SANDIA REPORT
SAND2007-3192
Unlimited Release
Printed May 2007

Operational Concepts and Implementation Strategies for the Design Configuration Management Process

Sharon L. Trauth

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

Sandia is a multiprogram laboratory operated by Sandia Corporation,
a Lockheed Martin Company, for the United States Department of Energy's
National Nuclear Security Administration under Contract DE-AC04-94AL85000.

Approved for public release; further dissemination unlimited.

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof, or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof, or any of their contractors.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

Telephone: (865) 576-8401
Facsimile: (865) 576-5728
E-Mail: reports@adonis.osti.gov
Online ordering: http://www.osti.gov/bridge

Available to the public from
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Rd.
Springfield, VA 22161

Telephone: (800) 553-6847
Facsimile: (703) 605-6900
E-Mail: orders@ntis.fedworld.gov
Online order: http://www.ntis.gov/help/ordermethods.asp?loc=7-4-0#online

SAND2007-3192
Unlimited Release
Printed May 2007

Operational Concepts and Implementation Strategies for the Design Configuration Management Process

Sharon L. Trauth
Department 2993
Product Realization Standards and Processes
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-MS0628

Abstract

This report describes operational concepts and implementation strategies for the Design Configuration Management Process (DCMP). It presents a process-based systems engineering model for the successful configuration management of the products generated during the operation of the design organization as a business entity. The DCMP model focuses on Pro/E and associated activities and information. It can serve as the framework for interconnecting all essential aspects of the product design business. A design operation scenario offers a sense of how to do business at a time when DCMP is second nature within the design organization.

ACKNOWLEDGMENTS

Contributing Authors/DCMP Implementation Team 4:

Marc Basiliere, Mechanical Design, Department 2997, WR Mechanical Design 3

Sean Brooks, Mechanical Design Analysis, Department 2991, Modeling and Simulation

Irene Kolb, Mechanical Design, Department 2992, Non-WR Mechanical Design

David Manzanares, Teamcenter® Requirements, 2993, Product Realization Standards and Processes

Timothy Meeks, Manager Department 2994, Engineering Tools Development

Anthony Trujillo, Mechanical Design, Department 2996, WR Mechanical Design I

Cathy Vortolomei, Desktop Pro/E Support, Department 2995, Engineering Data Management

Daniel Vortolomei, Mechanical Design, Department 2996, WR Mechanical Design I

Timothy Wiseley, Mechanical Design & Tools Development, Department 2994, Engineering Tools Development

Reviews and Edits:

Elsa Bumstead, Technical Writer, Department 2993, Product Realization Standards and Processes

Carol Eubanks, Office Assistant, Department 2993, Product Realization Standards and Processes

Prepared for:

Arthur E. Verardo, Senior Manager, 2990 Design Group and Program Manager, Engineering Information Systems

CONTENTS

FIGURES

NOMENCLATURE

CA	California
CCB	Change Control Board
CM	Configuration Management
CAD	Computer Aided Design
DCMP	Design Configuration Management Process
DDM	Design Definition Manager
DOE	Department of Energy
DTER	Drawing Transfer Engineering Release
EA	Engineering Authorization
EBOM	Engineering Bill of Materials
ECAD	Electrical Computer-Aided Design
EIS	Engineering Information Systems
KC/KCP	Kansas City/Kansas City Plant
NM	New Mexico
NTK	Need-To-Know
PA	Production Agency
PIN	Product Identification Number
Pro/E	Pro Engineer
PRS	Product Realization Standard
QAE	Quality Assurance Engineer
SCN	Sandia Classified Network
SNL	Sandia National Laboratories
SRN	Sandia Restricted Network
TBP	Technical Business Practice
TCR	Teamcenter® Requirements
UNC	Unclassified
WFO	Work for Others
WR	War Reserve

1. INTRODUCTION

The Design Configuration Management Process (DCMP) has been developed over the past several years by a series of teams. Each team has been comprised of members representing the four major functional areas within the design organization, namely Design, Process, Tools, and Data/Operations. Each team was focused on developing a particular aspect of DCMP:

- Team 1: High level process definition and representation.
- Team 2: Process refinement and Pro/E details; preliminary process overview training.
- Team 3: Development of baselining concepts, program planning and implementation planning.
- Team 4: Refinement of baselining processes and training; milestone roadmap.

Process development efforts quickly identified the need to perform configuration management (CM) of Pro/Engineer (Pro/E) models in association with other forms of relevant design definition and documentation. This essential piece of the CM puzzle has been built into the DCMP. To date, process details have been restricted to address aspects relevant only to Pro/E. Those efforts have focused on detailed designs, development and transition to production use, although the entire life cycle of information can be addressed by the DCMP and its essential functions.

Overview

As it exists today, the DCMP represents a process-based systems engineering model for the successful configuration management of the products generated during the operation of the design organization as a business entity. The DCMP model focuses on Pro/E and associated activities and information. A quick review of the process on the website reveals that it can serve as the framework for interconnecting all essential aspects of the design business, from the legacy paper-based approach to today's preliminary efforts to transition to a model-based approach for product design and definition.

The DCMP was developed from the perspective of the design organization. The DCMP included those elements of a sensible CM approach that were deemed essential to enable the organization to manage its design business and to support a variety of customers with a variety of work requests. Financial and administrative aspects of the design business were not addressed.

Essential DCMP Requirements

The DCMP was sponsored by Arthur E. Verardo, Senior Manager, 2990 Design Group. He set forth the essential requirements that shaped the content of the process-based business model that evolved. The objective of the team was to:

> Describe a consistent process to use for CM of Pro/E designs to follow for all War Reserve (WR) definition, where the following caveats apply.
> - Process shall handle:
>   i. Model based designs
>   ii. Designs that include models as well as non-modeled legacy parts.
> - Process shall cover development as well as production design efforts.
> - Process shall apply to non-WR designs as well (exceptions require management approval).

The essential requirements were identified as:

1. Develop a process that will:
   - Enable configuration management of Pro/E designs, including new design elements and legacy design elements.
   - Accommodate model and non-model based designs.
   - Comply with the guidance developed by the CM Product Realization Standards (PRS) and CM Technical Business Practices (TBP) where possible.
2. Develop a set of performance requirements for the CM tool.
3. **All designs** delivered to a customer shall be **released to IMS** to retain an **official record copy** of the design - **no exceptions**
4. **All WR designs** shall be released thru **EBOM** to insure maintenance of accurate **configuration management of our product structure** - **no exceptions.**

These requirements and the associated objectives led the way to establishing how designers can be expected to actually conduct the business of design as the DCMP is implemented and institutionalized.

2. SCENARIO: DESIGN OPERATION AFTER DCMP DEPLOYMENT

This section describes several key scenarios inherent in the DCMP. They offer the reader a sense of how business might be done at a time when the DCMP process is second nature within the design organization.

Scenario Description

A customer approaches the design organization to begin a design of a mechanical assembly. The product is an advanced component for data acquisition, storage, and transmittal. It could potentially find its way to JTA applications, test & monitoring equipment for security system applications, or possibly satellites.

The design engineer does not want to "presume," initially, where the product will be used. The engineer does know, however, that to save development dollars, he plans to use some of the parts used on a prior JTA design. He is certain that they'll use some of the same electrical components as well.

The engineer initially wants to try out two concepts. They are to be subjected to some analytical simulations for thermal exposure and shock, mechanical vibration and shock, and radiation responses to find where the product functional limitations and operational boundaries occur.

The designer is provided an on-line work request, complete with a project/task number. The work request appears in her in-box when the designer logs on to her computer at the start of the work day. The work request contains all the necessary requirements (DCMP 1.0), including the subordinate parts the engineer knows he wants to use. In addition, the engineer has attached a rough hand-drawn diagram for each of the concepts he wants to explore.

The requirements, preliminary parts list, and conceptual sketches were submitted electronically (checked-in) by the engineering customer from his desktop and placed into the central repository system under the job number assigned to the work request for design services.

The designer opens up viewable images of the requirements and development concepts and reviews the parts list. With an initial understanding of the work needed, the designer begins the design portion of the DCMP (DCMP 2.0). She first explores the parts her engineer specified. She logs onto the information system to view Product Data and search for the most current authorized design files she can find.

Product Data provides more than the traditional Engineering Bill of Materials (EBOM) production configuration records. The designer can readily find current model configurations for any development representation of any part or assembly and can locate all the associated evaluations and documentation connected to each configuration.

Digitizer Assembly

The Designer finds the Digitizer Assembly and confirms that there are several current product versions in use and still in production. She reviews the operational requirements for each of the

product versions, specifically looking for the environmental requirements for which the products were designed. She identifies the product version with what looks to be comparable radiation requirements. She sends her engineer a workflow request to review the performance parameters for the part she found and continues to explore the data for the other parts her engineer requested. She locates a record for the requested transmitter and notes that the part was not designed for any radiation environment.

Receiver Unit

The designer finds the requested receiver unit and confirms that the part's requirements exceed the current project requirements. She clicks on the receiver product identification number to obtain a full listing of all the available definition for the part. She finds only what once was called a "dumb block" model in Pro/E and locates a complete set of paper documentation for the part. She also notes that the model appears not to have been updated every time the rest of the documentation was changed. "It looks like this one is older than I thought," she muses. She opens the metadata for the part to find the owner and maintenance site for the part (DCMP 2.1.1). She learns that the part was originally designed by Sandia staff, but it has been transferred to the Kansas City Plant (KCP) for maintenance. She selects the option to request updated definition from the maintenance site.

Transmitter Unit

She then goes back to the transmitter unit and explores the available definition. The part is owned and maintained by Sandia. A fairly complete definition set is available, including all text specs and drawings, and several Pro/E models. She notices a production model, a radiation model, a model for mechanical shock and vibration (complete with simulation results), one for thermal response, a dumb block, several simplified reps, a viewable graphic image, an assembly simulation, and a user training file with the manual, complete with a video and user simulation run. Curious, she confirms that this particular part is used in many applications. "That explains why there is so much definition available," she says. She clicks the option to request a complete definition set for the part and receives notice that she is not authorized to view or obtain the definition files. She clicks on the request to be added to the Need-to-Know (NTK) group for the part, and the request is sent to the inboxes of the engineer for the current work assignment and to the NTK group owner.

Digitizer Assembly

Meanwhile she receives an email from her engineer that the performance parameters for the Digitizer Assembly she found would be acceptable for this assignment. She captures the approval and submits it to the DDM as part of the requirements authorization for this part of her development work. She views the available definition set for Digitizer Assembly and finds all the relevant model and simulation files. No drawings or specifications are found. Again, she reviews the metadata. She finds her colleague did the last design iteration and that Sandia National Laboratories (SNL) has maintenance authority. She asks her colleague if he could prepare the production drawings for the part. He responds that he no longer is working on the part and does not have the time to do all the work. He suggests that she could do it herself; he offers to review, and to have his engineer review her drawings for compatibility with the model. Since she will not need production drawings at this stage, she defers making drawings for the Digitizer Assembly until later in development.

She receives a KCP email giving her access (read only) to the model in the KCP's system for the receiver. She checks out a read-only copy of the most current model that KCP used to create the drawing. She confirms that there have been many changes since the "dumb block" representation was created.

Her task now is to get engineering approval for the KCP model content of the receiver to be "production quality level," not for drawing preparation only. She sends copies of the drawings and the KCP model to the model checker in her organization requesting all the checks production quality level checks be completed.

Product Identification Number

Next, she begins her Pro/E assembly model for the first design concept. Following DCMP 5.0, she launches Pro/E and opens the Product Identification Number (PIN) request window at her desktop. She completes all known information, taking care to indicate that the end application is not yet known. After processing, the system provides her with a Design Group PIN. It also reminds her that she will have to provide details regarding the end use before the application part number (i.e., six-digit base number for WR, R-number for WFO, etc.) can be assigned and the design finalized and "authorized" for use in any application.

She confirms that her NTK access to the transmitter definition has been approved. She checks the metadata for the transmitter and the Product Data records. She discovers that a new iteration of the part is in development for a revised set of requirements that includes radiation environments. Since she did not see any baselines identified in the DDM repository, she locates the designer and contacts him to check on the status of this effort,

She finds that the first baseline is planned for radiation simulation, and it is expected to be completed the next week. She takes a copy of the most recent design version of the new transmitter and adds her name to the list to receive notification of new versions, baselines, and releases of the model. Adding this model to her assembly brings classification issues into the picture. She launches the classified network and moves her initial design of the Data Unit onto the classified system. Automatically, records in the Product Data configuration record system are updated to reflect that the design is classified pending DC review. All preliminary records and definition files created on the UNC system (before the addition of the classified part) are purged.

Working on the classified system, the designer uses the designated PIN to add the current transmitter design to her assembly. She saves her design as a new version on the classified system. She returns to the unclassified system to address the receiver unit. She finds that the design checks were completed and satisfactory. She submits a workflow request to both the receiver engineer and the other designer to authorize the KCP model representation for full production quality level.

Back in the classified system, the designer begins creation of other parts she will need for her design. She locates all existing models and uses the suitable ones. She checks in her new versions routinely throughout this process. Each day, as she starts work, she obtains the last version checked to be certain she doesn't lose time or valuable design information.

As the first concept is developed, the designer saves each version in progress to keep track of her work. After several days, she reaches the point where she feels the digital model is ready for design checks and engineering review.

The designer designates her most current version as a baseline for the purpose of Designer Checks and Evaluation (DCMP 10.6). She then uses her desktop toolset to be sure she has not built in any problems. Her first iteration of Model-Check reveals a discontinuity at the interface between one of the electrical boards and the connectors. She stores the model check results files in the DDM and links them to her baseline. She includes a comment linked to the baseline where she is reworking the model based on the model-check results.

Since the designer did not create the models for these parts, she notifies the ECAD group and the ECAD librarian of the problems. She suspects it is a simple thing, perhaps a connector upside down. She turns to the task of creating the requested second concept. Later she receives confirmation that, indeed, her problem was with the connector; it was incorrectly located. She checks out the revised baseline of the circuit board and mating connector and incorporates these into a new version of her model. She saves the new version to the DDM. She runs Model-Check again. No problems are found. She checks in the model-check results and links them to the current baseline. She adds a note that this baseline is now established for engineering review. She establishes the workflow for engineering review of this baseline and starts the workflow process. She returns to her work on the second concept.

The designer later receives confirmation from the engineer that her work on the first concept is acceptable for the first thermal simulation. She captures the engineer's approval, links it to the baseline, and establishes a new baseline showing the approval and purpose for the thermal analysis.

Product Data

As thermal analysis results are obtained, the analyst checks-in the results: the run conditions, models he created, pre and post processing files, visual thermal animation, text report of the findings, and recommendations for changes. The analyst links all the information in the Product Data configuration records to the thermal analysis baseline established by the designer.

The engineer reviews these results and checks-in his requests for changes to the first concept. The designer checks out the change requests and begins her modifications. She follows the DCMP from her desktop, saves versions along the way, and captures appropriate baselines. When she completes the next design iteration, the engineer approves it for thermal analysis using the workflow process. Once again the results are linked to the respective baseline. This time, the thermal results are acceptable. The engineer requests the addition of more structural detail to the model. Using a change request, he checks it into the DDM and links it in Product Data to the last and most recent baseline. The designer captures the detail, sets another review baseline, obtains engineering approval, links it to the review baseline, and establishes the next baseline for structural analysis.

As the development proceeds, details, results, comments, authorizations, change request reports, and other information are captured and associated with the appropriate baseline. In this way, the development history is built, leading to authorization for full-production.

3. SCENARIO ANALYSIS

This section presents an analysis of the hypothetical scenario description of the design process in action at some future point in time after full deployment of the DCMP. It is important to note a few essential observations:

1. The information and process technologies that enable the realization of this operational concept scenario exist today; in some cases the needed technology may exist only in a limited, basic form.
2. The interactions between the engineer, designer, and analyst represent a significant shift from today's interactions. This cultural shift is enabled by the establishment of some value added automation capabilities illustrated within the scenario.
3. Full implementation of this overall concept of operation is dependent upon achieving substantial improvements in the operations of the SCN. This includes providing an ability to move seamlessly between the SCN and SRN while maintaining proper access controls and protection of classified information.

Further examination of the scenario leads to the identification of some essential new functional capabilities that the information systems and desk top computing environment should provide if the DCMP is to succeed. Although we can influence the improvements and capabilities provided in the SCN via the Engineering Information Systems (EIS) program, this area is considered outside the scope of the DCMP effort and is not addressed further in this paper.

As taught in the DCMP overview class, Configuration Management has five essential technical functions that need to be addressed for full and effective CM. These technical functions appear in one form or another in much of the discussion found in the literature on the subject of CM. For simplicity, the DCMP team developed a mnemonic term, “RICED,” to refer to the essential CM functions. RICED stands for the following terms:

R	=	Roles and responsibilities (also referred to as management or organization).
I	=	Identification of configuration items (also CI identification).
C	=	Change management (also referred to as CI release and change management).
E	=	Excellence of design (also referred to as CI review).
D	=	Data (also referred to as configuration item status accounting).

For each of the DCMP system functional capabilities discussed below, refer to the individual CM terms identified in this acronym.

Baselining Capability

The baselining capability is essential to several basic CM functions. It is essential to manage changes to configuration items, necessary to achieve design excellence, and it provides key data necessary for configuration item status accounting. (Refer to the “C,” “E,” and “D” elements of "RICED").

Baselining capability is essential to manage the development of the design definition for products designed within the New Mexico (NM) and California (CA) design organizations.

The baselining capability serves a number of purposes. It enables:

1. Designers to capture important stages within the development process so that work will not be lost or confused with other efforts in progress.
2. Designers to capture versions of the design model established for review, evaluation, or analysis.
3. Engineers to conduct reviews and analyses using an established starting point (i.e., baseline).
4. Designers to associate the results of reviews or analyses and the resulting changes made to a particular iteration of the design.
5. Engineers to capture the historical evolution of the product design along with evaluations leading to particular selected design options, decision paths and their rationale, as well as the technical basis for the authorization to field or deliver a particular design.
6. Designers, engineers, analysts, or production engineers to determine, with confidence, which model (or 2-D design) is the correct one to use for a particular purpose.

Product Identification Number Capability

The product identification number (PIN) capability is mapped directly to the identification of configuration items. It provides the basis for record and data retention. (Refer to the “I” element of "RICED.")

The PIN capability provides the basis for cataloguing and retrieving essential work done within the design organizations for their customers. It is not essential that this identification capability be established with only a numeric identifier (e.g., six-digit number). The identifier could be any approach established, either by manual methods or through the use of default identifiers assigned by CM tools or databases. The essential aspects of this capability are that it provides:

1. The ability to identify every product (part or assembly) designed by the design organizations and enable retention or retrieval of that design either permanently or for a defined period of time.
2. The ability for the designer to associate design information throughout the lifecycle with a particular product.
3. The ability for designers or engineers to utilize or reuse any particular product in any application without regard to whether the product has a weapon, non-weapon, or other part number.
4. The ability for engineers to manage the definition of all products and systems, including software, throughout the product lifecycle.
5. The ability to retrieve any and all desired information about a product, including definition, authorizations, used-on lists, product structure and test, surveillance, or analytical data, subject to NTK.

In addition to providing a mechanism to identify or retrieve part definitions, the identification scheme entails identifying other configuration items that the organization chooses to retain and associate with the part. This means that identifiers would be associated with the design elements

that are deemed significant. For example, parts could have: concepts; mechanical stress analysis; thermal analysis; preliminary, critical and productivity review results; prototype definitions; user manuals; or maintenance manuals. In each case, the identifiers for these "configuration items" can be assigned by following standards or conventions. Alternatively, the identifiers could be automatically assigned by the design tools, the storage repositories, or by the configuration management application.

Product Data Capability

The product data capability is a key enabler of several of the basic CM functions. It is the foundation for the data retained to enable configuration item status accounting. It captures and presents essential information to identify each member of a particular set of related configuration items at a particular time. Moreover, product data provides the records of and pointers to changes (e.g., requested, in-progress, and completed) and links them to associated permissions (e.g., view, approve, generate, edit). Product data is the collection of attributes and metadata that enable users to query the systems to locate the desired configuration or configuration item. (Refer to the “I,” “C,” “E,” and “D” elements of “RICED.”)

Currently EBOM data identifies the most current production configuration in weapon (and some non-weapon) products. In addition, EBOM data provides product structure and traceability records with additional information on historical product versions and their associated production configuration records.

In contrast, the scenario outlined previously describes a design environment in which product design and development information is retained, interrelated, and used. It depicts a design environment in which both models and graphic information are coupled with, and related to, text, numerical analyses, and/or performance data.

By adding additional relevant data to that which has previously been captured, management of models and related information is enabled throughout the product life cycle. Thus, "product data" can be seen as a natural evolution of today’s EBOM concept. It enables:

1. The designer to readily keep track of models in various states of maturity and evolution (e.g., concepts in review, in evaluation, quality) or integrity, purpose, and level of authorization.
2. The designer or engineer to readily associate other forms of relevant documentation or definition with any other form of documentation at any point in time.
3. The ability to connect other types of essential information to parts in the system, e.g., qualification or evaluations, quality records, failure data, long term performance and surveillance records, training, use, or maintenance information, etc.

Data retained must be readily available and in forms useful to those needing it. This capability provides an essential user interface to the product data. It would facilitate various tasks based on user information and data queries such as:

- Identification and retrieval of the right model at the right time for a designer's need.
- Identification and retrieval of relevant product structure information.
- Identification of which model is authorized for analysis and which one is for production.

- Identification and retrieval of other configuration items of interest linked throughout the product lifecycle.

Product data provides the door, lock, and key to processing user queries, work requests, and information actions. By querying the central product data repository(ies), the user should be able to quickly identify, for any given model or other form of definition, who authorized it, for what purpose, to whom, and when. Other attributes or characteristics of the information should be easy to determine as well, such as its quality level, the originator, current owning engineer, current designer, where used, and so on.

Note that much of this information should be handled as attributes, not as "Pro/E Parameters." When ownership location, approval state, quality level, or used-on information is added or modified, and if the associated data is located within the design or model file, then the file itself requires modification. However, if the information is treated as an "attribute" within the tool, the workflow action can modify the attribute without changing the electronic file itself. This latter approach is essential to configuration management. As the former approach would require a number of associated changes (release actions, state promotions, notifications, etc.), the latter can be expected to be a simpler information processing transaction.

Share and Release Models Capability

The share and release models capability is necessary to achieve design excellence and to manage changes. (Refer to the “C” element of “RICED.”)

A functional capability that appears frequently in the discussion above is that of approving the model or design definition for a particular use. It would be easy to conclude that this capability translates to the familiar Engineering Authorization (EA). A more careful consideration of the scenario indicates that there may be both a formal "authorization" (e.g., the EA) and a more informal approval, which could occur via a workflow approval or even an email message, if properly recorded.

In any case, the DCMP system will need to capture the approvals, associate them with the design definition baseline, indicate what has been approved (and for what purpose), and indicate in the baseline what uses the specific pieces of the definition or documentation may have.

For example, the Share and Release Model capability will enable:

1. Clear indication of which model are authorized for use by the Production Agency (PA) (or analyst, Quality Assurance Engineer [QAE], etc.), but not by others, and the purpose(s) the mode can be used for (tool or tester development, process development, manufacturing, inspection, etc.).
2. Identification and location determination of any supplemental documentation associated with the correct baseline.
3. The ability to capture the need for, authorization for, and rationale behind change requests, as well as the status of their implementation.

Web-and Workflow-Enabled Capabilities

Another functional capability prevalent throughout this discussion is a Web-enabled action request system powered behind the scenes by a workflow engine. The workflow engine can be provided by existing capabilities such as those found in the Engineering Authorization (EA) Web application or the SNL corporate workflow tool. Alternatively, workflow capabilities could be enabled by tools such as the current Design Definition Manager (DDM) or other commercially available packages.

The balance of this section is devoted to a generalized discussion of the types of web and workflow capabilities that would need to be established for the achievement of the design environment depicted in the scenario.

The scenario is dominated by electronic communications and work requests moving effortlessly between several roles, or actors, in the overall DCMP System.

For example, work requests would be submitted and processed electronically. Requests for review and associated responses, including comments, markups, etc., would be submitted and distributed electronically among actors and to necessary information systems.

Inherent in such an approach is the need for an interconnected collection of repositories linked seamlessly from the user's perspective via the web-enabled interface. Clearly, users will not and cannot be expected to move from one database or repository to another or to know in which location their desired information can be found.

Some workflow enabled activities illustrated in the scenario include the following actions:

- Request work
- Assign a job request number
- Assign a 2990 part number
- Assign a designer to the work request
- Select and view design definition from a centrally accessible configuration record system
- View information in a number of formats, including:
  - Data
  - Graphic images
  - Animations
  - Visualizations
  - Models
  - Simulations
- Request changes
- Route work in progress for review
- Approve work or changes via a simplified approach
  - Output information in EA format when necessary
  - User authentication
  - Workflow approval

Additional Capabilities

The five capabilities discussed represent the most significant new capabilities that emerged during the study and analysis of this effort. The overall system cannot function without the inherent but all important capability of Computer Aided Design (CAD) - both mechanical and electrical. In addition, the associated analysis capabilities, the ability to generate and edit text specifications, and the data operations activities are keys to the overall success of the DCMP effort.

These latter capabilities are not "new" to the Design Definition Organization and are not discussed further in this paper. The balance of the discussion focuses on implementation and realization of the identified new functional system-level capabilities.

4. ESSENTIAL FUNCTIONAL CAPABILITIES

Many user needs have been identified during development of the DCMP. These needs have been reviewed, analyzed, and reported in several different ways. This section discusses how the needs were gathered, analyzed, and used within the context of the scenario and the analysis previously presented. The resulting functional system architecture (an aspect of overall system design), which was developed based on the process, needs, and analyses, follows. Finally, as developed in Teamcenter® Requirements (TCR), the user needs are mapped to the functional architecture.

User Requirements

The DCMP team has gathered user needs from several different sources. The needs have been referred to as user requirements, user requests, and at times, change requests. The needs are statements made by potential DCMP users reflecting how they want to see the system operate to help them do their jobs. Alternatively, user needs can be thought of as required functions and necessary capabilities that users want. Thus, the needs represent required DCMP system functionality written from the user point of view. Development of specific actionable and verifiable requirements is follow-on systems engineering analysis that has been started in several areas of these needs, but has not yet completed.

To date, the sources of the needs gathered by the DCMP team include:

1. DCM process
2. Analysis
3. Designers
4. Design managers'
5. Feedback from initial training classes.

Priorities and Risk

The DCMP team reviewed all of these needs and assigned both priorities and a type of risk to each one. The risk category used was limited to risks affecting successful implementation and usability of the DCMP itself.

Appendix A contains a report generated by TCR that lists the user needs captured. For each need that appears in the report, the text and several attributes are provided. A brief discussion follows to explain the notation used when listing the requirements in the report. This short overview is intended to help the reader to interpret the balance of the report and to follow the remainder of the discussion in this section.

The first need appearing in the report in Appendix A is:

1. RQST-0012 - The tools shall be able to identify baselines of individual files and multiple related files.

Required for Implementation:	Yes
Priority:	9 − Showstopper
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	--
Manual:	No

Required for Implementation

Prior to placement of the above information into TCR and assignment of the Request Identifier (RQST -0012), the team considered the level of importance to successful implementation of the DCMP.

The team first asked the question:

Can the DCMP be implemented (used or followed) if this request is not met?

This question was explored for each identified need. The answers revealed all the requests deemed required for implementation of the DCMP.

Priority

The team next explored the level of risk associated with failure to meet the particular request. In the example shown, the team determined that failure to identify a single baselined file or a set of related files in a baseline would completely jeopardize implementation of the DCMP. The team therefore assigned a priority/risk level of “9-Showstopper” to the request.

Manual Method or Workaround

For some requests, the team was able to identify a manual method, or work-around, which could enable implementation of the DCMP to proceed. The development of a full solution to the request could be deferred until a later date, perhaps even to "post-deployment." Such assessments are indicated by the text in red where a manual work-around either exists or does not:

- Manual: No

Remaining Attributes

The remaining red "attributes" of the request indicate the following information about a particular request:

- Source Owner: Owner or original source for the request
- Customer Priority: The level of importance that the originator of the request associated with the request

- Customer Requested Phase: The phase of implementation requested by the request originator (not presently used)

Change Requests

The work on these needs and subsequent entry and use of TCR enabled the generation of change request actions for submittal to the Change Control Board (CCB). The first submittal to the CCB was the baselining capability. This was selected because the need was identified in a number of user requests. The tools staff also recognized the need for the capability. Baselining also has been acknowledged as a fundamental CM capability in the literature [2, 3]. The result was that focus on the baselining enabled teamwork and solid discussions, and a strong beginning for the CCB.

As the CCB proceeded to discuss and authorize the baselining capability as a functional work package, the CCB became a more functional body. Interactions between tools and processes staff began to take on more characteristics of a partnership. The effort to implement baselining led to the formation of a staff team to further analyze and derive requirements from the original request list described.

System Architecture

As a follow-on to the requirements work done for the baselining effort, TCR has been used to develop a preliminary functional architecture for the overall DCMP system. The functional architecture presents the structural relationships of the major capabilities identified in the previous section of this paper. The major new capabilities identified in the system architecture within the Teamcenter® tool are:

- Baselining
- Product Data (including Queries)
- Product Identifier
- Share and Release Models
- Web and Workflow Capabilities

Figure 1 shows the graphical output generated automatically from TCR for the first level of the hierarchy in the DCMP functional architecture. Using the TCR tool, each capability has been decomposed further into associated subordinate functional capabilities.

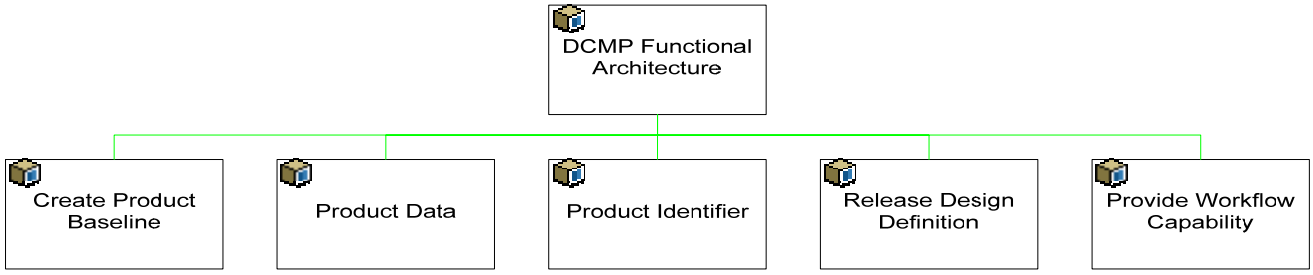


Figure 1. First Level DCMP Functional Hierarchy.

Figures 2 through 6 provide graphical representations of the functional breakdown for each of the capabilities just mentioned.

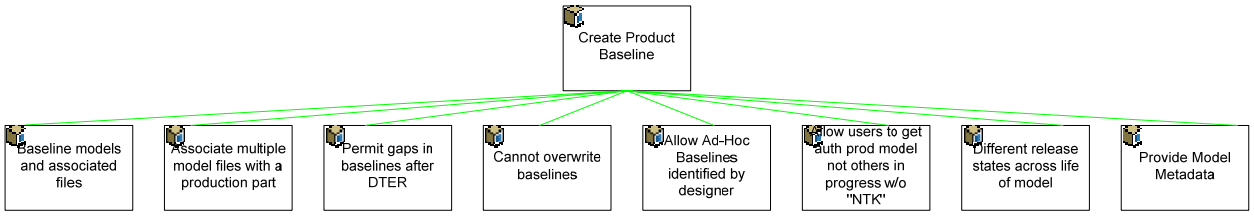


Figure 2. Functional Decomposition of DCMP Baselining Capability.

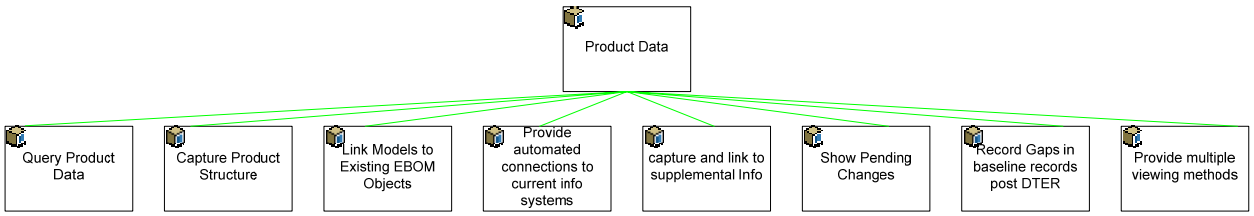


Figure 3. Functional Decomposition of DCMP Product Data Capability.

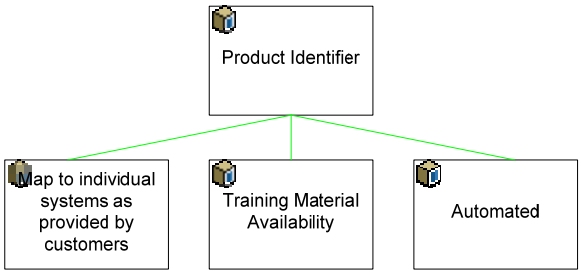


Figure 4. Functional Decomposition of DCMP Product Identifier Capability.

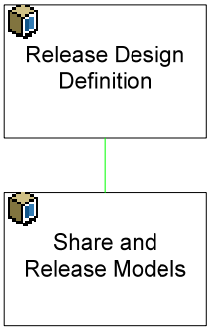


Figure 5. Functional Decomposition of DCMP Share and Release Models Capability.

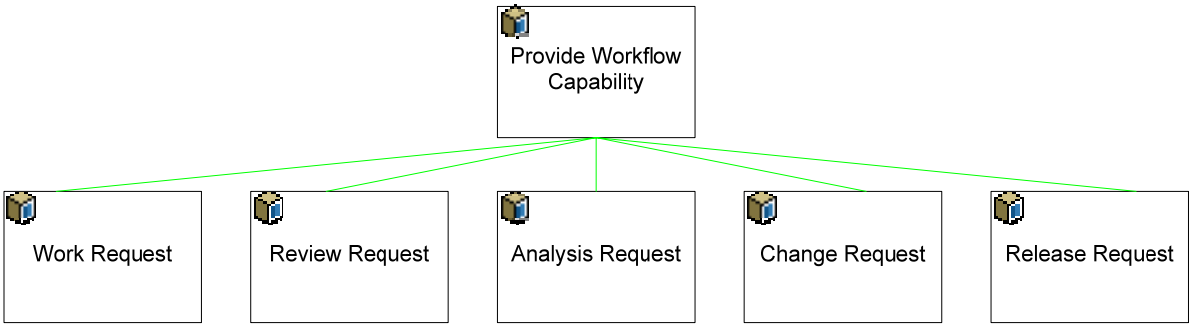


Figure 6. Functional Decomposition of DCMP Web and Workflow Capability.

Referencing Appendix A, each of the user needs/requests that was assigned a priority of "Showstopper," "High," or "Medium" has been mapped, or traced (in TCR syntax), to the functional capabilities, or blocks (in TCR syntax), that are shown in Figures 2-6. Efforts have been limited to higher priority needs and features to facilitate implementation planning. This allows for architectural changes that might be necessary as the implementation of functional capabilities evolves. As the project proceeds, mapping of the hierarchy to all the requests should be completed.

Figure 7-A shows, in a significantly reduced size, the resulting functional decomposition of the DCMP system traced to the user requests. The intent of Figure 7-A is to provide the reader with a general sense of the DCMP functional structure developed in Teamcenter®. Figure 7-B represents a portion of the functional structure shown in Figure 7-A mapped to the user requests. In Figure 7-B, the reader should note that the text represented by RQST-xxxx corresponds to the same identifier listed for the request in Appendix A.

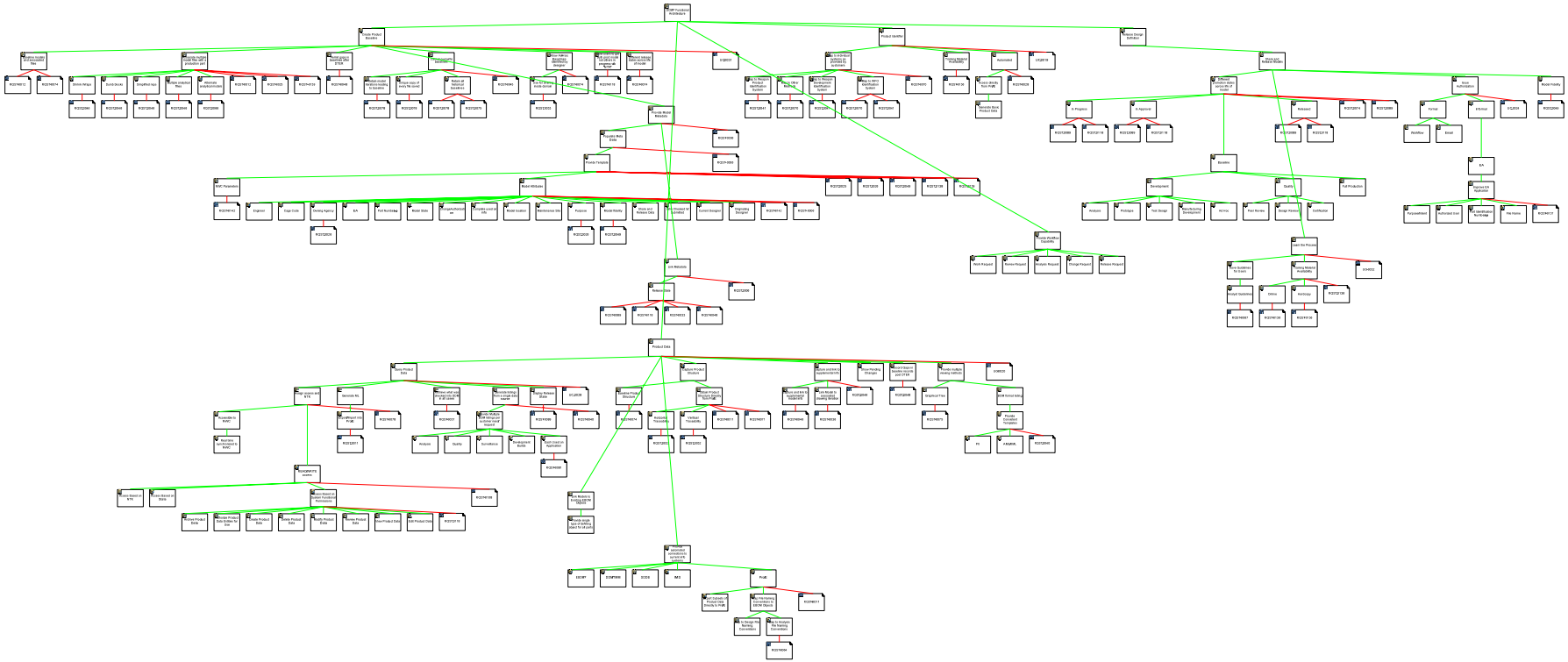


Figure 7-A. DCMP Functional Architecture Mapped to User Requests, Reduced Size

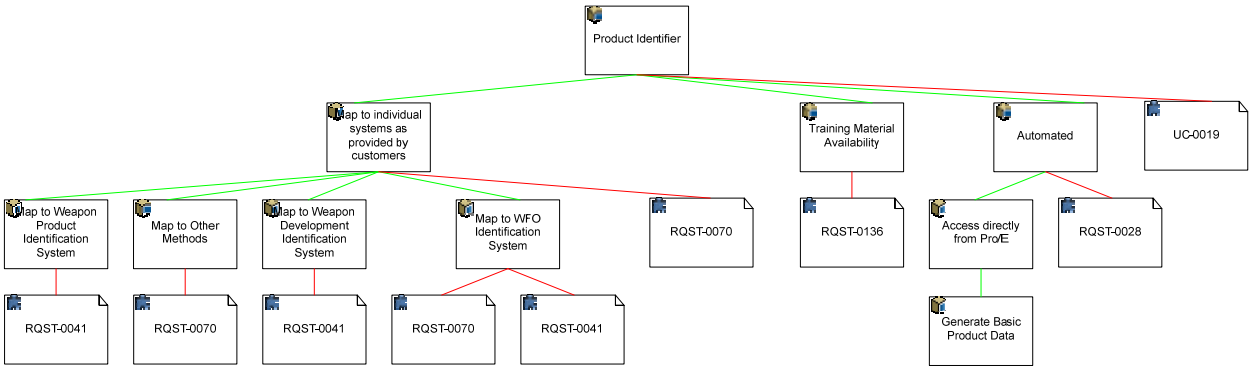


Figure 7-B. A Portion of the DCMP Functional Architecture Mapped to User Requests

5. IMPLEMENTATION

If all five essential capabilities were delivered, it would seem that the DCMP could be successfully implemented and followed consistently. The reality is that, due to limited resources, not all capabilities can be created simultaneously. In addition, many of the essential capabilities are interdependent. The process of creating model (or design definition) baselines needs to incorporate the Product Data capability as well; otherwise, baselines would be created which are not associated with any "product" configuration and which could not be searched by users across the life cycle. The focus of this section is the identification of such interdependence of the DCMP capabilities and a schedule for their implementation.

As indicated in Figures 7A and 7B, the functional architecture of the DCMP system was developed for several levels within the overall system hierarchy. The approach to prioritizing and sequencing the delivery of these functional capabilities was to obtain the first and second levels of the functional architecture from Teamcenter®. The architecture was examined to determine which collections or groups of functions had to be available before more complex functionality could be developed and delivered. Several questions were considered in determining the priorities for and delivery sequence of the capabilities:

Can a minimal capability provide opportunity for design staff to learn about new ways of doing business (process changes)?
Does the functional capability require another capability as a predecessor?
Does the functionality imply co-deployment of a related capability?
Is the capability aligned with the maturity level of the model-based approach?

These questions led to planning DCMP functionality deployment in three phases. The first phase corresponds to the initial and simpler level of maturity/complexity that could be delivered. The final stage corresponds to the most sophisticated, most automated level of achievement of the overall DCMP system.

The following paragraphs provide short descriptions of these phases and brief listings of the associated functional capabilities.

Phase 1 Capabilities

The initial phase represents the preliminary capability rollout and the achievement of the simplest level of sophistication of the overall process. In this phase, designers will be introduced to the concepts of baselining, and will begin to use the baselines in ways to suit their individual needs. Capturing baselines within the DDM will encourage designers to use the tool more frequently. Linking models and drawings together within a well defined part identification scheme will enable all customers and users to move more fully into a model-based approach. The ability to authorize the use of the model for a particular purpose will enable the clear establishment of a given model for a particular use and will eliminate confusion regarding which model is the "right" one.

Create Product Baselines

Cannot Overwrite Baseline Files

Allow Ad-Hoc Baselines Identified by Designer
Allow Users to Get Authorized Product Model and Not Other Models in Progress without NTK

Product Data
Provide Multiple Viewing Methods
Link Models to Product Data Objects

Product Identifier
Map to Individual Systems as Provided by Customers
Training Material Available

Release Design Definition
Release and Share Models
Learn the Process
Issue Authorization

Phase 2 Capabilities

In Phase 2 movement towards "model-based engineering" will proceed with the ability to associate multiple models with a single particular part. This will enable clear determination of which model is suitable and authorized for a given purpose and what its fidelity or limitations might be.

Create Product Baselines
Baseline Models and Associated Files
Associate Multiple Model Files with a Production Part
Provide Model Metadata

Product Data
Query Product Data
Capture Product Structure
Capture and Link to Supplemental Info

Release Design Definition
Release and Share Models
Model Fidelity

Phase 3 Capabilities

Phase 3 is the most automated, sophisticated level of DCMP implementation. In this phase, designers will routinely interact with production agencies for model exchange, more desktop automation will be provided, and other life cycle information will be related to a particular product via a sound, thorough information model. Phase 3 functions have been scheduled later for implementation to allow for other decisions to be reached during Phases 1 and 2 regarding such issues as centralized storage and access, and the degree of model-based approach that will be sought.

Create Product Baselines

Permit Gaps in Baselines after Drawing Transfer Engineering Release (DTER)
Different Release States across the Life Cycle

Product Data

Provide Automated Connections to Current Information Systems
Show Pending Changes
Record Gaps in Baseline Records Post DTER

Product Identifier

Automated

Release Design Definition

Release and Share Models
Different Promotion States across Life of Model

Provide Workflow Capability

Work Request
Review Request
Analysis Request
Release Request
Change Request

6. MILESTONES

The phases were then color coded into the architecture by representing Phase 1 as pink, Phase 2 as turquoise and Phase 3 as light orange. The resulting diagrams appear below in Figures 8 through 12.

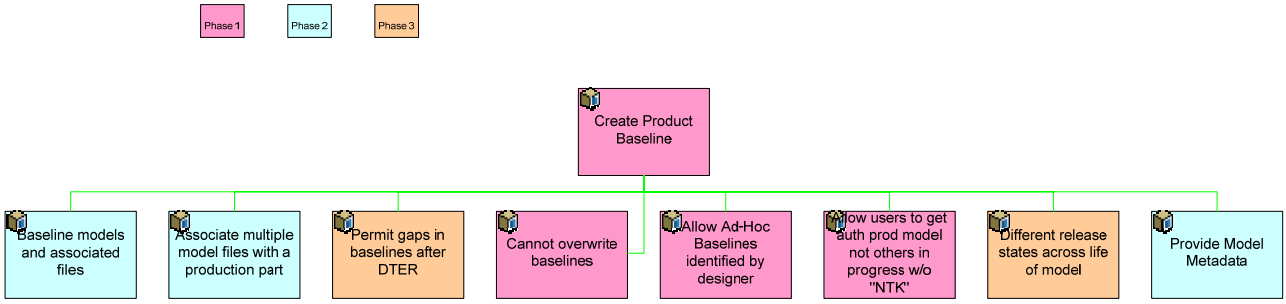


Figure 8: Functional Decomposition of DCMP Baselining Capability, with Priority Color Coding

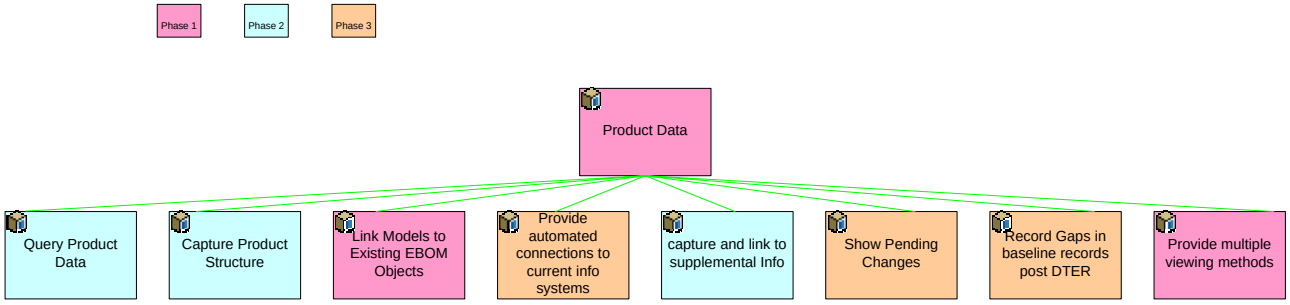


Figure 9: Functional Decomposition of DCMP Product Data Capability, with Priority Color Coding

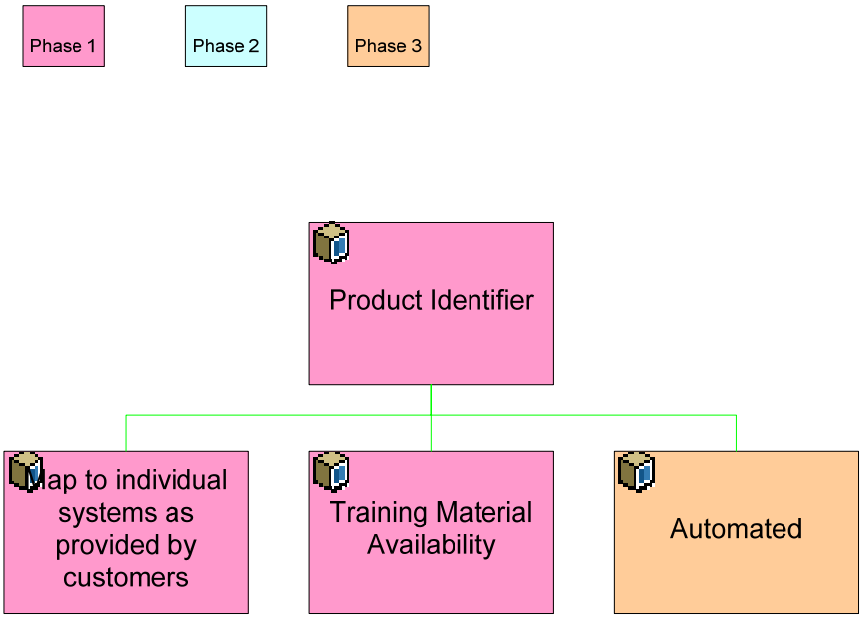


Figure 10: Functional Decomposition of DCMP Product Identifier Capability, with Priority Color Coding

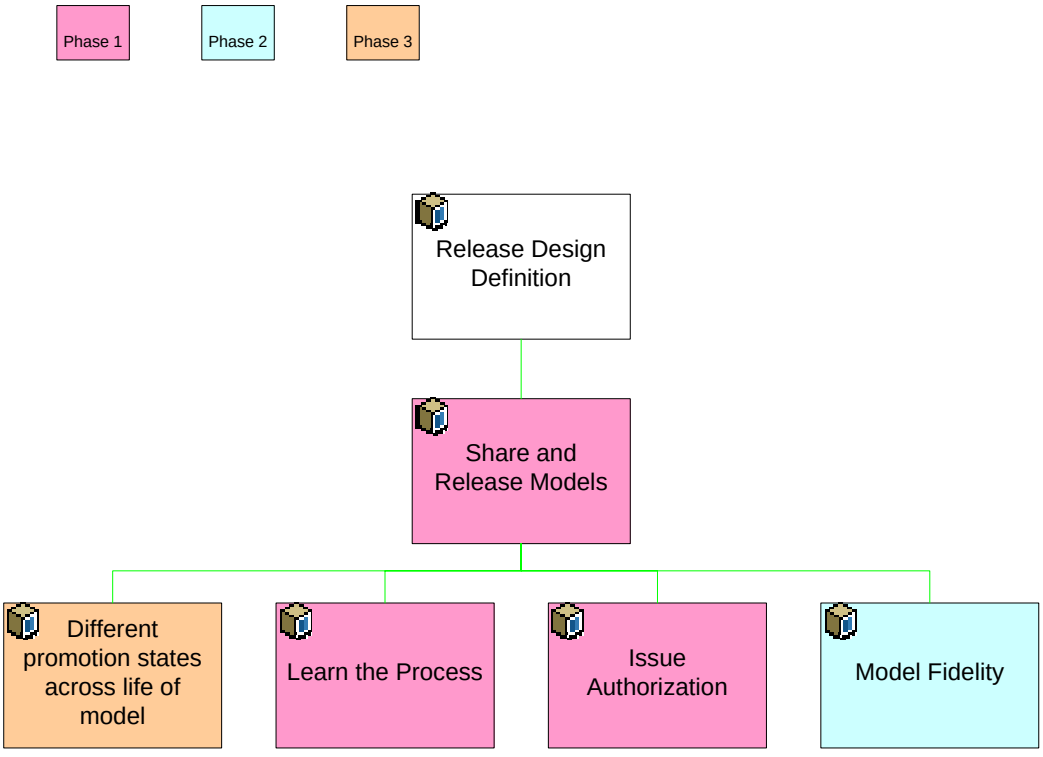


Figure 11: Functional Decomposition of DCMP Share and Release Models Capability, with Priority Color Coding

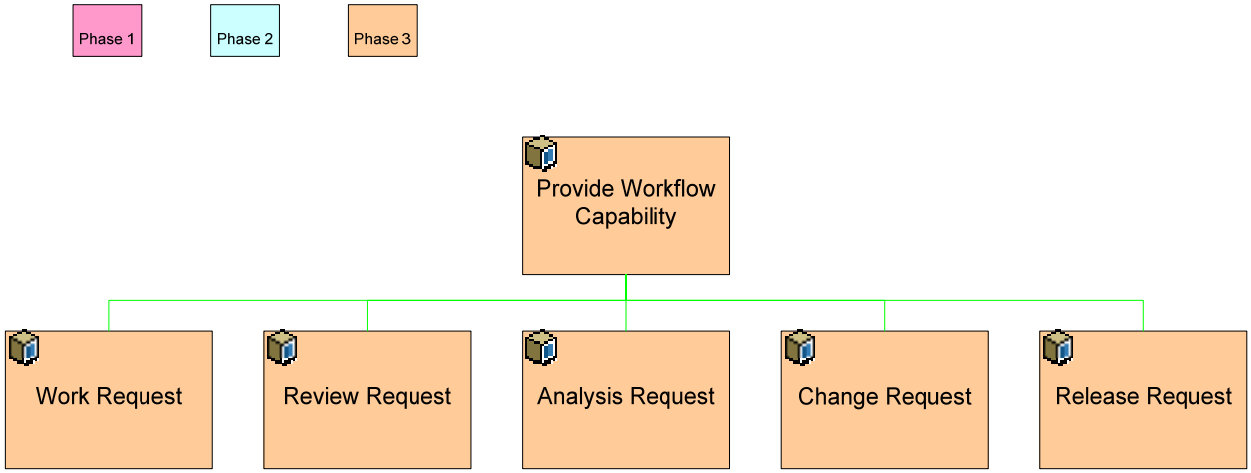


Figure 12: Functional Decomposition of DCMP Web and Workflow Capability, with Priority Color Coding

The first and second level functional structures discussed above have been mapped onto a milestone chart to indicate the expected, relative delivery times for each of the functional capabilities. Figure 13 provides the milestone mapping.

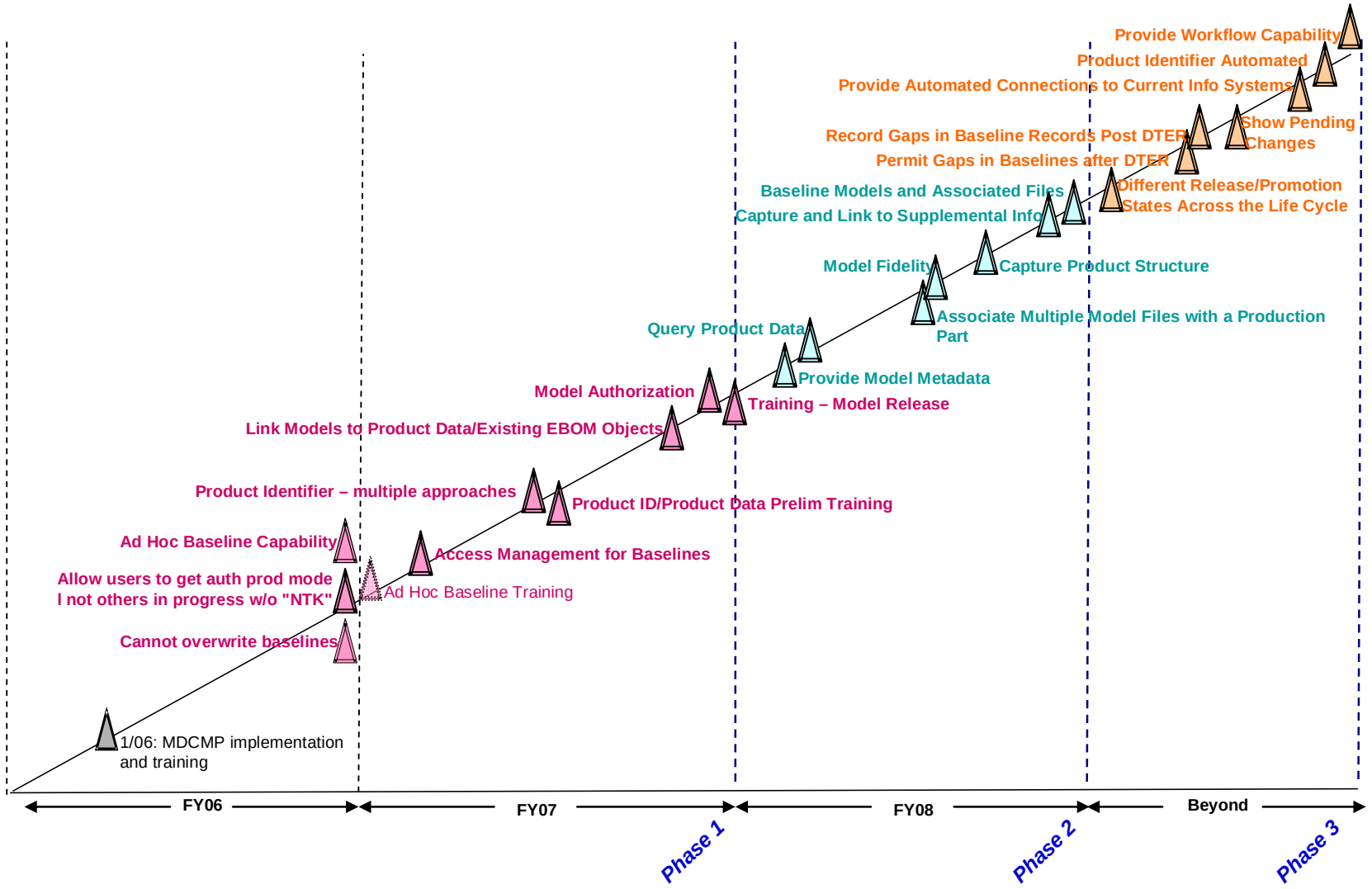


Figure 13: DCMP Milestone Chart – Phases 1-3

It is important to note that delivery dates are shown as *anticipated* milestones. Each functional capability needs to be approached as a work package within the overall DCMP system implementation. A team needs to be assigned to plan the work for each respective milestone. Preliminary definition of work packages has begun; efforts have been focused largely on development of requirements and training for the baselining capability. Appendix B shows the initial work package that was prepared for the "Prepare Baseline" functional delivery. Once the CCB authorized this work package, the implementation team planned the full deployment of the capability. It is scheduled for completion at the end of FY06. Appendix C contains the initial planning document for this deployment.

Although many preliminary work packages have been started, most have focused on functional architectural levels lower than those discussed in this paper. Successful realization of the DCMP requires planning at all levels in the architecture. Further details should be developed by the team assigned responsibility for the functional level which the detailed function supports.

Level of effort details are not represented in Figure 13. The milestone chart should be reviewed to obtain the relative sequence of DCMP implementation. The specific dates will be established based on resource availability and on the perceived and agreed upon need for progress.

So that the DCMP is not allowed to become a stagnant system, other essential aspects of implementation need to be addressed. Appendix D shows the initial planning of the implementation and rollout of the DCMP. The plan indicates the need to address process support, training, a system change request process, a tracking mechanism, etc. These tasks need to be addressed to assure that the DCMP system remains operational and useful to the group for a significant timeframe. However, initial realization of the DCMP approach depends upon delivery of the capabilities identified in this paper. Detailed planning for the support functions is being deferred until management decisions have been made to follow the phased implementation just described.

7. CONCLUSIONS

This paper has presented the initial objectives and constraints of the Design Configuration Management Process. A scenario has been presented describing a new way of approaching the design business after full implementation of the DCMP system.

Although technological capabilities available within today's tools and commercial software may enable the achievement of the DCMP system goals, development and deployment of significant capabilities are necessary to achieve the full vision represented by the scenario. The scenario revealed five significant functional capabilities that need to be addressed: Baselining, Product Data, Product Identifier, Share and Release Models, and Workflow.

Each of these functional capabilities was structurally developed further using the Teamcenter® Requirements System Engineering commercial software package. The first and second levels of the resulting DCMP functional architecture were presented in this paper. Each identified function was mapped to user requests received from designers, design managers, DCMP team members, and initial class participants in the pilot training overview session for the DCMP. Currently, only "Showstopper," "High," and "Medium" priority requests have been mapped to the proposed functional architecture.

The first level of hierarchical decomposition of each of the five functional capabilities was reviewed to identify a likely sequence of implementation and relative priority for achieving the DCMP operational business model. The first and second level functionalities within the DCMP architecture were aggregated into a three-phase approach. The three phases stress implementing fundamental and simpler capabilities first, leaving the more intricate capabilities and automations until the final deployment phase. The phase milestones were mapped into a milestone chart that indicates the relative implementation schedules for delivering each capability.

Based on the work done to date, there are several recommendations for the next steps:

1. The design managers should review and provide feedback on the scenario presented.
    a. It is important to assure that the organization is going in the same direction and that general concurrence exists among staff about working together to achieve DCMP milestones. This unity of purpose is essential to avoid working in fragmented, compartmentalized ways to achieve unintegrated goals. It is also key to avoiding point solutions to specific problems. Management support is fundamental to assure that resources are not diverted to other less time-critical projects resulting in unnecessary delays or inadequately staffed DCMP efforts.
2. The design managers and the CCB should review the relative schedule and priorities assigned to the milestones to verify the implementation sequence.
3. Proposals for achieving the FY07 milestones should be prepared.
    a. Work package descriptions should be completed and submitted for management or CCB approval.
    b. Team work is important to achieving the milestones presented. The management team must decide which work packages will be implemented individually and which can be merged or deferred for overall success.

4. Observations and feedback regarding the staff acceptance and movement within the phases are essential. At the completion of Phase 1 deployment, it is important to determine the degree to which the staff has begun to adopt the new ways of doing business, as well as the degree to which they understand and integrate the new configuration management concepts. This assessment will permit course corrections such as insertion of another functional capability that was not anticipated or development of additional critical training package.
5. The mapping of user requests to the functional elements of the DCMP system should be completed.
    a. This is a necessary task to assure that significant requests have not been overlooked and to assure that functional elements represented within the DCMP architecture are necessary to successful implementation. Careful identification of any gaps or omissions from either the request or design constraint perspective is essential.

Additional Impact

During the course of the DCMP project, the complexities of managing configuration definition that contained documents, models, and data became more deeply understood. It became apparent that a substantial improvement in our CM tools was needed to enable the realization of a scenario like that just described and to fully implement the DCMP process. As a result, management formed a follow-on team to deploy the PDM Link® tool for management of Pro/Engineer® model files. Deployment of PDM Link® is expected to be completed in FY07. Following that effort, it is expected that much of the DCMP effort will form the basis for future implementation of our design configuration management systems and processes.

8. REFERENCES

1. Design Configuration Management Process development website: http://www-irn.sandia.gov/organization/div2000/ctr2900/dpt2993/2990%20BOM%20Design%20Process/BDPIndex.htm

2. *Configuration Management*, vol. 4 of *Sandia Software Guidelines*, SAND85-2347, Sandia National Laboratories, Albuquerque, NM, June 1992. [Unclassified]

3. Standard for Software Configuration Management Plans, IEEE Std 828-2005, Institute of Electrical and Electronics Engineers, Inc., New York, 2005.

APPENDIX A: DESIGN PROCESS - STAKEHOLDER REQUESTS REQUIRED FOR IMPLEMENTATION

1. **RQST-0012 - The tools shall be able to identify baselines of individual files and multiple related files.**

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

1.1 Generate a Model

2. **RQST-0037 - Assure that what was entered into the TMM is what's retrieved for all cases.**

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

2.1 Query Product Data
2.2 Generate a Part Model

3. **RQST-0044 - When sharing models, base line promotion is required.**

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

3.1 Prepare Design Definition for Sharing

4. **RQST-0045 - No file baseline overwriting shall occur once established.**

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

4.1 Save to TMM

5. **RQST-0064 - A file naming convention for all analysis files must be in place prior to using a configuration management system. To help naming conventions, analysis categories could be created that may have a set of predefined file extensions for each. Possible categories and files types are listed below. a) Possible Configuration Management Categories• Analysis Solid Models (Pro/E, Solid Works, Cubit, Patran)• Analysis Mesh Models (Cosmos Works, Cubit,**

Patran)• Analysis Projects (Simba, all files grouped together)• Analysis input (input decks and associated exodus files)• Analysis Results (Various file types)• Analysis Data (Documents, spreadsheets, equations, scripts, etc)b) File Types and Extensions• STEP file from Pro/E (*.stp, could use the same as the parent Pro/E file) • Patran genesis files from Pro/E (*.geo, other) • XML file from Matrix (*.xml)• Solid Works Models (SMAR Team)• Solid Works STEP file (*.stp)• Patran data bases (*.db)• Patran session files (*.ses)• Patran journal files (*.jou)• Patran analysis decks (*.bdf, *.dat, other)• Nastran output (*.op2, *.f06, other)• Cubit files(*.cub)• Cubit journal files (*.jou)• Cubit XML files (*.xml)• Cubit Exodus files (*.gen, *.exo, *.e, *.g, *.txt, *.ex2, other)• Simba Databases (*.sim)• Simba XML files (*.xml)• Simba Exodus files (*.gen, *.exo, *.e, *.g, *.txt, *.ex2, other)• Simba input deck (*.i, *.inp, *.txt, other, COTS)• Analysis Code output (Exodus files, COTS)• Post processing (input decks, Exodus fiels, COTS)• Analysis document types, Microsoft Word and Excel, other

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	Analysis
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

5.1 Perform Analysis

6. **RQST-0074 - The product structure management software must support the concept of "baselines," a snapshot of significant parts within product structures at arbitrary milestones throughout the product and process lifecycle. Because numerous configurations of a product structure will be created over time, these baselines aid in identifying and establishing the product structure configurations of significant interest. Ad-hoc baselining by the designer must be available independent of formal baselines and IMS release.**

Required for Implementation:	Yes
Priority:	9 - Showstopper
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	1
Manual:	TBD

6.1 Populate Product Data
6.2 Prepare Design Definition for Sharing
6.3 Generate a Model

7. **RQST-0032 - Assure horizontal and vertical traceability of product information.**

Required for Implementation:	Yes
Priority:	8 - High
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

7.1 Query Product Data
7.2 Populate Product Data

8. **RQST-0033 - Permit the sharing of base-lined CAD design files outside the local tools (i.e., be able to indicate that a particular baseline has been shared outside the domain).**

Required for Implementation:	Yes

Priority: 8 - High
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

8.1 Prepare Design Definition for Sharing

9. **RQST-0036 - The product data shall manage/control which revision of a graphic drawing is tied to which version of a model or CAD file.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

9.1 Create 2-D Design Definition
9.2 Populate Product Data
9.3 Generate a Model

10. **RQST-0040 - Produce consistent callout listings for all Product Data listings (ML, AML, etc.) reports.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

10.1 Query Product Data
10.2 Create 2-D Design Definition

11. **RQST-0046 - The Product Data shall capture and manage information for supplemental models (shrink-wraps, dumb blocks, production, models for Thermal analysis, shock analysis, vibration analysis, several environments, etc.)**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

11.1 Populate Product Data

12. **RQST-0048 - If copies of models for all changes since DTER have not been loaded into SNL tools, then we must get administrative privileges to capture the correct latest revision of the Model. Product Data shall record these entries.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: WG
Customer Priority: High
Customer Requested Phase:

Manual: No

12.1 Determine Maintenance Responsibility

13. **RQST-0066 - TMM needs a place to store many Exodus files associated with single geometry file. This will capture the iteration process when running analysis (from CAD to results). The ability to associate a file(s) to other files for capturing how and why the analysis was performed. An example of this is when a project uses the same design solid model, analysis solid model and mesh model but different input decks, each deck is associated with the same set of downstream files. Each input deck can represent different velocities, material properties, coatings, boundary conditions and any other environment to be simulated. The current analysis process has situations where one file can have many upstream and downstream related files that can be anticipated and/or will be created on the fly for needed information. The PDM needs to be able to modify, add, remove file dependencies and file relationships.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Analysis
Customer Priority: High
Customer Requested Phase:
Manual: No

13.1 Perform Analysis

14. **RQST-0067 - Training/user guides must be in place for all functionality. Particularly the analysis category. The user that performs only design functions wants to know only how the PDM design process works. This process can be done by having sections specific to discipline.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Analysis
Customer Priority: High
Customer Requested Phase:
Manual: No

14.1 Perform Analysis

15. **RQST-0070 - System shall support (unique, configuration managed) user-defined part numbers (for instance, those used by 2300, like "01904") – user defined or automatically generated part numbers.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

15.1 Generate a Model

16. **RQST-0075 - Designer should be able to view (and edit when necessary) a product structure presented in the form of a hierarchical tree, where each node on the tree represents a different level of a product structure view. For example, an assembly can have branches representing sub-assemblies or components; each sub-assembly can have additional branches representing sub-sub assemblies and/or components.**

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

16.1 Query Product Data

17. RQST-0078 - System shall maintain record of each version of every item saved. The system shall provide viewing/updating access to each version with appropriate permissions (NTK groups "anded" with 2990 designers as default).

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

17.1 Query Product Data
17.2 Populate Product Data
17.3 Save to TMM

18. RQST-0081 - The solution shall be able to discover all uses of a particular assembly or component through a "where-used" report that reviews the contents of all or a specified portion of the available product structures. This function should work for all 2990 designers regardless of their NTK group.

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

18.1 Query Product Data

19. RQST-0089 - System shall allow for different release states for different categories of data (i.e. in progress, in approval, released, etc.).

Required for Implementation: Yes
Priority: 8 - High
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

19.1 Populate Product Data
19.2 Prepare Design Definition for Sharing
19.3 Query Product Data

20. RQST-0108 - A user intending simply to get read-only access to viewable info should not need to be concerned that they will accidentally change anything if they do have permission to do so (the read-only path to info and the manipulation of it should clearly be different than the processes used to modify data)

Required for Implementation:	Yes
Priority:	8 - High
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	1
Manual:	TBD

20.1 Query Product Data

21. RQST-0118 - The system must support a configuration that allows: A production user to access only the latest released file while another authorized user responsible for reviewing proposed changes can access the latest in-progress file of the same name.

Required for Implementation:	Yes
Priority:	8 - High
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	1
Manual:	TBD

21.1 Query Product Data

22. RQST-0016 - The tools shall be able to identify which version/iteration of a model is in the working area.

Required for Implementation:	Yes
Priority:	8 - High
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

22.1 Generate a Model

23. RQST-0071 - The system shall support Pro/Engineer product structures, item hierarchies, drawings, etc., that describe all the component parts of a product.

Required for Implementation:	Yes
Priority:	8 - High
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	1
Manual:	TBD

23.1 Generate a Model

24. RQST-0006 - Master Product Data attributes (such as drawing numbers, cage codes, titles, part classification, etc.) shall be propagated and/or available to Pro/E.

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

24.1 Populate Product Data

25. **RQST-0011 - Application(s) for importing and exporting Product Data (product structure, model references) to and from Pro/E.**

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

25.1 Populate Product Data

26. **RQST-0025 - Manage all the different models of the same part at different fidelities generated by multiple designers.**

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

26.1 Populate Product Data
26.2 Save to TMM
26.3 Generate a Model

27. **RQST-0026 - The necessary data for determining the maintenance site and the responsible designer of a model shall be electronically available from the TMM.**

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

27.1 Query Product Data
27.2 Populate Product Data
27.3 Determine Maintenance Responsibility

28. **RQST-0049 - The tools shall accommodate models of defined fidelity levels.**

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

28.1 Populate Product Data

29. **RQST-0136 - Training material specific to the designer/drafter job function should be consolidated and available both on-line and in hardcopy.**

Required for Implementation:	Yes
Priority:	5 - Medium

Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

29.1 Manage Design Requirements
29.2 Generate an Assembly Model
29.3 Generate a Part Model
29.4 Create 2-D Design Definition
29.5 Create Text Documentation
29.6 Get a Product Identification Number
29.7 Populate Product Data
29.8 Perform CM Verification and Audit
29.9 Prepare Design Definition for Sharing
29.10 Release Design Definition
29.11 Issue Engineering Authorization
29.12 Determine Maintenance Responsibility
29.13 Save to TMM
29.14 Generate a Model
29.15 Query Product Data
29.16 Perform Analysis

30. RQST-0137 - Improve the EA application.

Required for Implementation: Yes
Priority: 5 - Medium
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: Yes

30.1 Prepare Design Definition for Sharing
30.2 Release Design Definition

31. RQST-0138 - Provide an application for determining maintenance responsibility.

Required for Implementation: No
Priority: 5 - Medium
Source Owner: WG
Customer Priority: TBD
Customer Requested Phase:
Manual: TBD

31.1 Determine Maintenance Responsibility

32. RQST-0139 - Provide the capability to associate multiple models of different pedigrees ("production", "next assembly representation")

Required for Implementation: No
Priority: 5 - Medium
Source Owner: WG
Customer Priority: TBD
Customer Requested Phase:
Manual: TBD

32.1 Populate Product Data

33. **RQST-0140 - (TBP) Rules need to be documented concerning DTER and relationships to models (i.e., can you DTER a model only?; can you DTER a part base number without the model?;)**

Required for Implementation:	No
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	TBD
Customer Requested Phase:	
Manual:	TBD

33.1 Determine Maintenance Responsibility

34. **RQST-0141 - (TBP) Rules need to be documented concerning DTER and who has the authorization to create models.**

Required for Implementation:	No
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	TBD
Customer Requested Phase:	
Manual:	TBD

34.1 Determine Maintenance Responsibility

35. **RQST-0142 - The product data needs to record model attributes and existence in TMM**

Required for Implementation:	Yes
Priority:	5 - Medium
Source Owner:	WG
Customer Priority:	TBD
Customer Requested Phase:	
Manual:	TBD

35.1 Save to TMM

36. **RQST-0018 - The tools shall be able to identify owner of file and the last person checked in as separate values.**

Required for Implementation:	Yes
Priority:	2 - Low
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

36.1 Query Product Data
36.2 Populate Product Data

37. **RQST-0019 - The tools shall be able to identify the owning agency.**

Required for Implementation:	Yes
Priority:	2 - Low
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

37.1 Populate Product Data
37.2 Query Product Data

38. **RQST-0056 - The tools need to be faster than the current ability allows. Matrix is too slow checking in and checking out files for sharing and use especially analysis related files. For example, 30-45 min for large Pro/E assemblies which need to be reduced to a few minutes due to analysis artifacts can reach the size of 3-5 Gb. Due to work areas outside vaults and vault type rooms, checking objects in and out overnight cannot be done. The sharing capability needs to be fast and easy enough to replace the use of the dropzone, web file share and other ways of sharing data.**

Required for Implementation:	Yes
Priority:	2 - Low
Source Owner:	Analysis
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

38.1 Save to TMM
38.2 Perform Analysis

39. **RQST-0057 - Difficult to use for analysis files. The use of configuration management needs to be more transparent to the user and structured in a familiar fashion. Interface with other software such as Simba, Patran, Cubit, etc. need to have a way to interact with the PDM system for sharing and releasing analysis data. Note: DART's APC may fit this need.**

Required for Implementation:	Yes
Priority:	2 - Low
Source Owner:	Analysis
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

39.1 Perform Analysis

40. **RQST-0061 - Provide sufficient data storage for all required files. All required files are to be defined by ESAW, APC, ABOM and the customer. File Sizes are estimated in the gigabyte range on average.**

Required for Implementation:	Yes
Priority:	2 - Low
Source Owner:	Analysis
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

40.1 Perform Analysis

41. **RQST-0076 - Designers selecting a node on a product structure tree should be able to access a display of information about the object or objects represented by the node. This should include each object's status or state, the current user of the object if it is checked out, any changes in process that include the object, other relationships that include the object, and access to the object's change history. This view should be customizable for the different types of users who will be accessing the information.**

Required for Implementation:	Yes

Priority: 2 - Low
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

41.1 Query Product Data

42. RQST-0103 - Upon initiation of any change, system will immediately notify user of any change already pending on that selected item.

Required for Implementation: Yes
Priority: 2 - Low
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

42.1 Generate a Model
42.2 Query Product Data

43. RQST-0112 - A user should be able to access previous revisions of any drawing (and related data) obtained via the search of the database in the CM viewing interface

Required for Implementation: Yes
Priority: 2 - Low
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

43.1 Query Product Data

44. RQST-0129 - System shall allow viewing of Pro-E drawings, Word documents, Illustrator drawings and also .pdf files.

Required for Implementation: Yes
Priority: 2 - Low
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

44.1 Query Product Data

45. RQST-0017 - The tools shall notify a user when a newer version/iteration of a working model is available.

Required for Implementation: Yes
Priority: 2 - Low
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

45.1 Generate a Model

46. RQST-0143 - The system shall manage library parts.

Required for Implementation:	No
Priority:	2 - Low
Source Owner:	WG
Customer Priority:	TBD
Customer Requested Phase:	
Manual:	TBD

46.1 Generate a Model

47. RQST-0001 - Product Data shall link Pro/E models to respective IMS drawing images. Manage the relationships between the design definition entities (example: Pro/E model in TMM with image in IMS not generated from Pro/E model).

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

47.1 Populate Product Data

48. RQST-0002 - Product Data shall link Pro/E models to respective IMS drawing images. Link from Pro/E to IMS image.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	Low
Customer Requested Phase:	
Manual:	No

48.1 Populate Product Data

49. RQST-0003 - Product Data metadata shall be accessible to all designers and to all the NWC as a single source for the information. Product Data metadata shall be accessible to all designers.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

49.1 Populate Product Data

50. RQST-0004 - Product Data metadata shall be accessible to all designers and to all the NWC as a single source for the information. Product Data metadata shall be accessible to all the NWC.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	Medium
Customer Requested Phase:	
Manual:	Yes

50.1 Populate Product Data

51. RQST-0005 - Product Data shall provide ability to search for objects (Pro/E model) based on a file structure – associated with the part (Means "show where used";)

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

51.1 Populate Product Data

52. RQST-0007 - Product Data shall be able to search, request, list, find, etc., models from other sites databases

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

52.1 Query Product Data

53. RQST-0008 - SNL will own the Product Data data for all weapon systems (business rule).

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	TBD

53.1 Populate Product Data

54. RQST-0009 - Rules for populating insufficient legacy model parameters and attributes shall be established.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	Medium
Customer Requested Phase:	
Manual:	Yes

54.1 Populate Product Data

55. RQST-0010 - Insufficient legacy model parameter values and attributes shall be populated.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	Medium
Customer Requested Phase:	

Manual: Yes

55.1 Populate Product Data

56. RQST-0013 - The tools shall be able to associate layout files to respective Pro/E assembly files.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: No

56.1 Generate a Model

57. RQST-0014 - The tools shall be able to identify parts referenced in merged Pro/E parts.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: No

57.1 Generate a Model

58. RQST-0015 - The tools shall be able to identify suppressed objects.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: No

58.1 Generate a Model

59. RQST-0020 - The tools shall have an option at check-in to set access for the files (default condition should be established) (easy to use (non-functional requirement)) (available every time (non-functional requirement))

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

59.1 Save to TMM

60. RQST-0021 - Incorporate current change requests from Matrix Pro/E enhancement database where consistent with this process.

Required for Implementation: Yes
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High

Customer Requested Phase:
Manual: TBD

60.1 Generate a Model

61. RQST-0022 - Synchronize Product Data metadata with other sites real time.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

61.1 Populate Product Data

62. RQST-0023 - Need to accommodate legacy model files that have been saved using the current FN (tar/zip) process. (set base lines for all zipped files)

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: TBD
Customer Requested Phase:
Manual: No

62.1 Save to TMM

63. RQST-0024 - Must have faster checkin/checkout performance: 10 minutes or less for large assemblies (500 or more items)

Required for Implementation: Yes
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: TBD

63.1 Save to TMM

64. RQST-0027 - Accommodate bulk items at the part, assembly, and drawing level

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: No

64.1 Generate a Model

65. RQST-0028 - Automated Product Identification Number (six digit, R#'s, etc)

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High

Customer Requested Phase:
Manual: Yes

65.1 Get a Product Identification Number

66. RQST-0029 - Single entries of data for multiple points of use

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

66.1 Populate Product Data
66.2 Query Product Data

67. RQST-0030 - Provide NTK/Security access controls.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

67.1 Populate Product Data
67.2 Query Product Data

68. RQST-0031 - There should be multiple ways to view, report, print, etc. product information.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

68.1 Query Product Data

69. RQST-0034 - All new TMM files may only be accessed by check-in person. The check-in person provides access to the file. Improve the initial access control process for TMM files.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: Yes

69.1 Save to TMM

70. RQST-0035 - Tools shall provide for a single part-defining object for all other product data items to be associated with. (This requirement may be met today by using an AML as a part-defining drawing? But, it's not what we want.)

Required for Implementation: No

Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: Yes

70.1 Populate Product Data

71. RQST-0038 - Enforce the required NWC parameters to be filled in at some point in time.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: Yes

71.1 Populate Product Data
71.2 Perform CM Verification and Audit

72. RQST-0039 - It's desirable to build an automated/automatic link between the Product Data and the SDDB system.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: No

72.1 Query Product Data

73. RQST-0041 - The design must have a base number, part number, and/or development number

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: Yes

73.1 Perform CM Verification and Audit
73.2 Get a Product Identification Number

74. RQST-0042 - Initial Product Data must be created. Make this automatically created

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

74.1 Populate Product Data

75. RQST-0043 - Files are set to "in-progress" state at check-in in TMM

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Low
Customer Requested Phase:
Manual: Yes

75.1 Save to TMM

76. RQST-0047 - All models existing in the Product Data, shall be located and locatable in the TMM.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

76.1 Query Product Data

77. RQST-0050 - The tools shall manage reusable, low-level models as librarian-like parts.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

77.1 Generate an Assembly Model

78. RQST-0051 - Have an active link from within the TMM directly to other Product Data to support queries and validation

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: Medium
Customer Requested Phase:
Manual: No

78.1 Populate Product Data
78.2 Query Product Data

79. RQST-0052 - The tools shall be able to extract ML information contained in the Product Data to be placed on the face of the drawing.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: WG
Customer Priority: High
Customer Requested Phase:
Manual: No

79.1 Query Product Data

80. RQST-0053 - AML drawings are created by extracting (reporting) AML information from the Product Data.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

80.1 Query Product Data

81. RQST-0054 - Intelligible error messages shall be provided to users.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	High
Customer Requested Phase:	
Manual:	No

81.1 Get a Product Identification Number
81.2 Populate Product Data
81.3 Save to TMM
81.4 Query Product Data

82. RQST-0055 - The tools shall be able to automatically generate an EA when necessary.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	WG
Customer Priority:	Low
Customer Requested Phase:	
Manual:	Yes

82.1 Issue Engineering Authorization

83. RQST-0058 - Passwords must be synchronized with Kerberos. By having a different password is difficult to remember, the user may explore other means to share and store data.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Analysis
Customer Priority:	High
Customer Requested Phase:	
Manual:	Yes

83.1 Perform Analysis

84. RQST-0059 - Finding parts in TMM needs to be expanded. Many times the user doesn't know part numbers needed for retrieving models to be analyzed or existing models with analysis data. If one can submit a search based on last 10 submitted by username, date range or top level assemblies checked in by username (only parent assemblies), the ability to find needed models will be increased.

Required for Implementation:	No
Priority:	0 - TBD

Source Owner: Analysis
Customer Priority: Medium
Customer Requested Phase:
Manual: No

84.1 Perform Analysis

85. RQST-0060 - Add ability to show thumbnails of models and/or related files. This feature is similar to a preview before checking out.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Analysis
Customer Priority: Medium
Customer Requested Phase:
Manual: No

85.1 Perform Analysis

86. RQST-0062 - Communication between the large machines must be in place for fast transfer. Use the system in batch mode if needed. When running on a massive parallel system, the check in/out process needs to be fast as stated in other requirements.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Analysis
Customer Priority: Medium
Customer Requested Phase:
Manual: Yes

86.1 Perform Analysis

87. RQST-0063 - Check in is currently permanent, there needs to be a window of opportunity to make small changes before it becomes permanent. A staging area for checking in files needs to exits to make minor changes or changes that do not change the form, fit or function upping the issue of the file (file versioning can capture this which could potentially create many version numbers, hundreds, between releases.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Analysis
Customer Priority: Medium
Customer Requested Phase:
Manual: No

87.1 Save to TMM
87.2 Perform Analysis

88. RQST-0065 - TMM shall have a familiar structure for handling analysis files and associated types (i.e. Windows Explore, UNIX and Linux shells). This capability will help reduce the complexity of a user's work environment and will increase the initial use of a new product.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Analysis
Customer Priority: Medium

Customer Requested Phase:
Manual: Yes

88.1 Perform Analysis

89. RQST-0068 - The system shall support all Pro/Engineer file relationships using Pro-E Metadata (filenames, parameters, files modified, etc.) directly. Shall be compatible with Wildfire revision of Pro-E.

Required for Implementation: Yes
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

89.1 Generate a Model

90. RQST-0069 - System shall support the ability to add, subtract and extend attributes in Pro/E such as Titles, Issue, Drawing Number, etc. bi-directionally.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

90.1 Generate a Model

91. RQST-0072 - Users shall be able to link CAD content to any component or level of a product structure. This CAD content can be from any of the following systems: Pro/E, STEP (others later)

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

91.1 Populate Product Data

92. RQST-0073 - Users must be able to define products from either the top down or the bottom up. "Top-down design" is when a user creates the various levels and components of the hierarchy and later adds actual design data to them. "Bottom-up" design is when users access a hierarchy of parts from another source, such as an existing product, a CAD assembly model, or a supplier catalog, and then adds additional information such as manufacturing instructions.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

92.1 Generate a Model

93. RQST-0077 - Designers shall be able to associate documents to any component or level of a product structure. Examples could include specifications, test results, ECAD schematics, etc.)

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

93.1 Create 2-D Design Definition
93.2 Populate Product Data
93.3 Query Product Data

94. RQST-0079 - System shall have capabilities of creating and managing tabulated drawings.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

94.1 Create 2-D Design Definition

95. RQST-0080 - In addition to displaying a product structure view as a hierarchical tree, users shall be able to view a product structure as an indented Bill of Materials (BOM) within Pro/Engineer. Features appropriate to both BOM and tree viewing methods, such as comparisons of multiple views, switching between views, effectivity, pending changes, etc., shall be available using both methods.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

95.1 Query Product Data

96. RQST-0082 - System structure shall support alternate parts.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

96.1 Generate a Model

97. RQST-0083 - Authorized users should be able to "mark up" a BOM as part of the change management process. This mark-up should strike through items that will be replaced if the change is approved, and should also show the replacement item(s). When the change is

approved, the mark-up should be applied to the product structure within Pro/Engineer, which should be updated to reflect the mark-up i.e., additions & deletions.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

97.1 Create 2-D Design Definition

98. RQST-0084 - The system must support effectivity. Supported effectivity types must include date, lot number, and perhaps serial number.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

98.1 Populate Product Data
98.2 Query Product Data

99. RQST-0085 - The product structure management features of the system shall be integrated with the change management features, so that pending changes, change effectivities, etc., are properly reflected in various views of the product structure.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

99.1 Populate Product Data

100. RQST-0086 - The system shall provide a means to create workflows that assure that the change management processes are "closed-loop" as defined by CMII.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

100.1 Generate a Model

101. RQST-0087 - The system should allow the definition of change lifecycles, and the association of lifecycles to object types. A lifecycle should consist of a set of states, such as "in-work", "in-review", etc.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers

Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

101.1 Populate Product Data

102. RQST-0088 - The transition for each object from one state to the next should be based on a set of criteria, such as a successful review/approval process.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

102.1 Manage Design Requirements
102.2 Create 2-D Design Definition
102.3 Create Text Documentation
102.4 Generate a Model

103. RQST-0090 - System shall support multiple revision levels such as issue A, B, C and A.1, A.2 and A.3 etc. so as to allow the designer to make numerous baselined changes without release.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

103.1 Save to TMM

104. RQST-0091 - The system should provide a graphical, icon-based tool for the definition of lifecycles. This should include a set of icons representing states, gates, and outcome options; for example, if a gate is passed, the next gate should be clearly understood, and if a gate is failed, the outcome (return to previous state, move to "rework" state, etc.) also should be clear.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

104.1 Generate a Model

105. RQST-0092 - The system shall offer a pre-defined set of change management processes and objects, covering the entire process of releasing and then making a change to a managed item, from the first change request through the actions that implement the change.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2

Manual: TBD

105.1 Release Design Definition

106. RQST-0093 - It shall be possible to combine and/or separate workflow instances with multiple elements Example: One Engineering Change Request with two affected P/N's could be split into two separate ECNs each with one affected P/N (or vice-versa). General idea: One to many or many to one.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

106.1 Manage Design Requirements

107. RQST-0094 - Workflow changes should be captured for auditing purposes, e.g., responsible individual reassigned after viewing, approving task.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

107.1 Perform CM Verification and Audit

107. RQST-0095 - Pending and past changes to an object or product structure shall be available for viewing and printing.

Required for Implementation: Yes
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

108.1 Query Product Data

109. RQST-0096 - Users shall be able to enter comments as well as votes, and to save mark-ups associated with the review process, linking them to the reviewed object or objects. "No" votes shall require the entry of a comment (i.e. reason) for task completion.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

109.1 Save to TMM

110. RQST-0097 - User shall be able to attach scanned reference documents to any workflow instance.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

110.1 Create Text Documentation

111. RQST-0098 - System should have the capability to "hold" potential changes (for grouping minor changes for later processing or other reasons).

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

111.1 Manage Design Requirements

112. RQST-0099 - Users shall have ability to add comments to a workflow instance, regardless of action taken (approve, reject, etc.) and return to originator without having to stop workflow.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

112.1 Manage Design Requirements

113. RQST-0100 - CM system shall provide a means of viewing each document being routed.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

113.1 Query Product Data

114. RQST-0101 - System shall support parallel review and approval of proposed changes.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

114.1 Manage Design Requirements

115. RQST-0102 - System shall support parallel distribution of incorporation actions on workflow instance by task (mechanical changes to mechanical designer, manufacturing changes to production engineer, etc.).

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

115.1 Manage Design Requirements

116. RQST-0104 - System shall provide for automatic revision assignment with designer validation.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

116.1 Save to TMM
116.2 Generate a Model

117. RQST-0105 - System shall allow an approval workflow, whereby an item can be approved as revised and the revised item information only can be rerouted for approval without a need to restart the entire workflow or a need to re-route all non-revised items for approval.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

117.1 Manage Design Requirements

118. RQST-0106 - User has access to via the viewing tools items based on NTK access "anded" with 2990 designer status

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

118.1 Query Product Data

119. RQST-0107 - User should be able to get access to and navigate to desired viewable info with very few menu picks and keystrokes

Required for Implementation:	No
Priority:	0 - TBD

Source Owner: Design Managers
Customer Priority: Medium
Customer Requested Phase: 2
Manual: TBD

119.1 Query Product Data

120. RQST-0109 - Designer should be able to publishing (pre-release) into as needed to users with access to the CM system.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

120.1 Prepare Design Definition for Sharing

121. RQST-0110 - A user should be able to export 2D images in various formats (.bmp, .tif, .gif, etc.) from the viewing interface; the resolution should be controllable by the user

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

121.1 Query Product Data

122. RQST-0111 - A user should be able to export various 3D formats from the 3D model viewing interface, including IGES and STEP.

Required for Implementation: No
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 2
Manual: TBD

122.1 Query Product Data

123. RQST-0113 - A user should be able to obtain the native Pro/Engineer (and other types) configure / restrict this process to the "as stored" file set

Required for Implementation: Yes
Priority: 0 - TBD
Source Owner: Design Managers
Customer Priority: High
Customer Requested Phase: 1
Manual: TBD

123.1 Generate a Part Model

124. RQST-0114 - Custer users should be able to manipulate and query the CAD data from the viewing interface, including: 2D and 3D measurement, sectioning, and spinning components in 3D.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

124.1 Query Product Data

125. RQST-0115 - In the 3D viewing interface, a User should be able to interactively query the 3D model and/or an indented "product structure", with the result visibly highlighting in the other

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

125.1 Query Product Data

126. RQST-0116 - In the 3D viewing interface, a user should be able to query all model properties, and select only those that meet any given criteria; those selected should be highlighted in both the model and product structure

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

126.1 Query Product Data

127. RQST-0117 - The system must apply a "watermark" to output printed from the viewing interface. The watermark must by dynamically generated, and be configurable by Admin to show variable text and/or symbols depending on Drawing State at a minimum. This watermark information must also be captured when a user creates a .pdf file from the viewing interface.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

127.1 Query Product Data

128. RQST-0119 - The system shall allow customer/users to view and mark-up product information without having to have or launch the native application used to create the data.

Required for Implementation:	No

Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

128.1 Manage Design Requirements
128.2 Populate Product Data
128.3 Save to TMM
128.4 Generate a Model

129. RQST-0120 - Mark up methods shall be intuitive and easy to use. Shall have ability to mark up Word documents, 3D CAD files and drawings and pdf files.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

129.1 Manage Design Requirements
129.2 Create 2-D Design Definition
129.3 Create Text Documentation
129.4 Generate a Model

130. RQST-0121 - The system shall support mark-up of a two-dimensional or three-dimensional viewed object by multiple users concurrently. Each user's mark-ups shall be distinguished by color, line thickness, or some other easily understood convention.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

130.1 Manage Design Requirements
130.2 Create 2-D Design Definition

131. RQST-0122 - It shall be possible to view a mark-up file in conjunction with the source data. In other words, it shall be possible to view the mark-up as a layer over the document in the viewing tool.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

131.1 Query Product Data

132. RQST-0123 - Authorized users shall be able to view multiple mark-up layers overlaid on the original document

Required for Implementation:	No

Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	3
Manual:	TBD

132.1 Query Product Data

133. RQST-0124 - User shall be able to compare 2 versions of a drawing or model and readily see changes.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

133.1 Query Product Data

134. RQST-0125 - System shall allow for disposition of each comment with, for example, "yes – I agree" or provide link to other reference information.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

134.1 Generate a Model

135. RQST-0126 - User shall be able to link scanned manual mark up to document

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	3
Manual:	TBD

135.1 Create Text Documentation

136. RQST-0127 - Users shall be able to print hard copy of all viewed documents including attached (referenced) documents

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

136.1 Query Product Data

137. RQST-0128 - Management of the Mark up layers is automatically performed by the system. Multiple sheets and layers are managed by the system.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

137.1 Manage Design Requirements
137.2 Create 2-D Design Definition
137.3 Generate a Model

138. RQST-0130 - Viewing system shall provide Watermarks based on metadata or other attribute on all file types

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	3
Manual:	TBD

138.1 Query Product Data

139. RQST-0131 - The system shall provide check in/out of complex assembles (500 parts) within 5 minutes.

Required for Implementation:	Yes
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	1
Manual:	TBD

139.1 Save to TMM

140. RQST-0132 - The system should provide a template that assists the designer to establish product structure in alignment with standard product structure architectural.

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

140.1 Populate Product Data
140.1 Query Product Data

141. RQST-0133 - The designer password for the CM system should coincide with the corporate Kerberos password

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	High
Customer Requested Phase:	2
Manual:	TBD

141.1 Create 2-D Design Definition
141.2 Create Text Documentation
141.3 Populate Product Data
141.4 Prepare Design Definition for Sharing
141.5 Issue Engineering Authorization
141.6 Save to TMM
141.7 Generate a Model
141.8 Query Product Data

142. RQST-0134 - Search capability is needed to locate configuration items in-process or released by designer and by date

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

142.1 Query Product Data

143. RQST-0135 - Pre-checkout assistance such as thumbnails or review window should be provided

Required for Implementation:	No
Priority:	0 - TBD
Source Owner:	Design Managers
Customer Priority:	Medium
Customer Requested Phase:	2
Manual:	TBD

143.1 Generate a Model

APPENDIX B: DCMP WORK PACKAGE DESCRIPTION

Name .....: ***10.6 Prepare Baseline***
Responsible Lead .....: Sean Brooks
Priority .....: High
"Needed By" Date .....:
Start Date .....:
SME .....:
CCB Request .....: Yes
Difficulty .....: Hard
Parent .....:
Children .....:

Problem Statement	
The problem of …	Not being able to label a baseline; not having a documented process for creating a labeled baseline CAD files
affects …	Designers, receivers of models
The impact of which is…	• *Inability to capture snapshots of design models at any point in time for particular purposes*
A successful solution would…	• *Provide the capability to create a labeled baseline within the tools.* • *Allow the sharing of a labeled baseline intra- and inter-site.* • *Allow the ability to track labeled baselines.* • *Allow*

Dependencies

- *Ability within the tools to create a labeled baseline (coming February 2006, Eric Thulin)*
-

Notes

- *Links to the ability to authorize the sharing and use of a model at any particular point in time.*

Deliverables

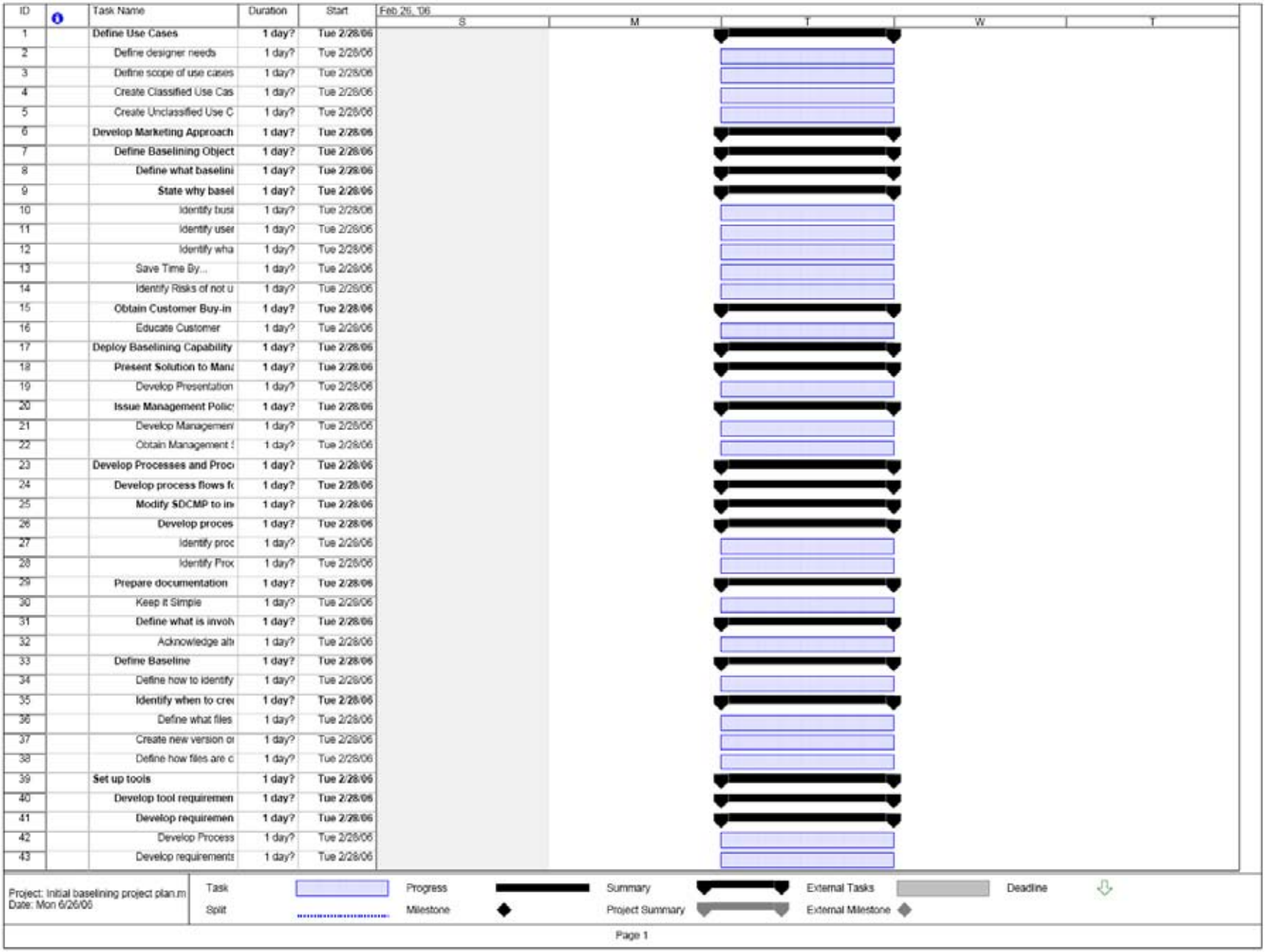
-

To be completed by Responsible Lead

Team Members .....: Larry Friday, Eric Thulin, Tim W.

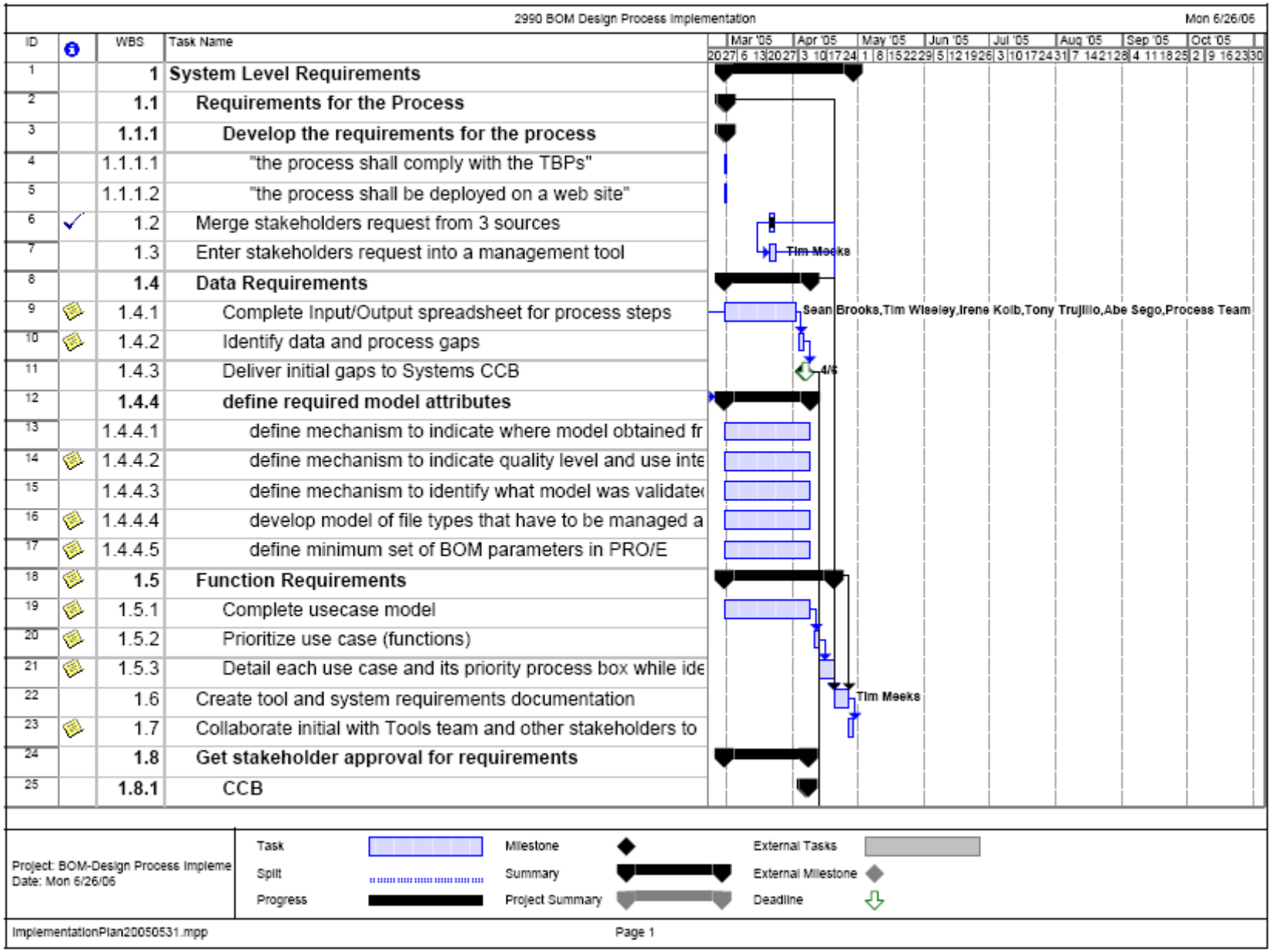
Estimated Completion Date :

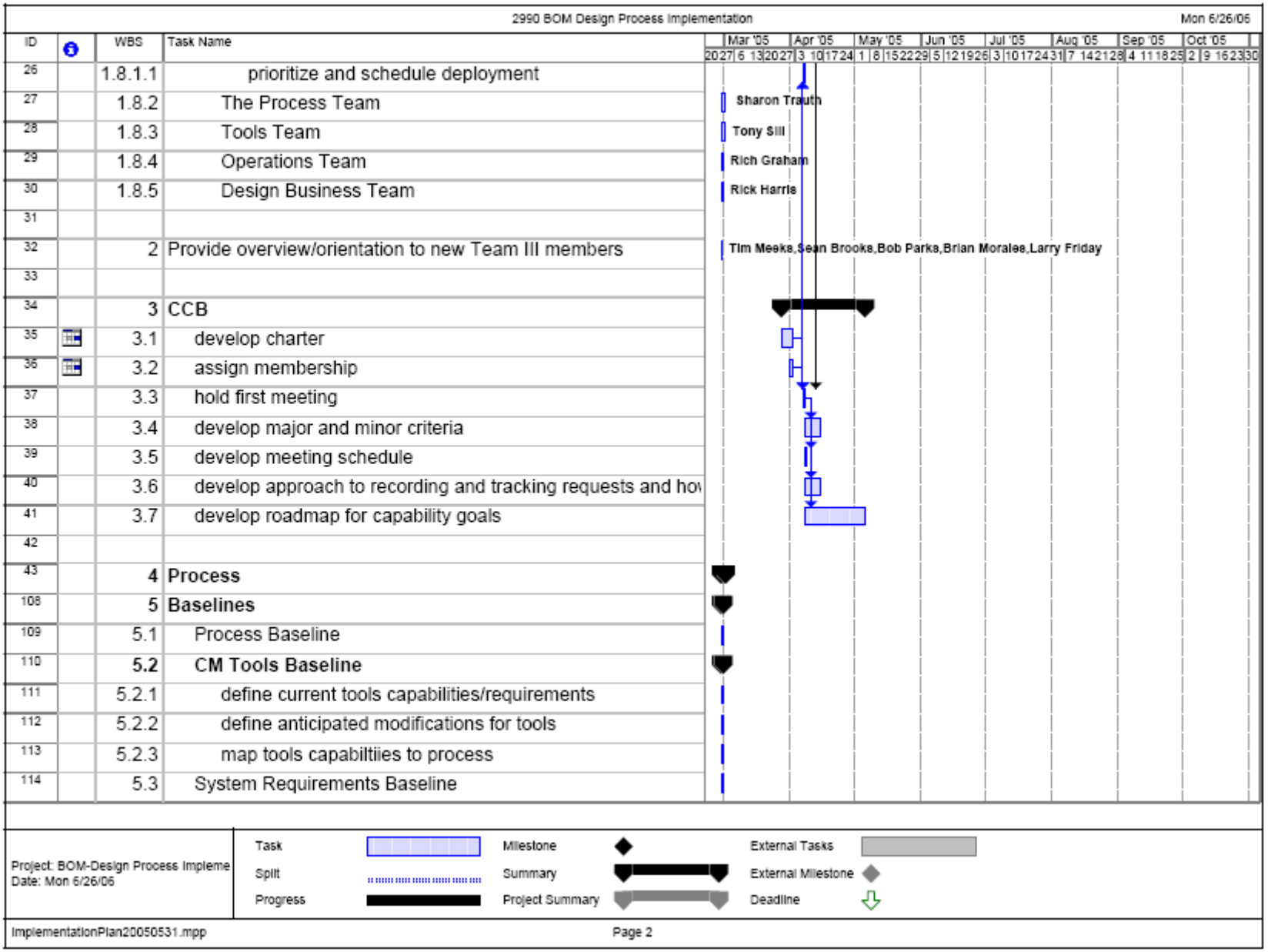
APPENDIX C: INITIAL PLANNING FOR DEPLOYMENT

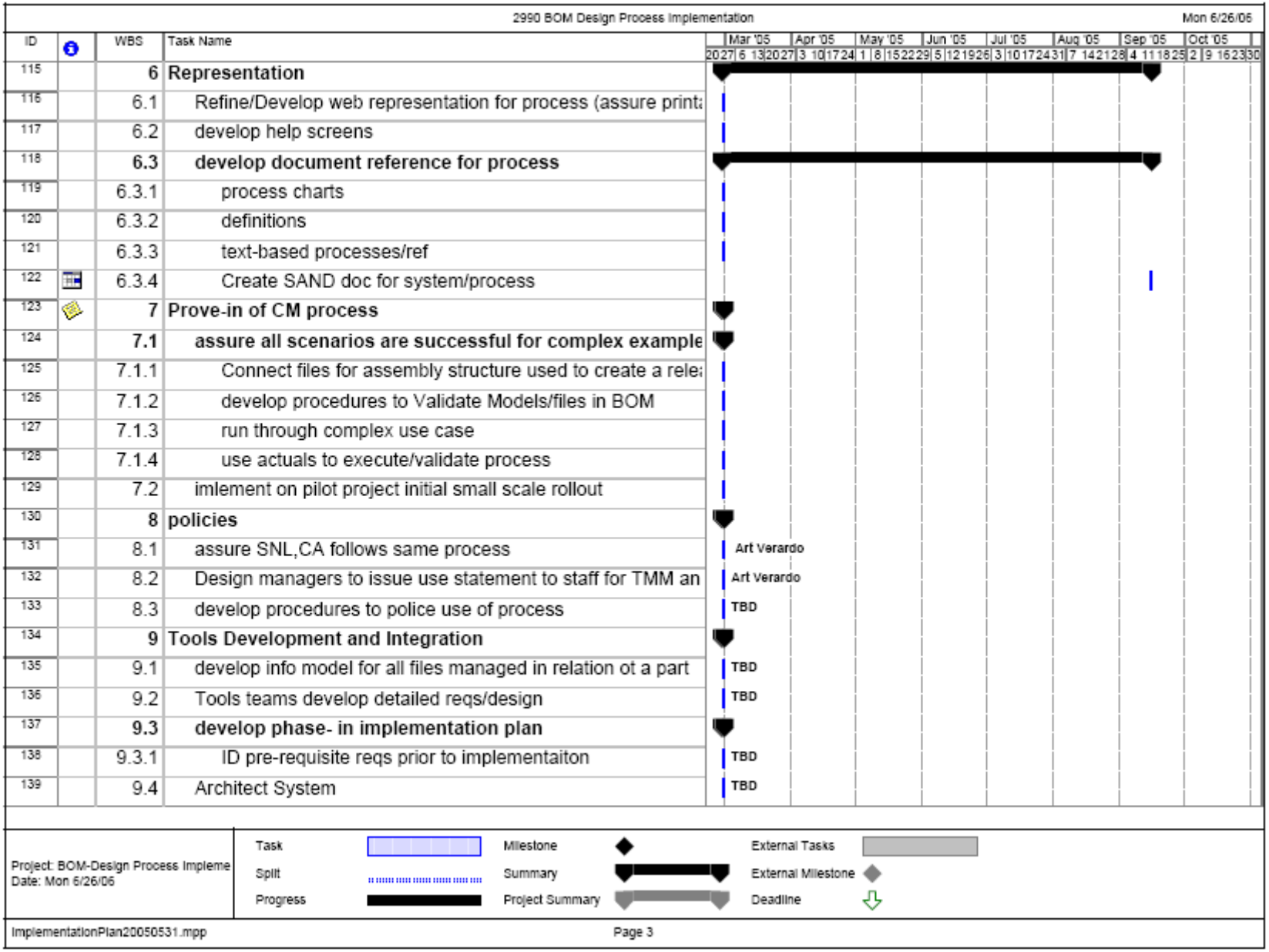


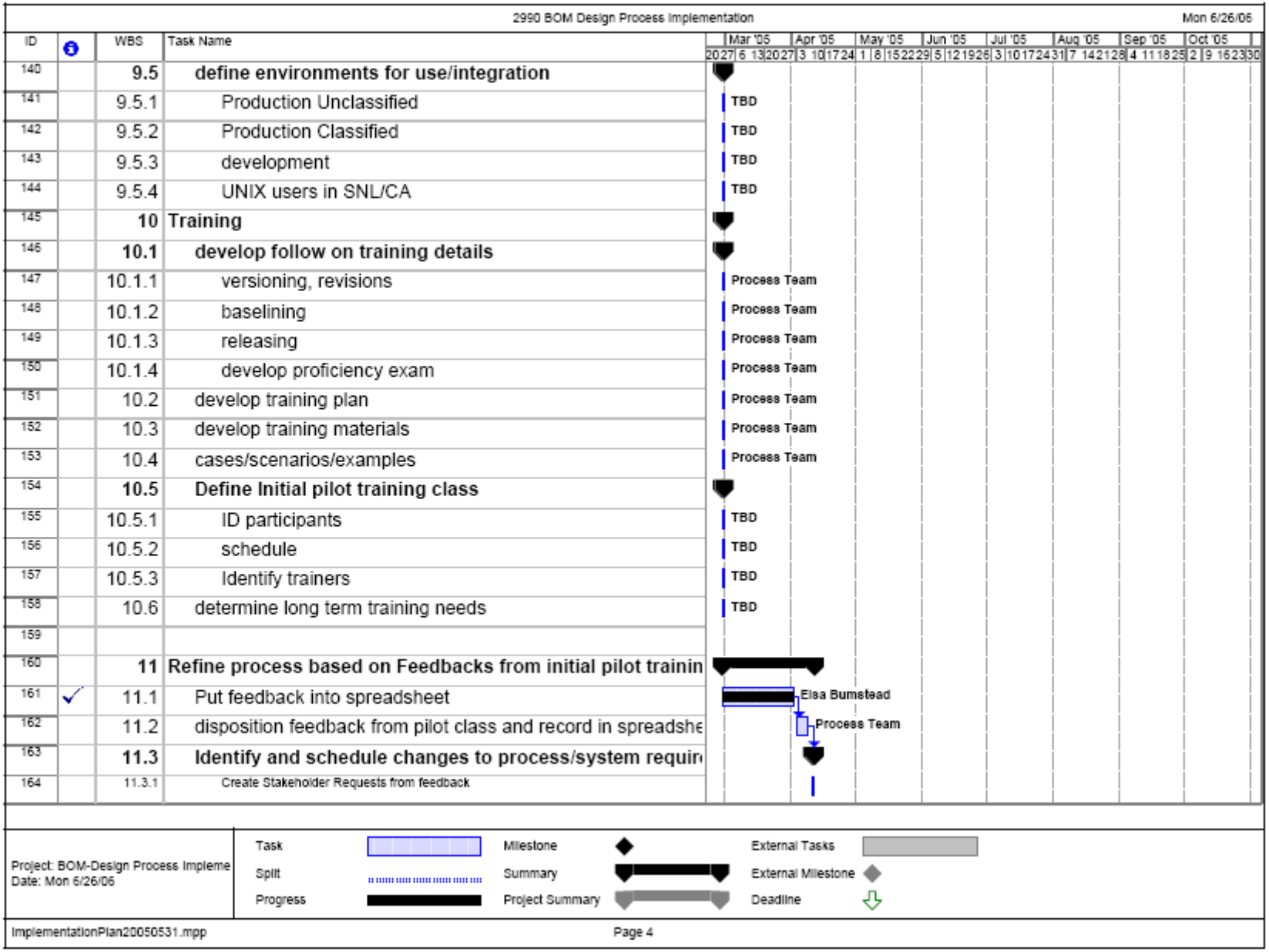
ID	Task Name	Duration	Start
1	**Define Use Cases**	1 day?	Tue 2/28/06
2	Define designer needs	1 day?	Tue 2/28/06
3	Define scope of use cases	1 day?	Tue 2/28/06
4	Create Classified Use Cas	1 day?	Tue 2/28/06
5	Create Unclassified Use C	1 day?	Tue 2/28/06
6	**Develop Marketing Approach**	1 day?	Tue 2/28/06
7	**Define Baselining Object**	1 day?	Tue 2/28/06
8	**Define what baselini**	1 day?	Tue 2/28/06
9	**State why basel**	1 day?	Tue 2/28/06
10	Identify busi	1 day?	Tue 2/28/06
11	Identify user	1 day?	Tue 2/28/06
12	Identify wha	1 day?	Tue 2/28/06
13	Save Time By...	1 day?	Tue 2/28/06
14	Identify Risks of not u	1 day?	Tue 2/28/06
15	**Obtain Customer Buy-in**	1 day?	Tue 2/28/06
16	Educate Customer	1 day?	Tue 2/28/06
17	**Deploy Baselining Capability**	1 day?	Tue 2/28/06
18	**Present Solution to Mana**	1 day?	Tue 2/28/06
19	Develop Presentation	1 day?	Tue 2/28/06
20	**Issue Management Polic**	1 day?	Tue 2/28/06
21	Develop Managemen	1 day?	Tue 2/28/06
22	Obtain Management S	1 day?	Tue 2/28/06
23	**Develop Processes and Proc**	1 day?	Tue 2/28/06
24	**Develop process flows fo**	1 day?	Tue 2/28/06
25	**Modify SDCMP to in**	1 day?	Tue 2/28/06
26	**Develop proces**	1 day?	Tue 2/28/06
27	Identify proc	1 day?	Tue 2/28/06
28	Identify Proc	1 day?	Tue 2/28/06
29	**Prepare documentation**	1 day?	Tue 2/28/06
30	Keep it Simple	1 day?	Tue 2/28/06
31	**Define what is involv**	1 day?	Tue 2/28/06
32	Acknowledge alt	1 day?	Tue 2/28/06
33	**Define Baseline**	1 day?	Tue 2/28/06
34	Define how to identify	1 day?	Tue 2/28/06
35	**Identify when to cre**	1 day?	Tue 2/28/06
36	Define what files	1 day?	Tue 2/28/06
37	Create new version o	1 day?	Tue 2/28/06
38	Define how files are c	1 day?	Tue 2/28/06
39	**Set up tools**	1 day?	Tue 2/28/06
40	**Develop tool requiremen**	1 day?	Tue 2/28/06
41	**Develop requiremen**	1 day?	Tue 2/28/06
42	Develop Process	1 day?	Tue 2/28/06
43	Develop requirements	1 day?	Tue 2/28/06

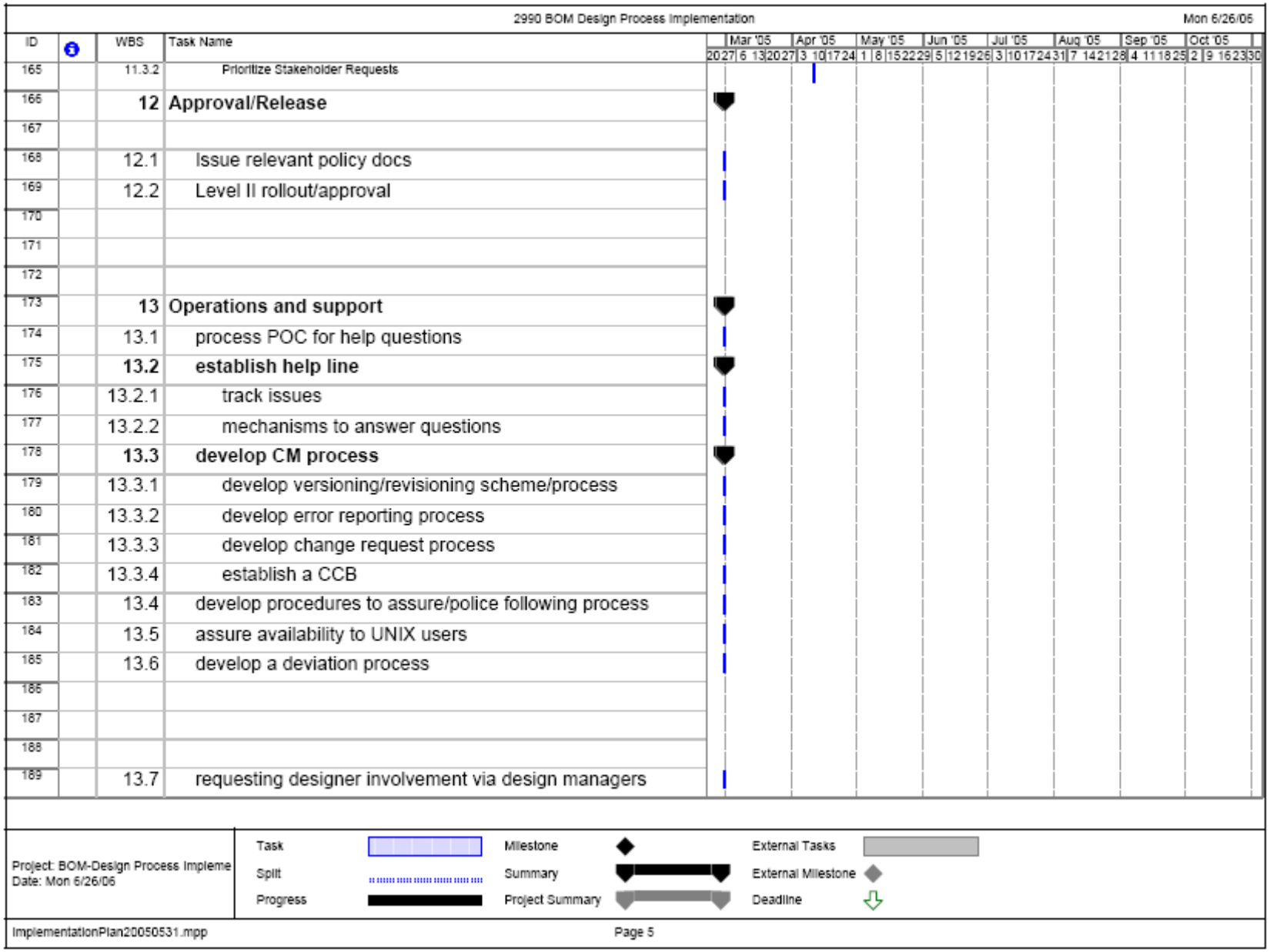
APPENDIX D: INITIAL PLANNING FOR IMPLEMENTATION AND ROLLOUT




2990 BOM Design Process Implementation
Mon 6/26/06
ID
WBS
Task Name
Mar '05
Apr '05
May '05
Jun '05
Jul '05
Aug '05
Sep '05
Oct '05
26 1.8.1.1 prioritize and schedule deployment
27 1.8.2 The Process Team
28 1.8.3 Tools Team
29 1.8.4 Operations Team
30 1.8.5 Design Business Team
31
32 2 Provide overview/orientation to new Team III members
33
34 3 CCB
35 3.1 develop charter
36 3.2 assign membership
37 3.3 hold first meeting
38 3.4 develop major and minor criteria
39 3.5 develop meeting schedule
40 3.6 develop approach to recording and tracking requests and hov
41 3.7 develop roadmap for capability goals
42
43 4 Process
108 5 Baselines
109 5.1 Process Baseline
110 5.2 CM Tools Baseline
111 5.2.1 define current tools capabilities/requirements
112 5.2.2 define anticipated modifications for tools
113 5.2.3 map tools capabiltiies to process
114 5.3 System Requirements Baseline
Sharon Trauth
Tony Sill
Rich Graham
Rick Harris
Tim Meeks,Sean Brooks,Bob Parks,Brian Morales,Larry Friday
Project: BOM-Design Process Impleme
Date: Mon 6/26/06
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
ImplementationPlan20050531.mpp
Page 2


2990 BOM Design Process Implementation
Mon 6/26/06
ID
WBS
Task Name
Mar '05
Apr '05
May '05
Jun '05
Jul '05
Aug '05
Sep '05
Oct '05
115 6 Representation
116 6.1 Refine/Develop web representation for process (assure printa
117 6.2 develop help screens
118 6.3 develop document reference for process
119 6.3.1 process charts
120 6.3.2 definitions
121 6.3.3 text-based processes/ref
122 6.3.4 Create SAND doc for system/process
123 7 Prove-in of CM process
124 7.1 assure all scenarios are successful for complex example
125 7.1.1 Connect files for assembly structure used to create a relea
126 7.1.2 develop procedures to Validate Models/files in BOM
127 7.1.3 run through complex use case
128 7.1.4 use actuals to execute/validate process
129 7.2 imlement on pilot project initial small scale rollout
130 8 policies
131 8.1 assure SNL,CA follows same process
Art Verardo
132 8.2 Design managers to issue use statement to staff for TMM an
Art Verardo
133 8.3 develop procedures to police use of process
TBD
134 9 Tools Development and Integration
135 9.1 develop info model for all files managed in relation ot a part
TBD
136 9.2 Tools teams develop detailed reqs/design
TBD
137 9.3 develop phase- in implementation plan
138 9.3.1 ID pre-requisite reqs prior to implementaiton
TBD
139 9.4 Architect System
TBD
Project: BOM-Design Process Impleme
Date: Mon 6/26/06
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
ImplementationPlan20050531.mpp
Page 3


2990 BOM Design Process Implementation
Mon 6/26/06
ID
WBS
Task Name
Mar '05
Apr '05
May '05
Jun '05
Jul '05
Aug '05
Sep '05
Oct '05
140 9.5 define environments for use/integration
141 9.5.1 Production Unclassified
142 9.5.2 Production Classified
143 9.5.3 development
144 9.5.4 UNIX users in SNL/CA
145 10 Training
146 10.1 develop follow on training details
147 10.1.1 versioning, revisions
148 10.1.2 baselining
149 10.1.3 releasing
150 10.1.4 develop proficiency exam
151 10.2 develop training plan
152 10.3 develop training materials
153 10.4 cases/scenarios/examples
154 10.5 Define Initial pilot training class
155 10.5.1 ID participants
156 10.5.2 schedule
157 10.5.3 Identify trainers
158 10.6 determine long term training needs
159
160 11 Refine process based on Feedbacks from initial pilot trainin
161 11.1 Put feedback into spreadsheet
162 11.2 disposition feedback from pilot class and record in spreadshe
163 11.3 Identify and schedule changes to process/system requir
164 11.3.1 Create Stakeholder Requests from feedback
TBD
Process Team
Elsa Bumstead
Project: BOM-Design Process Impleme
Date: Mon 6/26/06
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
ImplementationPlan20050531.mpp
Page 4


2990 BOM Design Process Implementation
Mon 6/26/06
ID
WBS
Task Name
Mar '05
Apr '05
May '05
Jun '05
Jul '05
Aug '05
Sep '05
Oct '05
20 27 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 4 11 18 25 2 9 16 23 30
165 11.3.2 Prioritize Stakeholder Requests
166 12 Approval/Release
167
168 12.1 Issue relevant policy docs
169 12.2 Level II rollout/approval
170
171
172
173 13 Operations and support
174 13.1 process POC for help questions
175 13.2 establish help line
176 13.2.1 track issues
177 13.2.2 mechanisms to answer questions
178 13.3 develop CM process
179 13.3.1 develop versioning/revisioning scheme/process
180 13.3.2 develop error reporting process
181 13.3.3 develop change request process
182 13.3.4 establish a CCB
183 13.4 develop procedures to assure/police following process
184 13.5 assure availability to UNIX users
185 13.6 develop a deviation process
186
187
188
189 13.7 requesting designer involvement via design managers
Project: BOM-Design Process Impleme
Date: Mon 6/26/06
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
ImplementationPlan20050531.mpp
Page 5

DISTRIBUTION

External recipients:
David Manzanares
Lockheed Martin Systems Integration-Owego, MD0210
1801 State Route 17C
Owego, NY 13827-0210
Phone: 607-751-6163

1	MS0139	Adrian Miura	2998
1	MS0139	Fran Current	2998
1	MS0374	Howard Walther	2991
1	MS0374	Sean Brooks	2991
1	MS0427	Anne Barnes	4513
1	MS0435	Regina Griego	2122
1	MS0435	Robert Koss	2122
1	MS0457	Steve Rottler	2000
1	MS0464	Dan Vortolomei	2996
1	MS0464	Tim Wiseley	2996
1	MS0464	Tony Hernandez	2996
1	MS0464	Abe Sego	2997
1	MS0464	Doug Hodge	2997
1	MS0464	Rick Harris	2997
1	MS0469	Dave Corbett	2900
1	MS0469	Art Verardo	2990
1	MS0624	Jeremy Dencklau	2994
1	MS0624	Jeremy Plake	2994
1	MS0624	Larry Friday	2994
1	MS0624	Tim Meeks	2994
1	MS0625	Cathy Votolomei	2995
1	MS0625	Rich Graham	2995
1	MS0627	Mark Geerts	02991-1
1	MS0629	Carla Fyie	2993
1	MS0629	Frank Ruth	2993
1	MS0629	Jeff Taylor	2993
1	MS0629	Kent de Jong	2993
5	MS0629	Sharon Trauth	2993
1	MS0629	Charlie Fleetwood	02993-1
1	MS0629	Tony Trujillo	02993-1
1	MS0660	Eric Thulin	4512
1	MS1158	Irene Kolb	2996
1	MS1453	Marc Basiliere	02993-1

1	MS9039	Ray Ng	8948
1	MS9039	Aaron Machado	08948-1

2	MS9018	Central Technical Files	8944
2	MS0899	Technical Library	4536