



# MSFC ISO 9000 Registration Workshop

April 22-23, 1998

# Welcome!

- ✦ Welcome
- ✦ Facilities
- ✦ Introductions
- ✦ Object of workshop: Show how MSFC implemented ISO 9001
  - It's not the only approach
  - It may not be the best approach
  - It is what worked for us!





# Management Strategy

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# Management Strategy

- ◆ ISO Management Representative was selected by Center Director
  - Mr. Robert Schwinghamer
  - Associate Director (Technical)
- ◆ Top management commitment crucial
- ◆ Management Representative accessibility to Center Director vital



## Management Strategy (con't)

- ✦ Avoid out-of-scope designation like the plague
- ✦ Involve everyone - employee updates, MSFC Star, banners, posters, Center staff meetings, etc.
- ✦ Avoid tendency to become dictatorial, or arbitrary



# Management Strategy (con't)

- ◆ Move out quickly to:
  - Establish Scope
  - Get registrar on board early-on, maintain contact
  - Establish the quality policy
  - Do the quality manual (top level document) ASAP
  - Start planning for training - 100% across the board
- ◆ Structure implementation team with organizational representatives from every major element - pride of ownership, interests not overlooked, removes Quality Dept. “Stigma”

## Management Strategy (con't)

- ✦ From observation of large implementation team, select a few key knowledgeable prime movers as the focus team
  - Use focus team to plot strategy, float trial balloons, plan agendas etc.
- ✦ Bring in others who have become certified, for lessons learned sessions (White Sands, RKDN, P&W, Raytheon)
- ✦ Engage successful consultant(s) to help with ISO implementation (MSFC has one - a jewel)



## Management Strategy (con't)

- ✦ Continuously drive home the need for simplicity  
- avoid the complex
- ✦ Time well spent flow charting processes before writing procedures
- ✦ Use existing information/procedures - check with other centers, don't create paper for the registrar
- ✦ Keep driving home the thesis that ISO is not solely the quality department's responsibility - it's a management system

## Management Strategy (con't)

- ✦ Communicate continuously - memos, web site, Center paper, e-mail, posters at all elevators, org. reps. with their organizations, etc.
- ✦ Web site - absolutely mandatory - we started hard copy and web site - had some illiteracy
- ✦ Our site - <http://iso9000.msfc.nasa.gov:9001/>
- ✦ Schedule “Commonality Reviews” for systemic problems or common necessities



## Management Strategy (con't)

- ✦ Baseline the documentation - eschew engineer's penchant for "making it a little bit better"
- ✦ Configuration management - drive out diversity, come to clear understanding of minimum requirements if tailoring allowed
- ✦ Internal audits - Strike early and hard on internal audits - do as many as possible - audits force acceptance of reality

# Management Strategy Concluding Comments

## ✦ Our Pre-Assessment Registrar

- Fair, balanced, knowledgeable, and courteous

## ✦ Deficiencies

- Statistically, some may go undetected, but since audit areas are at the discretion of auditor, don't count on slipping by

## ✦ Turning Point

- Came with the introduction of our internal audit - hit early and hard and sustain it as much as possible



# Management Strategy

## Concluding Comments (con't)

### ✦ Ownership

- Do everything you can to prove to employees it's their management system, not a quality department intrusion

### ✦ MSFC ISO aspiration

- Live up to goal established by our esteemed mentor, Dr. von Braun: “Late to bed, early to rise, work like hell, and advertise!”





# General Overview

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# Planning Stages

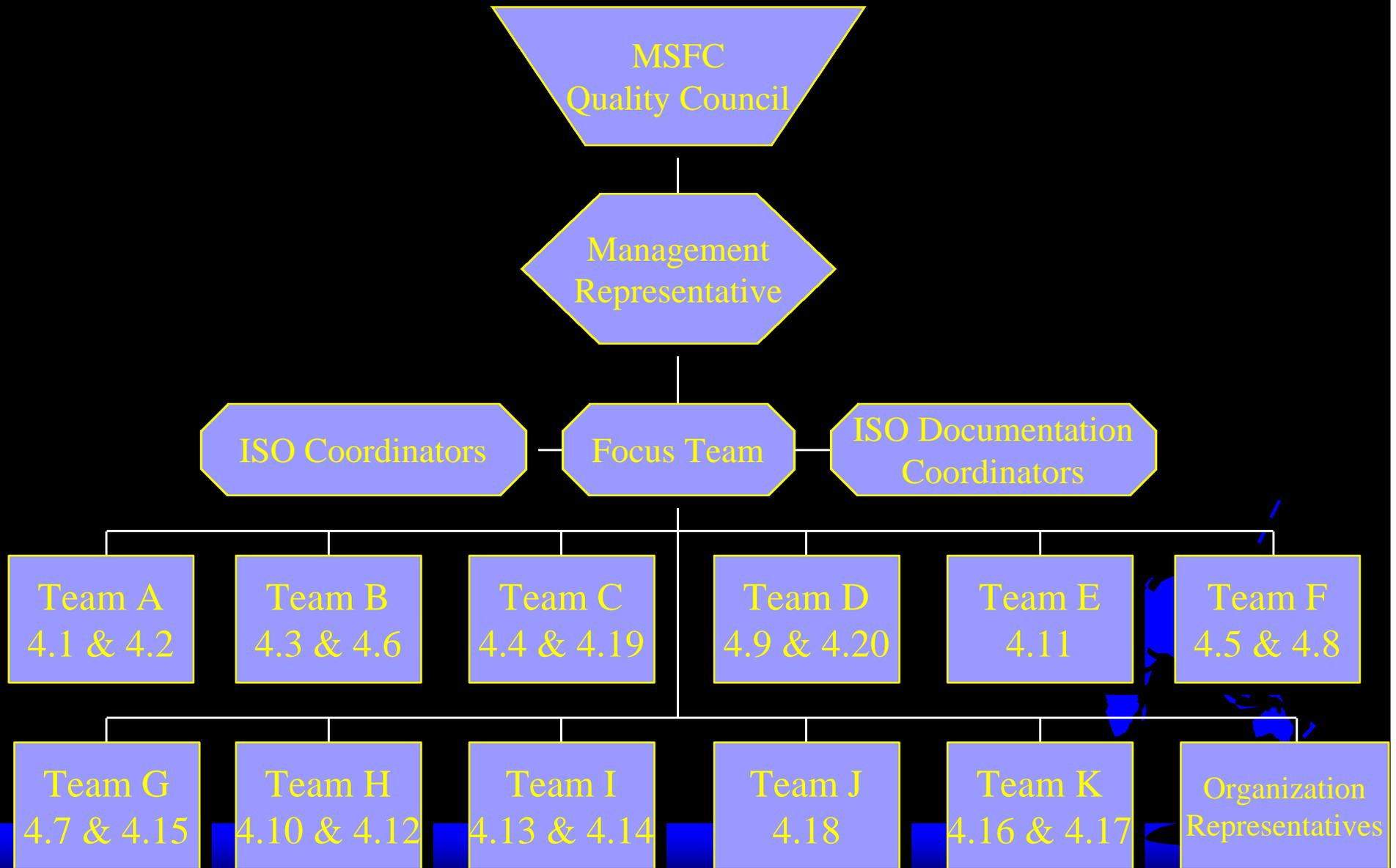
## Organizing for Action

- ◆ Briefed each organization director
  - Gave overview of ISO 9000, NASA policy, registration timetable
  - Solicited support for an "Implementation Team"
  - Stressed need for effective "Organization Representatives", primary and alternate
- ◆ Formed implementation team
  - Provided orientation to purposes of team
  - Provided two days of training on ISO 9000



# Planning Stages (con't)

## Implementation Team Org Chart



# Planning Stages (con't)

## Implementation Team

### ◆ Team operation

- 22 Orgs represented
- Dedicated, well-equipped conference room
- Weekly meetings chaired by Management Representative
- Minutes kept, action items assigned and tracked



# Planning Stages (con't)

## Implementation Team (con't)

- ◆ Initial task performed by implementation team
  - Developed plan (Microsoft Schedule)
  - Developed scope (still ongoing)
    - ◆ Lessons Learned (LL): Don't scope out any of your key processes
    - ◆ More time was spent trying to determine who was in scope versus just going ahead and performing the task
  - Developed a Quality Plan
    - ◆ KISS Approach
    - ◆ Needs to be a measurable statement/objectives



# Planning Stages (con't)

## Implementation Team Meetings

### ◆ Contents of Team Meetings

- Initial stages (Planning & Procedure Development)
  - ◆ Philosophy
  - ◆ Education/Learning phase: study, outsider briefings
  - ◆ Element Sub-Team status of Level 2 & 3 procedures
- Implementation Stage
  - ◆ Org Reps reported on status of OWI's
  - ◆ Audit Mgr reported on internal audits status
  - ◆ Org Reps reported on status of internal audits finding and closures
  - ◆ Special focus issues



# Planning Stages (con't)

## Focus Team

- ✦ Maintains focus on “the next step” needed for registration
- ✦ Meets weekly with Management Rep
- ✦ Ad hoc agenda to work current issues and examine alternate strategies
- ✦ “Pre-digests” the most difficult issues
- ✦ Participation evolves with the issues



# Planning Stages (con't)

## Marshall Quality Counsel (MQC)

- ✦ Meets as required (twice a year minimum)
- ✦ Center Director is Chairperson
- ✦ Required Attendance:
  - Center Director
  - Deputy Director
  - ISO Management Representative
  - S&MA Director
  - Associate Director
  - Science and Engineering Director



## Planning Stages (con't)

### Marshall Quality Counsel (MQC) con't

- ✦ Standing invitation to all MSFC SES's
- ✦ Typical MQC subject matter:
  - Fundamental direction of QMS
  - Internal audit results
  - Status of QMS implementation
  - Health of the QMS itself
- ✦ Actions formally assigned and tracked to closure



# Planning Stages (con't)

## Procedure Development

- ✦ Within Implementation Team, formed *augmented* "sub-teams" by ISO element to draft procedures (see org chart)
- ✦ Sub-team composition driven by recognition of application of ISO elements to organizational elements and size of the task (see matrix chart)
- ✦ Support for augmentation was solicited, not directed



# Planning Stages (con't)

## Implementation Team Org Chart

Subteams within  
dashed box



MSFC  
Quality Council

Management  
Representative

ISO Coordinators

Focus Team

ISO Documentation  
Coordinators

Team A  
4.1 & 4.2

Team B  
4.3 & 4.6

Team C  
4.4 & 4.19

Team D  
4.9 & 4.20

Team E  
4.11

Team F  
4.5 & 4.8

Team G  
4.7 & 4.15

Team H  
4.10 & 4.12

Team I  
4.13 & 4.14

Team J  
4.18

Team K  
4.16 & 4.17

Organization  
Representatives

# Planning Stages (con't)

## Element Sub-Teams Matrix

Team	ISO ELEMENT	APPLICABLE OFFICE CODES																									
		CR	AA	AB	AI	BC	DA	CN	CM	GP	CC	SA	FA	JA	PA	PD	EA	EE	EJ	EM	EB	ED	EH	EL	EP	ES	EO
A	4.1 MGT Responsibility	X					X										X		X								
	4.2 Quality System	X					X										X		X								
B	4.3 Contract Review	X	X			X	X			X	X			X					X		X						
	4.6 Purchasing	X	X					X		X	X			X				X	X	X							
C	4.4 Design Control								X				X		X		X	X		X	X	X	X	X	X	X	X
	4.19 Servicing																			X	X		X				
D	4.9 Process Control	X		X																X		X		X			
	4.20 Statistical Techniques	X																		X	X	X					
K	4.11 Meas & Test Equipment				X			X	X			X		X						X	X	X	X	X	X	X	X
F	4.7 Customer Supplied Prod Ctrl	X						X				X	X	X							X	X	X	X	X		
	4.15 Handling, Ship., Stor., Pkg	X	X	X				X					X									X	X				
G	4.10 Inspect & Test	X						X													XX	X	XX	X	X	X	
	4.12 Inspect & Test Status	X						X													XX	X	XX	X	X	X	
E	4.5 Docmt & Data Control	X						X										X			X						XXX
	4.8 Product ID & Traceability	X																X	X		X		X	X			
H	4.13 Cntrl of Nonconform Product	X						X				X	X								X		X	X	X	X	
	4.14 Corrective & Prevent Action	X						X				X	X								X		X	X	X	X	
I	4.18 Training	XX							X												X		X	X			X
J	4.16 Ctrl of Qual Records	X	X																			X					
	4.17 Internal Qual Audits	X															X										

## Planning Stages (con't)

### Procedure Development (con't)

- ◆ Sub-teams set out to accumulate all documents used to do business (policy, procedure, standards, specs, etc.)
- ◆ Following the premise "Say what you do, do what you say", assumed existing documents, in the aggregate, said what we did, embodied all requirements, and had logical interrelationships



# Planning Stages (con't)

## Procedure Development (con't)

- ◆ Original conservative intent: Identify existing policy, procedure, and work instruction, check for adequacy, and then re-use
- Method: Capture documentation data to...
  - Develop a clear understanding of what drives how we do business, then write system-level procedures that match existing way of doing business
  - Extract family tree relationships "for ISO registration purposes"
  - Record team judgments on each and every document



# Planning Stages (con't)

## Procedure Development (con't)

### ✦ REALITY:

- Quantity of documents was vast (2200+)
- Document relationships were disorderly: Family tree was more like a bush, with many peer branches instead of straight flowdown
- Data capture was, or was perceived as, a large and tedious task
- Comprehensive mapping of business processes via existing documents proved impracticable



# Planning Stages (con't)

## Procedure Development (con't)

- ✦ **REALITY, Part II:** Sub-teams forged ahead and wrote system-level procedures from the top down (i.e. from the 20 elements), rather than the bottom up
- ✦ **REALITY, Part III:**
  - Team learned from RKDN and from NQA, that document relationships need not be explicit (i.e. tree not needed)
  - The bulk of existing work instructions might be used as-is



# Planning Stages (con't)

## Procedure Development (con't)

- ✦ Outcome of document review:
  - Transferred work instruction effort either to natural or designated OPRs
  - Sub-teams concentrated on system-level procedures
- ✦ Retrospective value of document review effort:
  - Surfaced the few dozen key documents that truly had to be accounted-for and made compliant
  - Drew attention to the details of how business is actually conducted



# Planning Stages (con't)

## Procedure Development (con't)

### ◆ Nuts & Bolts:

- Established Document Hierarchy
  - ◆ Level 1: Marshall Quality Manual (MQM)
  - ◆ Level 2: Marshall Standard Procedures (MSPs)
  - ◆ Level 3: Center-Wide Work Instructions (CWIs)
  - ◆ Level 4: Organization Work Instructions (OWIs)
- Established numbering scheme
- Edicted procedure format, level by level
- Formulated document control guidelines
- Evaluated electronics for the future
- Drafted procedures over approximately 3 months



# Planning Stages (con't)

## Procedure Development (con't)

### ◆ Nuts & Bolts (con't)

#### – Informal Initial Reviews

- ◆ Org Reps obtained review within their Orgs
- ◆ Center requested to review, by memo
- ◆ Individual issues worked by Sub-Teams
- ◆ Process took approximately 6 months

#### – Selected field tests

- ◆ "Table Top" review
- ◆ Performed by the Labs (working level people) /



# Planning Stages (con't)

## Procedure Development (con't)

- ✦ Experience of initial Center-wide reviews
  - Comments beyond Org Reps' often cursory or absent
  - Drafts were not taken seriously
  - Surmised ISO not fully embraced
- ✦ LL: Perform initial reviews of system-level procedures Center-wide, then immediately baseline them. The workforce will comply, and proposals for desirable changes will follow.



# Planning Stages (con't)

## Registrar

- ✦ Selected Registrar (NQA) at beginning of procedure development phase
- ✦ NQA provided:
  - Review of the Quality Policy
  - Review of initial MSPs only for ISO compliance
  - High level guidance for procedure development
- ✦ LL: Registrar will not "approve" your procedures, so don't take great comfort from early reviews. Your work has just begun.



# Implementation

## Training the Workforce

- ◆ Begin simply, broadly and briefly
  - “What is ISO 9000?”
  - “What’s expected of me?”
- ◆ ISO Awareness may be all you achieve, but you have to start somewhere
- ◆ Perform initial training around the time of draft procedure reviews, and before internal audits begin

# Implementation (con't)

## Training the Workforce (con't)

- ◆ Target more specialized training as people become more knowledgeable and involved or a specific need is identified (e.g., auditor and lead auditor training)
- ◆ Anticipate possibility of “special subject” training as problem areas are identified



# Implementation (con't)

## Internal Audits

- ✦ Invariably, organizations preparing for audit discovered flaws in system-level procedures despite prior reviews
- ✦ Work instruction production and audit schedule had close correlation
- ✦ Managers, auditees and auditors alike were “in training” during the first round of audits:  
Much uncertainty as to the “correct answer”

# Implementation (con't)

## Internal Audits (con't)

- ◆ Audits motivated timely personal attention to detail at every level:
  - Provided a dress rehearsal for interviews with the Registrar
  - Stimulated desire to “come out clean”
  - Once exposed to the details, most recognized the utility and potential value of the system that had been constructed
- ◆ Audits provided a measure of the true progress of the QMS - anticipate surprises

# Registrar Audits Pre-Assessment

- ◆ Established centrally located "War Room"
  - Management & Operations
    - ◆ At beginning of each day, assigned escorts, scribes & org reps to support auditors' needs
    - ◆ Assignments shown on status board
    - ◆ Key subject matter experts on hand
  - Communications & Logistics
    - ◆ Staffed phone desk
      - Fielded questions, relayed messages, gave directions, worked crises, etc.
      - Maintained phone list for all key personnel, etc.



# Registrar Audits (con't)

## Pre-Assessment (con't)

- Communications & Logistics (con't)
  - ◆ Arranged pagers for each escort, org rep
  - ◆ Obtained priority taxi service; gov't car stand-by
  - ◆ Provided office supplies & incidentals for auditors
  - ◆ Coffee and doughnuts
- Adjacent private office area for NQA
- Conference room for daily NQA debriefs



# Registrar Audits (con't)

## Pre-Assessment (con't)

- ✦ Lead Assessors served as escorts
  - Experienced and trained
  - For continuity, auditor had same escort all day
- ✦ Internal auditors served as scribes
  - Experienced and trained
  - 1/2 day shift with same auditor
  - Scribe notes due by end of following shift
  - All notes available on web



# Registrar Audits (con't)

## Pre-Assessment (concluded)

- ✦ Org Reps in the field
  - Implementation team org rep (primary)
  - Implementation team Alt org rep (backup)
  - Coordinated logistics within organization
  - Reported developments to war room



# Registrar Audits (con't)

## Final Assessment

- ✦ LL: Clear all Pre-Assessment Findings prior to Final Assessment Audit!

### Versus Pre-Assessment

- ✦ Escorts...
  - Were Subject Matter Experts for the element the auditor was to review
  - "Interpreted" for the auditor & auditee
  - Intervened if things got off track



# Registrar Audits (con't)

## Final Assessment (concluded)

- ✦ Scribes: Any lead auditor or internal auditor
- ✦ War Room: Added a “War Chest” for vulnerable elements
  - Intended to assure all facts available for NQA review
  - Assembled by Subject Matter Experts
  - Included anything pertinent
    - ◆ Memos, applicable procedures, associated documents
    - ◆ NCR's and corrective actions taken
    - ◆ Training activities and presentations, etc.





# ISO Chronological Events at MSFC

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4/22/98

44

# ISO Chronological Events at MSFC

- ✦ Dec 6, 1995 - NMI 1270.3 signed by Goldin
- ✦ Dec 7, 1995 - Presentation to start ISO at MSFC to Center Director
- ✦ Jan '96 - Center Director announced retirement
- ✦ Feb '96 - New Center Director appointed
- ✦ Feb '96 - Presentation made to Center Director. Mr. Schwinghamer was appointed as ISO Mgt. Rep
- ✦ Mar '96 - Memo from Center Director requesting ISO 9000 Implementation Team members from Center

# ISO Chronological Events at MSFC (con't)

- ✦ April '96 - Overview given to all Lab Directors/Mgt to give information for Team Selection
- ✦ May '96 - ISO 9000 Team Members assigned and Training provided
- ✦ May '96 - First team meeting held (continuous)
- ✦ July '96 - Center Director requested Sub-team member by organization to support ISO 9000 Plan
- ✦ Sept '96 - Selected Registrar & started contract
- ✦ Sept - Oct '96 - Sub-team members selected and trained

# ISO Chronological Events at MSFC (con't)

- ◆ Oct '96 - Started Procedure reviews, categorizations, reconciliation and revisions
- ◆ Dec '96 - Contracted with NQA (Registrar)
- ◆ Dec '96 - Draft 1 of System Level Procedures in place
- ◆ Dec '96 - Organizations started Organization Work Instructions (OWI'S)
- ◆ Dec '96 - June '97 - ISO Mgt Rep visited all Lab Directors/Mgt to continue awareness/support to ISO
- ◆ Mar '97 - NQA reviewed Quality Manual and System Level Procedures (required prior to Pre-Assessment)

# ISO Chronological Events at MSFC (con't)

- ✦ June '97 - Started First round Internal Audits
- ✦ Dec '96 - July '97 - Training
  - General Employees (2161)
  - Senior Executives (49)
  - Managers (441)
  - Lead Auditors (35)
  - Internal Auditor (139)
- ✦ Oct '97 - Completed First Round Internal Audits
- ✦ Oct '97 - Pre-Assessment Audit by NQA (Optional, at the same depth as the Final Registration Audit)

# ISO Chronological Events at MSFC (con't)

- ◆ Nov '97 - Started Second round of Internal Audits
- ◆ Jan '98 - Completed Second round of Internal Audits
- ◆ Jan '98 - Calibration System Procedure Training (based on Pre-Assessment and Internal Audit Findings)
- ◆ Feb '98 - Corrective/Preventative Action Training (based on Pre-Assessment and Internal Audit Findings)

# ISO Chronological Events at MSFC (con't)

- ◆ Feb '98 - "Help Tiger Teams" to assist organizations in key areas of concern
  - Corrective Action Program
  - Metrology
  - Project Documentation
- ◆ Feb '98 - Final Registration Audit performed on Feb 25th - 27th.
- ◆ Feb. 27th, 1998

Recommended for Certification to ISO 9001



# Benefits of ISO to MSFC

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# Benefits of ISO to MSFC

- ✦ Electronic document system has made instant access and retrieval a reality
- ✦ Electronic document review and approval process has dramatically improved currency of policy and procedure
- ✦ Better communication between the Project Offices and their associated support groups (i.e., Chief Engineer's Office, S&MA, Configuration Management, etc.)

# Benefits of ISO to MSFC

- ◆ Better communications between the different Project Offices (i.e., SA, JA, MG & TA)  
Commonality Meetings and Actions
- ◆ 65% reduction of procedures within Procurement organization
- ◆ Forced attention to and improvement of Metrology and Calibration processes, and improved adherence to them



# Benefits of ISO to MSFC

- ◆ Prompted greater rigor in Project Planning, Quality Planning and Configuration Control Planning
- ◆ Afforded better exercise of contractor accountability for meeting requirements and for assuring correction of contractor deficiencies
- ◆ On-line Quality System Deficiency Notice (QSDN) establishes an avenue for anyone to prompt management attention to resolution of deficiencies in the quality system itself

# Benefits of ISO to MSFC

- ✦ Marshall Standard Procedures (MSPs) and Center Wide Instructions (CWIs) have established a uniform way of doing business in all key subject areas
- ✦ Prompted scrutiny and formal mapping of internal processes by organizations, often for the first time
- ✦ Eliminated redundant functions
- ✦ Eliminated redundancy in documents
- ✦ More discipline and control of records



# Benefits of ISO to MSFC

- ✦ More discipline and control of procedures
- ✦ Increased discipline in documentation configuration control
- ✦ Internal audits close the loop for verifying we meet our own requirements in all our key processes
- ✦ Formalization of Customer Agreement and Internal Agreement processes are bringing relief to working-level personnel, whose simple desire is to provide what is required

# Benefits of ISO to MSFC

- ✦ At last, broke the mentality that “Quality is the job of the Quality Department
- ✦ Improved communication and fostered teamwork between MSFC organizations with a common goal of registration with a mutual approach on how we do business
- ✦ Benefit of sharing information with other similar firms/contractors and other NASA Centers that have recently been, or are in the process of becoming ISO Registered

# Benefits of ISO to MSFC

- ◆ The Marshall Quality Council (MQC) and other features of the QMS have provided MSFC Senior Management a comprehensive tool for:
  - Insight into Product Quality
  - Guiding the healthy functioning of all key processes
  - Assuring desired outcomes
- ◆ We expect the ISO internal audit process to satisfy or substitute for many future HQ audits [i.e., procurement overviews, Functional Management Reviews (FMRs), etc.]



# MSFC ISO 9000 Web Site On-Line Overview

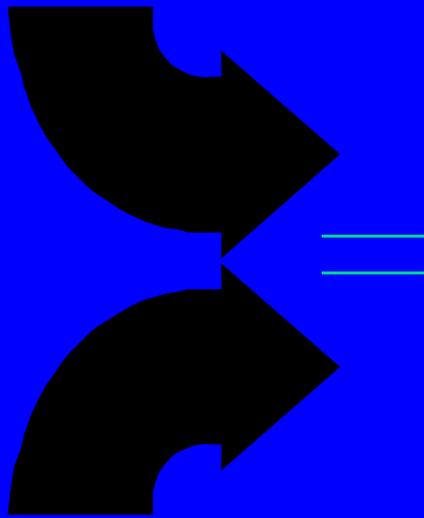
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# The MSFC Internal Audit Program



## The Road to Registration

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# Overview

- ◆ The Procedure
- ◆ Approach (Pre and Post Registration)
- ◆ Resources (Pre and Post Registration)
- ◆ Training
- ◆ Quality Records
- ◆ Metrics
- ◆ Nonconformance Documentation System



# The Procedure

- ✦ Initially developed as a Level II Procedure with a Level III Center-wide Work Instruction
  - Later Reduced to a single Level II Procedure
- ✦ Written by an MSFC cross functional team using:
  - The ISO 9001 Standard
  - Guidelines for Auditing Quality Systems (ANSI/ISO Q10011-1994)
  - JSC audit lessons learned
- ✦ Revision B is on the Web - Revision C in work



# The Procedure (con't)

- ◆ Procedure contents include:
  - Roles and Responsibilities
  - Step by step instructions on how to conduct an audit from start to finish
  - Copy of the nonconformance report (NCR) form with instructions on how to fill it out
  - Copy of the audit critique form with instructions on how to fill it out



# The Approach

- ◆ 2 Center-wide Audit Rounds prior to Registration (over an 8 month span)
  - Audited by Organization (in scope) both rounds
  - One before Pre-registration Audit followed by:
  - One before Registration Audit
- ◆ Organizational Auditing:
  - Allowed in depth audit penetration
  - Helped motivate organizations - a key stimulus
  - Consistent approach to each round facilitated evaluation of readiness

# The Approach (con't)

- ◆ Internal Auditing commenced prior to baselining of all documents
  - February registration deadline forced start
  - 1st Round - Audited to some draft documents
  - Helped drive effort to baseline documentation
  - Helped flush out documentation deficiencies



# Approach (1st Round)

Internal Audit System  
Road to Registration

ORG(s) to be Audited	ORG. REP.	Lead Auditor	1997				
			Jun	Jul	Aug	Sept	Oct
AA, AR, AB	Michael Haynes	Don Miller				8-Sep	
BC	John Howell	Dale McElyea				<b>Deleted</b>	
DA, DD, DE, DS	B. Schwinghamer	Jeff Spencer			25-Aug		
CC	Gray Marsee	Lisa Blue				6-Oct	
CN	Annette Tingle	Richard Lamb			25-Aug		
CM (CO)	Pat Schultz	Rex Geveden				3-Sep	
CR	Ed Kiessling	Hank Miller		28-Jul			
EA, EM	Hank Miller	Annette Tingle				8-Sep	
EB	Jim Blanche	Mark Strickland	23-Jun				
ED	Ricky Wilbanks	Rich Wegrich			25-Aug		
EH	Rich Wegrich	Bob Zagrodsky			18-Aug		
EL	B. Zagrodzky	James Niblett		21-Jul			
EO	Warren Woods	Dr. Whitacre				29-Sep	
EP	David Harris	Ray Moye		14-Jul			
ES	Roslin Hicks	Dr. Whitacre			18-Aug		
GP	Byron Butler	William Till			18-Aug		
JA	H. Shelton	Ed Reichman				8-Sep	
LA	T. Dollman	John Pea				15-Sep	
MG	S. Kirkindall	Donald Andrews				15-Sep	
PA	Don Thurman	Jerome Collins			11-Aug		
RA	Dennis Smith	Wyane Gamewell				29-Sep	
SA	John Pea	Jimmy Cobb		28-Jul			
TA	Marc Osborne	Jerome Collins				6-Oct	
<b>Registrar</b>							<b>21-Oct</b>

# Approach (2nd Round)

Internal Audit System  
Road to Registration

ORG(s)	ORG.	Lead	1997		1998		
to be Audited	REP.	Auditor	Nov	Dec	Jan	Feb	Mar
AA, AR, AB	Michael Haynes	Ed Reichman		8-Dec			
D codes, EA, EM	B. Schwinghamer/H. Miller	Dale McElyea	20-Nov				
CC	Gray Marsee	John Pea			12-Jan		
CO (CM,CN)	Annette Tingle/Pat Schultz	Ray Moye		8-Dec			
CR	Ed Kiessling	Lee Foster	3-Nov				
EB	Jim Blanche	Warren Woods	3-Nov				
ED	Ricky Wilbanks	Wayne Gamwell		1-Dec			
EH	Rich Wegrich	Mark Strickland		8-Dec			
EL	B. Zagrodzky	Dr. Whitacre		1-Dec			
EO	Warren Woods	James Niblett			20-Jan		
EP	David Harris	Bob Zagrodzky	17-Nov				
ES	Roslin Hicks	Rex Geveden	17-Nov				
GP	Byron Butler	James Sledd			12-Jan		
JA	H. Shelton	Hank Miller		8-Dec			
LA	T. Dollman	Richard Lamb			20-Jan		
MG	S. Kirkindall	Dr. Whitacre			12-Jan		
PA	Don Thurman	Rich Wegrich	12-Nov				
RA	Dennis Smith	Danny Walker			20-Jan		
SA	John Pea	William Till		1-Dec			
TA	Marc Osborne	Donald Andrews			Canceled		
BC	John Howell	Jerome Collins				18-Feb	
<b>Registrar</b>						25-27Feb	

# Approach (Post Registration)

Internal Audit System  
= Road to Registration

- ◆ Post Registration Auditing will see some changes
  - Frequency of audits will be reduced
    - ◆ Entire system at least once every FY
  - Audits will be Element Focused across the center
  - Organizational/Project audits will be scheduled as needed
    - ◆ As new organizations/projects transition in-scope
    - ◆ If problem areas are identified

# Approach (Post Registration)

Internal Audit System  
= Road to Registration

ORG/element to be Audited	ORG. REP/Element POC	1998											
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
AA, AR, AB	Michael Haynes												
D codes, EA, EM	B. Schwinghamer/H. Miller												
CC	Gray Marsee												
CO (CM,CN)	Annette Tingle/Pat Schultz												
CR	Ed Kiessling												
EB	Jim Blanche												
ED	Bill Till												
EH	Rich Wegrich												
EL	B. Zagrodzky												
EO	Warren Woods												
EP	David Harris												
ES	Roslin Hicks												
GP	Mellina Hudgins												
JA	Jackie Steadman												
LA	T. Dollman												
MG	S. Kirkindall												
PA	Don Thurman												
RA	Dennis Smith												
SA	John Pea												
TA	Marc Osborne												
BC	John Howell												
Elements 1, 2 & 4	Schwinghamer/Zagrodzky									X			
Elements 3 & 6	Dollman/Hudgins							X					
Elements 7 & 15	Tingle/Haynes		X										
Elements 8 & 9	Kiessling/Wegrich					X							
Elements 10 & 12	Kiessling				X								
Element 11	Haynes						X						
Elements 13 & 14	Kiessling		X								X		
Elements 18	Pay Schultz								X				
Elements 17 & 20	Kiessling											X	
Registrar				6-May									TBD

Organization/Project Audits as required:  
 - As new organizations/projects become in-scope  
 - Focused audits to address problem areas

Elements 5, 16, 17 and 18 will be reviewed during every audit

# Resources

- ◆ Audit Manager (AM) assigned full time
- ◆ Lead Auditors & Auditors are volunteers from center organizations - advantages include:
  - Audits viewed as Center vice S&MA activity
  - Promotes employee understanding of the MSFC Quality Management System
  - Promotes employee understanding of the roles of other MSFC organizations
  - Helps employees improve communications, leadership and presentation skills



# Resources (con't)

## ◆ Volunteer Approach - Disadvantages:

### – Difficult Logistics

- ◆ Center Resources are tight
- ◆ Often difficult to get volunteers
- ◆ The best volunteers are in demand by parent organization

### – AM has responsibility - no authority

### – Results in a mix quality of auditors/audits

- ◆ Limits consistency from audit to audit
- ◆ Excessive audit preparation time
- ◆ Regular duties conflict with audit and follow up requirements (NCR close-out and verification)



# Resources (Post Registration)

Internal Audit System  
= Road to Registration

- ◆ Auditing resources will change in the near future
  - Lead Auditors will be permanently assigned
  - Auditors will still come from the center (volunteers)
  - Methodology should:
    - ◆ Provide higher **consistency/quality** from audit to audit
    - ◆ Reduce audit preparation times
    - ◆ Reduce the burden on already limited resources
    - ◆ Facilitate more timely NCR follow up and closure
    - ◆ Facilitate employee awareness and understanding of MSFC
    - ◆ Help maintain the MSFC auditing MSFC philosophy

# Training

- ◆ Lead Auditors all attended a formal 5 day Lead Auditor Course
  - Two different contractors used
    - ◆ Quality Assurance Services of North America (provided by NASA HQ)
    - ◆ STAT-A-MATRIX (20/Class)
  - 35 personnel trained - about 25 actually served as a Lead Auditor



# Training (con't)

- ◆ Auditors all attended a formal 3 day Auditor Course
  - Provided by STAT-A-MATRIX (20/class)
  - 139 trained - 113 actually audited
- ◆ First series of audits relied on personnel with other audit experience + personnel under instruction
- ◆ 1st audit supported by an ISO 9000 consultant



# Quality Records

- ◆ Hard Copy Quality Records indexed, filed and maintained in accordance with NPG 1441.1 - NASA Records Retention Schedules
- ◆ Internal Audit Quality Records are:
  - Audit Report with Nonconformance Reports (NCRs)
  - Checklists/Interview notes
  - Auditor and Lead Auditor Training data
  - Returned Internal Audit Critique Forms
  - Electronic NCR data base

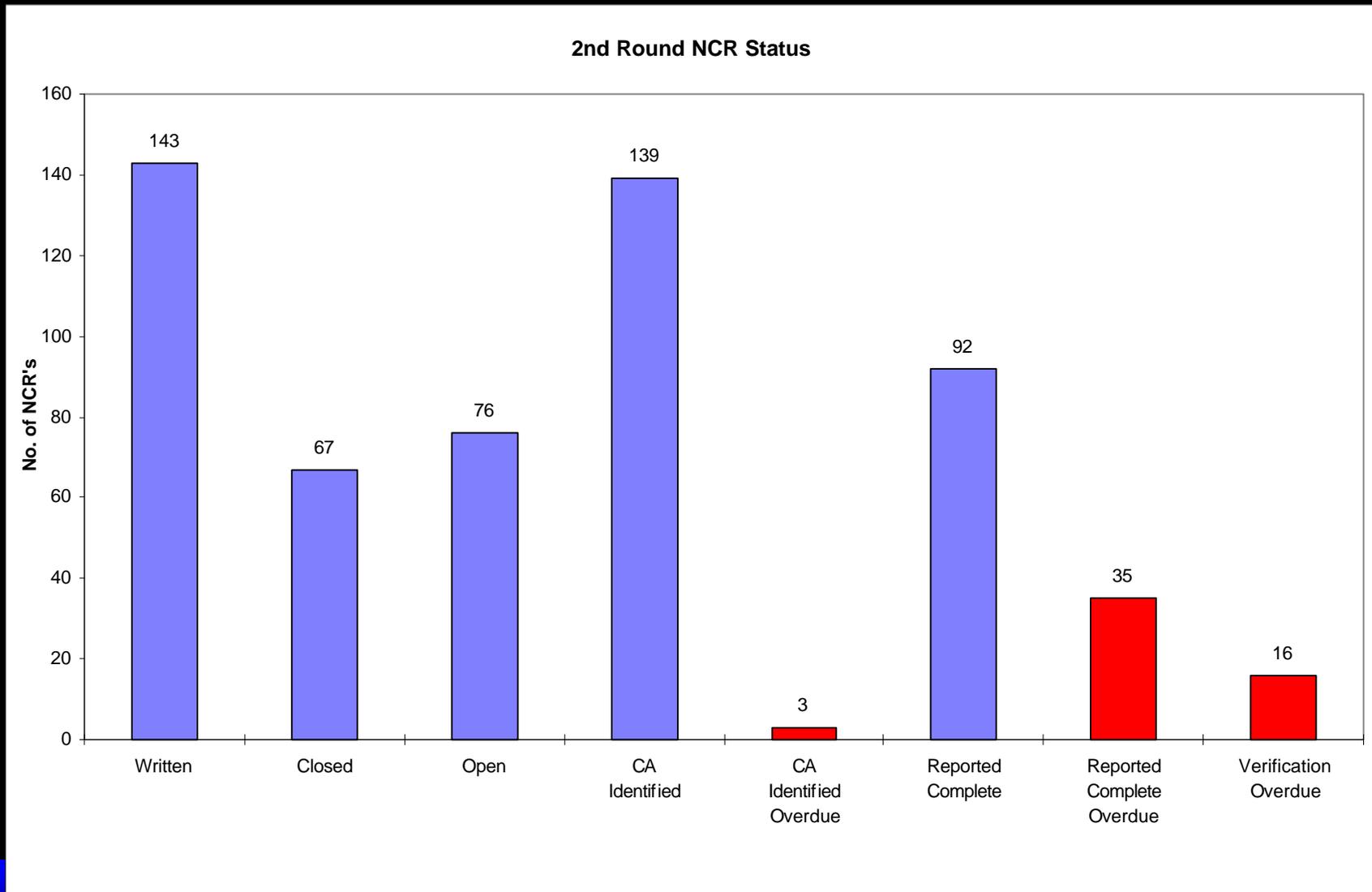


# Metrics

- ◆ Internal Audit Metrics Provided to Management include:
  - Internal Audit Nonconformances by element
  - Internal Audit Nonconformances by organization
  - Status of open NCRs
  - 1st Round audit results vs. 2nd Round audit results
  - Percent reduction in findings 1st Round vs. 2nd Round

# Metrics (NCR status)

Internal Audit System  
Road to Registration



# Metrics

(1st Round vs. 2nd Round)

Internal Audit System  
Road to Registration

# Nonconformance Documentation System

Internal Audit System  
= Road to Registration

- ◆ 1st Round of audits conducted using File Maker Pro Forms
  - Provided some limited electronic manipulation
  - Completed NCRs filed as hard copies
- ◆ 2nd Round of audits conducted using new web based NCR system  
(<http://msfcsma1.msfc.nasa.gov/dbwebs/auditdb/>)
  - Uses MICROSOFT ACCESS Database
  - Can be used by both MAC and PC platforms
  - All electronic from NCR creation to closure



# NCR System On-Line Demonstration

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# Document and Data Control

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# DOCUMENT AND DATA CONTROL

- ✦ Establish/maintain documented procedures to control all documents and data

- *Document and Data Control - MSFC-P05.1*

- ◆ Establish the Quality Management System (QMS)

- Level 1, MSFC-MQM, *MSFC Quality Manual* (Policy)
      - Level 2, MSFC Standard Procedures (MSPs) (Principles/Operating Procedures/Responsibilities)
      - Level 3, Centerwide Work Instructions (CWIs) (Detailed step-by-step or general instructions applying to all MSFC organizations)
      - Level 4, Organizational Work Instructions (OWIs) (Detailed step-by-step or general instructions applying to one or more MSFC organization but not Centerwide)



# DOCUMENT AND DATA CONTROL

- ◆ Specify Other Controlled Documentation Systems in Appendix A
  - MSFC Directives/MSFC Forms
  - Configuration Management Documentation
  - Data Procurement Requirements/In-House Data Requirements
  - Other Types of Documentation Controlled by OWIs
    - Project Plans/Quality Plans/Configuration Management Plans
    - Facility Activation Procedures/Facility Operation Procedures (FAPs/FOPs)
    - Organizational Forms/Memoranda
    - Standard Operating Procedures/Test and Checkout Procedures/Test Preparation Sheets



# DOCUMENT AND DATA CONTROL

- *Documentation Transition - MSFC-P05.1-C01*
  - ◆ Each organization identify and review all documentation used to perform work to determine
    - If in scope (whole or in part) of ISO 9001
    - Application to the 20 ISO elements
  - ◆ Element teams review in-scope, applicable documentation to determine whether to
    - Incorporate into Levels 1-3 documents
    - Use as applicable document to Levels 1-3 documentation
    - Use as external document
    - Use as guideline/reference



# DOCUMENT AND DATA CONTROL

- ◆ Determine to use
  - “As is” in current format/control system
  - Reformat to comply with Levels 1-3
  - Cover sheet into the QMS system
- ◆ Cancel/revise incorporated documentation
- ◆ Use same process for new documentation received
- ◆ Organizations determine applicability/use for Level 4 documentation



# DOCUMENT AND DATA CONTROL

– *Preparation of MSFC Standard Procedures (MSPs) - MSFC-P05.1-C02*

◆ Establish consistent method for preparing MSPs

– *Preparation of MSFC Centerwide Work Instructions (CWIs) - MSFC-P05.1-C03*

◆ Establish consistent method for preparing CWIs

– *Document Control Board (DCB) - MSFC-P05.1-C04*

◆ Establish consistent method for reviewing Levels 1-3 documentation

# DOCUMENT AND DATA CONTROL

- *Processing Levels 1, 2, and 3 Quality Management System Documents - MSFC-P05.1-C05*
  - ◆ Establish method of control for the electronic documentation system
- *MSFC Documentation Repository Input/Output and Data Management Project Requests - MSFC-P05.1-C06*
  - ◆ Establish responsibilities/instructions for input/output of documents to MSFC Documentation



# DOCUMENT AND DATA CONTROL

- ◆ Review/approve documents and data for adequacy by authorized personnel prior to issue and review/approve changes by same functions/organizations that performed original review/approval of the documents
  - *Document and Data Control - MSFC-P05.1* (Establish responsibility for review for adequacy and authorizes approving authorities)
  - *Document Control Board (DCB) - MSFC-P05.1-C04 (Review Process)*

# DOCUMENT AND DATA CONTROL

- *Processing Levels 1, 2, and 3 Quality Management System Documents - MSFC-P05.1-C05 (Electronic Review/Approval)*
  - ◆ Prepare Document Control Board Charter and establish membership of in-scope organizations
  - ◆ Review by DCB all Draft 1 documents (10-20 days), evaluate, and indicate disposition
  - ◆ If DCB concurs or OPR resolves conflicts/issues with no changes to the document, OPR submits final document for approval

# DOCUMENT AND DATA CONTROL

- ◆ If OPR resolves conflicts/issues with changes to the document or if unable to resolve conflicts/issues, OPR submits Draft 2 document for DCB review, evaluation, and disposition; or OPR requests to convene formal DCB. Additional reviews as determined by the DCB may be conducted.



# DOCUMENT AND DATA CONTROL

- ✦ Establish Master List(s) identifying current revision status of documents to preclude use of invalid/obsolete documents
  - *Document and Data Control - MSFC-P05.1*  
(Establish requirements/responsibility for Master Lists)
  - *Processing Levels 1, 2, and 3 Quality Management System Documents - MSFC-P05.1-C05* (Levels 1-3 Master List Process)
    - ◆ Ensure pertinent issues are available at essential locations

# DOCUMENT AND DATA CONTROL

- Establish electronic documentation library with documents and/or Master List(s) containing information to obtain correct versions accessible to all employees
- ◆ Ensure invalid/obsolete documents are promptly removed from points of issue or use, or otherwise assured against unintended use
  - Remove invalid/obsolete documents from the Master List(s)
  - Place statement “CHECK THE MASTER LIST at <http://masterlist.msfc.nasa.gov/>--VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE” on Levels 1-3 documents (some Level 4 also)
  - Users destroy obsolete/previous versions of documents

# DOCUMENT AND DATA CONTROL

- ◆ Ensure obsolete documents retained are suitably identified
  - Mark (e.g., on the face of the document, a file cabinet or drawer, bookcase or shelf) “FOR HISTORICAL PURPOSES,” “FOR LIMITED APPLICABILITY,” “REFERENCE,” ETC.
  - Otherwise suitably identify (e.g., via explanation)



# DOCUMENT AND DATA CONTROL

- ◆ Provide pertinent background information for review/approval
  - *Processing Levels 1, 2, and 3 Quality Management System Documents - MSFC-P05.1-C05*
    - ◆ Provide accessibility of DCB Disposition Status through the document library (DCB members' disposition/comments and OPRs' resolution/comments)
    - ◆ Utilize electronic Notes section
    - ◆ Provide minutes of DCB meetings



# DOCUMENT AND DATA CONTROL

- ◆ Identify the nature of the change in the document or appropriate attachments
  - *Preparation of MSFC Standard Procedures (MSPs) - MSFC-P05.1-C02*
  - *Preparation of MSFC Centerwide Work Instructions (CWIs) - MSFC-P05.1-C03*
    - ◆ Identify revisions in Document History Log, Notes section of electronic library, etc.

# DOCUMENT AND DATA CONTROL

## ✦ CONTINUOUS IMPROVEMENT

- Determine approach, resources required, and organizational responsibility for combining management documentation into one control system; plan transition
- Define and document a disciplined system that establishes data management:
  - ◆ Identification/Acquisition
  - ◆ Control
  - ◆ Interfaces
  - ◆ Disposition





# Electronic Documentation System On-Line Demonstration

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# Procurement

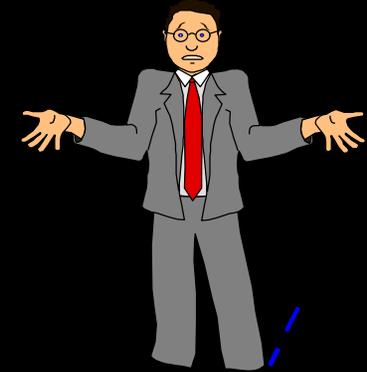
Byron Butler

(256)544-0368

[Byron.Butler@msfc.nasa.gov](mailto:Byron.Butler@msfc.nasa.gov)

# ISSUES/CONCERNS

- ◆ Workload associated with revision of existing documentation (work instructions) in ISO format
- ◆ Impact of introducing a major change in the midst of a sea of change
  - Procurement Regulation Changes
  - Personnel Reductions and Organizational Realignment
  - Anticipated impact of new Financial Management System
- ◆ Major ISO awareness/training effort required
- ◆ Existing heavy workload



# ISO vs. NASA Terminology

- ✦ Contract Award
- ✦ Supplier
- ✦ Subcontractor
- ✦ Vendor
- ✦ Qualified Bidders Lists
- ✦ Customer Involvement in the Procurement Process



# MSFC ISO Schedule

**CY96**

**CY97**

**CY98**

Determined MSFC ISO Scope, Prepared Quality Manual, Performed system level documentation gap analysis, Defined overall schedule and resource requirements, Formed Org. teams for the detailed document development process, Prepared first draft of all System Level Procedures (SLP's).

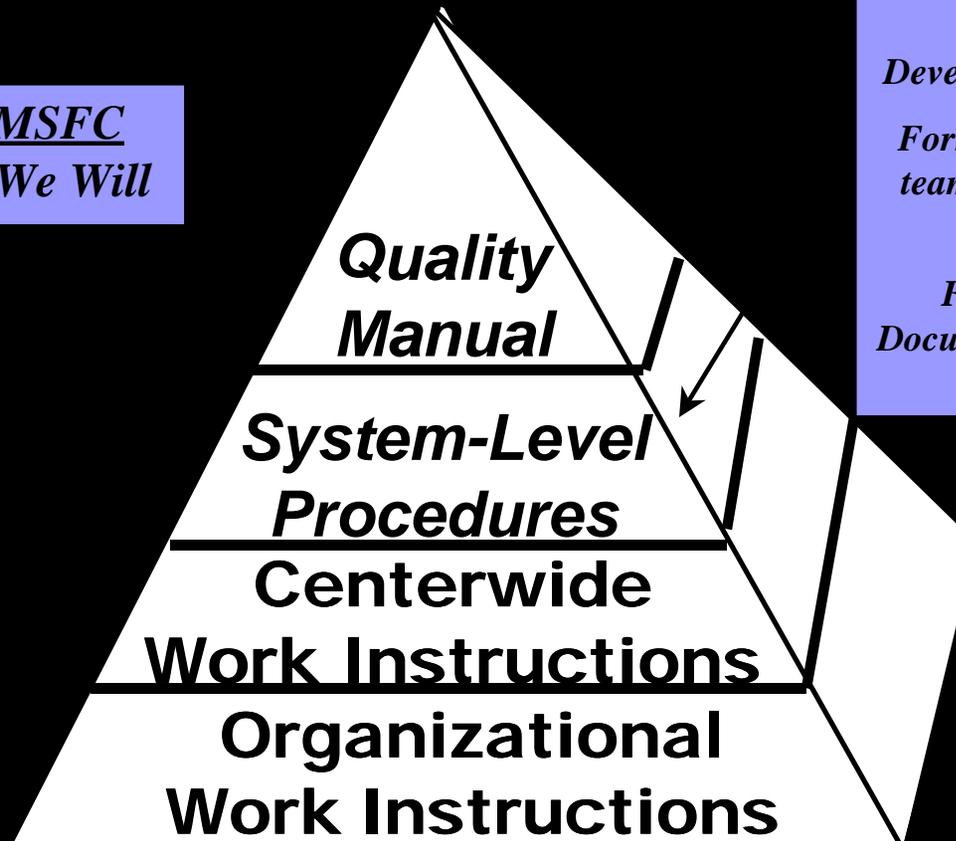


4/22/98

101

# The Documented Quality System

ISO = MSFC  
*You Shall*    *We Will*



## Key Activities

*Develop Resource & Schedule Plan*

*Form Implementation Team Sub-teams & Perform Documentation Gap Analysis*

*Form Organization Specific Documentation Development Teams*



4/22/98

# Centerwide and Organizational Work Instructions (How we do our daily jobs)

- ◆ Provide detailed “How to” information:
  - Perform specific duties (prepare forms, routing)
  - Prescribe how we are to conduct *inter-(CWI) and intra-(CWI & OWI)* departmental activities
- ◆ Key Organizations involved in 4.6 CWI's
  - Safety and Mission Assurance
  - Logistics
  - Financial Management Office
  - Requirements Definition (Engineering, Programmatic)
  - Program Management
  - Center Management
- ◆ Organizational Work Instructions primarily impact the owning Organization



# Detailed Gap Analysis & Documentation Development

- ◆ Determined where ISO requirements were not met and prepared an appropriate procedure/instruction
  - Vendor Selection and Past Performance OWI
  - Procurement Initiators Guide CWI
- ◆ Consolidated existing guidance/procedures dealing with same or associated subject matter
  - Reduced number of instructions by 65%

# Detailed Gap Analysis & Documentation Development (con't)

- ✦ Where feasible, used existing procedures as the ISO “genesis” document
  - Direct traceability significantly aided the training process
- ✦ Developed new ISO Instructions with philosophy of providing users (contract specialist, PR initiator) with information in a concise style that would be easy to read and understand/apply.



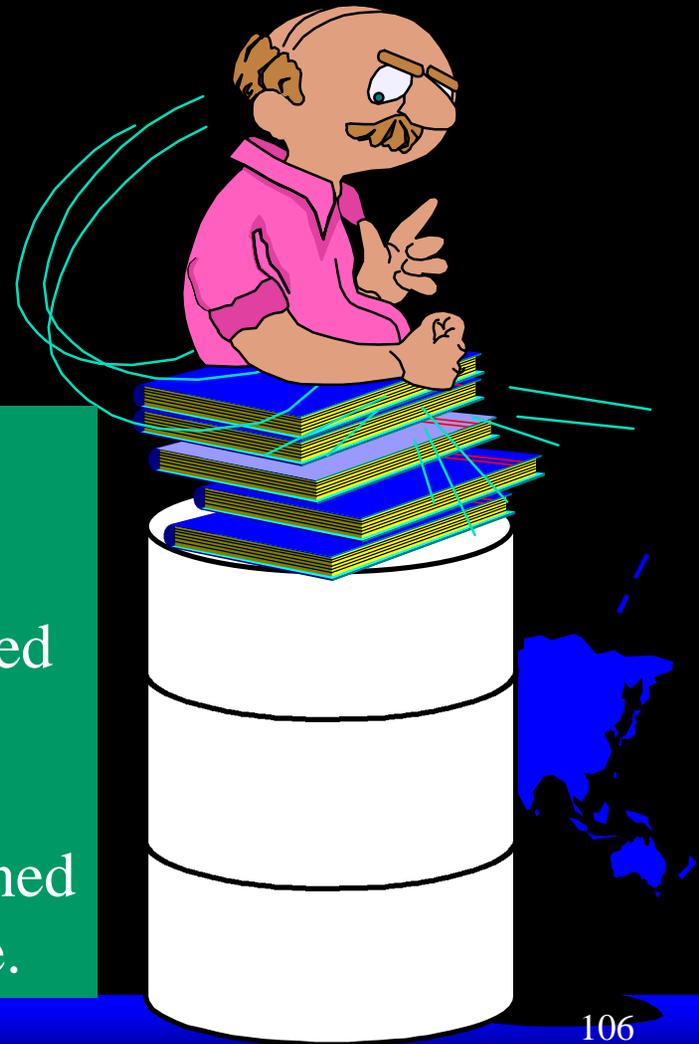
# ISO 9000 Requires *DOCUMENTED* Quality Systems:

- ✦ Documentation must be kept up to date...
- ✦ controlled...
- ✦ and removed from use when it's obsolete.

## Procurement Solution

Developed an electronic based documentation system, with fully linked forms and reference documents.

Instructions are both user and maintenance friendly. System maintained by MSFC Procurement Policy Office.



# Procurement and Quality Records

- ◆ Quality Records are the *objective evidence* that we're doing what we say we're doing.

Addressed in MSP MSFC-P06.1  
and referenced in OWI's/CWI's

- Definition of Purchasing Quality Records
- Filing System for Quality Records
- Retention Schedules established in FAR and NPG 5100.2



# Procurement Specific Training

- ✦ March 1997 - Presented 2 hour “ISO and Procurement” Briefing
  - Overall introduction to ISO 9000
  - ISO as it will impact Procurement
  - Review of first draft of Procurement System Level Procedure (MSP)
- ✦ October 1997 - Held Procurement ISO Standdown (8 hours)
  - Reviewed in detail the Purchasing MSP and all CWI's/OWI's



# Procurement Specific Training (con't)

- ✦ November 1997 - Initiated “ISO Daily Meditations”
- ✦ February 1998 - Held Pre-Assessment Refresher Training
  - Key Topics Training (2 hours)
  - Procurement Discrepancy Tracking System Training (1/2 hour)
  - Procurement Initiators Guide Training (12 hours)

**NET RESULT:** *All employees much more familiar with our Procurement procedures and processes*

# MSFC Procurement

## “LESSONS LEARNED”

- ✦ *Management's wholehearted support is essential*
- ✦ *Benefit of sharing information with other similar firms/agencies that have recently been, or are in the process of becoming, ISO Registered*
- ✦ *Begin early in defining the basic process flow diagram and strawman procedures*
- ✦ *Don't underestimate the magnitude of the documentation gap analysis (legitimate & illegitimate instructions) and the subsequent new documentation system development*

# MSFC Procurement

## “LESSONS LEARNED

- ◆ *Enlist your best people in developing your new documentation system*
- ◆ *Plan for a methodical, iterative and highly participative documentation review and improvement process*
- ◆ *Use internal audits to raise awareness and surface problem areas*
- ◆ *Develop a thorough training plan and schedule training well in advance - you can't overdo it!*





MSFC ISO 9000 Registration  
Workshop  
Corrective Action

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# Agenda

- ✦ Corrective Action System Overview
- ✦ Lessons Learned
- ✦ On-Line QSDN/CAS System Demonstration



# Corrective Action System Overview

Supplier &  
Subcontractor  
Nonconformances  
or Deficiencies

In-House Hardware  
or Software  
Nonconformances



# Corrective Action System Overview

## Suppliers/Subcontractors

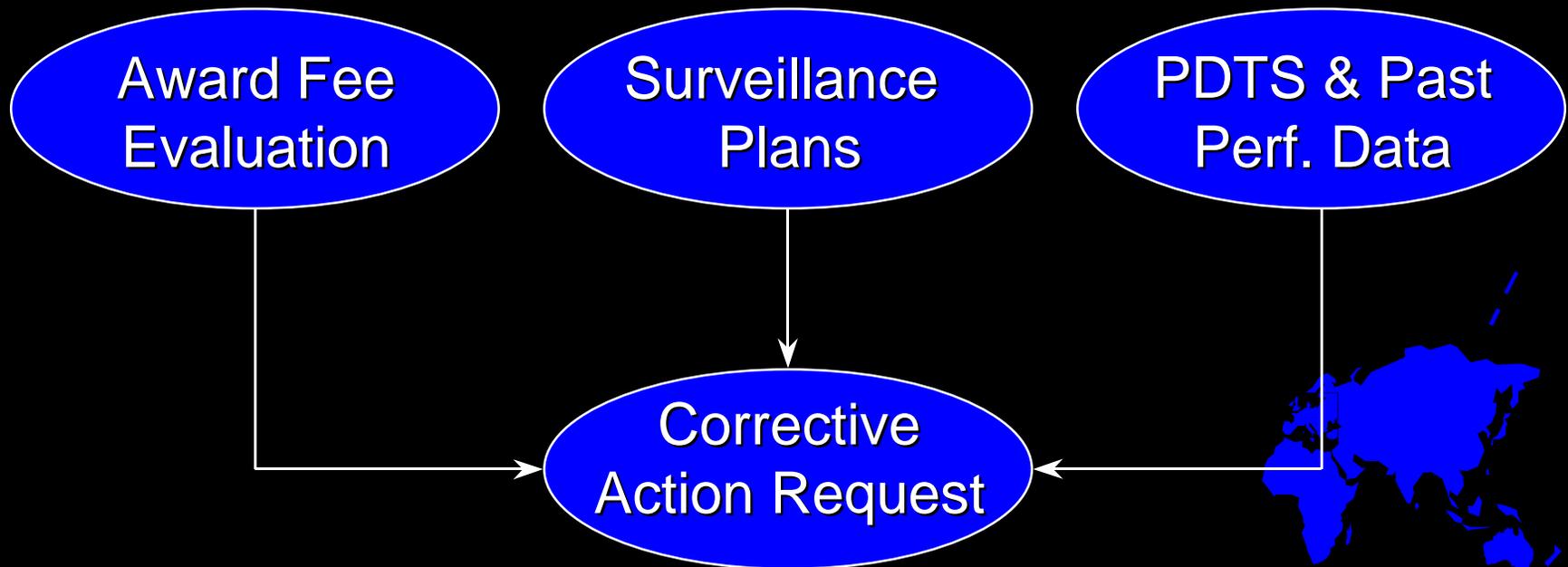
- ◆ MSFC-P06.1, Purchasing
- ◆ MSFC-P06.1-C03, Procurement Initiator's Guide
- ◆ MSFC-P06.1-C04, Evaluation of Contractor Performance for Contracts With Award Fee Provisions



# Corrective Action System Overview

## Suppliers/Subcontractors

### Supplier/Subcontractor Nonconformances

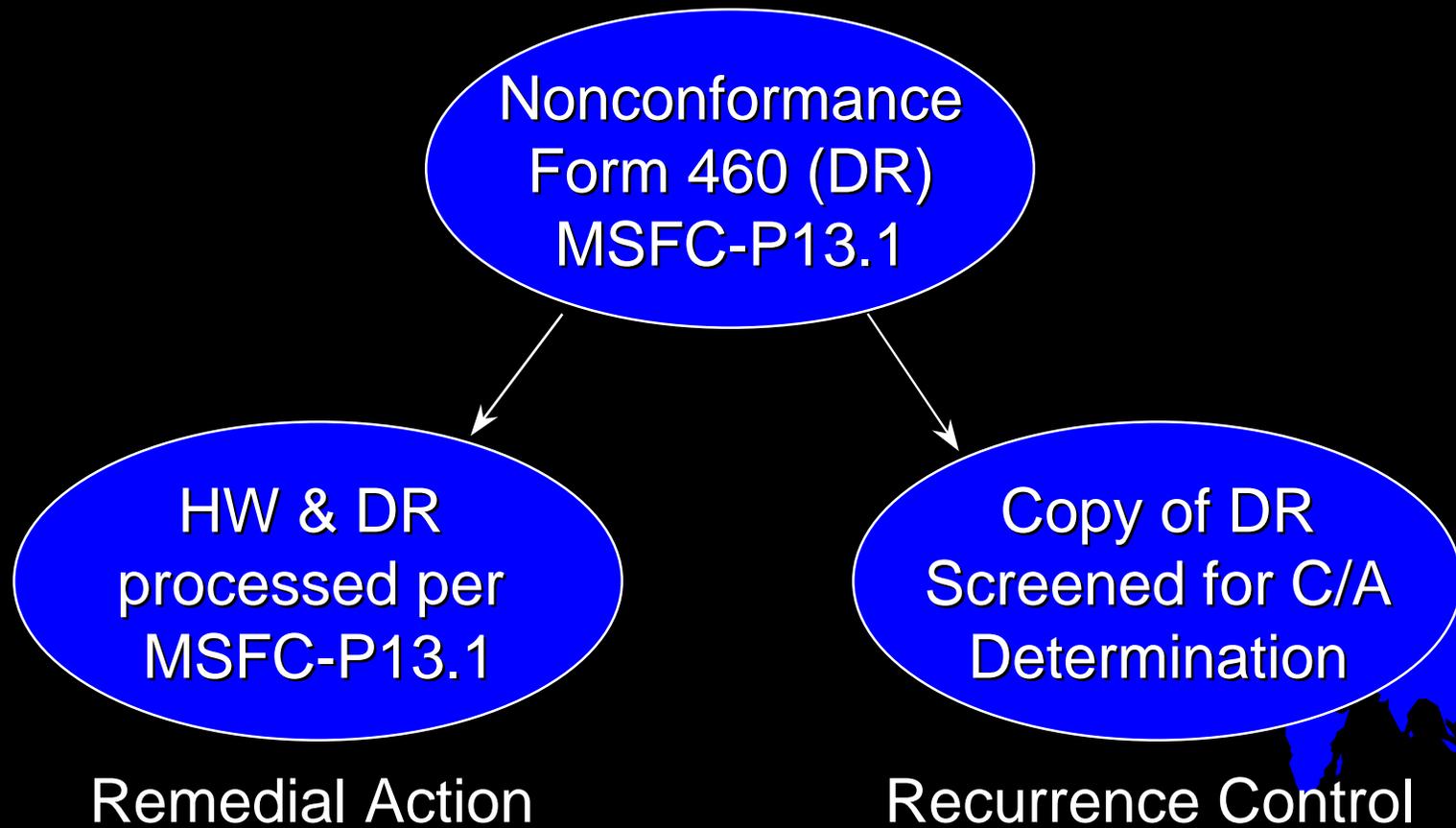


# Corrective Action System Overview In-House

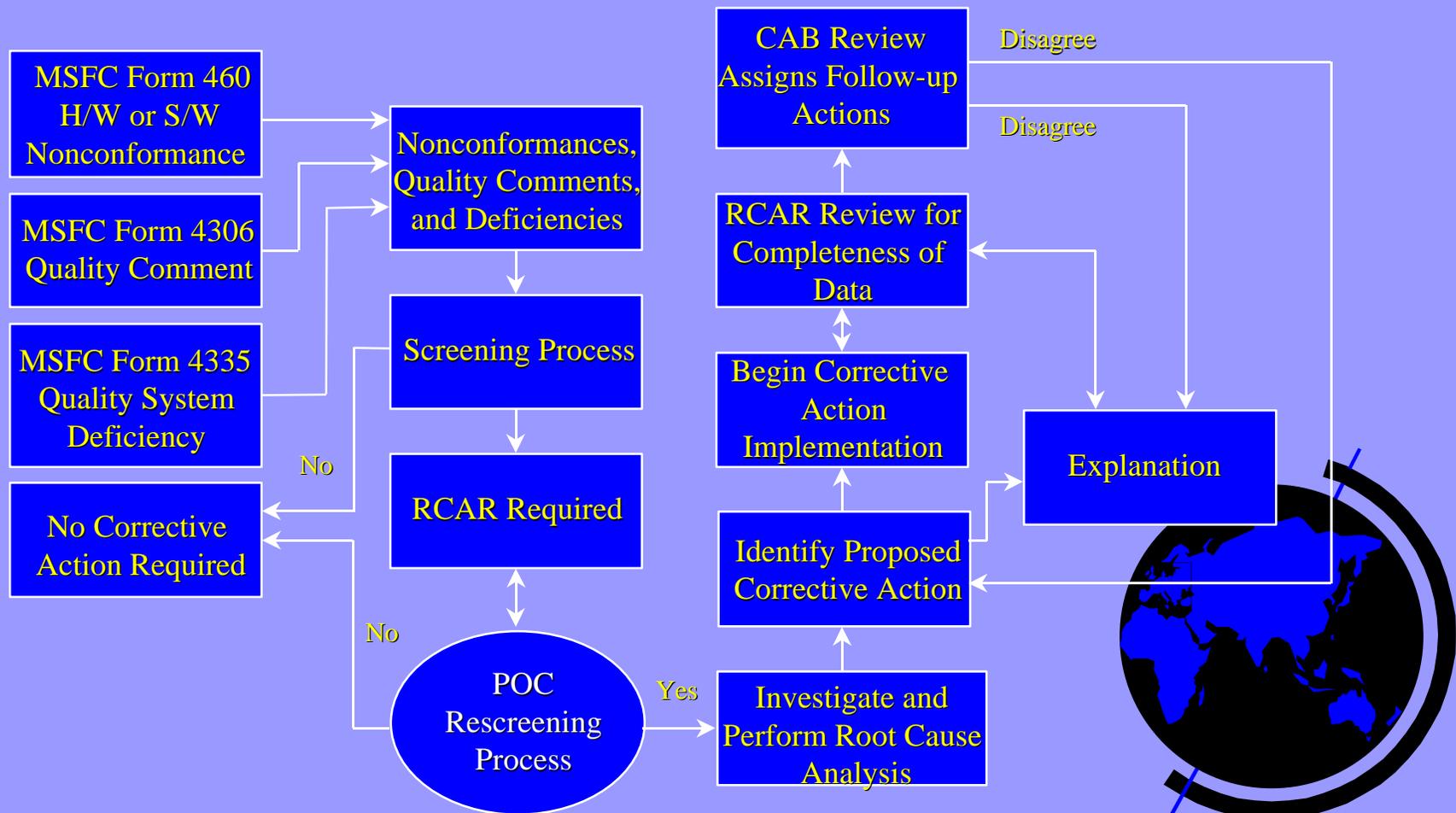
- ✦ MSFC-P14.1, MSFC Corrective Action System
- ✦ MSFC-P14.1-C01, MSFC Quality Comment System
- ✦ MSFC-P14.1-C02, MSFC Corrective/Preventive Action Notification System
- ✦ MSFC-P14.1-C03, MSFC Quality System Deficiency Notice System



# Corrective Action System Overview In-House



# Corrective Action System Overview In-House



# Corrective Action System Overview In-House

## Screening Criteria - No Corrective Action Required

- ✦ One time use
- ✦ One of a kind
- ✦ Benign condition
- ✦ Standard repair in place
- ✦ No effect on flight safety, mission performance, reuse or refurbishment



# Corrective Action Program

## Lessons Learned

- ◆ Establish corrective action system early
  - Go for one system
- ◆ Train all employees on their involvement
- ◆ Focus on corrective actions for pre-assessment findings
- ◆ Make provisions for customer comments and employee concerns
- ◆ Assure system addresses preventive action



# QSDN/CAS System On-Line Demonstration

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# Design Control (Hardware)

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# Agenda

- ◆ Background
- ◆ Implementation Approach
  - Including Configuration Management
- ◆ Software Design Control



# Design Control (Hardware) Background

- ✦ MSFC is a matrix organization
- ✦ Design activities are defined by a program/project manager or lead organization
- ✦ Chief Engineer assists in defining and assuring the completion of design tasks
- ✦ Matrix organizations accomplish with agreed to schedule and resources.

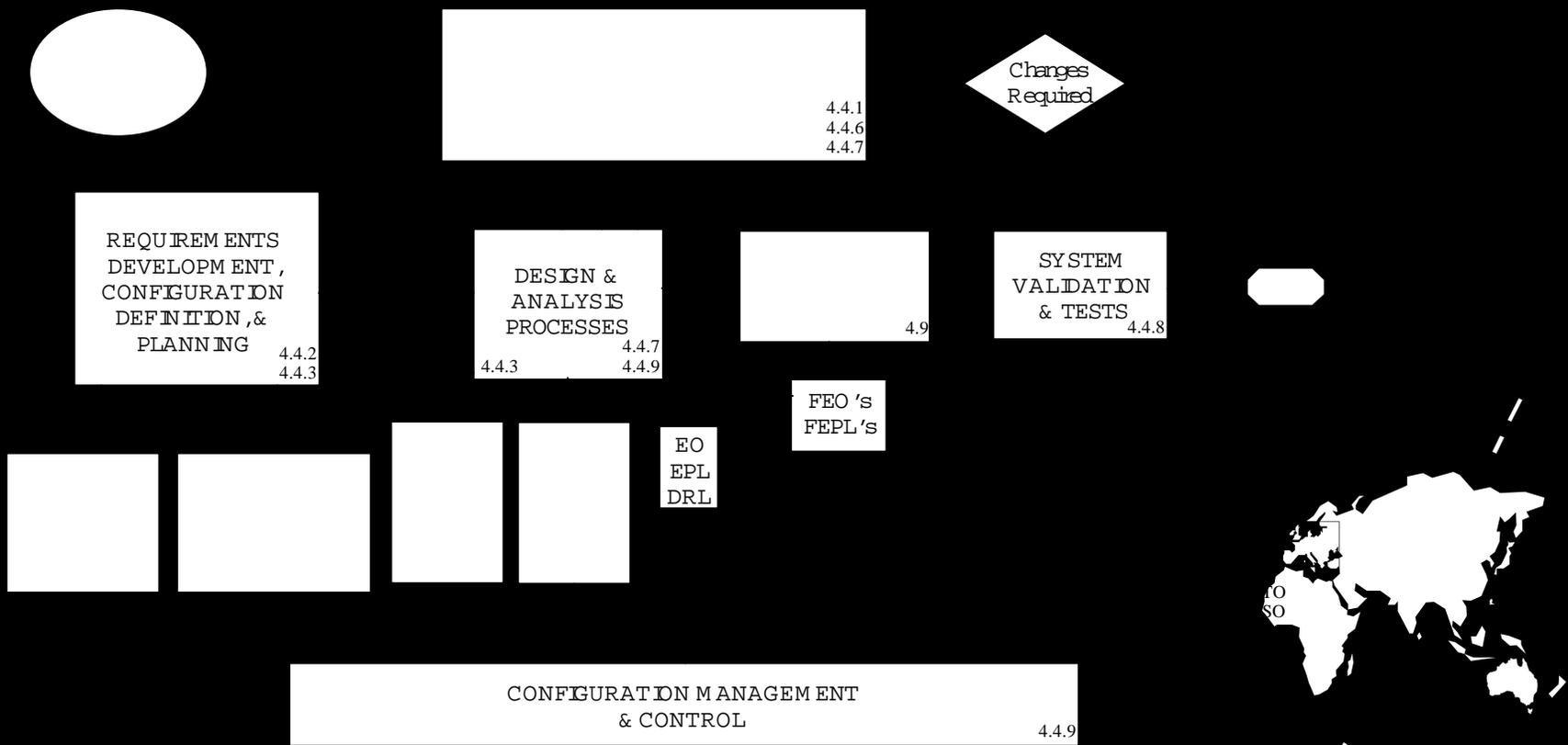


# Design Control Implementation Approach

- ✦ All design control documents were identified.
- ✦ “Use-as-is” were separated from those to be replaced with new ISO documents
- ✦ Existing design control process flowcharted, then modified to satisfy the ISO standard; system procedure was written
- ✦ A separate system procedure was written for configuration management



# Design Control Implementation Approach





# Design Control (Software)

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# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ◆ Division already had a defined and documented standard/process in place (MM 8075.1)
- ◆ Set out to document the process in greater detail to:
  - Comply with ISO 9000 and Software Engineering Institute (SEI) Capability Maturity Model (CMM) Level 3
  - Facilitate consistent implementation
  - Improve the process



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ✦ Viewed the process as a “product”, and the management of the process as a “project”
- ✦ Pursued satisfying ISO 9001 as an organization
  - OWI provides a matrix mapping document sections to quality elements and MSPs
- ✦ Maximized division involvement to maximize experience/ownership/acceptance



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ✦ Created “committees” responsible for process definition and management
  - Process Oversight Panel (management)
  - Process Review Team (technical)
  - Subteams (technical, function-specific)



# MSFC ISO 9000 Registration Workshop

## Software Design Control

**Process  
Oversight Panel**

**Process  
Review Team**

**Software  
Mgt Team**

**Requirements  
Definition Team**

**Design & Imp  
Team**

**V&V Team**

**Sustaining Eng.  
Team**

**Metrics Team**

**Software  
Contract Mgt.  
Team**

**SW Config.  
Mgt. Team**

**System Admin.  
Team**

# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ◆ Conducted mandatory software-specific ISO 9000 training for entire division
- ◆ Refined/documentated process based on how software development IS done
- ◆ Result was a disciplined but flexible process
  - Uses MIL-STD-498 as high-level s/w standard
  - Tailorable to project needs
  - Established minimum requirements for each type of software (flight, simulation, test, etc.)



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ✦ Near the audit, performed training for the division on OUR process (EB41 and MSFC)
  - Effort to bring everyone up to the same level of ISO 9000 understanding
  - Showed relationship from our functions to the ISO 9000 elements and MSPs
  - Defined/clarified key ISO 9000 terms/concepts



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ◆ Follows the MSP design control process
  - Primarily audited against the MSP, not our OWI
- ◆ Addresses primary software development functions, including Software Configuration Management (SCM)
- ◆ Documented in sufficient detail to facilitate:
  - Consistent execution across projects
  - Evaluation of process for improvements



# MSFC ISO 9000 Registration Workshop

## Software Design Control



*The  
Bowling  
Ball*



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ✦ For each function, specifies
  - Inputs to the function
  - Process or sub-processes
  - Outputs or products of the function
  - Quality records
  - Quality-related activities



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ◆ For software at your center:
  - Provide clear classification of software similar to the calibration classes MSFC used for test and measurement equipment
  - Levy appropriate requirements/discipline
  - Produce/obtain documented test results for all “qualified” software - procured or developed
    - ◆ Certification can often be purchased with software
    - ◆ Develop repeatable test procedures
    - ◆ Perform testing whenever software is modified



# MSFC ISO 9000 Registration Workshop

## Software Design Control

### ✦ Concerning audit preparation:

- Regardless of scope, have objective evidence that you follow your process
- Be prepared with several representative projects and related material
  - ◆ Preferably projects worked from initiation through delivery



# MSFC ISO 9000 Registration Workshop

## Software Design Control

- ◆ Discuss specifics of our audit session
  - Spent about 1 1/2 days under the Design Control microscope
  - How audit was conducted
  - What areas were of particular interest
  - What information should be available
- ◆ Process followed for OWI definition
- ◆ Specifics on our process as desired





# Metrology

Michael Haynes

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# Metrology

- ◆ Control of Inspection, Measuring, and Test Equipment - MSFC - P11.1
  - Procedure provides multiple paths for repair and calibration of test equipment:
    - ◆ calibration by the Using Line Organization
    - ◆ repair by the Institutional Services Contractor
    - ◆ repair / calibration by the Calibration Facility
    - ◆ repair / calibration by a qualified Outside Calibration Vendor



# Metrology

## ◆ Roles and Responsibilities

- Using Line Organization
- Calibration Contacts
- S&MA
- Facilities Services Office
- MSFC Calibration Facility



# Metrology

## ◆ Equipment Categories

- I. Mandatory Calibration & Scheduled Recall
- II. Calibrate before use - non-scheduled recall
- III. Not Calibrated
- IV. Calibrate before use each test series - ULO
- V. Calibrate periodically - ULO



# Metrology

## ◆ Audit Findings

- MMI 5300.4 “Standards and Calibration” was not being followed
- Use of test equipment with expired calibration



# Metrology

## ✦ Lessons Learned:

- heavy influx of equipment to be calibrated
- priority calibration request jumped from a normal of 5% to more than 20%
- over 1,900 “first time” calibrations have been performed in past 8 months





# Training

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# Training

## Organizations Responsible for Baselineing MSP 18.1

- ✦ Safety & Mission Assurance Office (CR01)
  - Responsible for Industrial Safety and Quality Assurance for Center
- ✦ Astrionics Laboratory (EB01)
- ✦ Mission Operations Laboratory (EO01)
  - Represented respective organizations
- ✦ Employee & Organizational Development Office (CO20)
  - Responsible for MSP 18.1 and Training Programs



## Training (con't)

### Appropriate Phasing of ISO 9000 Training

- ◆ Required Training Courses (Hours/Number Trained)
  - General Employee Overview (2 / 2144)
  - Executive Overview (2 / 49)
  - Introduction to Quality Systems for Managers (8 / 441)
  - Internal Auditor (24 / 139)
  - Lead Auditor (40 / 35)
  - Introduction to ISO 9000 Documentation (3 / 91)
  - Metrology Overview (1 / 210)
  - Corrective Action Overview (1 / 2161)



## Training (con't)

### Appropriate Phasing of ISO 9000 Training (con't)

#### ◆ Consultant/Trainer

- Stat-A-Matrix
- Implementation Team
- NASA Headquarters

#### ◆ Training Facility

- Conducive to groups



# Training (con't)

## E&ODO Centralized Function

### ✦ MSP 18.1 OPR

- Establish training programs for performing services that directly affect quality
- Maintain training records
- Retain employee training histories



# Training (con't)

## MSP 18.1 Issues

- ◆ Grandfather Clause
- ◆ Qualification/Certification
- ◆ OJT
- ◆ Quality Records



# Training (con't)

## ISO 9000 Element Familiarization

- ◆ Implementation Team Organizational Representative
- ◆ Senior Management Presentation
- ◆ Tiger Teams
- ◆ Organization Expert Consulting



## Training (con't)

# Complete Coverage for Implementation

- ✦ Center Director
- ✦ Senior Staff Meetings
- ✦ Implementation Team
  - Subteam members served Internal Auditors
- ✦ Certifying Officer
- ✦ ISO Home Page



## Training (con't)

### Complete Coverage for Implementation (con't)

- ✦ Marshall Star
- ✦ Administrative Officers Meeting
- ✦ Course Video Tapes
- ✦ In-Scope Contractors
- ✦ Organization Stand-down Meetings
- ✦ Project Specific Training



# Training (con't)

## Lessons Learned

- ✦ Make determination early-on that there is a difference between Qualification and Certification
- ✦ Determine when Certification is applicable
  - Sometimes training suffices
- ✦ Define what is a Quality Record early
- ✦ Don't reinvent the wheel
- ✦ Flow chart training and certification process





# Lessons Learned

# Lessons Learned

- ◆ Top management support

- Starts with top person “Center Director”
- Personal involvement necessary

- ◆ Don't scope anything out within your core business

- Much time was lost time arguing on what is in or out
- Scope issues usually become an excuse for the delay or not doing the job

# Lessons Learned

- ◆ Use as much existing information/documents as possible (don't reinvent the wheel)
  - Use existing procedures within your existing system
  - WSTF, JSC & MSFC ISO documents are also available
- ◆ Recommend flow charting your processes before writing or rewriting your documents



# Lessons Learned

- ◆ Involve everyone in the implementation process
  - ISO is a system on how we perform our day to day business
  - This is not the Quality Organization's initiative
- ◆ Minimize decentralization/stovepiping
- ◆ Training and Awareness necessary
  - ISO specific (i.e., Auditor, General Employee, Mgt., etc...)
  - Documentation changes that resulted from ISO



# Lessons Learned

## ◆ Start as soon as possible

- Establish Scope
- Involve your Registrar up front
- Establish a Quality Policy
- Start internal audits ASAP - this is what drove our organizations to really start getting serious and start doing what was necessary

## ◆ Establish an implementation team that represents all affected organizations

- Communication link to and from the organizations
- Ensures organizations' interests are not overlooked
- Takes away the perception of another Quality Initiative



# Lessons Learned

- ◆ Establish a decision-making team (focus team)
  - 7 to 10 people
  - Made up from Center experienced people and aggressive in getting the job done - “Champions”
- ◆ Have several companies give presentations on their “Lessons Learned” in getting certified
  - Rocketdyne
  - Pratt & Whitney
  - Raytheon (Registered by our Registrar)



# Lessons Learned

- ◆ Seek out consultants that have been successful in implementing ISO (full time working consultant has been priceless for MSFC)
- ◆ KISS Approach - for everything you do. The more complex the assignment, the less likely the action will be performed on time.
- ◆ Communication is very important. Use more than one media (i.e., memos, web site, Center paper, e-mail, posters, organizational representatives, etc.)

# Lessons Learned

- ✦ Web Site - one focal point for everyone to go to: <http://pdi.msfc.nasa.gov:9001/>
- ✦ Implement a positive approach where possible, ask for support, not demand or tell
- ✦ For different organizations performing similar tasks, (i.e., Program Project, Configuration Management, etc.) establish commonality reviews



# Lessons Learned (Pre-Assessment)

## ◆ Documentation

- Baseline as soon as possible; work improvements through the revision process
- Make sure all documents are under control through your system (i.e., external standards, forms, and plans)

## ◆ Configuration Management

- Ensure understanding of the requirements of the procedures/instructions
- If tailoring is allowed, ensure minimum requirements are established

