ISD Software Process Overview

May 26, 2005

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Software Process Improvement (SPI) Project

Agenda

- Purpose and Objectives
- ISD Process Overview
- Finding Assets in the Process Asset Library (PAL)
  - http://software.gsfc.nasa.gov/process.cfm

Purpose and Objectives

- **Purpose: Provide a walkthrough of top-priority ISD Mission Software process assets**
- **Objective: Help you understand:**
  - **What's in a process description**
  - **How the ISD process library is organized**
  - **What tasks are required for selected processes**
  - **Where to find support assets for each process addressed**
  - **Where to find assets in the Process Asset Library (PAL)**

http://software.gsfc.nasa.gov/process.cfm

Definitions for This Presentation

- Top Priority Processes – Refers to those processes that focus on the monitoring and controlling aspects of software project management
- Mission Software – Refers to software directly associated with the operational support of flight projects, including network communications, planning and scheduling, flight system (spacecraft and instrument), flight dynamics, ground mission and science command and control, and science data capture software
- Project – Refers to Software projects for the development or maintenance of mission support software
- Data Management – Refers to the collection, control, and handling of all process, management, and project data
- Project Manager – Refers to those who perform software project management functions, for example Development Team Lead, Product Development Lead, or Software Manager

Process Description Content

- Purpose
- Scope
- Context
- Roles and Responsibilities
- Inputs
- Entry Scenarios
- Entry Criteria
- Exit Criteria
- Outputs
- *Major Task (list)*
- *Major Task Description*
- Measures
- Tools
- Training
- References
- QMS Records

ISD Process Categories

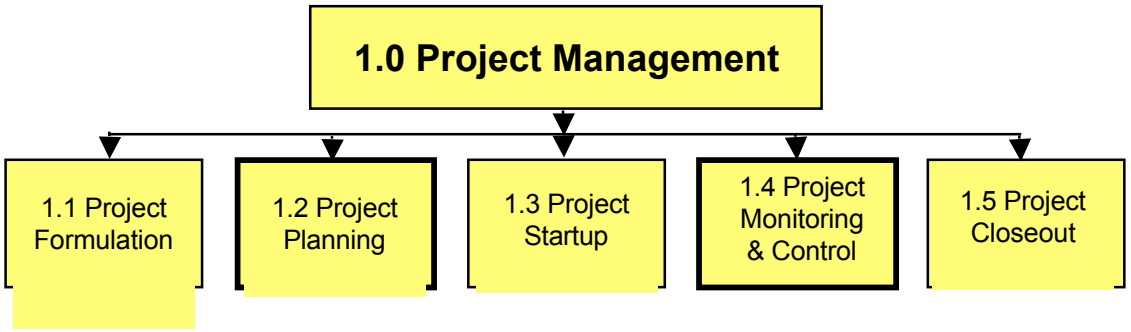
1.0 Project Management

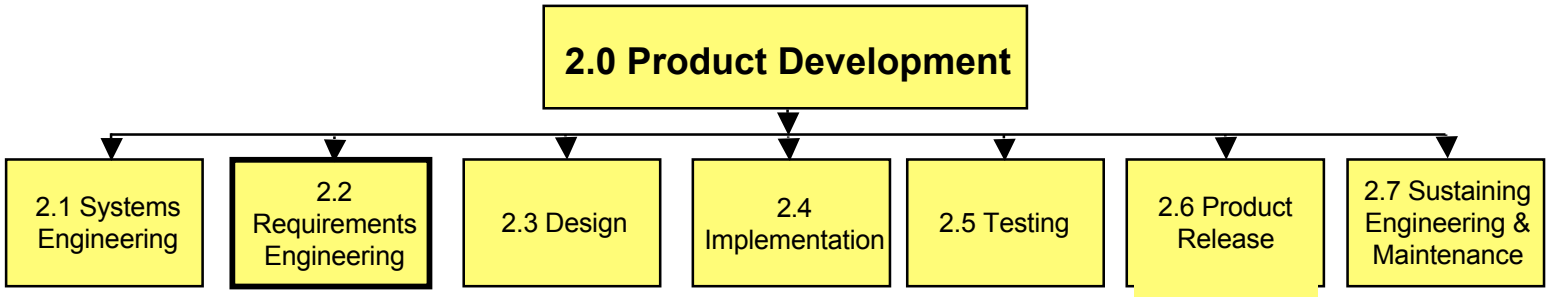
2.0 Product Development

3.0 Organizational Support

4.0 Acquisition

Process Categories, 1 of 2





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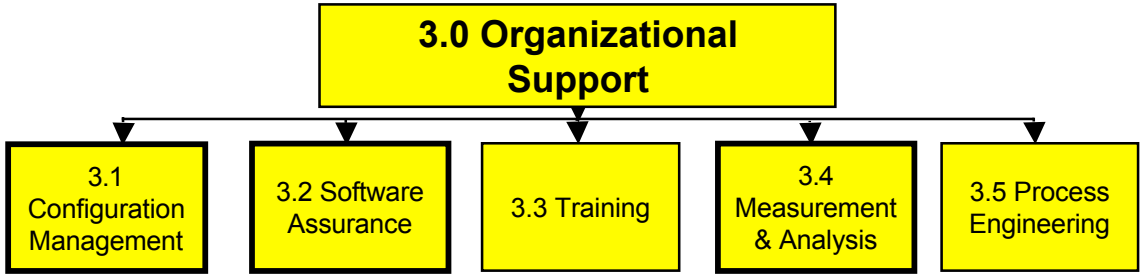
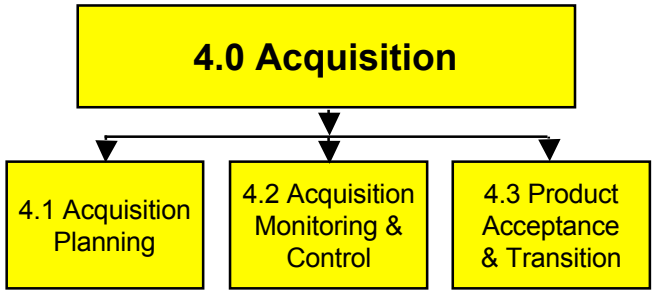
Process Categories, 2 of 2





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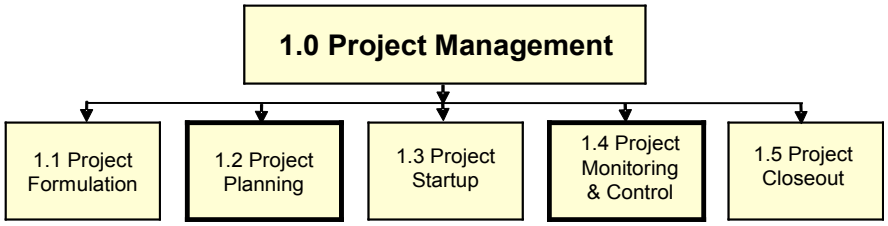
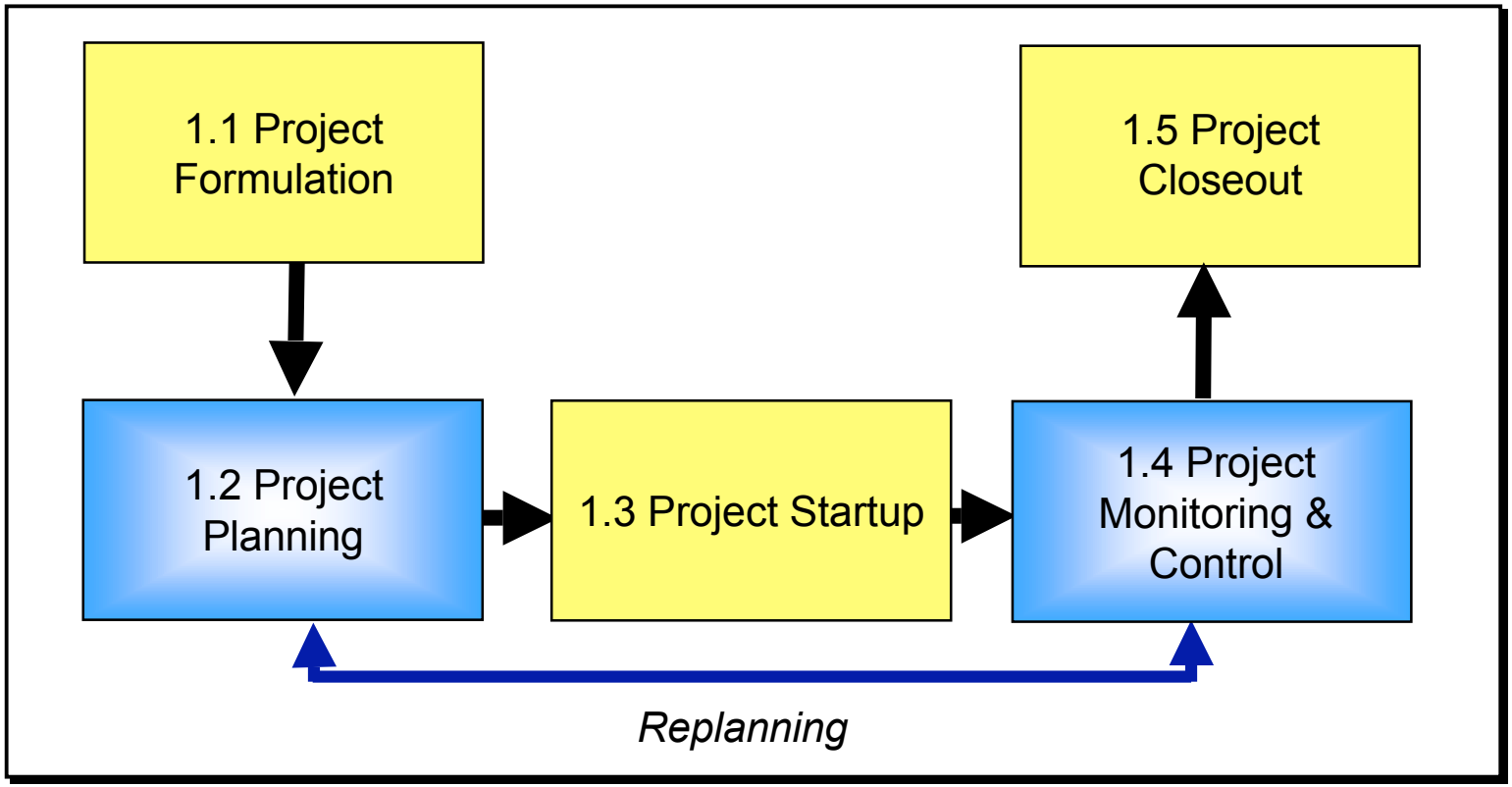
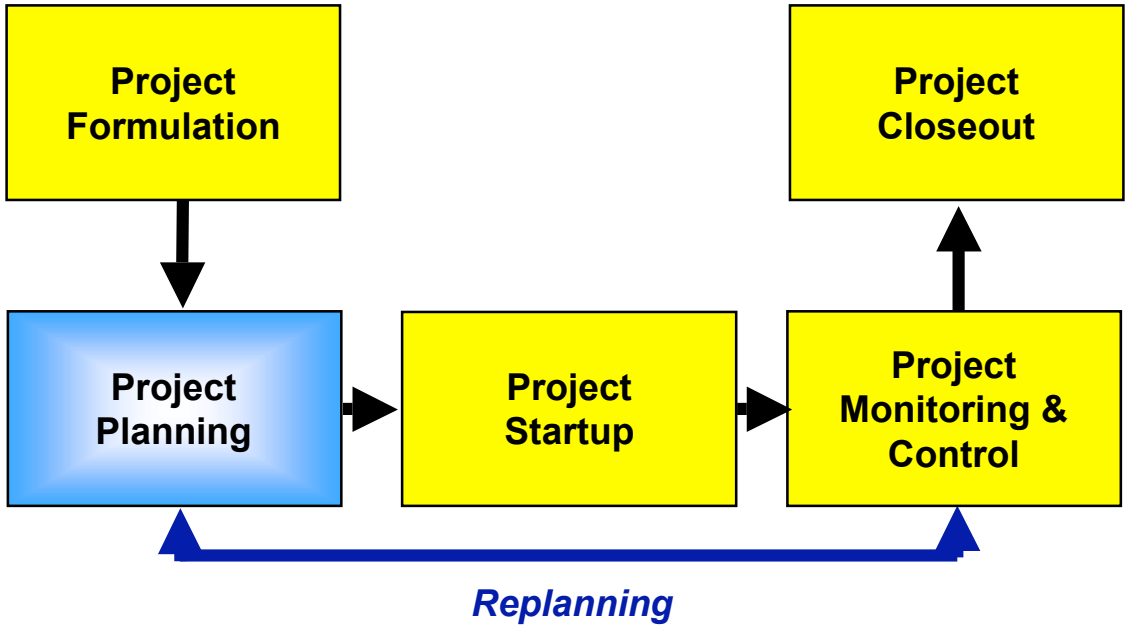
Project Management Process Flow





Project Planning Process

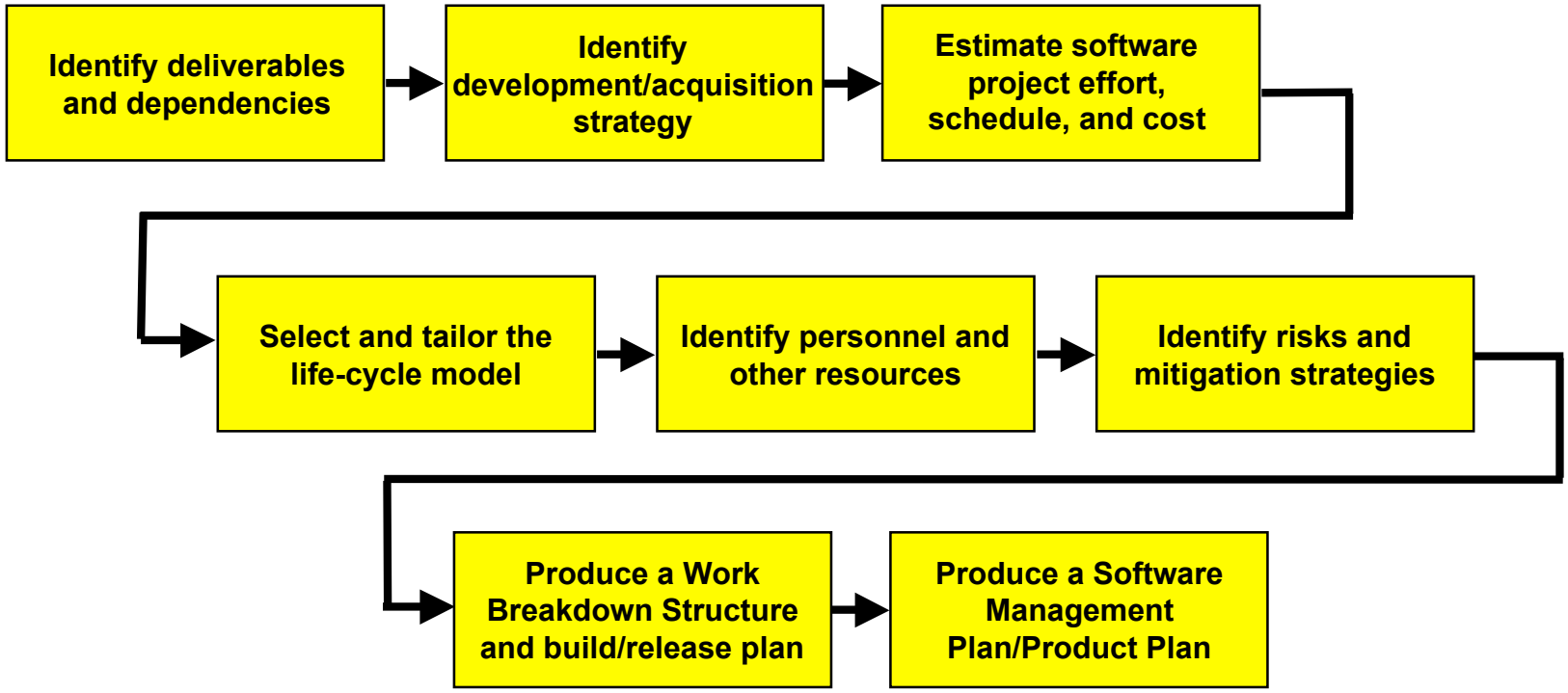
Helps you formulate your approach for managing and conducting your software development or maintenance effort.



http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 1.2

Project Planning Tasks

Tasks performed sequentially, iteratively, or in parallel *



**** Be sure to plan for data management and stakeholder involvement. Review associated plans for consistency.***

Modify the Software Management Plan/ Product Plan

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Project Planning Tasks

- **Project Planning Tasks**
  - **Identify deliverables and dependencies**
  - **Identify development/acquisition strategy**
  - **Estimate software project effort, schedule, and cost**
  - **Select and tailor the life-cycle model**
  - **Identify personnel and other resources**
- **Project Planning Tasks (contd.)**
  - **Identify risks and mitigation strategies**
  - **Produce a Work Breakdown Structure (WBS) and build/release plan**
  - **Produce a Software Management Plan/Product Plan**
  - **Modify the Software Management Plan/Product Plan**

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Project Planning – Related Assets

- **Policies**
  - **ISD Software Policies (1.0.0.1)**
- **Processes and Sub-processes**
  - **ISD Project Planning Process (1.2)**
  - **Estimating the Software Process (1.2.1)**
  - **ISD Software Risk Identification (1.2.3)**
- **Standards, Procedures, Guidelines, Templates, and Checklists**
  - **Wide Band Delphi Procedure (1.2.1.2)**
  - **ISD Guidelines for the WBS (1.2.4.1) – *coming soon***
  - **Estimating the Software Project (1.2.1) – *coming soon***
  - **Guidance on Data Management and Process Configuration Management (3.1.1.2) – *coming soon***
  - **ISD Software Management Plan/Product Plan templates (1.2.6.1 and 1.2.6.3) – *coming soon***
  - **FSW In-house Life-Cycle (1.2.2.1.1)**
  - **FSW Product Plan Template (1.2.6.1.1)**
- **Tools**
  - **Point Counting Spreadsheets (1.4.2.1)**
  - **FSW Cost Estimation Spreadsheets/Guideline (1.2.1.1.1) – *coming soon***
  - **FSW Staff Planning/Actuals Process (and Spreadsheet) (1.2.2.2.1) – *coming soon***

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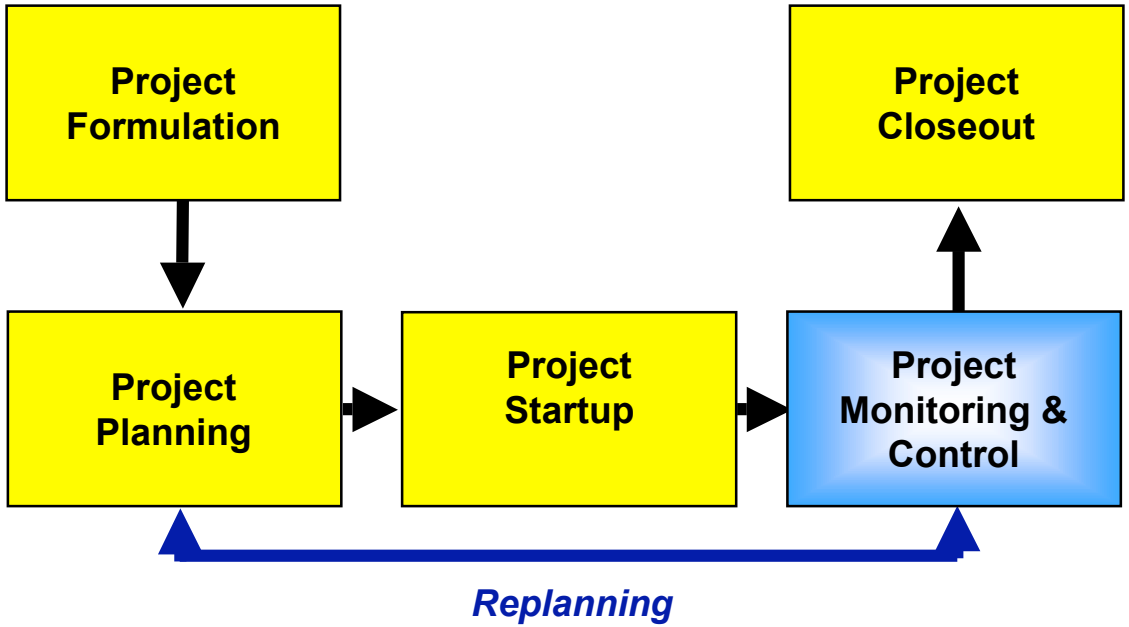
Project Monitoring and Control Process

Shows you how to assess your project's progress so you can take corrective actions when performance deviates from your plan.



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Project Monitoring and Control Tasks

Tasks performed continuously*

- Monitor software project activities and resources
- Monitor work products and project data
- Monitor software acquisition
- Monitor commitments

Tasks performed as needed

- Manage corrective actions
- Generate management reports and reviews
- Conduct milestone reviews
- Document lessons learned

**** Monitor data management, stakeholder involvement, and risk elements of the software project as you go.***

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Project Monitoring and Control Tasks

- **Project Monitoring and Control Tasks**
  - **Performed continuously:**
    - Monitor software project activities and resources
    - Monitor work products and software project data
    - Monitor software acquisition
    - Monitor commitments
  - **Performed as needed:**
    - Manage corrective actions
    - Generate management reports and reviews
    - Conduct milestone reviews
    - Document lessons learned

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Project Monitoring and Control – Related Assets

- Policies
  - ISD Software Policies (1.0.0.1)
- Processes and Sub-processes
  - ISD Project Monitoring and Control (1.4)
  - Risk Monitoring and Control (1.4.4)
- Standards, Procedures, Guidelines, Templates, and Checklists
  - Action Item Tracking Guideline (1.4.3.5)
  - Contents of the Software Requirements Review (2.2.1.6)
  - Software Contents of the Mission-Level Preliminary Design Review (2.3.1.5)
  - Contents of the Software Preliminary Design Review (2.3.1.6)
  - Software Contents of the Mission-Level Critical Design Review (2.3.2.4)
  - Contents of the Software Critical Design Review (2.3.2.5)
  - ISD Branch Status Review Template (1.4.3.4)
  - FSW Status Reporting Templates (1.4.3.2.1, 1.4.3.2.2, 1.4.3.2.3)
  - FSW PDR Standard (2.3.1.6.1)
  - FSW Preliminary Design Review Standard (2.3.1.6.1)
  - FSW Critical Design Review Standard (2.3.2.4.1)
- Tools
  - Point Counting Spreadsheets (1.4.2.1)

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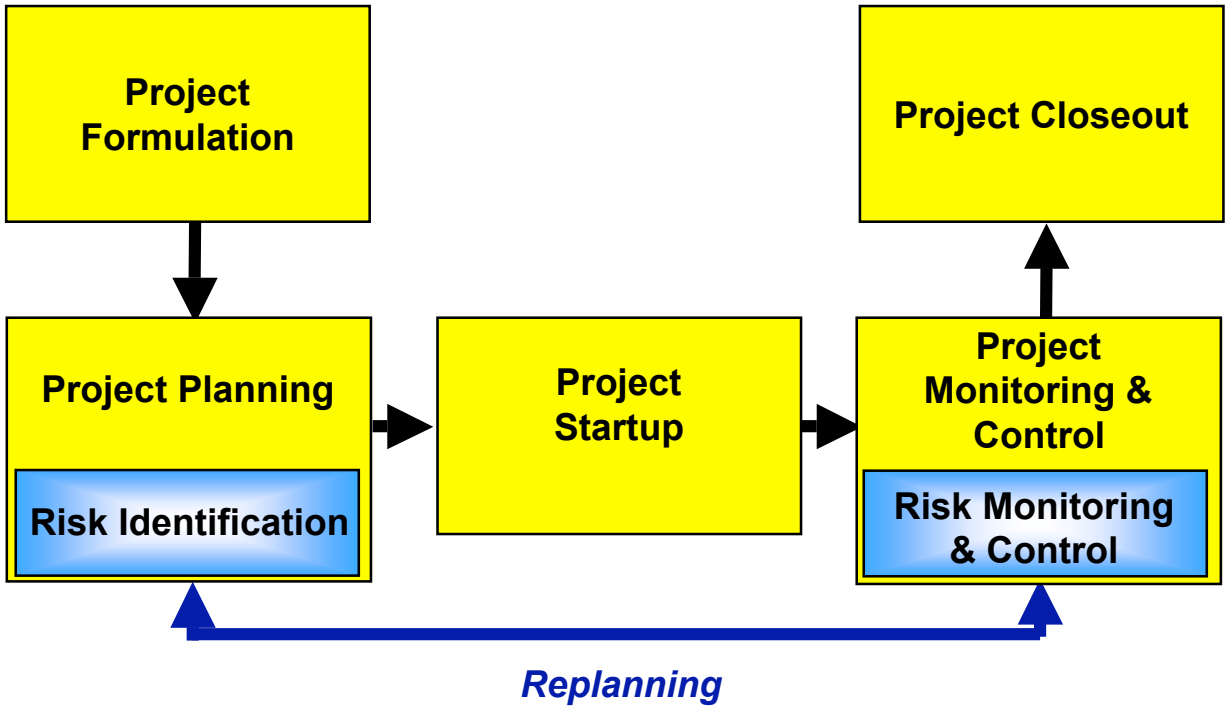
Risk Management Process

Helps you minimize the impact of risks on cost, schedule, and quality of your software project products.



http://software.gsfc.nasa.gov/isdpaindx.cfm Assets 1.2.3 and 1.4.4

Risk Identification Tasks

Tasks performed sequentially and iteratively*

As you begin risk identification, establish a risk strategy and identify risk sources and categories.

http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 1.2.3

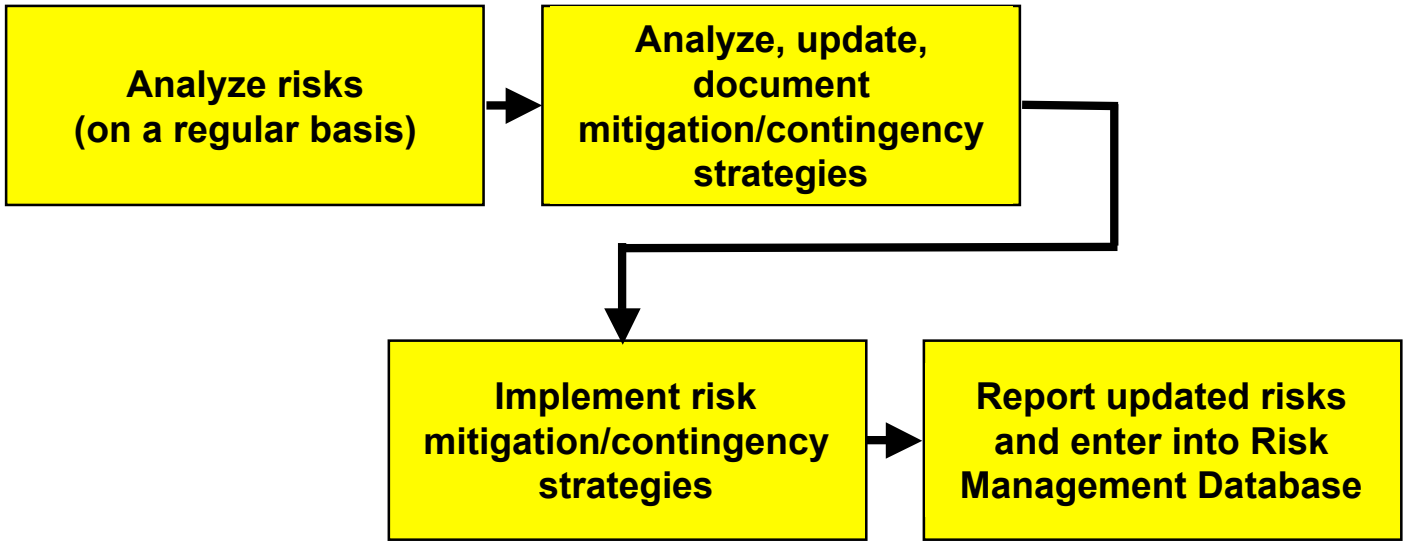
Risk Identification Tasks

- Risk Identification Tasks
  - Identify risks
  - Estimate impact, likelihood and risk exposure
  - Classify risks
  - Develop mitigation/contingency strategy for high-exposure risks
  - Create Risk Management Plan
  - Record risks in Risk Management Database
  - Get Risk Management Plan approval
  - Report risks or enter into Project-level risk tool

http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 1.2.3

Risk Monitoring & Control Tasks

Tasks performed sequentially and iteratively



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Risk Monitoring and Control Tasks

- **Risk Monitoring and Control Tasks**
  - **Analyze risks**
  - **Analyze, update, document risk mitigation/contingency strategies**
  - **Implement risk mitigation/contingency strategies**
  - **Report updated risks and enter into Risk Management Database**

http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 1.4.4

Risk Management – Related Assets

- **Policies**
  - **ISD Software Policies (1.0.0.1)**
  - **FSW Risk Management Policy (1.2.3.1.0)**
- **Processes and Sub-processes**
  - **ISD Software Risk Identification (1.2.3)**
  - **ISD Software Risk Monitoring and Control (1.4.4)**
  - **FSB Risk Management Process (1.2.3.1.1) – *coming soon***
- **Tools**
  - **FSB Risk Management Tool (1.2.3.3.1)**

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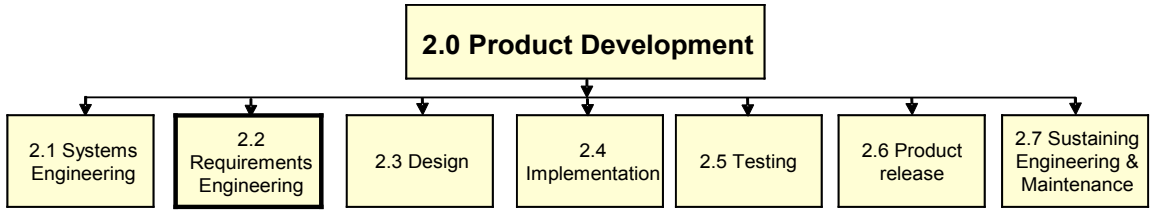
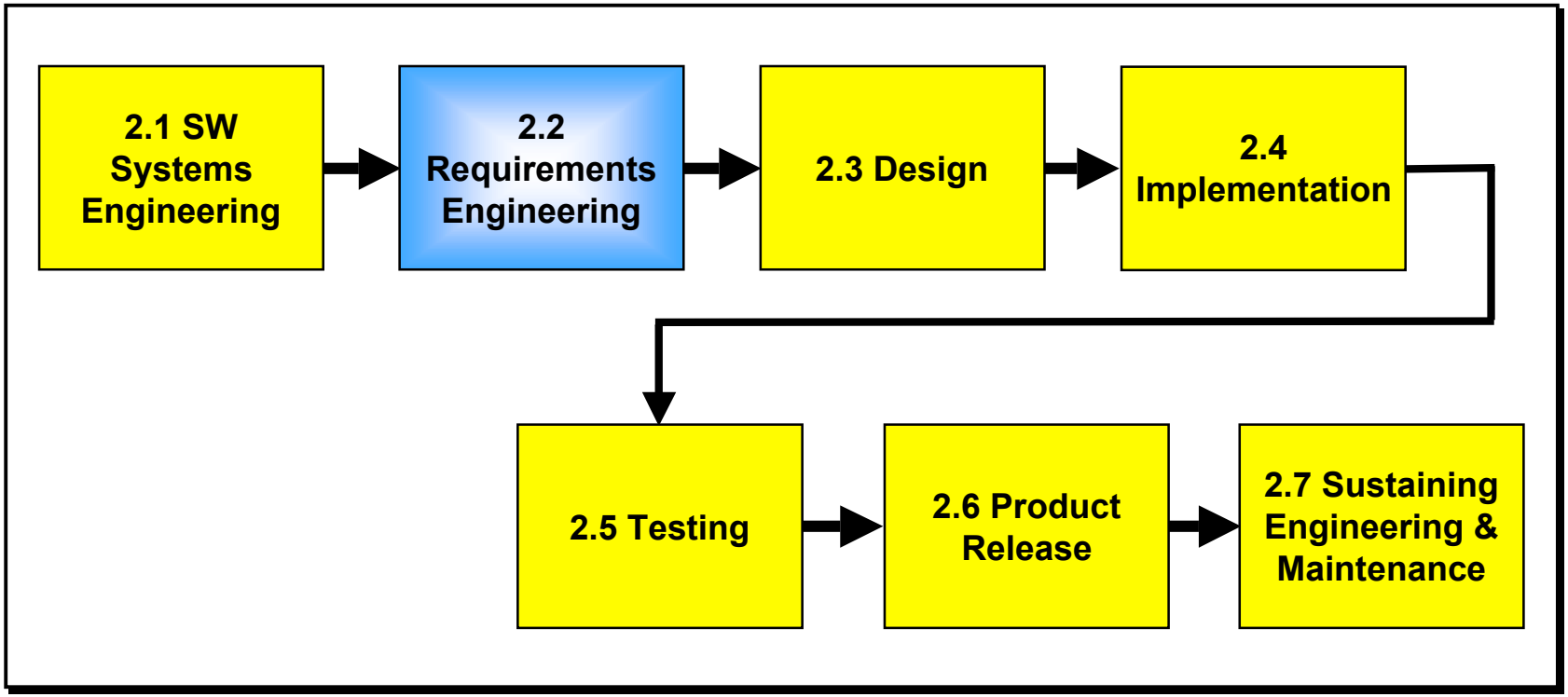
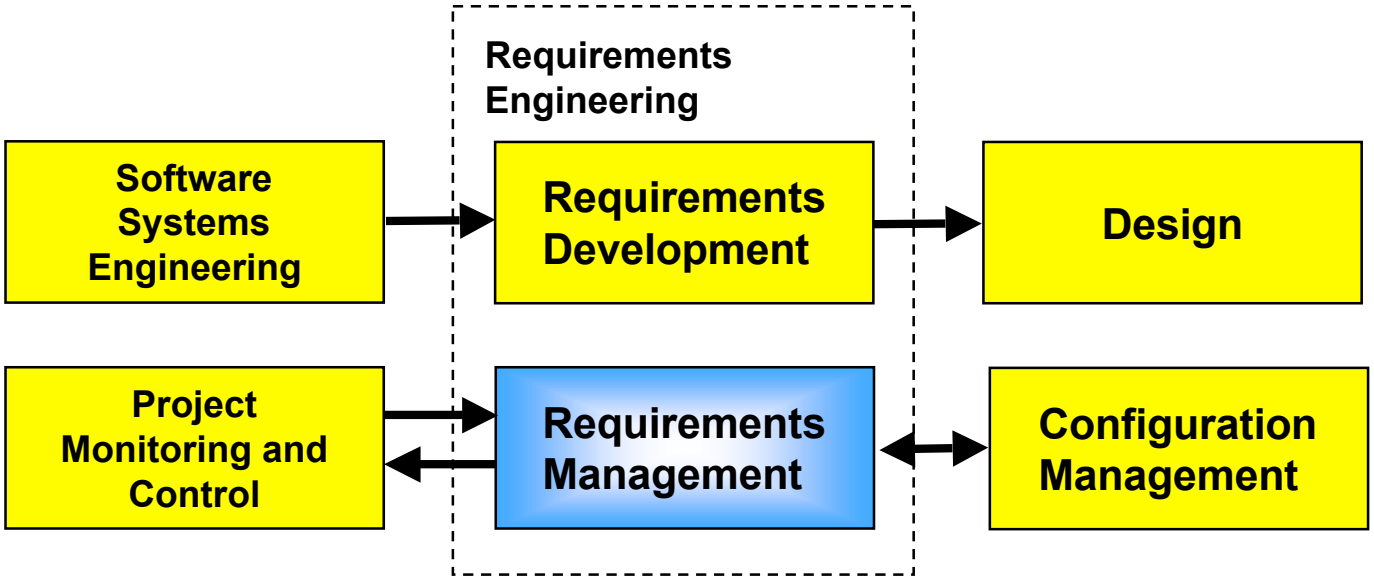
Product Development Process Flow





Requirements Management Process

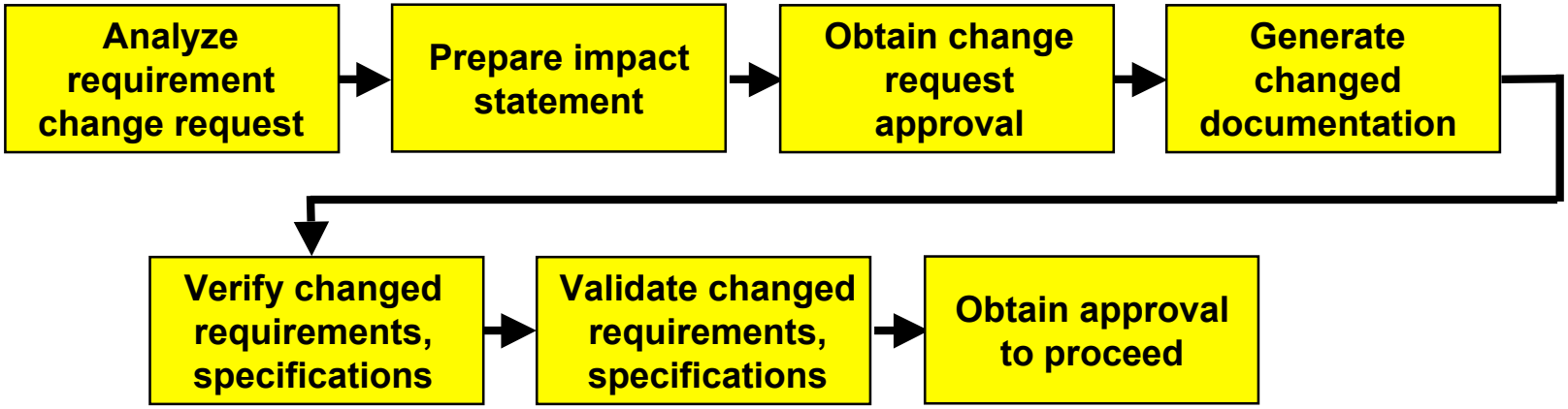
Keeps software project requirements change under control and lets you avoid unintended scope growth.



http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 2.2.2

Requirements Management Tasks

Tasks performed sequentially and iteratively



http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 2.2.2

Requirements Management Tasks

- Analyze change request
- Prepare impact statement
- Obtain change request approval
- Generate changed requirements, specification, and change requests for other work products
- Verify changed requirements and specifications
- Validate changed requirements and specifications
- Obtain approval to proceed

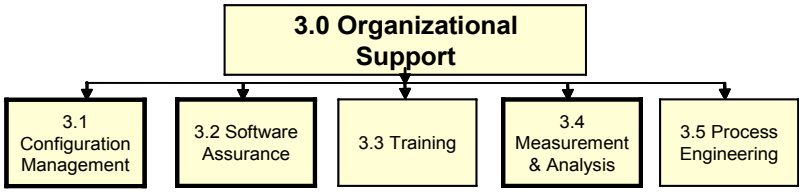
http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 2.2.2

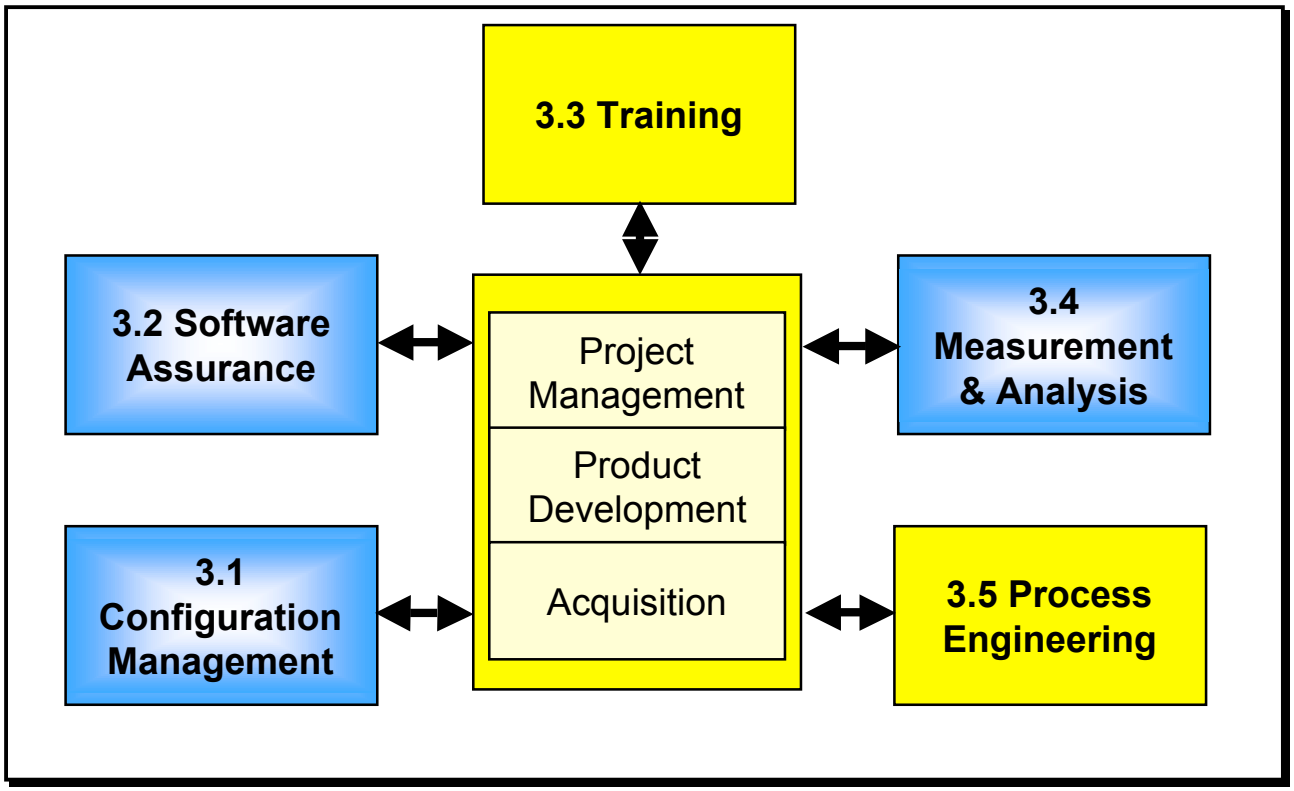
Requirements Management – Related Assets

- Policies
  - ISD Software Policies (1.0.0.1)
- Processes and Sub-processes
  - ISD Requirements Management Process (2.2.2)
- Standards, Procedures, Guidelines, Templates, and Checklists
  - Contents of the Software Requirements Review (2.2.1.6)
  - FSW Requirements Review Standard (2.2.1.6.1)
  - FSW Requirements for Maintainability (2.2.1.1.2) – *coming soon*
  - FSW Requirements Document Template (2.2.1.2.1)
- Tools
  - Rational RequisitePro – FSW standard requirements management aid (http://www-306.ibm.com/software/awdtools/reqpro/)
  - DOORs - Requirements tracing aid (http://www.telelogic.com/products/doorsers/doors/)
  - SLATE - Requirements tracing aid (http://www.sdrc.com/

http://software.gsfc.nasa.gov/isdpaindx.cfm

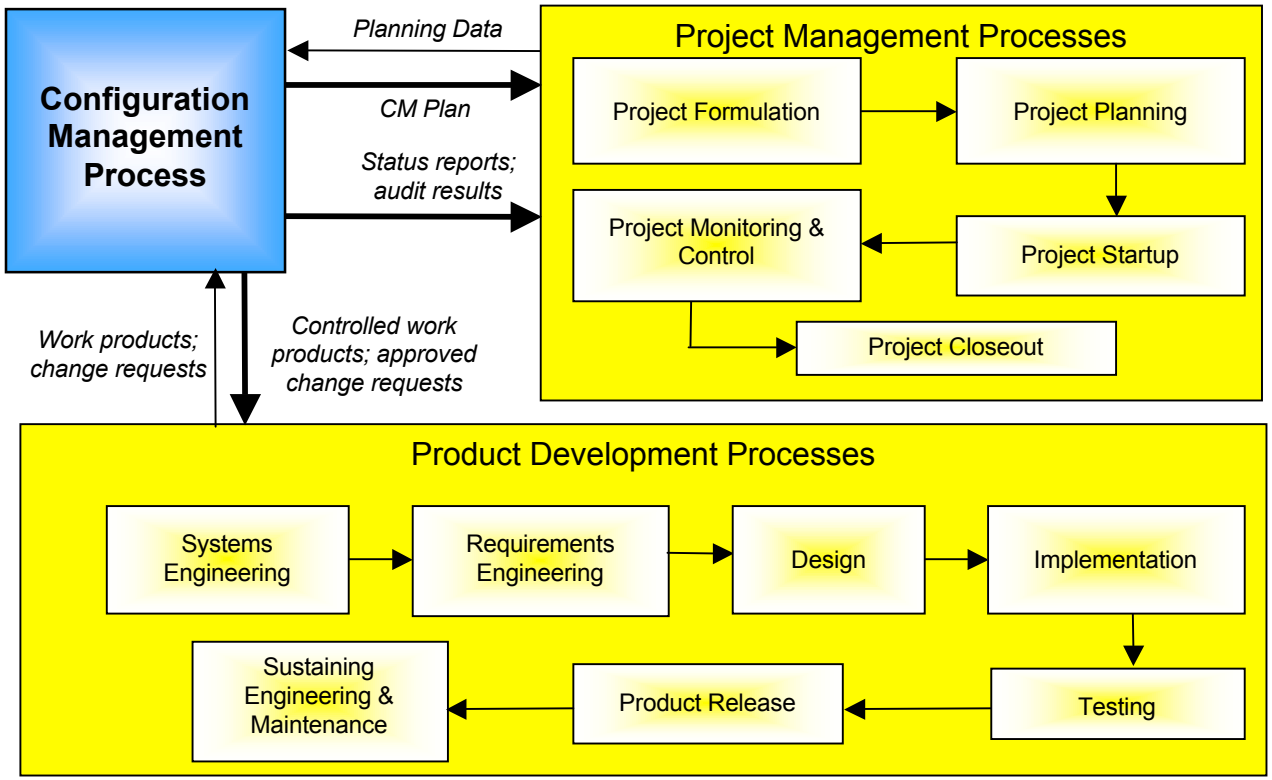
Organizational Support Process Flow





Configuration Management Process

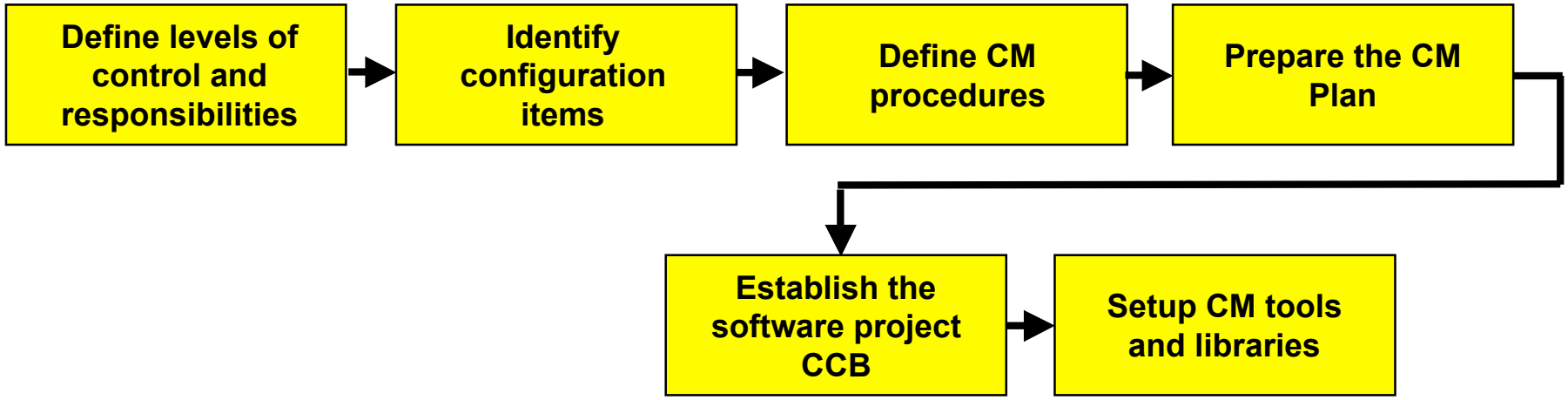
Helps you maintain the integrity of work products.



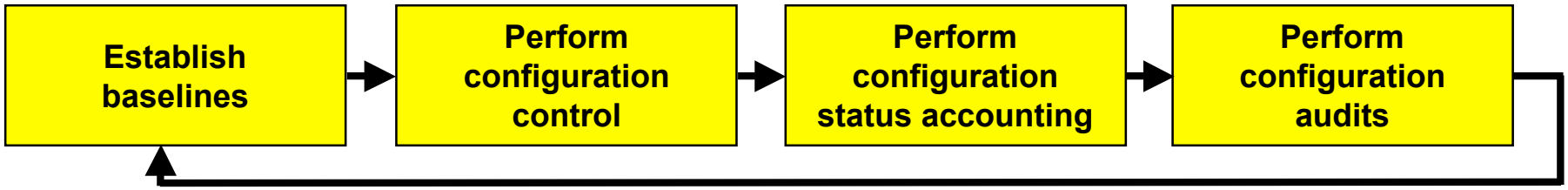
http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.1

Configuration Management Tasks

Tasks performed sequentially during planning and startup



Tasks performed sequentially and iteratively



http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.1

Configuration Management Tasks

- Tasks performed during planning and startup
  - Define levels of control, responsibilities, and methods for change authorization
  - Identify configuration items
  - Define CM procedures
  - Prepare the CM Plan
  - Establish the software project CCB
  - Setup CM tools and libraries
- Tasks performed iteratively
  - Establish baselines
  - Perform configuration control
  - Perform configuration status accounting
  - Perform configuration audits

http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.1

Configuration Management – Related Assets

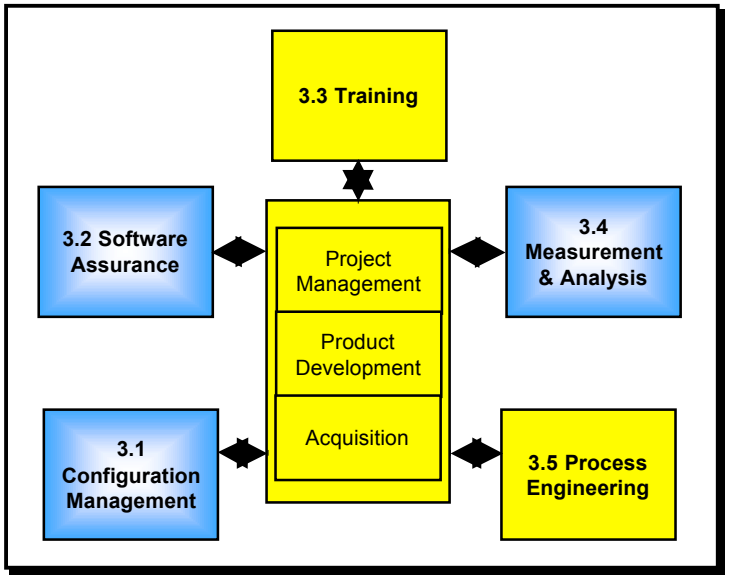
- **Policies**
  - **ISD Software Policies (1.0.0.1)**
- **Processes and Sub-processes**
  - **ISD Software Configuration Management (3.1)**
  - **FSB Standards CCB Process (3.5.3.1.1)**
- **Standards, Procedures, Guidelines, Templates, and Checklists**
  - **Functional Configuration Audit Checklist (3.1.1.3) – *coming soon***
  - **Physical Configuration Audit Checklist (3.1.1.4) – *coming soon***
  - **FSW Configuration Management Recommended Practice (3.1.1.2.2) – *coming soon***
  - **FSW Configuration Management Plan Template (3.1.1.1.1)**

http://software.gsfc.nasa.gov/isdpaindx.cfm

Software Assurance Process

Helps you ensure that software life cycle processes and products conform to requirements, standards, and procedures.

- Software Assurance begins during mission formulation
- The Office of Systems Safety and Mission Assurance (OSSMA), Code 300, nominally supports class B and class C software
- Software Quality (SQ) support is responsible for objective *evaluation of adherence* to all Process and Product Quality Assurance (PPQA) requirements
- Software Assurance is also supported by the Independent Verification and Validation Facility (IV&V)
- Software projects work in concert with these organizations

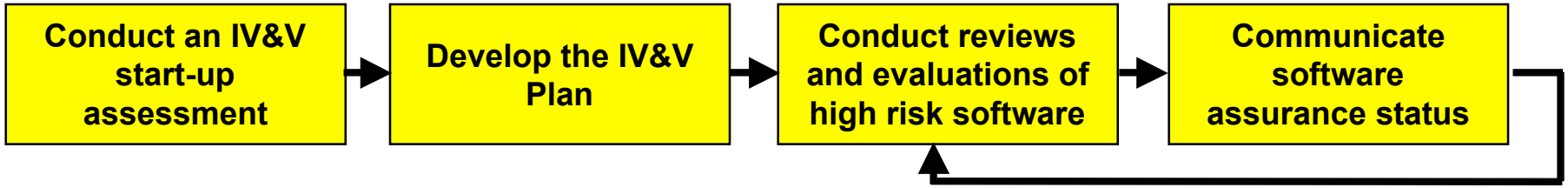


http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.2.1.1

Software Quality Tasks – Code 300

Software Quality support – sequential and iterative

IV&V support (if funded) – sequential and iterative



http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.2.1.1

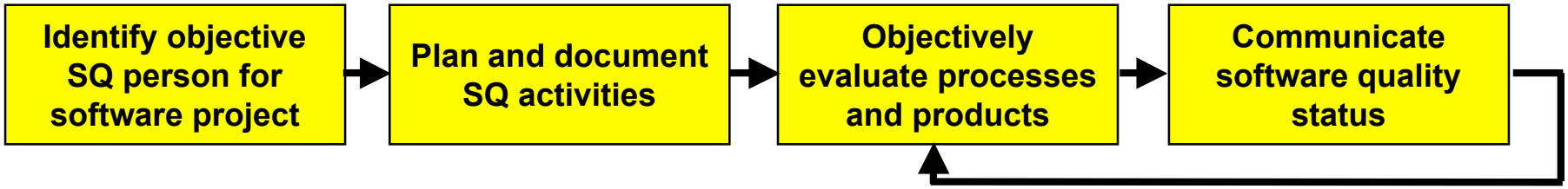
Software Quality Tasks – Code 300

- **Software Quality support**
  - Develop a Software Quality Plan to document quality program goals, processes, and responsibilities
  - Provide independent, objective evaluations of software processes and products throughout software life cycle
  - Communicate software assurance status with Software Management, project personnel, and IV&V (when assigned)
- **IV&V support**
  - Conduct an IV&V start-up assessment
  - Develop the IV&V Plan
  - Conduct reviews and evaluations of high risk software
  - Communicate software assurance status

http://software.gsfc.nasa.gov/isdpaindx.cfm Asset 3.2.1.1

If Not Supported By Code 300 …

Tasks performed sequentially and iteratively



If Not Supported By Code 300 …

- Identify an objective person to perform SQ activities for the software project
- Develop an SQ Plan to document quality program goals, processes, and responsibilities
- Provide independent, objective evaluations of software processes and products throughout software life cycle
- Communicate software quality status with Software Management and software project personnel

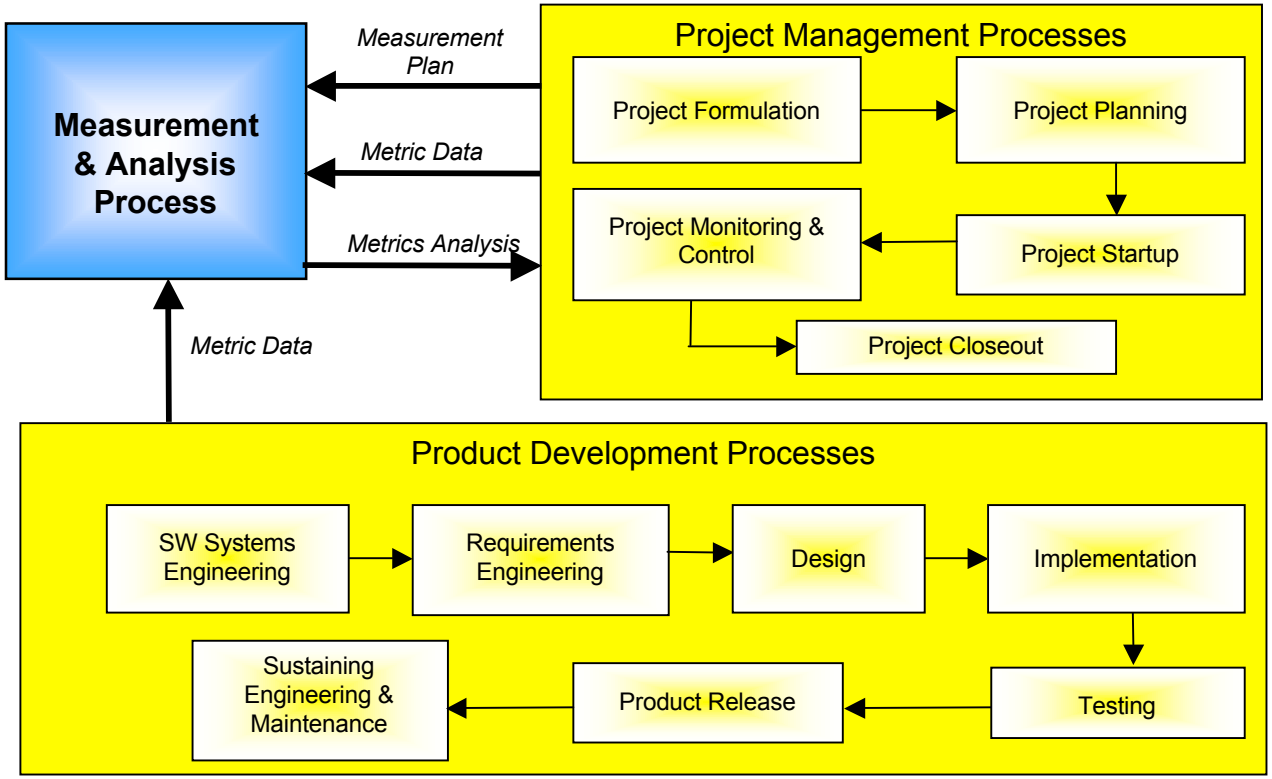
Software Assurance – Related Assets

- **Policies**
  - **ISD Software Policies (1.0.0.1)**
- **Processes and Sub-processes**
  - **Procedure for Developing and Implementing Software Quality Programs: http://sw-assurance.gsfc.nasa.gov/disciplines/quality/index.php**
- **Standards, Procedures, Guidelines, Templates, and Checklists**
  - **Software Quality Assurance Plan template: http://sw-assurance.gsfc.nasa.gov/disciplines/quality/index.php**
  - **ISD Software Assurance Planning Guidelines (3.2.1.1) – *coming soon***
- **Code 300 Assets: http://sw-assurance.gsfc.nasa.gov/disciplines/quality/index.php**

http://software.gsfc.nasa.gov/isdpaindx.cfm

Measurement and Analysis Process

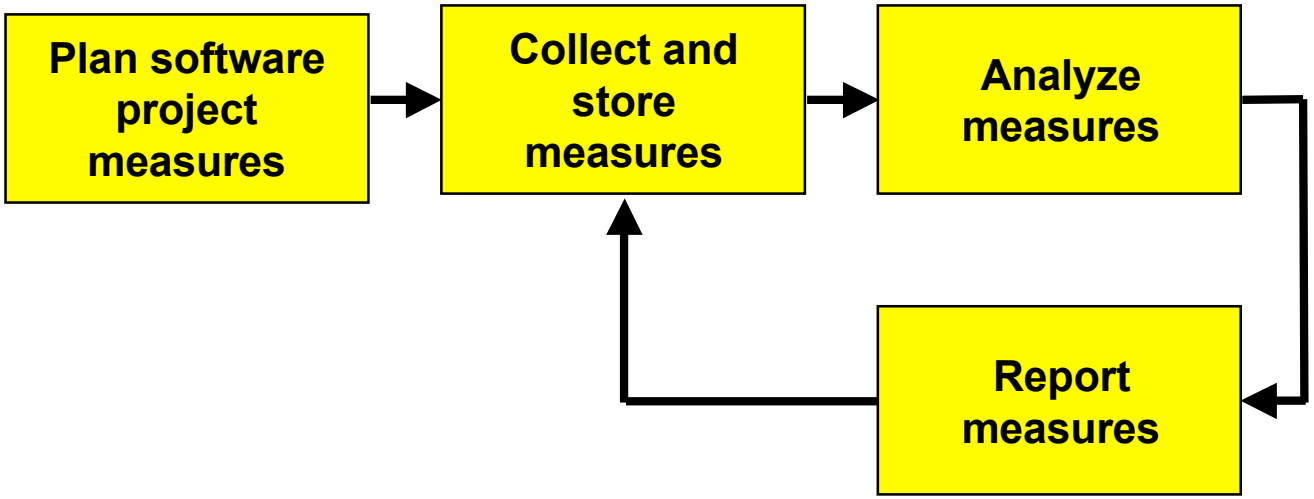
Helps you collect and analyze metric data to support both software project management and process improvement.



http://software.gsfc.nasa.gov/metrics.htm

Measurement and Analysis Tasks

Tasks performed sequentially and iteratively



http://software.gsfc.nasa.gov/metrics.htm

Measurement and Analysis Tasks

- Plan software project measures
- Collect and store measures
- Analyze measures
- Report measures

http://software.gsfc.nasa.gov/metrics.htm

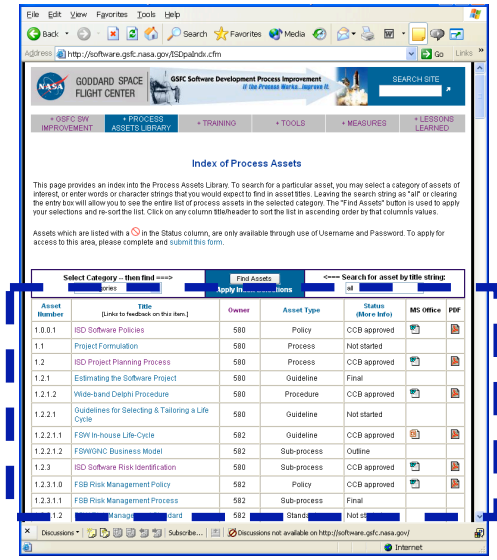
Measurement and Analysis – Related Assets

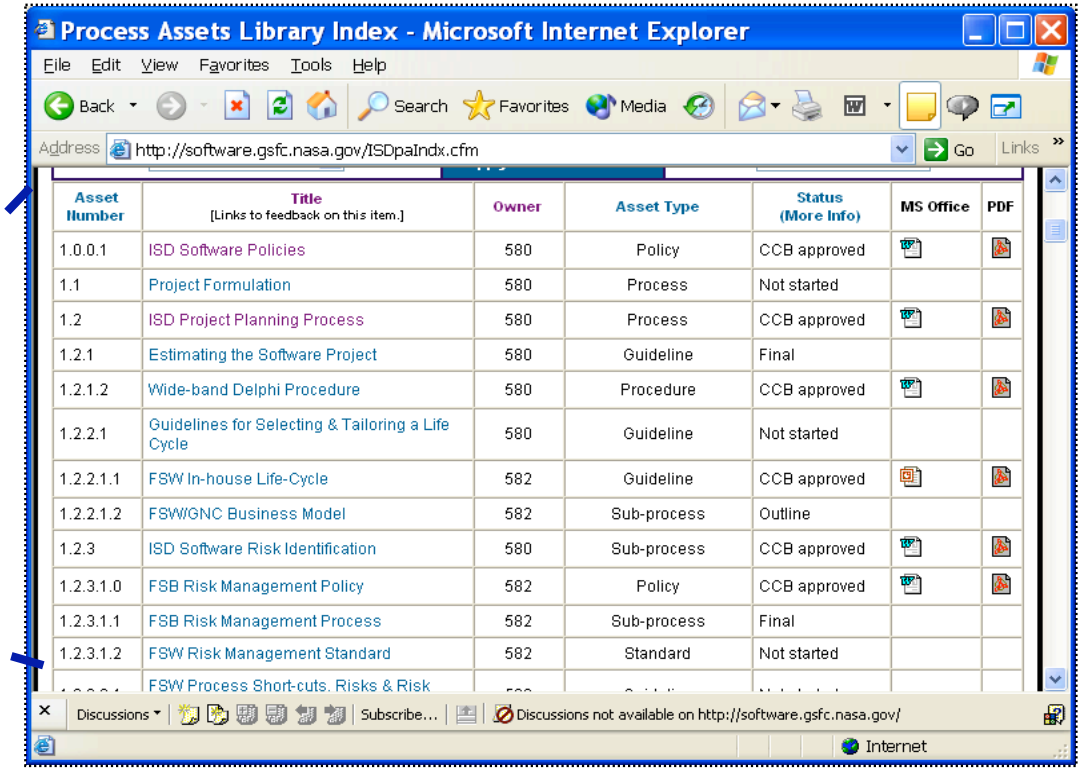
- **Policies**
  - **ISD Software Policies (1.0.0.1)**
- **Processes and Sub-processes**
  - **ISD Measurement and Analysis (3.4) – *coming soon***
  - **ISD Measurement Plan (3.4.11) – *coming soon***
- **Standards, Procedures, Guidelines, Templates, and Checklists**
  - **ISD Branch Status Review Template (1.4.3.4)**
  - **ISD Software Management Plan/Product Plan for Class B & C Software, measurement section (1.2.6.1) – *coming soon***
  - **FSW Status Reporting Templates (1.4.3.2.1, 1.4.3.2.2, 1.4.3.2.3)**
- **Tools**
  - **Point Counting Spreadsheet (1.4.2.1)**
  - **ISD Measurement Collection Spreadsheet – *coming soon***
- **Web Site**
  - **(http://software.gsfc.nasa.gov/metrics.htm)**

http://software.gsfc.nasa.gov/isdpaindx.cfm

Using the ISD Software Process Website

- **Attend the ISD Software Process Website Overview coming soon**
- **Look for ISD and FSW assets in the PAL**

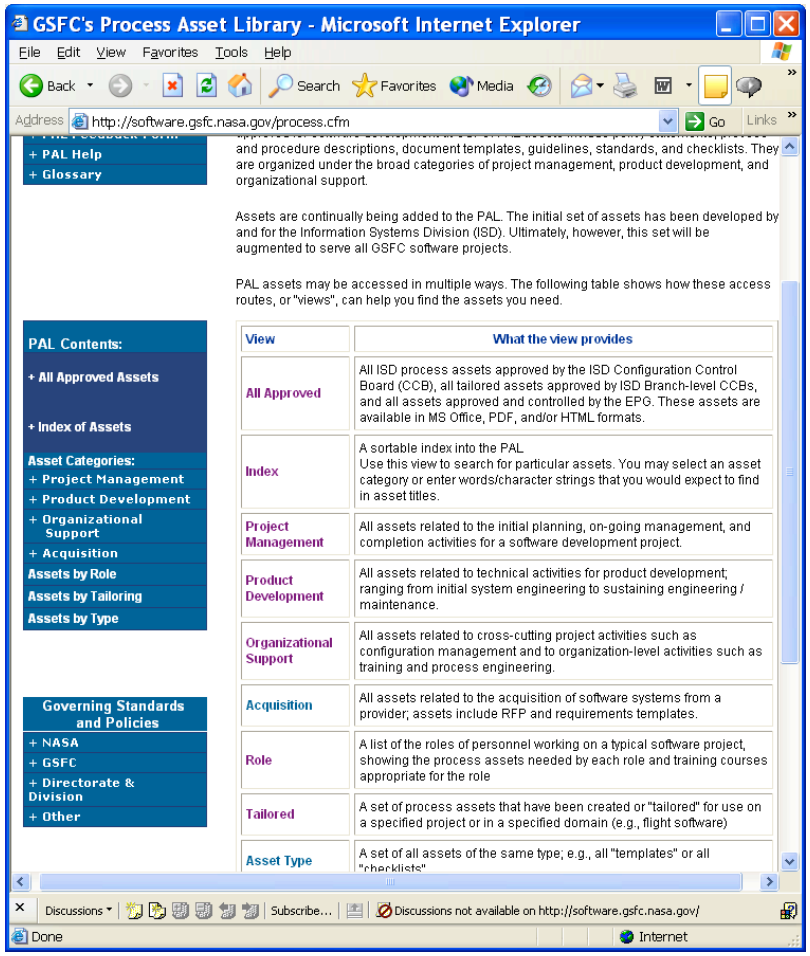




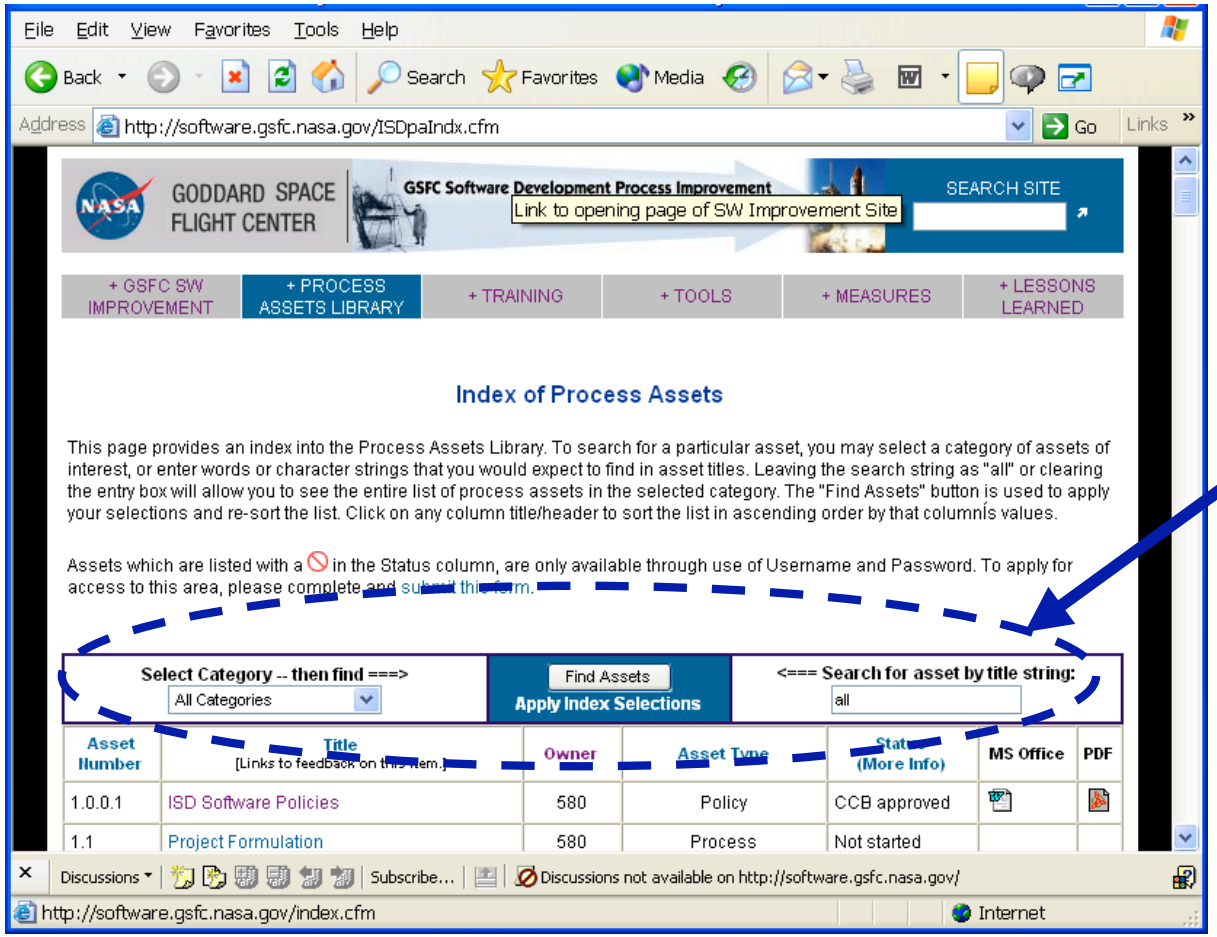
Asset Number	Title [Links to feedback on this item.]	Owner	Asset Type	Status (More Info)	MS Office	PDF
1.0.0.1	ISD Software Policies	580	Policy	CCB approved		
1.1	Project Formulation	580	Process	Not started		
1.2	ISD Project Planning Process	580	Process	CCB approved		
1.2.1	Estimating the Software Project	580	Guideline	Final		
1.2.1.2	Wide-band Delphi Procedure	580	Procedure	CCB approved		
1.2.2.1	Guidelines for Selecting & Tailoring a Life Cycle	580	Guideline	Not started		
1.2.2.1.1	FSW In-house Life-Cycle	582	Guideline	CCB approved		
1.2.2.1.2	FSWGNC Business Model	582	Sub-process	Outline		
1.2.3	ISD Software Risk Identification	580	Sub-process	CCB approved		
1.2.3.1.0	FSB Risk Management Policy	582	Policy	CCB approved		
1.2.3.1.1	FSB Risk Management Process	582	Sub-process	Final		
1.2.3.1.2	FSW Risk Management Standard	582	Standard	Not started		
	FSW Process Short-cuts, Risks & Risk					

Viewing Assets in the PAL

- View assets by *Index*, *All Approved*, *Asset Type*, or *Role*
- View assets by process category
  - *Project Management*
  - *Product Development*
  - *Organizational Support*
  - *Acquisition*
- Click *Tailored* for FSW policy, process guidelines, templates, roles, etc.



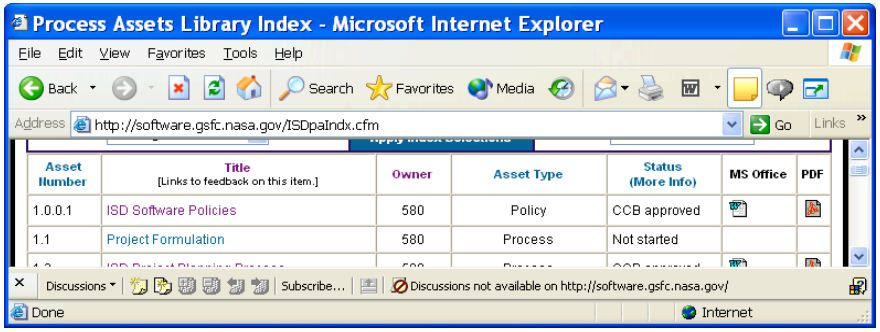
Searching for Assets in the PAL



- **Use the Search option from any asset list view**

Feedback and Help

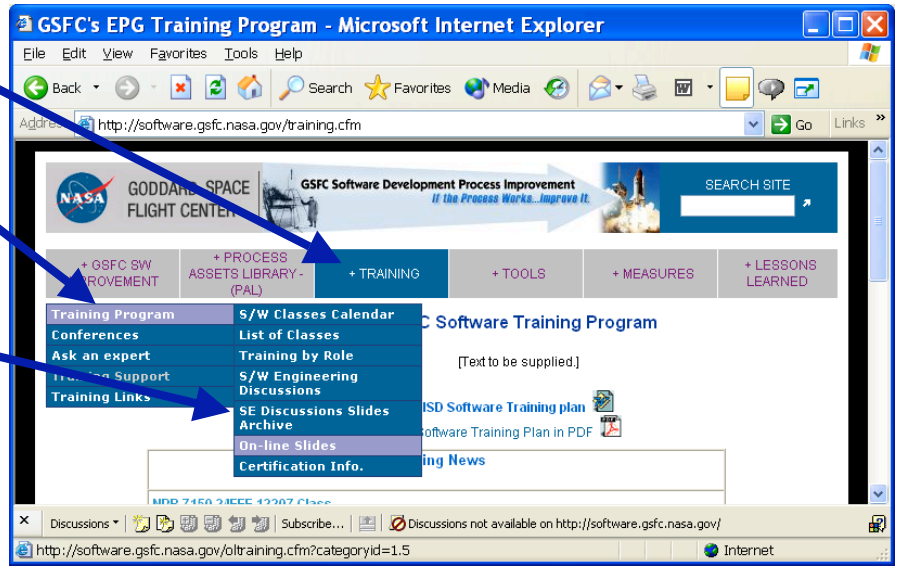
- **Provide feedback on assets or the PAL**
  - **Go to *http://software.gsfc.nasa.gov/index.cfm***
  - **Highlight process name and click for a *Feedback Form***

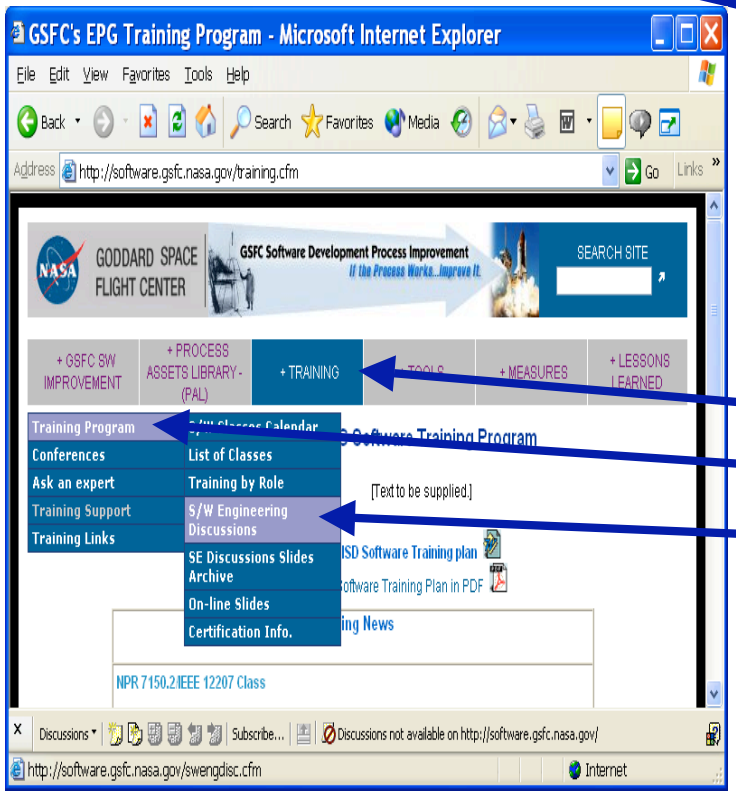


- **Get help when you need it**
  - **Sally Godfrey – Software Process Improvement Manager**
    - ***Sara.H.Godfrey@nasa.gov***
  - **Sanjeev Sharma – Software Process Improvement**
    - ***Sanjeev.K.Sharma@nasa.gov***

For Information on Presentations

- For Slides, look under Training
  - Then Training Program
  - Then SE Discussion Slides Archive





- For Presentation schedule, look under Training
  - Then Training Program
  - Then SW Engineering Discussions

Questions