

HIPR-SONIC Schedule Analysis Tool

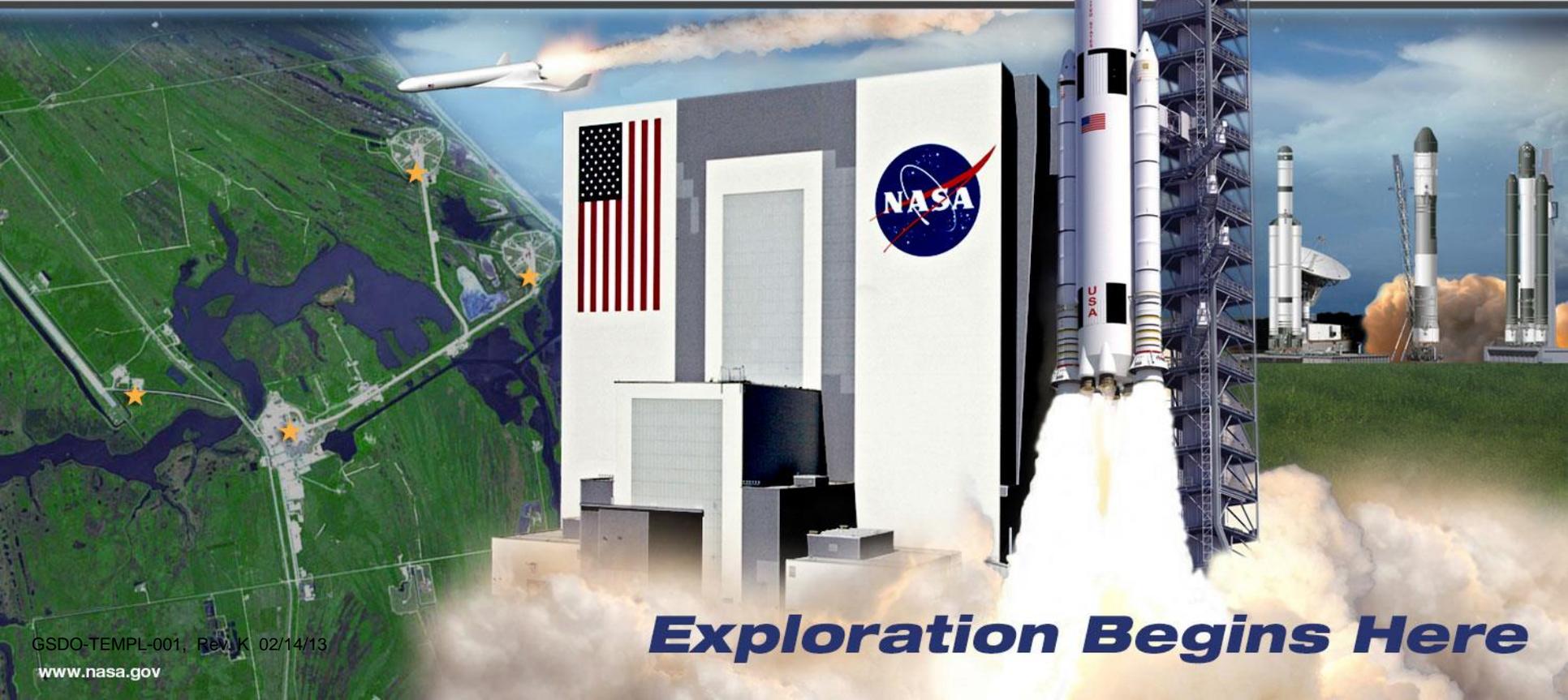
National Aeronautics and Space Administration

(Super Omniscient Nifty IMS Comparator)

2015 NASA Cost Symposium /
Schedule Community Of Practice (SCOPE) Meeting



Dr. Howard S. Kanner, LX
howard.s.kanner@nasa.gov
NASA Kennedy Space Center
25-27 August 2015



Exploration Begins Here

- ◆ **HIPR-SONIC = Highly Improved, Processed Refined SONIC**
 - SONIC⁵ = Super Omniscient Nifty IMS Comparator, 5th major revision
 - SUPR-SONIC = Special Update Per Requests, 4th major revision
 - Original draft, 08/06/2013
- ◆ **Developed to support GSDO PDR**
 - Streamlined schedule analysis process while improving data integrity
 - Supported reports presented to ESD and Management Councils
- ◆ **Received Associate Administrator Office of Evaluation (OoE) Award**
 - Recommended by SRB members to submit for Professional Society Award competition
- ◆ **Shared with NASA Schedule Analysis Working Group, April 2015**
 - Applicability to other NASA P/p or centers
- ◆ **Expanded use within GSDO**
 - PP&C
 - VAB
 - GSI/C3



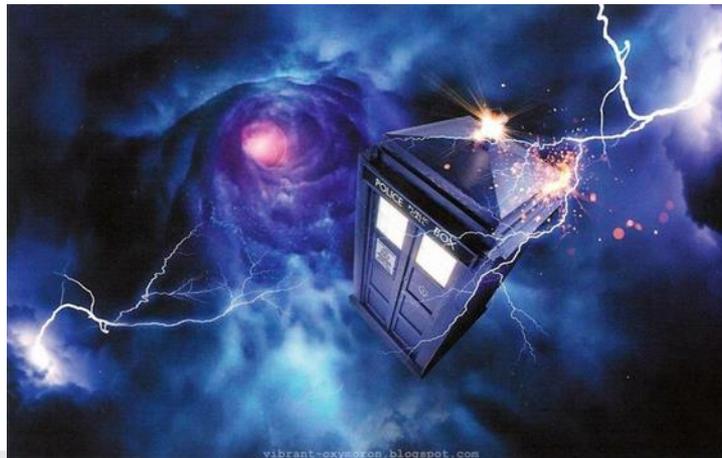
◆ GSDO Life Cycle Review (LCR) Support

- Initiated during preparations for Preliminary Design Review (PDR)
- Created to support Joint Confidence Level (JCL) Analysis Schedule development from Program Integrated Master Schedule (IMS)
 - GSDO IMS maintained in Primavera
 - GSDO JCL Analysis Schedule developed in Microsoft Project
 - Enable compatibility with external stakeholder tools
- No pre-existing software or tool existed to compare schedules from different COTS applications
- Schedule converters imperfect
 - JCL Analysis Schedule needed to represent IMS, but at higher level
 - Approximately 8000 IMS activities vs. 1000 JCL Analysis Schedule activities
 - Note: Current IMS : Analysis Schedule still 8:1, but grew by factor of 5!
 - Aligned activity start dates and finish dates
 - Mapped program risks to schedule activities
 - Consistent Critical Path
 - Created customized Schedule Health Checks (Metrics) for LCR needs

- ◆ **Responsive development process to incorporate (and anticipate) needs of end-users**
- ◆ **Improved program robustness to accommodate broader user base**
 - File import capability eliminate needs for extensive data pre-processing
 - User includes relevant data fields with specified column title
 - IMS from Primavera or MS Project
 - JCL Analysis Schedule from MS Project
 - Requires, *comma-delimited*, custom field identifying all IMS activities associated with analysis schedule activity (*Detail Schedule Map*)
 - Extend analysis schedule comparison for schedule revision analyses



- ◆ **Improved program capabilities to support evolving LCR needs**
 - Updated *Metrics* and added analyses not available in COTS tools
 - Identify ALL activities that can influence specific activity (predecessors)
 - Also identify ALL activities that *can be* influenced by specific activity (successors)
 - Batch mode capability that flags user-selected subset of activities
 - Determine connectivity of two schedule activities, identifying up to 4 paths
 - Updated with Batch mode capability
 - Keyword Search Reports from IMS Descriptions, Predecessors and Successors



- ◆ **Optimized source code for more efficient data handling, faster run times and improved error trapping**
- ◆ **Split application code and database into separate files**
 - Allows users to manage data in separate files
 - Less software “overhead” by not loading files with many schedules
 - Simplifies shareability of software with data files
- ◆ **New ideas?**
 - More detailed IMS / Analysis Schedule analyses
 - Schedule Assessment reporting / plotting



SONIC

General Info

SONIC (Super Omniscient Nifty IMS Comparator) is a schedule analysis tool developed to bridge the gap between COTS scheduling tools, providing assessment capability to ensure schedule health, activity alignment and traceability of content.

Assessment capabilities are divided into modules, which include:

➤ Metrics

- **RABBIT (Recursive Analysis By Backwards IMS Tracing = Predecessor & Successor Identifier)**
 - **BACON (Backwards Activity Chaser of Need)**
 - **DateCompare (Analysis Schedule to IMS Alignment tool)**
 - **S2S (Schedule to Schedule Comparator)**
 - **BurnsBacon (Batch Utility Runs Numerous Schedule IDs for BACON)**
 - **Bullseye (Batch Utility Looking Logically for Schedule Entities You Expect)**
- **PEEK-A-BOO (Probing Expressive Element Keywords and Bearing Orderly Outputs)**

The software runs in a MS Excel environment and provides import capabilities from Microsoft Project and Oracle Primavera.

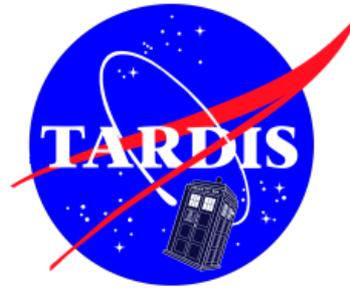
Points of Contact

Developer (ALL POINTS LOGISTICS): Howard Kanner, howard.s.kanner@nasa.gov

KSC GSDO: Brian Rutkowski, brian.j.rutkowski@nasa.gov

HQ CAD: Arnold Hill, arnold.a.hill@nasa.gov

Summary of SONIC Modules



SONIC Input File Mappings

Input file must conform to these column names

SONIC maps to these column names

Primavera Layout Field Name	MS Project Field Name	SONIC IMS Template	MS Project Field Name	SONIC JCL Template
Activity ID	ID	<i>Schedule ID</i>	ID	<i>ID</i>
Activity Name	Task Name	<i>Description</i>	Task Name	<i>Name</i>
Remaining Duration	Remaining Duration	<i>Rem Duration</i>	Start	<i>Start_Date</i>
At Completion Duration	Duration	<i>Duration</i>	Finish	<i>Finish_Date</i>
Activity Type	-	<i>Task Type</i>	Remaining Duration	<i>Remaining_Duration</i>
Start	Start	<i>Start</i>	Duration	<i>Scheduled_Duration</i>
Finish	Finish	<i>Finish</i>	Predecessors	<i>Predecessors</i>
Successors	Successors	<i>Succeeding</i>	Successors	<i>Successors</i>
Predecessors	Predecessors	<i>Preceding</i>	Detail Schedule Map	<i>Detail_Schedule_Map</i>
Critical	Critical	<i>Critical</i>	Constraint Type	<i>Constraint_Type</i>
Free Float	Finish Slack	<i>Free Finish Float</i>	Finish Slack	<i>Finish_Slack</i>
-	Start Slack	<i>Free Start Float</i>	Start Slack	<i>Start_Slack</i>
Total Float	Total Slack	<i>Total Finish Float</i>	Total Slack	<i>Total_Slack</i>
-	Free Slack	<i>Total Start Float</i>	Free Slack	<i>Free_Slack</i>
GSDO-SRB Notes	-	<i>GSDO SRB Notes</i>	Milestone	<i>Milestone</i>
Primary Constraint	Constraint Type	<i>Constraint</i>	Rollup	<i>Rollup</i>
Calendar	Task Calendar	<i>Calendar</i>	Critical	<i>Critical</i>
(GSDO) Risk ID	(JACS) Risk ID	<i>Risk ID</i>	Task Calendar	<i>Task_Calendar</i>
-	Milestone		(JACS) Risk ID	<i>Risk ID</i>
-	Rollup		-	<i>Task Type</i>

Items in **BOLD** Required for Import and Analysis

- ◆ **Access to file import functions, SONIC Restart**

- ◆ **Access to *Metrics* tool**

- Provide summary of schedule activities with typical metrics such as: Task Type, Constraints, Float, Predecessors, Successors, Criticality
- Provide metrics for tracking activity completion
- Provide in-depth summary of Normal activities
- Provide Error Checking of Start and Finish Dates
- Provide summary of linked calendars and mapped risks

- ◆ **Access to other analysis modules**

- *RABBIT Hole* (Predecessor & Successor variants), *Six Degrees of BACON*, and PEEK-A-BOO
 - Provide schedule predecessor/successor analysis, schedule activity connectivity determinator, and IMS keyword search capability
 - (Details to follow...)

- ◆ ***Limitations:***

- *Maximum of 59 Risks & Calendars will be listed for given analyzed schedule*

- ◆ **Located on Metrics worksheet**
- ◆ **Uses same Schedule selection as *Metrics* analysis**
- ◆ **Expanded to include directional variants**
 - Predecessor Chaser
 - Successor Chaser
- ◆ **User enters Schedule ID in pop-up dialog box**
 - Defaults to 1st Activity ID in schedule
- ◆ **Outputs alphabetical list of all preceding activities**
 - Identifies *Activity ID, Description, Task Type, Criticality, Start & Finish Dates*
 - *Summarizes # Predecessors & Successors to identify major nodes*
- ◆ **Provides export capability into CSV formatted file (*Under Development*)**
 - *RABBIT DROPS (RABBIT Data Reducer for Outputting Project Schedule)*
 - *Primavera export not viable due to limitations on Primavera Import Fields*
 - *MS Project Export achievable via CSV file, but not all fields*
 - *Open file, import with New Map, ignore errors for calendar names...*
- ◆ **Limitations:**
 - *Schedules must be imported in IMS format*

- ◆ **Located on Metrics worksheet**
- ◆ **Uses same Schedule selection as *Metrics* analysis**
- ◆ **User selects from pull-down list search algorithm**
 - Varies how path determined by direction of reading activity predecessor list
- ◆ **User enters Schedule IDs in pop-up dialog box**
 - Defaults to values of previous run
- ◆ **Provides sequence from latest activity back to earliest activity**
 - i.e. follows predecessors backwards, identifying Task Type and Float
- ◆ **Note:**
 - *Will reverse activity order if necessary (i.e. ID2 is successor of ID1)*
 - *Will identify if no connectivity exists*
- ◆ **Limitations:**
 - *Schedules must be imported in IMS format*
 - *Multiple paths are possible, and no guarantee to find shortest, longest or most critical path*

RABBIT Hole and Six Degrees of BACON



User Selects Schedule To Analyze And Runs Module

Page Navigation Controls
 <Go Top> = Metrics Default View
 <Go Level 1> = RABBIT Hole Default View

Select BACON Path Algorithm

Into the RABBIT Hole - Successor Chaser

#	Schedule ID	Description	Task Type	Critical	Suci Prei Con	Start Date	Finish Date	Cal	7	Backwards Path	Tot
1/1	LO	SPACE SHUTTLE LAUNCH (for reference only)	Start Milestone	Critical	tp5 tmd Mu	03/14/2011	03/15/2011	24 Hours		tp37	
1/1	tp15	APU/Hydraulic	Normal	Critical	tp25 tp8.29	03/18/2011	03/18/2011	24 Hours		tp25a	
1/1	tp25a	APU heater tank	Normal	Critical	tp3 tp15	03/19/2011	03/20/2011	24 Hours		tp15	
1/1	tp25b	Cockpit switch	Normal	Critical	tp3 tp8.29	03/20/2011	03/25/2011	24 Hours		tp8.29	
2/1	tp37	OMS 2 Burn - target 202.5 x 141.5 statute miles (TGO 2:49)	Finish Milestone	Critical	tp4 tp21 Mar	03/25/2011	04/03/2011	24 Hours		tp8.23	
1/0	tp40	On-Orbit Operations Begin	Normal	Critical	tp3 Fini	04/03/2011	05/15/2011	24 Hours		tp5	
1/1	tp5	Launch window closes (Flight Day 3 rendezvous)	Normal	Critical	tp8 LO	03/15/2011	03/16/2011	24 Hours		lo	
1/1	tp8.29	Main Engine Cutoff (MECO) commanded	Normal	Critical	tp8 tp5	03/16/2011	03/17/2011	24 Hours			
1/2	tp8.29	Zero thrust - orbit is 136 x 36 statute miles	Normal		tp1 tp8.23	03/17/2011	03/18/2011	24 Hours			
0	Activities with Duplicate Successors										

Rabbit Hole Starting Activity ID

Relevant Schedule Activity Details

Predecessor/Successor List

Predecessors / # Successors

7	Backwards Path	Total Finish Float	Task Type	Description
	tp37	-5	Finish Milestone	OMS 2 Burn - target 202.5 x 141.5 statute miles
	tp25a	-7	Normal	APU heater tank/fuel line/water system
	tp15	-1	Normal	APU/Hydraulic shutdown
	tp8.29	-7	Normal	Zero thrust - orbit is 136 x 36 statute miles
	tp8.23	0	Normal	Main Engine Cutoff (MECO) commanded
	tp5	-3	Normal	Launch window closes (Flight Day 3 rendezvous)
	lo	-5	Start Milestone	SPACE SHUTTLE LAUNCH (for reference only)

Path from Activity 1 to Activity 2

- ◆ **Located on Metrics worksheet**
- ◆ **Uses same Schedule selection as *Metrics* analysis**
- ◆ **User selects search data field (Description, Predecessors, Successors)**
 - Defaults to Description
- ◆ **User enters Keyword Search String in pop-up dialog box**
 - Defaults to previous search keyword
- ◆ **Outputs alphabetical list of all activities with keyword in Desired field**
 - Identifies *Schedule Activity ID, Description, Task Type, Criticality, Start & Finish Dates, Constraints, Successors, Predecessors and Calendar*

- ◆ **Limitations:**
 - *Schedules must be imported in IMS format*



User Selects Schedule To Analyze

Run Module

Select Search Field
Description / Predecessors / Successors

Page Navigation Controls
<Go Top> = Metrics Default View
<Go Level 2> = PEEK-A-BOO Report

The screenshot shows the SONIC3+ software interface. At the top, there are several buttons: 'RUN Metrics', 'Enter Predecessor Rabbit Hole', 'Enter Successor Rabbit Hole', and 'PEEK-A-BOO'. Below these are navigation controls: 'Go Top', 'Go Level 1', and 'Go Level 2'. A 'BACON' button is also visible. The main part of the interface is a table titled 'PEEK-A-BOO (Probing Expressive Element Keywords and Bearing Orderly Outputs)'. The table has columns for Schedule ID, Description, Task Type, Critical, Start Date, Finish Date, Const, Int, Succeeding, Preceding, and Calendar. The first row of data is highlighted.

Schedule ID	Description	Task Type	Critical	Start Date	Finish Date	Const	Int	Succeeding	Preceding	Calendar
tm9h	Launch Final Built-in Hold	Start Milestone	Critical	01/01/2011	01/31/2011	Start On		tm9c	FRR, WDR, tm20c	24 Hours
tm9c	Launch countdown resumes	Normal	Critical	01/31/2011	02/15/2011			tm7.30	tm9h[sf], tm9h[ss]	24 Hours
tm0.16	Activate launch sound suppression system	Normal		03/10/2011	03/12/2011			tm0.10	tm0.21	24 Hours
LO	SPACE SHUTTLE LAUNCH (for reference only)	Start Milestone	Critical	03/14/2011	03/15/2011	Must Start On		tp5	tm0.066	24 Hours
tp5	Launch window closes (Flight Day 3 rendezvous)	Normal	Critical	03/15/2011	03/16/2011			tp8.23	LO	24 Hours

User-defined keyword
And
Number of matches

Results: List of Schedule Activities with
Keyword in Description



- ◆ **Calculate Delta Start and Finish Dates of JCL Analysis Schedule to IMS**
 - Uses custom data field that associates Analysis Schedule activity ID with set of mapped IMS activity IDs
 - Determines Earliest Start / Latest Finish Dates
 - Identify activities with varying degrees of mismatch (> 2; >30; > 365 days)
 - Low-end value can be varied from 1-9 days, allowing for round-off errors
 - Identify activities with offset *Start Date*, but same *Duration*
 - Identify mapped activities not in IMS
- ◆ **Calculate activity durations via multiple methods to validate consistency**
- ◆ **Compare activity criticality from mapped activities to JCL Analysis Schedule**

- ◆ **Limitations:**
 - *Analysis Schedule data must be on Worksheet with root name “JCL”*
 - *IMS data must be on Worksheet with root name “IMS”*

Date Compare



User Selects Schedules To Analyze And Presses <RUN>

Error Check Verify Start Dates Precede Finish Dates

Identify Activity Date Shift vs. Activity Duration Change

SONIC Compares Dates Within User-Defined Tolerance

Analysis Schedule: JCL Fake 3-31-11		14	JCL Fake 3-31-11		SONIC ²										Goto Unmatched IDs		Calendar Day Delta		0.0% Crit Activities Match from Activity Sc					
IMS Schedule: IMS Fake 3-31-11		27	IMS Fake 3-31-11												Off by More Than 30 Days		0 (0.0%)		0 (0.0%)					
															Off by More Than 365 Days		0 (0.0%)		0 (0.0%)					
															13		13		0		9			
			Finish BEFORE Start Date												1		0		+/-2		+/-2 Matches=13		+/-2 Matches=12	
JCL Activity ID	JCL Activity Name	JCL Start	JCL Finish	JCL Remaining Duration	JCL Duration	Delta Days	Delta Work Day	Net Work Days No Holiday	JCL Primavera ID	Earliest IMS Start	Latest IMS Finish	Net Days	Net Work Day	Delta (JCL-IMS) Start	Delta (JCL-IMS) Finish	Critical Match (JCL/IMS)	Greater Than +/-2 days	DeltaStart < DeltaFinish						
1	tm9h: Launch Final Built-in Hold	01/01/2011	01/31/2011	3		30	20	20	tm9h	01/01/2011	01/31/2011	30	19	-	-	Cr / Cr								
2	tm9c: Launch countdown resumes	01/31/2011	02/18/2011	1		18	14	15	tm9c	01/31/2011	02/15/2011	15	11	-	3.0	Cr / Cr	>2	Chk Dur						
3	Solid Rocket Booster Launch Preparations	02/19/2011	03/10/2011	13		19	13	13	tm5b, tm0.21	02/20/2011	03/10/2011	18	12	(1.0)	-	Cr / No		Chk Dur						
4	Orbiter Preparations	02/16/2011	03/03/2011	22		15	11	11	tm7.30, tm5a, tm3.55a, t	02/16/2011	03/03/2011	15	10	-	-	Cr / Cr								
5	tm2: Crew members close and lock visors	03/03/2011	03/03/2011	5		0	0	1	tm2.0	01/00/1900	01/00/1900	0	0	40,605.0	40,605.0	No / No								
6	Controller Activities	03/03/2011	03/13/2011	12		10	6	7	tm0.50, tm0.31, tm0.09	03/03/2011	03/13/2011	10	6	-	-	Cr / Cr								
7	Ground Activities	03/12/2011	03/10/2011	7		-2	-1	-2	tm0.16, tm0.10	03/10/2011	03/12/2011	2	1	2.0	(2.0)	No / No		Chk Dur						
8	Engine Start, Vehicle Release	03/13/2011	03/14/2011	3		1	0	1	tm0.066, tm0.0a, tm0.0b	03/13/2011	03/14/2011	1	0	-	-	Cr / Cr								
9	Liftoff - SPACE SHUTTLE LAUNCH	03/14/2011	03/15/2011	8		1	1	2	LO	03/14/2011	03/15/2011	1	1	-	-	Cr / Cr								
10	Launch window closes	03/15/2011	03/16/2011	4		1	1	2	tp5	03/15/2011	03/16/2011	1	1	-	-	No / Cr								
11	Ascent Activities #1	03/16/2011	03/18/2011	6		2	2	3	tp8.23, tp8.29	03/16/2011	03/18/2011	2	2	-	-	Cr / Cr								
12	Ascent Activities #2	03/18/2011	03/20/2011	4		2	0	1	tp15, tp25a	03/18/2011	03/20/2011	2	0	-	-	Cr / Cr								
13	Ascent Activities #3	03/20/2011	04/03/2011	3		14	9	10	tp25b, tp37	03/20/2011	04/03/2011	14	9	-	-	No / Cr								
14	On-Orbit Operations Begin	04/03/2011	05/15/2011	8		42	29	30	tp40	04/03/2011	05/15/2011	42	29	-	-	No / Cr								
									Identify ALL Invalid Mapped IMS IDs										1 Missing Mapped IDs					
																			tm2.0					



- ◆ **Calculate Delta Start and Finish Dates of two like schedules**
 - Use schedule ID as common link
 - Identify activities with varying degrees of mismatch (> 2; >30; > 365 days)
 - Low-end value can be varied from 1-9 days, allowing for round-off errors
 - Identify activities with offset *Start Date*, but correct *Duration*
 - Identify mapped activities not in IMS
- ◆ **Calculate activity durations via multiple methods to validate consistency**
- ◆ **Compare activity criticality between two schedules**

- ◆ **Limitations:**
 - *Schedules must be imported in IMS format*
 - *1st 3 characters of Worksheet name must match for each schedule*

Schedule-to-Schedule (S2S)



User Selects Schedules To Analyze And Presses <RUN>

Error Check Verify Start Dates Precede Finish Dates

SONIC Compares Dates Within User-Defined Tolerance

Identify Activity Date Shift vs. Activity Duration Change

Schedule 1 ID	Schedule 1 Activity Name	Schedule 1 Start	Schedule 1 Finish	Schedule 1 Total Finish Float	Schedule 1 Rem Duratic	Schedule 1 Duration	Delta Days	Delta Work Day	Net Work Days No Holiday	Schedule 2 Start	Schedule 2 Finish	Schedule 2 Total Finish Float	Net Days	Net Work Day	Delta (S1-S2) Start	Delta (S1-S2) Finish	Delta (S1-S2) Total Finish Floa	Critical Match (#1/#2)	Greater Than +/-2 days	DeltaSta <> DeltaFin
tm3.55b	Start Orbiter main engine gimbal profile test	02/24/2011	03/01/2011	-5	2	5	3	4		02/24/2011	03/01/2011	-5	5	3	-	-	-	No / No		
tm2.55	Retract gaseous oxygen vent arm	03/01/2011	03/03/2011	-3	6	2	2	3		03/01/2011	03/03/2011	-3	2	2	-	-	-	No / No		
tm2	Crew members close and lock visors	03/03/2011	03/03/2011	0	5	0	0	1		01/00/1900	01/00/1900	0	0	0	40,605.0	40,605.0	-	No / No		
tm0.50	Orbiter transfers from ground to internal power	03/03/2011	03/06/2011	-7	3	3	1	2		03/03/2011	03/06/2011	-7	3	1	-	-	-	Cr / Cr		
tm0.31	Onboard computers take control of countdown	03/06/2011	03/07/2011	-2	5	1	0	1		03/06/2011	03/07/2011	-2	1	0	-	-	-	Cr / Cr		
tm0.21	Solid Rocket Booster steering test	03/07/2011	03/10/2011	-7	8	3	3	4		03/07/2011	03/10/2011	-7	3	3	-	-	-	No / No		
tm0.16	Activate launch sound suppression system	03/10/2011	03/12/2011	-9	9	2	1	2		03/10/2011	03/12/2011	-9	2	1	-	-	-	No / No		
tm0.10	Activate main engine hydrogen burnoff system	03/12/2011	03/12/2011	-5	7	0	0	0		03/12/2011	03/12/2011	-5	0	0	-	-	-	No / No		
tm0.09	KSC ground commanding removed by GLS (T-9 sec	03/12/2011	03/13/2011	-8	9	1	0	0		03/12/2011	03/13/2011	-8	1	0	-	-	-	No / No		
tm0.066	Main Engine start (T-6.6 seconds)	03/13/2011	03/14/2011	-6	3	1	0	1		03/13/2011	03/14/2011	-6	1	0	-	-	-	Cr / Cr		
tm0.0a	Solid Rocket Boosters ignite	03/14/2011	03/14/2011	-4	2	0	0	1		03/14/2011	03/14/2011	-4	0	0	-	-	-	Cr / Cr		
tm0.0b	Explosive bolts release Solid Rocket Boosters	03/14/2011	03/14/2011	-7	3	0	0	1		03/14/2011	03/14/2011	-7	0	0	-	-	-	Cr / Cr		
LO	SPACE SHUTTLE LAUNCH (for reference only)	03/14/2011	03/15/2011	-6	8	1	1	2		03/14/2011	03/15/2011	-6	1	1	-	-	-	Cr / Cr		
tp5	Launch window closes (Flight Day 3 rendezvous)	03/15/2011	03/16/2011	-9	4	1	1	2		03/15/2011	03/16/2011	-9	1	1	-	-	-	Cr / No		
tp8.23	Main Engine Cutoff (MECO) commanded	03/16/2011	03/17/2011	-2	6	1	1	2		03/16/2011	03/17/2011	-2	1	1	-	-	-	Cr / Cr		
tp8.29	Zero thrust - orbit is 136 x 36 statute miles	03/17/2011	03/18/2011	-5	2	1	1	2		03/17/2011	03/18/2011	-5	1	1	-	-	-	No / No		
tp15	APU/Hydraulic shutdown	03/18/2011	03/18/2011	-2	6	0	0	1		03/18/2011	03/18/2011	-2	0	0	-	-	-	Cr / Cr		
tp25a	APU heater tank/fuel line/water sys 1A, 2A, 3A	03/19/2011	03/20/2011	-8	4	1	0	0		03/19/2011	03/20/2011	-8	1	0	-	-	-	Cr / Cr		
tp25b	Cockpit switches to "auto"	03/20/2011	03/25/2011	-6	3	5	4	5		03/25/2011	03/20/2011	-6	-5	-4	(5.0)	5.0	-	Cr / No	>2	Chk Dur
tp37	OMS 2 Burn - target 202.5 x 141.5 statute miles	03/25/2011	04/03/2011	-7	3	9	5	6		03/26/2011	04/03/2011	-6	8	4	(1.0)	-	(1.0)	Cr / Cr		Chk Dur
tp40	On-Orbit Operations Begin	04/03/2011	05/15/2011	-6	8	42	29	30		04/03/2011	05/15/2011	-2	42	29	-	-	(4.0)	Cr / Cr		

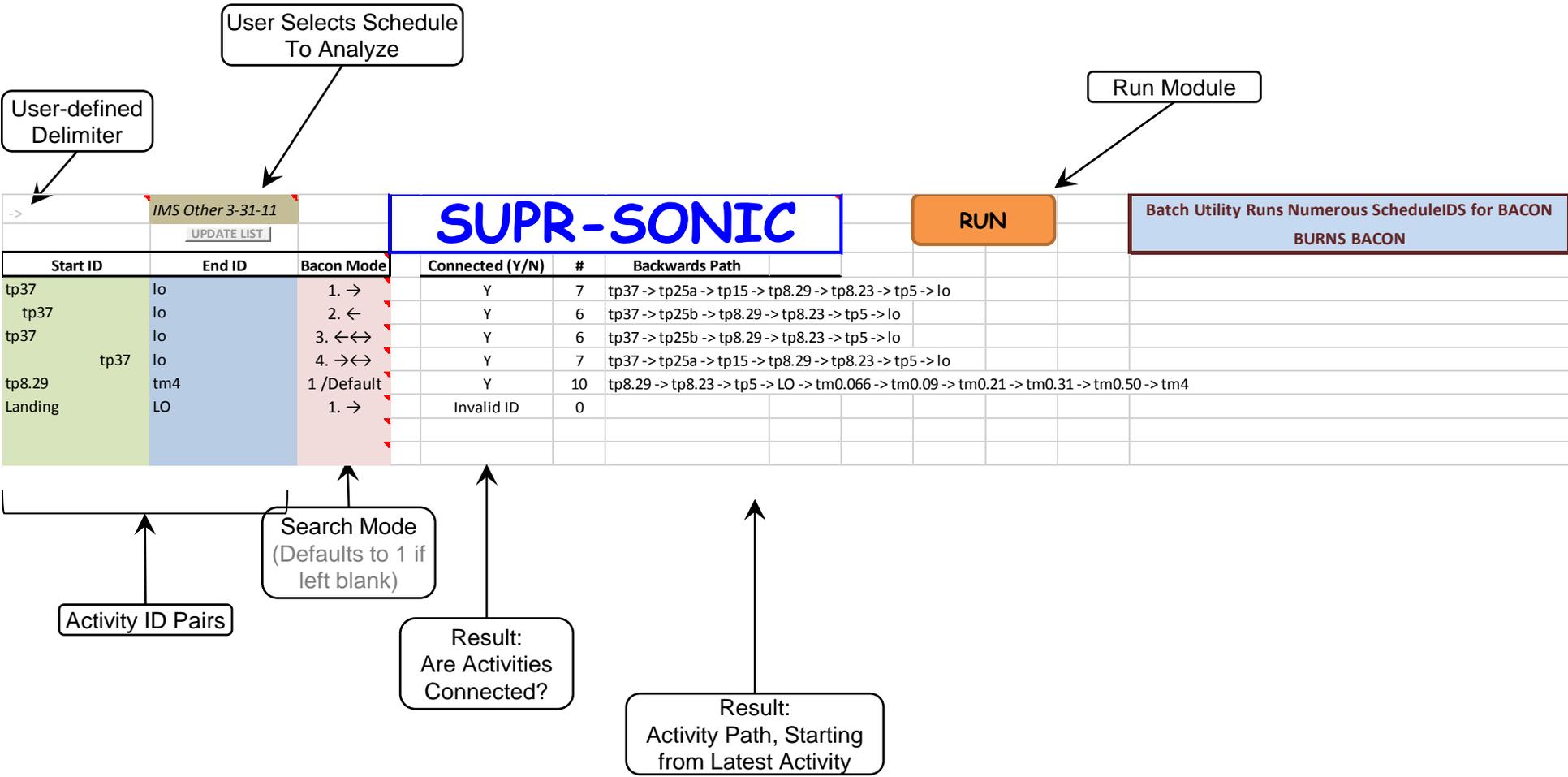
Identify ALL Invalid Mapped IMS IDs

1 Missing Mapped IDs
tm2

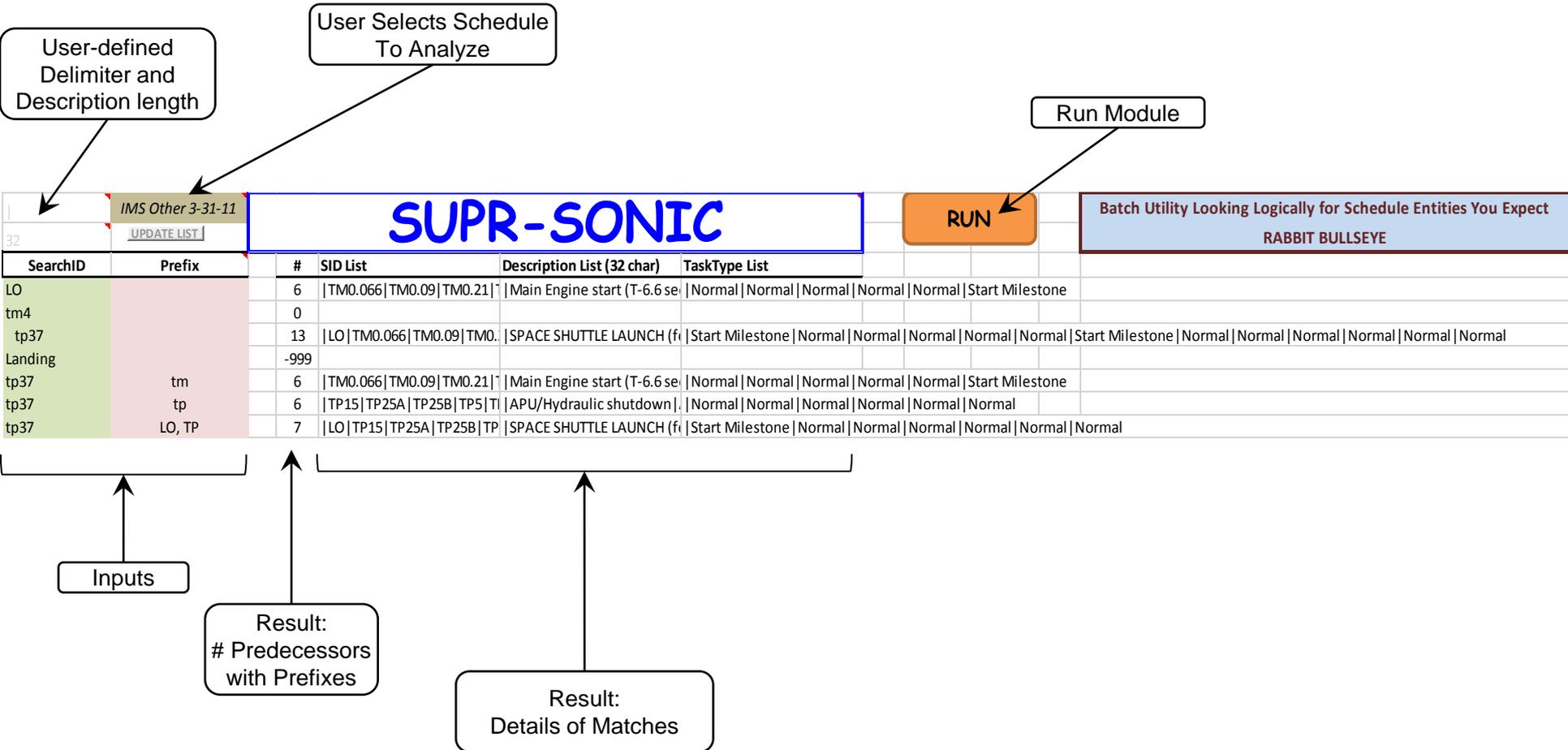
- ◆ **Located on BurnsBacon worksheet**
- ◆ **Batch mode of *Six Degrees of Bacon***
- ◆ **User provides schedule activity ID pairs and Bacon Search Mode**
 - Activity Pairs = Schedule Activity IDs
 - User selects search mode from pull-down list for each Activity Pair
- ◆ **Provides sequence from latest activity back to earliest activity**
 - i.e. follows predecessors backwards
 - Text field with user-defined delimiter

- ◆ **Note:**
 - *Will reverse activity order if necessary (i.e. End is successor of Start)*
 - *Will identify if no connectivity exists*

- ◆ **Limitations:**
 - *Schedules must be imported in IMS format*
 - *Multiple paths are possible, and no guarantee to find shortest, longest or most critical path*



- ◆ **Located on Bullseye worksheet**
- ◆ **Batch mode of *RABBIT Hole (Predecessor Chaser)***
- ◆ **User provides Schedule Activity ID and ID prefixes**
 - ID prefix = comma-delimited list of Schedule ID classes
 - No prefix = All Predecessors
- ◆ **Results = Predecessor list of Schedule Activity IDs with desired prefixes**
 - Also provides Descriptions and Task Type
 - Results “flattened” = delimited by user-specified delimiter (Default = “|”)
 - Allows post-processing within MS Excel using Data/Text-to-Columns
 - User limits Descriptions length (Default = 32, Max = 128)
 - Flags Schedule Activity IDs not found = -999
- ◆ **Limitations:**
 - *Schedules must be imported to IMS format*



Developed “How to’s...”

How to Import IMS from Primavera

- ◆ **IMS from Primavera**
 - Export Schedule into MS Excel with Column Titles in Row 1
 - Create SONIC layout with desired data fields (order not important)
 - Select All <Ctrl-A>, Copy into Clipboard <Ctrl-C>, Paste into new XLS file <Ctrl-V>
 - Note 1 – Method allows importing entire schedule made up of multiple projects
 - Note 2 – Section headers are mapped to “Summary” tasks
 - Open SONIC
 - Goto *Metrics* Worksheet
 - Press <Load IMS^{Prim}> Button
 - Using File Dialog, locate exported file and press <Open>
 - If file has more than 1 worksheet, select desired worksheet
 - Only 1st two worksheets can be imported
 - Enter IMS Data Date
 - Rename “IMS” in worksheet name to custom 3-character code per user needs
 - Enjoy ☺
 - Post-Processing Recommendation:
 - Filter imported schedule in SONIC and delete activities with no content, such as Summary (from section headers)

How to Start Using SONIC-Share

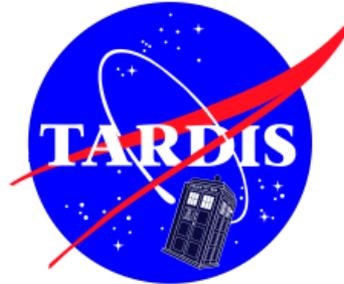
- ◆ **Open SONIC - Share**
 - Note: No schedules included
 - Placeholder Worksheets are included with made-up data
 - SONIC requires 1 JCL, 1 IMS, and 1 other worksheet in addition to software
 - Metrics, DateCompare, S2S, BurnsBacon, MS Blank and JCL Blank required last six (6) worksheets of SONIC
 - Import schedules
 - Follow instructions on following pages to import Primavera and Project schedules
 - User may rename “IMS” to custom 3-character code to create other schedule
 - Create sub-system schedules
 - Maintain end of worksheet name as date (“ABC description 3/14/15”)
 - Run Modules
 - Metrics for any schedule
 - DateCompare for JCL and IMS schedule
 - S2S, RABBIT Hole and BACON for non-JCL schedules
 - Enjoy ☺

How to Identify Predecessors/Successors

- ◆ **Identify Predecessors/Successors (Into the RABBIT Hole)**
 - Open SONIC
 - Goto *Metrics* Worksheet
 - Select desired schedule to analyze from drop-down list in cell B1
 - Press <Enter Predecessor RABBIT Hole> or <Enter Successor Rabbit Hole>
 - Enter Activity ID in pop-up dialog box
 - Enjoy ☺
- ◆ **To Export results**
 - Press <Export> located next to “Into the RABBIT Hole” title block
 - Enjoy ☺

How to Import IMS from MS Project

- ◆ **IMS from MS Project**
 - <Save As> Schedule into MS Excel (.xlsx)
 - Create custom Map to export desired fields
 - Update MS Excel field names as needed
 - Open SONIC
 - Goto *Metrics* Worksheet
 - Press <Load IMS^{MS}> Button
 - Using File Dialog, locate exported file and press <Open>
 - If file has more than 1 worksheet, select desired worksheet
 - Only 1st two worksheets can be imported
 - Enter IMS Data Date
 - Rename “IMS” in worksheet name to custom 3-character code per user needs
 - Enjoy ☺



How to Determine Activity Connectivity

- ◆ **Determine Activity Connectivity (Six Degrees of BACON)**
 - Open SONIC
 - Goto *Metrics* Worksheet
 - Select desired schedule to analyze from drop-down list in cell B1
 - Select desired path algorithm from drop-down list in cell K1
 - Press <BACON>
 - Enter Activity ID 1 in pop-up dialog box
 - Enter Activity ID 2 in pop-up dialog box
 - Enjoy ☺

How to Import Analysis Schedule from MS Project

- ◆ **Analysis Schedule from MS Project**
 - <Save As> Schedule into MS Excel (.xlsx)
 - Create custom Map to export desired fields, updating MS Excel field names as needed
 - Open SONIC
 - Goto *Metrics* Worksheet
 - Press <Load JCL^{MS}> Button
 - Using File Dialog, locate exported file and press <Open>
 - If file has more than 1 worksheet, select desired worksheet
 - Only 1st two worksheets can be imported
 - Enter Analysis Schedule Data Date
 - Enjoy ☺

How to Compare Like Schedule Dates

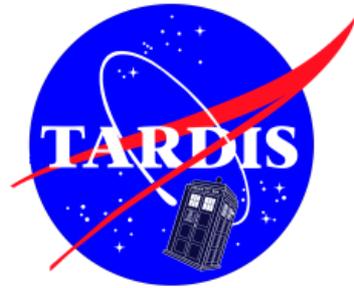
- ◆ **Compare Like Schedule Dates**
 - Open SONIC
 - Goto S2S Worksheet
 - Select desired Schedule from drop-down list in cell B1
 - Select desired Schedule of same type from drop-down list in cell B2
 - Press <Run>
 - Press <Goto Unmatched IDs> button to scroll to list of missing IDs
 - Press <Goto Top> to return view to top of page
 - Enjoy ☺

How to Delete Schedules

- ◆ **Delete Schedules**
 - Open SONIC
 - Delete Worksheets with unwanted schedules
 - Goto *Metrics* or *DateCompare* Worksheet
 - Press <Update List>
 - Enjoy ☺
- ◆ **Common Error:**
 - User deletes/rename Schedule name and does not press <Update List>

- ◆ **Dates follow U.S. convention m/d/y**
- ◆ **Source file column titles must match desired labels**
 - No limitation on order/sequence of data columns
- ◆ **7 Worksheets of App File must be *Metrics, DateCompare, S2S, BurnsBacon, Bullseye, IMS Blank* and *JCL Blank***
- ◆ **3 Worksheets of Companion File must be JCL*, and two IMS***
- ◆ **Module-specific limitations, as identified above**

Back-Up



- ◆ **Automate loading & pre-processing of Primavera and Project input files**
 - Primavera IMS File Import
 - Create Start/Finish Dates for Finish/Start Milestones
 - Change Task Type “Task Dependent / Resource Dependent” to “Normal”
 - Change Task Type “Level of Effort” to “Hammock”
 - Change Task Type “” to “Summary”
 - Change Criticality formatting from “Yes/No” to “Critical/_”
 - Convert durations and Float/Slack to numbers (from “#d”)
 - Format dates to mm/dd/yyyy
 - Microsoft Project File Import
 - Calculate Task_Type from Milestone and Rollup data fields
 - Convert durations and Float/Slack to numbers (from “# day(s)”)
 - Change Criticality formatting from “Yes/No” to “Critical/_” (if needed)
 - Format dates to mm/dd/yyyy
- ◆ **Update Pull-Down Lists to only include schedules**
 - *Metrics* - All schedules
 - *DateCompare* - JCL on Analysis Schedule list and IMS on IMS list
 - Values set at last valid schedule worksheet name

◆ Predecessor (Successor) Determination

- Identify ALL predecessors (successors) for a given schedule activity
- Export basic schedule data to Microsoft CSV file (MS Project compatible)

◆ Activity Connections

- Determine existence of connectivity between 2 schedule activities
- Identify path between 2 activity schedules via up to 4 search methods
- Run in Batch-Mode for list of Activity ID pairs

◆ Enhanced Metrics

- Activity completion metrics added (total, prior month, subsequent month)
- Normal Activities with Missing Logic metric added

◆ Keyword Search Reports

- Schedule description keyword search
- Overcomes MS Excel limits with Auto-Filter on very large schedules

◆ Separate App and database files