

# Joint JPL-GSFC Quality Mission Software Workshop

## GSFC Implementation Plan

Last Updated 5/2/01, 3:30 EST

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## Notes

- Westover contacts: Mary Floyd ([mfloyd@westover-gb.com](mailto:mfloyd@westover-gb.com), 301-345-3211), Angela Clark-Williams ([aclarkwilliams@westover-gb.com](mailto:aclarkwilliams@westover-gb.com), 301-345-3211)
- Looking into special events/entertainment activities at night.
- 1/18/01 - Telecon with JPL, possibly 15-20 attendees from JPL. Expect to receive assistance with Web Page development from Sandy Thomas/JPL for putting schedule on Web, attendees, etc.
- 1/19/01 - Added attendee list and updated session schedule
- 2/1/01 - Updated Master schedule to end early on third day. Updated co-chair names based on JPL inputs. Eliminated what was session 4 - Flight Software project/task management.
- 2/1/01 - Updated schedule again after telecon with Mary Ann and Chi.
- 2/8/01 - Added additional invitees, as per Elaine Shell's comments, Session 4 may be changed to Flight S/W testbeds/Infrastructure (S/W reuse) (co-chair S. Keake/582, Roger Lee - JPL) S/W infrastructure to support test-beds and test-bed development (product lines, software reuse, etc.)
- **2/9/01 - Updated invitee list, switched topics 2 and 5, Session 1=Roles and org models, Session 2=V&V of software, s/w stress testing based on feedback from GSFC co-chairs meeting held on 2/9/01**
- 2/13/01 - Change JPL co-chairs as per direction from Chi Lin.
- 2/15/01 - Added an agenda, supplies list and draft invitation
- 2/20/01 - Removed Lou Hallock and added Mike Bay/J&T from/to invitee list
- 2/28/01 - Session 4 changed to
  - Generic FSW High Fidelity Testbed Capabilities. Co-chair JPL ?, GSFC - Tom Clement
  - Added Ken as the co-chair of sub-session B, Generic FSW Test Cases for Various Mission Types under session #4- 4. Flight S/W testbeds - John Hackney/JPL
- 3/7/01 - Updated session #2 and invitee list, switched sessions #2 and #4.
- 3/12/01 - Added abstracts to several sessions, still need additional abstracts. Added 2 invitees for Mike Stark.
- 3/13/01 - Updated descriptions for two sessions.
- 3/14/01 - Added summary for session #3.
- 3/21/01 - Added three more JPL invitees.
- 4/2/01 - Added description for first informational session
- 4/11/01 - Added Laura Needels to the invitee list

The purpose of this document is to help plan the GSFC-JPL Quality Mission Software Workshop - 2001.

## Workshop Theme - Software Quality

The theme of this workshop is software quality as it applies to software development in general and not just flight software.

## Workshop Logistics

- Target date: April 24-26, Backup date: April 17-19
- Attendance is by invitation only - focus on the right people/skill mix
- Location - Williamsburg, VA
- Banquet style - all meals provided
- No video conference services provided
- Each session shall have a co-chair from GSFC and one from JPL

## Workshop Products

- Each working session should have a primary objective and deliverable.
- Products will be delivered from each workshop working session. Either a product will be delivered at the end of the workshop. The product may be a detailed action plan for follow-up activities after the workshop is completed.
- Generally, most products produced from the workshop will be detailed handbooks or requirements documents.
- Progress will be assessed and goals and metrics of success will be evaluated at the end of the workshop. Session organizers are responsible for producing a list of lessons learned and methods to improve the workshops

## Session Co-Chair Responsibilities

Session co-chairs are responsible for the following:

1. Establishing dialog with other co-chairs and topic presenters for the session
2. Defining the objectives of the session, MOU between JPL and GSFC for completion of the final product(s)
3. Defining the agenda and subtopics (if any) for the session

# Identifying the products and deliverables that are to be produced at the end of each working session

4. Chairing the session and providing a summary of the session results, and making sure minutes of the session are recorded.
5. Maintaining order and productivity during the session
6. Delivering session products or a plan to produce a final product (at the end of the workshop or within no more than 2 weeks after the workshop is complete)

## Agenda

The workshop will last 2 1/2 days from April 24, 2001 to April 26, 2001. April 23 (Monday) is expected to be a travel day (to the workshop). Breaks during each working session will be scheduled by working session co-chairs.

### Day 1 - April 24, 2001

Activity		Time	Point of Contact	
Breakfast		7:30 AM - 9:00 AM	Mary Floyd	
Registration		8:30 AM - 9:30 AM	Mary Floyd	
Introduction		9:30 AM - 10:00 AM	Mary Ann Esfandiari, Rich Doyle	
Working Session #1 Room A	Working Session #2 Room B	10:00 AM - 1:00 PM	#1 - L. Boyce, E. Shell, D. Eisenman	#2 T. Clement, J. Roberts
Lunch		1:00 PM - 2:00 PM	Mary Floyd	
Working Session #3 Room A		2:00 PM - 5:00 PM	D. McComas, A. Aljabri	
Break before dinner		5:00 PM - 6:00 PM		
Conference Dinner		6:00 PM - 7:00 PM	Mary Floyd	
Evening Event		6:45 PM	Mary Floyd, John Donohue	

### Day 2 - April 25, 2001

Activity		Time	Point of Contact	
Breakfast		7:30 AM - 9:00 AM	Mary Floyd	
Introduction		9:00 AM - 9:30 AM	Mary Ann Esfandiari, Rich Doyle	
Working Session #4 Room A	Working Session #5 Room B	9:30 AM - 1:00 PM	#4 -K. Rehm, T. Jackson, J. Hackney	#5 - M. Stark, D. Nichols, L. Bright. J. Lubelczyk
Lunch		1:00 PM - 2:00 PM	Mary Floyd	
Informational Session #1 - MCO/MPL Findings		2:00 PM - 2:30 PM	Hugh Henry	
Informational Session #2 - NASA S/W Working Group		2:30 PM - 3:00 PM	Sally Godfrey, John Kelly	
Break		3:00 PM - 3:15 PM		

Informational Session #3 - Upgrade to Legacy Systems	3:15 PM - 3:45 PM	Charles Norton
Break before dinner	3:45 PM - 6:00 PM	
Evening Event	6:45 PM	Mary Floyd, John Donohue

Day 3 - April 26, 2001

Activity	Time	Point of Contact
Breakfast	7:30 AM - 9:00 AM	Mary Floyd
Introduction	9:00 AM - 9:15 AM	Mary Ann Esfandiari, Rich Doyle
Working Sessions Product Generation	9:15 AM - 10:30 AM	Working Session Co-chairs
Working Session #1 Report Out	10:30 AM - 10:50 AM	Working Session #1 co-chairs
Working Session #2 Report Out	10:50 AM - 11:10 AM	Working Session #2 co-chairs
Working Session #3 Report Out	11:10 AM - 11:30 AM	Working Session #3 co-chairs
Break	11:30 AM - 11:50 AM	
Working Session #4 Report Out	11:50 AM - 12:10 PM	Working Session #4 co-chairs
Working Session #5 Report Out	12:10 PM - 12:30 PM	Working Session #5 co-chairs
Discussion of Workshop Metrics and Areas for improvement, Close-out	12:30 PM - 1:00 PM	Mary Ann Esfandiari, Rich Doyle, Elaine Shell

## Workshop Sessions

The workshop will be comprised of both informational and working sessions. Some working sessions will be held in parallel such that attendees will be able to participate in those sessions in which they have the most interest.

### Working Sessions (5)

1. Roles and organizational models for flight S/W projects - management track (co-chair Leslye Boyce, Elaine Shell, Dave Eisenman-JPL)

#### Summary

Flight software efforts can be managed successfully in an environment of effective, risk mitigating productivity. But it seems that for every success story, there is a story containing major difficulties. Even software efforts requiring only one person can sometimes become high risk. This workshop session will consider mission organizational structures and the management issues that impact flight software teams. The focus will be organizations external to the flight software team, the levels of flight software team leadership, and how the flight software team integrates with other elements of the project. The product from this workshop session will be a recommended Work Breakdown Structure for flight software; the Lessons Learned that result in the recommendations, and recommendations for how to manage & avoid specific high risks.

2. Generic, High Fidelity FSW Test-Bed Capabilities (co-chair GSFC - Tom Clement, JPL - J. Roberts)

#### Summary

The purpose of this working session is to establish the general capabilities for high fidelity test bed systems used in the development, testing, and maintenance of spacecraft flight software systems. The participants in this working session will accomplish this by reviewing a GSFC draft document that describes the ideal capabilities of high fidelity Flight Software Test Beds (FSTBs). The goal of the session is to develop a clear and unambiguous set of generic capabilities and justification for each capability, as well as to identify the risks associated with omitting any capability. The product resulting from this working session will be a joint GSFC/JPL document that describes this often mission critical FSW validation tool.

3. Spacecraft fault protection S/W Implementation Strategies - technical track (co-chair Dave McComas, Abdullah Aljabri-JPL)

#### Summary

The spacecraft fault protection strategies working session will address issues concerned with implementing fault protection in flight software (FSW). The goals of the session are to exchange information and to produce a FSW fault protection guidebook. The session will look at the entire spacecraft lifecycle (requirements, design, code, testing, operations, and maintenance) from the perspective of FSW fault protection. Both technical and non-technical issues will be addressed. Technical issues include: requirement definition, implementation techniques, testing techniques, and onboard maintenance. Non-technical issues include development processes, roles and responsibilities, and technology insertion processes. The session will include a mixture of talks and working groups. The talks will provide contextual and historical information. The working groups will enhance the draft FSW fault protection guidebook that will be provided to attendees in advance.

4. Validation Testing and Stress Testing of Flight Software (co-chairs: Ken Rehm, Tom Jackson-GSFC, John Hackney-JPL)

### Summary

This session will focus on guidelines for a generic test program which will validate performance of the fully integrated spacecraft flight software system during all phases of mission life. The intent is to cover both nominal and anomalous/failure on-orbit scenarios. During the workshop session, participants will review existing generic test definition guidelines that are intended to offer suggestions to a flight software test team which has been tasked to assure that the FSW will accommodate all possible on-orbit situations. The product from this workshop session will be an agreed upon GSFC/JPL FSW Validation/Stress Test Process outline (with draft contents); plus a structure for capturing the lessons learned about both nominal and stress test case development. The manner of updating the documents will also be strategized at the workshop.

5. CMM - Process Improvement for CMM level 3 and beyond - (co-chair M. Stark, J. Lubelczyk, D. Nichols & L. Bright - JPL)

### Summary

This session will focus on opportunities for JPL and GSFC to collaborate on process improvement activities. This collaboration will be shaped by the Agency-level goal of attaining CMM Level 3 at all Centers. The session will focus on identifying each Center's process and process engineering capabilities, and then to create a plan for collaboration between the Centers. There will also be short presentations on how the JPL process organization will be structured (GSFC's will be similar) and on key enablers and inhibitors of a successful process improvement program. The product of this workshop will be a plan for collaboration between GSFC and JPL on reaching level 3 at each Center.

## Informational Sessions (3)

1. MCO/MPL Findings (Hugh Henry)

### Summary

A summary report on the review of the software development process at Lockheed-Martin for MCO, MPL and Stardust missions. In response to the findings and recommendations of the Mars Polar Lander (MPL) Failure investigation board, JPL initiated a software process review aimed at identifying and correcting the root causes of the software issues raised in the board report. Our objective is to record any relevant lessons learned and use these lessons to modify, where applicable, our internal processes and external interfaces with customers and contractors, in order to ensure that similar problems are not likely to occur in the future.

2. NASA S/W Working Group Report (co-chairs Sally Godfrey - GSFC, John Kelly - JPL)

### Summary

The NASA Software Working Group (SWG) is chartered by the Chief Engineer to develop and oversee the formulation and implementation of an Agency wide plan to work toward continuous, sustained software engineering process and product improvements in NASA; and to ensure appropriate visibility of software issues within the Agency. The Software Working Group has played a significant role over the past year in working with the Enterprises and Centers to ensure the success of NASA's Initiative to Improve Quality and Safety of Software.

This initiative has major thrusts in the following areas:

- Using CMM level 3 as a "benchmark" to measure the progress at the Centers toward achieving the NASA plan goal of, "Achieve, sustain, and advance software engineering<sup>1</sup> practices to effectively deliver the scientific and technological objectives of NASA"
- Develop NASA Software Guidelines (NPG 2820.1) using IEEE 12207 as a foundation with additional guidance in Verification & Validation, End-to-End Testing, and Metrics

- Pilot and implement a meaningful software metrics program for all major activities within the Agency

This talk will supply important update information that affects software process and product improvement plans at Goddard and JPL for FY 02 -07.

### 3. Upgrade of Legacy Systems (Charles Norton)

#### Summary

Many mission-critical scientific applications often rely on a legacy of software representing great intellectual and commercial value. This software is generally well debugged, produces trusted results, is actively meeting end-user goals, and preserves (sometimes hidden) expert knowledge that cannot be easily reproduced. Nevertheless, more ambitious missions require increased capabilities that impose new demands on software. Should these legacy codes be abandoned and rewritten from scratch, or can they be modernized to achieve new objectives?

Our approach for modernizing legacy scientific software, based on the new features of Fortran 90/95, will be presented. The methodology adds new capabilities, and increased safety, while promoting collaborative development and abstraction-based design. Application of this technique to modernize the Modeling and Analysis for Controlled Optical Systems software (developed at JPL and important to NASA's Next Generation Space Telescope Project) will be described concluding with new directions such as software tools for partial automation and evolution toward object-oriented concepts.

Session Schedule

Some working sessions will be held in parallel or concurrently.

Time	Day 1 - April 24		Day 2 - April 25				
7:30 AM	Breakfast		Breakfast				
8:30 AM		Registration					
9:00 AM			Introduction/Status				
9:30 AM	Introduction		Working Session #4	Working Session #5	W		
10:00 AM	Working Session #1	Working Session #2	Validation Testing and Stress Testing of Flight Software (co-chairs: Ken Rehm, Tom Jackson-GSFC, John Hackney-JPL) ROOM A	5. CMM - Process Improvement for CMM level 3 and beyond - (co-chair M. Stark, J. Lubelczyk, D. Nichols, L. Bright JPL) ROOM B	G		
11 AM	Roles and organizational models for flight S/W projects - (co-chair L. Boyce, E. Shell-GSFC, Dave Eisenman-JPL)	Generic, High Fidelity FSW Test-Bed Capabilities (co-chair GSFC - Tom Clement, JPL - J. Roberts)					Worl
12:00PM							(
	ROOM A	ROOM B					Worl
1 PM	Lunch		Lunch		D		
2 PM	Working Session #3		Informational Sessions		Metr		
	Spacecraft fault protection S/W Implementation Strategies - technical track (co-chair Dave McComas, Abdullah Aljabri-JPL) ROOM A		MCO/MPL Findings (co-chairs Hugh Henry) ROOM A				
			NASA S/W Working Group Report - (co-chairs S. Godfrey - GSFC, J. Kelly - JPL) - ROOM A				
3 PM			Break				
			Upgrade to Legacy Systems - ROOM A (presenter - Charles Norton)				
4 PM							
5 PM	Break before Dinner						
	Conference Dinner						
6PM							
	Evening Event						
7PM			Evening Event				

## Schedule of Remaining Activities

- Target date: April 24-26 or later

<i>Activity</i>	<i>Due Date</i>	<i>Responsible Person</i>
Obtain commitment from co-chairs	1/19/00	Donohue, Esfandiari
Finalize working and info session topics	1/16/01	Donohue, Esfandiari
Justification for Workshop	1/30/01	Esfandiari, Reph
Draft sessions (working and info) objectives	1/31/01	Session, Co-Chairs
Draft Invitee List	2/1/01	Donohue, Lin, Esfandiari
Conference/Hotel Contract Signed	2/1/01	Esfandiari
Finalize objectives of each session	2/9/01 <b>2/16/01</b>	Session, Co-Chairs
Finalize logistics	2/9/01 <b>3/6/01</b>	Westover, Donohue, Esfandiari
Draft workshop invitation (announcement) and identify participants	2/15/01	Westover, Donohue
Finalize invitation memo and participants	2/20/01	Donohue
Send out invitation via Email	3/15/01 <b>3/8/01</b>	Donohue
Cutoff for Registration	4/6/01	Westover
Submit blanket travel request for GSFC employees	4/8/01	Donohue
Review list of attendees	4/10/01	Donohue, Esfandiari
Soft and hardcopy of session slides to J. Donohue	4/16/01	Session co-chairs
Reserve NASA vans for travel	4/16/01	Donohue
Gather equipment/supplies to be taken to Workshop	4/19/01	Donohue, Westover
Travel to site	4/23/01	All
Begin Workshop	4/24/01	All

## Invitee List

The following list contains invitees to the workshop.

**For JPL Employee Information See**

[http://mhs.jpl.nasa.gov/cgi-bin/wlSearch/ou%3dJet Propulsion Laboratory%2c%3dNational Aeronautics and Space Administration%2cc%3dUS](http://mhs.jpl.nasa.gov/cgi-bin/wlSearch/ou%3dJet+Propulsion+Laboratory%2c%3dNational+Aeronautics+and+Space+Administration%2cc%3dUS)

**For Goddard Employee Information See**

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28				
Total Invitees: 66				

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Norton	Charles	Jet Propulsion Lab	charles.d.norton@jpl.nasa.gov
Roberts	James	Jet Propulsion Lab	james.a.roberts@jpl.nasa.gov
Sigal	Burton	Jet Propulsion Lab	Burton.C.Sigal@jpl.nasa.gov
Watney	Garth	Jet Propulsion Lab	watney@jpl.nasa.gov
Subtotal	25		
White	Michael	JHU/APL	michael.j.white@jhuapl.edu
Chu	Martha	JHU/APL	martha.chu@jhuapl.edu
Subtotal	2		
Clement	Thomas	NASA Goddard Space Flight Center	thomas.g.clement@gssc.nasa.gov
Donohue	John	NASA Goddard Space Flight Center	john.t.donohue.1@gssc.nasa.gov
Esfandiari	Mary	NASA Goddard Space Flight Center	mary.esfandiari@gssc.nasa.gov
Godfrey	Sara	NASA Goddard Space Flight Center	sara.h.godfrey.1@gssc.nasa.gov
Green	Scott	NASA Goddard Space Flight Center	sgreen@pop500.gssc.nasa.gov
Hardison	David	NASA Goddard Space Flight Center	david.hardison@gssc.nasa.gov
Hinchey	Mike	NASA Goddard Space Flight Center	mike.hinchey@gssc.nasa.gov
Jackson	Tom	NASA Goddard Space Flight Center	thomas.m.jackson.1@gssc.nasa.gov
Kea	Howard	NASA Goddard Space Flight Center	hekea@pop500.gssc.nasa.gov
Lubelczyk	Jeff	NASA Goddard Space Flight Center	jeffrey.lubelczyk@gssc.nasa.gov
McComas	David	NASA Goddard Space Flight Center	david.c.mccomas.1@gssc.nasa.gov
Messori	Steve	NASA Goddard Space Flight Center	steve.messori@gssc.nasa.gov
Scott	Barbara	NASA Goddard Space Flight Center	barbara.l.scott@gssc.nasa.gov
Shell	Elaine	NASA Goddard Space Flight Center	elaine.shell@gssc.nasa.gov
Stark	Michael	NASA Goddard Space Flight Center	Michael.E.Stark.1@gssc.nasa.gov

Whitley	Raymond	NASA Goddard Space Flight Center	rwhitley@pop700.gsfc.nasa.gov
Subtotal	16		
Niles	Charles	NASA Langley Research Center	c.e.niles@larc.nasa.gov
Schuler	Pat	NASA Langley Research Center	m.p.schuler@larc.nasa.gov
Subtotal	2		
Greville	Ed	Orbital Sciences Corporation (GSFC)	ed.greville@gsfc.nasa.gov
Subtotal	1		
Tilley	Michael	Raytheon (GSFC)	mike.tilley@gsfc.nasa.gov
Subtotal	1		
Barry	Matthew	United Space Alliance	mrb@rice.edu
Subtotal	1		
Floyd	Mary	Westover Consultants, Inc.	
Subtotal	1		
Grand Total	49		

Individuals That Registered But Did Not Attend

Bright	Larry	Jet Propulsion Lab	larry.e.bright@jpl.nasa.gov
Hihn	Jairus	Jet Propulsion Lab	jhihn@jpl.nasa.gov
Lee	Roger	Jet Propulsion Lab	
Mehta	Jitendra	Jet Propulsion Lab	roger.a.lee@jpl.nasa.gov
Morillo	Ronald	Jet Propulsion Lab	ronald.morillo@jpl.nasa.gov
Thomas	Sandi	Jet Propulsion Lab	stthomas@.mail1.jpl.nasa.gov
Total	6		

## General Discussion - Workshop Wrap-up

### General Observations (Results from the Group Discussion at the End of the Workshop)

- Workshop chairpersons recommended an executive summary for each workshop session (to be posted on web site)
- Do participants have a preference for accessing data - web site vs. compact disk?
- URL for previous workshop - <http://csmis.jpl.nasa.gov/workshop/>
- Next action is to brainstorm the process for selecting the next workshop topics (Chi, Mary Ann, Rich, Elaine)

### What Worked Well for this Workshop

- Parallel Sessions - participants attended those sessions that they were interested in most. More topics are covered in same workshop.
- Participation by invitation only - The right people/skill mix for the right topics
- Good topics/good discussion during sessions, good focus on technical topics
- Having material ready to be reviewed at each session

### What Did Not Work Well for this Workshop

- Parallel Sessions - topics were too closely related. Participants wanted to attend both sessions. Participants felt they missed important information in parallel session.
- Mixed format workshop - provided both a tutorial and working sessions. Recommendation was to choose one type of workshop (tutorial, working, etc.) and provide guidance to session co-chairs for setting up session.
- Sessions too short - fewer topics, longer sessions

### Plans for Fourth Workshop

- Should we investigate broader participation for the next workshop - other NASA Centers, APL (again), etc.
- When ? - June 2002. We discussed having the conference either pre or post a technology or software conference in the same area such that participants could attend both activities on same travel dollar.
- Where ? - San Diego, Santa Barbara, Palm Springs, Lake Arrowhead, Big Bear,....
- Should we have the project manager briefings as per the second workshop? (there were no project manager briefings during the third workshop).
- Possible topics for the next workshop

Technical	Management/Process	Follow-Up from Previous Workshop
Model-based Fault Protection	Cost Estimation Methods for S/W Development and Risk Analysis	Follow-on of Topics from Third Workshop with Continuing Thread
Software Reuse Across Testbeds	Risk Management	Co-chair Follow-Up from Third Workshop - status and new collaborations
Middleware	Software Process Improvement	
Automatic Code Generation	Project Management	
Software Design Topics - Design Patterns, Reusability, Software Models and Modeling Tools	V&V of Flight Software	
Simulator Design Techniques - Simulation Architectures, Tools for Generating Models	Guidelines/Lessons Learned of Software Testing - Knowing When You Are Done	
Robust Flight Software Designs (FSW Product Timeline with		

Product Dependencies)		
Flight Software Product Lines		



Draft Invitation

*Goddard Space Flight Center - Jet Propulsion Laboratory  
Third Quality Mission Software Workshop  
April 2001*

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Sponsored by the Information Systems Center, Code 580, GSFC and  
the Information Technologies and Software Systems Division, Code 3600, JPL

**You are cordially invited to attend our joint workshop that continues with last year's theme of quality mission software. There will be 5 working sessions and 3 informational sessions. Please see below for session details.**

**Location: Williamsburg, Virginia (Historic District)**

**Dates: April 24 - April 26, 2001 (April 26 will be a 1/2 day session)**

**Logding/Meals:**

- **Williamsburg Hospitality house, Williamsburg, VA,**  
<http://www.williamsburghoshouse.com/>, [www.williamsburg.com](http://www.williamsburg.com)
- **Breakfast, lunch and dinner included**
- **Two evening events scheduled**
- **Block of rooms reserved**

**Working Sessions (5)**

1. Roles and organizational models for flight S/W projects (co-chair Leslye Boyce, Elaine Shell, Dave Eisenman-JPL)
2. Verification and validation of software, software stress testing (co-chair Martha Chu-GSFC, Tom Jackson-GSFC, John Hackney-JPL)
3. Spacecraft fault protection S/W Implementation Strategies (co-chair Dave McComas, Abdullah Aljabri-JPL)
4. Flight Software Testbeds and Test Cases
  - a.) Generic FSW High Fidelity Testbed Capabilities (co-chair GSFC - Tom Clement, JPL - ???)
  - b.) Generic FSW Test Cases for Various Mission Types (GN&C & C&DH only). (co-chair GSFC - Ken Rehm, JPL - ???)
5. CMM - What process is required to achieve CMM Level 3 (co-chair M. Stark, J. Lubelczyk, D. Nichols & L.Bright - JPL)

**Informational Sessions (3)**

1. MCO/Mars Polar Lander Findings (Hugh Henry - JPL)
2. NASA S/W Working Group Report (co-chairs Sally Godfrey - GSFC, John Kelly - JPL)
3. Upgrade of Legacy Systems (Charles Norton - JPL)

**PLEASE RSVP BY: April 4, 2001 (late registration will not be permitted)**

If you wish to attend, please send the following information to Mr. John Donohue or Mary Floyd??:

(Send via Email [john.t.donohue.1@gsfc.nasa.gov](mailto:john.t.donohue.1@gsfc.nasa.gov), or Fax to 301-286-2325, or call 301-286-6149)

1. Name:
2. Email Address:
3. Phone:
4. Organization:
5. If you are a GSFC employee, do you wish to be a passenger on a NASA van to travel to Williamsburg ? (Y/N)    Are you willing to drive the van (Y/N) ?
6. Special dietary requirements (be specific):
7. Special disability requirements (be specific):
8. The sessions you wish to attend (Work Sessions 1 - 5, Informational Sessions 1-3):

Thank you.

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## Final Invitation

# **GSFC-JPL Quality Mission Software Workshop - April 2001**

[http://rtsel.gsfc.nasa.gov/moc\\_tech/web/workshop/workshop.htm](http://rtsel.gsfc.nasa.gov/moc_tech/web/workshop/workshop.htm)

## **Sponsored by:**

The Information Systems Center, Code 580, GSFC and  
The Information Technologies and Software Systems Division, Code 3600, JPL

## **Workshop Chairs:**

Ms. Mary Ann Esfandiari, Associate Chief, Information Systems Center, GSFC  
Mr. Richard Doyle, Phd., Chief, Center for Space Information and Software Systems, JPL  
Ms. Chi Lin, Partner Program Manager/External Liaison, Center for Space Information and Software Systems, JPL  
Mr. John Donohue, Associate Branch Manager, Information Systems Center, GSFC

**Mary Ann Esfandiari and Richard Doyle cordially invite you to attend this joint workshop that continues with last year's theme of quality mission software, including flight software failure detection and validation. Flight software test specialists and flight software system engineers are encouraged to participate. There will be 5 working sessions and 3 informational sessions. Please see below for session details.**

## **SESSION DESCRIPTIONS:**

### **Working Sessions (5)**

1. **Roles And Organizational Models For Flight S/W Projects** (co-chair Leslye Boyce, Elaine Shell, Dave Eisenman-JPL)  
Summary  
Flight software efforts can be managed in an environment of effective, risk mitigating productivity. But it seems that for every success, there is a 'disaster'. Even flight software efforts requiring only one programmer have become high risk. This workshop session will consider mission organizational structures and the management issues that impact flight software teams. The focus will be organizations external to the flight software team, plus the highest level of flight software team leadership.
2. **Generic, High Fidelity FSW Test-Bed Capabilities** (co-chair GSFC - Tom Clement, JPL co-chair TBA)  
Summary  
The purpose of this working session is to establish the general capabilities for high fidelity test bed systems used in the development, testing, and maintenance of spacecraft flight software systems. The participants in this working session will accomplish this by reviewing a GSFC draft document that describes the ideal capabilities of high fidelity Flight Software Test Beds (FSTBs). The goal of the session is to develop a clear and unambiguous set of generic capabilities and justification for each capability, as well as to identify the risks associated with omitting any capability.
3. **Spacecraft Fault Protection S/W Implementation Strategies** (co-chair Dave McComas, Abdullah Aljabri-JPL)  
Summary  
The purpose of this working session is to address issues concerned with implementing fault protection in flight software (FSW). The goals of the session are to exchange information and to produce a FSW fault protection guidebook. The session will look at the entire spacecraft lifecycle (requirements, design, code, testing, operations, and maintenance) from the perspective of FSW fault protection. Both technical and non-technical issues will be addressed. Technical issues include: requirement definition, implementation techniques, testing techniques, and onboard maintenance. Non-technical issues include development processes, roles and responsibilities, and technology insertion processes.
4. **Validation Testing and Stress Testing of Flight Software** (co-chairs: Ken Rehm, Tom Jackson-GSFC, John Hackney-JPL)  
Summary  
This session will focus on guidelines for a generic test program which will validate performance of the fully integrated spacecraft flight software system during all phases of mission life. The intent is to cover both nominal and anomalous / failure on-orbit scenarios. During the workshop session, participants will review existing generic test definition guidelines that are intended to offer suggestions to a flight software test team which has been tasked to assure that the FSW will accommodate all possible on-orbit situations.

5. **CMM - Process Improvement For CMM Level 3 And Beyond** - (co-chair M. Stark, J. Lubelczyk, D. Nichols & L. Bright - JPL)

Summary

This session will focus on opportunities for JPL and GSFC to collaborate on process improvement activities. This collaboration will be shaped by the Agency-level goal of attaining CMM Level 3 at all Centers. The session will focus on identifying each Center's process and process engineering capabilities, and then to create a plan for collaboration between the Centers. There will also be short presentations on how the JPL process organization will be structured (GSFC's will be similar) and on key enablers and inhibitors of a successful process improvement program.

**Informational Sessions (3)**

1. **Mars Climate Orbiter And Mars Polar Lander Findings** (Hugh Henry -JPL)

Summary

A summary report on the review of the software development process at Lockheed-Martin for MCO, MPL and Stardust missions. In response to the findings and recommendations of the Mars Polar Lander (MPL) Failure investigation board, JPL initiated a software process review aimed at identifying and correcting the root causes of the software issues raised in the board report. Our objective is to record any relevant lessons learned and use these lessons to modify, where applicable, our internal processes and external interfaces with customers and contractors, in order to ensure that similar problems are not likely to occur in the future.

2. **Nasa S/W Working Group Report** (co-chairs Sally Godfrey - GSFC, John Kelly - JPL)

Summary

The NASA Software Working Group (SWG) is chartered by the Chief Engineer to develop and oversee the formulation and implementation of an Agency wide plan to work toward continuous, sustained software engineering process and product improvements in NASA; and to ensure appropriate visibility of software issues within the Agency. The Software Working Group has played a significant role over the past year in working with the Enterprises and Centers to ensure the success of NASA's Initiative to Improve Quality and Safety of Software. This initiative has major thrusts in the following areas: using CMM level 3 as a "benchmark" to measure the progress at the Centers toward achieving the NASA plan goal of, "Achieve, sustain, and advance software engineering1 practices to effectively deliver the scientific and technological objectives of NASA"; develop NASA Software Guidelines (NPG 2820.1) using IEEE 12207 as a foundation with additional guidance in Verification & Validation, end-to-end testing, and metrics; and pilot and implement a meaningful software metrics program for all major activities within the Agency. This talk will supply important update information that affects software process and product improvement plans at Goddard and JPL for FY 02 -07.

3. **Upgrade Of Legacy Systems** (Charles Norton-JPL)

Summary

Many mission-critical scientific applications often rely on a legacy of software representing great intellectual and commercial value. This software is generally well debugged, produces trusted results, is actively meeting end-user goals, and preserves (sometimes hidden) expert knowledge that cannot be easily reproduced. Nevertheless, more ambitious missions require increased capabilities that impose new demands on software. Should these legacy codes be abandoned and rewritten from scratch, or can they be modernized to achieve new objectives?

**AGENDA/SCHEDULE**

Day 1 - April 24, 2001

Activity		Time	Point of Contact	
Breakfast		7:30 AM - 9:00 AM	Mary Floyd	
Registration		8:30 AM - 9:30 AM	Mary Floyd	
Introduction		9:30 AM - 10:00 AM	Mary Ann Esfandiari, Rich Doyle	
Working Session #1 Room A	Working Session #2 Room B	10:00 AM - 1:00 PM	#1 - Leslye Boyce, Elaine Shell, Dave Eisenman	#2 Tom Clement, J. Roberts
Lunch		1:00 PM - 2:00 PM	Mary Floyd	
Working Session #3 Room A		2:00 PM - 5:00 PM	Dave McComas, Abdullah Aljabri	
Break before dinner		5:00 PM - 6:00 PM		
Conference Dinner		6:00 PM - 7:00 PM	Mary Floyd	
Evening Event		7:00 PM	Mary Floyd, John Donohue	

Day 2 - April 25, 2001

Activity		Time	Point of Contact
Breakfast		7:30 AM - 9:00 AM	Mary Floyd

Introduction		9:00 AM - 9:30 AM	Mary Ann Esfandiari, Rich Doyle	
Working Session #4 Room A	Working Session #5 Room B	9:30 AM - 1:00 PM	#4 -Ken Rehm, Tom Jackson, John Hackney	#5 - Mike Stark, Dave Nichols, Larry Bright
Lunch		1:00 PM - 2:00 PM	Mary Floyd	
Informational Session #1 - MCO/MPL Findings		2:00 PM - 2:30 PM	Hugh Henry	
Informational Session #2 - NASA S/W Working Group		2:30 PM - 3:00 PM	Sally Godfrey, John Kelly	
Break		3:00 PM - 3:15 PM		
Informational Session #3 - Upgrade to Legacy Systems		3:15 PM - 3:45 PM	Charles Norton	
Break before dinner		3:45 PM - 6:00 PM		
Evening Event		7:00 PM	Mary Floyd, John Donohue	

Day 3 - April 26, 2001

Activity	Time	Point of Contact
Breakfast	7:30 AM - 9:00 AM	Mary Floyd
Introduction	9:00 AM - 9:15 AM	Mary Ann Esfandiari, Rich Doyle
Working Sessions Product Generation	9:15 AM - 10:30 AM	Working Session Co-chairs
Working Session #1 Report Out	10:30 AM - 10:50 AM	Working Session #1 co-chairs
Working Session #2 Report Out	10:50 AM - 11:10 AM	Working Session #2 co-chairs
Working Session #3 Report Out	11:10 AM - 11:30 AM	Working Session #3 co-chairs
Break	11:30 AM - 11:50 AM	
Working Session #4 Report Out	11:50 AM - 12:10 PM	Working Session #4 co-chairs
Working Session #5 Report Out	12:10 PM - 12:30 PM	Working Session #5 co-chairs
Discussion of Workshop Metrics and Areas for improvement, Close-out	12:30 PM - 1:00 PM	Mary Ann Esfandiari, Rich Doyle, Elaine Shell

## WORKSHOP LOCATION:

The Williamsburg Hospitality House  
415 Richmond Road  
Williamsburg, VA 23185-3536  
Reservations: 1-800-932-9192  
Ph: 757-229-4020  
Fx: 757-229-9557  
<http://www.williamsburghoshouse.com/>

## REGISTRATION INFORMATION:

Please complete the attached registration form and return to Mary Floyd at [mfloyd@westover-gb.com](mailto:mfloyd@westover-gb.com) or via facsimile at 301-345-4659. There is no registration fee for this conference. The only fee is for special events listed below. Please return this form no later than April 7, 2001.

## HOTEL ACCOMMODATIONS:

A block of sleeping rooms has been reserved at the Hospitality House under the name "GSFC-JPL Quality". The rate per night is \$133.08 if staying for three nights. This includes taxes, 3 breakfasts, 3 lunches, and 1 dinner and is the approved government per diem. However, if you stay less than 3 nights, the Hospitality House will charge you \$146.41 per night which is over the per diem rate. Please call the

hotel at 1-800-932-9192 to make your reservation. You must call by **April 7, 2001** in order to guarantee availability of rooms and rates. After this date, rooms will be available on a rate/space only basis.

### **AIR TRAVEL:**

The Williamsburg Hospitality House is accessible from three airports. All airports are serviced by most major carriers:

Norfolk International Airport – 45 minutes

Richmond, Byrd Field – 45 minutes

Newport News-Williamsburg Airport – 20 minutes

### **TRAIN:**

An Amtrak train station is located 4 blocks from the hotel.

### **SHUTTLE:**

Taxi service and car rental is available at each airport, requiring less than 50 minutes travel time to the Williamsburg Area.

Shuttle transportation to the area is available from Groome Transportation. Please call the following numbers for information for specific airports: Norfolk and Newport News: 757-877-9477 Richmond: 1-800-552-7911

### **SOCIAL EVENTS:**

Two social events have been arranged for your enjoyment:

#### **Tuesday, April 24**

**“REMEMBER ME”** - The entire family will be mesmerized by Old Paris, an enslaved man who uses oral traditions, music, dance, and spirituality to cope with his loss of freedom and to keep his heritage alive for the next generations. Journey with him through the horrors of the middle passage to his destination at the Carter's plantation. The program will begin at 7:00 p.m. and last for one hour. It will be held at the Hennege Auditorium located 3 blocks from the hotel in the Historic District. The cost per person is \$10.00. This program is appropriate for children under 12.

#### **Wednesday, April 25**

Christiana Campbell's Tavern – Join us for regional and southern specialties in Mrs. Campbell's tavern, renowned as George Washington's favorite eating establishment. While you dine in an informal eighteenth-century setting, strolling balladeers may happen by your table to sing songs of two centuries ago. The meal will begin promptly at 7:15 p.m. We will be leaving the hotel as a group at 6:45 p.m. Once we are seated for dinner, you will be able to choose from one of two menus listed below. All meals come with coffee tea and fountain beverages and are inclusive of tax and gratuity. Alcoholic beverages are not included. You do not need to choose your menu in advance, as you will be able to order at the tavern.

As for the transportation to the restaurant, we may be able to use the hotel shuttle and/or NASA vans for those people who do not have cars.

Hickory Grilled Breast of Chicken  
With Currant Sauce and Smithfield Ham  
Fresh Vegetables and Rice Pilaf  
Black Bottom Chocolate Pecan Pie  
Or  
Fig Ice Cream with Ginger Snap

Hickory Grilled Filet of Salmon  
With Baby Shrimp Dijonnaise  
Fresh Vegetables and Rice Pilaf  
Fresh Baked Cherry Pie

**Or**  
**Rum Cream Pie with Chocolate Shavings**

**DIRECTIONS:**

For directions and a map please see <http://www.williamsburghospouse.com/>

**PARKING:**

Parking is free to meeting attendees and overnight guests.

**AREA INFORMATION:**

For information on the Williamsburg area please see <http://www.colonialwilliamsburg.org/> or call 1-800-HISTORY.

For questions concerning these logistics, please contact Mary Floyd at [mfloyd@westover-gb.com](mailto:mfloyd@westover-gb.com) or 1-800-634-6326 x107. For questions concerning meeting content please contact John Donohue at [john.t.donohue.1@gsfc.nasa.gov](mailto:john.t.donohue.1@gsfc.nasa.gov) or 301-286-6149.

# REGISTRATION FORM

## GSFC-JPL Quality Mission Software Workshop - April 2001

Please complete this form and return to Mary A. Floyd, Westover Consultants, Inc., RS Information Systems, 7833 Walker Drive, Suite 560, Greenbelt, MD, 20770 or via facsimile at: 301-345-4659 by **April 7, 2001**.

NAME: \_\_\_\_\_

AFFILIATION: \_\_\_\_\_

STREET ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_ FAX: \_\_\_\_\_

EMAIL: \_\_\_\_\_

**Please indicate which sessions you wish to attend? (Check one per time period):**

Working Sessions (Some sessions are held in parallel)

1. Roles and organizational models for flight S/W projects - Tues., April 24, 10AM - 1PM.
2. Generic, High Fidelity FSW Test-bed Capabilities - Tues., April 24, 10AM - 1PM.
3. Spacecraft fault protection S/W Implementation Strategies - Tues., April 24, 2PM - 5PM.
4. Validation Testing and Stress Testing of Flight Software - Wed., April 25, 9:30 AM - 1PM.
5. CMM - Process Improvement for CMM level 3 and beyond - Wed., April 25, 9:30AM - 1PM.

Informational Sessions (3)

1. MCO/MPL Findings - Wed, April 25, 2PM - 2:30PM.
2. NASA S/W Working Group Report - Wed., 2:30PM - 3PM.
3. Upgrade of Legacy Systems - Wed., April 25, 3:15PM - 3:45PM.

If you are a NASA/GSFC Employee, do you wish to be a passenger on a NASA van to travel to Williamsburg?    YES            NO

Would you be willing to drive the van?    YES    NO

Do you require any assistance in accordance with ADA regulations?

\_\_\_\_\_

NAME: \_\_\_\_\_

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**SPECIAL EVENT REGISTRATION:**

"Remember Me"	\$10.00 per person	No. of people _____	\$ _____ (total due)
Tavern Dinner	\$35.00 per person	No. of people _____	\$ _____ (total due)
		Total amount Due	\$ _____

**METHOD OF PAYMENT:**

\_\_\_\_ Check or Money Order payable to **RS Information Systems, Inc.**

\_\_\_\_ Credit Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Card Type: Visa \_\_\_\_\_ Mastercard \_\_\_\_\_ AMEX \_\_\_\_\_ (*We do not accept Diners*)

Name on Credit Card \_\_\_\_\_

Signature of Cardholder \_\_\_\_\_

## Supplies List

The following is a list of supplies to be brought from GSFC to Williamsburg, VA. These supplies will be hand-carried by John Donohue or other Code 580 representative. J. Donohue will compile the appropriate property passes.

<b>Item/Noun</b>	<b>Owner</b>	<b>POC</b>	<b>Approx. Size</b>	<b>Notes</b>
Video Projector, 800x600 resolution (with Spare Bulb)	584	John Donohue, 6-6149	2 cu.ft.	Need property pass.
Overhead projector and spare bulb	584	John Donohue, 6-6149	2 cu. ft	Need property pass.
Video Projector, 800x600 resolution	583	Henry Murray, 6-6347	2 cu.ft.	Need property pass.
Easels (2) and markers	580	Donohue	1 cu ft.	
Pens (box)	580	Westover		
Notebooks	580	Westover		
Laptop and case	584	John Donohue 6-6149	2 cu.ft	Need property pass.
Box of transparencies and markers	580	Westover	.5 cu. ft.	Westover

## Westover Checklist

TECHNICAL INFORMATION SERVICES BRANCH (TISB) Code 293  
CONFERENCE PLANNING FORM  
NASA GODDARD SPACE FLIGHT CENTER

Conference Contact: Mary Ann Esfandiari, John Donohue  
Phone: 301-286-8928, or 6-6149 Fax: 301-286-1767 Code: 580  
Div. Resource Analyst: Linda White  
Phone: 301 286-8927 Fax: 301-286-1767 Code: 501, Mailstop 580

Meeting Title: GSFC-JPL Quality Mission Software Workshop - 2001

Meeting Location(s):  
1st Choice: Williamsburg  
2nd Choice: \_\_\_\_\_

Meeting Date(s): Target date: April 24-26 or later

Meeting Time(s):  
Day 1: from 8AM to 8PM (Attach Preliminary Agenda if Available)  
Day 2: from 8AM to 8PM  
Day 3: from 8AM to 4PM  
Day 4: from \_\_\_\_\_ to \_\_\_\_\_  
Day 5: from \_\_\_\_\_ to \_\_\_\_\_

Total Number of Attendees: Approx. 60 (Attach List of Names and Addresses if Available)  
NASA: \_\_\_\_\_  
Foreign: \_\_\_\_\_  
Other Government: \_\_\_\_\_  
University Participants: \_\_\_\_\_  
NASA Project & Support Service Contractors: \_\_\_\_\_

Set up Choices: Theater, Hollow Square, U-Shape, Conference, or Classroom  
General Session Setup: Informational Sessions (3) - Conference Style (Sessions not yet finalized)  
Total # of Breakout(s): 3 sets of 2 parallel/concurrent sessions  
Breakout(s) Setup: Working Sessions (6) - Classrooms (2) (Sessions not yet finalized)  
Audio Visual Requirements: (Check all that apply and indicate quantity required)  
X Flip Chart(s) X Laser Pointer(s) 2 per room  
X Overhead Projector(s) \_\_\_\_\_ LCD Panel(s) 1 per room  
X Podium(s) \_\_\_\_\_ Slide Projector(s) 1 per room  
X Microphone(s) X TV w/VCR/Monitor(s) 1 per room  
client supplied Video Projector(s) X A/V Technician onsite

Non Government Travel Support: (Invited speakers, PI's, etc.) Attach a list of names and addresses if available.  
Below check all that apply.

Indicate total # of travelers: \_\_\_\_\_  
\_\_\_\_ Airfare  
\_\_\_\_ Per diem (Meals)  
\_\_\_\_ Ground Transportation  
\_\_\_\_ Rental Cars  
\_\_\_\_ Lodging  
\_\_\_\_ Honorarium (Amount: \$ \_\_\_\_\_ Indicate which travelers should receive honorarium)

Advisory Travel Support

\_\_\_# of travel orders/vouchers to be prepared. (For advisory committee members only) Indicate allowable cost above.

Answer Yes or No to the following questions:

PRE-CONFERENCE ACTIVITIES

- No Federal Register notice?
- Yes Block sleeping rooms at hotel? Total # of sleeping rooms to block: \_\_\_\_\_
- Yes Meeting announcement to be mailed? [Email and Website](#)
- Yes Logistical information to be sent to all attendees?
- No Interpreter? [Don't know yet](#)
- Yes Namebadges?
- Yes Table Tents? Indicate which attendees. [\(Blank with markers\)](#)
- Yes Registration packets?
- Yes Minute Recording/Transcription?
- No Security Clearance to Center U.S.? \_\_\_ Foreign? \_\_\_

ON-SITE ACTIVITIES

- Yes On-site support to register attendees, take messages, run errands, etc.?
- Yes Copying onsite?
- Yes Telephone line in meeting room?
- Yes Modem Capability onsite?
- No Poster Session? Date(s): \_\_\_\_\_
- Yes Fax Machine onsite?
- [Client Supplied](#) \_\_\_ Computer Equipment (type of software, etc. )? [One laptop per working session](#) \_\_\_\_\_
- No Typist?

POST-CONFERENCE ACTIVITIES

- Yes, [Website](#) \_\_\_ Post-conference mailings?
- Yes, [Website](#) \_\_\_ Final Attendee List, what form? (hard copy or [disk](#))

Do you want to collect registration fees? [No](#)

Please note that registration fees may have to be collected to cover the cost when arranging the following:

- Yes \_\_\_ A.M./P.M. Breaks No. of Days? [2](#) \_\_\_\_\_
- Yes \_\_\_ Lunch How Many? [TBS](#) \_\_\_ [Set up in Mtg. Rm.](#) or Separate Rm.
- Yes \_\_\_ Banquet/Dinner How Many? [TBS](#) \_\_\_\_\_
- Yes \_\_\_ Reception How Many? [TBS](#) \_\_\_\_\_

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OFFICE USE ONLY

Customer/Coordinator Meeting/Telecon Date: \_\_\_\_\_

TMU/Cost Due Date: \_\_\_\_\_

Meeting Coordinator: \_\_\_\_\_

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