



Dryden Flight Research Center
Edwards, California 93523

DMSM
Revision G

Code X

Dryden Management System Manual (DMSM)

Electronically approved by
Assistant Director of Management Systems

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INTRODUCTION

The Dryden Flight Research Center (DFRC) is located 65 miles northeast of Los Angeles at Edwards, California. DFRC employs a complement of civil service and contractor personnel to execute its mission of flight research. Along with a varied fleet of research and support aircraft, DFRC has facilities for high temperature and loads calibration, flight instrumentation, flight systems development, flight simulation, flow visualization, data analysis, and systems integration. In addition, more than 12,000 square miles of special use airspace for flight research and flight science projects is available with capabilities that include computer-controlled tracking, telemetry, communications, and control room complexes. These facilities, together with highly skilled and innovative pilots, engineers, and technicians, provide a unique and highly specialized capability to conduct flight research programs and projects.

It is the National Aeronautics and Space Administration's (NASA) vision to be an investment in America's future. As explorers, pioneers, and innovators, NASA expands the frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

NASA Vision:

To improve life here, to extend life to there, to find life beyond.

NASA Mission:

To understand and protect our home planet, to explore the universe and search for life, to inspire the next generation of explorers, as only NASA can...

In support of the Agency's vision and mission, Dryden is one of four research centers under NASA's Aerospace Technology Enterprise. In that capacity, Dryden supports the following Agency goals:

Goal 1 – Understand Earth's system and apply Earth system-science to improve the prediction of climate, weather, and natural hazards.

Goal 2 – Enable a safer, more secure, efficient, and environmentally friendly air transportation system.

Goal 3 – Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies, industry, and academia.

Goal 6 – Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.

Goal 7 – Engage the public in shaping and sharing the experience of exploration and discovery.

Goal 8 – Ensure the provision of space access and improve it by increasing safety, reliability, and affordability.

Goal 10 – Enable revolutionary capabilities through new technology.

Dryden's flight research mission includes design, development, production, and operations. The Center provides NASA's capability for atmospheric flight operations and conducts flight research.

Dryden also supports NASA's Earth Science Enterprise (Code Y) by providing program management and Airborne Science Mission Operations support to customers of the Earth Science Enterprise. NASA's Code Y Enterprise is dedicated to understanding the total Earth system and the effects of natural and human-induced changes on the global environment. Programs of the Enterprise study the interactions among these components to advance the new discipline of Earth System Science, with a near-term emphasis on global climate change. Research results contribute to the development of sound environmental policy and economic investment decisions.

With its extensive range and communication capability, Dryden provides contingency landing support for the Shuttle and on-orbit communication support for both the Shuttle and the International Space Station in support of NASA's Code M Enterprise,

1.0 PURPOSE

In order to ensure our customers receive products and services that meet or exceed their expectations and to facilitate continual improvement, Dryden has established the Dryden Flight Research Center Management System. This Dryden Management System Manual (DMSM) describes the scope, requirements, and responsibilities for implementing the Dryden Management System (DMS) in compliance with all applicable plans, policies, regulations, laws, and standards. In order to comply with NASA's Management System Policy (NPD 1280.1), the Dryden Management System is certified to the ISO 9001 Standard.

2.0 SCOPE

The DMSM establishes, documents, and implements the DMS. The DMS is established to implement management systems necessary for the fulfillment of NASA's vision, mission, and objectives in adherence with standards, regulations, specifications, and procedures.

The scope of the DMS is inclusive of

Flight Project and Mission Management, Aircraft and System Development, Flight Operations, Airborne Science Mission Operations, Research Systems, and all enabling activities.

3.0 EXCLUSIONS

There are no DMS exclusions to the requirements of the ISO 9001:2000 standard.

4.0 RELEVANT DOCUMENTS

4.1 Authority

NPR 1000.3	NASA Organization
NPD 1280.1	NASA Management System Policy

4.2 Reference

The following documents contain provisions that, through reference in this DMSM or in policy or procedure documents, constitute the basis for the DFRC management system:

ANSI/ISO/ASQ Q9001-2000	International Standard, Quality Management Systems-Requirements
ANSI/ISO/ASQ Q9000-2000	International Standard, Quality Management Systems-Fundamentals and Vocabulary
ANSI/ISO/ASQ Q9004-2000	International Standard, Quality Management Systems-Guidelines for Performance Improvements
NPD 1000.1	NASA Strategic Plan
NPR 1000.2	NASA Strategic Management Handbook
NPR 1441.1	Records Retention Schedules
CIP	Center Implementation Plan
DOM	Dryden Organization Manual

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5.0 DRYDEN PHILOSOPHY AND STRATEGIC DIRECTION

5.1 DFRC Vision Statement

***To Fly
What Others
Only Imagine***



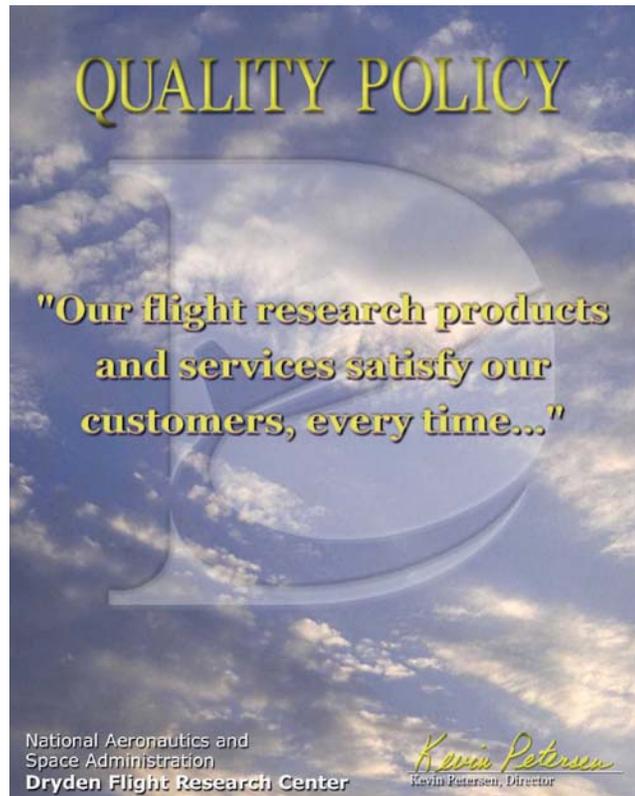
The success of NASA's, and thus the DFRC's, strategic plans, performance plans, and management systems depends upon the active participation of all Center employees, including management at every level, working to achieve a common vision.

Dryden's vision representing technological innovation and achievement also recognizes that leadership plays a critical role in establishing the values, strategy, structure, and systems of the Center. More importantly, it relies on shifting the organizational model to a more inclusive, less hierarchical, team-based, "networked talent model" to build a high performance organization that can more effectively and efficiently achieve this vision.

Dryden has established a Center vision statement that is succinct and is the essence of Dryden's existence: that every employee, civil servant and contractor, can understand how the vision relates to a set of values that both inspire and drive our actions to constantly achieve what others only imagine.

5.2 Quality Policy

The Dryden Quality Policy is established in recognition of the importance of meeting customer, statutory, and regulatory requirements to ensure continued customer focus and promote process effectiveness and continual improvement in our products and capabilities.



5.3 Mission

Dryden develops experiments and conducts flights to advance technology for future aerospace vehicles, to understand and protect our environment, and to inspire the next generation. We will

- Perform flight research and technology integration to revolutionize aviation, advance space transportation, and pioneer aerospace technology,
- Develop and operate flight test beds for research and science missions,
- Conduct airborne remote sensing and in situ observations, and
- Support operations of the Space Shuttle and the International Space Station.

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5.4 Values

5.4.1 Dryden Leadership Philosophy

At Dryden, this is our Leadership Philosophy:

- Professionalism – We are a unified organization of diverse, talented, honest, and hardworking professionals dedicated to safely providing the highest value service and products.
- Learning Environment – Together we create a workplace that values people, communicates openly, and expands our knowledge and skills.
- Shared Vision and Values – We share a vision and set of values that are characterized by achievement and the knowledge that the work we do is critical to the nation.
- Networked Talent – Each of us have leadership, management, and technical roles to perform in our work and therefore rely on the wide and extensive distribution of knowledge and creativity that comes from diversity of people and experience.
- Teamwork – We believe that teamwork produces superior results through successful integration of technical and functional disciplines and consider our customers and suppliers to be our equal partners; we are responsible for and dedicated to mutual success.

5.4.2 Individual Behavioral Values

At Dryden, this is our set of Individual Behavioral Values:

- Personal Integrity – We believe this is our most important asset. We are honest, trustworthy, ethical, and respectful of others and ourselves.
- Commitment to Safety – We ensure safety in all aspects of personal endeavors and we are committed to ensuring the safety of others.
- Honor Commitments – We are accountable, reliable, responsive, disciplined, and dedicated.
- Achieve Goals – We have a “can-do” attitude. We are creative, resourceful, proactive, efficient, and courageous; and we strive for win-win relationships.
- Treat Each Other as Customers – We respect diversity in culture and experience, and we are fair, open-minded, courteous, and discreet.

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- Personal Leadership – We have commitment to continuous learning and improvements to oneself, being a positive role model, and helping others develop and learn through mentoring and coaching.

5.4.3 Operating System Values

At Dryden, this is our set of Operating System Values:

- We achieve One-NASA through teamwork within, among, and between organizations and by sharing competencies and knowledge.
- We assure a commitment to safety by employing systems and processes that insure the safety of the public, the employees, and assets.
- We focus on customer satisfaction by being effective, excellent, high value, on time and budget, consistent, competitive, and service oriented.
- We support personal leadership by employing systems and processes that encourage growth and empowerment, innovation and responsible risk-taking, freedom to manage, and by providing foundations for higher performance.
- We reward leadership, management, and technical efforts that align with organization vision, mission, and values.

5.5 **Management System Objectives**

Senior Management (Directors and Office Chiefs) is responsible for ensuring that objectives and milestones for fulfilling the Center's mission, the Agency Strategic Plan, and customer requirements have been established at relevant functions and levels. The objectives shall be measurable and consistent with the Quality Policy. Top-level objectives and milestones are documented in the annual Center Implementation Plan. DMS objectives are instituted in this document. Directors and Office Managers are responsible for ensuring that objectives are established for their respective organizations and are documented in Dryden Organizational Chapter (DOC) documents. Managers at all levels are responsible for ensuring that employees know how their work contributes to these objectives and/or milestones.

There are four management system objectives that enable Dryden to accomplish its mission and maintain its core capabilities. All four objectives are strategically managed and reviewed through a number of focused Center-level processes, technical (e.g., mini tech), and product (e.g., project) reviews conducted through various boards, panels, and

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councils. Management Reviews are discussed in Section 11.7. The DMS objectives are to

- Provide flight research products and services that meet or exceed customer requirements.
- Provide safe and timely flight and mission operations that meet or exceed customer requirements.
- Provide modern, state-of-the-art facilities that meet or exceed customer requirements for supporting flight and mission.
- Develop the highly motivated and skilled workforce necessary to satisfy customer requirements.

The underlying goal for achieving these objectives is to create a naturally evolving, high performance, and measurable management system. This document sets the baseline for measuring the success and progress of that evolution.

5.6 Strategic Intent Areas

With its Leadership Philosophy, Center management believes that by providing a clear statement of its strategy for accomplishing the Center's mission, employees will be able to work in an integrated and efficient manner toward our stated objectives. This strategic intent is encapsulated below.

- We will be recognized as the premier flight research and test organization for the validation of high-risk, emerging aerospace technology concepts and worldwide airborne science operations.
- Dryden will empower its people and teams to make possible the highest value products and services.
- We will increase our capacity and improve our capability, extending our influence, unconstrained by our current infrastructure.

6.0 DRYDEN KEY PROCESSES

Dryden's ultimate goal of total customer satisfaction, as expressed in its Quality Policy, will be realized through the management of key Center-level processes that draw from Agency strategic, performance, and operating plans. In the execution of its processes, Dryden is fully committed to total customer satisfaction and continual improvement of this quality management system's effectiveness.

Key processes within Dryden stem from Agency goals and objectives. This strategic alignment of the Enterprise's institutional capabilities and resources within NASA is achieved in a straightforward manner defined in the NASA Strategic Handbook. As

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described in Section 9.0, Resource Management herein, the Dryden Center Implementation Plan correlates Dryden business activities with this Agency alignment. It consolidates our commitments to our primary customers and explains how we integrate with other Centers and external organizations. It also identifies our program responsibilities and, ultimately, relates to the role of individual organizations and employees at Dryden.

NASA has recognized that the broad application of certain standard operating processes and business management principles can enhance the returns on its work toward achieving diverse program/project and functional objectives. NASA has defined five Implementing Strategies (IS) to implement these standard operating processes and principles.

- Management and Institutional Excellence (IS-1)
- Information Technology Leadership (IS-2)
- Core Capabilities, Safety, and Mission Success (IS-3)
- Assured Work Environment (IS-4)
- Effective Risk Management (IS-5)

The Dryden Flight Research Center Implementation Plan (CIP) collects and integrates Dryden's commitments to Agency-level implementing strategies that are common to all Agency goals. In order to ensure that the DMS key processes are defined, interfaced, and measurable to the extent that corrective actions or process improvements are possible, Dryden maintains a "big picture" Integrated Center-level Process Map (ICPM) that depicts and integrates the DMS by clarifying Dryden's key customer acceptance, strategic planning, and resource management, thereby enabling product realization, communication, and review processes. The ICPM illustrates functional alignment with NASA's "Implementing Strategies", identifies interfaces among the Center's key processes, and catalogs DMS documentation required for process execution. DMS documents provide details such as the scope and purpose of functional guidance as well as the objectives of the processes or procedures as defined and coordinated by the document owners. Responsible parties and critical interactions are defined along with a sequence of steps and appropriate records necessary to document the attainment of the objectives of the guidance. The ICPM remains under document configuration control, and the controlled copy is posted strategically in the Center. Figure 1 represents a high-level view of the ICPM.

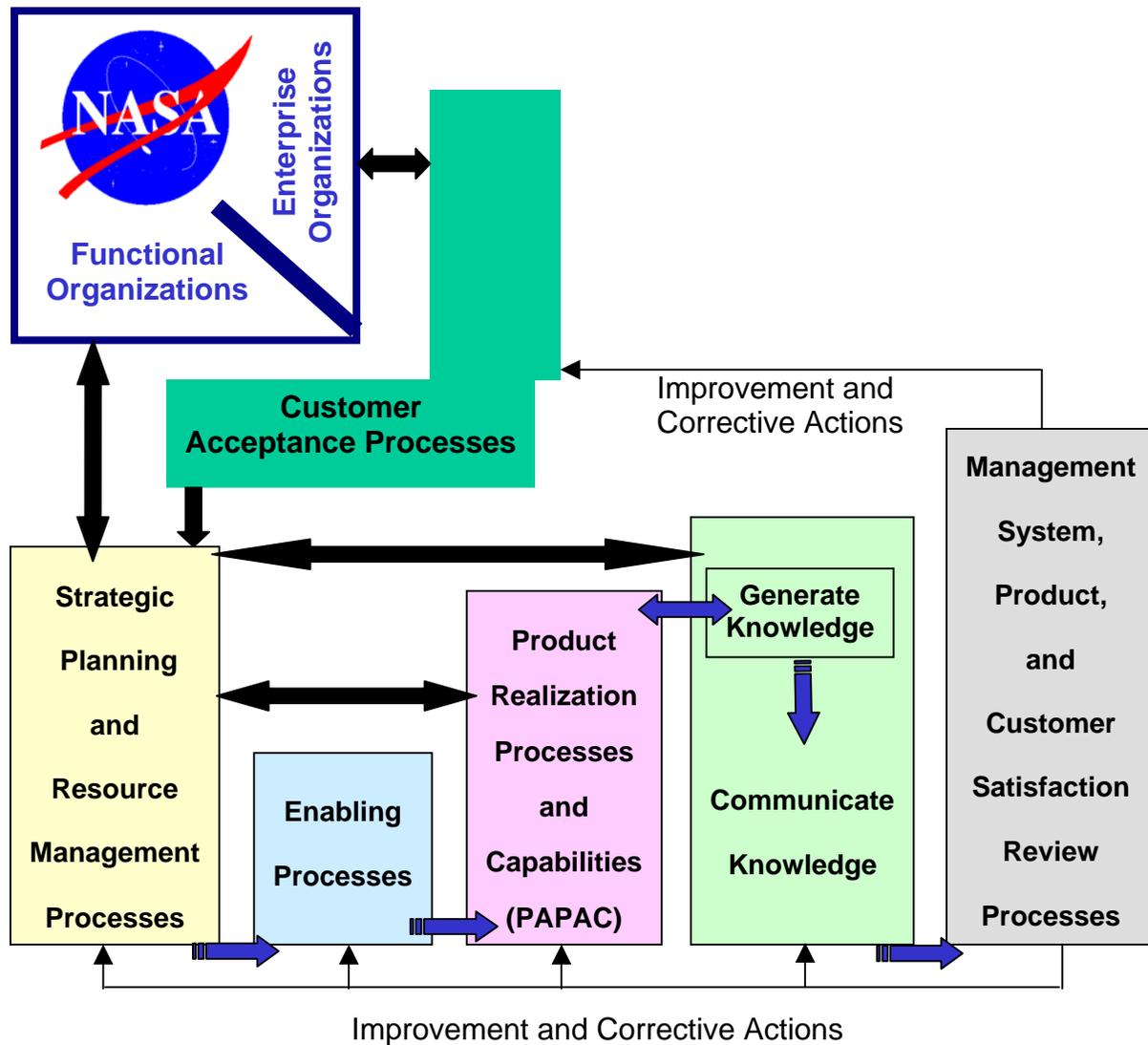


Figure 1 – Schematic Depiction of the Center-level Process Map

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7.0 DMS DOCUMENT CONTROL

All processes are implemented in accordance with DMS documents. The DMS document structure is depicted in Figure 2.

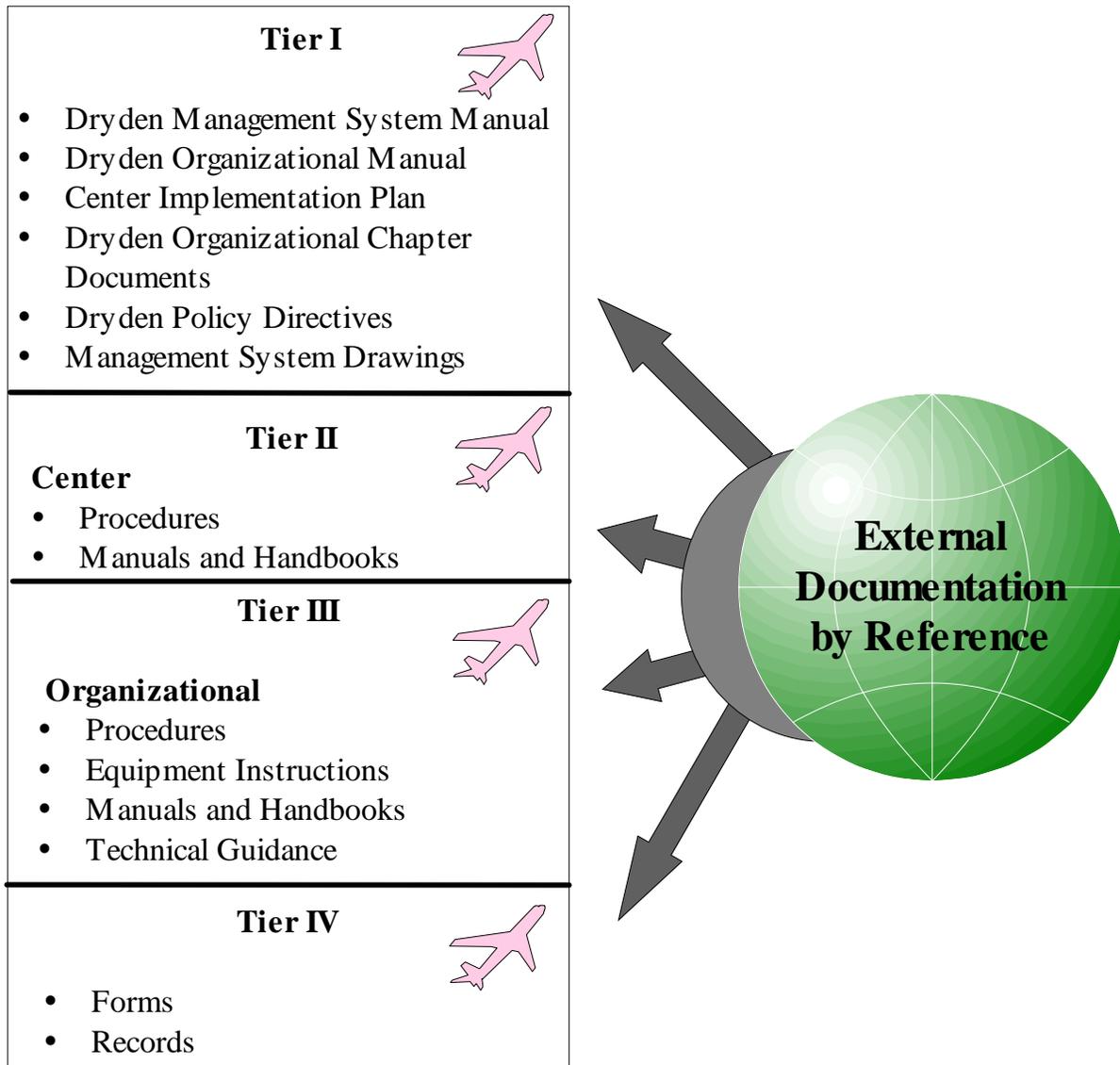


Figure 2 – Dryden Documentation Hierarchy

- DMS document and data control is implemented at Dryden per DPD-1440.1. The directive provides requirements that all documentation systems at Dryden must meet.

DMS documents depicted in Figure 2 are developed and managed through document guidelines and controls. The Interactive Document Management System (IDMS) provides controlled access to directives, this quality manual, process procedures,

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handbooks, manuals, plans, equipment instructions, records, and other internal and external document sources as well as process automation capabilities that support the document production process. Document control procedures for DMS documents are maintained in and can be accessed from the IDMS.

7.1 DFRC Management System Manual (DMSM)

The DFRC has established and maintains the DMSM that includes

- The scope of the Dryden Management System, including any exclusions
- DMS objectives
- Documented processes and procedures established for effective implementation of the DMS, or references to them
- A description of the interaction between the key processes of the DMS and the functional organization roles and responsibilities required for DMS implementation.

7.2 Records Control

NPR 1441.1, NASA Records Management, is the documented Agency Policy and Procedure for identifying, filing, storing, protecting, and dispositioning records.

Records shall be legible, readily retrievable, and stored in facilities that prevent damage, deterioration, or loss. Records that have not been assigned a retention time in NPR 1441.1 shall utilize the retention period identified in Management of Management System Records, DCP-X-013, until a retention time is assigned.

Organizations are responsible for identifying their records and retention periods directly in the process maps and procedural documents, which include records required by the ISO 9001:2000 Standard.

Organizational Record Lists are maintained in the IDMS, and access is provided on the IDMS Xnet web page.

In addition to guidance provided in NPR 1441.1, Dryden has documented additional requirements for records control.

8.0 MANAGEMENT RESPONSIBILITY, AUTHORITY, AND COMMUNICATION

8.1 Responsibility and Authority

In order to execute Center key processes, the DFRC is organized into functional directorates and offices that are in alignment with NASA HQ organizational elements. Roles and responsibilities are assigned to Directorates and Offices and are then flowed down to the sub-organizations. The relationship between functional organizations and key processes is illustrated by the color-coded areas of Dryden’s organization chart, Figure 3 that identifies where responsibility has been assigned for the effective management of enabling and product realization processes. This chart is only a representation of the official Dryden Organizational chart.

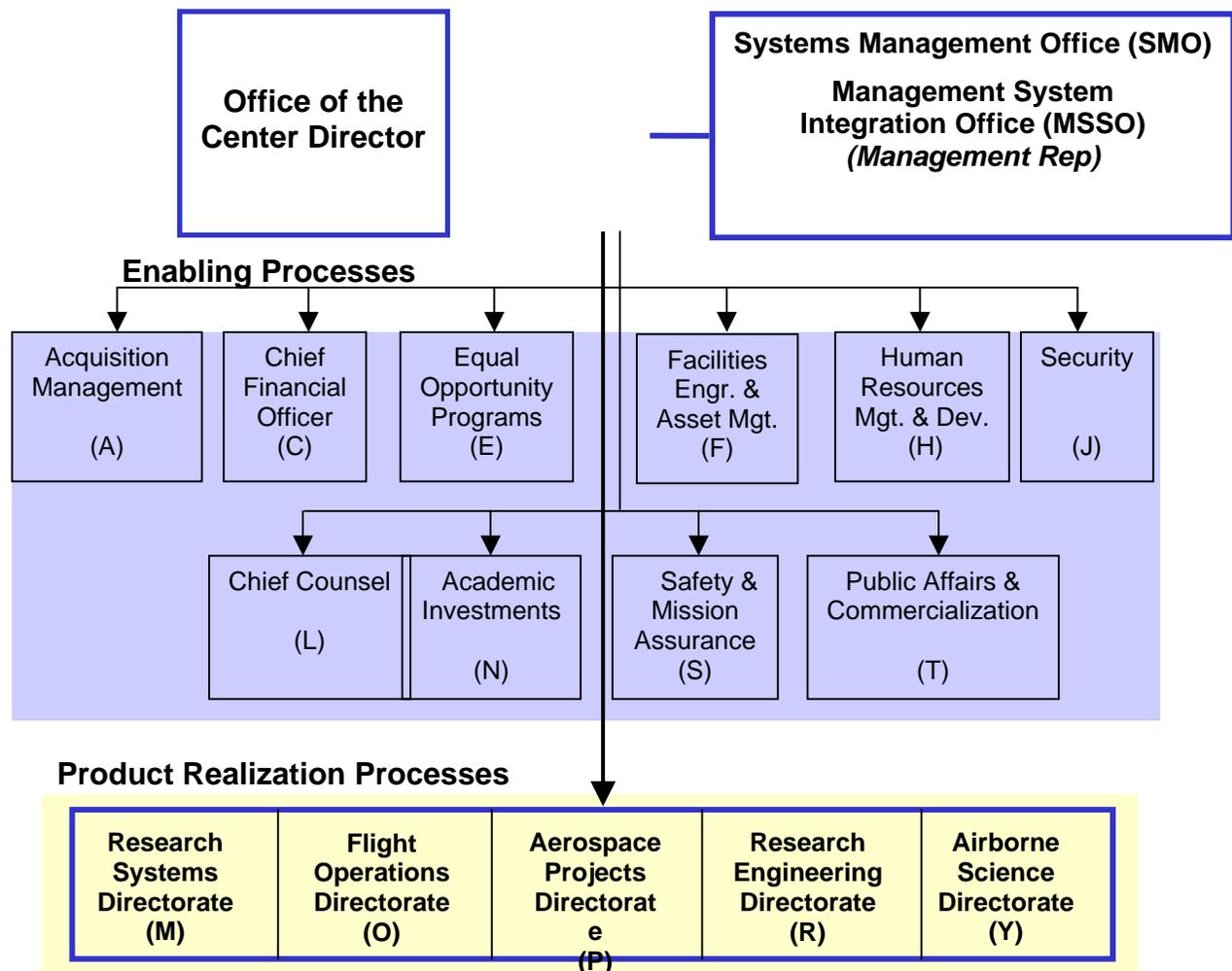


Figure 3 – Dryden Organizational Chart

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DFRC processes are managed from a functional perspective. Roles and responsibilities for the effective execution and continual improvement of these processes are assigned to Directors and Office Chiefs through Dryden Organizational Chapter documents (DOCs) and by assignment to various NASA and Center boards, panels, and teams. Directors and Office Chiefs are responsible for the development of objectives and metrics for the processes and procedures within their organizations that are vital to achieving Center objectives. The Assistant Director of Management Systems (ADMS) ensures that these processes are effective and are interfaced to achieve Dryden key process goals and objectives. DOCs also contain detailed information concerning Dryden's functional organizations' process and product objectives and the metrics required to evaluate how well these objectives have been met.

Dryden utilizes various boards, panels, and councils to provide management oversight of the technical status of programs and projects and as a gauge of the effectiveness of all DMS processes. The Dryden Organizational Manual differentiates major management boards and panels and clarifies the role that they play within Dryden's management oversight processes.

All levels of DFRC Management are responsible for implementing, maintaining, and improving the DMS. Managers are required to support, communicate, and promote the DFRC Vision, Mission, Values, Quality Policy and Objectives and to ensure compliance with the DMS policies and procedures.

Senior Management (Directors and Office Chiefs) ensures that planning is carried out to implement, maintain, and improve the DMS. Of special importance is that when changes are made to the DMS, they are planned and implemented in such a way that the integrity of the DMS is maintained.

It is the responsibility of management to ensure that responsibilities and authorities are defined and communicated throughout Dryden. The positions described below are key DFRC management positions.

Center Director: The Center Director is responsible for ensuring that the DFRC institution and infrastructure is capable of producing products and capabilities that meet customers' requirements and that processes, procedures, and configuration management applied to product development are defined, followed, measured for effectiveness, and continually improved as needed. The Center Director is responsible for providing sufficient resources and trained personnel for management, process implementation, and verification. The Center Director is also responsible for:

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- Program management and execution
- Enterprise program and central services implementation
- Center capability development and maintenance
- Multi-Enterprise resources management
- Functional leadership and central services activities implementation
- NASA, Strategic Enterprise, and Agency level functional policies implementation
- Establishing oversight and evaluations of Center functions through self-assessments, internal and external audits, performance metrics, and evaluation of other functional requirements as identified,
- Conducting management reviews, and
- Establishing measurable quality objectives that are consistent with the quality policy.

Assistant Director for Management Systems (ADMS): The DFRC Center Director has designated in writing that the ADMS will assume the responsibilities of a Centerwide Management Representative. The ADMS has the responsibility and authority to ensure that the DMS is established and maintained in accordance with NASA policy, applicable laws and regulations, and standards requirements (to include the ISO 9001:2000). The ADMS reports to Senior Management on DMS performance indicators and product metrics as the basis for corrective and preventive actions and continual improvement. The ADMS ensures that customer acceptance processes are in place that capture and document customer requirements and promote awareness of these requirements throughout impacted organizations.

Inter-Organization Process Panel (IPP): The IPP is composed of management representatives from all DFRC Directorates and Offices. It supports the implementation, communication, execution, and continual improvement of the Dryden Management System. Secondary objectives are to: 1) ensure alignment with Agency policy and guidance, 2) ensure that Agency initiatives and special focus activities are implemented in a well-integrated manner, 3) review and assess organization changes and transition plans to enhance likelihood of success, and 4) ensure that Center policies and processes enhance the efficiency and effectiveness of Dryden's business and mission operations.

Directorate and Office Managers: Top management of each Center organization is responsible for communicating and implementing the DMS within their individual work areas and ensuring that personnel operate in compliance with applicable standards, regulations, specifications, and

procedures. They establish and maintain work processes that consistently yield the desired product and service quality.

8.2 Communication

Senior Management (Directors and Office Chiefs) is responsible for establishing communication processes within the Center and for promoting communication regarding the effectiveness of the DMS.

Senior Management communicates regularly with employees through managers' meetings, all-hands meetings, and State-of-the-Center addresses. The minutes from the weekly Dryden Monday Management Meetings (DM3) are released throughout the organization. Directors and Office Chiefs flow information from Center and Agency Management meetings to their organizations through staff meetings.

Additional forms of communication include

- The Center's news publication, X-Press
- Make Dryden Safer (MDS) safety bulletins
- Presentations, informational forums, and web sites
- DMS assessment reports on the DMS web site
- DMSB reports and presentations
- Nonconformance Report (NCR) system
- DMS Center internal web pages

9.0 RESOURCE MANAGEMENT

Resource Management has its foundation in the Federal Budget, which is developed through a two-year cycle that ultimately results in an Agency performance plan. This performance plan specifies performance targets for the NASA Enterprises and Functional Organization areas. The Center responds by creating a Center Implementation Plan (CIP) that contains milestones to support the NASA Performance Plan. Center resources are then deployed against the CIP in alignment with the budget. Dryden management is responsible for determining and providing the Center resources needed to meet customer requirements and to implement, maintain, and improve the DMS.

The Center's performance is measured against that set of commitments and constraints and reported in the NASA Performance Report. The NASA extended, multi-year planning and execution cycle is the continuous process that is the core of Resource Management.

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9.1 Human Resources

All DFRC personnel affect product and service quality. Job assignments are based on a careful analysis by management of education, skills, training, and experience needed to satisfactorily accomplish tasks. Management has a specific responsibility to:

- Determine competency needs for all personnel
- Provide training or take action to ensure competency needs are met
- Evaluate the effectiveness of training and/or actions taken
- Ensure that employees are aware of the relevance and importance of their activities and how they contribute to the achievement of organizational objectives
- Maintain records of education, skills, experience, training, and certification.

9.2 Work Environment

Dryden maintains and manages a work environment that is conducive to providing products, services, and capabilities that meet customer requirements. Work environment requirements shall be determined and managed to ensure conformity to product, quality, safety, security, and environmental requirements. There are many programs, required and voluntary, that together make the Dryden work environment a model workplace that fully demonstrates the key values of quality, openness, diversity, and integrity. Examples of these programs include

- Dryden's Environmental Management System (EMS), which is compliant with ISO 14001 and is integrated as part of the DMS.
- The "Make Dryden Safer" (MDS) program, an adjunct to the NASA Dryden Flight Research Center Safety Program, is an employee-based program aimed at making Dryden a safer and better place to work. The foundation of this employee-based safety program is active employee involvement and management commitment.

10.0 PRODUCT REALIZATION

Product realization activities and processes are described at a high level in Dryden Key Processes, Section 6.0, and Management Responsibility, Authority, and Communication, Section 8.0. Planning of these processes is based on customer requirements, strategic planning activities, adherence to NASA policy and directives,

relevant laws and regulations, and applicable standards and is implemented through the functional DFRC organizations. Product realization processes include:

- Project and Research Planning and Implementation
- Customer Requirements Definition
- Customer Agreements
- Research and Design and Development
- Supporting Sub-Processes (e.g., Procurement, Configuration Control, Customer Property)
- Flight Operations
- Facilities Planning and Realization
- Product Delivery

Document ownership is indicated by organizational Code (Codes M, N, O, P, R, and Y).

The key to satisfying our customers lies in understanding customer requirements and our capability to fulfill them, which is ensured through Dryden's Customer Acceptance Processes.

10.1 Dryden's Customer Acceptance Processes

As stated in the Quality Policy, Dryden is committed to satisfying its customers. Before accepting a task, Senior Management ensures that customer requirements are determined and can be met with the aim of enhancing customer satisfaction.

Research programs, projects, subprojects, and tasks at Dryden come from a wide variety of customers. These customers can be either external (other NASA centers, Space Act Agreements with private industry, academia, etc.) or internal (other programs, projects, subprojects, or tasks). Regardless of the source, it is important that the customer's requirements be completely understood and that Dryden organizations be capable of performing the required work.

In determining customer requirements, Dryden's Customer Acceptance Processes require that

- requirements specified by the customer, including the requirements for delivery and post-delivery activities,
- requirements not stated by the customer but necessary for specified or intended use, when known, and
- statutory and regulatory requirements

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are captured in such a way that customer satisfaction is ensured and that the product meets customer requirements.

An open dialogue is maintained with the customer to efficiently resolve any issues that may arise during the requirements negotiation and capability analysis activities.

Where the customer does not provide a documented requirements statement, Dryden negotiates and verifies the intent of the requirements to ensure capability exists to produce the product.

When requirement changes occur, the Dryden organization ensures that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

These activities involve a series of reviews that begin at the initiation of the decision process for accepting a new task (e.g., project) and continue through product delivery. Reviews ensure that:

- The requirements are adequately defined and documented,
- Any differences between the tasking requirements and those in the contract or agreement are resolved, and that
- Dryden has the capability to meet the contract, agreement, or tasking requirements
- Changes to requirements are documented and communicated.

Applicable reviews are recorded in meeting minutes and resulting actions documented.

Records of these reviews shall be maintained per the Dryden Records Management procedure and NPR 1441.1

11.0 PERFORMANCE MONITORING, ANALYSIS AND IMPROVEMENT

11.1 Customer Satisfaction

As one of the measurements of the performance of the DMS, Dryden will monitor and analyze information relating to customer perception as to whether Dryden has met customer requirements. The methods for obtaining and using this information are determined by the implementing organizations, Codes P and Y.

11.2 Independent Assessment

The Center's performance measures and management system effectiveness are subjected to independent assessment from internal and external auditing bodies.

External audit organizations such as the General Accounting Office, NASA's Office of Inspector General, Environmental Management System (EMS) Auditors, and 3rd party ISO 9001 registrars are representative of the broad scope of external audits against the DMS.

In conjunction with external audits, internal audits (e.g., Software Assurance, Contract performance, EMS, and Export Control) are conducted to provide management with information as to whether the DMS is performing as intended and what corrective/preventive actions or improvements need to be considered.

Both internal and external audits and assessments provide snapshots in time relating to the effectiveness of and compliance with DMS processes in achieving performance metrics and meeting objectives, which ultimately indicates the level of customer satisfaction that the Center has achieved. This information is analyzed and presented for Management Review.

Dryden Contractors play a significant role in achieving Center goals and objectives. The criteria for how they are evaluated by Dryden are determined by the type and terms of the respective contract. The two types of contracts with audit ramifications include

- Dryden Contractors who are contracted to provide services and products (service contracts) in support of Dryden processes will use Dryden documents to perform their work. Contract Officers and Contract Officer Technical Representatives (COTRs) provide oversight of this type of contract per established Dryden procedures. In addition, contractors will be subject to DMS audits as they apply to the Dryden procedures being audited in the same manner as Dryden Civil Servants.
- Outsourced service contracts, where the contractor has contractual deliverables that are produced using the contractor's own management system, will not be subject to the DMS audits. Contract Officers, COTRs, and the Topic Manager provide oversight of this type of contract per established Dryden procedures.

The Dryden Management System Support Office (MSSO), managed by the ADMS, is responsible for conducting internal audits of DFRC processes to ensure compliance with DMS procedures, NASA policy and directives, and applicable laws, regulations, and standards to ensure

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effective process implementation. The Dryden Audit Manager is delegated the responsibility for Audit planning, performance, and follow-up. The Audit Manager utilizes auditors trained in audit methodologies and, when needed, subject matter experts, that are independent of the area being audited for conducting Dryden DMS internal audits.

DFRC audit procedures provide details about audit roles and responsibilities, requirements, methods employed to plan, schedule, conduct, report, and follow-up on audits; and for required records and their maintenance.

Findings of audits and assessments are recorded, analyzed, and presented to the appropriate level of management to determine if corrective or preventive actions are needed. Findings are also analyzed to identify potential trends or systemic issues that may require action through the Management Review process. Findings are maintained in corrective and preventive action systems where they are tracked to closure.

Center managers are key to ensuring that corrective and preventive actions are adequately assessed and implemented in a timely manner.

11.3 Process Measurement

Whether or not the DFRC is successful in carrying out its mission is determined by the Center's ability to meet or surpass goals and performance metrics outlined in the Center Implementation Plan. The Center uses objective and verifiable performance metrics, regular management insight, audit, and review processes or comparable tools to assess its performance at all levels – Center, Directorates and Offices (Chapter DOCs), programs and projects (cost and schedule), and individual employee assessments. Each level participates in setting objectives and performance metrics, evaluating performance against those targets, and reporting results.

Managers are responsible for analyzing all aspects of processes and procedures under their control to identify those critical characteristics that are a key to success, and they ensure that these characteristics are measured.

DFRC Senior Management reviews the status of the DMS based on process metrics and performance indicators. As part of the overall review of the DMS, specific attention is given to evaluating whether or not the processes for monitoring, measurement, analysis, and improvement are adequate to demonstrate both conformity to the DMS and the effectiveness of actions taken to continually improve the DMS.

11.4 Product Measurement

Monitoring and measuring of research and technology products to ensure that requirements are met are important aspects of Dryden's Product Realization processes. Monitoring and measuring are conducted by various methods including inspection and test. Product monitoring and measuring occur at appropriate stages of product or service development in accordance with design and development processes. With the exception of receiving inspection, all inspection and test requirements will normally be contained in project reviews, equipment procedures, quality inspection procedures, or test plans. Completion of monitoring, inspections, and testing procedures is documented as required.

11.5 Testing and Receiving Inspection

Normal receiving inspection is conducted in a central receiving area following approved receiving inspection procedures. Any special test and receiving inspection requirements are documented for a specific material or product by the requesting organization.

Testing and inspection activities are vital to effective research and development activities. This is especially true where products are pushing the state of technology and/or are one-of-a-kind products. Test and inspection results verify design parameters and conformance to customer requirements. Products are not released until all required tests and inspections have been completed and accepted, unless approved by a relevant authority and, if applicable, by the customer.

Records are maintained that provide evidence that the testing and receiving meet requirements.

Documentation support for records retention and control is found in Records Retention Schedules, NPR 1441.1

11.6 Nonconforming Product

Nonconforming products are products (e.g. equipment, services, software) that do not meet design or purchase requirements related to an intended or specified use. Dryden has identified three sources of nonconforming products:

- Items (products or services) received by Dryden as a consequence of procurement action
- Items received through the Department of Defense (DoD) logistics system

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- Items created internally.

Documented procedures are established and maintained to ensure that such items are prevented from unintended use or installation. Nonconforming items received as a consequence of procurement action are reviewed and dispositioned by the Contracting Officer in accordance with Federal Acquisition Regulations and related Dryden procedures. Nonconforming hardware requisitioned through DoD agencies is reviewed and dispositioned by the Dryden Inspection Office in accordance with Dryden documented procedures, which are consistent with DoD processes. Nonconforming hardware created internally is reviewed and dispositioned by the assigned quality inspector in accordance with documented Work Order procedures. Documented procedures are also established to ensure that nonconforming software is prevented from unintended use or installation. Additionally, Dryden has documented procedures for identification, review, and dispositioning of nonconforming products identified through the Government and Industry Data Exchange Program (GIDEP).

11.7 Management Reviews

Dryden's management system objectives are strategically managed and reviewed through a number of focused Center-level process and product reviews conducted through various boards, panels, and councils. These assessments are based on performance indicators and customer feedback relative to the purpose of each specific review

The Dryden Program Management Council (DPMC), based on project metrics, is chartered to assess the overall effectiveness of product delivery processes. The Center Management Council (CMC) is chartered to assess the overall effectiveness of functional processes based on CIP performance objectives.

Management Review of product and institutional realization processes is depicted in Figure 4. Inputs to the DPMC are performance relative to metrics and requirements established in project plans, action item follow up, and customer feedback reported through the Aerospace Projects and Airborne Science Mission Operations processes.

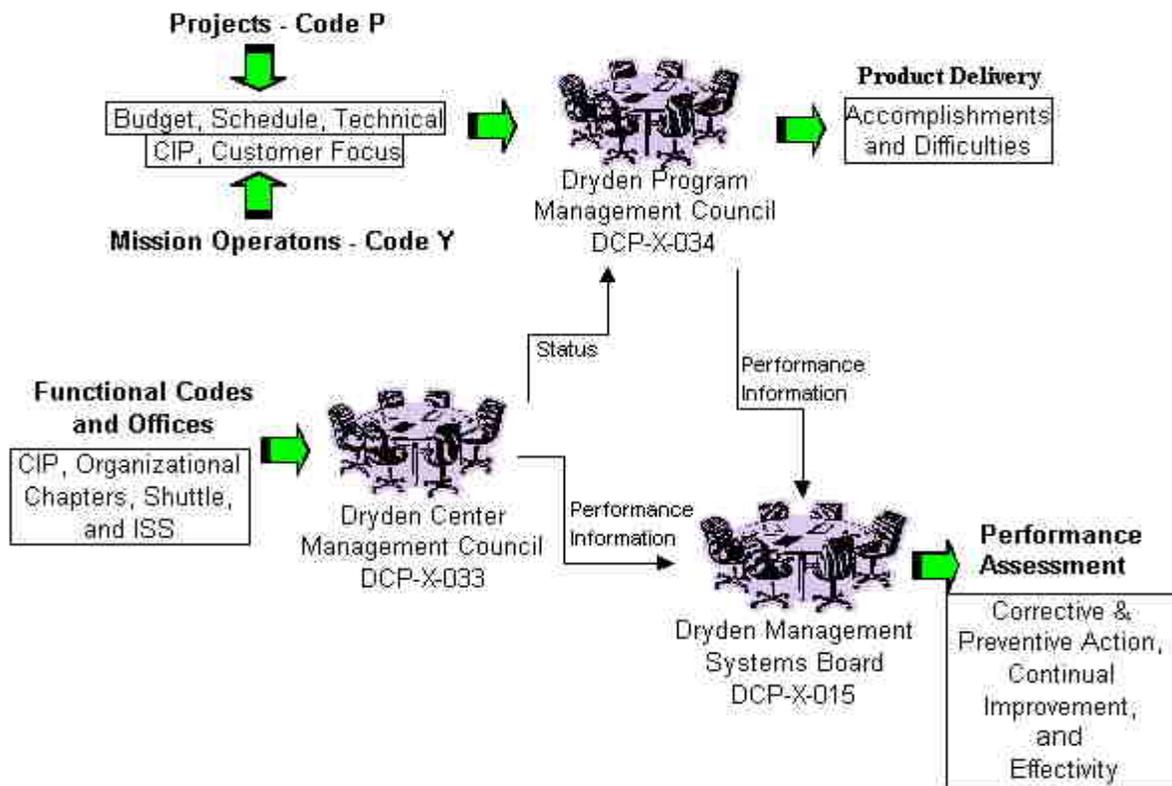


Figure 4 – Management Review Process

Inputs to the Center Management Council (CMC) are status and results of enabling processes based on CIP metrics, the organizational administrative activities performed and in progress, and budget and resources status. Due to the limited scope of these activities, Shuttle Mission and International Space Station support (capabilities) is also reviewed at the CMC.

Outputs from the DPMC and the CMC are summarized (as appropriate) and presented at the Dryden Management System Board (DMSB). The DMSB presents information to Senior Management (Directors and Office Chiefs) regarding the suitability and effectiveness of the DMS and also presents issues relative to the health of the management system including the continued applicability of the Quality Policy and DMS objectives.

Inputs to the DMSB reviews include

- Input from other review processes (DPMC and CMC)
- DMS internal and external audit results
- Customer feedback

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- Status of preventive and corrective actions
- Process performance and product conformity
- Process improvements
- Changes that could affect the DMS
- Quality Policy changes
- Recommendations for improvement
- Follow-up actions from previous management reviews

The output from DPMC, CMC, and DMSB reviews include, at a minimum, any decisions or actions related to

- Improvement of the effectiveness of the DMS and its processes
- Improvement of product related to customer requirements
- Resource needs

Documentation support for records retention and control is found in Records Retention Schedules, NPR 1441.1

Document History Log

Status Change	Document Revision	Effective Date	Page	Description of Change
Baseline		01/13/99		
Revision	A	02/09/99		<p>To incorporate Registrar comments; specifically,</p> <ul style="list-style-type: none"> a. Complete rewrite of Customer Agreements (4.3), page 12. b. Complete rewrite of Design and Development (4.4), page 13. c. Added words to cover 4.6.4 under Procurement (4.6), page 16. d. Complete rewrite of Calibration of Equipment and Verification of Test Software (4.11), page 21-22. e. Additional wording inserted, Control of Nonconforming Flight Related Hardware and Software (4.13), page 23. <p>Changed "approved " to "Electronically approved and original signed by:"</p>
Revision	B	04/14/99	All	<p>To correct problems identified through audit.</p> <ul style="list-style-type: none"> a. Several sections expanded to address sub-clauses of the standard not previously addressed. b. Document listings reviewed, and changed as necessary, to maintain consistency with current documentation. c. Some sections expanded, or wording changed, to enhance clarity.
Revision	C	04/16/99	All	<ul style="list-style-type: none"> a. Deleted page listings in Table of Contents (pages shift when converting to PDF). b. Deleted "Date" from Management System Policy letter. c. Reworded last sentence under "Organization" to refer to Chapter documents for details; web site hot links are not up-to-date. d. Customer Agreements section restructured, portions rewritten. e. Deleted DOP-S-003 (cancelled) from documents listing of Organizational Procedures for Procurement. f. Reworded paragraph under Management Control and Learning. g. Added DCP-F-602 to documents listing of Centerwide Procedures for Control of Documents and Data. h. Added DCP-X-005 to documents listing of Centerwide Procedures for Corrective and Preventive Action. i. Added DCP-X-013 to documents listing of Centerwide Procedures for Management System Records (reference NCR 99D1-1-X). j. Added DOP-A-009 to document listing of Organizational Procedure for Management System Records (reference NCR 99D1-1-X).

Before use, check the NASA PBMA web site at <http://pbma.nasa.gov> for the current revision.

Status Change	Document Revision	Effective Date	Page	Description of Change
Revision	D	04/19/00	All	<ul style="list-style-type: none"> a. Implemented corrective action for OFIs 99-138-X and 99-230-X. b. Implemented corrective action for NCR's 99I4-X-018 and 99I4-X-20. c. Deleted cancelled documents from DMSM-ISO 9001 Documentation Correlation Matrix. d. Corrected omissions and errors transcribing BOM policies. e. Incorporated Center Director's safety policy. f. Referenced Center Director's management philosophy. g. Replaced Figure 1 with new figure h. Added Systems Management Office to Figure 2 i. Replaced Figure 3 with new figure j. Modified Figure 4
Revision	E	06/28/02	All	<ul style="list-style-type: none"> a. Changed "Associate Director" to "Assistant Director for Management Systems" throughout. b. Changed "Review and Control Board (RCB)" to "Project Approval Board" throughout. c. Changed "hardware" to "product" in Control of Customer-Supplied Product (4.7). d. Clarified use of "statistical techniques" in measurements used for process control (4.15-Measurements). e. Minor clarifications throughout.
Revision	F	6-17-03	18, 19	Change the wording in section 4.7 to include the control of non-flight or intellectual type customer supplied product.
Revision	G	8-8-03	All	This revision is a total rewrite that incorporates changes required by ISO 9001:2000 to depict the process view of the Dryden Management System. The Center's Vision, Mission, and Values are also included.
Admin	G	8-12-03	4	Changed one word in the NASA Mission statement from "lift" to "life".
Admin	G	3-30-04	All	Changed NPG to NPR per HQ direction on 12/5/03.
Admin	G	4-20-04	15 All	Removed reference to obsolete document DOP-F-603. Minor spelling and grammar corrections.