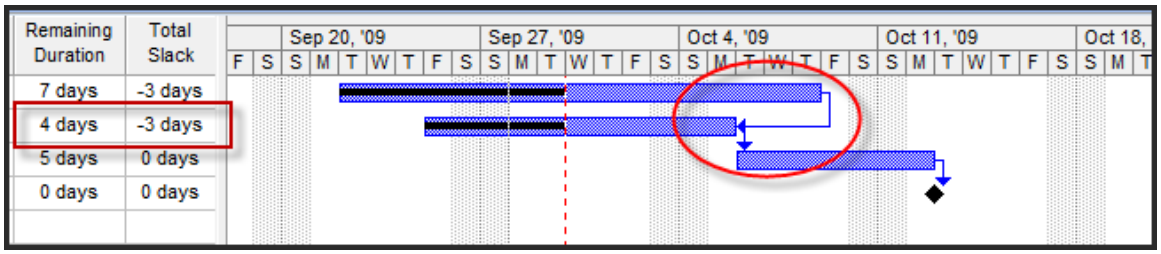
Tasks in Microsoft Project that have an actual start, but do not have an actual finish, and have FF predecessors, do not automatically adjust their finish dates by honoring their FF predecessors' finish dates. This is unique to this tool. Thus, it is possible for a task to have an earlier finish date than its FF predecessor's finish date (not honoring the relationship). MS Project tries to alert the user to this condition by reflecting a negative total slack value equal to the amount of duration

overlap. The user must decide if the relationship is still valid. If so, the task's remaining duration must be revised to reflect a finish date that is equal to or later than its FF predecessor's finish date. If the relationship is not valid, the FF predecessor must be modified and / or replaced by a more appropriate relationship; such as FS or SS.



Finish to Finish Relationship

MS Project screen shot correctly depicting a FF relationship, the second in-progress task does not finish earlier than its FF predecessor's finish.



Incorrect Finish to Finish Relationship

MS Project exhibit depicting a FF relationship, the second in-progress task incorrectly finishes earlier than its FF predecessor's finish. Note the negative three days of total slack (aka total float), indicating the amount of duration that is incongruent with the relationship. This affects the third task and milestone, as they are incorrectly scheduled three working days earlier.

Caution: Check in-progress tasks with finish-to-finish predecessor relationships for correct finish dates that honor their predecessor's finish date. Also logically limit the use of FF unless absolutely necessary.

Logical Relationships Between Summary Tasks

Caution: Software programs that use Summary Tasks (such as Microsoft Project) permit assigning schedule logic relationships at the Summary Task level. Avoid assigning logic relationships at the Summary Task level as this may have unintended consequences on its subtasks and their logic relationships to tasks outside the Summary. It is also difficult to analyze the schedule when sorting detail tasks if the logic exists at the Summary Task level. Assign predecessors and successors at only the detail task level.

Leads and Lags

A Lag is a modification to logical relationship that directs a delay in the successor activity. For example, with a finish-to-start relationship and positive 3 working days lag, the successor starts three working days after the end of the first task. Lags can be used to model wait time, and not to represent contracted work effort. For example, a 30 day government review of a contactor document may be modeled with lag. However never use a lead/lag to plan when a task starts or ends. Lags should have a rationale for their use, documented in the task notes.

Consider using a documented "no earlier than" constraint to model resource availability instead of applying lag for this purpose.

A lead is a logical relationship modification that allows acceleration in the successor activity; modeling the successor's start and possibly finish to occur earlier than the predecessor's dates. Leads should be avoided, as negative time is not demonstrable. Lags should not be used to manipulate float / slack or constrain the schedule.

Consider decomposing a task into more than one task to enable properly modeling finish-to-start logic relationships to avoid using a lead.

Constraints

Constraints are specific controls applied to tasks that help establish dates or monitor when conditions are such that achieving objectives might be in jeopardy. A constraint potentially overrides the calculated start or finish of a task with a date. There are two conditions that allow only the logic to determine the date: As Soon as Possible and As Late as Possible.

The "No Earlier Than" constraints prohibit tasks from starting or finishing prior to a specific date. The network logic can cause these tasks to schedule later, but not earlier than, the constraint date. Modeling the anticipated receipt of material or components, receiving the authorization or approval to proceed, or acknowledging the earliest availability of a limited resource are examples of using this type of constraint.

The "No Later Than" constraints can have one of two possible effects, depending on the schedule tool settings. They may either prohibit the start or finish date from reflecting the impact of the network logic that would schedule the task later than its constraint date or allow the later date, but establish the need to achieve the date. Regardless of the settings, the "No Later Than" constraints calculate the total slack correctly and provide the related visibility into achieving the need date. A negative total slack condition reflects the working days predecessor tasks must gain so that the start and finish dates support the milestone constraint date.

Minimize use of all constraints in favor of establishing dates by the free flowing logic network. Use documented "No Earlier Than" constraints to refine near future period dates that reflect resource availability conditions. These constraints should be in addition to the logic relationships and establish feed-in point dates for known deliverables not readily identified by logic relationships. Apply "No Later Than" constraints and deadlines sparingly, and preferably with the tool settings configured that allow predecessor impacts to determine the achievable dates. They should reflect the known need dates that are different than the downstream logic path

naturally determines, and used to closely monitor portions of the schedule that are prone to schedule slip, as a method to manage the total float. Identify and apply to milestones, as opposed to tasks, that clearly indicate the intent of using related constraints.

As an example, the following is a list of constraints used in MSP:

As Soon As Possible (ASAP) – This constraint schedules the task to begin as early as possible. This is the default condition for tasks when scheduling from the project start date. Do not enter a start or finish date with this constraint.

As Late As Possible (ALAP) – This constraint schedules the task as late as possible according to its successor path tasks. This is the default constraint for tasks when scheduling from the project finish date. Do not enter a start or finish date with this constraint. Generally, minimize the use of ALAP in that it may be difficult to manage and may have unintended consequences that are difficult to detect.

Start No Earlier Than (SNET) – This constraint schedules the task to start on or after a specified date. Use this constraint to ensure that a task does not start before a specified date. It is sometimes used for representing a physical resource constraint.

Finish No Earlier Than (FNET) – This constraint schedules the task to finish on or after a specified date. Use this constraint to ensure that a task does not finish before a certain date.

Start No Later Than (SNLT) – This constraint schedules the task to start on or before a specified date. Use this constraint to ensure that a task does not start after a specified date.

Finish No Later Than (FNLT) – This constraint schedules the task to finish on or before a specified date. Use this constraint to ensure that a task does not finish after a certain date.

Must Start On (MSO) – This constraint schedules the task to start on a specified date. This sets the early, scheduled, and late start dates to the date entered and anchors the task in the schedule.

Must Finish On (MFO) – This constraint schedules the task to finish on a specified date. This sets the early, scheduled, and late finish dates to the date entered and anchors the task in the schedule.

Note: Reference specific tool settings to understand the constraint's treatment under different configurations and the related task behavior that make SNLT, FNLT, MSO, and MFO constraints considered as "hard" constraints. Regardless of settings, recommend not using MSO and MFO to reflect need dates.

Deadlines

MS Project offers a Deadline feature that behaves similarly to the "No Later Than" constraints without restricting the effects of the network logic determining the task's start or finish date. There are benefits to using deadline dates rather than constraints. The use of deadlines allows impacts to downstream successor path tasks caused by a schedule movement to the right.

The MFO constraint does not permit the task or milestone to move and subsequently does not reflect the impact to successor path tasks (if option is checked for 'Tasks will always honor their constraint dates' under Tool, Options, Schedule tab). The restrictive characteristics of MFO and other hard constraints obscure visibility into the predictive capability of the logic network. Alternatively, deadlines allow tasks or milestones to reflect the impact from predecessors, thus reflecting the correct dates and also permitting the downstream successor path impacts to forecast dates. The Total Slack is calculated correctly using either method for the focus task, but using deadlines permits accurate successor path forecasting and therefore does not prohibit the correct total slack calculation for those tasks.

Calendar(s)

Most tasks use the default program calendar to determine their start and finish dates. A program calendar is typically based on an eight hour workday, Monday through Friday, 40 hour workweek, and recognizes company holidays as non-work days. The calendar establishes those available start and finish dates, based on the tasks' timing. Apply a separate unique calendar of workdays / hours representing those conditions to tasks requiring workdays and hours that are different from the default standard calendar. This more accurately reflects how related tasks are scheduled. For example, customized calendars could reflect working Saturdays for the next two months or working two ten-hour shifts, seven days per week for a period. Be advised that applying different calendars to tasks in the same schedule may result in some date / duration calculations providing mixed values and making analysis more complex. For example, tasks with different calendars that are on the same logical path to a program milestone could have different total float values. Tasks using a five workdays per week calendar might have negative five days of total float and tasks using a seven workdays per week calendar might have seven days of negative total float. Both sets of tasks have one week of negative total float when measured against their respective calendars.

Tip: Minimize the use of unique task and resource calendars and be aware of their impact on the critical path. Use the indicators field to highlight the use of other than the project calendar.

Critical Path and Driving Path(s)

The critical path is the longest path of related incomplete tasks in the logic network from Timenow whose total duration determines the earliest program completion. Similarly, the longest path of related incomplete tasks in the logic network from Timenow whose total duration determines the earliest interim milestone completion is called the driving path. Defining the driving path to relate to interim milestones and critical path to relate to program completion differentiates these two terms. The critical path generally reflects the least amount of total float, but this may not be the case in all situations, when constraints are applied to tasks and milestones to reflect need dates. Any delay of tasks on the critical path results in an equal delay to program completion or similarly with the driving path to interim milestone completion. Conversely, any critical path shortening can result in an earlier program completion, earlier interim milestone completion and sometimes results in a new set of related tasks determining the critical path. Constraints configured to permit and reflect precedence impacts to dates, while still accurately

calculating total float values, such as appropriately configured "not later than" constraints or deadlines, should be applied to endpoint milestones.

Warning: If LOE is included in the IMS, never link these tasks to discrete work. LOE should never drive the critical path.

Crashing the Critical Path

After identifying all tasks and establishing logical relationships, observe the effects to the program completion and program milestone dates. Often the initial schedule development includes timing scenarios that do not support the target goals of the program. Find the milestone dates and note any negative total float, caused by logic paths whose total duration results in a calculated finish date that exceeds the desired end date.

Crashing the critical path involves iterative passes of driving path reviews to assess the tasks and relationships that comprise these long duration sequence of tasks. Analyze task durations and logical relationships for possible optimization. These reviews require inquiry into what trade-offs are possible and acceptable with respect to risks to reduce the total time required to achieve the end date.

Questions to be asked are:

- Can certain tasks be performed in less time?
- Can certain tasks be performed in parallel instead of the existing serial logic?
- If the task were split into shorter duration tasks, would that provide the opportunity to begin a subsequent task earlier, where its dependence is on the "up front" steps?
- Can task durations be shortened if more resources are applied to the task? Would productivity increase through acknowledged longer working days or additional work periods?

As one path is reviewed and adjusted, another path of logically tied tasks may become the next critical path that is not as long in duration as the previous path of tasks, but is too long to achieve desired program goals. The same review process continues until all logical paths to the program milestone are resolved for acceptable and executable conditions. It is through this type of critique that task durations and logical relationships are tailored to reduce total duration and achieve the program goals within acceptable amounts of risk.

If assigning resources after critical path development, the optimized schedule must be reviewed in light of the resource allocation required to execute the schedule. The schedule may indicate peak amounts of resources required at different time intervals of the program. Where resource quantities do not exceed demand, some resource level smoothing may take place to avoid the peaks and valleys of the resource load. This requires rescheduling tasks in the network to take advantage of total float to level the amount of resources needed during the period. If resources are scarce or the resource type with the required skill-set are in short supply, a more rigorous review of task durations and precedence logic may be required to resolve resource allocation issues. If the executable schedule envisioned cannot be achieved after resource allocation smoothing, it is advisable that the supplier and customer negotiate a new achievable milestone end date.

Resource Loading

There are different approaches to developing a resource loaded IMS. Some schedulers prefer loading resources along with the other task information during schedule development. Others prefer to develop the schedule, including all related information except for resources, to concentrate on resolving schedule conflicts without the burden of the resources affecting any of the adjustments. Whichever approach is taken, resource loading the IMS is an excellent method to determine cost, observe the settings for assigning resources to tasks and the effect this action has on task duration. After applying resources, review the critical path to determine any impact of resource loading and resource leveling.

Assigning and maintaining resources in the IMS provides great visibility during program execution. The dynamics encountered during execution require logic and task duration changes to reflect the manner the program is unfolding. These changes could reschedule tasks such that the resources required to perform the work are greater than available staffing. The lack of resource loading in the IMS restricts the program's visibility regarding over-allocated resource conditions. Analyzing the schedule with resource allocation visibility enables the program to make decisions on rescheduling tasks with the insight of available resources and the preferred order of task execution.

Caution: Software programs that use Summary Tasks, such as Microsoft Project, permit assigning resources at the Summary Task level. Avoid assigning resources at Summary Task level, as this may have unintended consequences on the subtasks and the ability to apply resource loading to specific task requirements. Assign resources at the detail task level.

Another benefit to having a resource loaded IMS is the costs developed at the work package / planning package level establish integration with the separate cost system, provide a method to validate that the entire scope is planned, and provide a weighted value for each task.

The resource loaded IMS, along with the SOW and WBS, validates that the IMS contains all program scope and is useful for reconciling program budget changes when performing baseline change activity.

Not all tasks are equal, and a resource loaded IMS quantifies task magnitude by identifying the number of resources involved or the amount of budget assigned to each task. This is especially useful when analyzing the schedule and making management decisions. Without the benefit of identifying resources at the task level, it is difficult to ascertain priorities and the importance of one task over another or to assess the impact of management decisions. Quantifiable magnitude is especially helpful when analyzing the schedule and making decisions regarding critical path / near-critical path tasks, or tiebreaker decisions on task execution.

Resource-loading can be by name, functional category, or skill-set. The approach most likely varies by program scope and complexity. A mixture is typical: by name for the key resources and by category for the majority of the program resources.

Baselines

When the basic task information is established and the program has confidence the tasks can execute within the constraints of capabilities, budget, and available resources to achieve program targets and goals; the program is ready to baseline the tasks in the IMS. Setting the baseline for tasks establishes a benchmark of start and finish dates, task durations, and estimated costs used to measure periodic actual performance and revised projections on remaining work. Set the baseline on all tasks in the IMS prior to entering the execution and maintenance / status phase. Set the baseline for new tasks when adding them to the IMS. Establishing the baseline places the IMS under configuration control and all subsequent task changes now follow the program's formal baseline change process.

Establish the baseline at the start of the program as equal to the forecast. The baseline is the executable plan that performance is measured. In practical terms, the baseline uses the IMS's early dates and is controlled throughout program execution through the baseline change management process.

Building an IMS

The following two sections offer guidance on building and maintaining an IMS. They offer insight into the methods and procedures that contractors use in preparing IMS deliverables.

Building the IMS is a collaborative effort involving the entire program management team, utilizing all pertinent technical, schedule, and resource information in constructing a tool with the predictive capabilities necessary to manage the program effectively. This instruction is intended for the person acting as the program planner and provides knowledge, suggestions, and tips to use in building the IMS as a way to understand the features and characteristics of an IMS. In reality, constructing the IMS is dependent upon the information provided by the program management team, especially the CAMs. The CAMs are the task owners responsible for planning, executing, and managing their efforts and performance. Avoid the IMS becoming the planner's schedule by involving the team throughout the process in developing, setting the baseline, and managing the schedule.

The following are the major steps in constructing an IMS. The order of steps varies slightly based on contractor procedures.

IMS Structure

Determine the program structure best suited for managing the effort, single project or multiple integrated subprojects. Single project structure is easy to manage and requires less integration effort for programs but limits the schedule management to a single user. Large programs with separately managed entities may prefer the flexibility of managing these components simultaneously. This requires more discipline and coordination to manage the integration and configuration control of schedule techniques and file management.

Utilize the IMP

Enter the IMP Events, Accomplishments, and Criteria structure into the IMS, by employing user defined codes, populated with IMP numbers or other schedule tool structure features. This

provides assurance of IMP / IMS alignment and the IMP numbering system provides a convenient task cross reference with the IMP.

Establish Calendars

Define the project calendar. Organizations typically follow a standard workday calendar that identifies non-workday holidays and accounting month-end periods. Define the default workdays in the calendar. Determine if any unique task calendars or resource calendars are needed and define them at this time if possible.

Identify Tasks

The planners, working with the CAMs, define the tasks in sufficient detail to accomplish the program objectives using the source information described above. The tasks have duration, and sequence required to perform the effort calculated against a workday calendar that produces a schedule. The tasks align with program milestones to determine if the program's goals are achievable. The IMS is a predictive forecaster of future efforts and budgets required to achieve success and a performance measurement tool for completed work effort.

Identify Task Constraints and Relationships

Program IPTs and CAMs identify the relationships among their tasks and milestones, external activities, and other IPT tasks. Constraints for tasks are identified and documented.

Earned Value Methods or Earned Value Techniques (EVTs)

Maintain EVTs at the work package level, as required. It is recommended to maintain EVTs in the IMS for best usability.

Numbering System

Provide cross reference numbering for the IMS tasks. Cross references to the IMP, SOW, WBS, Control Account, program risks, deliverables, and baseline changes are some of the cross reference numbers that should exist in the IMS.

Resources

If the IMS is a resource loaded schedule, add resources at the work package level and if possible at the IMS discrete task level. Allocate resources to match availability. Following tasks' structures revision, redo the analysis performed in the previous step. If resources are not included in the IMS, then a detailed and frequent reconciliation to the baseline and forecast of resources to IMS timelines is required to ensure alignment.

Initial Analysis

Conduct a critical path analysis and a Schedule Risk Assessment (SRA) on the completed IMS.

Document IMS

Prepare the IMS Supplemental Guidance or similar named document, such as IMS Basis and Assumptions document, to provide a comprehensive understanding for an IMS construct and intended use. The IMS Supplemental Guidance provides the user with instructions on how to use the IMS, explanations on special techniques applied to its content, and defined methods for determining program critical path or driving path to interim program milestones.

Maintaining an IMS

Maintenance is performed on the IMS to add new work, remove unnecessary work, modify existing work, or portray the effects of executing the work through historical recording and forecasting remaining work. This maintenance is accomplished through baseline changes and status updates to the schedule.

Updating Forecasts

The IMS contains baseline dates for each task as well as forecast dates. The baseline dates reflect the approved and controlled plan. The forecast dates reflect the currently projected activity dates from the task owners. Forecast dates are updated during each IMS update cycle. This is done at least monthly but on many programs is performed weekly.

Resource Changes

Resources frequently change and the schedule should reflect those updates. CAMs may be reassigned and the IMS reflects the responsibility for each task. Resource types and quantities may change to keep in alignment with project dynamics. These changes may be made to the approved plan (baseline) or the forecast information. Approved plan changes require a Baseline Change Request.

Baseline Changes

Change management in the IMS generally involves changes that affect the schedule baseline. These changes have a potential impact to the schedule, control account budgets, estimates at completion, and claiming performance. The Baseline Change Request (BCR) process is the manner in which documented and approved scope changes and related budget changes are reflected in the IMS. The BCR quantifies scope changes with both time and cost impacts.

Recording Progress

Perform schedule status during the execution phase. Schedule status refers either to the schedule's condition, as in the schedule projects completing prior to the need dates, or to the process of determining the condition, such as in performing the monthly status cycle. The status process seeks to determine if the scheduled work accomplished is ahead of, on, or behind schedule or if the remaining work effort is ahead of, on, or behind schedule and with the resulting projected forecast impacts properly reflected. The baseline dates provide the basis for determining if completed, in-progress, or future tasks are ahead of, on, or behind schedule.

Assessing the program's status condition is most meaningful when determined on a cyclical basis. For example, once per month with the month end date coinciding with the accounting period close. Soliciting status requires generating the schedule information pertaining to the status cycle period for the responsible person to assess progress and record the proper information. In an Earned Value Management environment, the responsible person is the CAM; they are in control of executing the work and claiming performance on work accomplished. The CAM must record accurate historical information for completed work and make accurate projections for remaining work. This takes the form of recording Actual Start and Actual Finish dates for completed tasks, determining remaining duration or forecasting finish dates for work started but not completed, and projecting the start and or finish dates of work that should have started or completed during the status cycle period, but did not. It is also important to look ahead to the immediate period or two following the status cycle period to determine if those tasks can execute as scheduled or validate rescheduling as a result of the current actual date performance or projections reflected through the successor relationships. Tasks in the look-ahead period may

require modified logical relationships to reflect their revised execution due to other known reasons. This is a direct reflection that consequences and program dynamics are better understood in the near future as opposed to assumptions made during the planning phase. Adjustments here ensure the most accurate schedule information and the predictability of the IMS remains effective.

Note: Coordinate complementary status cycles and status dates with subcontractors so the integrated schedule information is relevant.

The Status Date is the "as of" date for the schedule information in the program; also known as Timenow or Data Date. In general, the status date is the point in time that identifies all tasks' condition as either completed, in-progress, or future. The status date marks a relevant point in time. Tasks scheduled earlier than the date should have completed, tasks scheduled later than the date are either started and in-progress, with their finish dates projected later than the status date, or they have not started, and are scheduled to start and finish in the future. Typically, status dates represent an end to a monthly accounting period cycle and occur on a regular basis to enable program period performance measurement. Status dates reflect the amount of effort completed up to that point in time, how much progress is achieved since the previous status date and how much effort is remaining. Metrics based on these end of period dates provide meaningful measures to help managers assess progress, know where difficulties exist through performance analysis and projected schedule impacts, and enable fact-based decision making to effectively manage the program.

Determining the amount of task percent complete is easy for un-started or completed work; they are either zero or 100 percent complete respectively. In-progress tasks present a more challenging scenario when determining progress or percent complete. Assessing the amount of work accomplished as opposed to the amount of time that has passed is the best method in determining progress achieved. When applying status to an in-progress task (started but not completed), identifying the percent complete can take the forms below:

Task Duration Percent Complete

Percent Complete (often represented as "% Complete") refers to task duration percent complete. It is a simple percentage of time through status date as compared to the total task's duration. For example, a task with a 20 day duration that is 50% complete means that 50% of the duration is completed (10 working days) and 50% of the duration is remaining (10 working days).

In Microsoft Project (MSP) the percent complete field alone is inadequate for schedule status due how it treats remaining duration. For MSP schedules the in-progress tasks should be updated to the status date and the task duration percent complete is automatically calculated. Do not rely on task duration percent complete as a progress indicator; EV percent complete and physical percent complete convey more meaningful indications of progress. The remaining duration must be forecast beginning at the status date to have the tool calculate an accurate finish date.

An example illustrates the MSP unique situation with statusing. For this example assume the following scenario:

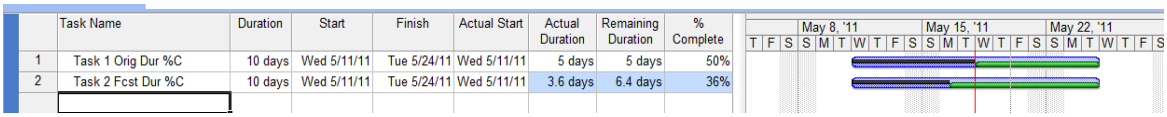
- A 10 day task is planned to start on 5/11/11 and finish on 5/24/11 (Calendar is set for Saturday and Sunday as non-working)

- The task actually starts on 5/11/11
- The status date is Tue 5/17. The percent complete to the original duration is 50% (5/10 days)
- As of the status date the forecast of completion is 5/30/2011 or a remaining duration of 9 days from the status date. The percent complete to the forecast is 35.7% (5/14 days)
- The new duration of 14 days is calculated as 5 days complete plus 9 days forecast

In the screenshot below, the effect of only statusing percent complete is analyzed. MSP uses the following formulas:

- Actual Duration + Remaining Duration = Duration
- % Complete = Actual Duration / Duration

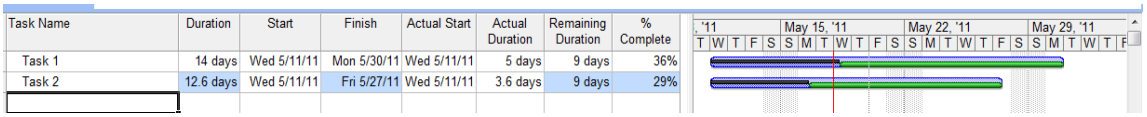
In the picture the vertical red line is the status date, and in the bars the blue is the original duration, the black the progress based on percent complete, and the green is the remaining duration.



	Task Name	Duration	Start	Finish	Actual Start	Actual Duration	Remaining Duration	% Complete
1	Task 1 Orig Dur %C	10 days	Wed 5/11/11	Tue 5/24/11	Wed 5/11/11	5 days	5 days	50%
2	Task 2 Fcst Dur %C	10 days	Wed 5/11/11	Tue 5/24/11	Wed 5/11/11	3.6 days	6.4 days	36%

Please note that despite different percentage completions, the end date of the task remains unchanged at 5/24/11. This is not correct according to the forecast, and why percent complete alone is not sufficient to capture status. Also note the realistic percent complete based on the forecast showed the progress before Timenow, which is not appropriate.

The second example adds to the same scenario a status of remaining duration based on the current forecast of 9 days to reflect the projected 5/30/11 date.



Task Name	Duration	Start	Finish	Actual Start	Actual Duration	Remaining Duration	% Complete
Task 1	14 days	Wed 5/11/11	Mon 5/30/11	Wed 5/11/11	5 days	9 days	36%
Task 2	12.6 days	Wed 5/11/11	Fri 5/27/11	Wed 5/11/11	3.6 days	9 days	29%

Notice now the first task is correctly reflecting the forecast finish date of Monday 5/30/11. The second task is not projecting the correct forecast finish date, the 5/27/11 finish date is calculating the remaining duration from the past period.

The graphical example showed the only accurate MSP status to be when percent complete is through the status date and the revised remaining duration is also input. Only then is the forecast finish date accurate.

Note: Statusing a task to Timenow demonstrates that the task has been statused, focuses attention on the task's remaining duration, and projects more accurate forecast finish dates on the task and the downstream successor logic path tasks.

EV Percent Complete

Earned Value Percent Complete (often represented as % EV Complete) refers to the Earned Value Method based percent complete. It simply reflects the percent complete based on the EVM technique selected for the task. For example, consider a task that has a 50/50 EVM technique. The 50/50 type earns half the value credit for starting the effort and takes credit for the remaining half value credit when the effort has completed. For a task that has started and is in-progress (not completed) the CAM claims 50% earned value (EV). The CAM can claim 100% value upon task completion. A task with an EVM technique of 0/100 would not claim EV until the task is completed. A Percent Complete (PC) EVM technique relies on the percent complete method, possibly requiring defined criteria to substantiate the percent complete residing in supplemental objective evidence known as Quantifiable Backup Data (QBD), as required by the contractor's documented EVM Process. The task owner or CAM establishes QBD items for a PC task for which the items represent the steps and their weighting as a percentage of the total effort. These steps do not have an ordered sequence and are meant to depict the relative value of work in the task. The CAM updates the steps in the QBD as part of the status process, earning the weighted percent complete for each step as effort is completed. The cumulative earned value of QBD items establishes the total percent complete for the related task.

Regardless of the EVM technique selected for a work package, the EV percent complete value must always match the conditions of its method and the status of the work. A 50/50 task cannot reflect an EV Percent Complete value of 75% and a 0/100 task cannot reflect any values other than zero for an incomplete task or 100% for a completed task. PC tasks cannot reflect a percentage that is different than any combination of its QBD items. That is, if there are four items each worth 25% (totaling 100% value), the EV Percent Complete value cannot be 37%. It must be 25, 50, 75 or 100 % EV Complete.

Each program decides the best available EVM technique types for its team to use.

Note: When assigning EVM techniques for work packages consider conditions such as the type of work effort; the task's planned duration, and the number of accounting periods the work is planned to span.

Physical Percent Complete

Physical Percent Complete refers to the amount of work completed. The Physical Percent Complete approach strives to determine and reflect the amount of work accomplished as opposed to the amount of time that has passed or the Earned Value method assigned. This determination may be based on the CAM's subjective but knowledgeable assessment of the work completed based on physical accomplishment.

Physical Percent Complete is the most accurate means of determining progress achieved because it focuses on the amount of effort accomplished and considers the remaining amount of effort relative to the remaining duration. It also requires the status provider to consider whether the

remaining effort can be accomplished in the remaining amount of time (remaining duration) or if more or less time is required, prompting a revised forecast finish date.

Invalid Dates

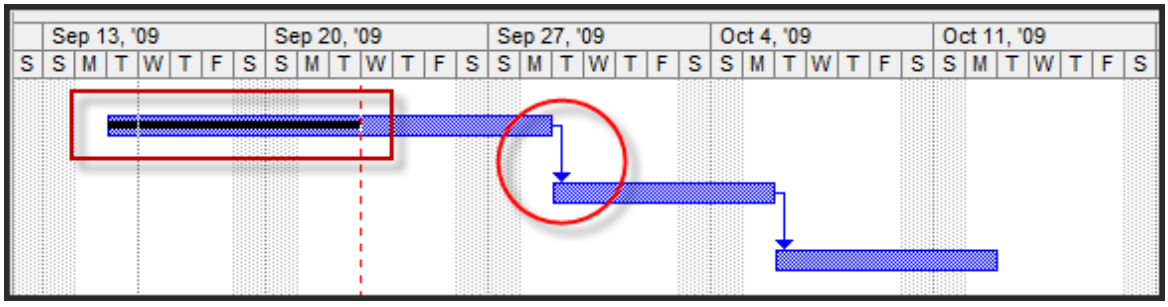
Exercise care when performing status in the IMS. Recording the Actual Start and / or the Actual Finish dates involves status date recognition and precedence logic awareness of the tasks. Recording invalid dates is a common problem affecting schedules, impeding accurate schedule information and forecast projections.

Invalid dates can take the form of these conditions:

Actual Start or Actual Finish dates are later than the Status Date. The status date indicates the cut-off between the past and the future periods. It is not feasible to have completed work in the future. Actual dates should remain in the past relative to the status date.

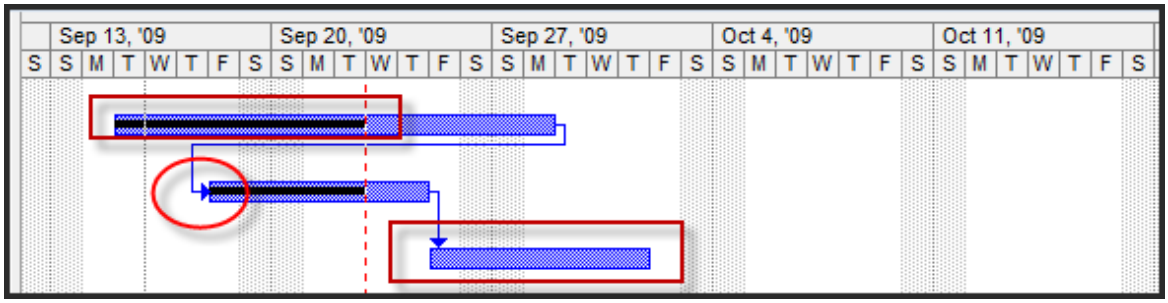
Start and Finish dates that are earlier than the Status Date and do not have applicable Actual Start and / or Actual Finish dates. It is not feasible to have incomplete work in the past: a forecasted Start or Finish that is before Timenow without a related Actual Start and / or Actual Finish date. That is the equivalent to stating these tasks WILL start or finish in the past.

Be aware of out-of-sequence status conditions that affect the calculated total float values and downstream successor path tasks and their forecasted dates. Recording an Actual Start and / or an Actual Finish without satisfying the predecessor requirements causes an out-of-sequence status condition as illustrated in the examples below.



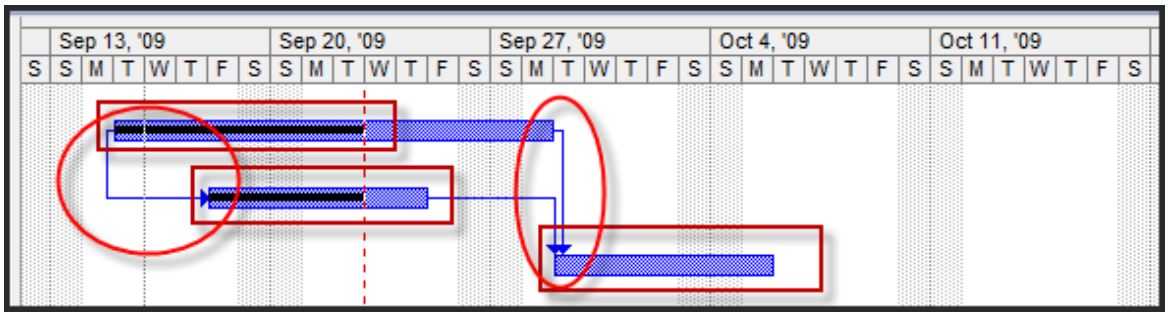
Finish to Start Logic

Finish-to-start logic on this in-progress task dictates that its successor cannot start until it is finished.



Incorrect Finish to Start Logic

The second task reflecting an Actual Start before its finish-to-start predecessor completes ignores the relationship and incorrectly shows that it can complete earlier than the logic determines it should. This condition also allows the third task to start earlier and does not reflect the effects that the logic intended. This distorts critical path determination along with total float values. It is also logically impossible.



Corrected Logic

In this example, the second task is able to start after the first task starts and the logic reflects this with the modified start-to-start relationship. The third task has a dependency on the completion of the first and second tasks. The revised logic shows both tasks as finish-to-start relationships to the third task, still starting earlier than originally modeled.

This completes the section on IMS key terms and concepts for the intermediate scheduler. The next section contains processes and procedures to conduct a schedule assessment.

IMS Quick Look Assessment

The IMS Quick Look Assessment is an abbreviated IMS evaluation using the GASP. The goal of the IMS Quick Look Assessment is not to just provide a report card, but to objectively assess the pros and cons of the IMS content and, more importantly, provide concrete recommended actions for improving the schedule. Some actions might be significant and entail considerable effort by the program team. Other actions might seem minor or administrative in nature, but may be essential to improving data integrity, reliability, and integration. The IMS Quick Look Assessment applies at any stage of the program life cycle, from source selection to validating the schedule as it evolves after contract award. The program manager may evaluate the IMS for routine oversight, major program reviews, for major replanning or rebaselining efforts. The IMS Assessment process typically begins with a decision by the PMO to conduct a Quick Look Assessment. A small data call is provided to the contractor. The data items required for a Quick Look Assessment are defined on the next page. The latest IMS deliverable should be adequate for the IMS. If the contractor has not provided any supplemental guidance as part of the IMS deliverable, the PMO may ask need to ask the contractor for it to help clarify how the IMS was developed and which columns serve what function. After gathering artifacts, the team performs an IMS Quick Look Assessment.

The time and effort required to complete IMS Quick Look Assessment actions will vary by program and by sections within the IMS. Program management must decide on when the actions are sufficiently completed to move on to an IMS Comprehensive Assessment. Minimally, the first five GASP tenets should be satisfactorily met to achieve a valid schedule.

Overview of Mechanics

The IMS Quick Look Assessment focuses on non-summary tasks unless otherwise stated. Tests including summary tasks are specified. Most Quick Look tests involve incomplete tasks. Tests involving all tasks or tasks with either Actual Starts or Actual Finishes are specified.

Tests by GASP Tenet

The tests for performing a Quick Look Assessment are organized by GASP tenet. Each test is listed in a table that follows.

General Information about the Quick Look Table

Prior to performing analysis on an IMS, save an archived copy of the original IMS file for file backup assurance in a separate folder. Rename the IMS to designate it as the analysis version, and change the IMS file attributes to NOT Read-Only and eliminate any password protection on the analysis version file.

The Quick Look Assessment requires the following data items:

- IMS
- IMS Field Mapping (user defined fields in the IMS file)
- IMS Basis and Assumptions or IMS Supplemental Guidance Document

Do NOT convert durations to days prior to conducting the IMS Quick Look Assessment as this could invalidate some tests. However, tasks with elapsed durations may cause false detections

during IMS Quick Look Assessments due to Microsoft Project conversion interpretation. For example a 20 elapsed day duration task (just under three weeks) is detected as having greater than 44 working days because of the manner in which Microsoft Project handles the underlying duration value. Ensure all incomplete tasks do not use "elapsed days". Convert tasks durations to days if tasks have elapsed units of measure detected.

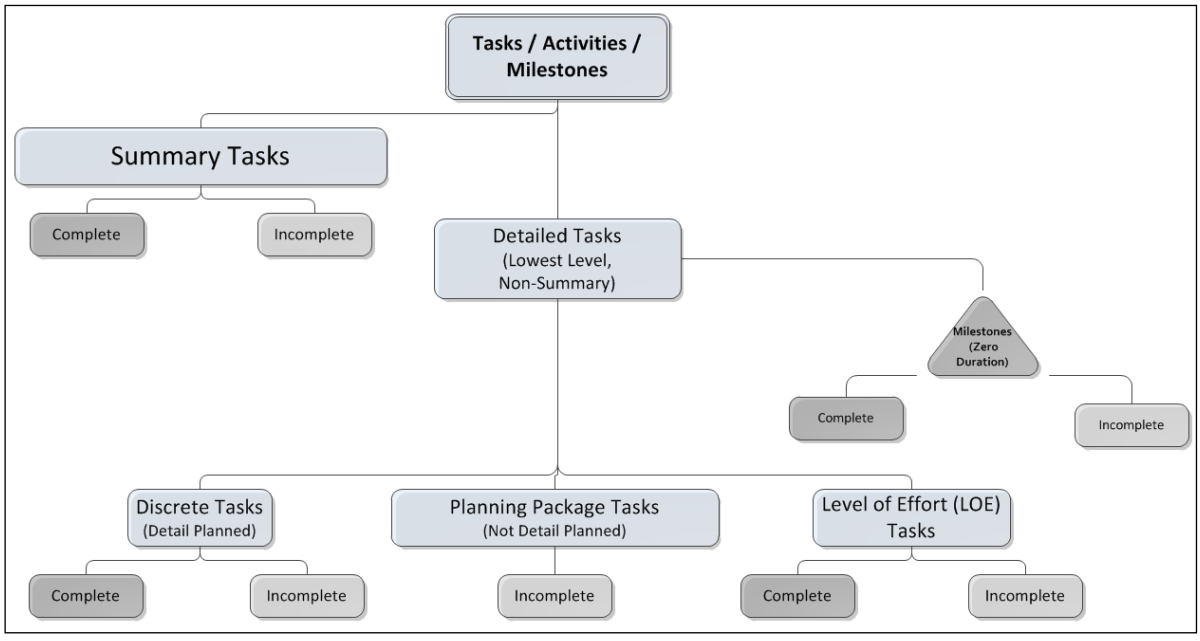
Tip: After conducting the IMS Quick Look Assessment, consider converting all incomplete tasks with task duration in "hours", "weeks", or "months" to "days" as the unit of measure for subsequent analysis. For example, analyzing tasks with common task duration units is easier when comparing total float values.

Analysts may use the accompanying IMS Quick Look Template Word format document to record IMS Quick Look test results and focus program attention on schedule weaknesses requiring improvement. The template facilitates recording Pass / Fail / NA results for each test conducted. The analyst may determine if the IMS Quick Look test results constitute a Yes / No rating for each of the applicable five GASP tenets.

The template has a section for highlighting favorable schedule observations, and identifying unfavorable findings with related, actionable suggested improvements discovered from performing each test. Using the template for subsequent IMS Quick Look assessments enables trend visibility into the program's IMS progress towards achieving schedule validity as the program implements schedule improvements.

Summary Tasks vs. Tasks, Tasks vs. Milestones, Discrete vs. Planning Packages vs. LOE

The Quick Look examines and filters the schedule across a variety of activity types. The chart below shows the normal hierarchy of schedule activities.



Task Definitions

Several of the tests require that LOE tasks be excluded. LOE may or may not be included in the IMS depending on contractor processes. While LOE work packages must be clearly identified in the IMS, LOE may be identified in a number of ways including the EVT field, as prefix or suffix to task name, or a separate user ID field. Contact a Schedule Subject Matter Expert (SME) or the contractor to determine the best way to isolate LOE.

Most of the tests are concerned with the schedule condition going forward. As a result, most tests are focused on incomplete tasks. Tests can be run against the total number of tasks to get a feel for the discipline used when initially planning the entire project.

The IMS Quick Look Assessment table explains how to perform each test by GASP tenet. The first column labeled "Test Description" describes the test or check and provides a tip as to the intent of performing the related test. The second column labeled "How to Determine" describes the schedule items to include / exclude and how to perform the counts, determine percentages, and identify test threshold goals. The third column labeled "Why It Matters; Corrective Action*"* provides insight into related conditions and suggestions to make schedule improvements.

The appendix contains information about government and commercial tools that help filter the data and perform the task counts.

Tenet 1: Complete

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 1 **Baseline Durations >2 Months** Determine % of incomplete tasks with baseline durations greater than 44 working days (2 months). Tip: Shorter baseline durations reflect original planning scope granularity for efficient execution & precise performance measurement.	D. Exclude LOE, planning packages, summary tasks, milestones, & non-baselined tasks. Include tasks w/o actual finishes & count for total number of tasks. N. Further, include tasks with baseline duration > 44 working days & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks that have baseline durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks with baseline durations greater than 0 days.	Why It Matters: Shorter activities (2 months or less in duration) provide more visibility into how the activities were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with baseline durations longer than 44 working days or split into tasks less than 44 days.
Test 2 **Forecast Durations > 2 Months** Determine % of incomplete tasks with durations greater than 44 working days (2 months). Tip: Shorter task durations are easier to status & provide scope granularity for precise performance measurement.	D. Exclude LOE, planning packages, external tasks & milestones. Include tasks w/o actual finishes & count for total number of tasks. N. Further, include tasks with durations > 44 working days & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks that have durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks.	Why It Matters: Shorter activities (2 months or less in duration) provide more visibility into how the activities were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with forecast durations longer than 44 working days or split into tasks less than 44 days.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 3 **Forecast Durations > 2 Months in 3 Month Look Ahead** Determine % of incomplete tasks with durations greater than 44 working days (2 months) that are within next 3 months. Tip: Activities clearly defined & well planned with easier to status shorter durations provide granularity for precise performance measurement.	D. Exclude LOE, planning packages, external tasks & milestones. Include tasks w/o actual finishes; Include tasks scheduled in the next 3 months & count for total number of tasks. N. Further, include tasks with durations > 44 working days & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) within 3 months of status date, number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks that have durations greater than 44 working days to (D) same period number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks.	Why It Matters: 3 month look ahead period scope must be understood & planned to execute efficiently. Shorter tasks (2 months or less in duration) provide more visibility into how the tasks were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with forecast durations longer than 44 working days or split into shorter tasks; apply this approach to advanced look ahead periods to affect changes.
Test 4 **Estimated Durations** Determine number of incomplete tasks with estimated durations. Tip: Indicates incomplete planning (durations have not been addressed).	Include tasks w/o actual finishes; Include estimated tasks & count. Goal: Zero exceptions. Detects: Number of incomplete tasks that have estimated durations.	Why It Matters: Estimated durations are the default in MSP indicating there has not been any duration input for that task. This suggests the planning has not yet been completed. Corrective Action: Replace estimated durations for all non-milestone tasks with durations from the CAM.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Tests 5 & 6 **Missing Baseline Dates & Baseline Duration** Determine all tasks without baseline dates & valid baseline durations. Tip: Cannot determine if tasks are early or late during execution without proper baseline.	Include all tasks w/o baseline start or baseline finish or valid baseline duration & count. Goal: All tasks have baseline dates & baseline duration. Detects: Number of tasks that do not have established baseline start, baseline finish, or baseline duration.	Why It Matters: Missing baseline information may indicate lapse in proper schedule management processes & exhibit lack of performance measure capabilities. Corrective Action: Populate & maintain proper baseline dates & durations (baseline the schedule).
Test 7 **Cross Reference Fields** Comprehensive data field referencing in IMS. Tip: Demonstrates source information tracks to each other, is represented in the IMS, & enables better program management.	Verify all documents cross-referenced to the IMS are represented with their own field in the IMS & are appropriately populated. Required: CAMs, Control Account (CA), IMP, WBS, SOW, EVT, Work Package, Planning Package Recommended: OBS/IPT. Determine related fields in the IMS for each artifact & search for completeness Analyst uses judgment to determine if IMS is adequately cross-referenced. Goal: All required fields complete.	Why It Matters: Data cross reference fields exist & are populated to demonstrate source data alignment & provides a verifiable basis for IMS planning. Corrective Action: Populate & maintain proper artifact data fields in the IMS.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 8 **Duplicate / Blank Names** Search for blank or duplicate task names in the entire IMS. Tip: Unique & descriptive task names define the scope content & deliverable, aide user comprehension & facilitate determining progress during status.	Sort the entire IMS by task name, observe obvious task name duplicates & blank names for Test 8. Be aware of sorting parameters- E.g. in MSP do not check the option *Keep Outline Structure* for sorting when including summary tasks; not checking the option eliminates outline structure as the primary sort that would prevent task name alignment as a primary sort for comparison. Through several iterations, search task names containing common words to discern repetitive phrases that do not exhibit uniqueness, such as several tasks that merely state *Perform Test*, not differentiating specific tests. Goal: All names are unique & not blank.	IMS task nomenclature is best understood when organized, unique, meaningful, & not reliant on summary or grouping titles to supplement their comprehension. Corrective Actions: Use present tense action verbs as described in the IMP , if applicable, for each non-summary task where possible, when revising task names. Words such as analyze, design, draft, determine, produce, conduct, review & approve provide insight into unique descriptive task names & aid understanding each task deliverable.
Test 9 **Missing Logic** Determine number of incomplete tasks without logic (predecessors or successors). Tip: Logic is fundamental for establishing an achievable schedule & imperative for its predictive capability. Missing logic calls into question schedule soundness & critical path validity.	Exclude LOE tasks , external tasks, summary tasks. Include tasks w/o actual finishes that do not contain predecessors or successors & count. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-external, non-summary tasks that do not have at least one predecessor or one successor.	Why It Matters: External feed-in milestones w/o predecessor or feed-out milestones w/o successor may be appropriate, but all other activities need proper logic found within the IMS. Corrective Action: Determine appropriate predecessors & / or successors for tasks missing logic.

GASP Complete Evaluation

Tenet 2: Traceable

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 10 **Summary Logic (& Constraints / Deadlines)** Identify summary tasks with applied logic or constraints. Tip: Applying logic or constraint to summary tasks potentially obscures impacts to detailed tasks & hinders schedule analysis.	Include **only** summary tasks. Include summary tasks containing: predecessors or successors or constraint dates or MSP deadline dates & count. Goal: Zero exceptions. Detects: Number of all summary tasks that have predecessors or successors or constraint dates or deadline dates applied.	Why It Matters: Logic or constraints applied to summary tasks may have unintended consequences to subordinate detail tasks & may be difficult to discover when reviewing / analyzing schedule information. Corrective Action: Remove logic, constraints, & Deadlines from summary tasks & apply logic & appropriate constraints & deadlines to detailed tasks.
Test 11 **Finish-to-Start (FS) Relationships** Determine % of incomplete tasks using FS relationships (preferred). Tip: FS relationships avoid scheduling activities in parallel & ensure the least opportunity for creating resource conflicts.	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes & count for total number of tasks. N. Further, include tasks that contain FS predecessors & count. Divide the numerator (N) count by the denominator (D) count. Goal: 90% or greater. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have finish-to-start predecessor relationships to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Promoting parallel activities risks scheduling more work than can be executed & potentially understates projecting accurate program finish. Corrective Action: Verify the use of any non-FS relationships & change to FS if appropriate.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 12 **Start-to-Start (SS) or Start-to-Finish (SF) Successor w/o also Finish-to-Start (FS) or Finish-to-Finish (FF)** Determine number of incomplete activities using only SS or SF successor relationships. Tip: SS relationships may be valid, but not having at least one additional FS successor relationship prohibits establishing finish consequences, resulting in meaningless total float values.	Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes that contain SS or SF successors & do not also contain FS or FF successors (to another task) & count. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE activities that have a SS or SF successor, but also do not have at least one FS or FF successor relationship to another activity. Note: Condition, potentially equivalent of missing a successor.	Why It Matters: Relying only on SS or SF successor relationships does not model a finish consequence to the activity. Once in-progress, it loses its impact to other activities, does not retain priority to finishing & can reflect meaningless total float value to program end. Corrective Action: Determine & apply additional, appropriate FS or FF successor relationships.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 13 **Total Float > 3 Months** Determine % of tasks with total float >60 working days. Tip: Indicates a task may slip greater than 3 months without impact to program completion. Suggests a task is starting too early (missing an identified predecessor), or is not reflecting potential impacts to critical path (missing an identified successor). Possibility that some scope is not identified (tasks not present in the IMS).	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes & count for total number of tasks. N. Further, include tasks with total float > 60 working days & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have total float greater than 60 working days to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Excessive total float is indication the task is not properly sequenced, either starting too early, or is missing a potential successor that could impact critical path determination & not properly forecasting program completion. Usually, identifying the end task in a path for missing successors is effective in addressing high total float for all tasks in the path. Corrective Action: Determine appropriate predecessors & / or successors for tasks with excessive total float. Tip: Sort the detected tasks in descending total float order to focus corrective actions on tasks with largest total float values.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 14 **SNETs / FNETs Beyond 3 Month Look Ahead** Determine % of SNET or FNET constraints on tasks > 3 month look ahead. Tip: Anticipate using fewer "no earlier than" constraints in periods further out, due to uncertainty & related rationale, relying more on logic alone to schedule a project.	D. Exclude LOE tasks, summary tasks, external tasks. Include tasks w/o actual finishes; Include tasks that start beyond 3 months from status date & count for total number of tasks. N. Further, include tasks containing "no earlier than" constraints & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary, non-external tasks beyond 3 months from status date that have SNETs or FNETs to (D) number of incomplete, non-LOE, non-summary, non-external tasks beyond 3 months from status date.	Why It Matters: Generally, assumptions are less accurate in further look ahead periods, especially when attempting to model resource availability with SNETs / FNETs. Corrective Action: Review the "No Earlier Than" constraints & replace with logic relationships where practical.
Test 15 **SNETs / FNETs within 3 Month Look Ahead** Determine % of SNET or FNET constraints on tasks < =3 month look ahead. Tip: Anticipate using more "no earlier than" constraints in immediate period, due to certainty, to refine dates, where logic alone may not adequately model the project.	D. Exclude LOE tasks, summary tasks, external tasks. Include tasks w/o actual finishes; Include tasks that start within 3 months from status date or are in-progress & count for total number of tasks. N. Further, include tasks containing "no earlier than" constraints & count. Divide the numerator (N) count by the denominator (D) count. Goal: 10% or less. Compares: (N) number of incomplete, non-LOE, non-summary, non-external tasks within 3 months from status date that have SNETs or FNETs to (D) number of incomplete, non-LOE, non-summary, non-external tasks within 3 months from status date.	Why It Matters: Generally, conditions are well known in very near term & predecessors alone may not sufficiently model resource availability for task execution. Use SNETs / FNETs appropriately, but not in place of logic. Corrective Action: Validate the "No Earlier Than" constraints & replace with logic relationships where practical.

GASP Traceable Evaluation

Tenet 3: Transparent

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 16 **Tasks with Leads** Determine number of incomplete tasks with leads > one day (imposed logic accelerations to successors). Tip: Ignores tasks finishing & successor starting on same day condition; Difficult to understand & manage "time overlap" created using leads.	Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes that contain predecessor leads greater than one day & count. Note: Leads may be defined as a negative lag. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-summary tasks that have negative lag predecessors (greater than one day).	Why It Matters: Leads can distort total float & mask potential impacts to successor path tasks. Promote decomposing tasks & durations to facilitate FS relationships without leads. Corrective Action: Eliminate leads to allow schedule logic to drive dates.
Test 17 **Tasks with Lags** Determine % of incomplete tasks with lags (imposed logic delays to successors). Tip: Difficult to understand & manage "time gap" created using lags.	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes & count for total number of tasks. N. Further, include tasks that contain predecessor lag & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have predecessors with lag to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Lags interject vagueness related to a "time gap" represented by the lag & are difficult to understand & manage. Lags should only model "wait time", not replace work effort or be used to anticipate successor start dates. Corrective Action: Minimize lags to allow schedule logic to drive dates.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 18 **Constraints w/o Rationale** Determine % of incomplete tasks that have constraints without comments (rationale) in Notes field. Note: Recognize that the schedule authors may utilize another custom field or document to explain constraints use (such as in the IMS Supplemental Guidance documentation), may need to adjust test results accordingly. Tip: Rationale aids understanding of applied constraints.	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes that contain types other than "as soon as possible" & count for total number of tasks. Note: Consider MSP deadlines as constraints for this test. N. Further, include tasks without documented rationale & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that are not ASAP & do not have note entries to (D) number of incomplete, non-LOE, non-summary tasks that are not ASAP.	Why It Matters: Documented explanations are required to understand constraint use, including validity & underlying intent. Aids in decision making & schedule maintenance. Corrective Action: Add explanations for deadlines & constraints to the Notes field.
Test 19 **Lead/Lag w/o Rationale** Determine % of incomplete tasks that have leads or lags without comments (rationale) in Notes field. Tip: Rationale aids understanding of applied delays or accelerations.	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes that contain predecessors with positive lead or lag relationships & count for total number of tasks. N. Further, include tasks without documented rationale & count. Divide the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have predecessor leads or lags & do not have Notes entries to (D) number of incomplete, non-LOE, non-summary tasks that have predecessor leads or lags.	Why It Matters: Rationale is required to understand lead / lag use, including validity & underlying intent. Aids in decision making & schedule maintenance Corrective Action: Add explanations for leads / lags to the Notes field. Also see Leads (Test 16) above for alternative techniques.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 20 **Hard Constraints** Determine number of incomplete tasks utilizing hard constraints, prohibiting free flow of logic-driven IMS. Tip: Prevent dates from reflecting driving predecessor impacts. e.g. in MSP Includes: Must Start On Must Finish On Start No Later Than Finish No Later Than	Exclude LOE tasks. Include tasks w/o actual finishes that contain "no later than" or "must" constraint types & count. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE tasks that have MSP-like constraints such as MSO or MFO or SNLT or FNLT constraints applied.	Why It Matters: Documented constraints affecting late dates may be necessary to establish key need dates & total float other than relying solely on backward pass calculations (use sparingly). Corrective Action: Eliminate hard constraints from IMS & consider using constraints similar to MSP deadlines instead. Deadlines enable forecast impacts while providing accurate total float values.
Test 21 **Excessive Lags** Determine number of incomplete tasks with excessive lags (delay values greater than one month). Tip: Excessive lag values potentially extend beyond one status period, complicating dates.	Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes that contain predecessor or successor lag values greater than 20 working days & count. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-summary tasks that have predecessors or successors with lag values greater than 20 working days.	Why It Matters: Excessive "wait times" complicate schedule management / visibility. Corrective Action: Replace excessive lags with documented / maintained "no earlier than" constraints.

GASP Transparent Evaluation

4. Statused - Schedules reflect valid actual and forecast dates, and tasks maintain previously established logical relationships.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 22 **Invalid Forecast Dates** Determine number of incomplete tasks that are not statused up to status date. Tip: Includes incomplete tasks without appropriate actual start or actual finish dates < status date, or in-progress tasks with remaining duration starting < status date. Tip: Unaccomplished work in the past is not accurate status, causes inaccurate projections, & diminishes schedule reliability.	Exclude summary tasks. Include tasks w/o actual starts & forecast starts less than or equal to status date; Include tasks w/o actual finishes & forecast finishes less than or equal to status date; Include in-progress tasks with remaining duration beginning earlier than status date & count. Goal: Zero exceptions. Detects: Number of non-summary tasks that have forecast start or forecast finish dates earlier than the status date, without the applicable actual start or actual finish dates, or remaining duration not beginning at the status date for in-progress tasks.	Why It Matters: It is not possible to perform future work in the past, therefore all tasks with work scheduled earlier than status date must re-schedule that work later than status date. Corrective Action: Address invalid dates & incomplete tasks that are earlier than Timenow by providing accurate status & / or forecast dates. Not reflecting proper status jeopardizes performance measurement & successor path task projections.
Test 23 **Invalid Actual Dates** Determine number of tasks with actual start or actual finish dates in future. Tip: Tasks reflecting achievement in the future do not have accurate status, which causes inaccurate projections & diminishes schedule reliability.	Exclude summary tasks. Include tasks with actual starts greater than status date; Include tasks with actual finishes greater than status date & count. Goal: Zero exceptions. Detects: Number of non-summary tasks that have actual start or actual finish dates later than the status date. Note: IMS cannot have tasks with invalid actual dates.	Why It Matters: Status date defines separation between past & future. It is not possible to accomplish effort in the future, beyond Timenow (status date). Corrective Action: Correct the actual start or finish dates of tasks listed in the future. Not reflecting proper status jeopardizes performance measurement & successor path task projections.

4. Statused - Schedules reflect valid actual and forecast dates, and tasks maintain previously established logical relationships.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 24 **Out-of-Sequence (OOS) Status Conditions** Determine number of tasks that contain status conditions violating their logic relationships. Tip: Any tasks with out-of-sequence status condition render IMS projecting capabilities unreliable.	Review & detect tasks reflecting actual starts or actual finishes in current status cycle that are incongruent with predecessor logical relationships for Test 24. E.g. an incomplete FS predecessor to an in-progress successor – that has an actual start & its predecessor does not have an actual finish, does not honor the relationship. Goal: Zero exceptions. Note: This test is performed more efficiently using an analysis tool designed to automate OOS status condition detections. See the Appendix – Schedule and Schedule Assessment Tools for products that perform this automated function.	Why It Matters: Out-of-sequence status conditions override logic & potentially return overly optimistic successor path projections & meaningless total float values. Corrective Action: Resolve out-of-sequence status issues by either changing logic (if appropriate) or correcting the actual start or finish dates.

GASP Statused Evaluation

Tenet 5: Predictive

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 25 **Push Forward Test** Assess logic network integrity to program completion. Tip: Delaying an incomplete task with least total float reflects a proportionate delay to program completion, demonstrating logic path to program completion.	Observe / record program completion milestone early finish date. Perform a successor trace by selecting a current period task with the least amount of total float, add 600 working days to existing duration, recalculate the schedule. Verify the program completion milestone early finish date reflects a proportionate delay; the delayed milestone demonstrates it is logically tied to the selected task. Check for a logic break if the milestone does not reflect a proportionate delay. Failed test when milestone does not reflect anticipated delay. Repeat this test on other current period tasks to ensure consistency. Note: If task with least total float has positive 25 working days total float, may only expect a 575 working day delaying impact to milestone.	Why It Matters: Adding 600 working days is more than two years duration, introducing dramatic impact to program completion. Failing the test indicates either broken logic exists or hard constraints prevent delays to successor path tasks. Corrective Action: Address missing logic or applied hard constraint issues.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 26 **Program Completion Trace Test** Determine % of non-LOE, incomplete tasks logically tied to program completion. Tip: Interjecting a one year earlier need date identifies tasks that may not be tied to milestone through resulting negative total float values feed-out tasks detected during this test should have documented rationale . Note any hard constraints assigned.	D. Exclude LOE tasks, summary tasks. Include tasks w/o actual finishes & count for total number of tasks. Temporarily remove hard constraints. Note: Apply a one year earlier "no later than" constraint to program completion milestone, recalculate IMS, count tasks with negative / greatly reduced total float values. Divide the numerator (N) count by the denominator (D) count. Goal: 95% & greater. Note: Ensure one year earlier is within IMS project calendar range (adjust accordingly); typically 240 – 260 working days. Note: Review tasks without negative / greatly reduced total float values. These tasks may not be logically tied to the program completion milestone. Ensure majority of tasks do not have excessive positive total float values (resolve applicable issues).	Why It Matters: Although a percentage is calculated for test, it is more meaningful to review suspect tasks. Even a relatively few significant tasks without a successor path to program completion is reason for concern. Ideally all incomplete, non-LOE, non-summary tasks are logically tied to completion milestone. Corrective Action: Investigate tasks not detected by the test, address missing successor path logic to milestone. Essential tasks not logically tied to program completion render IMS as not predictive & invalidate critical path.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 27 **No LOE in Path to Program Completion** Use the *Program Completion Trace Test* set-up for this check. Tip: Identify LOE tasks detected as having logical successor paths to program completion.	Use the *Program Completion Trace Test* parameters, except include LOE tasks. Review the LOE tasks impacted (have negative or reduced total float values). Investigate to confirm that these LOE tasks are logically tied to discrete tasks & milestone & recommend changing logic. Goal: No LOE tied to discrete effort.	Why It Matters: LOE should not be logically tied to discrete work & should not be part of the critical path. Corrective Action: Investigate & remove LOE logic to discrete tasks & program completion to ensure LOE will not become part of the critical path. Recommend using a LOE completion milestone to terminate LOE logic if necessary.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 28 **Appropriate Constraints Applied to Endpoint Milestones** Verify related milestones have appropriate constraints that provide meaningful schedule measures. Tip: Missing constraints diminish program management prioritization. Avoid using hard constraints that override predictive nature of logic network.	Identify & review the endpoint milestones to ensure appropriate, documented constraints provide meaningful total float values & permit driving predecessors to establish forecast dates. Note: Method & rationale for establishing need dates (late dates) should align with IMS Supplemental Guidance documentation. Goal: All endpoint milestones should have constraints applied.	Why It Matters: Need dates reflect management's target. Constraints affecting the backward pass to program end & major milestones (if applicable) enable accurate total float calculation & permit precedence logic impacts. Corrective Actions: Validate appropriate constraints used on endpoint milestones. Consider using documented MSP equivalent deadlines.
Test 29 **Critical Path Length Index (CPLI)** Project performance indication of the ability to finish on time.	Determine working days duration from status date to program completion early finish date in IMS, **A** (critical path length). Add amount of total float, **B** (least positive or negative value) to **A** & total. Divide total (**A** + **B**) by **A** (critical path length, as determined above). **(A + B) / A** Goal: Should not be less than 0.95 with target of 1.00 (>1.00 is favorable <1.00 is unfavorable).	Why It Matters: Although geared towards performance, this test reflects IMS realism of completing on time & is meaningful when satisfactorily passing all previous GASP tests.

GASP Predictive Evaluation

Using the Quick Look Results

The primary benefit of the Quick Look results is providing feedback to the contractor so that they may improve the schedule. Most Air Force PMOs perform some evaluation of the IMS deliverable. Some may use the DCMA 14 Point Assessment which is included in the tests above. Others may go beyond the 14 Points with a Quick Look. The key is to feedback the information to the contractor in time for changes to be incorporated in the next deliverable.

A number of the tests have a basis in DI-MGMT-81650 and may be grounds to reject the IMS deliverable in addition to providing recommended changes. Some, but not all of the tests that relate to the DID are: cross references to the SOW, IMP, and contract milestones; identifying LOE, if included; and duration-based percent complete and physical percent complete for tasks that have at least begun.

After the assessment team evaluates the IMS against the first five GASP items and passed the results to the contractor, they may decide to proceed with the IMS Comprehensive Assessment. An IMS Comprehensive Assessment may not be considered if substantial corrective actions remain for the current IMS. The following are examples of conditions that could result in a No-Go decision for performing an IMS Comprehensive Assessment:

- **Complete** –SOW / IMP references omitted.
- **Traceable** –Missing logic or excessive total float.
- **Transparent** – IMS does not have documented explanations for leads, lags, and constraints.
- **Statused** – Invalid dates detected.
- **Predictive** –LOE is logically tied to the program end milestone.

There may be a situation where the IMS has significant discrepancies against the Quick Look tests but a program elects to perform the Comprehensive IMS Assessment. Normally this is when the PMO wants to explore and determine the root cause for the discrepancies.

Performing an IMS Quick Look Assessment Using Run!23

This section describes using the Run!23 tool to perform an IMS assessment. Please refer to the IMS Quick Look Assessment section for all guidance on performing a Quick Look assessment.

Prior to performing analysis on an IMS, save an archived copy of the original IMS file for backup assurance in a separate folder. Rename the IMS to designate it as the analysis version, change the IMS file attributes to NOT Read-Only, and eliminate any password protection on the analysis version file.

Do NOT convert durations to days prior to conducting the IMS Quick Look Assessment as this could invalidate some tests. However, tasks with elapsed durations may cause false detections during IMS Quick Look Assessments due to Microsoft Project conversion interpretation. For example a 20 elapsed day duration task (just under three weeks) is detected as having greater than 44 working days because of the manner in which Microsoft Project handles the underlying duration value. Ensure all incomplete tasks do not use "elapsed days". Convert tasks durations to days if tasks have elapsed units of measure detected.

Tip: After conducting the IMS Quick Look Assessment, consider converting all incomplete tasks with task duration in "hours", "weeks", or "months" to "days" as the unit of measure for subsequent analysis. For example, analyzing tasks with common task duration units is easier when comparing total float values.

Run!23 is a freeware add-in for Microsoft Project that provides a number of the filters needed for performing the IMS Quick Look Assessment tests. Filters for use in the Quick Look Assessment are prefixed with "QL" labels and executed through the "Quick Look" button on the Run!23 toolbar. The tool also provides a task counting capability that helps automate filtering and counting tasks or metrics, where required for manual processes, within the Microsoft Project file, as well as performing forward and backward traces to analyze schedule logic. Reference the Run!23 Toolbar section below for tool navigation tips and assistance.

Installing Run!23

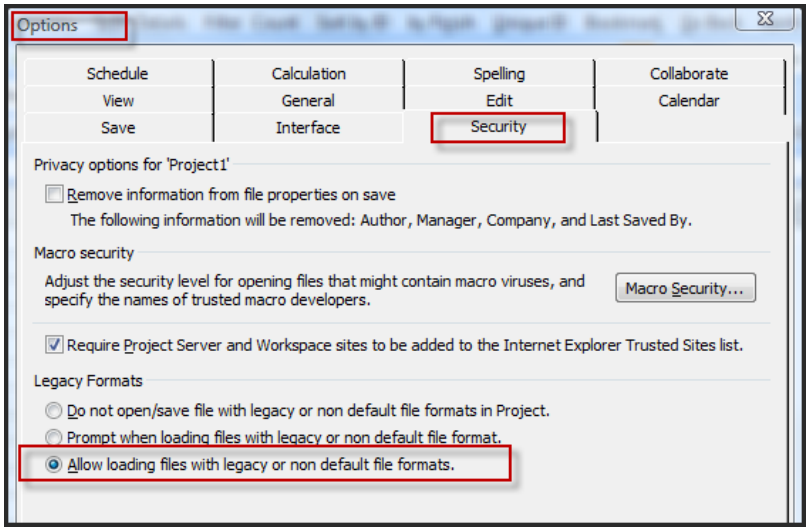
Access Run!23 and the Run!23 Microsoft Project 2003 / 2007 Quick Start at the following location:
https://www.my.af.mil/gcss-af/USAF/ep/globalTab.do?channelPageId=s5FDEA9F02769C1090127867185EE02F8

Down load and save the AzTech Run!23.mpp file..

Open Run!23 from Microsoft Project. If the user has other Microsoft Project versions on their computer, and wants to use version 2007, open Microsoft Project 2007 first, then open Run!23. Otherwise, launching Run!23 from the Start menu first as described, will open the latest Microsoft Project version. Having Run!23 open prior to opening other schedule files allows the user to use its functionality to navigate and analyze open the other Microsoft Project schedules.

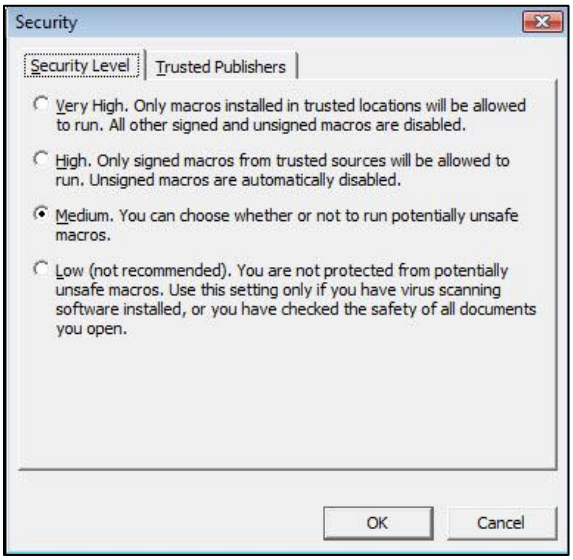
Configure MS Project (MSP) 2007 and the Run!23 (.MPP) Template

Open MSP 2007, then go to **Tools** > **Options** > **Security** tab to select the third radio button under Legacy Formats to "Allow loading files with legacy or non-default file formats."



While on the same **Security** tab, click the **Macro Security…** button.

In the dialog box select: **Medium Security** > click **OK,** and then click **OK** at the bottom of the **Security** tab.



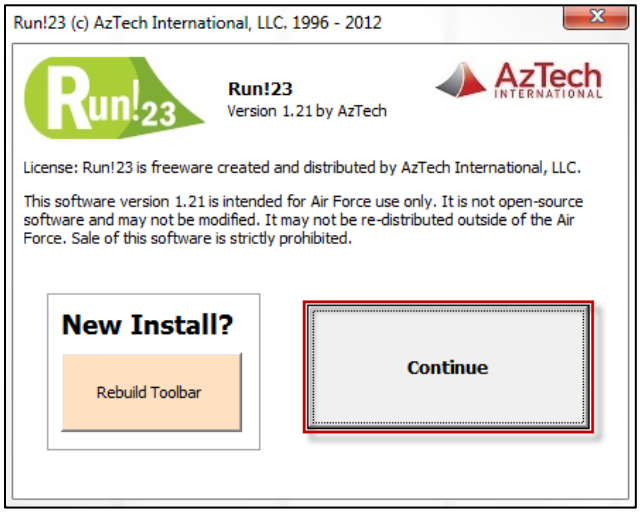
Close Microsoft Project. Microsoft Project must be closed and reopened for the Macro Security settings to be changed.

Open Microsoft Project and open the Run!23 file. You are ready to configure Run!23.

A Microsoft Office Project Security Notice appears, click **Enable Macros**.

A Run!23 splash screen automatically appears (shown below). All users must click **Rebuild Toolbar** only the **first time** opening a new or updated Run!23 version.

After the initial installation of Run!23, there is no need to rebuild the toolbar; just click **Continue**. This splash screen will appear every time you open Run!23.



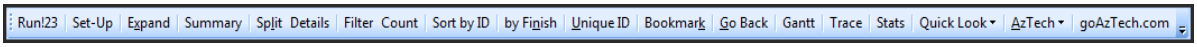
Click **File** > **Save**, to save all of the initial configuration settings within Run!23. Then, **Close *MS Project***. If prompted to save as Microsoft Project 2007 format, answer "**Yes**".

Please note, the above instructions are only necessary to install and initially configure Run!23. These steps are required only upon a new installation or upgrade to this tool.

Moving forward, launch Run!23 from the **Start** menu to open ***MS Project***.

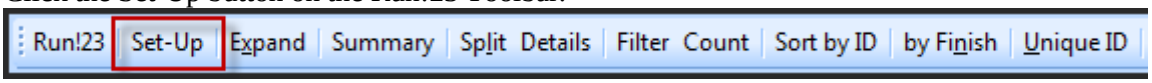
Preparation for using Run!23

Run!23 Tool Bar.

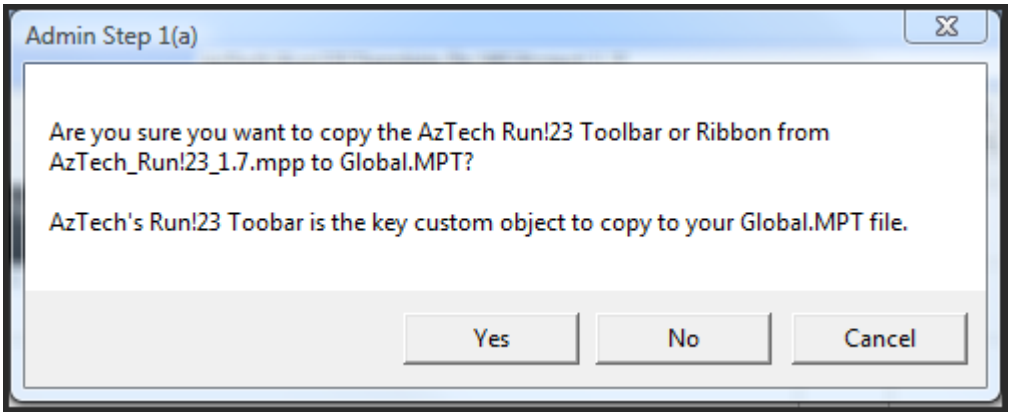


Click the Run!23 button on the Run!23 Toolbar.
This provides version details and allows the user to check for updates to Run!23 online.

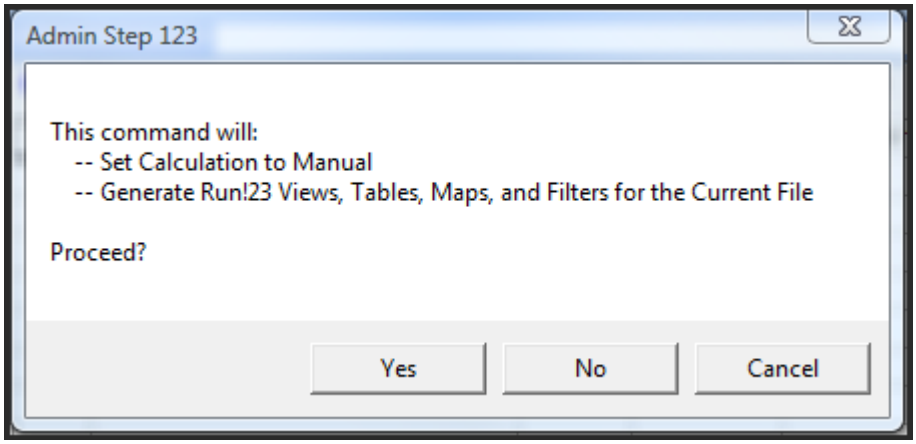
Click the Set-Up button on the Run!23 Toolbar.



When clicked with the Run!23.mpp template file as the active window, acts as a one-time set-up button that copies the Run!23 toolbar to the Global.mpp template file so that the toolbar opens every time MS Project is opened.



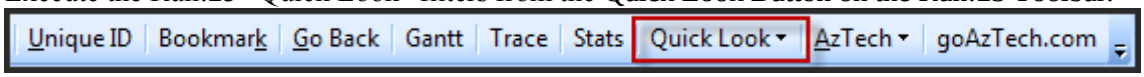
When clicked with a live project file as the active window, sets up the appropriate Run!23 views and settings for working with the file and provides the opportunity to change the EVM from the tool's default Text29 to another Text field. This should be run each time a live project file is opened.



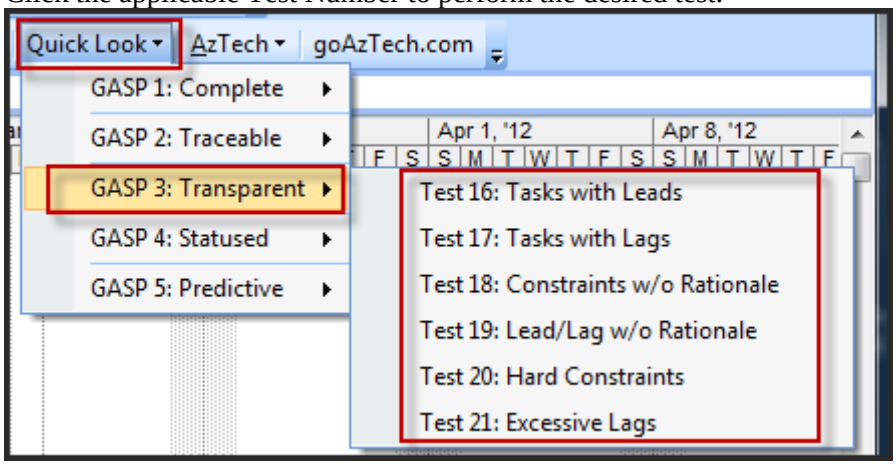
Use "Quick Look" Button to Execute Filters

Use Run!23 to perform the IMS Quick Look Assessment using filters that populate the open Microsoft Project schedule for review after performing the Set-up on the open schedule. The assessment filters are designated with a "QL" prefix label, are executed using the "Quick Look" button, and align with the first five Generally Accepted Scheduling Principles (GASP) with the filters grouped by GASP tenet. The Quick Look filters are sequentially numbered to correlate to the tests described in the table below. Run the applicable Quick Look test for each assessment test, Run!23 automatically applies the related filter or filters, and the results are displayed in a message box. Filters are designed for percent score numerator and denominator calculations and single zero exceptions tests. The accompanying Run!23 Quick Start document illustrates this capability.

Execute the Run!23 "Quick Look" filters from the Quick Look Button on the Run!23 Toolbar.



Click the applicable Test Number to perform the desired test.



Check These Custom Fields

Ensure Flag19 custom field does not contain important data, perhaps needed for analysis, and then clear existing data and formulas from this field. Copy the existing data from these custom fields to other available custom fields to preserve the data, if desired. Run!23 uses these custom fields to perform some of its functionality and clearing existing data and eliminating resident formulas in these fields assures the tool can perform as intended.

Text29 is the Run!23 default custom field for Earned Value Method / Technique (EVM). Identify the schedule's EVM field and modify Run!23 to recognize the field accordingly using the Set-up button on the active project. Determine how Level of Effort (LOE) and Planning Packages (PPkgs) are identified in the schedule. Populate the appropriate Text field defined for EVM with LOE and PPkg if these tasks are not already coded in the EVM field.

Tip: Using a copy of the original IMS file for analysis ensures modifications such as populating the EVM field with planning package or LOE identifiers do not affect the original IMS.

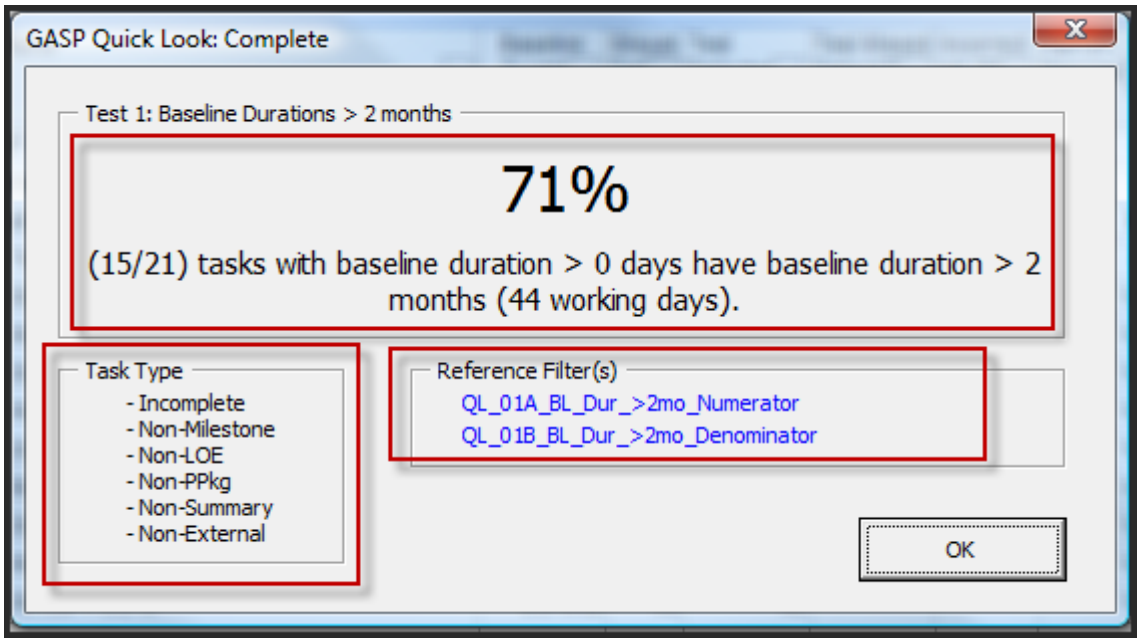
Using Run!23 to Perform an IMS Quick Look Assessment

The IMS Quick Look assessment table explains how to perform each test by GASP tenet using Run!23. The first column labeled "Test Description" describes the test or check and provides a tip as to the intent of performing the related test. The second column labeled "How to Determine*"* describes the applicable Run!23 Quick Look test to use, with a description of the filters involved, or uses the existing manual method if the feature is not included in Run!23. Run!23 performs the counts, determines percentages where applicable, and identifies test threshold goals. The third column labeled "Why It Matters; *Corrective Action"* provides insight into related unsatisfactory conditions and suggestions to make schedule improvements.

Filters stating "non-external" exclusions refer to external tasks that reside in a separate project, in a multiple project environment, but have a logical relationship to tasks in the analyzed project. External tasks are often referred to as "ghost tasks".

Most tests are either percent score or zero exceptions tests. Run!23 uses filters that identify the amount of tasks for the numerator and the denominator, and then calculates and displays the percentage for percentage score tests. For zero exceptions tests, Run!23 identifies the amount of tasks detected for the related condition and displays the amount. Other tests require performing described steps to determine the results.

Percent score tests use two related filters for each test. The first filter detects the amount of tasks for the stated condition and counts the tasks for the numerator; then the second filter uses the same parameters without the stated condition to determine the task count for the denominator. Run!23 performs the mathematical division and provides the percentage of tasks detected in a displayed message box as seen in the screen shot below. The analyst compares the result to the stated goal amount to determine if the condition exceeds the threshold. Goals are stated in the table for each applicable test such as "5% or less" for example. The message box also indicates the Task Types considered for each related test.



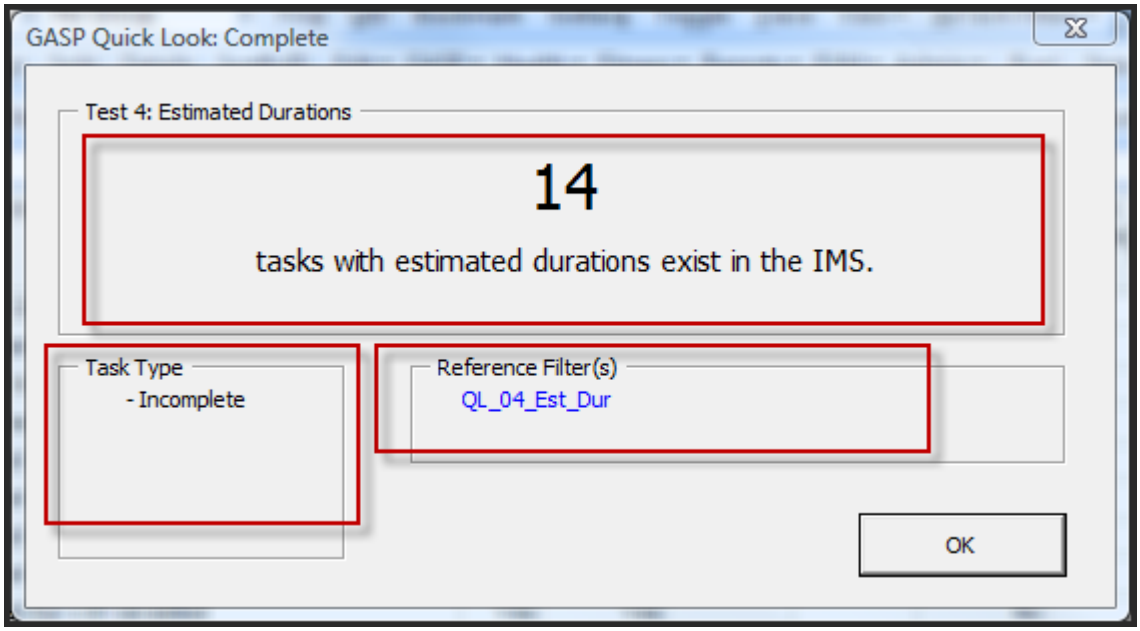
Run!23 Quick Look GASP 1: Complete Test 1 displayed message box

The blue highlighted Reference Filter(s) in the message box above are hyperlinks that filter the related tasks in the schedule. Click a hyperlink filter and click OK. This closes the message box and filters the related tasks in the schedule. Investigate the detected tasks to understand more about what tasks comprise the selection and the tasks' condition.

Tip: Exceeding the threshold requires further investigation to understand the condition and possibly recommend corrective actions to enable schedule improvements.

Zero exception tests have a single filter used to detect the stated condition. Tasks detected in these tests do not require a mathematical operation, just a count of the filtered tasks. Use the blue hyperlink to filter the related tasks in the schedule. Tests for zero exception conditions may require further investigation to understand the condition, but usually result in recommending corrective actions to resolve the detected condition to make schedule improvements.

Filter exclusions identify the types of tasks not included in each test. Exclusions may be stated such as "incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks" for example. Again, where used for a percent score test, the numerator and denominator contain the same exclusions. The message box in the screen shot below indicates that Test 4 considers all incomplete tasks and does not exclude other task types.



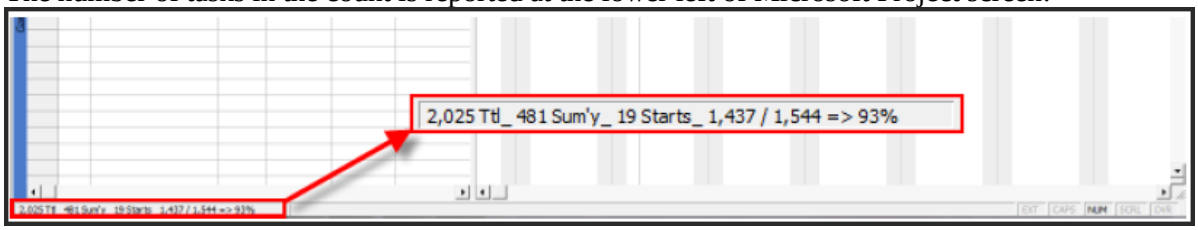
Run!23 Quick Look GASP 1: Complete Test 4 displayed message box

Test 4 is an example of a no-exceptions test as there is not paired numerator and denominator filters applied to determine a percent score. Zero exception tests apply a single filter. Any detected items must be addressed with the message box displaying the amount of tasks detected. The blue colored Reference Filter(s) are hyper-links that when selected and OK clicked activate the filter to display the detected tasks in the schedule. This makes it handy to investigate tasks identified by the filter used in the test.

Tests requiring manual steps can use the Run!23 Count feature to determine number of tasks detected, where applicable.

Determine the number of tasks detected by highlighting a column in the table and clicking the "Count" button.

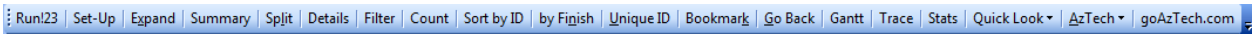
The number of tasks in the count is reported at the lower left of Microsoft Project screen.



The count in the above example displays in the lower left-hand side of the screen in this format: Total Tasks Summary Tasks_In-Progress Tasks_Completed Tasks / Total Non-Summary Tasks => xx%.

Run!23 Toolbar

The Run!23 Toolbar is the navigation tool for conducting the various tests found in Run!23. Each menu item is described below:



Run!23

Gives version details and allows the user to rebuild the toolbar.

Set-Up

When clicked with a live project file as the active window, sets up the appropriate Run!23 views and settings for working with the file. Should be run each time a live project file is opened.

Expand

Unfilter the active project to show all tasks. Also resets any current AutoFiltering.

Summary

Toggles whether or not to show summary tasks.

Split

Toggles screen between showing two panes (top and bottom)—hiding the bottom pane.

1. Before you split the screen, select the View to appear in the top pane (e.g. Gantt).
2. Click the Split button to make the task Form View appears in the bottom pane.
3. To change the Details that are shown, right click in the grey area to the right and select the Details to show, or choose View, and More Views to pick a different View for the bottom pane.
4. To toggle the bottom pane on or off, click the Split button again.

Details

Splits the screen, showing the task Details Form in the bottom pane.

1. Select the task to see the Details.
2. Click the Details button to make the Task Details View appear in the bottom pane.
3. To change the Details shown, right click in the grey area to the right, and select the Details to show.
4. To remove the split from the screen, click the Split button.

NOTE: Right-click the bottom pane to switch the information to be displayed.

Filter

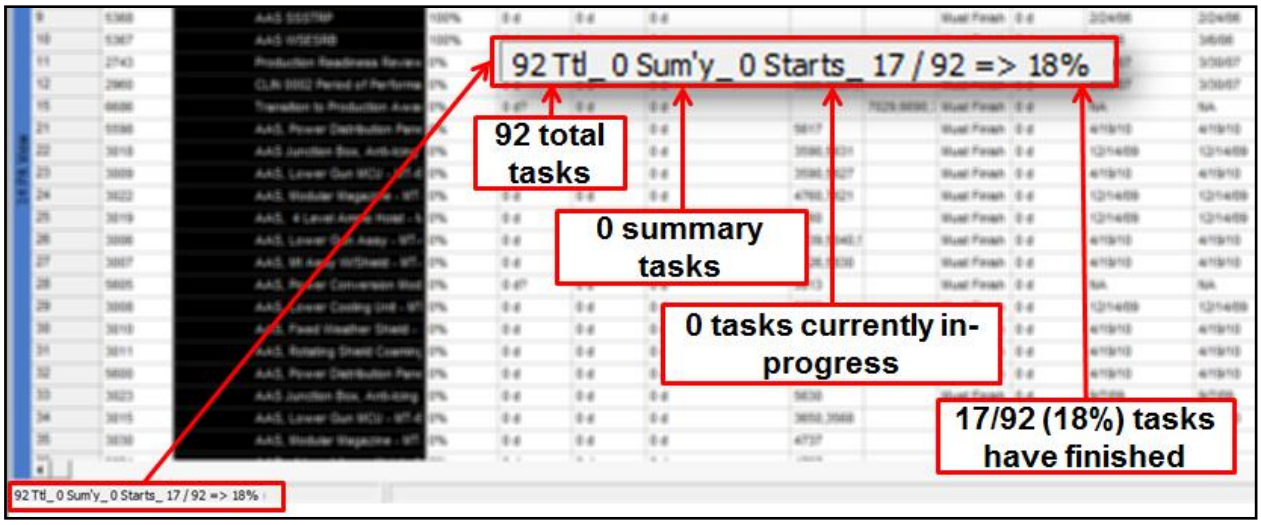
Filters for a given input located in the Name field. The results do not include Summary tasks unless a Summary task contains the input value. This is not case sensitive, but every space or letter counts.

Count

For the selected tasks, counts the Total Number of tasks, Summary tasks, In-Progress tasks, Completed Detailed tasks, Detailed tasks, and the % Complete of Detailed tasks (# Actual Finishes / # Detailed tasks).

1. Highlight all of the tasks to count (select any column to count ALL tasks shown in the current Filter).
2. Click the Count button.

NOTE: If the results do not show up, go to **Tools**, **Options**, **View**, **Show**, and verify that 'Status Bar' is checked.



Sort by ID

Sorts all tasks by ID number (ascending order).

by Finish

Sorts all tasks by Finish Date (earliest to latest).

Unique ID

Jumps to the task with the user-entered Unique ID.

Bookmark / Go Back

Stores the selected task's location. Go Back is used to return to the bookmarked task. Only one location can be bookmarked at a time.

Gantt

Changes the Gantt Chart view to the AzTech Default (A_Gantt view).

Trace

Shows the predecessor tasks for the selected task (always select only ONE task or milestone).

1. Highlight the single task (or milestone) to trace--ONLY works off of ONE task.

2. Click Trace, choose the desired option from the Trace dialog box, and click OK.

NOTE: The default is to hide Summary tasks.

Stats

Creates a spreadsheet containing statistics about all or selected tasks.

1. Highlight any tasks in the project.
2. Click the Stats button.
3. Optional: Enter a name for the Excel document to be created.
4. Open the folder where the Project is saved.
5. The Excel document created is named: 'AzTechStats_', followed by the Project's filename and the name selected in Step 3.
6. Open the Excel document to see the program statistics.

NOTE: If the MS Project file has an .MPX or extension other than .MPP, save the file with the .MPP extension before running the Stats tool.

Quick Look

Displays the automated Quick Look test menu. Select the desired Quick Look test from the drop-down to automatically quantify data anomalies against this test in the IMS.

AzTech

Displays the full Run!AzTech menu, available through Run!AzTech software.

goAzTech.com

Link to AzTech's website.

Performing a Trace of Predecessor Path or Successor Path Logic

With your project schedule as the active window, find and select the milestone or task you want to trace.

NOTE: To find the last task or milestone in the schedule, click **Summaries On/Off** until Summary tasks are hidden, click **by Finish** to sort by finish date, then CTRL-Arrow Down to find the last task or milestone.
Click the **Trace** button on the Run!23 toolbar.

Select the appropriate Trace options from the dialog box (e.g. select C to perform a Critical Path Trace), then click **OK**.
NOTE: There is no need to select an option for each category, but you may only select and enter one option within each category (Predecessor Trace Options, Successor Trace Options, and Sort Options) in the edit line at the bottom of the AzTech Trace Options window.

EXAMPLES:
For all predecessors, leave options blank.

For a critical path trace organized by finish, choose and enter "CF".

For a critical path trace organized by finish, and to check for any LOE on the path, choose and enter “CFL”.

Tenet 1: Complete

Please refer to the basic, non-tool specific IMS Quick Look section for definitions of task types such as detailed, discrete, LOE, planning packages, and milestones.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 1 **Baseline Durations >2 Months** Determine % of incomplete tasks with baseline durations greater than 44 working days (2 months). Tip: Shorter baseline durations reflect original planning scope granularity for efficient execution & precise performance measurement.	1. Apply Run!23 **Quick Look GASP 1: Complete Test 1** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_01A_BL_Dur_>2mo_Numerator QL_01B_BL_Dur_>2mo_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks that have baseline duration greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks with baseline durations greater than 0 days.	Why It Matters: Shorter activities (2 months or less in duration) provide more visibility into how the activities were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with baseline durations longer than 44 working days or split into tasks less than 44 days.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 2 **Forecast Durations > 2 Months** Determine % of incomplete tasks with durations greater than 44 working days (2 months). Tip: Shorter task durations are easier to status & provide scope granularity for precise performance measurement.	1. Apply Run!23 **Quick Look GASP 1: Complete Test 2** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_02A_Fcst_Dur_>2mo_Numerator QL_02B_Fcst_Dur_>2mo _Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks that have durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks.	Why It Matters: Shorter tasks (2 months or less in duration) provide more visibility into how the tasks were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with forecast durations longer than 44 working days or split into tasks less than 44 days.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 3 **Forecast Durations > 2 Months in 3 Month Look Ahead** Determine % of incomplete tasks with durations greater than 44 working days (2 months) that are within next 3 months. Tasks clearly defined & well planned with easier to status shorter durations, provide granularity for precise performance measurement.	1. Apply Run!23 **Quick Look GASP 1: Complete Test 3** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_03A_Fcst_Dur_>2mo_within_3mo_Numerator QL_03B_Fcst_Dur_>2mo_within_3mo_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks activities within 3 months of status date that have durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-external, non-summary, non-milestone tasks within the same period.	Why It Matters: 3 month look ahead period scope must be understood & planned to execute efficiently. Shorter tasks (2 months or less in duration) provide more visibility into how the tasks were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify tasks with forecast durations longer than 44 working days or split into shorter tasks; apply this approach to advanced look ahead periods to affect changes.
Test 4 **Estimated Durations** Determine number of incomplete tasks with estimated durations. Tip: Indicates incomplete planning (durations have not been addressed).	1. Apply Run!23 **Quick Look GASP 1: Complete Test 4** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_04_Est_Dur Goal: Zero exceptions. Detects: number of incomplete tasks that have estimated durations.	Why It Matters: Estimated durations are the default in MSP indicating there has not been any duration input for that task. This suggests the planning has not yet been completed. Corrective Action: Replace estimated durations for all non-milestone tasks with durations from the CAM.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Tests 5 & 6 **Missing Baseline Dates & Baseline Duration** Determine all tasks without baseline dates & valid baseline durations. Tip: Cannot determine if tasks are early or late during execution without proper baseline.	1. Apply Run!23 **Quick Look GASP 1: Complete Tests 5 & 6.** 2. Observe & record detected number displayed in each message box. Uses Quick Look Filters: QL_05_No_BL_Dates, then QL_06_No_BL_Dur Goal: All tasks have baseline dates & baseline duration. Detects: number of all tasks that do not have established baseline start, baseline finish, or baseline duration.	Why It Matters: Missing baseline information may indicate lapse in proper schedule management processes & exhibit lack of performance measure capabilities. Corrective Action: Populate & maintain proper baseline dates & durations (baseline the schedule).
Test 7 **Cross Reference Fields** Comprehensive data field referencing in IMS. Tip: Demonstrates source information tracks to each other, is represented in the IMS, & enables better program management.	Use the "**A_AllFields**" Table to identify related User Defined Fields for Test 7. Verify all documents cross-referenced to the IMS are represented with their own field in the IMS & are appropriately populated Required: CAMs, CAs, IMP, WBS, SOW, EVT, Work Package, Planning Package Recommended: OBS/IPT Determine related fields in the IMS for each artifact & search for completeness. Analyst uses judgment to determine if IMS is adequately cross-referenced. Goal: All required fields complete.	Why It Matters: Data cross reference fields exist & are populated to demonstrate source data alignment & provides a verifiable basis for IMS planning. Corrective Action: Populate & maintain proper artifact data fields in the IMS.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 8 **Duplicate / Blank Names** Search for blank or duplicate task names in the entire IMS. Tip: Unique & descriptive task names define the scope content & deliverable, aide user comprehension & facilitate determining progress during status.	Sort the entire IMS by task name, observe obvious task name duplicates & blank names for Test 8. Be aware of sorting parameters e.g. in MSP do not check the option *Keep Outline Structure* for sorting when including summary tasks; not checking the option eliminates outline structure as the primary sort that would prevent task name alignment as a primary sort for comparison. Through several iterations, search task names containing common words to discern repetitive phrases that do not exhibit uniqueness, such as several tasks that merely state "Perform Test", not differentiating specific tests. Goal: All names are unique & not blank.	Why It Matters: IMS task nomenclature is best understood when organized, unique, meaningful, & not reliant on summary or grouping titles to supplement their comprehension. Corrective Actions: Use present tense action verbs as described in the IMP if applicable, for each non-summary task where possible, when revising task names. Words such as analyze, design, draft, determine, produce, conduct, review & approve provide insight into unique descriptive task names & aid understanding each task deliverable.

GASP Complete Evaluation

Tenet 2: Traceable

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 9 **Missing Logic** Determine number of incomplete tasks without logic (predecessors or successors). Tip: Logic is fundamental for establishing an achievable schedule & imperative for its predictive capability. Missing logic calls into question schedule soundness & critical path validity.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 9** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_09_No_Logic Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-external, non-summary tasks that do not have at least one predecessor or one successor.	Why It Matters: External feed-in milestones w/o predecessor or feed-out milestones w/o successor may be appropriate, but all other activities need proper logic found within the IMS. Corrective Action: Determine appropriate predecessors & / or successors for tasks missing logic.
Test 10 **Summary Logic (& Constraints / Deadlines)** Identify summary tasks with applied logic or constraints. Tip: Applying logic or constraint to summary tasks potentially obscures impacts to detailed tasks & hinders schedule analysis.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 10** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_10_Summary_Logic Goal: Zero exceptions. Detects: Number of all summary tasks that have predecessors or successors or constraint dates or deadline dates applied.	Why It Matters: Logic or constraints applied to summary tasks may have unintended consequences to subordinate detail tasks & may be difficult to discover when reviewing / analyzing schedule information. Corrective Action: Remove logic, constraints, & deadlines from summary tasks & apply logic & appropriate constraints & deadlines to detailed tasks.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 11 **Finish-to-Start (FS) Relationships** Determine % of incomplete tasks using FS relationships (preferred). Tip: FS relationships avoid scheduling activities in parallel & ensure the least opportunity for creating resource conflicts.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 11** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_11A_FS_Rel_Numerator QL_11B_FS_Rel_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 90% or greater. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have finish-to-start predecessor relationships to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Promoting parallel activities risks scheduling more work than can be executed & potentially understates projecting accurate program finish. Corrective Action: Verify the use of any non-FS relationships & change to FS if appropriate.
Test 12 **Start-to-Start (SS) or Start-to-Finish (SF) Successor w/o also Finish-to-Start (FS) or Finish-to-Finish (FF)** Determine number of incomplete activities using only SS or SF successor relationships. Tip: SS relationships may be valid, but not having at least one additional FS successor relationship prohibits establishing finish consequences, resulting in meaningless total float values.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 12** 2. Observe & record detected number displayed in message box. Run!23 function Goal: Zero exceptions. Detects: Number of incomplete, non-LOE tasks that have a SS or SF successor, but also do not have at least one FS or FF successor relationship to another task. Note: Condition, potentially equivalent of missing a successor.	Why It Matters: Relying only on SS or SF successor relationships does not model a finish consequence to the activity. Once in-progress, it loses its impact to other activities, does not retain priority to finishing & can reflect meaningless total float value to program end. Corrective Action: Determine & apply additional, appropriate FS or FF successor relationships.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 13 **Total Float > 3 Months** Determine % of tasks with total float >60 working days. Tip: Indicates a task may slip greater than 3 months without impact to program completion. Suggests a task is starting too early (missing an identified predecessor), or is not reflecting potential impacts to critical path (missing an identified successor). Possibility that some scope is not identified (tasks not present in the IMS).	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 13** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_13A_TF_>3mo_Numerator QL_13B_TF_>3mo_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have total float greater than 60 working days to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Excessive total float is indication the task is not properly sequenced, either starting too early, or is missing a potential successor that could impact critical path determination & not properly forecasting program completion. Usually, identifying the end task in a path for missing successors is effective in addressing high total float for all tasks in the path. Corrective Action: Determine appropriate predecessors & / or successors for tasks with excessive total float. Tip: Sort the detected tasks in descending total float order to focus corrective actions on tasks with largest total float values.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 14 **SNETs / FNETs Beyond 3 Month Look Ahead** Determine % of SNET or FNET constraints on tasks > 3 month look ahead. Tip: Anticipate using less "no earlier than" constraints in periods further out, due to uncertainty & related rationale, relying more on logic alone to schedule a project.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 14** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_14A_SNETorFNET_beyond _3mo_Numerator QL_14B_SNETorFNET_beyond _3mo_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary, non-external tasks beyond 3 months from status date that have SNETs or FNETs to (D) number of incomplete, non-LOE, non-summary, non-external tasks beyond 3 months from status date.	Why It Matters: Generally, assumptions are less accurate in further look ahead periods, especially when attempting to model resource availability with SNETs / FNETs. Corrective Action: Review the "No Earlier Than" constraints & replace with logic relationships where practical.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 15 **SNETs / FNETs within 3 Month Look Ahead** Determine % of SNET or FNET constraints on tasks < =3 month look ahead. Tip: Anticipate using more "no earlier than" constraints in immediate period, due to certainty, to refine dates, where logic alone may not adequately model the project.	1. Apply Run!23 **Quick Look GASP 2: Traceable Test 15** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_15A_SNETorFNET_within _3mo_Numerator QL_15B_SNETorFNET_within _3mo_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 10% or less. Compares: (N) number of incomplete, non-LOE, non-summary, non-external tasks within 3 months from status date that have SNETs or FNETs to (D) number of incomplete, non-LOE, non-summary, non-external tasks within 3 months from status date.	Why It Matters: Generally, conditions are well known in very near term & predecessors alone may not sufficiently model resource availability for task execution. Use SNETs / FNETs appropriately, but not in place of logic. Corrective Action: Validate the "No Earlier Than" constraints & replace with logic relationships where practical.

GASP Traceable Evaluation

Tenet 3: Transparent

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 16 **Tasks with Leads** Determine number of incomplete tasks with leads > one day (imposed logic accelerations to successors). Tip: Ignores tasks finishing & successor starting on same day condition; Difficult to understand & manage "time overlap" created using leads.	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 16** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_16_Leads_>1d Note: Leads may be defined as a negative lag. Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-summary tasks that have negative lag predecessors (greater than one day).	Why It Matters: Leads can distort total float & mask potential impacts to successor path tasks. Promote decomposing tasks & durations to facilitate Finish-to-Start relationships without leads. Corrective Action: Eliminate leads to allow schedule logic to drive dates.
Test 17 **Tasks with Lags** Determine % of incomplete tasks with lags (imposed logic delays to successors). Tip: Difficult to understand & manage "time gap" created using lags.	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 17** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_17A_Lags_Numerator QL_17B_Lags_Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have predecessors with lag to (D) number of incomplete, non-LOE, non-summary tasks.	Why It Matters: Lags interject vagueness related to a "time gap" represented by the lag & are difficult to understand & manage. Lags should only model "wait time", not replace work effort or be used to anticipate successor start dates. Corrective Action: Minimize lags to allow schedule logic to drive dates.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 18 **Constraints w/o Rationale** Determine % of incomplete tasks that have constraints without comments (rationale) in Notes field. Note: Recognize that the schedule authors may utilize another custom field or document to explain constraints use (such as in the IMS Supplemental Guidance documentation), may need to adjust test results accordingly. Tip: Rationale aids understanding of applied constraints.	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 18** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_18A_Constraints_No_Notes _Numerator QL_18B_Constraints_No_Notes _Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that are not ASAP & do not have Notes entries to (D) number of incomplete, non-LOE, non-summary tasks that are not ASAP.	Why It Matters: Documented explanations are required to understand constraint use, including validity & underlying intent. Aids in decision making & schedule maintenance. Corrective Action: Add explanations for deadlines & constraints to the Notes field.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 19 **Lead/Lag w/o Rationale** Determine % of incomplete tasks that have leads or lags without comments (rationale) in Notes field. Tip: Rationale aids understanding of applied delays or accelerations.	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 19** 2. Observe & record percent score displayed in message box. Uses Quick Look Filters: QL_19A_Leads_Lags_No_Notes _Numerator QL_19B_Leads_Lags_No_Notes _Denominator Run!23 divides the numerator (N) count by the denominator (D) count. Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-summary tasks that have predecessor leads or lags & do not have note entries to (D) number of incomplete, non-LOE, non-summary tasks that have predecessor leads or lags.	Why It Matters: Rationale is required to understand lead / lag use, including validity & underlying intent. Aids in decision making & schedule maintenance. Corrective Action: Add explanations for leads / lags to the Notes field. Also see Leads (Test 16) above for alternative techniques.
Test 20 **Hard Constraints** Determine number of incomplete tasks utilizing hard constraints, prohibiting free flow of logic-driven IMS. Tip: Prevent dates from reflecting driving predecessor impacts. Includes: Must Start On Must Finish On Start No Later Than Finish No Later Than	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 20** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_20_Hard Constraints Goal: Zero exceptions. Detects: Number of incomplete, non-LOE tasks that have MSO or MFO or SNLT or FNLT constraints applied.	Why It Matters: Documented constraints affecting late dates may be necessary to establish key need dates & total float other than relying solely on backward pass calculations (use sparingly). Corrective Actions: Eliminate hard constraints from IMS & consider using deadlines instead. Deadlines enable forecast impacts while providing accurate total float values.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 21 **Excessive Lags** Determine number of incomplete tasks with excessive lags (delay values greater than one month). Tip: Excessive lag values potentially extend beyond one status period, complicating analysis of dates.	1. Apply Run!23 **Quick Look GASP 3: Transparent Test 21** 2. Observe & record detected number displayed in message box. Run!23 function Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-summary tasks that have predecessors or successors with lag values greater than 20 working days.	Why It Matters: Excessive "wait time" complicates schedule management / visibility. Corrective Action: Replace excessive lags with documented / maintained "no earlier than" constraints".

GASP Transparent Evaluation

Tenet 4: Statused

4. Statused - Schedules reflect valid actual and forecast dates, and tasks maintain previously established logical relationships.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 22 **Invalid Forecast Dates** Determine number of incomplete tasks that are not statused up to status date. Tip: Includes incomplete tasks without appropriate actual start or actual finish dates < status date, or in-progress tasks with remaining duration starting < status date. Tip: Unaccomplished work in the past is not accurate status, causes inaccurate projections, & diminishes schedule reliability.	1. Apply Run!23 **Quick Look GASP 4: Statused Test 22** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_22_Invalid_Forecast_Dates Goal: Zero exceptions Detects: Number of non-summary tasks that have forecast start or forecast finish dates earlier than the status date, without the applicable actual start or actual finish dates, or remaining duration not beginning at the status date for in-progress tasks. Note: IMS cannot have tasks with invalid forecast dates.	Why It Matters: It is not possible to perform future work in the past, therefore all tasks with work scheduled earlier than status date must re-schedule that work later than status date. Corrective Actions: Address invalid dates & incomplete tasks that are earlier than Timenow by providing accurate status & / or forecast dates. Not reflecting proper status jeopardizes performance measurement & successor path task projections.
Test 23 **Invalid Actual Dates** Determine number of tasks with actual start or actual finish dates in future. Tip: Tasks reflecting achievement in the future do not have accurate status, which causes inaccurate projections & diminishes schedule reliability.	1. Apply Run!23 **Quick Look GASP 4: Statused Test 23** 2. Observe & record detected number displayed in message box. Uses Quick Look Filter: QL_23_Invalid_Actual_Dates Goal: Zero exceptions. Detects: Number of non-summary tasks that have actual start or actual finish dates later than the status date. Note: IMS cannot have tasks with invalid actual dates.	Why It Matters: Status date defines separation between past & future. It is not possible to accomplish effort in the future, beyond Timenow (status date). Corrective Actions: Correct the actual start or finish dates of tasks listed in the future. Not reflecting proper status jeopardizes performance measurement & successor path task projections.

4. Statused - Schedules reflect valid actual and forecast dates, and tasks maintain previously established logical relationships.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 24 **Out-of-Sequence (OOS) Status Conditions** Determine number of tasks that contain status conditions violating their logic relationships. Tip: Any tasks with out-of-sequence status condition render IMS projecting capabilities unreliable.	Review & detect tasks reflecting Actual Starts or Actual Finishes in current status cycle that are incongruent with predecessor logical relationships for Test 24. E.g. an incomplete FS predecessor to an in-progress successor – that has an Actual Start & its predecessor does not have an Actual Finish, does not honor the relationship. Goal: Zero exceptions. Note: This test is performed more efficiently using an analysis tool designed to automate OOS status condition detections. See the Appendix – Schedule and Schedule Assessment Tools for products that perform this automated function.	Why It Matters: Out-of-sequence status conditions override logic & potentially return overly optimistic successor path projections & meaningless total float values. Corrective Action: Resolve out-of-sequence status issues by either changing logic (if appropriate) or correcting the actual start or finish dates.

GASP Statused Evaluation

Tenet 5: Predictive

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 25 **Push Forward Test** Assess logic network integrity to program completion. Tip: Delaying an incomplete task with least total float reflects proportionate delay to program completion, demonstrating logic path to program completion.	Observe / record program completion milestone Early Finish date. Perform a successor trace by selecting a current period task with the least amount of total float, add 600 working days to existing duration, recalculate the schedule & click the *Trace* button**,** using the *R* (for Right) option. Verify the program completion milestone Early Finish date reflects a proportionate delay; the milestone is in the filtered set of tasks if it is logically tied to the successor trace task. Check for a logic break if the milestone is not present in the filtered set of tasks. Failed test when milestone does not reflect anticipated delay. Repeat this test on another current period task to ensure consistency. Note: If task with least total float has positive 25 working days total float, may only expect a 575 working day delaying impact to milestone.	Why It Matters: Adding 600 working days is more than two years duration, introducing dramatic impact to program completion. Failing the test indicates either broken logic exists or hard constraints prevent delays to successor path tasks. Corrective Action: Address missing logic or applied hard constraint issues.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 26 **Program Completion Trace Test** Determine % of non-LOE, incomplete tasks logically tied to program completion. Tip: Feed-out tasks detected during this test should have documented rationale. Note any hard constraints assigned.	1. Perform a predecessor trace by selecting the program completion milestone & clicking the *Trace* button, using defaults (no options), highlight all tasks & Count. Note LOEs detected in path; decrement number of LOE from detected number for accurate calculation See Test 27 with respect to detected LOE. 2. Apply Run!23 **Quick Look GASP 5: Predictive Test 26** 3. Observe & record detected number displayed in message box for denominator. Uses Quick Look Filter: QL_26B_Program_Completion _Trace_Test_Denominator. Divide Trace Count by number of total incomplete, non-LOE, non-summary task (QL_26B). Goal: 95% & greater. Note: Review tasks not detected in the path by selecting Flag19 = "No" before continuing with other tests (Trace populates Flag19 with "Yes"). These are the tasks not logically tied to the program completion milestone.	Why It Matters: Although a percentage is calculated for test, it is more meaningful to review suspect tasks. Even a relatively few significant tasks without a successor path to program completion is reason for concern. Ideally all incomplete, non-LOE, non-summary tasks are logically tied to completion milestone. Corrective Actions: Investigate tasks not detected by the test, address missing successor path logic to milestone. Essential tasks not logically tied to program completion render IMS as not predictive & invalidate critical path.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 27 **No LOE in Path to Program Completion** Use the *Program Completion Trace Test* set-up for this check. Tip: Identify LOE tasks detected as having logical successor paths to program completion.	Perform a predecessor trace by selecting the program completion milestone & clicking the *Trace* button, using the *L* option to detect LOE in the path; window displays the number of LOE detected. Review the LOE tasks detected. Investigate to confirm that these LOE tasks are logically tied to discrete tasks & milestone & recommend changing logic. Goal: No LOE tied to discrete effort.	Why It Matters: LOE should not be logically tied to discrete work & should not be part of the critical path. Corrective Action: Investigate & remove LOE logic to discrete tasks & program completion to ensure LOE will not become part of the critical path. Recommend using a LOE completion milestone to terminate LOE logic if necessary.
Test 28 **Appropriate Constraints Applied to Endpoint Milestones** Verify related milestones have appropriate constraints that provide meaningful schedule measures. Tip: Missing constraints diminish program management prioritization Avoid using hard constraints that override predictive nature of logic network.	Identify & review the endpoint milestones to ensure appropriate, documented constraints provide meaningful total float values & permit driving predecessors to establish forecast dates. Note: Method & rationale for establishing need dates (Late Dates) should align with IMS Supplemental Guidance documentation. Goal: All endpoint milestones should have constraints applied.	Why It Matters: Need dates reflect management's target. Constraints affecting the backward pass to program end & major milestones (if applicable) enable accurate total float calculation & permit precedence logic impacts. Corrective Action: Validate appropriate constraints used on endpoint milestones. Consider using documented deadlines.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 29 **Critical Path Length Index (CPLI)** Project performance indication of the ability to finish on time.	1. Determine working days duration from status date to program completion Early Finish date in IMS, **A** (critical path length). 2. Add amount of total float, **B** (least positive or negative value) to **A** & total. 3. Divide total (**A** + **B**) by **A** (critical path length, as determined above). **(A + B) / A** Goal: Should not be less than 0.95 with target of 1.00 (>1.00 is favorable <1.00 is unfavorable).	Why It Matters: Although geared towards performance, this test reflects IMS realism of completing on time & is meaningful when satisfactorily passing all previous GASP tests.

GASP Predictive Evaluation

Performing an IMS Quick Look Assessment Using Open Plan Professional

This section describes using Open Plan to perform an IMS Assessment. Please refer to the IMS Quick Look Assessment section for all guidance on performing an IMS Quick Look Assessment.

Prior to performing analysis on an IMS, save a copy of the IMS for analysis using a unique project name.

BK3 File

A file, *Air Force Open Plan.bk3*, is provided with this process. The BK3 file provides views, calculated fields and filters to use for performing a Quick Look Assessment.

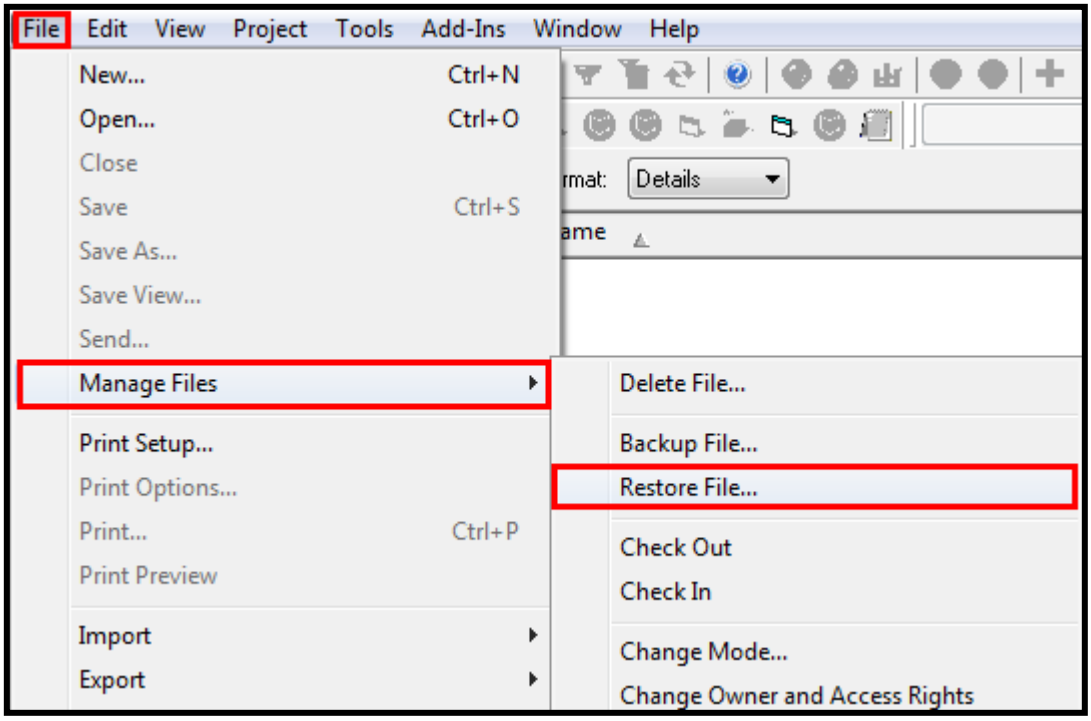
Note: The Air Force BK3 file also contains additional views, filters, sorts, and bar sets to aid in other schedule analysis functions.

Follow the steps below to import the BK3 file.

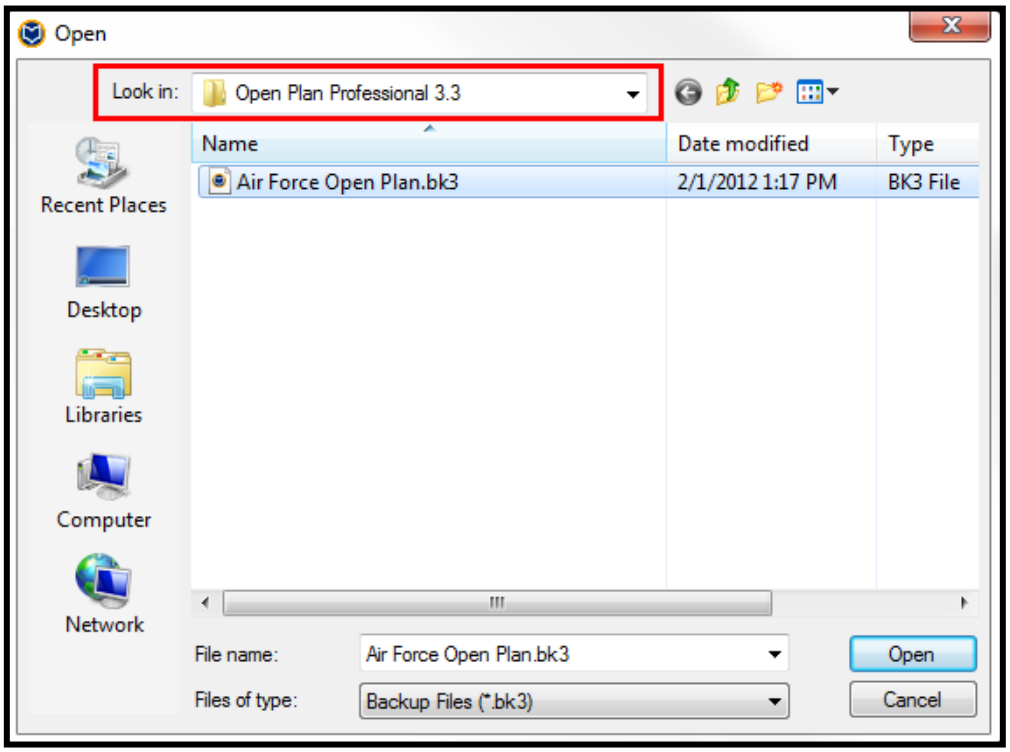
1. Access the BK3 file on the Air Force Portal at: https://www.my.af.mil/gcss-af/USAF/ep/globalTab.do?channelPageId=s5FDEA9F02769C1090127867185EE02F8

2. Save the file to your computer.

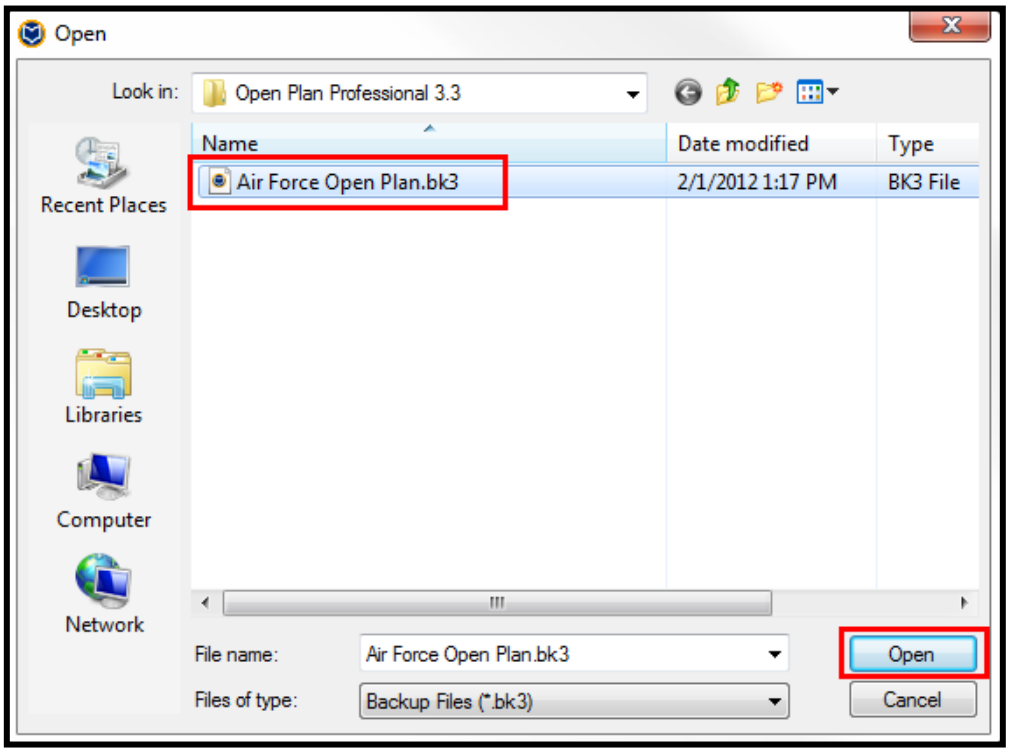
3. In Open Plan, select *File* > *Manage Files* > *Restore File*.



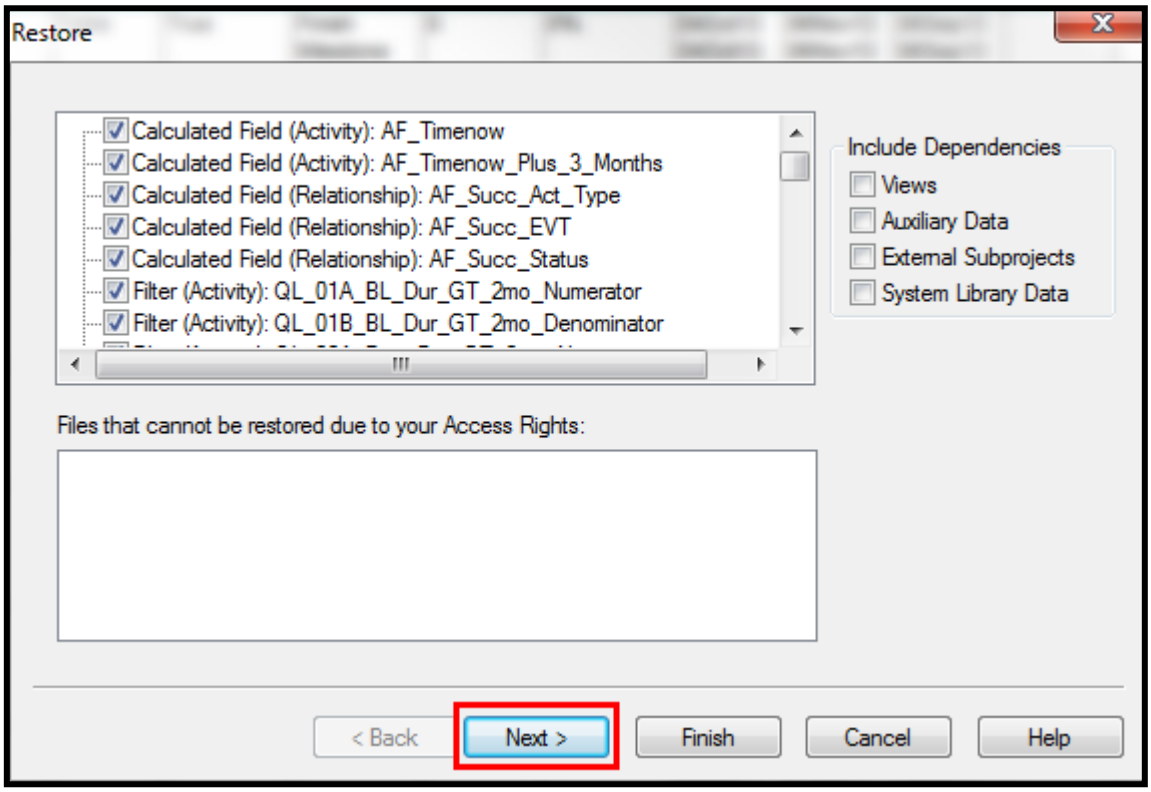
4. Navigate to the folder the BK3 file was saved in.



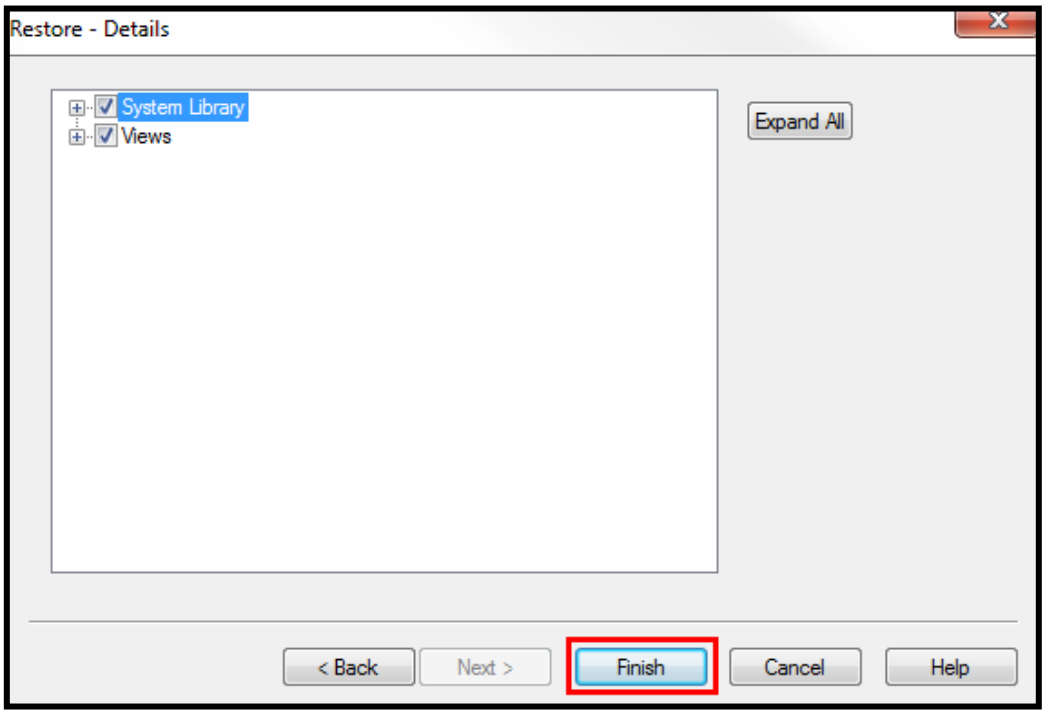
5. Select the *Air Force Open Plan* BK3 file and select *Open*.



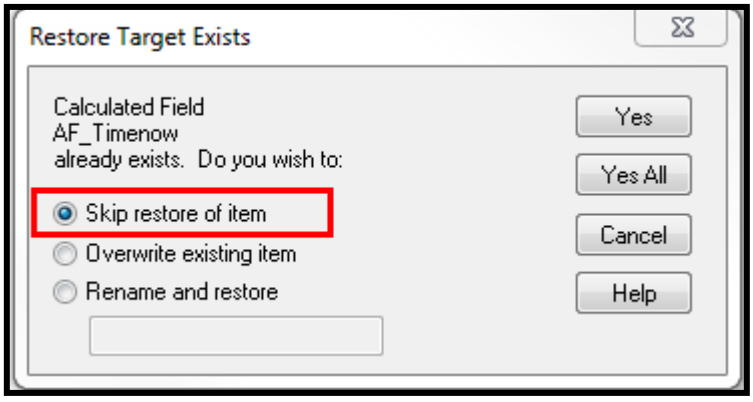
6. All fields, filters, views, sorts and bar charts included in the *Air Force Open Plan* BK3 file are checked within the next two screens. Select *Next*.



7. Select *Finish*.

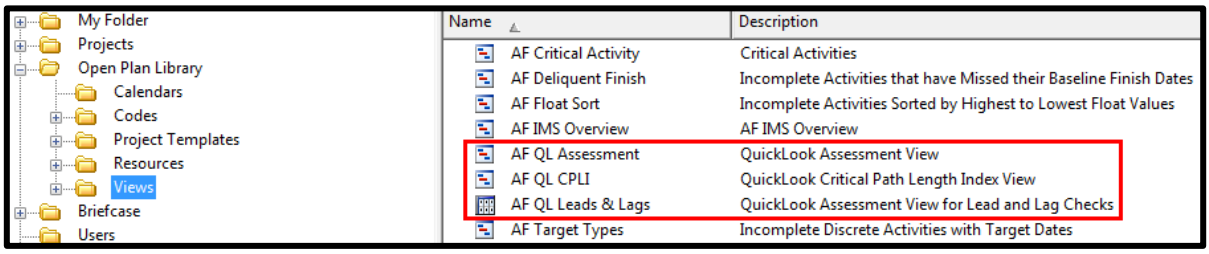


8. For any items that already exists, select *Skip restore of item* so that any elements that have been previously modified by the user are not overwritten. However, if previously modified items need to be replaced by the original, *Overwrite existing item* may be selected.



Views

Three views are provided to use with Quick Look Assessments. These views are named *AF QL Assessment*, *AF QL CPLI* and *AF QL Leads & Lags.* In Open Plan Explorer, these may be selected within the *Open Plan Library* > *Views* folder.



Note: Other Air Force views are provided in the BK3 file to assist with additional schedule analysis. These include AF Critical Activity, AF Delinquent Finish, AF Float Sort, AF IMS Overview and AF Target Types views.

AF QL Assessment View

The *AF QL Assessment* view contains fields that are helpful to use when performing a Quick Look Assessment.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates	Baseline Duration	Remaining Duration	Total Float	EVT	AF Target Dates	Predecessors (ID, Rel Type, Lag)	Successors (ID, Rel Type, Lag)	Out of Sequence Progress	Trace Critical Path	Trace Logic
Program XYZ IMS		303				0%														246.00
1	Project XYZ IMS	1	True	Subproject	1468d	0%	01May11 12Oct16	01May11 14Dec16	01May11 09Nov36	01May11	1423d	1424d	-43d	Percent Complete	S: None F: Not Earlier Than 20Jan2012			False		0.00
1.1	Program Milestones	1	True	Subproject	1468d	0%	01May11 12Oct16	01May11 14Dec16	01May11 14Oct16	01May11	1423d	1424d	-43d	Percent Complete	S: None F: None			False		0.00
1.1.1	Start Contract	1	False	Finish Milestone	0	100%	01May11 01May11	01May11 01May11	01May11 01May11	01May11 01May11	0	0	0	Percent Complete	S: None F: None		1.3.2, SS, 0 1.2.2.1, SS, -1d 1.2.4.1, FS, -2d 1.2, FS, 0	False		1.00

There is a *Count* column that totals the number of activities resulting when different filters are applied.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates
Program XYZ IMS		303				0%				
1	Project XYZ IMS	1	True	Subproject	1468d	0%	01May11 12Oct16	01May11 14Dec16	01May11 09Nov36	01May11
1.1	Program Milestones	1	True	Subproject	1468d	0%	01May11 12Oct16	01May11 14Dec16	01May11 14Oct16	01May11
1.1.1	Start Contract	1	False	Finish Milestone	0	100%	01May11 01May11	01May11 01May11	01May11 01May11	01May11 01May11

Date fields include baseline dates, early dates, late dates, actual dates and target dates. Start and finish dates appear in the same cell, consolidating space. The start dates are reflected on the top of each cell and the finish dates are reflected on the bottom. If a date is not listed, it does not exists for the specific activity.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates	Baseline Duration	Remaining Duration	Total Float	EVT	AF Target Dates
1.3.3.3	Obtain FDS Approval for FDS RMM1100	1	False	ASAP	2d	100%	18May11 19May11	18May11 19May11	18May11 19May11	18May11 19May11	2d	0	0	Percent Complete	S: Not Earlier Than 18May2011 F: None
1.3.3.4	Write FTP for FDS RMM1100	1	False	ASAP	10d	100%	20May11 02Jun11	20May11 02Jun11	20May11 02Jun11	20May11 02Jun11	10d	0	0	Percent Complete	S: None F: None
1.3.3.5	Approve FTP for FDS RMM1100	1	True	ASAP	6d	0%	07Jun11 09Jun11	07Jun11 07Jul11	07Jun11 29Jun11	07Jun11	3d	5d	-6d	Percent Complete	S: None F: None

For subproject activities (identified in the *Activity Type* field as *Subproject*), the date fields reflect the earliest start and the latest finish dates of the lower level activities that roll up to the subproject.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates
1.2.4	Interface Control Agreement	1	False	Subproject	85d	0%	17Aug11 13Dec11	31Aug11 28Dec11	21Sep11 18Jan12	
1.2.4.1	Draft ICA	1	False	ASAP	30d	0%	17Aug11 27Sep11	31Aug11 12Oct11	21Sep11 02Nov11	
1.2.4.2	Conduct Negotiations for ICA	1	False	ASAP	35d	0%	28Sep11 15Nov11	12Oct11 30Nov11	02Nov11 21Dec11	
1.2.4.3	Finalize ICA	1	False	ASAP	15d	0%	16Nov11 06Dec11	30Nov11 21Dec11	21Dec11 11Jan12	
1.2.4.4	Aquire Signature for ICA	1	False	ASAP	5d	0%	07Dec11 13Dec11	21Dec11 28Dec11	11Jan12 18Jan12	

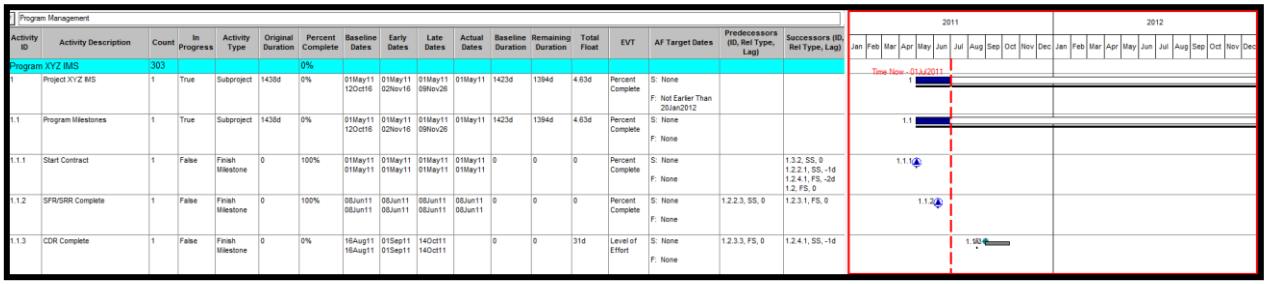
The *Target Dates* field reflects the target type on top and the target date on bottom for both start and finish targets that have been assigned to an activity.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates	Baseline Duration	Remaining Duration	Total Float	EVT	Target Dates
1.2.8	System Verification Review	1	False	Subproject	33d	0%	09Aug12 27Sep12	09Aug12 24Sep12	13Aug12 26Sep12		36d	33d	2d	Percent Complete	S: None F: None
1.2.8.1	Prepare SVR Checklist	1	False	ASAP	2d	0%	09Aug12 10Aug12	09Aug12 10Aug12	13Aug12 14Aug12		2d	2d	2d	Percent Complete	S: Not Earlier Than 09Aug2012 F: None
1.2.8.2	Review SVR Checklist Items for Internal Quality Review	1	False	ASAP	2d	0%	13Aug12 14Aug12	13Aug12 14Aug12	15Aug12 16Aug12		2d	2d	2d	Percent Complete	S: None F: None

The *Predecessors* and *Successors* fields list the activity id, relationship type, and lag value (positive or negative) on a line for each relationship assigned to an activity.

Activity ID	Activity Description	Count	In Progress	Activity Type	Original Duration	Percent Complete	Baseline Dates	Early Dates	Late Dates	Actual Dates	Baseline Duration	Remaining Duration	Total Float	EVT	Target Dates	Predecessors (ID, Rel Type, Lag)	Successors (ID, Rel Type, Lag)
1.2.7.1	Prepare for PRR	1	False	ASAP	30d	0%	31May12 11Jul12	25Jun12 25Jun12	14Jun12 14Jun12	26Jan12	30d	0	-6.63d	Percent Complete	S: Not Earlier Than 31May2012 F: None	1.2.6.3, FS, 0 1.2.6.9, FS, 2d 1.2.6.4, FS, 3d 1.2.5.4, FS, -2d	1.2.7.2, FS, -1d
1.2.7.2	Finalize PRR Presentation	1	False	ASAP	15d	0%	12Jul12 01Aug12	22Jun12 13Jul12	14Jun12 04Jul12	27Jan12	15d	15d	-6.63d	Percent Complete	S: None F: None	1.2.7.1, FS, -1d 1.2.6.1, FS, 2d	1.2.7.3, FS, 0
1.2.7.3	Conduct PRR	1	False	ASAP	5d	0%	02Aug12 08Aug12	13Jul12 20Jul12	05Jul12 11Jul12	13Jul11	5d	5d	-6.63d	Percent Complete	S: None F: None	1.2.7.2, FS, 0	1.2.7.4, FS, 0
1.2.7.4	PRR Complete	1	False	Finish Milestone	0	0%	08Aug12 08Aug12	20Jul12 20Jul12	11Jul12 11Jul12		0	0	-6.63d	Percent Complete	S: None F: None	1.2.7.3, FS, 0	1.2.8.1, SS, 0

If desired, the bar chart may be viewed by expanding the right section of the screen.



AF QL CPLI View

The *AF QL CPLI* view contains fields that are helpful to use when determining the CPLI for a schedule. The view is also filtered and sorted for the CPLI test.

Activity ID	Activity Description	Activity Type	Original Duration	Percent Complete	Early Dates	Late Dates	Remaining Duration	Total Float	Target Dates	Predecessors (ID, Rel Type, Lag)	Successors (ID, Rel Type, Lag)
Program XYZ				0%							
1.3.3.5	Approve FTP for FDS RMM1100	ASAP	6d	0%	01Jul11 07Jul11	01Jul11 25Aug11	5d	0	S: None F: None	1.4.1.6, FS, 0	1.4.1.8, FS, 0
1.4.1.2	Develop TDS for FDS RMM1100	ASAP	7d	0%	01Jul11 07Jul11	01Jul11 05Jul11	5d	0	S: None F: None	1.4.1.1, FS, 0	1.4.1.3, FS, 0
1.4.1.3	Input TDS for FDS RMM1100	ASAP	10d	0%	08Jul11 21Jul11	05Jul11 19Jul11	10d	-2d	S: None F: None	1.4.1.2, FS, 0	1.4.1.4, FS, 0
1.2.3.1	Prepare for CDR	ASAP	30d	0%	01Jul11 05Aug11	01Jul11 14Nov11	26d	0	S: Not Earlier Than 05Aug2012 F: None	1.1.2, FS, 0	1.2.3.2, FS, 0

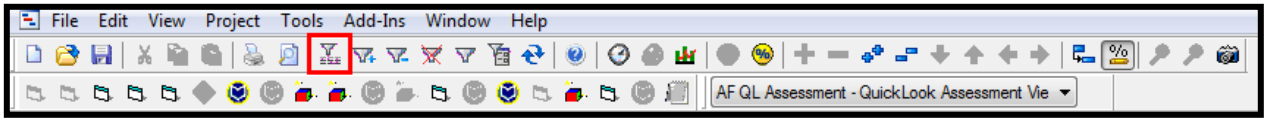
AF QL Leads & Lags View

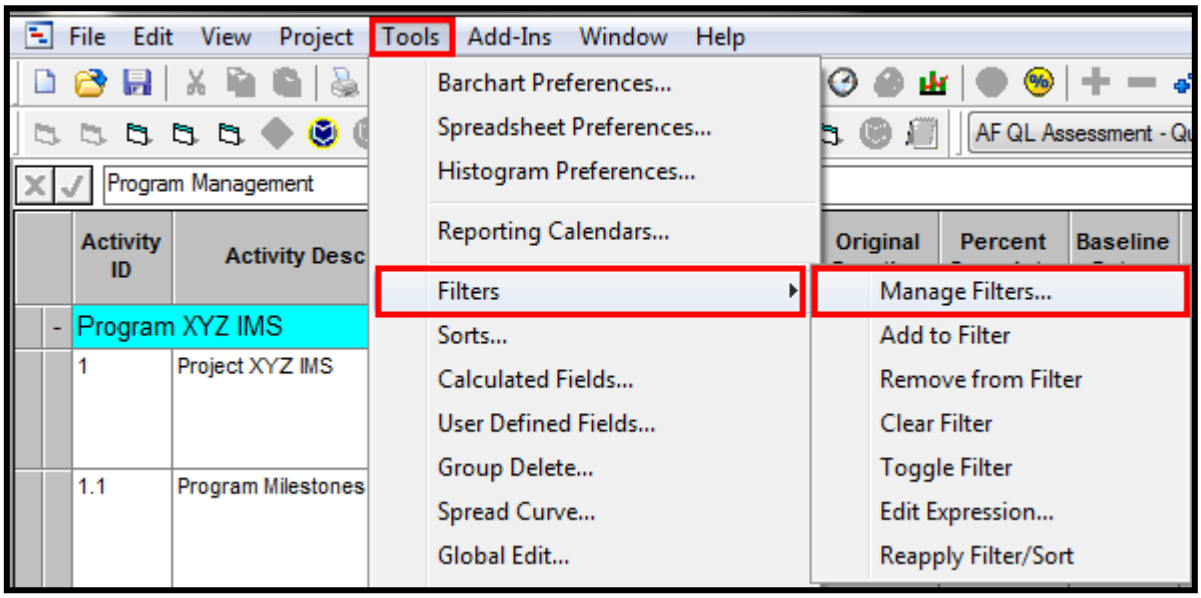
The *AF QL Leads & Lags* view is a relationship view that contains fields and groupings that are helpful when performing the *Activities with Leads* and *Excessive Lags* checks for a Quick Look Assessment. This view counts relationships, rather than individual activities.

Predecessor ID	Predecessor Description	Successor ID	Successor Description	Relationship Lag	Relationship Type	Count
1.1.1 -- Start Contract						
1.1.1	Start Contract	1.2.4.1	Draft ICA	-2d	Finish to Start	1
1.1.1	Start Contract	1.2.2.1	Prepare for SFR/SRR	-1d	Start to Start	1
1.1.1	Start Contract	1.2	Program Management	0	Finish to Start	1
1.1.1	Start Contract	1.3.2	Start Configuration	0	Start to Start	1
1.1.2 -- SFR/SRR Complete						
1.1.2	SFR/SRR Complete	1.2.3.1	Prepare for CDR	0	Finish to Start	1
1.1.3 -- CDR Complete						
1.1.3	CDR Complete	1.2.4.1	Draft ICA	-1d	Start to Start	1
1.1.4 -- TRR Cycle 3 Complete						
1.1.4	TRR Cycle 3 Complete	1.5.7	Conduct TRR UAT	0	Finish to Start	1
1.1.5 -- UAT Complete						
1.1.5	UAT Complete	1.2.12.1	Prepare for Milestone C	0	Finish to Start	1
1.1.5	UAT Complete	1.6.2	Start User Management	0	Finish to Start	1
1.1.6 -- Milestone C Complete						
1.1.6	Milestone C Complete	1.6.2	Start User Management	0	Finish to Start	1

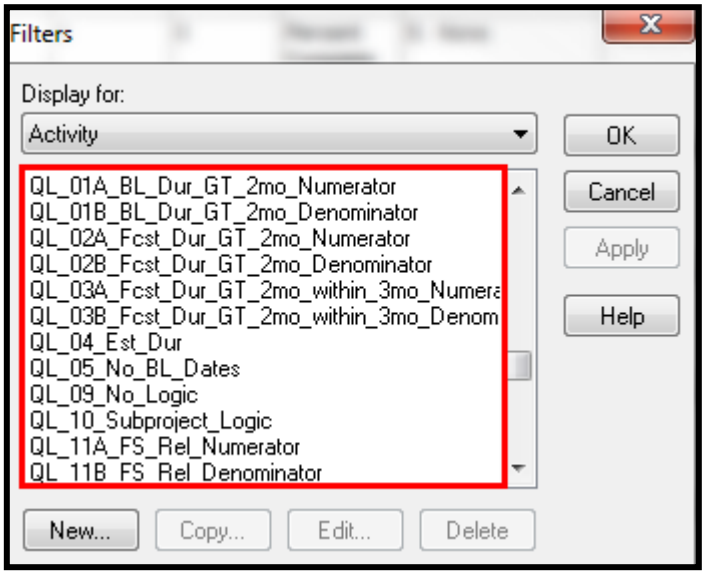
Filters

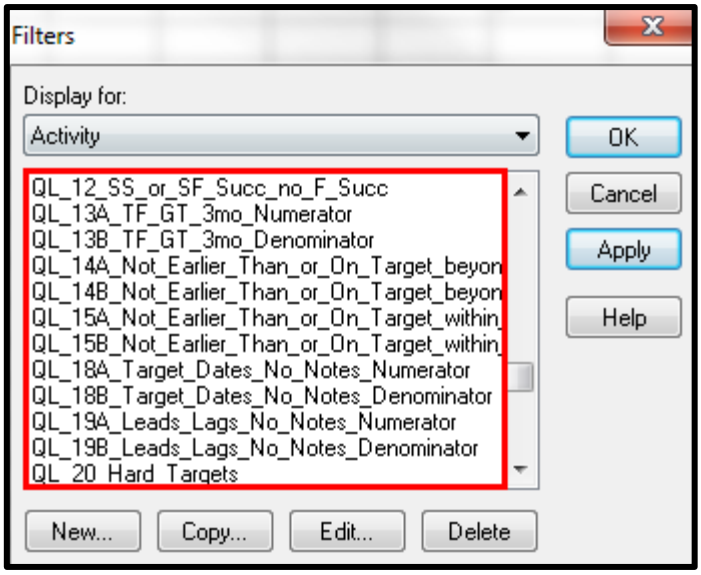
The QL Filters provided in the BK3 file are used for the various tests included in a Quick Look Assessment. To apply a filter, either select the filter icon on the toolbar or select *Tools* > *Filters* > *Manage Filters*.

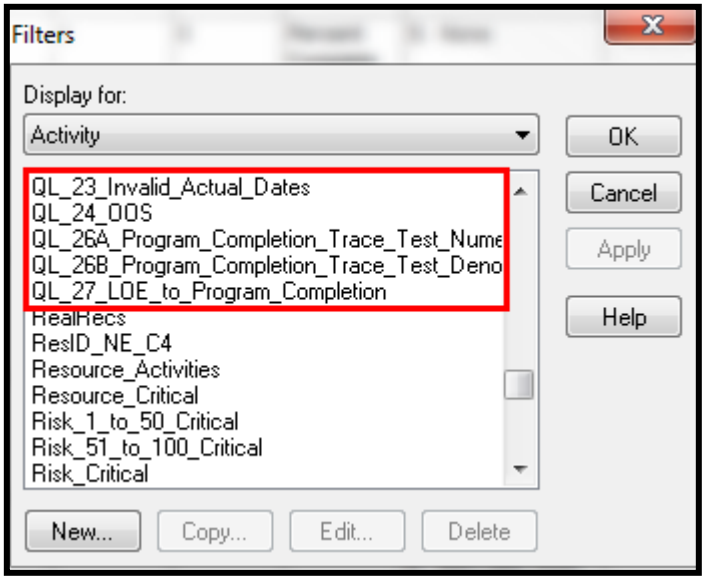




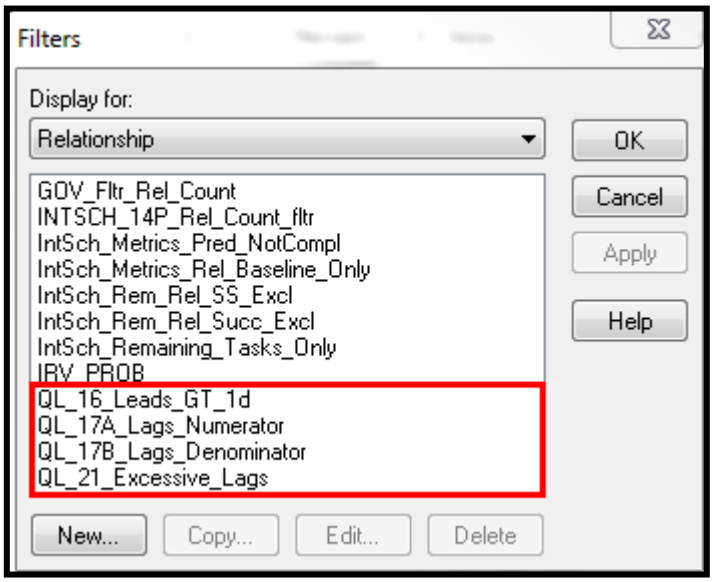
The filters to be used for the Quick Look Assessment checks all begin with *QL*. There are 29 Quick Look activity filters available.




Filters
Display for:
Activity
OK
Cancel
Apply
Help
QL_12_SS_or_SF_Succ_no_F_Succ
QL_13A_TF_GT_3mo_Numerator
QL_13B_TF_GT_3mo_Denominator
QL_14A_Not_Earlier_Than_or_On_Target_beyon
QL_14B_Not_Earlier_Than_or_On_Target_beyon
QL_15A_Not_Earlier_Than_or_On_Target_within
QL_15B_Not_Earlier_Than_or_On_Target_within
QL_18A_Target_Dates_No_Notes_Numerator
QL_18B_Target_Dates_No_Notes_Denominator
QL_19A_Leads_Lags_No_Notes_Numerator
QL_19B_Leads_Lags_No_Notes_Denominator
QL_20_Hard_Targets
New...
Copy...
Edit...
Delete


Filters
Display for:
Activity
OK
Cancel
Apply
Help
QL_23_Invalid_Actual_Dates
QL_24_OOS
QL_26A_Program_Completion_Trace_Test_Nume
QL_26B_Program_Completion_Trace_Test_Deno
QL_27_LOE_to_Program_Completion
RealRecs
ResID_NE_C4
Resource_Activities
Resource_Critical
Risk_1_to_50_Critical
Risk_51_to_100_Critical
Risk_Critical
New...
Copy...
Edit...
Delete

There are also four Quick Look relationship filters available in the *AF QL Leads & Lags* view.



Types of Quick Look Filters

Most Quick Look tests are either percent score or zero exceptions tests.

Percent Score Filters

Percent score tests use two related filters for each test. The first filter detects the number of activities for the stated condition and counts the activities for the numerator. The second filter uses the same parameters without the stated condition to determine the task count for the denominator. The mathematical division needs to be completed manually to provide the percentage of activities detected. The analyst compares the result to the stated goal to determine if the condition exceeds the threshold. Exceeding the threshold requires further investigation to understand the condition and to possibly recommend corrective actions to enable schedule improvements.

Zero Exception Filters

For zero exceptions tests, Open Plan Professional uses a single filter to identify the number of activities detected for the related condition. Activities detected in these tests do not require a mathematical operation, just a count of the filtered activities which is displayed in the *Count* column of the *AF QL Assessment* view. Tests for zero exception conditions may require further investigation to understand the condition, but usually result in recommending corrective actions to resolve the detected condition to make schedule improvements.

Note: Filtering is not viable for some tests which will require manually performing the described steps in the table below to determine the results.

Filter Exclusions

Filters may exclude certain types of activities from a test. Exclusions may include activities that have completed, LOE, planning packages, milestones, subprojects, external subprojects, foreign activities, foreign subprojects, and foreign projects. Again, where used for a percent score test, the numerator and denominator contain the same exclusions.

Using Open Plan Professional to Perform an IMS Quick Look Assessment

Most of the IMS deliveries for analysis will be in BK3 format. The PMO analyst will restore the file using Open Plan.

Prior to performing a Quick Look Assessment, ensure Time Analysis has been run on the schedule.

The IMS Quick Look Assessment table explains how to perform each test by GASP tenet using Open Plan.

The first column, *Test Description*, describes the test or check and provides a tip regarding the intent of performing the related test.

The second column, *How to Determine*, list the steps necessary to perform each check. This includes the applicable Open Plan Quick Look filter to use with a description or describes the manual method if a filter is not viable for a check. Threshold goals are also stated in this column for each applicable test, such as "5% or less". Unless otherwise stated, the *AF QL Assessment* view should be used.

In the descriptions, some Open Plan fields are referenced in general terms. For example, External Subproject, Foreign Activity, Foreign Subproject and Foreign Project are not listed individually but included in the Non-External and Non-Foreign references.

The third column, *Why It Matters / Corrective Action*, provides insight into related unsatisfactory conditions and suggestions to make schedule improvements.

Tenet 1: Complete

Please refer to the basic, non-tool specific IMS Quick Look section for definitions of activity types such as detailed, discrete, LOE, planning packages, and milestones.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 1 **Baseline Durations > 2 Months** Determine % of incomplete activities with baseline durations greater than 44 working days (2 months). Tip: Shorter baseline durations reflect original planning scope granularity for efficient execution & precise performance measurement. Note: The *AF Baseline Duration* field calculates the number of working days between the baseline start & baseline finish dates.	1. Apply QL filter: QL_01A_BL_Dur_GT_2mo_ Numerator 2. Observe & record count 3. Apply QL filter: QL_01B_BL_Dur_GT_2mo_ Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-subproject, non-milestone, non-external, non-foreign activities that have baseline durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-subproject, non-milestone, non-external, non-foreign activities.	Why It Matters: Shorter activities (2 months or less in duration) provide more visibility into how the activities were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify activities with baseline durations longer than 44 working days or split into activities less than 44 days.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 2 **Forecast Durations > 2 Months** Determine % of incomplete activities with durations greater than 44 working days (2 months). Tip: Shorter activity durations are easier to status & provide scope granularity for precise performance measurement.	1. Apply QL filter: QL_02A_Fcst_Dur_GT_2mo_ Numerator 2. Observe & record count 3. Apply QL filter: QL_02B_Fcst_Dur_GT_2mo_ Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-subproject, non-milestone, non-external, non-foreign activities that have durations greater than 44 working days to (D) number of incomplete, non-LOE, non-subproject, non-milestone, non-external, non-foreign activities.	Why It Matters: Shorter activities (2 months or less in duration) provide more visibility into how the activities were planned & allow a more objective evaluation of progress. Corrective Action: Review & verify activities with forecast durations longer than 44 working days or split into activities less than 44 days. Note that near term activities may be prohibited from being split due to baseline change freeze periods.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 3 **Forecast Durations > 2 Months in 3 Month Look Ahead** Determine % of incomplete activities with durations greater than 44 working days (2 months) that are within next 3 months. Tip: Activities clearly defined & well planned with easier to status shorter durations provide granularity for precise performance measurement.	1. Apply QL filter: QL_03A_Fcst_Dur_GT_2mo_ within_3mo_Numerator 2. Observe & record count 3. Apply QL filter: QL_03B_Fcst_Dur_GT_2mo_ within_3mo _Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-planning package, non-subproject, non-milestone, non-external, non-foreign activities within 3 months of Timenow that have durations greater than 44 working days to (D) number of incomplete, non-LOE, non-planning package, non-subproject, non-milestone, non-external, non-foreign activities within the same period.	Why It Matters: 3 month look ahead period scope must be well understood & planned to execute efficiently. Corrective Action: Review & verify activities with forecast durations longer than 44 working days or split into shorter activities. Apply this approach to advanced look ahead periods to affect changes.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 4 **Estimated Durations** Determine number of incomplete activities with estimated durations. Tip: Indicates incomplete planning (durations have not been addressed).	1. Apply QL filter: QL_04_Est_Dur 2. Observe & record count Goal: zero exceptions. Detects: number of incomplete activities that have estimated durations.	Why It Matters: A zero day duration may indicate there has not been any duration input for a non-milestone activity. This suggests the planning has not yet been completed. Corrective Action: Replace estimated durations for all non-milestone activities with durations from the CAM.
Tests 5 (& 6) **Missing Baseline Dates** Determine all activities without baseline dates. Tip: Cannot determine if activities are early or late during execution without proper baseline. Note: Missing Baseline Durations (Test 6) do not need to be checked when using Open Plan since this is not a field that Open Plan provides (only provided via the BK3 for AF use).	1. Apply QL filter: QL_05_No_BL_Dates 2. Observe & record count Goal: All activities have baseline dates. Detects: Number of activities that do not have established baseline start or baseline finish dates.	Why It Matters: Missing baseline information may indicate a lapse in proper schedule management processes & exhibit lack of performance measure capabilities. Corrective Action: Populate & maintain proper baseline dates (baseline the schedule).

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 7 **Cross Reference Fields** Comprehensive data field referencing in IMS. Tip: Demonstrates source information tracks to each other, is represented in the IMS, & enables better program management.	1. Remove all filters 2. Determine related fields in the IMS for each artifact & add to view: Required: CAMs, CAs, IMP, WBS, SOW, EVT, Work Package, Planning Package Recommended: OBS/IPT 3. Verify all documents cross-referenced to the IMS are represented with their own fields in the IMS & are appropriately populated 4. Determine related fields in the IMS for each artifact & search for completeness Analyst uses judgment to determine if IMS is adequately cross-referenced. Goal: All required fields complete.	Why It Matters: Data cross reference fields exist & are populated to demonstrate source data alignment & provides a verifiable basis for IMS planning. Corrective Action: Populate & maintain proper artifact data fields in the IMS.

1. Complete - Schedules reflect comprehensive planning and are effective for execution. Level of Effort may be excluded from the IMS.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 8 **Duplicate / Blank Names** Search for blank or duplicate activity names in the entire IMS. Tip: Unique & descriptive activity descriptions define the scope content & deliverable, aide user comprehension, & facilitate determining progress during status.	1. Remove all filters 2. Sort the IMS by activity description 3. Observe obvious activity description duplicates 4. Through several iterations, search activity descriptions containing common words to discern repetitive phrases that do not exhibit uniqueness, such as several activities that merely state "Perform Test", not differentiating specific tests Goal: All descriptions unique & not blank.	Why It Matters: IMS task nomenclature is best understood when organized, unique, meaningful, & not reliant on subproject or grouping titles to supplement their comprehension. Corrective Action: Use present tense action verbs, as described in the IMP, if applicable, for each non-subproject activity where possible, when revising activity descriptions. Words such as analyze, design, draft, determine, produce, conduct, review & approve provide insight into unique expressive activity descriptions & aid understanding each activity deliverable.

GASP Complete Evaluation

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 9 **Missing Logic** Determine number of incomplete activities without logic (predecessors or successors). Tip: Logic is fundamental for establishing an achievable schedule & imperative for its predictive capability. Missing logic calls into question schedule soundness & critical path validity.	1. Apply QL filter: QL_09_No_Logic 2. Observe & record count Goal: Zero exceptions. Detects: Number of incomplete, non-LOE, non-external, non-subproject activities that do not have at least one predecessor or one successor.	Why It Matters: External feed-in milestones w/o predecessor or feed-out milestones w/o successor may be appropriate, but all other activities need proper logic found within the IMS. Corrective Action: Determine appropriate predecessors & / or successors for activities missing logic
Test 10 **Subproject Logic (& Target Dates)** Identify subproject activities with applied logic or constraints. Tip: Applying logic or constraints to subproject activities potentially obscures impacts to detailed activities & hinders schedule analysis.	1. Apply QL filter: QL_10_Subproject_Logic 2. Observe & record count Goal: Zero exceptions. Detects: Number of all subproject activities that have predecessors or successors or target dates applied.	Why It Matters: Logic or target dates applied to subproject activities may have unintended consequences to subordinate detail activities that may be difficult to discover when reviewing / analyzing schedule information. Corrective Action: Remove logic & target dates from subproject activities & apply logic & appropriate target dates to detailed activities.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 11 **Finish-to-Start (FS) Relationships** Determine % of incomplete activities using FS relationships (preferred). Tip: FS relationships avoid scheduling activities in parallel & ensure the least opportunity for creating resource conflicts.	1. Apply QL filter: QL_11A_FS_Rel_Numerator 2. Observe & record count 3. Apply QL filter: QL_11B_FS_Rel_Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 90% or greater. Compares: (N) number of incomplete, non-LOE, non-subproject activities that have finish-to-start predecessor relationships to (D) number of incomplete, non-LOE, non-subproject activities.	Why It Matters: Promoting parallel activities risks scheduling more work than can be executed & potentially understates projecting accurate program finish. Corrective Action: Verify the use of any non-FS relationships & change to FS if appropriate.
Test 12 **Start-to-Start (SS) or Start-to-Finish (SF) Successor w/o also Finish-to-Start (FS) or Finish-to-Finish (FF)** Determine number of incomplete activities using only SS or SF successor relationships. Tip: SS relationships may be valid, but not having at least one additional FS successor relationship prohibits establishing finish consequences, resulting in meaningless total float values.	1. Apply QL filter: QL_12_SS_or_SF_Succ_no_F_Succ 2. Observe & record count Goal: Zero exceptions. Detects: Number of incomplete, non-LOE activities that have a SS or SF successor, but also do not have at least one FS or FF successor relationship to another activity. Note: Condition, potentially equivalent of missing a successor.	Why It Matters: Relying only on SS or SF successor relationships does not model a finish consequence to the activity. Once in-progress, it loses its impact to other activities, does not retain priority to finishing & can reflect meaningless total float value to program end. Corrective Action: Determine & apply additional, appropriate FS or FF successor relationships.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 13 **Total Float > 3 Months** Determine % of activities with total float >60 working days. Tip: Indicates an activity may slip greater than 3 months without impacting program completion. Suggests an activity is starting too early (missing an identified predecessor) or is not reflecting potential impacts to critical path (missing an identified successor). Possibility that some scope has not been identified (activities not present in the IMS).	1. Apply QL filter: QL_13A_TF_GT_3mo_Numerator 2. Observe & record count 3. Apply QL filter: QL_13B_TF_GT_3mo_Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-subproject activities that have total float greater than 60 working days to (D) number of incomplete, non-LOE, non-subproject activities.	Why It Matters: Excessive total float is an indication the activity is not properly sequenced, either starting too early or is missing a potential successor that could impact critical path determination. Usually, identifying the end activity in a path for missing successors is effective in addressing high total float for all activities in the path. Corrective Action: Determine appropriate predecessors & / or successors for activities with excessive total float. Tip: Sort the detected activities in descending total float order to focus corrective actions on activities with largest total float values (use AF Float Sort view).

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 14 **Not Earlier Than or On Target Beyond 3 Month Look Ahead** Determine % of Not Earlier Than or On Target start or finish dates on activities > 3 month look ahead. Tip: Anticipate using fewer Not Earlier Than & On Target dates in periods further out, due to uncertainty & related rationale, relying more on logic alone to schedule a project.	1. Apply QL filter: QL_14A_Not_Earlier_Than_or_ On_Target_beyond _3mo_Numerator 2. Observe & record count 3. Apply QL filter: QL_14B_Not_Earlier_Than_or_ On_Target_beyond _3mo _Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-subproject, non-external activities beyond 3 months from Timenow that have Not Earlier Than or On Target start or finish dates to (D) number of incomplete, non-LOE, non-subproject, non-external activities beyond 3 months from Timenow.	Why It Matters: Generally, assumptions are less accurate in further look ahead periods, especially when attempting to model resource availability with Not Earlier Than & On Target dates. Corrective Action: Review the Not Earlier Than and On Target dates & replace with logic relationships where practical.

2. Traceable - Schedules have full network logic that reflects potential impacts to program completion. Schedules have populated code fields relating to required field mapping.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 15 **Not Earlier Than or On Target within 3 Month Look Ahead** Determine % of Not Earlier Than or On Target start or finish dates on activities < =3 month look ahead. Tip: Anticipate using more Not Earlier Than & On Target dates in immediate period, due to certainty, to refine dates, where logic alone may not adequately model the project.	1. Apply QL filter: QL_15A_Not_Earlier_Than_or_ On_Target_within_3mo_Numerator 2. Observe & record count 3. Apply QL filter: QL_15B_ Not_Earlier_Than_or_ On_Target _within_3mo _Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 10% or less. Compares: (N) number of incomplete, non-LOE, non-subproject, non-external activities within 3 months from Timenow that have Not Earlier Than or On Target start or finish dates to (D) number of incomplete, non-LOE, non-subproject, non-external activities within 3 months from Timenow.	Why It Matters: Generally, conditions are well known in very near term periods & predecessors alone may not sufficiently model resource availability for task execution. Use Not Earlier Than & On Target dates appropriately, but not in place of logic. Corrective Action: Validate the Not Earlier Than & On Target dates & replace with logic relationships where practical.

GASP Traceable Evaluation

Tenet 3: Transparent

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 16 **Activities with Leads** Determine number of relationships with an incomplete predecessor with leads > one day (imposed logic accelerations to successors).	1. Open view: AF QL Leads & Lags 2. Apply QL filter: QL_16_Leads_GT_1d 3. Observe & record count Note: Leads may be defined as negative lag Goal: Zero exceptions. Detects: Number of relationships with an incomplete, non-LOE, non-subproject predecessor that have leads (greater than one day).	Why It Matters: Leads can distort total float & mask potential impacts to successor path activities. Promote decomposing activities & durations to facilitate FS relationships without leads. Corrective Action: Eliminate leads to allow schedule logic to drive dates.
Test 17 **Activities with Lags** Determine % incomplete relationships with lags (imposed logic delays to successors). Tip: Difficult to understand & manage "time gap" created using lags.	1. Open view: AF QL Leads & Lags (if not already open) 2. Apply QL filter: QL_17A_Lags_Numerator 3. Observe & record count 4. Apply QL filter: QL_17B_Lags_Denominator 5. Observe & record count 6. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-subproject relationships that have predecessors or successors with lag to (D) number of incomplete, non-LOE, non-subproject relationships.	Why It Matters: Lags interject vagueness related to a "time gap" represented by the lag & are difficult to understand & manage. Lags should only model "wait time", not replace work effort or be used to anticipate successor start dates. Corrective Action: Minimize lags to allow schedule logic to drive dates. Appropriate target dates, rather than lags, should be used to model resource availability.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 18 **Target Dates w/o Rationale** Determine % of incomplete activities that have target dates without comments (rationale) in Notes field. Note: Recognize that the schedule authors may utilize another user defined field or document to explain target date use (such as in the IMS Supplemental Guidance documentation). May need to adjust test results accordingly. The calculated field created for Notes only detects notes in the Default category. If a project has additional note categories, these need to be added to the calculated field expression. Tip: Rationale aids understanding of applied constraints.	1. Apply QL filter: QL_18A_Target_Dates_No_Notes _Numerator 2. Observe & record count 3. Apply QL filter: QL_18B_Target_Dates_No_Notes _Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-subproject activities that have target dates & do not have Note entries to (D) number of incomplete, non-LOE, non-subproject activities that have target dates.	Why It Matters: Documented explanations are required to understand target date use, including validity & underlying intent. Aids in decision making & schedule maintenance. Corrective Action: Add explanations for target dates to the Notes field.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 19 **Lead/Lag w/o Rationale** Determine % of incomplete activities that have leads or lags without comments (rationale) in Notes field. Note: The calculated field created for Notes only detects notes in the Default category. If a project has additional note categories, these need to be added to the calculated field expression. Tip: Rationale aids understanding of applied delays or accelerations.	1. Apply QL filter: QL_19A_Leads_Lags_No_Notes _Numerator 2. Observe & record count 3. Apply QL filter: QL_19B_Leads_Lags_No_Notes _Denominator 4. Observe & record count 5. Divide the numerator (N) count by the denominator (D) count Goal: 5% or less. Compares: (N) number of incomplete, non-LOE, non-subproject activities that have predecessor leads or lags & do not have Notes entries to (D) number of incomplete, non-LOE, non-subproject activities that have predecessor leads or lags.	Why It Matters: Rationale is required to understand lead / lag use, including validity & underlying intent. Aids in decision making & schedule maintenance. Corrective Action: Add explanations for leads / lags to the Notes field. Also see Leads (Test 16) above for alternative techniques.
Test 20 **Hard Target Dates** Determine number of incomplete activities utilizing Fixed target dates, prohibiting free flow of logic-driven IMS. Tip: Prevent dates from reflecting driving predecessor impacts. Includes: Start & Finish Fixed Target Dates.	1. Apply QL filter: QL_20_Hard_Targets 2. Observe & record count Goal: Zero exceptions. Detects: Number of incomplete, non-LOE activities that have start or finish Fixed target dates applied.	Why It Matters: Hard target dates impact calculation of the critical path & total float values. Corrective Action: Eliminate Fixed target dates from IMS & use target types that enable forecast impacts, while providing accurate total float values.

3. Transparent - Schedules are constructed, used, maintained, and analyzed consistently with the IMS Supplemental Guidance (or equivalent documentation), rely on status and network logic as the primary forecast technique, identify risks and opportunities, and reflect rationale for constraints and lags.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 21 **Excessive Lags** Determine number of relationships with an incomplete predecessor with excessive lags (delay values greater than one month). Tip: Excessive lag values potentially extend beyond one status period, complicating analysis of dates.	1. Open view: AF QL Leads & Lags 2. Apply QL filter: QL_21_Excessive_Lags 3. Observe & record count Goal: Zero exceptions. Detects: Number of relationships with an incomplete, non-LOE, non-subproject predecessor that have lag values greater than 20 working days.	Why It Matters: Excessive lag, or "wait time", complicates schedule management & visibility. Corrective Action: Replace excessive lags with documented / maintained Not Earlier Than target dates

GASP Transparent Evaluation

Tenet 4: Statused

4. Statused - Schedules reflect valid actual and forecast dates, and activities maintain previously established logical relationships.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 22 **Invalid Forecast Dates**	This test is not required when using Open Plan because activities are statused to Timenow when using Time Analysis.	
Test 23 **Invalid Actual Dates** Determine number of activities with actual start or actual finish dates in future. Tip: Activities reflecting achievement in the future do not have accurate status, which causes inaccurate projections & diminishes schedule reliability.	1. Apply QL filter: QL_23_Invalid_Actual_Dates 2. Observe & record count Goal: Zero exceptions Detects: Number of non-subproject activities that have actual start or actual finish dates later than Timenow.	Why It Matters: Timenow defines separation between past & future. It is not possible to accomplish effort in the future, beyond Timenow (status date). Corrective Action: Correct the actual start or finish dates of activities listed in the future. Not reflecting proper status jeopardizes performance measurement & successor path activity projections.
Test 24 **Out-of-Sequence (OOS) Status Conditions** Determine number of activities that contain status conditions violating their logic relationships. Tip: Any activities with out-of-sequence status condition render IMS projecting capabilities unreliable.	1. Run *Time Analysis* from the *Project* menu 2. Apply QL filter: QL_24_OOS 3. Observe & record count of OOS activities Goal: Zero exceptions. Example of OOS condition: an incomplete FS predecessor to an in-progress successor- that has an actual start even though its predecessor does not have an actual finish, causing it to not honor the relationship.	Why It Matters: Out-of-sequence status conditions override logic & potentially return overly optimistic successor path projections & meaningless total float values. Corrective Action: Resolve out-of-sequence status issues by either changing logic (if appropriate) or correcting the actual start or finish dates.

GASP Statused Evaluation

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 25 **Push Forward Test** Assess logic network integrity to program completion. Tip: Delaying an incomplete activity with least total float reflects a proportionate delay to program completion, demonstrating logic path to milestone.	1. Determine & record the program completion milestone's early finish date 2. Select the program completion milestone 3. Select *Trace Critical Path* from the *Add- Ins* menu 4. Select one activity with least amount of total float that was identified as being on the critical path (coded as *01* in the *Trace Critical Path* field) 5. Add 600 working days to the activity's existing duration 6. Run *Time Analysis* from the *Project* menu 7. Verify the program completion milestone Early Finish date reflects a proportionate delay Failed test when milestone does not reflect anticipated delay 8. Repeat this test on other current period activities to ensure consistency Note: If activity with least total float has positive 25 working days total float, may only expect a 575 working day delaying impact to milestone.	Why It Matters: Adding 600 working days is more than two years duration, introducing dramatic impact to program completion. Failing the test indicates either broken logic exists or hard target dates prevent delays to successor path activities. Corrective Action: Address missing logic & applied hard target date issues.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 26 **Program Completion Trace Test** Determines % of non-LOE, incomplete activities logically tied to program completion. Tip: Feed-out activities detected during this test should have documented rationale. Note any hard target dates assigned.	1. Ensure the *LOGICT* view has been copied from the Open Plan Library to the IMS project to enable trace logic functionality to run properly 2. Select the program completion milestone 3. Select *Trace Logic* from the *Add-Ins* menu, using User Numeric Field 1 4. Show the *AF QL Assessment* view 5. Apply QL filter: QL_26A_Program_Completion_Trace _Test _Numerator 6. Observe & record count 7. Apply QL filter: QL_26B_Program_Completion_Trace _Test_Denominator 8. Observe & record count 9. Divide the numerator (N) count by the denominator (D) count Goal: 95% & greater. See Test 27, *No LOE in Path to Program Completion*, with respect to detected LOE. Note: Review activities not detected in the path by selecting those for which *Trace Logic* equals *0.00* before continuing with other tests. Activities not logically tied to the program completion milestone are identified with *0.00*. The program completion milestone selected for the trace is identified with *3.00*.	Why It Matters: Although a percentage is calculated for test, it is more meaningful to review suspect activities. Even a relatively few significant activities without a successor path to program completion is reason for concern. Ideally all incomplete, non-LOE, non-subprojects, non-foreign subprojects, & non-foreign projects are logically tied to completion milestone. Corrective Action: Investigate activities not detected by the test & address missing successor path logic to milestone. Essential activities not logically tied to program completion render the IMS as not predictive & invalidate critical path.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 27 **No LOE in Path to Program Completion** Use the Program *Completion Trace Test* set-up for this check. Tip: Identify LOE activities detected as having logical successor paths to program completion.	If Test 26 was previously performed, skip to step 5 because steps 1-4 have already been completed. 1. Ensure the *LOGICT* view has been copied from the Open Plan Library to the IMS project to enable trace logic functionality to run properly 2. Select the program completion milestone 3. Select *Trace Logic* from the *Add-Ins* menu, using User Numeric Field 1 4. Show the *AF QL Assessment* view 5. Apply QL filter: QL_27_LOE_to_Program_Completion 6. Review the LOE activities detected & investigate to confirm they are logically tied to discrete activities & milestones Goal: No LOE tied to discrete effort.	Why It Matters: By definition, LOE does not reflect schedule slips & may mask an accurate critical path determination. LOE should not be logically tied to discrete work & should not be part of the critical path. Corrective Action: Investigate & remove LOE logic to discrete activities & program completion to ensure LOE will not become part of the critical path. Recommend using a LOE completion milestone to terminate LOE logic if necessary.
Test 28 **Appropriate Target Dates Applied to Endpoint Milestones** Verify related milestones have appropriate target types that provide meaningful schedule measures. Tip: Missing targets diminish program management prioritization. Avoid using hard target types that override predictive nature of logic network.	Identify & review the endpoint milestones to ensure appropriate, documented targets provide meaningful total float values & permit driving predecessors to establish forecast dates. Note: method & rationale for establishing need dates (late dates) should align with IMS Supplemental Guidance documentation.	Why It Matters: Need dates reflect management's target to measure progress against. Targets can enable accurate total float calculation & permit precedence logic impacts to the IMS. Corrective Action: Validate appropriate targets used on endpoint milestones. Consider using documented Not Later Than or On Target dates.

5. Predictive - Schedules provide logic-driven forecast information, meaningful critical paths, and reflect achievable program completion dates.		
Test Description	**How to Determine**	**Why It Matters / Corrective Action**
Test 29 **Critical Path Length Index (CPLI)** Project performance indication of the ability to finish on time.	1. Open view: AF QL CPLI 2. Determine working days duration from Timenow to program completion early finish date in IMS, **A** (critical path length) • Add a dummy activity and apply a SNET=Status Date • Adjust the duration of the dummy activity to match the early finish of the last linked activity 3. Add number of total float, **B** (least positive or negative value) to **A** & total 4. Divide total (**A** + **B**) by **A** (critical path length, as determined above) **(A + B) / A** Goal: Should not be less than 0.95 with target of 1.00 (>1.00 is favorable <1.00 is unfavorable).	Why It Matters: Although geared towards performance, this test reflects IMS realism of completing on time & is meaningful when satisfactorily passing all previous GASP tests.

GASP Predictive Evaluation

Part 3 – Integrated Master Schedule (IMS) Comprehensive Assessment

IMS Comprehensive Assessment

This part of the IMS Assessment Process document provides the scope, steps, and procedures for performing an IMS Comprehensive Assessment.

Scope of the IMS Comprehensive Assessment

The IMS Comprehensive Assessment is the most detailed review of the IMS. The IMS Quick Look Assessment determines the mechanical soundness of an IMS. Further tests are required in the IMS Comprehensive Assessment to determine if all aspects of the Generally Accepted Scheduling Principles (GASP) tenets are achieved. The IMS Comprehensive Assessment considers many program artifacts to create a more extensive analysis. The table below highlights the differences between the Quick Look and the IMS Comprehensive Assessment.

Attribute	Quick Look	Comprehensive
Objective	Determine schedule health	Determine root cause(s) for significant schedule health discrepancies; identify preclusive action(s)
Scope	First Five GASP tenets (mechanical checks of Complete, Traceable, Transparent, Statused, and Predictive)	All eight GASP tenets (adds Resourced, Usable, and Controlled tenets)
Data Analyzed	Single deliverable IMS, Basis and Assumptions, IMS Supplemental Guidance Document, IMS Field Mapping / Data Dictionary (if separate document)	Extensive data call addressing most artifacts that interface with the IMS; may address multiple IMS deliveries for trends
Expertise Required	Scheduler or Schedule Analyst	Senior or Master Scheduler
Time Required	One or two days	One or more weeks depending upon tests selected
Tailoring	All 29 tests should be performed to adequately assess schedule health	Only those test needed to address the reasons for the assessment need to be performed.
Tools Required / Suggested	Run!23 for MSP and BK3 file for OPP views and filters and the reporting template provided with AF Process document.	Third party schedule analysis tools for added efficiency in performing IMS Comprehensive Assessment

The IMS Comprehensive Assessment covers areas not addressed by the Quick Look, particularly the last three GASP tenets. The IMS Comprehensive Assessment also explores additional aspects of the first five GASP tenets, reaching beyond simple observations to determine the root cause and preclusive actions appropriate to prevent like errors, or to recommend / enforce improvements in future schedules.

In addition to more detailed schedule health assessment tests, the IMS Comprehensive Assessment investigates project schedule performance issues. A number of tests and specific measurements within those tests seek to focus on areas and causes of poor project performance. The Quick Look is predominately a schedule health assessment of a single deliverable IMS. The IMS Comprehensive Assessment may examine multiple submissions of an IMS over time to explore performance trends. Performance results may indicate the thoroughness of the IMS planning and the ability of the IMS to be an effective management tool.

Reasons for an IMS Comprehensive Assessment

There are several reasons the Air Force requires an IMS Comprehensive Assessment:

1. The program may be approaching a major decision point and the credibility and effectiveness of the schedule to be used in that decision may need to be verified.
2. The IMS has not been useful in predicting future performance, rather only recording slips and delays as they occur. Thus, the IMS's use as a predictive tool needs to be evaluated.
3. A Schedule Risk Assessment (SRA) is pending and there is a need to ensure the IMS is ready and demonstrates "fitness" for the simulation and the ability to project completion dates and their probabilities.
4. Significant discrepancies were discovered during a Quick Look and the program leadership needs to identify root cause(s) and preclusive action(s) through a more detailed and focused analysis.
5. The program leadership desires to complete an assessment of the IMS against the eight GASP tenets to gain assurance of its alignment with program artifacts, its predictive capabilities, and maturity for use as a decision making tool.
6. There is a need to evaluate project schedule performance and schedule performance trends.
7. Program leadership has surfaced areas of concern regarding the program schedule and needs to determine if corrective actions are necessary.
8. There is a need to evaluate subcontractor schedule integration.
9. Program leadership wants to understand potential schedule risks and opportunities not previously identified.

Expertise Required for the IMS Comprehensive Assessment

The IMS Comprehensive Assessment should be performed by experienced schedulers or senior schedule analysts. The process for IMS Comprehensive Assessments has been written with the assumption that scheduling subject matter experts (SMEs) are leading the effort. The IMS Comprehensive Assessment will likely require participation on the part of the contractor to include program SMEs.

A number of the tests in the IMS Comprehensive Assessment require detailed knowledge of the applicable scheduling software and the use of third party schedule analysis tools (such as Steelray Project Analyzer or Acumen Fuse). Attempting many of the tests without these tools can be very labor intensive. Later discussion explains tailoring of the IMS Comprehensive Assessment.

Tailoring Tests / Activities in the IMS Comprehensive Assessment

There are a multitude of tests and investigative activities that can be performed in an IMS Comprehensive Assessment. The tests and activities selected depend upon the results of the Quick Look and the reason for conducting the Comprehensive Assessment. Having selected the applicable tests, the scheduler also validates the criteria to apply for each test. The scheduler documents the tests selected and the rationale for each criterion for inclusion in the assessment report.

The first five GASP tenets are examined in the Quick Look. If only minor discrepancies were discovered during the Quick Look in a particular GASP tenet, the scheduler may elect to not pursue any additional tests in that GASP tenet. The IMS Comprehensive Assessment Test / Activity List is organized by GASP tenet to facilitate such tailoring.

The PMO and scheduler discuss the next steps where the Quick Look results did not meet the expected standard or guideline. As an example, if the percent of tasks without logic is twice the standard / guideline, the scheduler may elect to review: (1) the corrections performed after the Quick Look to verify they were appropriate, (2) any remaining tasks without logic to determine if potential critical tasks are missing from the program critical path, and (3) assure other tasks have appropriate logic. The scheduler may elect to document the test plan in a spreadsheet and include the following information:

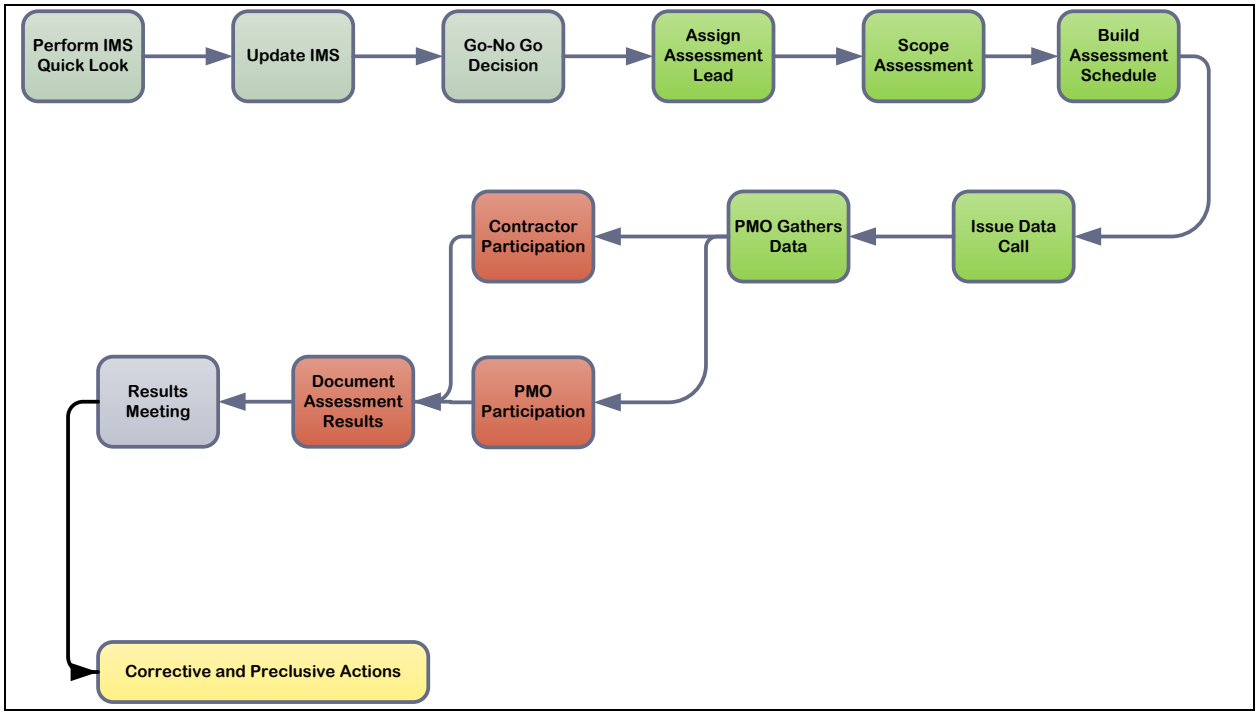
- Test Selected
- Performance Expected
- Test Results
- Recommendation for further investigation or recommended corrective actions

The scheduler performs all the selected tests. As results are feeding back from the tests, the scheduler may elect to include additional tests where doing so would help identify root causes.

After the tests are complete, the scheduler begins to analyze the results. For each deficient result, its impact on the ability to execute the program is determined and included in the assessment report.

Steps in the IMS Comprehensive Assessment

The chart below shows the key steps in the IMS Comprehensive Assessment, with detail for each step following the chart.



IMS Comprehensive Assessment Steps

The following are the key IMS Comprehensive Assessment steps, beginning with the Quick Look:

Perform IMS Quick Look

If the Quick Look Assessment was not performed earlier and the PMO is moving directly into a Comprehensive Assessment, a Quick Look will need to be performed. The results of the Quick Look Assessment are provided to the contractor so that the IMS may be improved. It is imperative that the PMO communicate contractor commitment and progress toward IMS improvements with the scheduler performing the IMS Comprehensive Assessment to help determine test and criterion decisions.

Update the IMS

After the contractor improves the IMS based on the Quick Look results, the PMO provides the IMS to the scheduler responsible for the assessment.

Go-No Go Decision

Upon satisfactorily concluding the IMS Quick Look Assessment, the Go-No Go decision for the Comprehensive Assessment is made. If the Quick Look revealed significant issues with the IMS and those issues have not been corrected, the driving reason for proceeding with a Comprehensive Assessment may be to discover root causes or complete the remaining GASP tenet checks. If the IMS is still in an unacceptable condition, the PMO may elect to delay the Comprehensive Assessment.

If the IMS has been adequately corrected, the Comprehensive Assessment can begin.

Assign Assessment Lead

Typically the scheduler is assigned as the IMS Comprehensive Assessment Lead and manages data requirements/delivery and PMO SME participation, as required.

Scope Assessment

Identify specific tests and checks to perform for the IMS Comprehensive Assessment. Include the previous documents needed for trend analysis.

Build Assessment Schedule

PMO and scheduler decide on a plan and timeline for the IMS Comprehensive Assessment and consider resource availability.

Issue Data Call

The PMO sends correspondence to the contractor, including the data call, explaining the nature of the assessment and setting expectations. The data call items will be tailored to the agreed upon scope of the Comprehensive Assessment. The PMO requests specific, non-CDRL data from the contractor based on the data call list. Previous reporting period data may be required to facilitate trends analysis. The data call items may include, but are not limited to:

- WBS and WBS Dictionary
- Integrated Master Plan
- Integrated Master Schedule (CDRL deliverable)
- IMS file used to perform SRA
- Dollarized Responsibility Assignment Matrix (RAM)
- Subcontract Management Plan
- Subcontractor schedules (if applicable)
- Control Account Plan (CAP)
- Master Phasing Schedule / Milestone Chart / Top Tier Program Schedule
- IMS Supplemental Guidance (or IMS Basis and Assumptions (B&A), Data Dictionary / IMS Field Mapping
- Program Monthly Calendar; or “Business Rhythm” (if separate document)
- Desktop procedures, if not included in the IMS supplemental guidance
- Staffing Profile (including previous periods as identified)
- Quantifiable Backup Data (QBD) for Percent Complete EVT work packages
- Resource Histogram (including previous periods as identified)
- Latest Estimate at Completion (EAC) / Latest Revised Estimate (LRE)
- Latest Monthly IMS Analysis Narrative
- Applicable Variance Analysis Reports (Format 5)
- Latest Schedule Health Assessment Results
- Program Budget Logs
- Baseline Change Logs
- Contractor Performance Reports
- Statement of Work (SOW), Statement of Objectives (SOO), Performance Work Statement (PWS)
- System Engineering Management Plan (SEMP)
- Basis of Estimate (BOE)

- Work Authorization Documents (WAD)
- GFE / GFI Lists
- Risk and Opportunities Management Plan (ROMP)
- Risk Register
- EVM System Description (EVMSD)
- Additional program specific data artifacts as identified by the scheduler

Note: Items that are contract deliverables (CDRL Items) need not be included on data call requests.

PMO Gathers Data

The scheduler gathers PMO information including System Metric and Reporting Tool (SMART) data.

Contractor / PMO Participation

Contractor provides data requested in the data call to the PMO. Depending upon the roles and responsibilities agreed to when the Comprehensive Assessment plan was completed, a number of coordination meetings between the contractor and PMO may be appropriate. Establish the required amount and frequency of telephone or video conference calls between the contractor and PMO based on the assessment scope and schedule. Depending upon discoveries during the IMS Comprehensive Assessment, additional data may need to be requested from the contractor. These meetings will review status and track new and existing action items. The government scheduler leads these meetings.

Document Assessment Results

Develop the report that includes the assessment results and recommended actions for any issues. Provide this to the Government PMO.

Results Meeting

A Results Meeting is conducted with the PMO and the contractor to present the outcome of the IMS Comprehensive Assessment.

Corrective and Preclusive Actions

Based on the results of the assessment, the PMO and contractor will agree on a corrective action plan.

IMS Comprehensive Assessment Test / Activity List

The information on the following pages shows the possible activities in a Comprehensive Assessment. Tests that were performed in the predecessor Quick Look are cross referenced.

Complete Tenet Comprehensive Assessment Activities

Baseline Durations Greater than 2 Months

Quick Look Assessment Cross Reference: Test 1

Rationale: Smaller task durations provide granularity for precise performance measurement.

Activity: Review justifications for baseline durations over 44 working days. Check forecast durations as a reflection of project performance. Difference between the number of tasks with over 44 forecast working days and the number of tasks with over 44 baseline working days could

be an indicator of project schedule performance issues. Find similar tasks (by portion of task name) and compare baseline / forecast duration deltas. For MSP schedules check that baseline duration is the calculated difference between baseline finish and baseline start.

> **Tip:** Justification or explanation may be in task notes or in justification code fields. Check the IMS Basis and Assumptions (B&A) or IMS Supplemental Guidance documents for identified justification codes.

Forecast Durations Greater than 2 Months

Quick Look Assessment Cross Reference: Test 2

Rationale: Smaller task durations provide granularity for precise performance measurement.

Activity: Review justifications for forecast durations over 44 working days. Check forecast durations as a reflection of project performance. The difference between the number of tasks with over 44 forecast working days and the number of tasks with over 44 baseline working days could be an indicator of project schedule performance issues. Compare baseline duration to forecast duration. If forecast durations break threshold but baseline does not, schedule performance issues may be indicated and corrective action may be necessary to respond to schedule variance.

> **Tip:** Justification or explanation may be in task notes or in justification code fields. Check the IMS B&A or IMS Supplemental Guidance documents for identified justification codes.

Forecast Durations Greater than 2 months in a 3 month look ahead

Quick Look Assessment Cross Reference: Test 3

Rationale: Near-term shorter duration tasks reflect clarity and provide granularity for precise performance measurement.

Activity: Review justifications for forecast durations over 44 working days. Examine justification codes if used to rationalize durations. If duration analysis shows more near-term deltas compared to future term, this may indicate lack of attention for reflecting accurate task information. Compare baseline duration to forecast duration. If forecast durations break threshold but baseline does not, schedule performance issues may be indicated and corrective action may be necessary to respond to schedule variance.

> **Tip:** Justification or explanation may be in task notes or in justification code fields. Check the IMS B&A or IMS Supplemental Guidance documents for identified justification codes.

Estimated Durations

Quick Look Assessment Cross Reference: Test 4

Rationale: Tasks with estimated durations may indicate incomplete planning.

Activity: Review tasks with estimated durations. Determine reason for estimated durations and plans to update estimates.

> **Tip:** Estimated durations may occur because one day is the MSP default duration and schedulers may not reenter the duration to remove the estimated duration. A scheduler may turn off the question mark in the duration field that flags estimated durations. In Open Plan Professional, estimated task durations have durations of zero and are not milestones.

Missing Baseline Dates and Baseline Duration

Quick Look Assessment Cross Reference: Test 5 and 6

Rationale: The IMS must be baselined to measure performance.

Activity: Check that baseline dates and baseline durations agree, as it is possible to manually enter baseline dates in MSP. Baseline durations do not need to be checked when using Open Plan Professional. Perform schedule vertical integration checks to ensure that summary task baseline dates reflect subordinate task baseline dates (See Traceable Confirm Vertical Integration).

> **Tip:** MSP has a function "ProjDateDiff" that may be used to calculate the working day difference between baseline start and finish dates. ProjDateDiff works properly for contiguous tasks. Several third party schedule analysis tools check for vertical schedule integration.

Cross Reference Fields

Quick Look Assessment Cross Reference: Test 7

Rationale: Data cross reference fields should exist and be populated. Data fields required: CAM, IMP, WBS, SOW, EVT/WP/PPkg, and CA. (OBS/IPT also recommended but not required). Cross references ensure all artifacts track to each other and enable better management.

Activity: The Quick Look checked for the presence of the cross reference fields and that they were appropriately populated. This check examines the cross reference fields for correct data. Review the IMS B&A or IMS Supplemental Guidance Documents to determine user defined field use. Check that user defined field entries are complete and valid. Check Baseline Change documents against the IMS to ensure that changes are reflected in cross reference fields. This may also include a check for inappropriately or inconsistently populated fields, such as numbers in the CAM name field or names in the WBS field instead of numbers (See IMP Cross Reference Check below for specific procedures when checking IMP cross references.)

> **Tip:** Sorts and auto filter selections can assist with checks to these other documents. For example, an auto filtered view of the SOW cross reference field may be compared to the table of contents of the SOW to ensure all SOW paragraphs are represented in the IMS.

Duplicate / Blank Names

Quick Look Assessment Cross Reference: Test 8

Rationale: Duplicate or blank task names make schedule progress reporting and analysis difficult. It makes the use of filters and groupings impractical.

Activity: Check that IMS task nomenclature is organized. Action verbs described in the IMP should be used for each task where possible. IMP tasks should be written in past tense. IMS tasks should be written in present tense and are most effective when they begin with a present-tense action verb. Check that task descriptions are written so the exit criteria for task completion are clear. Task names should describe the scope in such a manner that clearly defines the intent, such as "Analyze Flight Survivability Test Data. Check that summary tasks are not needed to understand task meaning.

Tip: For large schedules, a filter for action verbs may be created and used to find exceptions. Be aware that searching on action verbs or words may result in detecting similar words used in different context and should be vetted.

Review IMS Basis and Assumptions and IMS Supplemental Guidance Documents

Quick Look Assessment Cross Reference: N/A

Activity: Check that the IMS B&A or IMS Supplemental Guidance (or similar, but differently named guidance) documents exist. Topics should include data dictionary, tools, tool settings, file architecture, calendar use, baseline process, field mapping, treatment of handoffs and external tasks, supplier schedule integration, health metrics, schedule maintenance, schedule techniques, critical and driving path analysis, and statusing procedures. Review documents for accuracy and completeness. Determine if the IMS complies with these documents. Note: Data dictionary may be separate document.

Tip: The requirement for the IMS B&A exists in DI-MGMT-81650. The requirement for an IMS Supplemental Guidance document may exists in the EVMSD, or contractor schedule guidance processes and procedures.

Check GFE, GFI, and GFP in Contractor IMS

Quick Look Assessment Cross Reference: N/A

Activity: Check for GFE GFI and GFP in the IMS. Compare these to lists in contract and verify GF material is contained in the IMS. Validate delivery dates if included in the contract. Search task / activity name field and related custom fields in the IMS to verify Government furnished items are included.

Tip: Create task description filters to determine if Government Furnished items are in the IMS.

IMS Scope Check

Quick Look Assessment Cross Reference: N/A

Activity: Check for all scope in the IMS. The IMS is required by DI-MGMT- 81650 to represent the entire contract. Compare Performance Work Statement (PWS), SOW, SOO, WBS, and WAD to ensure all scope of work is addressed. Note: LOE activities may not be in the IMS, check the IMS B&A or IMS Supplemental Guidance. Verify that subcontracted effort is included in the IMS.

Tip: Use sorts or auto filters on cross reference fields to compare to other documents such as SOW or CWBS.

Review Earned Value Techniques

Quick Look Assessment Cross Reference: N/A

Activity:

Compare baseline durations to selected EVT. Look at relative percentages of each EVT type. Examine "No EV" work packages to ensure EVTs are correctly applied. Check that EVTs used are consistent with those identified in EVMSD. Ensure planning packages are converted to work packages in appropriate look ahead period, according to EVMSD / Program Instructions (See Transparent Verify Rolling Wave Planning).

Tip: Create a table or view that shows baseline dates or baseline duration and the EVT field. Use group by EVTs to determine relative percent of each type of EVT. Alternate: Group by durations to align with the EVT.

Evaluate Essential Subcontracted or External Work

Quick Look Assessment Cross Reference: N/A

Activity: Check that subcontracted work that is within scope of the contract is integrated yet distinguishable from internal work. Check that key external work is reflected in the IMS as milestones (at a minimum), representative tasks, or entire external schedules.

Tip: Major subcontracted efforts are often included as separate control accounts. External work may be reflected as feed-in milestones. Check the field mapping to determine if specific codes are used to identify subcontracted and external work and check IMS Supplemental Guidance for identified subcontracted / external approach.

IMP Cross Reference

Quick Look Assessment Cross Reference: N/A

Activity: Check for IMP cross references. The IMS may have IMP Events, Accomplishments and Criteria duplicated in the IMS. Other IMS's may have a cross reference field that uses IMP coding structure to reflect Events, Accomplishments, and Criteria. Determine procedure from the IMS B&A or IMS Supplemental Guidance document. Check IMP content or cross references for accuracy and completeness.

Program Milestones

Quick Look Assessment Cross Reference: N/A

Activity: Evaluate if Program Milestones are clearly identified in IMS. Confirm milestones' name, phase, and baseline dates align with contractual information. Check program milestones that have Deadlines / Targets reflecting schedule margin approach as identified in IMS Supplemental Guidance.

> **Tip:** Program milestones appear in a view or table enabling easy identification and are aligned with the appropriate phase and PoP. Coordinate with Traceable Vertical Integration. Clarification may be provided in the IMS B&A or IMS Supplemental Guidance.

Missing Logic

Quick Look Assessment Cross Reference: Test 9

Rationale: Missing logic calls into question schedule soundness and is essential to critical path (CP) validity.

Activity: Review all tasks that have missing logic. Review tasks with missing logic to consider if potential exists for inclusion in CP. Review the paths between major milestones with appropriate Government SMEs. Verify that the sequence of activities reflects the systems engineering and integration approach defined in the Systems Engineering Plan or Systems Engineering Management Plan.

> **Tip:** Filter for tasks with missing logic and then browse the tasks, looking for tasks that need predecessors or successors.

Traceable Tenet Comprehensive Assessment Activities

Summary Logic (& Constraints / Deadlines)

Quick Look Assessment Cross Reference: Test 10.

Rationale: Applying logic or constraints to summary tasks potentially obscures impacts to detailed tasks and may hinder analysis.

Activity: Test for the ratio of summary tasks to effort tasks. A schedule with at least one summary for every 20 tasks will be easier to collapse for display and analysis. Similarly, having too many summary tasks will make the schedule difficult to read and understand.

> **Tip:** Use schedule application or third party schedule analysis tools to count tasks and determine this ratio. Once the Quick Look summary task with logic check has been evaluated, then test for the ratio of summary to effort tasks.

Finish-to-Start Relationships

Quick Look Assessment Cross Reference: Test 11

Rationale: FS relationships avoid scheduling tasks in parallel. Other relationships can cause resource conflicts.

Activity: The Quick Look test examined the percent of FS relationships. Review the use of other than FS relationships. The rationale for use of other than FS relationships should be documented in task notes. Check that the rationale justifies the use of the other relationships. Note if the use of other predecessors or successors would increase the use of FS relationships.

> **Tip:** Filter on the predecessor field in MSP or use relationship views in Open Plan Professional to see the other relationships.

Start-to-Start or Start-to Finish Successor w/o also Finish to Start or Finish-to-Finish

Quick Look Assessment Cross Reference: Test 12

Rationale: Tasks with only SS or SF successor relationships need to have at least one FS or FF successor to another task or the total float values will be meaningless.

Activity: If exceptions from the Quick Look test still exist in a schedule, determine impact of not having finish successors on driving or critical paths. If corrected, check that added FS successors are appropriate for the activity. Check that all discrete tasks in the IMS have at least one non-FF predecessor.

> **Tip:** Investigate the successors of the SS successor to determine if a similar FS or FF relationship for the focus task is appropriate.

Total Float > 3 Months

Quick Look Assessment Cross Reference: Test 13

Rationale: Suggests tasks starting too early or missing an identified successor. Excessive total float could also reflect missing scope in the IMS.

Activity: Determine if cause of high total float is bad or missing logic. If logic is sound, determine reason for starting work early. Discuss specific high total float examples with PMO and contractor. Check for acceptable high total float conditions documentation and that total procedures for designating these conditions are contained in the IMS B&A or IMS Supplemental Guidance documents.

> **Tip:** Create a table that shows total float sorted high to low and displays successor tasks. Browse this view to identify potential problems. Isolate the tasks that do not have zero free float, eliminating the filtered tasks in a chain, to focus on the end task in the chain. Resolving a missing or applying a more appropriate successor to the end task may correct the high total float for all tasks in the chain.

SNETs / FNETs Beyond 3 Month Look Ahead

Quick Look Assessment Cross Reference: Test 14

Rationale: Some use of constraints to refine dates due to resource availability is acceptable. Constraints should be used less frequently beyond a 3 month Look Ahead period than near-term, as predicting resource availability is not practical in the far-term. Excessive use inhibits critical path analysis.

Activity: Discuss the use of constraints delaying the forecast start / finish, rather than logic, with the contractor scheduler . Examine the rationale for constraint use provided in task notes. Constraint use should reflect known dates. Since resource availability is often a primary reason for constraint use, conduct a bow wave analysis to determine if adequate resources exist. Determine if constraints delaying the forecast start / finish are creating a bow wave of work. Check for the percentage of milestones using constraints affecting the forecast dates.

> **Tip:** Consider using third party schedule analysis software to test for tasks riding the status date and for bow wave analysis.

SNETs / FNETs within a 3 Month Look Ahead

Quick Look Assessment Cross Reference: Test 15

Rationale: Some use of constraints to refine dates due to resource availability is acceptable. Excessive use inhibits critical path analysis.

Activity: Discuss the use of constraints delaying the forecast start / finish, rather than logic, with the contractor scheduler. Examine the rationale for constraint use provided in task notes. Constraint use should reflect known dates. Resource availability is often a primary reason for constraint use. Check for the percentage of milestones using constraints.

> **Tip:** Consider using third party schedule analysis software to test for tasks riding the status date and for bow wave analysis. Sort unstarted tasks by start and check for SNET dates and verify no other appropriate predecessors exist.

Supplemental Logic Metrics

Quick Look Assessment Cross Reference: N/A

Activity: There are a number of checks for sound logic in the schedule. The logic density measures the average number of relationship per activity or task. Greater than an average of three relationships is reason for concern. Milestone ratio is the ratio of milestones to effort tasks. There should be at least one milestone for each 20 tasks. Logic hot spots are tasks with a large number of predecessors or successors or both. When logic hot spots are on the critical path they should be of significant concern.

> **Tip:** Consider using third party schedule analysis software to perform these logic tests. A counting capability combined with filters, will enable the schedule to generate these metrics.

Compare Deadlines (Constraints / Targets) and Milestone Baseline Dates

Quick Look Assessment Cross Reference: N/A

Activity: Check for Major Program Milestones with later deadline dates than baseline dates without comments. Review comments and evaluate rationale for later deadlines.

> **Tip:** This test can be performed with a table or view containing milestones, deadlines or target dates, and baseline finish dates. A second alternative is to create a flag field with a formula that detects the later deadlines.

Compare IMS and Master Phasing Schedule

Quick Look Assessment Cross Reference: N/A

Activity: Check that the contractor IMS matches the Government Master Schedule, Master Phasing Schedules, Program Roadmap or other presentation material provided for the Comprehensive IMS Assessment. Check that summarized tasks and program milestones align with the Master Phasing Schedule. Check that IMS dates match dates in all EVMS artifacts.

> **Tip:** Third party software, such as Kidasa Milestones Professional, will electronically link subordinate schedules to Master or Program Level schedules. Their use will make this test more efficient.

Deliverables listed in the IMS

Quick Look Assessment Cross Reference: N/A

Activity: Check to ensure all contract deliverables (CDRL or SDRL numbers) are listed or referenced in the IMS. Deliverables may be referenced in task descriptions, a user defined field or as a milestone. Cross check deliverables in the IMS to WBS Dictionary, SOW, and CDRL.

> **Tip:** Check the IMS B&A or IMS Supplement Guidance documents to determine how deliverables (CDRL Items) are to be shown in the IMS.

Verify Horizontal Integration

Quick Look Assessment Cross Reference: N/A

Activity: The schedule should reflect the handoffs between OBS elements through milestones and network logic. Determining that horizontal integration is adequate may involve the use of experts SMEs. Handoffs between product development, integration organizations, and test organizations are obvious points to check. Check horizontal integration between control accounts through the use of milestones.

> **Tip:** The check for horizontal integration can often be performed as part of the technical risk review by having the technical panel review the IMS as part of risk identification. Group tasks by performing IPT. Then search task description for other IPT names. Ensure there is a task logic dependency that is consistent with the handoff described by the task. Knowing the basic relationship between systems engineering, design, development, integration and test organizations is essential when performing this test. Group tasks by WBS element and ensure the WBS product is transitioning from one IPT to another as appropriate.

Confirm Vertical Integration

Quick Look Assessment Cross Reference: N/A

Activity: Vertical schedule integration was checked under the Complete Tenet (See QL Test 5 & 6). Typically an IMS contains a top level tier of milestones that represent the overall program at a high level. Subordinate parts of the schedule should trace to this top level milestone set. Perform a predecessor logic trace from a program milestone or IMP Event (if included in IMS) and determine those activities, identified as supporting the milestone / event through task description or related code field entries that are not logically tied to the end-point. Consider using a User Defined Field (UDF) for identifying the traced items while performing subsequent analysis.

> **Tip:** Provide Government SMEs with a relationship trace of activities to milestones in their area of interest. They can then determine if all essential activities are included in the path to the milestones.

Transparent Tenet Comprehensive Assessment Activities

Tasks with Leads

Quick Look Assessment Cross Reference: Test 16

Rationale: Difficult to understand and manage time overlaps.

Activity: Evaluate the documented reason for the leads. Reasons for leads should be documented in task notes and possibly in the IMS Supplemental Guidance to describe the application of this technique. Anticipate acceptable one-day leads to model same day finish to start condition where appropriate.

Tasks with Lags

Quick Look Assessment Cross Reference: Test 17

Rationale: Lags can adversely affect analysis and time gaps are difficult to understand and manage. Lag use is permitted but should not be excessive.

Activity: Evaluate the documented reason for the lags and determine if soft constraints would better reflect the relationship.

> **Tip:** Combine a filter that shows task with lags with a table that shows task notes. If justification codes are used for lags, display that field and filter on tasks with lag. Investigate IMS Supplemental Guidance & data dictionary for justification / exclusion codes in user defined fields. Look for inconsistencies where codes, notes / rationale, and technique applications are not aligned.

Constraints w/o Rationale

Quick Look Assessment Cross Reference: Test 18

Rationale: Use of any schedule driver other than FS relationships needs to be documented to aid understanding of the IMS.

Activity: Review all the notes providing rationale for constraints looking for meaningful explanations. If justification codes or fields are provided, review those as well. Investigate IMS Supplemental Guidance & data dictionary for justification / exclusion codes in user defined fields mentioned. Look for inconsistencies where codes, notes / rationale, and technique applications are not aligned.

Tip: Combine a filter that shows task with constraints with a table that shows task notes.

Lead / Lag w/o Rationale

Quick Look Assessment Cross Reference: Test 19

Rationale: Use of any schedule driver other than FS relationships needs to be documented to aid understanding of the IMS.

Activity: Review all the notes providing rationale for leads and lags looking for meaningful explanations. If justification codes or fields are provided, review those as well. Investigate IMS Supplemental Guidance & data dictionary for justification / exclusion codes in user defined fields mentioned. Look for inconsistencies where codes, notes / rationale, and technique application are not aligned.

Tip: Combine a filter that shows tasks with leads and lags with a table that shows task notes.

Hard Constraints

Quick Look Assessment Cross Reference: Test 20

Rationale: Hard constraints prevent tasks from reflecting predecessor impacts.

Activity: Evaluate rationale for Hard Constraint use. If hard constraints remain in the schedule, determine the impact on the critical path and possible SRA (if performed with constraints in place).

Tip: Present the list of hard constraints to the PM and ask if they are valid and necessary, and for reasons for not replacing these with more appropriate constraints and targets that permit forecast impacts while reflecting accurate total float values.

Excessive Lags

Quick Look Assessment Cross Reference: Test 21

Rationale: Excessive (greater than 20 working days) lags cannot be statused and tend to hide detail in schedules.

Activity: Excessive lags may result from poor dependency selection. Examine lags to determine if alternate relationships could reduce the size of the lag. Also ask the contractor scheduler to

consider replacing lags with documented "no earlier than" type constraints to model the anticipated start / finish.

> **Tip:** Task notes may provide insight into the selection of the dependent task relationship and size of the lag, and what constitutes the wait time.

Perform Critical Path (CP) and Driving Path (DP) Identification and Analysis

Quick Look Assessment Cross Reference: N/A

Activity: Review contractor's method for identifying and analyzing critical and driving paths (check the IMS B&A or IMS Supplemental Guidance documents). Compare CP of previous IMSs to determine CP movement. Determine if there is a joint contractor / customer agreement on the definition of "near critical" paths. Evaluate how CP information is distributed to managers that are on the critical path or the near critical paths. Determine CP / DP & related near paths where schedule was corrected for invalid status or if previously used hard constraints were converted to see impact. Also, consider performing CP / DP where code fields or separately produced CP / DP documents exist & lack documented methodology to identify CP /DP. Check for multiple calendar use & potential CP / DP impacts. (See Controlled Calendars for additional calendar use analysis)

Program Completion Trace Test

Quick Look Assessment Cross Reference: Test 26

Analyze Path to Program Completion: Perform a backward trace from program completion and analyze the tasks on the path. Determine if tasks on the path are not crucial to completion or if crucial tasks are missing from this path.

> **Tip:** Some scheduling software contains extensive trace features. Others have limited trace capability. Most third party schedule analysis applications have forward and backward trace capabilities.

Perform IMS Comparison

Quick Look Assessment Cross Reference: N/A

Activity: Perform a comparison of recent IMS versions to determine if unauthorized changes have been made. Unauthorized changes are schedule modifications of configuration control elements without an approved baseline change document. Also, pay particular attention to changes in forecast duration and modification of logic. These changes could disguise schedule performance issues, especially where observing near-term schedule slips and encroaching on overrunning program goal end dates. Verify total float trend erosion that is maintained later. Identify any performance trends and unauthorized changes to the IMS. Examine situations where progress was de-earned.

> **Tip:** Most schedule applications have the capability to compare two versions of the same schedule. Third party schedule analysis software also has this capability.

Verify Deadlines or Targets

Quick Look Assessment Cross Reference: N/A

Activity: Examine the use of deadlines or targets. Check deadline / target use as described in B&A or IMS Supplement Guidance document, and if used as part of the schedule margin approach. Evaluate how deadlines / targets are used and documented. Check the percentage of deadline / target use.

Evaluate Schedule Health Assessment (SHA)

Quick Look Assessment Cross Reference: N/A

Schedule Health Assessment (SHA): Determine if contractor prepares and maintains schedule health metrics. Some contractors have adopted the DCMA 14 Point Assessment as their default metric. Evaluate quantity and quality of metrics, their use, and schedule health trends. If possible, validate the contractor's metrics by running the same metrics using another application. Determine if the contractor's metrics are altered by the use of justification codes. If so, run the metrics with and without the justification codes to determine the impact of justifications. Investigate how SHA results are reviewed and applied. Evaluate the SHA trend.

> **Tip:** Several third party schedule analysis applications provide the DCMA 14 Point Assessment.

Verify Rolling Wave Planning

Quick Look Assessment Cross Reference: N/A

Activity: The IMS may not be detailed planned through to program completion. Check the IMS B&A and IMS Supplemental Guidance documents for rolling wave planning procedures. Verify the IMS is consistent with these procedures. Check that only planning packages are changed during the rolling wave planning process by referencing applicable change logs and determining newly added tasks and related baseline information align with previous planning package tasks.

> **Tip:** Use EVT field and baseline start field to isolate portions of the IMS that are applicable to the next rolling wave of detailed planning.

Evaluate Risk and Risk Mitigation Identification

Quick Look Assessment Cross Reference: N/A

Activity: For the IMS to be an effective management tool, it should be closely integrated with the program risk and opportunity management efforts. Risks with schedule impacts should be identified in the schedule. A common technique is to establish a user defined field to reflect the risk number, typically from the risk register or risk management plan. Risk mitigation activities should also be included in the IMS. Check the IMS B&A or IMS Supplemental Guidance document to ensure that procedures for risk and risk management integration with the IMS are established.

Note: Risk Integration is also addressed in the Usable Tenet (See Usable Risk Integration into the IMS).

Determine Treatment of Schedule Visibility Tasks (SVT)

Quick Look Assessment Cross Reference: N/A

Activity: Review the procedures for the use of SVTs in the IMS B&A or IMS Supplemental Guidance Documents. Verify that SVTs are being used and managed in accordance with documented procedures. If the SVTs are more than 10 percent of discrete tasks, determine SHA metrics without SVTs. Verify that SVTs are not resource loaded. Verify that SVTs have criteria for progress measurement and are statused.

Verify Program Performance Metrics

Quick Look Assessment Cross Reference: N/A

Activity: Determine if the contractor maintains schedule performance metrics. IMS schedule performance metrics should be translated into PM reports. Evaluate schedule performance reports, how they are used, and program trends. A combination of several performance metrics is appropriate for most schedules. Overall project metrics are important to determine current performance, as well as predicting project completion. Lower tier performance metrics (task level) are useful for determining potential problem areas and predicting specific organization or WBS element performance. Trend analysis is important at both the project and WBS/OBS level to determining if corrective and preventative measures are effective.

Tip: Consider using Air Force IMS Performance Trends Tool to determine schedule performance trends.

Statused Tenet Comprehensive Assessment Activities

Invalid Forecast Dates

Quick Look Assessment Cross Reference: Test 22

Rationale: Includes improper status and in-progress tasks with status left of Timenow. The IMS is not useful for predictions unless accurately statused.

Activity: Invalid forecast dates identified in the Quick Look should be corrected. Review the process for statusing the schedule. Determine if tasks are being individually statused by CAMs or Work Package Managers (preferred approach). The process should be documented in the IMS B&A or IMS Supplemental Guidance documents. Determine if the process is being followed through investigative follow-up with the contractor scheduler. Check configuration control for meaningful forecast information. Determine if the contractor scheduler is performing checks when statusing is complete. Count the number of tasks that have not been statused to the status date. Then determine the impact on TF and significant milestones if the IMS was statused to Timenow.

Invalid Actual Dates

Quick Look Assessment Cross Reference: Test 23

Rationale: Actual start or finish dates in the future. Invalid actual date entries imply that the schedule is not properly statused.

Activity: Invalid actual dates should be corrected. Review the process for statusing the schedule. The process should be documented in the IMS B&A or IMS Supplemental Guidance documents. Determine if the process is being followed through investigative follow-up with the contractor scheduler. Check configuration control of actual information. Determine if the contractor scheduler is performing checks for this when statusing is complete.

Out-of-Sequence (OOS) Status Conditions

Quick Look Assessment Cross Reference: Test 24

Rationale: Any task with an OOS condition renders IMS predicting capabilities unreliable.

Activity: The Quick Look determines if OOS conditions exist. If found, determine cause by interviewing contractor scheduler. OOS status reflects incorrect logic or not operating to plan. Sometimes execution strategies are changed after the schedule is developed and the logic needs to be updated. If the logic is incorrect, it can be updated as part of the statusing process. Determine if a process exists to detect and prevent OOS conditions.

Check Tasks Riding the Status Date

Quick Look Assessment Cross Reference: N/A

Activity: Check to see if a number of forecast start dates are close to or equal to the status date. This may mean that tasks are being pushed out and a bow wave of effort is being created.

> **Tip:** Create a filter to list the detailed tasks close to the status date. Detected tasks may be more significant if their predecessors are completed (not driving) and if their baseline dates are earlier than forecast dates (late tasks that may not have been addressed). Count the number of tasks and compare to previous accounting period schedules to determine if a negative trend is developing. An alternative is to compare the last two accounting period schedules and review all changes to forecast start dates.

Evaluate Logic Changes

Quick Look Assessment Cross Reference: N/A

Activity: Most contractors do not baseline or configuration control changes to schedule logic. Using a comparison tool, check the amount of logic changed from one IMS delivery to the next. Logic changes can disguise schedule delays. Discuss any significant logic changes with the contractor scheduler and ensure current logic reflects accurate execution strategy.

Tip: Most scheduling application and third party schedule analysis software have a file comparison function. Acknowledge that completed or in-progress tasks may reflect logic changes made to enable execution to occur without inducing OOS status conditions.

Note: This activity can also be performed as part of Transparent or Traceable tenets.

Determine Subcontractor / Supplier Schedule Status

Quick Look Assessment Cross Reference: N/A

Activity: Determine if subcontractor and supplier schedules are being entered into the IMS with the same status date. Spot check subcontractor schedules to the contractor's IMS. Check that subcontractor's EVTs are consistent with contractor EVTs when data is directly transferred. If subcontractor schedules are reflected as milestones in the contractor schedule, ensure that subcontractor predecessors are 100% complete before marking milestones as 100% complete. Check that subcontractor schedules have Quantifiable Backup Data where appropriate for percent complete EVT.

Validate Remaining Durations

Quick Look Assessment Cross Reference: N/A

Activity: Verify that remaining durations are accurate. If appropriate, have them reviewed by Government SMEs. The IMS must reflect sound estimates to completion. Spot check against history by performing a duration variance analysis. Overly optimistic forecasting can invalidate project completion predictions. Check resource loading against remaining duration to determine achievable finish dates (for resource loaded schedules).

Tip: The Air Force IMS Performance Trends Tool has a duration variance analysis function that will compare task actual and forecast durations to task baseline durations.

Predictive Tenet Comprehensive Assessment Activities

Push Forward Test

Quick Look Assessment Cross Reference: Test 25

Rationale: Used to assess logic network integrity to program completion.

Activity: If the Push Forward Test failed, perform a forward trace on each of the selected tasks for the test. Determine the cause for the failure. Check to see if documented scheduling practices in the IMS B&A or IMS Supplemental Guidance documents should have caught the problem. See also critical path (CP) and driving path (DP) Identification and Analysis test in Transparent Tenet.

Tip: Some scheduling applications and most third party schedule analysis software have forward trace capability.

Program Completion Trace Test

Quick Look Assessment Cross Reference: Test 26

Rationale: Determines the percentage of non-LOE incomplete tasks logically tied to program completion.

Activity: A high percent of tasks should be on the path to program completion. Mark or flag the tasks that were on the Program Completion Trace. Filter for the unmarked tasks to determine if any should be on the path to program completion. Discuss any questionable tasks with the contractor scheduler.

No LOE in Path to Project Completion

Quick Look Assessment Cross Reference: Test 27

Rationale: LOE tasks should not be linked to other discrete tasks or be in the driving path to project completion.

Activity: Examine the treatment of LOE tasks as described in the IMS B&A or IMS Supplemental Guidance documents. Some contractors exclude LOE from the IMS. Others do not apply logic to LOE. Check to see if the approach for LOE is consistently applied. If not, determine the cause.

Appropriate Constraints Applied to Endpoint Milestones

Quick Look Assessment Cross Reference: Test 28

Rationale: Should be used for important endpoint milestones to generate meaningful total float values and permit predecessor impacts. Investigate for issues.

Activity: Determine the impact these constraints have on critical path and driving path analysis and in conducting SRAs. Using a performance trends tool, examine the total float changes on these endpoint milestones.

Critical Path Length Index (CPLI)

Quick Look Assessment Cross Reference: Test 29

Rationale: Project performance indication of the ability to finish the project on time.

Activity: Examine the trend of CPLI over prior IMS reporting periods. Determine if contractor is taking action to correct adverse trends.

Check Redundant Logic

Quick Look Assessment Cross Reference: N/A

Activity: Check for redundant logic. Redundant logic can be checked with a network view of the schedule. Redundant logic, if removed, would not result in a change to task dates. Redundant logic adds confusion to understanding and analyzing the network.

Tip: Several third party schedule analysis applications provide automated tests for redundant logic.

Determine Parallel Critical Paths

Quick Look Assessment Cross Reference: N/A

Activity: Parallel critical paths are two separate paths of logically tied tasks with equal impact determining the end date, where if one path was removed, no change in the end task dates would occur. Check for existence of parallel critical paths and determine if they are appropriate, through discussion with the contractor's scheduler.

Tip: Several third party schedule analysis applications provide automated tests for parallel paths.

Evaluate Merge Points, Diverge Points, and Merge Hot Spots

Quick Look Assessment Cross Reference: N/A

Activity: Merge points are tasks with a large number of predecessors. Diverge points are tasks with a large number of successors. Merge hot spots have both a high number of predecessors and successors and may be on or nearly on the critical path. These points and hot spots pose higher than normal schedule risk and should be closely monitored. Check to determine if the contractor schedule assessment addresses these points and hot spots.

Tip: Merge / Diverge points and hot spots may be easily identified with third party schedule analysis applications.

Perform Measures of Schedule Execution

Quick Look Assessment Cross Reference: N/A

Activity: The Quick Look provides one measure of overall project progress, the CPLI. If project performance is less than desired, several tests or metrics may be applied to focus on the cause. Since the number of metrics or tests in schedule analysis application is significant, it is best to begin with a premise of the schedule execution issue and select the appropriate metric to validate the issue and focus on a cause. For example, if tasks tend to be starting on schedule but taking longer than baselined, a Baseline Hit Ratio or Current Execution Index may be appropriate. Other measures of overall schedule execution include Baseline Execution Index, Forecast Execution Index, Rate Charts, Schedule Performance Index, Earned Schedule, Project Schedule Variance, Total Float, Total Float erosion, and Schedule Margin Burn-down.

Tip: Refer to the Specific IMS Comprehensive Assessment Techniques and Measurements section narrative after this section for additional information. The PASEG provides several suggested schedule execution metrics. Third party schedule analysis applications provide

additional capabilities. Review their offering when deciding on the appropriate metric for the schedule issues.

Usable Tenet Comprehensive Assessment Activities

The Useable, Resourced and Controlled Tenets do not have any Quick Look cross references.

IMS Structure

Activity: Check that the IMS is logically organized to align with other documents. Check if the IMS is WBS, OBS, or IMP based and consistent. If the IMS is WBS based, check for consistency with MIL-STD-881C. Check that there are sufficient summary or hammock tasks. Determine if the IMS structure is defined in the IMS B&A or IMS Supplemental Guidance documents.

IMS Statistics and Performance Metrics

Activity: The IMS statistics reports contain quantified data about the schedule. IMS Performance Metrics provides quantified data about schedule execution. Determine which reports are developed from the IMS and how they are used to manage the program. Examine the business rhythm for generating and distributing these reports. Examine the accuracy and the use of the IMS related reports. Discuss statistics and performance metrics used with the contractor scheduler.

Note: See related items on metrics in Transparent and Predictive Tenets.

Risk Integration into the IMS

Activity: Verify that identified risks are integrated into the IMS. Moderate and High Program Risks that have a schedule impact or which can be identified with a task or work package, should have a cross reference to the risk register. This can be accomplished with a user defined field, typically referencing the risk ID number. Risk mitigation efforts containing assigned budget or having potential schedule impact must be included in IMS. Cross check the risk register with the IMS. Make sure that the risk register "as-of-date" is consistent with the IMS status date. The check should include risk cross referencing, as well as a comparison of risk mitigation status.

Tip: Review the contractor Risk and Opportunities Management Plan, the IMS B&A and IMS Supplemental Guidance documents to determine the process for integrating identified risks into the IMS.

Schedule Hierarchy

Activity: On large complex programs, the Performance Measurement Baseline (PMB) may be represented by a number of linked or inserted and linked schedules. Check the IMS B&A and IMS Supplemental Guidance documents to see if multiple files are used to represent the IMS. If

multiple files are used, check to see their settings and status dates are consistent. Check the links from schedule to schedule to ensure that correct linkages have been established.

IMS Usable for Decision Making

Activity: Through conversations with contractor IPT Leads and PM, determine what decisions are made using the IMS. Determine if the IMS data used for these decisions is timely, accurate, and summarized in IMS reports in a meaningful manner.

Adequacy of IMS for SRA

Activity: Check that the IMS is fundamentally sound enough to be used for a SRA. The soundness for an IMS is defined in the Air Force SRA Process Document. Determine if a previous SRA has been performed. If an SRA was performed, the IMS should contain the three point values and distribution curves selected for the simulation. Review previously run SRA results and analysis. Examine the schedule file that was used for the SRA to ensure that schedule changes and SRA settings were consistent with the Air Force process.

Resourced Tenet Comprehensive Assessment Activities

The activities in this category assume that the IMS is a resource loaded schedule. Resource loading may vary from contractor to contractor. Check the EVMSD, IMS B&A, or IMS Supplemental Guidance document to determine resource loading standards for the IMS.

Resource Types and Categories

Activity: Resource types may include material, labor, and subcontractors. Resource categories may include items such as engineers, technicians, and managers. Review the resource sheet or equivalent in the schedule tool. Check the number and type of IMS resources. There should be adequate types and categories to reflect the breadth of resources used on the project. For example, a single resource category for engineering may not be adequate when electrical, mechanical, and software subsystems are being developed. Determine if subcontractor resources and material are included in the resource types and categories.

> **Tip:** Scheduling applications have resource views or tables that show all the potential resource types and categories that may be used in the schedule.

Complete Resource Loading

Activity: Check the percentage of detailed tasks containing resource assignments. All effort work packages (excluding SVTs) in a resource loaded schedule should have resources assigned consistent with the contractor's scheduling procedures. Check to ensure there is no mixing of OBS elements in a single control account. Check that the resources are consistent with the task description. Compare IMS resource loading to the RAM for appropriate OBS/WBS elements.

Tip: Filters may be used to isolate tasks that do not contain resources and to check for proper resources. For example filter on "software" in the task name and use a task usage view to see if software engineers are assigned to a task.

Resource Profiles / Histograms

Activity: Review any resource profiles prepared as part of schedule analysis or EVM reporting. Check to ensure that resource profiles are reasonable. Ramp ups and phase outs should be realistic and achievable. Crosscheck BOEs to IMS resource loading. Consider performing a task density analysis to examine if in progress task loading and near term starts are reasonable. Check that the resource profiles from the IMS are consistent with the staffing profiles presented in the Contractor Performance Report and other management reports if applicable.

Resource Alignment with other EVMS Artifacts

Activity: Check that IMS resource assignments align with the CAP and addresses elements of cost which should match to the baseline. Check the resource profiles or histograms to ensure they are consistent with the ETC and EAC.

IMS with Resource Budgets

Activity: Some contractors include rates and budgets for resources. This provides the capability for the IMS to generate the PMB for the program. If this is a requirement of the EVMSD or IMS B&A documents, check the baseline totals for control accounts against the CAP or Cost System.

Tasks with Budgets

Activity: Observe tasks with budgets. For resource loaded schedules, effort tasks should have some resources assigned. Match tasks, work packages, and control accounts to CAP and WAD.

Resource Changes

Activity: Compare Resource Baselines with Current Resource Forecasts. Where significant differences occur, they should be documented in the task notes. Check with the contractor’s scheduler for any significant undocumented changes.

Tip: Open a table or view showing baseline and forecast resources. Browse for significant changes.

Resource Loading Consistent with Task Durations

Activity: Check that resource loaded tasks contain work (task description includes effort within scope of contract). If the task description contains effort (a present tense action verb), the task should be resource loaded, unless it is a SVT. Check for unrealistic duration and resource

combinations, such as a one day duration and 1000 labor hours. Check that milestones with resources (such as material received) are shown as 1 day tasks.

Controlled Tenet Comprehensive Assessment Activities

Configuration Control

Activity: Verify configuration control of the IMS. The IMS is part of the PMB and requires configuration control. Check the IMS B&A or IMS Supplemental Guidance document to determine which elements of the IMS are baselined. Determine who has the authority for changing the content of the IMS. Compare multiple IMS's to identify items requiring baseline configuration controls that changed without an authorizing related Baseline Change document. Run a file compare application or routine to detect changes between IMS deliveries. Coordinate this test with the Traceable Baseline History activity below.

> **Tip:** Several file comparison routines require the user to specify the data elements to be compared. Limit the comparison to baselined data elements such as Baseline Start, Baseline Finish, Baseline Duration, and Baseline Work / Cost to speed the comparison routine. Check the IMS B&A or IMS Supplemental Guidance documents for identified alternate baseline field use.

Field Mapping

Activity: Check that IMS Field Mapping is maintained. All user defined fields must be defined and documented. Customers may impose external requirements on user defined fields. Check the contract for any special field mapping requirements. Review the Field Mapping document for accuracy and completeness. If codes are used in any user defined fields, determine where the codes are defined and check for their proper use. Maintain awareness of formula use in user defined fields; should be identified in B&A or IMS Supplemental Guidance documents.

Business Rhythm

Activity: Review the EVMSD and IMS business rhythm. The rhythm should address all activities in the typical program EVM operational cycle and describe a time phased process for recording progress and updates, implementing baseline changes, generating reports, and performing schedule analysis. The Business Rhythm may be in the EVMSD, IMS B&A, or IMS Supplemental Guidance documents. The time-phasing should provide adequate time for variance analysis and corrective action planning. The business rhythm should describe the update process to ensure that the IMS is consistent with other EVMS artifacts such as WAD, CAP, and CPR.

Calendars

Activity: Check that Project, Task, and Resource Calendars are appropriately used. Specific calendars should be used where their use adds precision to the IMS. Resource and task calendars can alter the forecast duration of tasks. Their use should be documented in IMS B&A or IMS Supplemental Guidance documents. Review application, appropriateness, and accuracy of

calendars. Evaluate multiple calendars in use on the critical and near critical paths to compare float values. Review Resource Sheet for appropriate resource calendar use.

> **Tip:** A change in the project calendar can alter dates in the schedule. One third party schedule analysis application checks for calendar changes.

Traceable Baseline History

Activity: Determine if baseline history is traceable. Each change to the IMS baseline should be documented. Check individual baseline change documents against the IMS. Compare latest baseline change documents to determine if any changes impact the IMS baseline schedule. Check IMS baseline information alignment with the schedule related baseline change document. Verify a trace between BCR documentation and the IMS.

Tip: Determine if a user defined baseline change field is in the IMS (documented in field mapping, IMS B&A or IMS Supplemental Guidance); check for alignment with related documents such as BCR log and MR log activity.

Documenting an IMS Comprehensive Assessment

A well-documented IMS Assessment provides the PMO with the information they need to make important decisions. The IMS Quick Look Assessment steps address the material required in an IMS Quick Look Assessment out-brief and report.

The IMS Comprehensive Assessment should culminate in an out-briefing as well as a prepared assessment report. The out-brief and the report should both contain executive summaries that are appropriate for Program Manager, PEO and higher level reviews. The focus at this level is on whether the schedule reflects the program plan, whether it has the granularity necessary to execute the program, and the mechanical completeness of the schedule and effective use for decision-making such that it is reliable for predicting future program performance.

Consider including the completed Quick Look Report Template as an attachment to the IMS Comprehensive Assessment Report. If possible, include the current status (items identified for correction and the status of those correction efforts).

IMS Comprehensive Assessment Report

The report content includes:

- Executive Summary (One page with focus on significant observations, conclusions, and recommendations).
- Ground Rules and Assumptions
  - Primary Purpose of the IMS Comprehensive Assessment
  - Schedule and artifacts observed (address any significant artifacts not provided)
  - Personnel contacted (significant contributors of information)
  - Standards and guidelines applied (such as DID, contract, GASP)
  - Measurements, techniques and tools used in the assessment
- Observations.
  - Instances where the IMS met or did not meet the criteria or guideline

    - Observations on personnel competencies
    - Observations on IMS related processes and procedures
- Conclusions.
    - On the schedule health and fitness
    - On the program health as reflected by the IMS
    - On program schedule performance
    - On the use of the IMS to predict future program performance
- Recommendations (include next steps and their priority) that will:
    - Improve the IMS
    - Maintain the improvements
    - Improve the personnel competencies
    - Improve processes and procedures
    - Improve program schedule performance

Turning Reports into Results

An IMS Comprehensive Assessment report is a starting point for improving the contractor's IMS and ensuring it remains a useful tool for program management. The challenge is to turn the report into results. In the case of non-compliance with standards, contracts, and contractor's procedures; results are usually achieved, although the pace may seem slow. For deliverables that are approval documents, the government has a strong position. For other documents, such as the IMS that is normally not an approval deliverable, other leverage can be pursued. Do not hesitate to change the IMS to an approval document during a routine contract modification. An IMS that does not meet the contractor's EVMS Description requirements or the program unique scheduling procedures can be pursued through the contractor's management if necessary to effect improvements.

Where using leverage is not feasible, and the contractor may be slow to react to needed changes, interface between the government PM and the contractor PM is a logical escalation step. When viewed from the higher government PM perspective, the program is a team effort with the government and the contractor on the same team. Contractors may deemphasize the need for a credible IMS. Or the contractor's priorities levied upon them by the government may not allow them to place priority upon maintaining the validity of the IMS. Both the government and contractor should work together to create and maintain the best possible IMS for successful program management.

Common Program Manager Questions Answered by IMS Comprehensive Assessments

In this section common questions are posed regarding a contractor's IMS. Following each question, is a description of potential government scheduler activity followed by suggested responses to the PM. Where applicable, schedule analysis tools that would facilitate the response are included.

Are the duration estimates in the schedule realistic?

Perform a Duration Variance Analysis to help determine if past performance supports future projections. Future task durations should incorporate the demonstrated productivity of previously completed and projected work efforts to determine a reliable forecast. Duration Variance Analysis measures the difference in actual duration and baseline duration, as well as the

difference between baseline duration and forecast duration. If the program has a history of significant differences then future expected performance should be questioned and the observed results folded into SRA three point duration estimates.

Focus attention on the performance of similar completed work effort tasks to understand the likelihood of achieving the stated durations, and the resulting projected finishes. The IMS may not be accurately predicting future completion, and possibly cost, where significant differences exist between longer actual performance and unaltered future projections. Discuss the reasons for the demonstrated poor performance of completed tasks and what will prevent this from occurring on similar work efforts in the future. If the explanations seem void of reasonable one-time conditions, not applicable to future execution, then suggest the contractor perform a what-if exercise applying the relatively longer durations on similar work to see IMS impacts and discuss plans for possible mitigation.

Suggested Response to PM: Prepare charts for the PM that show the results of the duration variance analysis (bar charts or scatter diagrams). Identify significant contributors to the duration variances by WBS or Control Account.

Automated Tools: The IMS Performance Trends Tool (Duration Variance), Run!AzTech (Duration Variance Analysis)

Is work being pushed to the right forming a bow wave of work that the contractor cannot sustain?

Perform a Bow Wave Analysis to help determine if the work can be executed as scheduled. An additional discussion of Bow Wave Analysis is contained in a later section under Specific IMS Comprehensive Assessment Techniques and Measurements. The number of tasks forecast to start in the next month may point to an increasing amount (bow wave) of future work. If the number of tasks forecast to start next month has a rising trend, a bow wave of work may be forming (increasingly plowing the work ahead).

Tasks that appear in the current period may have slipped from an earlier period. This may happen due to predecessors not executing as scheduled or resources unavailable to perform the work. Bow wave conditions often reflect in-progress tasks and unstarted tasks with start dates at the status date (Timenow) and not determined by predecessor impacts. This suggests that these tasks have been pushed ahead by the passage of time and may be adding to the entire volume of work existing in current and near term periods.

Review the history of completed tasks. If the current period indicates an inordinate amount of tasks that have not been successfully executed as planned, discuss the contributing causes with the contractor. Inquire if the contractor plans to increase resources to accomplish this volume of work or has implemented solutions to address the causes for drag-on in-progress tasks. Discuss with the contractor any plans for adding appropriate predecessors or applying “No-Earlier Than” type constraints to reflect a near term look-ahead schedule that is executable. Focus attention on tasks that may be holding up additional work from executing.

Suggested Response to PM: If the IMS is resource loaded, build a resource profile that shows if a bow wave is forming. If the IMS is not resource loaded, consider a task density chart of forecast starts or forecast in-progress tasks to show if a bow wave is forming. Provide any responses from contractor queries on this matter. Use Baseline Execution Index (BEI) to gauge execution

to plan; if the percentage is low (threshold goal is 95% and higher), this may be an indication of work being pushed into the future. Combine with Current Execution Index (CEI) to understand if the contractor is executing to its forecast from one period to the next. Eliminating potential baseline management challenges, determine if the contractors, "do what they said they would?"

Automated Tools: The IMS Performance Trends Tool (Task Density, Task Burn-down), Run!AzTech (STAT-Bow Wave)

What is the total float trend and what is it telling me?

Perform a Total Float Trend Analysis to help determine if project goals are attainable. Understanding total float value erosion or augmentation over time indicates the program's ability to achieve the program's completion goal. If total float to project completion (less the schedule margin) is decreasing, the risk to timely project completion is increasing.

Determine the growth or loss of total float values on remaining tasks over the past few periods. Focus attention on the overall program to see how the average total float is changing relative to the remaining time to program completion. Observe the total float changes on program milestones to gain an understanding of the general program trend. Expand this awareness to remaining work within control accounts and then to all remaining tasks to see more specific areas of total float changes. Combine this with the consistency of applied constraints affecting the backwards pass (late dates). Determine if the quantity of constraints and the dates applied are changing by conducting a file compare to the previous IMSs. Determine if changes to the constraints are consistent with the documented schedule margin approach.

Decreasing total float values may indicate a schedule slippage trend. Compare the critical / driving paths from period to period (Critical Path Density) to see if there is a consistent picture of same remaining tasks or similar type work, and if the percentage of tasks becoming critical / near critical or driving / near driving is growing. If total float is negative, discuss the contributing causes with the contractor and understand mitigation efforts to eliminate the negative values. Suggest validating the IMS forecast and using new targets as constraints to represent achievable goals and provide meaning total float values to aid program decision-making, where negative total float is not remediable to the current targets.

Suggested Response to PM: Show chart reflecting the total float on program milestones for the previous four reporting periods, note any constraint or deadline date changes that would affect total float calculated values. Show the calculation of the TFCI for the past four reporting periods. Correlate the amount of total float loss or gain to the remaining time to go to the applicable program milestone or program completion.

Automated Tools: Scheduling Applications or Analysis tools that trace critical or driving paths

When I compare cost performance to schedule performance, what is that telling me?

SPI reflects the effectiveness of executing the schedule against the baseline plan. Individual monthly SPI measurements, as well as the cumulative SPI, can indicate problems that need to be investigated. Anticipate relative performance between schedule and cost metrics. CPI and SPI can be compared at program down to control account levels. CV and SV are similar measures.

A positive CV and a negative SV reflect efficiency in performing planned work but delays in the performance of the work. Check to make sure that actual cost reporting is not lagging behind schedule performance reporting. If this is checked and is acceptable, another possibility may be technical delays or inadequate resources are causing cost to not be accumulated as planned.

A negative CV and a positive SV are indicators that the work is being performed when planned or even ahead of schedule, but work may be inefficiently executed. Further analysis may be necessary to determine the cause for work taking more effort, perhaps due to underestimated work.

Having a positive CV and SV is good news. The work is being accomplished as planned or ahead of schedule at greater than planned efficiency.

Having a negative CV and SV is cause for concern, the work is not being accomplished when planned and it is consuming more budget than allocated. Isolate the control account(s), where possible, to focus attention.

Compare WBS elements or control account schedule variances (SV) in the IMS versus Contract Performance Report (CPR) or Integrated Program Management Report (IPMR) Format 1 and 5 for alignment over the previous few periods and determine if Format 5 explanations make sense. Verify that variance reporting satisfies contractual requirements for detailed reporting and effectively addresses root cause issues. Compare the EAC with the IMS for period of performance alignment. Discuss EAC composition and corrective action efforts with the contractor to determine the projected cost and schedule impacts to the program.

Suggested Response to PM: Prepare summarized chart depicting WBS elements that should be cause for concern by the PM. Investigate under spent or over spent and late conditions to determine adequate explanation for lateness. Use this data to ask the contractor about potential continuing trends or related get-well plans.

Automated Tools: MPM, Cobra, or wInsight

Which CAMs and WBS elements need help?

Determine the portions of the program that are most sensitive to impacting program completion. These are the efforts on the critical and near critical paths. For those efforts on these paths, determine which are not performing as planned, such as late starts, late finishes, longer durations, and consuming more resources than planned. Analyze at the OBS level to determine if bow wave conditions may impact particular functional areas.

Understand how the contractor integrates subcontracted efforts in the IMS. Whether using entire subcontractor schedule import or representative tasks to capture the meaningful portions, or applying delivery milestones to reflect the feed-in points to tasks in the IMS, the subcontracted efforts represent a CAM's responsibility and fall under a WBS element.

Investigate identified handoff conditions that might delay related CAM and WBS element tasks due to late material deliveries, awaiting authority to proceed, or gaining access to required facilities or equipment needed to perform the work.

Suggested Response to PM: Generate and show Bow Wave and Late and Critical tasks by CAM and WBS elements to historically demonstrate problem work that may potentially threaten program goals. Present contractor's method of representing subcontracted tasks or receipt milestones chart and discuss if it provides sufficient visibility for potential program impacts.

Automated Tools: The Air Force IMS Performance Trends Tool

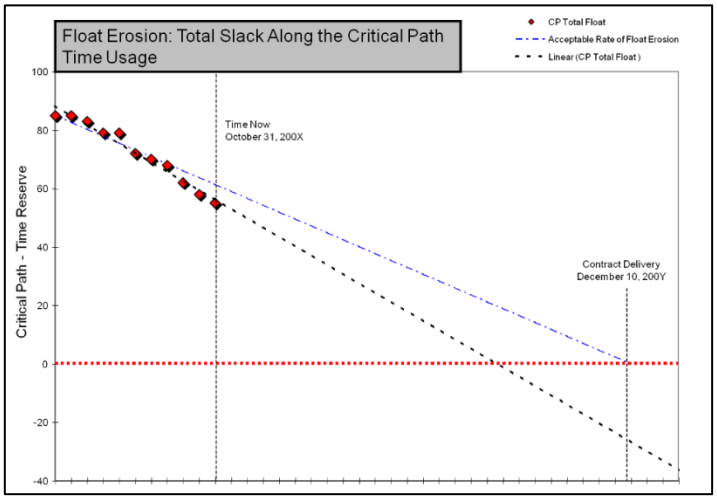
Do we have enough schedule margin left?

Schedules should have a project level margin of time between the last activity and a contract event or end item deliverable / end of the project (contract completion milestone). Verify the contractor identifies milestones such as Preliminary Design Review (PDR), Critical Design Review (CDR), and Test Readiness Review (TRR), as well as the Program Completion milestone, and understand the management of margin. The difference between baseline and forecast dates for these milestones is an indicator of margin consumption along the path to program completion. Plot the remaining schedule margin for each IMS reporting period, such as the previous four IMSs.

Decreasing trends of buffer amounts may indicate a general schedule slip or at least a slip to the critical path or driving paths when the decreases do not align with the remaining time to go. For example there may be less concern with a 35% decrease in buffer trend and four months remaining to milestone versus a 35% reduction trend and 24 months remaining. Discuss the program's schedule margin approach and understand the factors for rapid buffer erosion with the contractor, and if efforts to abate or reverse the trend are achievable.

Perform a Schedule Risk Assessment and compare the probable program completion date to the schedule margin remaining.

Suggested Response to PM: Show a schedule margin burn-down chart over the last six reporting periods. Compare the remaining margin to the 80 percent probability completion date from the SRA. If necessary, make recommendations to compress or crash the schedule. A sample schedule margin burn-down chart is shown below.



Automated Tools: SRA Tool, Air Force IMS Performance Trends Tool

What tasks have been moving closer to the critical path (less and less total float)?

Perform a Total Float Trend Analysis with a focus on tasks with low (and possibly negative) total float values to help identify tasks that may become CP / DP tasks. Observe trends that indicate significant loss of total float over the periods and flag tasks that show up supporting this trend. These tasks may be slightly off the critical path radar. The causes for the tasks becoming more critical may require immediate attention to avoid being caught by surprise if these tasks "all-of-the-sudden" appear on the critical / near critical paths or driving / near driving paths. Discuss the trend with the contractor to ensure awareness of the condition and plan to monitor the related tasks in future IMS submittals to maintain vigilance.

Conduct a more extensive analysis by performing CP / DP Analysis for each of the previous trend periods, again with a focus on the higher total float tasks to determine total float erosion condition that indicate a trend towards becoming either a critical or driving path. This more detailed analysis provides definite ranking for tasks with potential to impact the critical path / driving paths. Compared over several periods this indicates the trend toward the specific milestone or program completion.

Suggested Response to PM: Show and compare the previous four reporting periods' total float consumption charts reflecting tasks that may be approaching the total float values represented by the primary, secondary, and tertiary critical and driving paths for those periods. Recognize that some of the tasks could become critical or driving path from a previous period.

Automated Tools: Run!23 (Trace)

What is the probability that we can finish by a specific date?

There are several evaluations and analyses to select to effectively answer the question. A combination of the some of the following will provide insight into determining the probability of on-time completion.

Calculate the Baseline Execution Index (BEI) to determine if work is completing as planned. Baseline Execution Index (BEI) measures the number of tasks completed as a ratio to those tasks that should have completed to date, according to the original (baseline) plan.

Calculate the Start Execution Index (SEI) to determine if work is starting as planned. Start Execution Index (SEI) measures the number of tasks started as a ratio to those tasks that should have started to date, according to the original (baseline) plan.

If the SEI remains high but the BEI is dropping then duration estimates may be overly optimistic; may indicate work is starting on-schedule, but not completing on-schedule.

Perform Current Execution Index (CEI) to measure how accurately the program is forecasting and executing to its forecast from one period to the next. Use the results of CEI as a basis to discuss the contractor's ability to execute the immediate look-ahead period.

Perform Total Float Consumption Index (TFCI) to consider what would happen if the program continued at its current rate of total float consumption and predict where a project would complete if trends persist or corrective action is not taken. Total Float Consumption Index (TFCI) applies the schedule's current rate of total float consumption to the remaining scope of work and projects a forecast finish date of the entire project. Discuss the factored total float trend as predicted with the contractor to understand if previous schedule performance conditions expect to continue in the future. Discuss the resulting projected finish compared to the EAC to determine reasonableness.

Schedule risk assessments (SRAs) provide a probability of achieving a projected completion date based on a range of possible durations and applied conditions, and understanding the period to period results increases the confidence trend. The SRA provides a probability of project completion on a specific date. Reflect the program's projected and baseline completion date along with the probabilistic completion to understand the potential risk. Discuss the results with the contractor to understand their awareness and how they address the effects of schedule uncertainty. Combined with poor schedule performance the SRA may necessitate revising schedule projections to more accurately reflect expected execution and possibly address the contractor's ability to achieve program target goals.

Suggested Response to PM: Refer to the latest SRA or recommend conducting an SRA on the contractor's IMS. If there is time and the project has at least 15 percent BCWP, do an SRA using global banding based on past performance. If there is not time to do the SRA, use the TFCI as a projection of completion dates. Show the SEI, BEI, and Forecast Execution Index results over the previous four reporting periods to reflect if work is trending later or earlier to the baseline and as validation of the SRA and TFCI data. Present the Current Execution Index results for the previous four reporting periods to provide an indication that the near term work is accurately planned and executed.

Automated Tools: The Air Force IMS Performance Trends Tool (Schedule Performance), Run!AzTech.

Specific IMS Comprehensive Assessment Techniques and Measurements

This section describes several assessment techniques and measurements. This is information that was not developed earlier in Parts 1 or 2 of the IMS Assessment Process. The following tests that are applicable to earlier Part 3 items are identified with references to those earlier IMS Comprehensive Assessment Test / Activity List sections.

Measures of Schedule Execution

Reference: Predictive Tenet / Measures of Schedule Execution Test

There are a number of tests that may be used to measure project schedule performance. Most of these measures are used as part of performance trends analysis. If the scope of the IMS Comprehensive Assessment includes an analysis of project schedule performance, consider using several of the metrics below to assess the project. Some of these measures may be labor intensive. Select those that are most closely related to the postulate project performance issues. Potential measures and a description of their potential uses are shown below:

- Critical Path Length Index: The critical path length plus total float divided by the critical path length. A measure of project completion realism to the planned completion. Used in trend analysis.
- Number of missed tasks (baseline compliance): The number of tasks that were not completed by the baseline completion date.
- Number of late starts: The number of tasks that started later than baselined. Used in trend analysis.
- Number of late finishes: The number of tasks that finished (completed) later than baselined. Used in trend analysis.
- Number of overdue starts: The number of tasks that were baselined to start by the status date but have not yet started. Used in trend analysis.
- Number of look ahead late finishes (forecast to finish late to their baseline finish in next TBD days). Used in trend analysis.
- Task Density: The number of tasks in progress. Used in trend analysis.
- Task Burn-down: The number of tasks completed each reporting period, establishing performance expectations. Used in trend analysis.
- Remaining work (where the IMS contains resources or hours): The amount of work remaining as of the status date. Can be used in trend analysis and to determine the work completed each period.
- Earned Schedule (SVt and SPIt): The measure of schedule performance in units of time rather than dollars. Useful for determining confidence in predicting completion dates.
- Schedule Performance Index (SPI): An EVM measure, cumulative BCWP divided by cumulative BCWS. Used in trend analysis.
- Forecast Execution Index (FEI): The percentage of forecasted finishes matching or are earlier than their baseline finish dates / periods.
- Baseline Execution Index (BEI): The percentage of total actual finishes compared to total baseline finishes planned through the status date.
- Determine the percentage of tasks with actual finish dates that are up to TBD days later than their baseline finish date to the tasks with baseline finish dates earlier than the status date. A decreasing percentage over time indicates the schedule is slipping.
- Start Execution Index (SEI): The percentage of total actual starts compared to total baseline starts planned through the status date.
- Determine the percentage of tasks with actual start dates that are up to TBD days later than their baseline start date to the tasks with baseline start dates earlier than the status date. A decreasing percentage over time indicates the schedule is slipping.
- Current Execution Index: The number of tasks completed in a period compared to their previously forecasted completion in that period. May be used in trend analysis.
- Rate Charts: These are trend charts of actual finishes compared to baseline finishes and often segregated by OBS or WBS element. Used in trend analysis.
- Bow Wave Charts: The number of forecast starts near the Status Date. Used to detect the slipping for forecast starts and points to a potential resource issue.
- Project Schedule Variance: The measure of the difference between BCWP and BCWS in dollars or labor hours. Often segregated by OBS or WBS element.
- Average days late: The average difference between task forecast completion dates and baseline completion dates for incomplete tasks.

- Number of tasks that started in period planned (baselined): Used in trend analysis.
- Number of tasks that finished in period planned (baselined): Used in trend analysis.
- Number of tasks that started on time but finished late: Potential measure of estimating accuracy. May be used in trend analysis.
- Total Float trend: The amount of time a task can slip without impact to the project completion milestone. Compare amounts of total float to program completion across periods. Compare total float to milestone(s) between periods. Used in trend analysis for key milestones.
- Schedule Margin Burn-down: A trend chart displaying the consumption of schedule margin over time.
- Schedule Risk Assessment: A probability distribution of project dates based on a simulation.
- Schedule Overrun (Duration Variance): The number of tasks with remaining duration greater than original duration or baseline duration.
- Remaining total project critical duration: The project critical path in task days. (Accounts for parallel critical paths and is used in trend analysis).
- Average baseline duration compared to average remaining duration for incomplete tasks
- Total tasks days started early compared with total task days started late: Measure of overall schedule performance.
- Number of tasks that have been completed and took longer than baselined. Useful in period by period analysis and trend analysis.
- Total Float Consumption Index: Measure of the change in project total float and used to predict the forecast project finish date.

A number of schedule analysis software tools exist that provide schedule execution metrics. These tools include Acumen Fuse, Air Force IMS Performance Trends Tool, Run!Aztech, and Steelray Project Analyzer.

Late and Critical Tasks

Reference: Predictive Tenet / Measures of Schedule Execution

Monitor late and critical tasks to understand the magnitude of tasks that are not performing to their baseline dates. The combination of a late and critical condition focuses attention on those tasks with greater impact to program milestones, as opposed to all late tasks. Comparing the amount of late and critical tasks to previous status cycle periods offers insight into a possible trend toward poor schedule performance and potential schedule impacts.

An example of late and critical tasks are incomplete tasks with forecast dates later than their baseline dates and total float values less than the critical threshold. For example, the program may decide to define the critical threshold as tasks with total float less than a positive six working days to have more awareness for tasks close to reflecting negative total float values.

Critical Path / Driving Path Determination

Reference: Transparent Tenet / Critical Path and Driving Path Identification and Analysis

Analyze Path to Program Completion, and IMS Comparison tests. Note: the following describes critical path analysis, but is also applicable for driving path analysis. When using the IMS as a management tool, it is important that the critical path can be identified, analyzed, and validated. Because of the importance of the critical path, a number of IMS assessment tools are available that facilitate identification and analysis of the critical path. Scheduling software is adding features to assist in critical path identification. Microsoft Project 2007 and later versions have an increased capability for identifying task drivers.

Absent a tool for automatically analyzing the critical path or predecessor path to a milestone, one technique that can be used in any scheduling tool is to ensure the endpoint milestone (focus task) is constrained using an appropriate constraint, and temporarily neutralizing other existing constraints that may prevent tasks from reflecting the impacts of the focus task's constraint. Next, change the latter constraint date to a date much earlier in the program, such as six months or a year earlier. This creates negative total float for the critical and near critical paths. Filter for the lowest total float value to see the critical path. Then filter for the next lowest total float value to see the near critical path and so on. Optionally, use a text or flag field to annotate the critical paths.

After determining the critical path, examine the tasks that comprise the path. Pay particular attention to the critical tasks and their relationships. Sometimes a task may wind up on the critical path due to an erroneously placed relationship. For example, a test result even in draft form may be needed before integration can begin, but the critical path includes test results, draft report, final report and report approval all as predecessors to integration. The three subsequent efforts after test results, although are needed in the program, are not prerequisites to integration. Including the tasks as predecessors to integration, adds unnecessary time, and in this example, unnecessarily extends the critical path. In this example, review and revise the logic so the tasks are not prerequisites for integration, but have appropriate logic ties to other tasks.

After the critical path is determined, look closely at the tasks that do not have complete logic (both predecessors and successors). It is possible these tasks, if they had complete logic, would be on the critical path. The point to remember is that the analysis work has just begun when determining the critical path.

Associated with critical path determination is near-critical path determination. A task may be just a one day delay away from joining or establishing the critical path. Most scheduling software that highlights critical paths permits setting the total float value used to determine task critical threshold. Use the scheduling software feature or other tools to look for tasks that are near critical so that they also receive management attention.

Bow Wave Analysis

Reference: Statused Tenet / Riding the Status Date Test; Predictive Tenet / Measures of Schedule Execution Test

In scheduling terms, bow wave tasks refer to those riding the status date or forecasted just beyond the status date. This occurs for two reasons:

- Tasks are running late and have been updated with a new Start Date that is determined by the push of the new status date.

- Tasks are running late and have been updated with a new Start Date using a near term constraint, as opposed to precedence logic.

Objective: Count the number of tasks on the bow wave and determine if the work stacked up on the status date can realistically be completed as scheduled when compared to historical performance. If not, the scheduler should work with the CAMs to re-schedule or re-sequence the work more realistically.

Typically, these tasks do not have a predecessor or their predecessors are complete and no longer determine their start dates. They appear immediately following the status date because they are rescheduled to Timenow or their start dates appear shortly after the status date due to the use of a "no earlier than" type constraint date. Regardless, bow wave tasks are problematic because they add tasks, and therefore work, in the immediate period that may not be executable in light of the total scheduled work. An increasing bow wave obscures priorities regarding what tasks to perform.

Another problem associated with bow wave conditions is lack of schedule predictability. The increasing number of bow wave tasks is an indication that the rate of work accomplished is not keeping pace with expectations, possibly due to technical problems or not having sufficient resources to perform the work. This suggests that the tasks are pushed as the status date is moved and are not executable. This eliminates predictability of potential impacts to successor path tasks by not re-planning the tasks into more achievable periods. Bow wave conditions present an overly optimistic view of the schedule and obscure a realistic achievement until discovery when accurate forecasts are projected. Only at this time does program management realize that program goals are not achievable.

Rolling Wave / Planning Packages

Reference: Complete Tenet / Earned Value Techniques Test; Transparent Tenet Verify Rolling Wave Planning

Identify work not easily defined in future periods as planning packages to capture all program scope along with the detailed planning identified in the work packages. As the program continues and planning packages come into the near term horizon, they should be converted to work packages by defining the task or tasks that reflect the approach for completing the work.

This includes defining the steps and the resources needed to execute the work. Converting planning packages to work packages also requires establishing an Earned Value Technique for each work package. Typically, the BCR process is used when converting planning packages to work packages as part of the IMS configuration control. It is important that planning packages are not scheduled to start within one month prior of the current status date. To ensure this has been accomplished, filter for planning package tasks that have a start date within one month of the current status date. If any exist, these should be rescheduled or converted to work packages.

Planning packages with long durations of at least six months can distort the results of an SRA. Consider asking for planning packages to be broken into shorter durations. Planning packages conversion into work packages is often best performed as a comprehensive exercise. Review the program plans or instructions for converting planning packages. Validate that other CAMs

impacted by these planning package conversions have a chance to coordinate the detailed planning.

First and Last Tasks Analysis

Reference: Compete Tenet / Program Milestones Test; Traceable Tenet / Finish-to-Start Relationships Test; Predictive Tenet / Program Completion Trace Test; Controlled Tenet / Calendars Test

Locate the first and last detail tasks or milestones that have successor and predecessor relationships respectively in the IMS to determine the number of logic ties to the beginning and end of the program

Analyzing "First" Tasks

After defining the First task, such as Contract Award or Project Start, conduct the following sanity checks:

- The First task should be baselined and fall within the program's PoP.
- Assess the number of successors. Analyze the time period between the start date of the successor and the finish date of the First task.
- Review the SS and SF relationships that do not provide a logical sequence throughout a schedule.
- Determine what types of calendar(s) are used. Using multiple calendars can cause resource conflicts and make schedule analysis difficult.

Sometimes the successors have Start Dates well beyond the Project Start task and are often "nailed down" using a "no earlier than" type constraint. This indicates poor logic ties where a more meaningful predecessor may be more appropriate or an attempt at "beating the metrics" by linking the Project Start (or other similar task) to future work just to avoid the Missing Predecessor metric. Evaluate the total period of performance and ensure that all tasks fall within the Period of Performance (PoP).

Analyzing "Last" Tasks in the IMS

Find the last task in the IMS that has a predecessor. Review those tasks for more appropriate successor relationships, rather than assigning the last task in the IMS for their successor. After defining the Last task, such as Contract Complete or Project Complete, conduct the following sanity checks:

- The Last task should be baselined and fall within the programs PoP.
- Assess the number of predecessors. Analyze the time period between the finish date of the predecessor and the start of the Last task; programs tend to link tasks to project complete milestones that inflate total float values.
- Look for tasks with negative or zero total float as they may be pushing the Last task (deliverable date); determine if these tasks represent the scope or type of work that makes sense for determining the last task date.
- Review the; SS and SF relationships that do not provide a logical sequence throughout a schedule.

- Determine what types of calendar(s) the predecessors employ (task calendar). As the project comes to an end, using multiple calendars can cause resource conflicts.

Software tools exist that can automatically determine the first and last tasks with corresponding predecessors and successors.

Duration Variance / Pace / Earned Value Method Analysis

Reference: Statused Tenet / Remaining Duration Test

Pace Analysis compares baseline versus actual or forecast durations to help understand if the current schedule is realistic. For example, if tasks are typically taking twice the baseline duration, then why are the future tasks not forecasted to take longer? If not, is there an explanation why the forecast durations are more or less than the baseline or past performance? Is there a mitigation plan in place to assure the forecast durations are achievable and realistic?

Conduct a Pace Analysis by looking for anomalies, such as:

- 0/100 forecast or actual duration greater than one month, maybe even spanning several months or longer--or much longer than the baseline.
- 50/50 forecast or actual duration greater than two months, maybe even spanning several months or longer--or much longer than the baseline.
- Percent Complete (sometimes called PC or % Complete) baselined at greater than three month's duration (i.e., > 12 weeks). This is not atypical, but the longer the tasks without interim measures, the more difficult it is to assess the objective percent complete without examining the quantifiable backup data (QBD or rationale) that supports the earned value percent complete.
- Percent Complete forecast or actual duration greater than three months--or much longer than the baseline.
- LOE or Planning Packages greater than one year (i.e., > 52 weeks) are not recommended.

Risks & Opportunities Integration Analysis

Reference: Transparent Tenet / Risk and Risk Mitigation Identification Test; Usable Tenet / Risk Integration into the IMS Test

Ideally, the IMS contains risk and opportunity (R&O) activities that are coded to readily identify them as such. Typically, the R&O tasks have an R&O ID that aligns to the R&O register. At a minimum, IMS activities should be traceable to individual risks and opportunities in the R&O database/register.

To assess whether R&O tasks are identified, examine the Text fields, Notes fields, or the Name field. If the R&O register is available, spot check if recent items exist in the schedule.

Tip: R&O visibility enables focused attention on related tasks

Verify that related R&O tasks are identified in the IMS & align with related source documentation. Query schedule authors for explanations regarding items detected that do not satisfy R&O alignment.

Acronyms

AC	Accomplishment Criteria
ACWP	Actual Cost of Work Performed
ALAP	As Late As Possible
ASAP	As Soon As Possible
BCR	Baseline Change Request
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BEI	Baseline Execution Index
BOE	Basis of Estimate
CAM	Control Account Manager
CAP	Control Account Plan
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CEI	Current Execution Index
CEVM	Center for Earned Value Management
CLIN	Contract Line Item Number
CP	Critical Path
CPLI	Critical Path Length Index
CPM	Critical Path Method
CPR	Contract Performance Report
CV	Cost Variance
DCMA	Defense Contract Management Agency
DID	Data Item Description
DP	Driving Path
EAC	Estimate At Completion
ETC	Estimate To Complete
EV	Earned Value
EVM	Earned Value Management
EVM	Earned Value Method
EVMS	Earned Value Management System
EVMSD	Earned Value Management System Description
EVT	Earned Value Technique
FAR	Federal Acquisition Regulation
FF	Finish to Finish
FNET	Finish No Earlier Than
FNLT	Finish No Later Than
FS	Finish to Start
GAO	Government Accountability Office
GASP	Generally Accepted Scheduling Principles
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GFP	Government Furnished Property
IBR	Integrated Baseline Review
IMP	Integrated Master Plan
IMS	Integrated Master Schedule
IPMR	Integrated Program Management Report

IPT	Integrated Product Team
LOE	Level of Effort
LRE	Latest Revised Estimate
MFO	Must Finish On
MPM	Microframe Program Manager
MSO	Must Start On
MR	Management Reserve
MSP	Microsoft Project
NDIA	National Defense Industrial Association
OBS	Organizational Breakdown Structure
OOS	Out Of Sequence
OOSS	Out Of Sequence Status
OPP	Open Plan Professional
PASEG	Planning and Scheduling Excellence Guide
PC	Percent Complete
PDR	Preliminary Design Review
PE	Program Event
PEO	Program Executive Officer
PMB	Performance Measurement Baseline
PMI	Project Management Institute
PMO	Program Management Office
PoP	Period of Performance
PPKg	Planning Package
PRR	Production Readiness Review
PWS	Performance Work Statement
QBD	Quantifiable Backup Data
QL	Quick Look
RAM	Responsibility Assignment Matrix
ROMP	Risk and Opportunity Management Plan
R&O	Risk and Opportunity
SA	Significant Accomplishment
SAF	Secretary of the Air Force
SDRL	Subcontract Data Requirements List
SEI	Start Execution Index
SEMP	Systems Engineering Management Plan
SF	Start to Finish
SHA	Schedule Health Assessment
SMART	System Metric And Reporting Tool
SME	Subject Matter Expert
SNET	Start No Earlier Than
SNLT	Start No Later Than
SOO	Statement of Objectives
SOW	Statement of Work
SPI	Schedule Performance Index
SPIt	Schedule Performance Index based on time
SRA	Schedule Risk Assessment
SS	Start to Start
SV	Schedule Variance

SVt	Schedule Variance based on time
SVT	Schedule Visibility Task
TFCI	Total Float Consumption Index
TRR	Test Readiness Review
UDF	User Defined Field
WAD	Work Authorization Document
WBS	Work Breakdown Structure
WP	Work Package

Appendix – Schedule and Schedule Assessment Tools

This process document has described methods to perform IMS Quick Look and Comprehensive IMS Assessments. Test methods are described independent of scheduling software and schedule assessment tools to provide an understanding of the underlying scheduling principles. A section is added to increase the efficiency of tests for Microsoft Project files using Run!23.

A number of government owned and commercial tools are available that make scheduling and schedule assessment much more efficient. This appendix describes the more common of these tools.

Schedule Generating Software

Within the aerospace industry, the companies working with the Air Force use primarily three scheduling software applications, Deltek Open Plan Professional, Microsoft Project and Oracle's Primavera

Microsoft Project is currently supported in three versions 2003, 2007, and 2010. There are server editions for all three versions, but IMSs prepared using the server version may be examined by government agencies with a non-server version. Server versions are normally used on large programs where multiple schedulers need to work on a schedule simultaneously.

Deltek Open Plan Professional is normally operated in a server environment on large programs for the same reason as companies use Microsoft Project in a server edition. It also is available in standalone desktop versions.

Oracle's Primavera is the third most common scheduling software used by Air Force contractors on acquisition programs. Primavera comes in several versions, P3 and P6 being the most currently used applications. These applications come in server versions as well as standalone applications.

DI-MGMT-81650, the required schedule data item description for Earned Value programs mandates that schedules be provided in native scheduling software format. As a result most program offices should have an adequate number of copies of the same scheduling software used by their contractors to evaluate submitted schedules.

Schedule Assessment Tools Associated with Schedule Software

There are a number of products that work within the schedule software to facilitate schedule assessments. Most of these products perform or facilitate the user in performing the DCMA 14 Point Assessment. Some require the schedule software to reside on the same computer as the schedule assessment tool. Other tools can import the schedule data independently of the schedule software being available on the same computer. These tools are listed alphabetically with no advocacy or recommendation by SAF/AQXC.

Acumen Fuse

Acumen Fuse is a standalone commercially available tool for schedule analysis that analyzes Primavera, Open Plan Professional, and Microsoft Project files. The software contains over 250 metrics and produces a MS Word document for the DCMA 14 Point Assessment. It does require

Open Plan Professional to be installed on the same computer as Acumen Fuse. It does not require MS Project or Primavera to import and analyze those native files.

Air Force IMS Performance Trends Tool

This government MS Excel-based tool provides for an automatic import of Microsoft Project and manual import of other schedule files using an Excel template. The tool is oriented to evaluating project performance, particularly trend data. It can help perform several of the Quick Look tests as well. This tool is available from SAF/AQXC.

Defense Contract Management Agency (DCMA) 14 Point IMS Assessment

This government tool comes in versions for Open Plan Professional and Microsoft Project. All filters are provided in narrative form and may be created in the scheduling software. The Microsoft Project application also comes in an Excel spreadsheet that can import the MSP schedule data.

Deltek Open Plan Professional

Deltek Open Plan Professional is capable of generating a Schedule Health Assessment using services provided by Deltek. Deltek Support Services will provide a set of metrics as an add-in to the scheduling tool. The Air Force is currently developing a set of filters, views, sorts, and calculated fields that will automate the performance of a number of the tests using a native Open Plan schedule and described in the process document. This set of Open Plan Professional elements will be provided in the next update to this Process Document.

Run!AzTech for MS Project

Run!AzTech is a commercial schedule analysis tool (add-in) for Microsoft Project. It operates as an add-in for Microsoft Project. Run!AzTech contains over 240 filters and generates GASP and checks and other advanced analysis and assessments. It also generates a statistics report of basic and advanced schedule characteristics and an out-of-sequence status report, among others.

Run!23 for MS Project

Run!23 is a freeware add-in for Microsoft Project that provides a number of the filters needed for the Quick Look Assessment tests. Filters for use in the IMS Quick Look Assessment are prefixed with “QL” labels and the test number. The tool provides a task counting capability that helps automate filtering and counting tasks or metrics as well as forward and backward traces to analyze schedule logic.

Steelray Project Analyzer

Steelray Project Analyzer is a standalone commercial tool that analyses schedules in Primavera and Microsoft Project native formats. The software comes with a tailorable filter set of 90 metrics that includes most of the filters needed to perform the IMS Quick Look Assessment. Project Analyzer also performs the DCMA 14 Point Assessment and generates a report in Clipboard for transfer to other applications such as MS Word or PowerPoint.