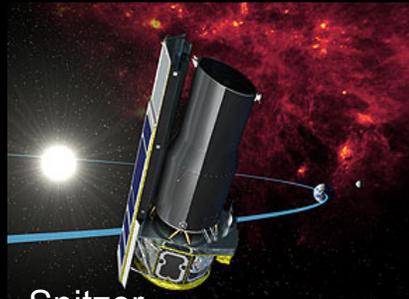




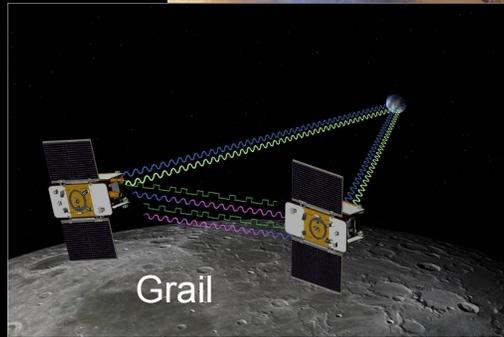
Automated Sequence Processor Something Old, Something New



Spitzer



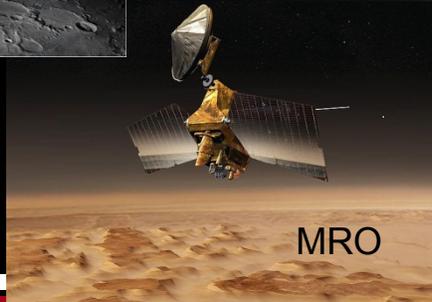
Odyssey



Grail



Juno



MRO

ASP Users

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Agenda

- Background
- Automated Sequence Processor (ASP) Introduction
- ASP Process
- Documenting and Analyzing ASP
 - ASP Documentation
 - Documentation Software Process
 - Sample Call Trees
- ASP Users Group
- ASP Users Group Composition
- Decisions on Revitalizing ASP
- Required Design Characteristics
 - Current ASP Display
 - ASP Work Flow Prototyping
- Conclusion
- References



Background

- High productivity required for operations teams to meet schedules
- Risk must be minimized
- Scripting used to automate processes
- Scripts perform essential operations functions

Automated Sequence Processor (ASP) was a grass-roots task built to automate the command uplink process

System engineering task for ASP revitalization organized

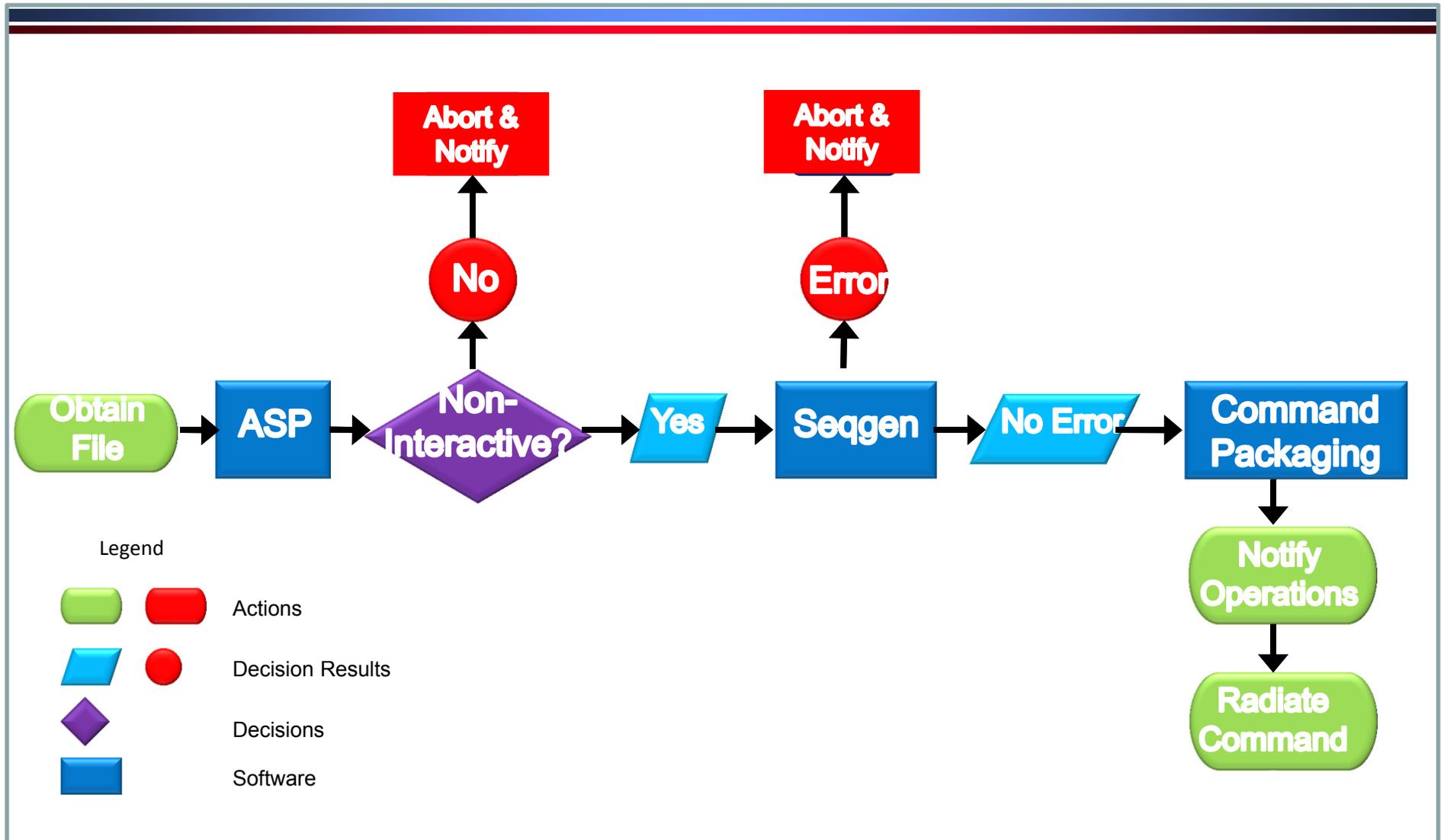


ASP Introduction

- ASP is a set of approximately 200 scripts written in Perl, C Shell, AWK and other scripting languages.
- ASP processes/checks/packages non-interactive commands automatically.
 - Non-interactive commands are guaranteed to be safe and have been checked by hardware or software simulators.
- ASP checks that commands are non-interactive.
- ASP processes the commands through a command simulator and then packages them if there are no errors.
- ASP must be active 24 hours/day, 7 days/week.



ASP Process





Documenting & Analyzing ASP

- Since ASP was built as an evolutionary grass-roots task by multiple operations teams, documentation is minimal.
- Newer scripts often used smaller existing scripts.
- Learning is performed on the job.
- The first task of the revitalization effort has been to document ASP.
- Documentation took two forms:
 - Spread sheet containing the following information:
 - name of script
 - scripting language
 - brief functional description
 - inputs and outputs
 - scripts called by it
 - scripts it calls
 - Call trees of the scripts for visualization
- Documentation has been created by software

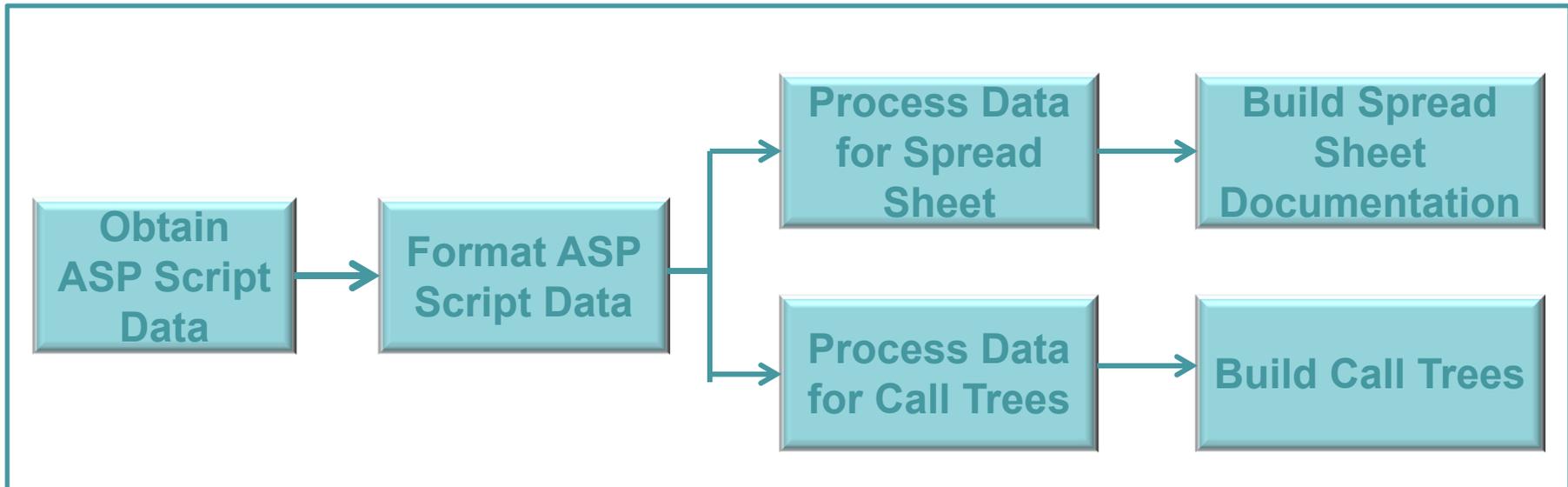


ASP Documentation

Identifier	Details			Parameters		Communication	
	Name of Script	Type	Functional Description	Inputs	Outputs	Called By	Calls
[1-5] Used for color coordination of "type" column.	Main file name	perl, cshell, shell, awk, text, other	Brief description of purpose of script.	What the input names are	What the script outputs	Scripts that call this script $\Delta = \text{none}$	Scripts that this script calls $\Delta = \text{none}$
2	add_command	c-shell	Adds commands to the spacecraft activity sequence file (sarf)	step_num offset offset_type command param sarf_name	command appended to "sarf_name.sarf" file	file_load	Δ



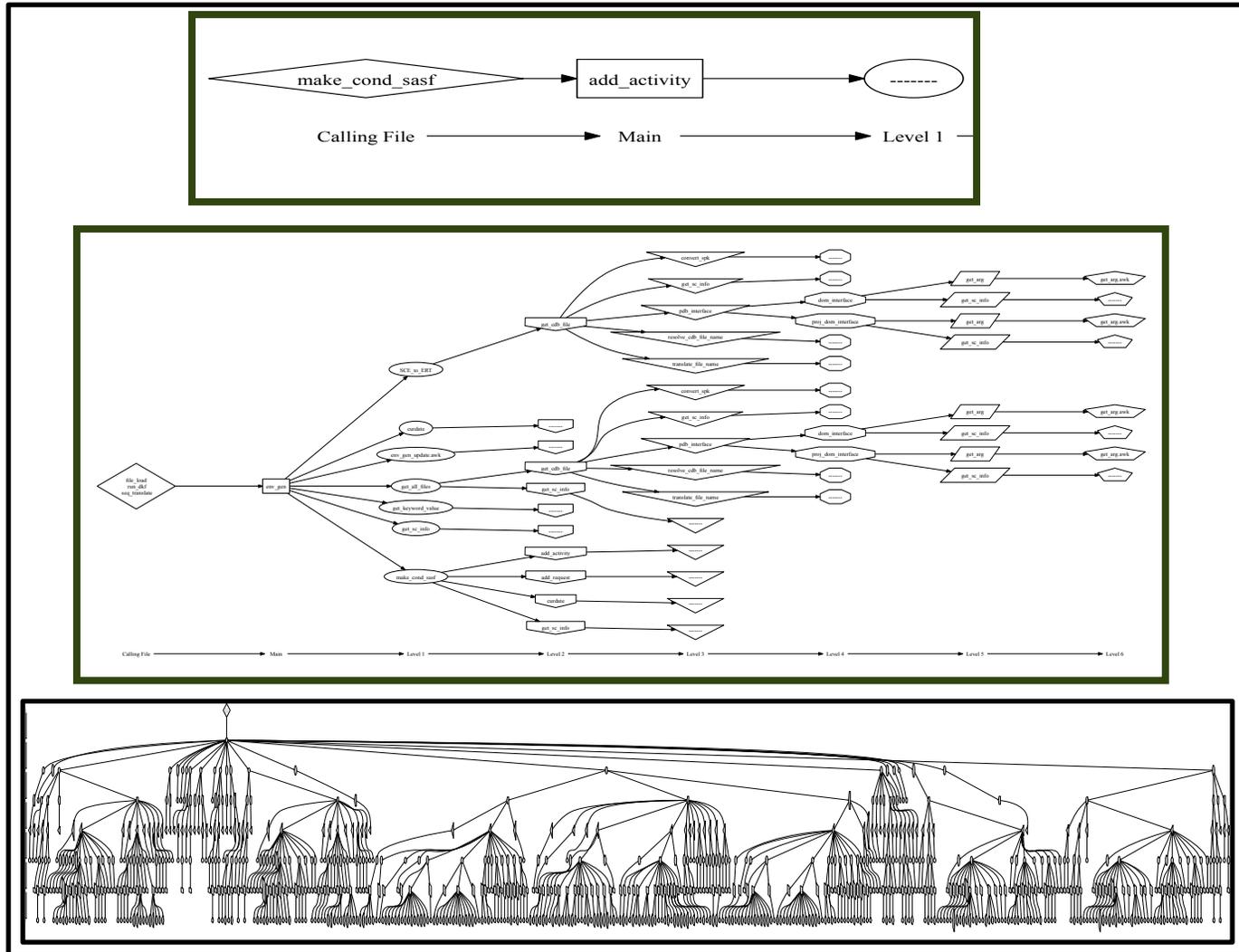
Documentation Software Process





Sample ASP Call Trees

- Call trees have varying degrees of complexity:



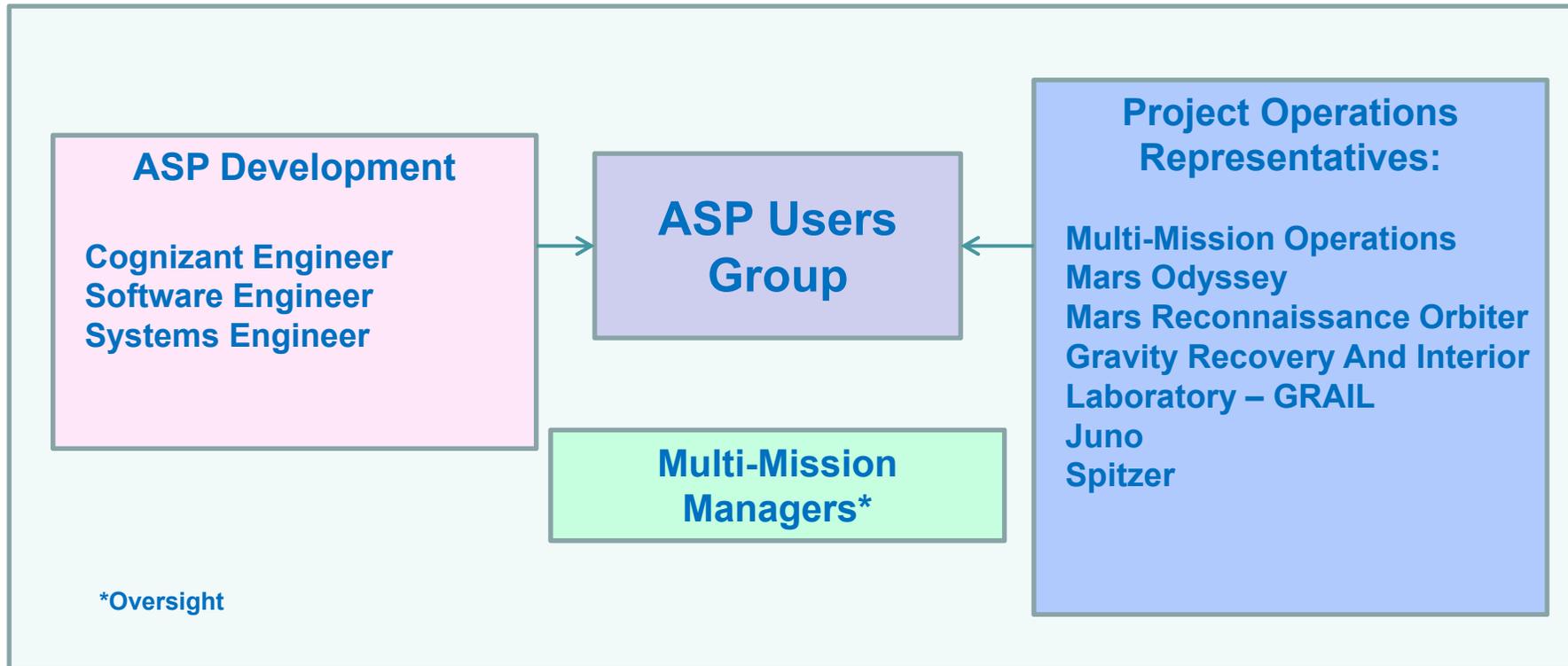


ASP User's Group

- Elements for revitalization
 - Understanding the current ASP capabilities
 - Understanding the users' current and future needs
- User Group
 - Each mission using ASP provides a representative
 - Cognizant Engineer for ASP runs the meetings
 - Meets monthly
 - Determines priorities for fixing current ASP issues
 - Discusses progress of revitalization and the revitalization capabilities



ASP User Group Composition





Decisions on ASP Revitalization



ASP revitalization possibilities:

1. Start from scratch including obtaining a new set of requirements
2. Upgrade the current system using the existing design
3. Use portions of the current system with a new design
4. Use a combination of the old requirements along with new requirements that determine the system's capabilities, but develop a new design and new software

Rationale:

- Graphical User Interface and Queuing have been recently redesigned and rewritten
- Internal ASP core has not been reworked in recent years
- New capabilities have been added without regard to overall cohesion or design
- Many different scripting languages have been used
- Maintenance is difficult
- Newer technologies have not been investigated to be used

Result: Select item 4 from the possibilities while maintaining the current ASP



Required Design Characteristics

- Since ASP was created by operations teams for themselves, revitalized ASP must contain the same functionality as the old one in terms of operations processes, procedures, and flexibility.
 - Current ASP allows operations teams to monitor the state of ASP processing including the processing queues and systems running ASP processors.
 - The GUI must reflect the above information.
 - Current ASP allows operations teams to modify ASP in real time to meet immediate needs.
 - ASP must be available for processing 24/7.



Current ASP Display

Current System



ASP State



Current Jobs



Wait Queue



Systems





ASP Work Flow Prototyping

- Because ASP is basically a workflow engine, commercial-off-the-shelf (COTS) workflow engines have been used in prototypes as part of the revitalization effort
- Criteria for workflow engine evaluation:
 - Process progress represented graphically
 - Customization
 - Mechanism for creating/using custom code (for example, REST Interface)
 - Web interface
 - Ability to use open source development environment (for example, Eclipse IDE)
 - Documentation and community support
 - Open source (if possible)



ASP Work Flow Prototyping

- Step 1 of prototyping:
Initial evaluation based on web site information

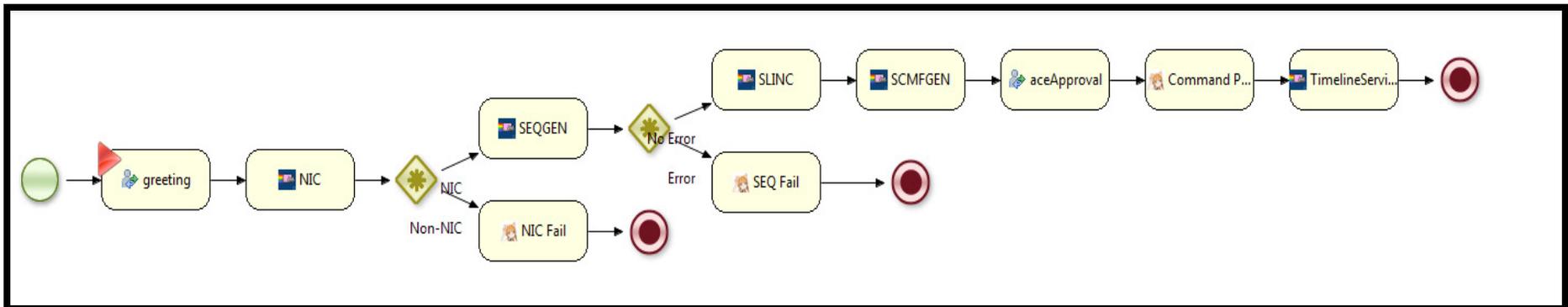
Workflow Engine	Customization	ReST Interface	Web Interface	Documentation	Community Support
jBPM	Y	Y	Y	Y	Y
Activity	Y	Y	Y	Y	Y
Intalio	N	N	Y	Y	Y
Apache ODE	Y	Y	Y	Y	Y
Open Business Engine	Y	N	N	Y-	N
Open for Business	Y	Y	N	Y-	N
Pegasus	Y	N	N	N	Y



ASP Work Flow Prototyping

- Prototyping step 2:
Select a work flow engine and create a prototype

Prototype ASP process in jBPM:



- Prototyping step 3:
Create more realistic prototype using actual software elements – to be completed this year



Conclusion

ASP is essential for JPL operations teams

ASP development continues to be a two-pronged effort

- Maintain current ASP for users
- Revitalize ASP for the future

Continuing the user group is a priority in accomplishing these goals

Automated Sequence Processor (ASP) –
Something Old, Something New



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