The NASA Program/Project Life Cycle Process Flow

Mission Feasibility
- Define mission objectives and top level functional and performance requirements
- Ensure mission technical and programmatic feasibility
- Confirm customer's mission need

Mission Definition
- Establish validated (segment level) requirements which meet mission objectives
- Establish architectural and top level operations concept
- Identify technology risks and mitigation plan
- Refine programmatic resource need estimates

System Definition
- Establish validated requirements for End Items (complete functional baseline)
- Complete ***architecture(level of design.
- Mitigate technical risk: critical technology, long lead items.
- Establish firm estimates of programmatic and technical resources
- Mitigate programmatic risks
- Demonstrate system can be built within cost, schedule, performance constraints

Preliminary Design
- Establish a design solution that fully meets mission needs
- Complete test and verification plan
- Establish design dependent requirements and interfaces
- Complete "implementation" level of design

Final Design
- Establish complete, validated detailed design
- Complete all design specialty audits
- Establish manufacturing processes and controls
- Finalize & integrate system interfaces

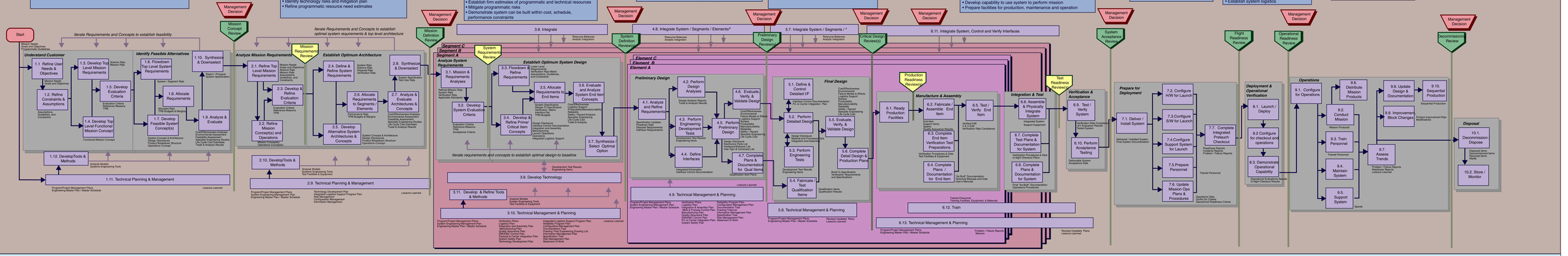
Fabrication & Integration
- Produce items that conform to specifications and acceptance criteria
- Assemble and integrate the system
- Validate and verify system
- Develop capability to use system to perform mission
- Prepare facilities for production, maintenance and operation

Preparation for Deployment
- Configure system for launch / deploy
- Establish readiness to launch / deploy

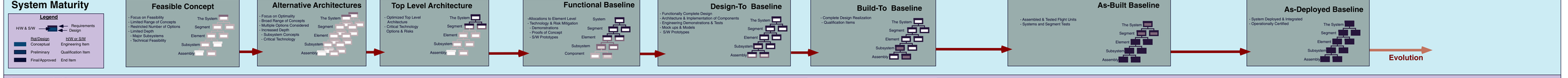
Deployment and Operational Verification
- Launch / deploy system
- Establish operational envelope of system
- Establish system logistics

Mission Operations
- Perform Mission
- Sustain system
- Improve/augment System

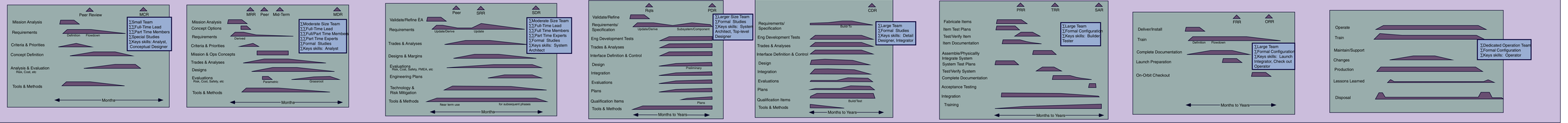
Disposal
- Decommission/dispose of system items



System Maturity



Representative Staffing & Management



Reviews & Control Gates

Legend
C= Conceptual
P= Preliminary
F= Final/Approved
Δ= Update
* to Top level or partial
Σ= Complete

Mission Concept Review
Objective: Validate mission needs and mission objectives
Is mission fully defined?
Do mission requirements fulfill mission needs?
Is mission feasible? Technically? Programatically?

Results
Approve proposal or submit RFP for Phase A
or
Accept report as potential input into later RFP
or
Recommend further concept exploration

Major Products
Mission/Proposal

Checklist
C Mission Goals and Objectives
C Mission Needs
C Science Requirements
C Top Level Requirements
C Assumptions, Guidelines, and Constraints
C Technology Development Requirements
C Verification Plans
C System Concept & Architecture
C Mission Concept(s) and Operations Concept
C Concept/Design Evaluation Criteria
- Feasibility Assessment
- Life Cycle Cost Estimates
- Trade & Analysis Results

Mission Requirements Review
Objective: Validate mission requirements
Is mission fully defined?
Do mission requirements fulfill mission needs?

Results
Proceed with System and Mission Definition

Major Products
Mission Requirements

Checklist
F Mission Requirements
F Mission Goals and Objectives
F Mission Need Statement
- Design Evaluation Criteria
P System Requirements
L Requirements Trades
Trade & Analysis Results

Mission Definition Review
Objective: Validate system requirements
Do functional and performance meet original mission objectives?
Are requirements complete & consistent?

Results
Release Mission level requirements and program needs

Major Products
Architecture
System Operations Concept
System Requirements
Risk Planning & Mitigation

Checklist
C Design-To Specification
C Mission Concept & Architecture
C Interface Requirements
P System Specification
P Technology Development Requirements
C Verification Requirements Matrix
C Verification Plans
C Design Disclosure
C Preliminary Interface List
P System Concept & Architecture
C Manufacturing Plan
P Quality Assurance Plan
C Disposal Plans
C Operations Concept
P Integrated Logistics Support Plan
P Concept/Design Evaluation Criteria
- Cost/Effectiveness Analyses
- Environmental Assessment
L Feasibility Assessment
L Specialty Engineering Studies
L System Interface Studies
- Life Cycle Cost Estimates
L Trade & Analysis Results
L Development Tests
C Development Plans
L Analysis Models
L Systems Engineering Tools
- Test Facilities & Equipment
C Development Plans
C Technical Performance Measures Plan
P Technical Performance Management Plan
L System Engineering Management Plan
P Risk Management Plan
P Technology Development Plan
- Integrated Logistics Support Program Plan
C Work Breakdown Structure
- Engineering Master Plan / Master Schedule
- Configuration Management Plan
- Information Management Plan
P Risk Management Plan
P Program/Project Management Plans

System Definition Review
Objective: Demonstrate system architecture is acceptable and allocations to functional elements are complete
Can system be built to meet mission objectives?
Are requirements complete & consistent?

Results
Release System level requirements
Release DesignTo Specs

Major Products
Identification of End Items
End Item Specifications

Checklist
L/ Engineering Items
P/ Acceptance Criteria
P/ Design Disclosure
F/ Environmental Specification
P/ Interface Requirements
F/ Environments Control Plan
P/ Applicable Standards
P/ Interface Requirements Matrix
P/ Verification Plans
C Design Disclosure
P Preliminary Interface List
P Interface Control Documentation
C Integration and Assembly Plan
C Manufacturing Plan
P Quality Assurance Plan
C Disposal Plans
P Integrated Logistics Support Plan
P Cost/Effectiveness Analyses
- Logistics Support Analysis
- Producibility/Manufacturability Studies & Audits
- Reliability Assessment
- Safety / Hazard Analysis
- Specialty Engineering Studies
L System Interface Studies
- Life Cycle Cost Estimates
L Trade & Analysis Results
L Development Tests
C Development Plans
L Analysis Models
L Systems Engineering Tools
- Test Facilities & Equipment
C Development Plans
C Technical Performance Plan
P Technical Performance Measurement Plan
L System Engineering Management Plan
P Risk Management Plan
P Technology Development Plan
- Integrated Logistics Support Program Plan
C Work Breakdown Structure
- Engineering Master Plan / Master Schedule
- Configuration Management Plan
- Information Management Plan
P Risk Management Plan
P Program/Project Management Plans

Preliminary Design Review
Objective: Demonstrate System Design is complete, optimal, and meets system requirements
Is the design correct considering system requirements, verification methodologies, production, and operations?
Does the design meet cost and schedule constraints?

Results
Release specifications, drawings, ICDs
Begin building qualification hardware.

Major Products
Design-To baseline
Qualification Plans

Checklist
L/ Engineering Items
- User's Manuals
P/ Acceptance Criteria
F/ Build-To Specification
F Design-To Specification
F Detailed Design Drawings
F Vendor I/F Requirements Specs
F Environments Control Plan
F Applicable Standards
- Verification Rqts and Specs
F Interface Control Documentation
F Verification Plans
P Design Disclosure
F Interface Control Documentation
- Material and Processes Data
P Preliminary Interface List
P Integration and Assembly Plan
P Manufacturing Plan
P Quality Assurance Plan
P Materials & Processes Control Plan
P Disposal Plans
P Launch Operations Plan
C Operations Plan
P Spares Provisioning List
P Integrated Logistics Support Plan
P Training Plan
- Logistics Support Analysis
- Failure Modes and Effects Analysis
- Logistics Support Analysis
- Producibility/Manufacturability Studies & Audits
- Reliability Assessment
- Safety / Hazard Analysis
- Specialty Engineering Studies
L Life Cycle Cost Estimates
L Trade & Analysis Results
L Development Test Results
L Analysis Models
L Systems Engineering Tools
- Test Facilities & Equipment
P Acceptance Criteria
P Technical Performance Measures Reports
L Design Changes Summary
L Information Management Plan
P Statement of Work (SOW)

Critical Design Review
Objective: Verify detail design meets system requirements.
Are system performance, operations defined?
Are verification and acceptance testing defined?

Results
Release design for production

Major Products
Build-To Specification

Checklist
P Engineering Items
Q Qualification Items
F Build-To Specification
F Quality Control procedures
L Material and Processes Data
F Integration and Assembly Plan
F Manufacturing Plan
F Materials and Processes Control Plan
F Interface Control Documentation
F Operations Plan
F Transition to Operations Plan
F Inventory Control Software
P Training Plan
Σ Design Analysis Reports
Σ Logistics Support Analysis
Σ Producibility/Manufacturability Studies & Audits
Σ Reliability Assessment
Σ Safety / Hazard Analysis
Σ Specialty Engineering Studies
Σ Life Cycle Cost Estimates
Σ Analysis Models
Σ Systems Engineering Tools
- Test Facilities & Equipment
Σ Technical Performance Measures Reports
Σ Design Changes Summary
Σ Information Management Plan
F Statement of Work (SOW)

Production Readiness Review
Objective: Verify production facilities and processes are ready to begin actual construction of end-item.

Results
Proceed with production

Major Products
Manufacturing/Production Plans
Manufacturing/Production Schedule
Quality requirements

Checklist
F Manufacturing/Production Plans
F Manufacturing/Production Schedule
F Quality Control procedures
L Material and Processes Data
F Integration and Assembly Plan
F Manufacturing Plan
F Materials and Processes Control Plan

Test Readiness Review
Objective: Verify design meets system requirements.
Are test facilities and personnel in place?
Are acceptance plans and criteria in place?

Results
Release design for production

Major Products
Complete Set of Procedures
Software Test Configuration Control Plans
Quality Control Plans/Procedures
Test Results Data Handling Plans
Acceptance Criteria

Checklist
F Verification Procedures & Data
E Hardware/Software End Items
L Analysis Models
F Test Facilities & Equipment
- Problem / Failure Reports
P Acceptance Criteria
F Quality Control Plans/Procedures
F Test Facilities & Equipment
Σ Software Programmers Manual
F Computer Resource Integrated Support Document
F Operations Procedures
F Operations Plans
F Training Facilities, Equipment, & Materials
F Training Plan
L Analysis Models
L Test Facilities & Equipment
- Problem / Failure Reports
F Waivers
L Information Management Plan

System Acceptance Review
Objective: Demonstrate that system elements as constructed meet requirements
Is the system quality verified?
Are hardware/software verified?

Results
Accept system from developers

Major Products
Verified Systems/ Segments/*

Checklist
E Hardware/Software End Items
P Operations Data
L Spares
Support Items
L Trained Personnel
F Verification Requirements Criteria
F Verification Requirements Compliance
F Verification Procedures & Data
L User's Manuals
L Operational Readiness Criteria
F Launch Facility Checkout Results
F Verification & Validation Evaluation Results
F Verification Requirements Compliance
F Verification Procedures & Data
F Test Facilities & Equipment
L Quality Assurance Results
Σ Software Programmers Manual
F Computer Resource Integrated Support Document
F Operations Procedures
F Operations Plans
F Training Facilities, Equipment, & Materials
F Training Plan
L Analysis Models
L Test Facilities & Equipment
- Problem / Failure Reports
F Waivers
L Information Management Plan

Flight Readiness Review
Objective: Demonstrate System is ready for launch.

Results
Launch / deployment

Major Products
Approval for launch

Checklist
E Hardware/Software End Items
P Operations Data
L Spares
Support Items
L Trained Personnel
F Verification Requirements Criteria
F Verification Requirements Compliance
F Verification Procedures & Data
L User's Manuals
F Launch Facility Checkout Results
F GoNo Go Criteria
F Launch Facility Flight/Launch Readiness
F Closure Reports
E Incidents Reports
L Problem / Failure Reports
Σ Readiness Reports
L Product Change Report

Operational Readiness Review
Objective: Demonstrate that deployed system is ready to perform the mission
Does deployed system meet mission requirements?
Can system transition from developers to operators?
Do plans & procedures reflect actual performance and operations?

Results
Transition to mission operations

Major Products
Operational System

Checklist
F Operations Data
L Spares
F Operations Limits & Constraints
L Technical Manuals and Data
L User's Manuals
L Trained Personnel
- Product improvement requirements
F Verification Requirements Compliance
F Verification Procedures & Data
- Operational Evaluations Results
L In-flight Checkout Results
F Operations Procedures
F Operations Plans
Δ Transition to Operations Plan
Δ Integrated Logistics Support Plan
F Training Plan
L Problem / Failure Reports
Σ Readiness Reports
Σ Configuration changes

Decommissioning Review
Objective: Ratify that disposal is appropriate
Is removal from service acceptable?
Are plans and procedures in place?
Have necessary preparation been made?

Results
Removal of item from service

Major Products
Decommissioned/disposed items

Checklist
E Mission Products
L Trained Personnel
L Spares
L Disposal Requirements
L Product improvement requirements
L Verification Requirements Compliance
F Operational Evaluations Results
L Disposal Plans
L Personnel Transition Plans
L Problem / Failure Reports
Σ Readiness Reports

Acquisition Phases

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