Special Report
CMU/SEI-97-SR-001

Proceedings of the *Introducing Requirements Management into Organizations Workshop: Requirements Management Transition Packages*

November 11-13, 1996

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This report was prepared for the

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FOR THE COMMANDER
(signature on file)
Thomas R. Miller, Lt Col, USAF
SEI Joint Program Office

This work is sponsored by the U.S. Department of Defense.

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Introducing Requirements Management into
Organizations Workshop: Requirements
Management Transition Packages

Abstract: This document summarizes the findings and presents the raw data from the *Introducing Requirements Management into Organizations* workshop hosted by the SEI (Software Engineering Institute) in November 1996. A transition package consists of a process description, related materials for users of the description, and materials for use by change agents in action teams and technical working groups introducing requirements management processes and tools into their organizations. The workshop participants considered the feasibility of building a transition package to expedite the adoption of effective requirements management practice and concluded that a transition package can and should be built for requirements management. This document records and publicizes the findings of the workshop, including problems and opportunities related to requirements management transition packages identified by workshop participants.

1. About This Document

1.1 Purpose of This Document

This document summarizes the findings and presents the raw data from the *Introducing Requirements Management into Organizations* workshop hosted by the SEI in November 1996. Transition packages consist of

- a process description (for example, for performing requirements management)
- related materials for users of the description (such as metrics or software tools and instructions on their use)
- materials for use by those introducing the process (such as training materials and sponsor coaching checklists).

The *Introducing Requirements Management into Organizations Workshop* was convened to consider the feasibility of building a transition package to expedite the adoption of effective requirements management practice. The purpose of this document is twofold:

- to record and publicize the proceedings of the workshop so that those interested in the subject area can learn from the workshop's results

- to encourage the construction of transition packages for requirements management and other technology areas, by providing information about transition package problems and opportunities that were identified by workshop participants

1.2 Intended Audience

This document is intended for change agents in software engineering process groups (SEPGs) that are planning Capability Maturity Model[SM] (CMM[SM])-based process improvements in organizations and for members of process action teams (PATs), or technical working groups (TWGs), especially those addressing the introduction of effective requirements management practice. Typically, members of these groups are experienced software engineers or technical managers. This document should also be useful to software process improvement consultants and vendors striving to provide repeatable consulting services in the areas of software process improvement and requirements management. Transition packages may provide an approach to efficient and effective delivery of these services.

1.3 Organization of This Report

The chapters that follow provide the background for the workshop, a detailed description of the workshop and its results, and candidate next steps that were identified in the workshop for further work on requirements management transition packages.

The appendices contain the materials used to publicize and organize the workshop, the detailed plans for the workshop, detailed descriptions of the results of each of the sections of the workshop, and copies of the slides presented by each participating organization during the workshop.

[SM] Capability Maturity Model and CMM are service marks of Carnegie Mellon University.

2. Background

This chapter provides a description of “transition packages,” the basis for the workshop design, and some of the technical work that led to convening the workshop.

2.1 Transition Packages

KPA (key process area) transition packages are "whole products” [Moore 91] that provide detailed guidance for introducing software engineering methods, tools, and processes. A “whole product” consists of a core technology (such as a software quality assurance process or requirements management process) and all of the components that support moving an organization from non-use to routine, everyday use. Creating these components is labor intensive and may be difficult for people on software change teams, such as SEPGs, PATs, or TWGs, who are charged with introducing new processes, methods, and tools that comply with key process area goals. Members of these teams often have technical and management skills, but may not have experience applying these skills to the process of managing technology-based change in organizations.

Furthermore, many organizations’ internal change agents are moving from supporting their “early adopters” to supporting the majority of their adopter population, who typically constitute 68% of the adopters. These later adopters require more carefully developed tools and support than the early adopters. The things that are important to the early adopters—for example, hands-on involvement, the chance to develop and tailor support processes and tools, and involvement in pilot tests and implementation planning—are of less interest to members of these larger populations. Moore calls these latter groups “pragmatists” and “conservatives” and notes that they are most concerned with the quality and reliability of the processes and tools that they are expected to learn to use (these are Rogers’ “early majority” and “late majority,” respectively [Rogers 83]). Change agents in this situation need tailorable materials as well as an adaptable process description of requirements management. They also need a repeatable process for tailoring and introducing the requirements management process and related materials. Transition packages are intended to meet these needs.

If transition packages may address these needs—and the SEI is still validating this through collaborative work with customers—then two key issues in creating transition packages are

- where to obtain the components
- how to address reuse and adaptation

The workshop described in this report was designed to go directly to potential developers and customers of transition package components to determine what issues and barriers they had already encountered. The workshop was also designed to determine how likely these people were to contribute artifacts that they had built, either as examples or as the basis for generalized, tailorable components.

2.2 Workshop Background

This workshop convened participants with experience in introducing requirements management into their organizations to ask them whether a transition package would have been helpful, and if so, how it would have helped. In effect, the proposition presented to workshop participants was as follows:

> Change agents given a "whole product"—a complete kit of the materials needed to implement an organizational change, with tailoring instructions—are able to implement that change much more easily and more directly than is possible without such a kit.

The workshop was designed to provide information about the feasibility of, requirements for, and reasonable next steps needed for producing a transition package for requirements management. To make it worthwhile for participants to attend, the workshop was also designed to be an open "benchmarking" [Spendolini 92] experience, where each participant would learn from the lessons of the others in introducing requirements management.

2.3 Prior Technical Work

SEI personnel working to improve technology adoption methods have had some success over the past several years working with customers to develop internal transition packages. Issues and requirements for transition packages were developed while working with the SEPG and the requirements management improvement action team at Xerox Printing Systems Group in El Segundo, California to build a package for internal use. Our work with Union Switch & Signal in Pittsburgh, Pennsylvania to introduce an improved testing process [Mc Andrews 97] indicated differences between smaller and larger organizations in the technology introduction process. A site visit to the Defense Finance and Administration Service in Indianapolis, Indiana helped us to understand successful strategies for rolling out requirements management in a distributed organization. Another site visit to the Navy's Fleet Material Support Office in Mechanicsburg, Pennsylvania gave insight into requirements management introduction in the context of a strong, internally consistent software development process.

Ongoing technical interchange with Hughes has identified key issues related to systems engineering and the use of tools such as the Dynamic Object-Oriented Requirements System (DOORS[1]) to support requirements management. Informal technical interchange with other organizations such as PRC Inc. and SEMATECH has confirmed the need for transition packages and has given insight into how much effort an organization must invest in developing them.

Requirements management (RM) was selected by the SEI as the initial KPA to explore in conjunction with developing the concept of a transition package because of its relative brevity in the Software CMM (SW-CMM). RM has only 3 activities, versus an average of 12 for the other Level 2 KPAs, and this means a narrower change effort for the transition package to address.[2] In addition, the SEI wished to build on its experience collaborating on the development of the transition package concept for requirements management with two organizations.

When participants in the workshop discussed the pros and cons of building an RM transition package first, opinions were varied. Some felt that RM might not be a good place to start because most other Level 2 KPAs (such as software configuration management) are heavily connected to it. Others felt it was a good KPA to begin with because requirements management is addressed early in the improvement plans for many organizations and it has the potential to improve their relationship to their customers.

[1] DOORS is a trademark of Quality Systems and Software, Inc.

[2] Some research in technology adoption issues suggests that the "size" of a technology is a factor in the success of its adoption. Dorothy Leonard-Barton describes size in terms of the number of work units affected by the technology adoption (scope) versus the number of different categories of personnel affected (span). See [Leonard-Barton 1988].

3. Workshop Description

This chapter provides a description of the workshop participants, purpose, and both an overview and a detailed description of the workshop activities.

3.1 Participants

Participation in the workshop was by invitation. All of those invited were expected to have had a requirements management introduction effort underway for several months. Most invitees satisfied that minimum criterion, and about half of them were working to deploy requirements management across a major division or an entire corporation. Participants included 12 people from 8 organizations, 7 SEI staff members from 3 areas, and 2 organizers/facilitators (one from the SEI, one from Process Advantage Technology). Participants came from organizations in Europe and throughout the U.S. (Participant names, addresses, and company names are listed in Appendix A.) The level of knowledge and experience represented in this group contributed to a high level of energy throughout the workshop.

Each participant was asked to present his or her organization's experience in introducing requirements management. In addition, they were asked to bring materials representative of this experience. The diverse backgrounds of the participants, ranging from process improvement consultant to requirements engineering change manager, led to the cross-discipline discussions about these experiences and materials that we had hoped to encourage.

3.2 Workshop Purpose

The major goal of the SEI in hosting the workshop was to understand whether and how transition packages could be developed to be helpful. The participants' goals for attending were to

- learn how other companies have approached improving RM processes
- get reactions to their own approaches from respected peers
- identify RM "best practices" (enabling them to bring a fresh perspective to their clients and the marketplace)
- contribute to the initial formulation of an RM transition package—a potentially high-leverage strategy for introducing technology

The people who attended the workshop were invited because they were experienced in managing change in their organizations. These people know that even if they don't have all the answers, they do know what many of the questions are. With this constituency, the workshop provided a "benchmarking" opportunity, although not in the most rigorous sense of the classic benchmarking process described in *Benchmarking* [Camp 89]. As a gathering of peers who each had something valuable to share with the others, the workshop encouraged integration of each of the participants' experiences into the activities, and informal comparison of both experiences and artifacts. Thus benchmarking was approached as in Spendolini's definition. Spendolini calls benchmarking "learning" and approaches it as a qualitative activity among qualified peers [Spendolini 92].

In the spirit of this style of benchmarking and to accelerate understanding of their respective contexts, workshop participants were asked to describe their organizations and processes. This laid the foundation for future direct benchmarking.

We expected to produce the following from this workshop:

- shared experiences, strategies, and lessons learned while introducing requirements management (as just discussed)
- a definition of "best practice" for application to the introduction of requirements management, with criteria for identifying best practices
- evaluation of a number of artifacts to gain an understanding of how well artifacts brought to the workshop fit the "best practice" criteria
- an extensive list of all of the artifacts that might be included in the transition package and a sequence for their use

Additionally, the workshop attempted to answer the following questions:

- What particular vocabulary and terminology applies to this area?
- Who would want a transition package for introducing requirements management, and why?
- Are there particular issues concerning the packaging, delivery, or use of requirements management transition packages?
- What are the next steps in developing these transition packages?

Accordingly, the workshop was designed to identify the content of transition packages, in addition to strategies and tactics for delivering transition packages, for both internal change agents and for vendors and consultants working from outside organizations. Workshop findings could potentially be applied to transition packages in general and to the requirements management transition package in particular.

3.3 Overview of Activities

The workshop was designed to fit within two and a half days, organized as follows:

- Day 1: Participants from each non-SEI organization made presentations that described their experience with introducing requirements management into their organizations. In discussions following each presentation, participants worked together and moved toward a shared understanding of the transition package concept as a way to view and perform the introduction of requirements management practices.
- Day 2: Working in both small groups and in one large group, participants attempted to understand what might comprise a requirements management transition package. This was carried out through exercises during which participants defined the term "best practice," then applied it to the artifacts they had brought and presented on the first day of the workshop. Then the group extended the list of possible artifacts that might go into a transition package. Finally, they posted the expanded list of artifacts into affinity groups representing an order of use for the artifacts.
- Day 3: Participants identified characteristics of potential customers for requirements management transition packages and described issues those customers might have with supporting, buying, or using the packages. Finally, participants listed possible next steps needed to develop, package, and deliver requirements management transition packages.

3.4 Description of the Workshop Activities

Each of the workshop days is described in more detail in the following sections. Appendix D contains copies of the slides presented on the first day. Refer to Appendices B and C for the data resulting from the exercises on Day 2 and Day 3 of the workshop.

3.4.1 Day 1 (11/11/96)

Day 1 began with introductions, determining expectations, and settling the order of participants' presentations. To give some context for the rest of the workshop, a brief description of the "whole product" concept and the "whole-product wheel"—the technical basis for the transition package concept [Moore 91] was provided.

The morning and afternoon were devoted to presentations by participants from the eight invited organizations. During lunch, in further context setting, the group learned about the practice of process benchmarking and how this workshop might be considered a form of benchmarking. By the end of the day, the participants had gained a shared understanding of their views of requirements management and RM

introduction. After the presentations, the group brainstormed a list of topics to consider for possible discussion over the next day and a half.

3.4.2 Day 2 (11/12/96)

After a brief discussion of the presentations on the day before, we completed two exercises to develop a working set of criteria to identify the "best practices" for RM introduction. We developed this definition: "Best practices are complete, feasible, and appropriate guidelines for executing an activity; [a best practice provides] a common procedure that improves performance efficiently and effectively." The group then developed a number of "best practice" criteria for RM introduction.

After these exercises, some participants were asked to talk about the materials they had brought and presented, and how their materials fit these criteria. This resulted in a dialogue about the possible generalization of tools and documents developed and used by participants that might be of interest to others. This discussion focused the information presented on the first day and gave people a means to discuss more clearly the possibility of sharing and borrowing artifacts.

During lunch an overview of the relationship of the RM KPA to the other SW-CMM KPAs and CMMs was presented. In addition, current activities in the broader area of requirements engineering were briefed.

Participants next developed a list of assumptions about the introduction of requirements management into organizations. Due to time constraints, assumptions were not challenged or tested. Instead, they will be used as a starting list of assumptions to build upon for the RM transition package and, more generally, for the transition package concept.

A requirements management "whole product wheel" (from the co-development activities of Xerox and the SEI in this area[3]) had been described to the group on Monday, and now served as a "strawman" for a working session to identify components of a requirements management transition package. The participants identified artifacts not included in this wheel, but which would be necessary for a robust transition package. These artifacts were posted on a wall chart in an order related to their sequence of use in the introduction of new requirements management practices.

In this activity, participants combined brainstorming and affinity grouping with extensive discussion. Most of the discussion concerned how to organize the artifacts. Ultimately, 136 artifacts in 16 clusters across 8 life cycle categories were nominated for possible inclusion in a requirements management transition package. Appendix C contains the

[3] Xerox and the SEI have a Cooperative Research and Development Agreement to use and evaluate the SEI prototype *Process Change Guide*. The agreement allows for disclosure of jointly created material

raw data from the wall chart exercise, mapped to phases of a generic life cycle and also to the IDEAL[SM] model.

By the end of the day, the group had developed a working vocabulary, and the scheduled session on terminology was canceled. In addition to the term "transition package," the group also used the terms "starter kit" and "blue box" (the group's nickname for a package of shrink-wrapped transition materials similar to those provided with a commercial software package).

3.4.3 Day 3 (11/13/96)

After reviewing the results of the exercises performed the previous day, the group worked on the question, "Who would want a transition package and why?" The result was a list of many different potential users; limited time precluded discussion of why each user would want a package.

Noting that users and customers are not synonymous, participants then developed a list of the customers for a requirements management transition package. Customers were defined as those who would pay for the package.

Discussion of users and customers led to a related discussion about marketing, in particular how to characterize potential customers. The general categories of "finders, minders, and grinders" were proposed, mapping to sponsors, managers, and engineers, respectively (and respectfully). A transition package is used to make a change; therefore, for the primary customers (finders) the first questions are

- *What is the change?*
- *Who needs the change?*
- *Who helps make the change?*

Together, the group members envisioned a requirements management transition package that is given to a change agent (whether that is an individual technology adopter or a manager planning a change for an entire organization) who is responsible for managing the change. That person was identified as the primary customer. The group determined that the transition package should address the primary customer's needs and requirements.

In the next to last session, participants moved quickly through a review of the workshop, gathering ideas about what worked and what did not. Generally, participants felt that the workshop compressed its work into too short a time. They especially wished for more discussion of participants' materials after developing best-practice criteria. The exercise to identify more artifacts and put them in order on the wall chart was frustrating for some participants because of the difficulty of reaching consensus on artifact

[SM]IDEAL is a service mark of Carnegie Mellon University.

categories. Overall, participants felt that this had been a valuable workshop and looked forward to further development of the transition-package concept.

In the final session, participants recommended and briefly discussed “next steps” for RM transition packages and some 39 ideas were proposed. Chapter 5 of this report lists the proposed next steps, organizing them into clusters of possibilities.

4. Data Gathered at the Workshop

The preceding chapter described the results of the individual workshop activities. This chapter contains

- tables that describe the organizations that participated in the workshop
- the characteristics of the materials and support they used to introduce requirements management
- the artifacts they brought to the workshop
- a matrix of likely artifacts to be included in a transition package

4.1 Organization and RM Process Profiles

Tables 1 and 2 contain descriptions of the organizations that participated in this workshop in terms that may help us understand the context of requirements management for each of them, revealing the organizational context for introducing technology-based change and RM in particular. This context may help in designing future workshops to gather new or confirming information.

Because formal benchmarking was not the purpose of this workshop, we did not provide guidance for participants to collect their data and prepare their reports consistently. Therefore, the terms, abbreviations, units of measurement, and acronyms used in the table data are not consistent and, in many cases, were not defined by their contributors. However, this data does help us understand the differences, local cultures, and priorities of the participating organizations.

As indicated by the information in these tables, participants came from a mix of organizations—from small to large, from distributed to localized, and from diverse user communities to focused, specific user communities. Participants also hailed from different markets, ranging from commercial to government and the military. Note that in some cases, for example KPMG Peat Marwick, the information provided is representative only of certain programs and/or clients, not the entire organization.

A list of the attendees representing each of these organizations is included in Appendix A.

Table 1: Organization and RM Process Profiles, Part 1

RM Characteristics	Aimware, Ltd.	Hughes Aircraft Company	KPMG Peat Marwick	Naval Oceanographic Office
Industry	software	military, aerospace, commercial	federal / military	military
Type of product	software engineering database	electronics	large application systems	environmental prediction SW systems
Length of product life	new release each 6 months	weeks to decades	approx. 10 years	one year
Organization size	8	40000	Govt.= 200, prime contractor = 300	60
Levels of management	2	6	multiple govt. levels	2
Size of applications	current code base = 30 MB	varies	varies	450K - 40 applications
Size of user community	900	very large	50000	Navy fleet, other DoD users
Characteristics of user community	software engineering groups	defense and commercial	split user base with differing expertise	Navy spread throughout world and at sea
Size of req'ts supplier community	5 organizations	no	same as user community	1. fleet (70), want user friendly with few key strokes 2. command headquarters (10), requirements are vague 3. oceanographer of Navy (5), requirements are vague 4. R&D transition (15), very R&D oriented - software with lots of built-in flexibility 5. internal ideas (50)
Characteristics of req'ts supplier community	SEPGs	diverse	same as user community	various
Requirements type (market-oriented, contractual)	market = 50%, contractua = 50%	market-oriented and contractual	contractual, system, functional	new capabilities, upgrades in existing capabilities
Number of req'ts supported	1000	not provided	thousands: 50,000 function points	300 change request forms/project release
RM introduction steps	PDCA	not provided	CMM training, req'ts doc's reviews, re-use POS	currently deriving

Table 2: Organization and RM Process Profiles, Part 2

Company & RM Characteristics	PRC	Texas Instruments	Thomson CSF	United Defense
Industry	system integration- mostly govt. oriented	Various—semiconductors, defense, digital imaging, software, calculators, notebook computers	THICKS	Defense
Type of product	Info systems- e.g., automated patent system, weather systems, criminal justice	Semiconductors, software productivity tools, mobile computing products, consumer electronics products, electrical controls, and metallurgical materials	professional electronic	tracked ground vehicles
Length of product life	9 mos. to multi-years dev't & maintenance	weeks to decades	0.5 to 5 years	20 years
Organization size	5600	Approximately 60,000 employees world-wide	37,000 ppl—4600 SW engineers	60 engineers
Levels of management	4 plus	4 plus	5 to 6	no
Size of applications	all sizes < 12 to??	varies	50 KLOC to 2,000 KLOC	1 MLOC
Size of user community	various	customers world-wide	government administration -> training course -> implementation	Army
Characteristics of user community	various	varies	Administration, Ministry of Defense	distributed
Size of req'ts supplier community	various	varies (1 to thousands)	1 to 50 people; average ~5	2
Characteristics ofreq'ts supplier community	various	various	various	yes
Requirements type (market-oriented, contractual)	marketing, contractual	market-oriented, contractual, enhancement requests	enhanced	contractual
Number of requirements supported	50 to 20K	varies widely (less than 10 to thousands)	200 - 3000 system req'ts allocated to software	1700
RM introduction steps	various	tailored to the organization and domain	best-practices -> guidelines -> training course -> implementation	various

4.2 Characteristics of Artifacts and Materials

Tables 3 and 4 show some characteristics of the materials and support that workshop participants use when introducing RM into their organizations. The range of materials and formality for all of the categories shows that all the components in a transition package will need to be flexible and tailorable, and some will be optional.

Table 3: Artifact & Support Characteristics, Part 1

Artifact & Support Characteristics	Aimware, Ltd.	Hughes Aircraft Company	KPMG Peat Marwick	Naval Oceanographic Office
Templates and examples of plans	yes	no	configuration management plan, release plan	charter, tactical action plan
Process model and guide for RM	SEI operational Framework , SR-007	Hughes built, based on CMM and P1220		deployment chart & ETVX
Education and coaching materials for sponsors	not needed!	ad hoc	change management training	meeting minutes, project status mtgs. w/ mgt., mgt. sponsor for each TWIG.
Document examples, templates and guidance	yes	no	provided	CSCI SRS-Mil-Std-498 DID
Annotated bibliography	no	no	no	no
"Sales" briefings for RM	not used! used workshop instead	yes	no	mgt. briefs dept.
Requirements and specifications for training	no	some	no	compiling notes for RM departmental (based on FASTRAK & Alan Davis' book, *Software Requirements*)
Criteria for selecting subject matter experts and vendors	no	no	functionally organized, chosen by user representatives	can relate and directly apply their expertise to your organization
Subject matter expert list	no	some	no	FASTRAK, Dave Close; Union Switch & Signal; David Maibor Associates- Military Standards
Consulting scenarios	search conference	some	no	consulting with FASTRAK
Strategies for adapting to different domains	no	no	no	divide responsibilities for defining req'ts, scientist defines req'ts in functional terms & describes math and physics in standard mathematical notation, coders define design constraints; scientist does operational testing , user support, req'ts elicit.
Training selection& customization criteria	no	not yet	yes	workshops
Tool selection, customization,& installation guidance	internal tools	no	RTM tool	no
Reprints of commonly cited reference papers	yes	no	no	Crosstalk - Requirements Traceability article - Air Force

Table 4: Artifact & Support Characteristics, Part 2

Artifact & Support Characteristics	PRC	Texas Instruments	Thomson CSF	United Defense
Templates & examples of plans	Yes, SPIP action plans	In some organizations	Yes - company restricted but can show	yes
Process model & guide for RM	Yes, corporate and tailored for RM processes	yes	Yes - company restricted but can show	yes
Education & coaching materials for sponsors	2 yr. executive sponsor status review (ESSR), tech. Seminars, courses in managing quality improvement, SW process improvement, briefings	High level requirements engineering briefing	yes - company restricted but can show	yes
Document examples, templates & guidance	PRC policies, systems integration manual - SRS DIDs, sample RM databases	In some organizations	Yes - company restricted but can show	yes
Annotated bibliography	Yes - from SEI	yes	Yes - company restricted but can show	no
"Sales" briefings for RM	no - not particular for RM, lots for general SPI	yes	no	no
Training req'ts & specs	yes - training dev't process collects training req'ts	In some organizations	yes	no
Criteria for selecting SMEs and vendors	no - not particular for RM, lots for general SPI	In some organizations	yes	no
SME list	for some KPAs, not RM	Yes, for internal contacts; also have requirements working groups and requirements interest groups with group message address	no	FASTRAK, Software Systems Quality Committee (SC2C), Brian Lawrence, Performance excellence, Davis Systems
Consulting scenarios		Included in general consulting training	yes	several: writing training
Strategies for adapting to different domains	only conceptual	Some guidance on methods appropriate for various situations	yes	yes
Training selection & customization criteria	tried this; didn't work	Pointers to available training for requirements engineering	still in work	no
Tool selection, customization, and installation guidance	selection criteria, vendor list	Some organizations have groups to do this	can make a copy of ours	no
Reprints of commonly cited reference papers	included as appendices to training material	Pointers to these as well as web page links to key requirements sites and sources on the Internet and internal web pages[4]		yes

[4] TI reports that it is moving to a more web-based approach and organizations have software-oriented Process Asset Libraries.

4.3 Inventory of RM Artifacts Brought and Displayed

The following list shows artifacts that participants brought for presentation and discussion. We did not attempt to log every artifact, and some artifacts were brought by participants but were not displayed or discussed. This log shows the variety of examples and templates that are available to share and build on.

Inventory of RM Artifacts Brought and Displayed

Aimware, Ltd.
Trispin Case Study

Hughes Aircraft Company
DOORS at Hughes, user's reference
DOORS at Hughes, administrative guide
DOORS at Hughes, Primer
Successful vendor collaboration deploying a requirements management tool
Computer Aided Sub-Processes (CASPS): Getting Process and Tools into Operational Use
Outline of 3-day requirements class
Example of RM CASP
Presentation: Using DOORS for Requirements Management
Presentation: Requirements Management Using DOORS
Teaching the Elephant to Manage Requirements (Adopting Process & Tools Across the Organization)

KPMG Peat Marwick
SEI CMM assessment report
"change agreement" reports
RTM tool description brochure
RCAS CM board charter
Materials for requirements prioritization assistance conference
RCAS configuration management plan
RCAS Operational Concept Description

Naval Oceanographic Center
Requirements Management TWG: charter, plan, minutes, schedule, as-is report, to-be process, schedule, metrics
draft software process definition guide
IDEF RM description
Union Switch & Signal presentation materials, including charters, quality tools

PRC
article on process reuse
Phoenix SPA Reference Guide
Process DID
PAL: Live phone link

Texas Instruments

Video tapes, scripts and other materials for: "Introduction to Software Requirements Elicitation" and "Introduction to Software Requirements Engineering" which were jointly copyrighted by Texas Instruments and the Software Engineering Institute

Journal: "Requirements Engineering" 1.1

Journal description brochures

TechNote: "Requirements Engineering," which included the following:

- *Definition of "requirement"*
- *Characteristics of "good" requirements*
- *Types of requirements*
- *Selected requirements bibliography*
- *Contact list*
- *Available training*
- *Information about an internal Technical Interchange on requirements and how to receive the videotaped proceedings*

Requirements working group materials

Thomson CSF

Presentation materials

United Defense

minutes of meetings
Processes & procedures
pcr for requirements
policy
sponsor letter
performance appraisal factors
organization chart
accountabilities matrix
reading list
brochures
SPI implementation plan

4.4 Proposed Artifacts for RM Transition Packages

Table 5 shows the names of all artifacts proposed for possible inclusion in an RM transition package. (The complete chart is contained in Appendix C.) This version shows a number of attributes for each name, including possible mappings to the IDEAL cycle, to a generic life cycle, and to group names for the different artifacts. The "Groupings" column contains subheadings for affinity groups of artifacts within or across the generic life-cycle phases. For example, "planning support" describes artifacts used during the generic life-cycle phase "plan" as well as artifacts used later, for example, during "design" to develop the plan for the pilot project.

This list is a starting point for developing a comprehensive inventory of components for a requirements management transition package.

Table 5: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Abridged)

Artifacts Grouped and in Sequence by Life-Cycle Phase

Generic Life-Cycle Phase	IDEAL	Groupings	Artifact
Plan	Leverage	Motivation & support	support: human aspects, rewards, ownership
Plan	Leverage	Motivation & support	goals
Plan	Leverage	Motivation & support	motivation: Why should this be done?
Plan	Initiate	Motivation & support	management sponsorship
Plan	Establish	Planning support	project plan
Plan	Establish	Planning support	charter/tactical activity, plan deriving
Plan	Diagnose	Planning support	process model: how to introduce the process
Plan	Diagnose	Planning support	risk of package & process
Plan	Establish	Standards & policy	policy: waivers/deviation policy
Plan	Establish	Standards & policy	policy: how to change & approve
Plan	Establish	Standards & policy	policy: exception policy
Plan	Establish	Standards & policy	policy: policy standard
Plan	Establish	Standards & policy	standards
Plan	Initiate	Standards & policy	policy standards and the associated process to develop and introduce the policy (define the role of the sponsor)
Plan	Establish	Team support	guidance on who should be on team
Plan	Establish	Team support	team charter
Plan	Action	Team support	team building
Plan	Action	Team support	prerequisites - management-approved team members & time commitment
Plan	Action	Team support	roles & responsibilities
Plan	Diagnose	Team support	problem-solving strategy (e.g., as is)
Plan	Diagnose	Diagnostics	assessment report - e.g., internal process improvement (IPI) report
Plan	Establish	Diagnostics	situation assessment: project priority vs. process priority
Plan	Initiate	Diagnostics	case study
Plan	Initiate	Communication support	conference materials
Plan	Establish	Communication support	meeting minutes
Plan	Action	Communication support	facilitation (description of what, when, how)
Req'ts	Diagnose	Directions	document (input) lessons learned
Req'ts	Initiate	Standards & policy	requirements from standards (CMM, SE-CMM, ISO)

Artifacts Grouped and in Sequence by Life-Cycle Phase

Generic Life-Cycle Phase	IDEAL	Groupings	Artifact
Req'ts	Initiate	Standards & policy	guidelines for working groups, interest groups
Req'ts	Establish	Standards & policy	policy: cost value criteria for decision-making board(s)
Req'ts	Establish	Directions	roles and responsibilities of RM, magmata. domain expert
Req'ts	Establish	Directions	documentation list of relevant domain experts
Req'ts	Establish	Role definitions	support: process champion
Req'ts	Establish	Role definitions	support: internal consultant
Req'ts	Establish	Role definitions	support: game integration plan
Req'ts	Establish	Planning support	training required
Req'ts	Establish	Standards & policy	training: methodology
Req'ts	Establish	Standards & policy	documentation selection criteria for domain experts
Design	Establish	Standards & policy	policy: requirements control board charter
Design	Establish	Requirements	customer requirements
Design	Establish	Planning support	quality assurance recommendation
Design	Establish	Directions	guideline
Design	Establish	Directions	procedure
Design	Establish	Directions	standard
Design	Establish	Directions	process model: process description and guide
Design	Establish	Directions	requirements review template
Design	Establish	Requirements	requirements from user
Design	Establish	Standards & policy	document checklists for practice
Design	Establish	Directions	software requirements specification review checklist
Design	Establish	Standards & policy	documentation - operating instructions template
Design	Establish	Planning support	process model: RM program manager's plan
Design	Establish	Directions	change request form
Design	Establish	Directions	change request database
Design	Establish	Directions	training: education and coaching materials for all sponsors
Design	Establish	Directions	training: training selection and customization criteria
Design	Establish	Directions	training: how to tailor
Design	Establish	Directions	document tailoring guidance per domain (loose definition of)
Design	Establish	Standards & policy	workshop guidelines
Design	Establish	Standards & policy	information technology - tool-selection criteria
Design	Establish	Directions	tools
Design	Establish	Directions	tool evaluation reports
Design	Establish	Directions	tool descriptions
Design	Establish	Standards & policy	document output (artifact) templates
Design	Establish	Directions	document requirement traceability matrix
Design	Establish	Directions	other: requirements and change metrics reports
Design	Establish	Directions	documentation, measurement templates for RM
Design	Establish	Directions	threshold measures
Design	Establish	Directions	baseline measures
Design	Establish	Directions	measurements

Artifacts Grouped and in Sequence by Life-Cycle Phase

Generic Life-Cycle Phase	IDEAL	Groupings	Artifact
Design	Establish	Directions	metrics
Design	Diagnose	Standards & policy	traceability matrix to CMM
Design	Establish	Directions	document: metrics templates
Design	Establish	Standards & policy	examples of indicators for RM according to stability/instability scenarios, type of process, type of commitments with SE people for defining "allocated requirements"
Design	Diagnose	Standards & policy	process integration: link to other KPA process architectures
Design	Diagnose	Standards & policy	process integration: link to other KPAs
Design	Establish	Standards & policy	process integration: interfaces to other procedures
Design	Establish	Directions	process model: X-reference between transition package elements & local organization command media
Design	Establish	Standards & policy	information technology—compatible document formats
Design	Establish	Directions	information technology—common connectivity for communicating
Design	Establish	Planning support	pilot & roll out plans scenarios
Design	Establish	Directions	documentation list of solution component sources
Design	Establish	Directions	document samples
Design	Establish	Directions	documentation: operational concept description
Design	Establish	Directions	example use of the RM transition package (documentation)
Design	Establish	Directions	document: 1-page definition for proposals
Design	Establish	Directions	documentation materials & job aids for user types
Design	Establish	Directions	job aids, checklists, templates, surveys
Implement	Establish	Pilot plans	pilot and roll-out plans: symbolic acts by managers
Implement	Establish	Pilot plans	pilot and roll-out plans: operational strategy, check and balance
Implement	Establish	Pilot plans	pilot and roll-out plans: communication strategies
Implement	Establish	Pilot plans	pilot/roll out plan schedule to roll out for project manager
Implement	Establish	Training	training tools
Implement	Action	Training	training: process training for users and other affected groups
Implement	Action	Training	training: brown bag presentations (modular)
Implement	Action	Training	document/training: introduction material
Implement	Action	Training	videos
Implement	Action	Training	support: external consultants
Implement	Establish	Samples	"DIDs": documentation, document templates with instructions for completing
Implement	Establish	Samples	commitment form (standard), between the PM, the Software PM, and the "chef de service" (European term for lead technical person)
Implement	Establish	Samples	communications: charts, templates
Implement	Establish	Samples	requirements test criteria
Implement	Establish	Samples	commitment forms
Implement	Action	Samples	change agreement reports
Integrate	Establish	Transition tools	document: change agent handbook, checklist

Artifacts Grouped and in Sequence by Life-Cycle Phase

Generic Life-Cycle Phase	IDEAL	Groupings	Artifact
Integrate	Establish	Transition tools	transition package
Integrate	Establish	Transition tools	process integration—links to other models (e.g., ISO 9000, SE-CMM)
Integrate	Establish	Transition tools	link to other KPAs: with configuration management for RM Activity 3
Integrate	Action	Deployment tools	pilot/roll-out testimonials from "first victim" for roll-out events
Integrate	Establish	Deployment tools	documentation: reprints of standard references
Integrate	Leverage	Deployment tools	documentation: cost/benefit analysis and related briefings
Integrate	Action	Deployment tools	documentation: sample agenda for periodic senior manager reviews
Integrate	Action	Deployment tools	documentation: primer & frequently asked question (FAQ)
SRS template	Action	Deployment tools	software requirements specification template
Integrate	Leverage	Deployment tools	information technology: process implications for using specific tool or method
Integrate	Action	Tool support	tool administration
Integrate	Action	Tool support	tool documentation
Integrate	Action	Tool support	tool descriptions
Integrate	Action	Tool support	toolsmiths
Integrate	Establish	Tool support	RM tool environment set up
Integrate	Establish	Tool support	information technology: RM tool implementation plan & procedure
Integrate	Establish	Tool support	tool executables
Integrate	Action	Tool support	RM tool tailoring support
Verify	Action	Evaluation tools	performance appraisal forms
Verify	Establish	Evaluation tools	introduction effectiveness measures
Verify	Establish	Evaluation tools	senior management review record
Verify	Action	Evaluation tools	project manager review record
Verify	Action	Evaluation tools	Software Quality Assurance review record
Lessons Learned	Leverage	Experience reports	Public relations for (good) results
Lessons Learned	Action	Experience reports	documentation: annotated bibliography
Lessons Learned	Leverage	Experience reports	risks of package & process
Lessons Learned	Leverage	Experience reports	lessons learned
Lessons Learned	Leverage	Experience reports	experience reports
Lessons Learned	Leverage	Experience reports	pilot/roll-out case studies with critical success factors
Lessons Learned	Leverage	Experience reports	success stories

Artifacts Grouped and in Sequence by Life-Cycle Phase

Generic Life-Cycle Phase	IDEAL	Groupings	Artifact
Lessons Learned	Action	Media	information technology Web page "newsletter"
Lessons Learned	Action	Media	technology notes to newsletter

5. Proposed Next Steps

This "next steps" exercise in the workshop yielded insight into problems that participants anticipated for the development of an RM transition package. Countermeasures to address these problems and risk areas were also proposed. The ideas and advice can be grouped into six "clusters" of concern:

1. *How can we identify the users of a transition package and determine the real user needs?*
2. *How can artifacts, samples, examples, etc., be collected or developed and tailored for use?*
3. *What strategies for developing and distributing the package will work best, including proposals for types of packages (maybe even non-RM specific packages)?*
4. *What are the ways that participants can continue to work together and what can be done first?*
5. *What should the scope of the package be and how should appropriate expectations be set?*
6. *What are the business-related concerns?*

The full list of suggested next steps is provided in Appendix B. Each of the clusters just noted is elaborated briefly below.

5.1 Users and User Needs

The issues raised dealt with determining who the users of the RM transition package are. Participants suggested that those taking part in the workshop might not be typical users of an RM transition package, or might not represent a complete set of user types. One participant suggested that the workshop participants might, in fact, be atypical, because they were largely change agents in a leadership role in their organizations. They may even be considered "early-adopter" change agents given their interest in the concept of an RM transition package. Another suggested that a different mix of people might produce quite different findings. Finally, there were recommendations on how to determine who the users really are:

- perform a survey
- capture what potential users currently are doing by creating an "as-is" process description
- use materials created in the workshop (such as the wall chart) as the basis for discussion of needs with prospective users

5.2 Artifacts, Samples, and Examples

Comments in this cluster related to the value of examples and how to organize them. Another theme was the need to sanitize examples to protect proprietary interests or identities before organizations would donate them. There was considerable discussion regarding the specific artifacts and samples that would be required in a transition package and, more importantly, how those artifacts could be grouped and presented most effectively. Finally, there was a proposal that all examples carry a warning to users about the risk that some users may not be careful in how they adapt examples and that some of those contributing examples may not be able to describe their context adequately.

5.3 Strategies for the Package

This collection of comments mixed strategies for building the package with strategies for designing it. During the workshop, the RM transition package was informally dubbed the “blue box,” from the envisioned notion that a shrink-wrapped “blue box” might arrive on a user’s desk. Considerable discussion ensued once this image was presented. Would the blue box arrive alone, with a consultant, with a hot line, accompanied by training, etc.? Would it contain an integrated solution, or a set of components that the user could configure as desired? What skills would the user need? Comments in this cluster reflect some of the flavor of that discussion. Some additional discussion suggested that transition packages might be built at the software process improvement level rather than the key process area level, or that even at the KPA level, the package need not be specific to RM. Most participants seemed to prefer the RM-specific focus for the package. Again, as earlier, the risk was raised related to adapting the package or its components. How would users need to adapt it to be successful? What is the minimum set of materials and components needed?

5.4 How to Work Together

Some participants considered and suggested the ways and means of working together to create an RM transition package. The following issues were raised:

- *Should it be built by the community, as with the Systems Enginee ring Capability Maturity Model?*
- *Should it be built by a small working group?*
- *What role should the SEI play?*
- *What are the risks of a working group building the transition package, versus a single organization?*

There was a lack of consensus on a framework within which to construct the package and a suggestion was made that smaller groups—each organized around a single model—should work together at the next workshop to address this.

5.5 Setting Scope and Expectations for the Transition Package

This cluster was quite simple and pragmatic in its suggestion that the scope of any RM transition package should be carefully and narrowly defined. However, there were suggestions to be sure to set RM in the context of systems engineering and requirements engineering. A theme here seemed to be that scope would constrain collaborators, as might be expected. Some might prefer a narrower scope; some a much broader one.

5.6 Business-Related Concerns

Befitting a group of savvy change agents, participants made a lively series of suggestions on how to position an RM transition package to engage collaborators and those funding the transition, including mention of the need to make clear the selection criteria up front. Participants noted that only one member of the vendor community for tools and services related to SPI (software process improvement) was represented at the workshop and suggested that discussions be held with vendor organizations as potential collaborators. The need for an almost immediate follow-on workshop was argued, with the suggestion that the next one might be held in conjunction with the SEPG 1997 conference.

6. Workshop Results and Conclusions

The SEI supports and expedites the transfer of emerging software engineering technologies. More frequently, in attempting to fulfill its mission to advance the state of the practice of software engineering, the SEI facilitates the broad introduction of best (or better) practices into the software engineering community. The goal of this work is the improvement of the general quality of software-intensive products. More specifically, in working to improve technology adoption, SEI teams have collaborated with organizations (such as Xerox and Hughes) that are performing internal process improvement. In these efforts, there has been some success in building prototype proprietary transition packages. In other organizations, similar approaches have been used to introduce software engineering methods, tools, and processes [Strauss 94, Grady 87].

Despite these experiences, the transition package concept is not yet clearly defined or explicitly applied in more than a few organizations. We are still very early in exploring the application of transition packages, and need to learn the requirements of potential customers and users of the packages. With this goal in mind, the SEI invited 18 experienced practitioners to this workshop to evaluate the concept of a transition package as a way to improve the odds of success in adopting requirements management processes and tools. They were also to evaluate the hypothesis that a transition package can enable organizations to achieve the objectives of Software CMM level 2 in requirements management much more rapidly than is currently the case [Hayes 95].

As we anticipated in planning the workshop, convening a group of experienced change agents from one context—process improvement in the context of the Software CMM—expedited communication and allowed the participants to focus on issues and ideas. The benchmarking approach to the workshop, which allowed sharing of artifacts and explicit, albeit uneven, descriptions of organizational contexts, promoted lively interchange. Many artifacts were informally distributed by participants to each other. The “whole product” concept [Moore 91], sketched briefly early in the workshop, provided a foundation model for a requirements management transition package.

As shown in the comments of the “next steps” materials (Chapter 5), most participants agreed that a transition package for requirements management (and other technology areas as well) made sense, and was a viable, if somewhat risky, venture to attempt. Almost all comments focused on *how* to build the package, rather than *whether* to build it.

We conclude that building a requirements management transition package prototype is an important and urgent task. The “early adopters,” and early “early majority” populations [Moore 91, Rogers 95] of organizations in the software engineering community have reached Software CMM Level 2 by using their internal resources and capabilities to build transition package-type solutions on their own. Later “early-majority,” and “late-majority” populations are more risk averse and prefer codified solutions at lower cost. With transition packages available as a commodity that contains the materials necessary to implement the capability of a CMM KPA, the rest of the software engineering community will also be successful.

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Appendix A: Correspondence to Participants and List of Participants

Correspondence began with an initial announcement, shown in Section 1 of this appendix. People who expressed an interest were screened based on their experience with introducing requirements management into their organizations and, if interested, were sent an initial invitation, described in Section 2 of this appendix. Those people who committed to attending the workshop were sent email (described in Section 3 of this appendix) with details concerning the workshop and what they were expected to do to prepare for the workshop. Section 4 of this appendix contains the detailed list of participants.

1. Original Announcement of Investigation Into the Area

Following is the original notice that was distributed on the Software Process Improvement Network, an international, electronic distribution list of software engineering process groups (these groups facilitate internal technology adoption related to software process improvement based on the CMM and ISO).

> From: Dawna Baird on Thu, Sep 19, 1996 6:08 AM
> Subject: Request for Information
> To: spin.;@SEI.CMU.EDU
>
>
>
> Subject: Has your organization had recent experience introducing requirements
> management processes, methods, and/or tools?
>
> If you have had recent experience (in the past 6 to 12 months) getting
> requirements management processes (plus tools, methods, policies, etc.) in
> place, in the context of the Software CMM, please let me know. We areplanning
> a small workshop in November to tap experience on behalf of the community,
> and to understand it and frame it as a technology adoption activity so that we
> can codify the experience for others. (You may have heard this referred to as a
> "transition package".)
>
> Please contact me by phone or email, no later than October 18, 1996.
>
> Thanks!
>
> Priscilla Fowler
> Software Engineering Institute
> (412) 268-7748
> Fax (412) 268-5758
> pjf@sei.cmu.edu
>

2. Initial Invitation to the Workshop

Each invitee was screened informally by telephone to be sure that they met the participation criteria. They and their organization needed to be well along in the process of implementing requirements management practices. If they passed muster, they were sent a variant of the following letter.

Subject: Please plan to attend the SEI RM Workshop

Hello:

It was a pleasure speaking with you just now, and as discussed, here's the letter of invitation to the workshop. You should get a version on letterhead later today. --Priscilla

Dear <name>,

The Software Engineering Institute is hosting a small workshop on the introduction of requirements management practices and technology. We are inviting 20-25 expert practitioners to share experiences, strategies, and lessons learned gained while installing methods, tools, and processes for managing requirements for software-intensive products and systems or information systems. A guidebook, and tentatively a web site, will be developed reflecting the composite of best practices presented at the workshop, and all contributors will be acknowledged, as will their organizations.

We invite you to join us and present your experiences introducing requirements management processes to the components of your Program. We believe workshop participants will want to hear how you have moved this program from a less successful to a highly successful approach to RM. Please describe the program context as well as some of the issues of reconciling the requirements of the different segments of the organization that the Program is supporting. Transforming the operational requirements to task orders in contracts is an area that should be interesting as well. Please invite one or two colleagues who represent perspectives in this work that are complementary to yours, if you think this is appropriate.

[logistical details, omitted]

Best regards,

Priscilla Fowler
Team Leader, KPA Transition Packages
Transition Enabling Program

ATTACHMENT: Requirements Management Transition Packages

The SEI believes software organizations can achieve the objectives of the Software-CMM Key Process Areas faster by using KPA Transition Packages. KPA Transition Packages are "whole products" that can provide the "how to" for the introduction of software engineering methods, tools, and processes. A whole product consists of a core technology (such as a software quality assurance process or requirements management process) and all the components that support moving an organization from non-use to routine, everyday use. These include process models and guides, training that's ready to customize, scenarios for consulting support to project and individual customers, document templates, and more.

Creating these components is labor-intensive and may be difficult for people on change teams such as Software Engineering Process Groups and Process Action Teams (PATs) or Technical Working Groups (TWGs). Members of these teams often have excellent problem-solving and other technical and management skills, but may not have had experience applying these skills to the process of managing change.

In addition, many PATs and TWGs reinvent the implementation of Software Process Improvement. They create process models of (and project plans for) the introduction of KPA-related change (including practices, procedures, methods, tools, etc.). They recreate documents needed for enacting KPAs such as estimating forms, tracking logs, and project plans.

Readily-available examples of documents such as IEEE standards or textbook examples are often too general or high-level for direct use in a practical setting. People want real-world examples and guidance for tailoring these, to save time and to build on lessons learned elsewhere. In sum, people doing software process improvement need an integrated set of materials from a reliable source for meeting the objectives of a KPA.

Collectively, the software engineering community has most of the components of KPA Transition Packages, but individually, even leading edge organizations may each have 50% or less. To determine whether this is true, we will be building a proof-of-concept Transition Package for the requirements management KPA. ("Transition Package" is the working label.)

The RM KPA Transition Package will combine best practices from participating organizations, and will contain guidance on adapting it for the user's organization. It will be published in 1997 as a guidebook and/or web site, acknowledging those who contribute as individuals and as organizations.

We anticipate large companies will tailor the package to suit, and that vendors may add their own spin to the package and sell commercial versions or use the package in conjunction with consulting activities. We aren't yet sure how very small organizations will be able to use the packages, although we have some ideas about how to work this issue.

Work on this project is already under way on a number of levels. Early work with Xerox to create an internal requirements management Transition Package has helped identify issues and requirements. Work at Union Switch & Signal in a different technical area, testing, showed up differences between smaller organizations and larger ones in the technology introduction process. Site visits to the Defense Finance and Administration Service and the Navy's Fleet Material Support Office during August helped us to understand successful Requirements Introduction strategies in experienced organizations. Ongoing technical interchange with Hughes has identified key issues related to systems engineering and the use of tools to support requirements management.

Based on these experiences, and earlier work at the SEI on systematic methods for technology introduction, we believe that an RM KPA Transition Package should include these components:

- steps for introduction of RM and guidance on executing the steps
- templates and examples of plans for introducing RM into one or more organizational units
- process model and guide for doing RM
- education and coaching materials for sponsors
- document examples, templates and guidance, e.g. for policies or a software requirements specification
- annotated bibliography
- "sales" information and briefings for the RM action team to use for buy in
- requirements and specifications for training or orientation for all participants
- criteria for selecting subject matter experts and vendors
- subject matter expert list, with contact information (list does not imply endorsement)
- vendor list, with contact information (list does not imply endorsement) cost/benefit analyses and related
- consulting scenarios (how to help projects adopt)
- strategies for adapting these approaches to different domains such as information systems, embedded systems, and software products
- training selection and customization criteria
- tool selection, customization, and installation guidance
- reprints of commonly-cited reference papers

ATTACHMENT: WORKSHOP ON INTRODUCING REQUIREMENTS MANAGEMENT INTO ORGANIZATIONS

A small group of expert practitioners are invited to share experiences, strategies, and lessons learned while installing methods, tools, and processes for managing requirements for software-intensive products and systems or information systems. The Workshop on Introducing Requirements Management into Organizations will be held at the Software Engineering Institute November 11-13, 1996, in Pittsburgh Pennsylvania. A guidebook, and tentatively a web site, will be developed (targeted for publication in 1997)

reflecting the composite of best practices presented at the workshop, and all contributors will be acknowledged, as will their organizations.

Participants in the workshop will have the opportunity for intensive benchmarking in the area of requirements management, and will take away strategies for effective introduction of requirements management processes, methods, and tools.

The agenda will include presentations by participants, facilitated working sessions, and evening special interest group meetings. Participants will directly influence the design of the requirements management Transition Package (see description in Attachment) as they work to determine the most useful set of components. Participants will also have the opportunity to contribute materials to the Package, and to provide review during its development.

3. Email Confirming Participation

Those people who committed to attending the workshop were sent this email:

Dear ...

Thank you for agreeing to participate in the SEI Workshop on Introducing Requirements Management Into Organizations November 11-14. This email will provide you with the information you need to register and prepare for the workshop.

PRESENTATION MATERIAL

Please plan to present your work with emphasis on the areas called out in your invitation letter. Because participants will come from many different business and government domains, you may want to spend a few minutes at the beginning of your presentation providing context. There are suggestions on this, courtesy of a colleague of mine, Mac Patrick, who does benchmarking for a living! These are appended below.

*The core of what you present should be a description of how you *introduced* practices, methods and tools to your organization. For example, did you do training, and if so, for whom, and at what point? Did you prepare an overall introduction plan? How did you document and maintain your RM process? Again, there are further suggestions below.*

Please plan to speak for about 20 minutes. There will be another 5-10 minutes allocated for clarification and brief discussion after each presentation. We are keeping formal presentations very brief to allow participants time in working sessions, and to review materials on exhibit (see next item). If you wish to have us make copies of your presentation to hand out, we can do so if we receive a master by November 5. Otherwise, please bring 25 copies with you, three-hole punched, so that participants can insert a copy into their workshop binder.

MATERIAL TO EXHIBIT

We plan to set up an area where participants can display examples of materials they discuss in their presentation. Those who are willing to share copies of these materials with the SEI and the workshop participants can do so at their convenience. We are unable to accommodate preparation of nondisclosure agreements so please don't bring material that is proprietary or sensitive. See the checklist appended for items that may be of interest to participants.

[Shipping/administrative information omitted]

REGISTRATION

[Registration information omitted]

ATTACHMENTS:

1. Suggestions for providing context.
2. Suggestions for describing how you introduced RM processes, methods, and/or tools.
3. Suggestions for materials to exhibit.

ATTACHMENT 1: SUGGESTIONS FOR PROVIDING CONTEXT

You can provide as much as possible of the following information as part of your presentation or as a handout:

1. nature of your organization
2. type of product or system you build?
3. length of life for products- time between major product introductions or revisions?
4. size of the organization, managers / practitioners?
5. number of levels of management responsible for development?
6. size of applications supported by their requirements, in lines of code, total head count, function points, or any other common measure?
7. size and characteristics of your user-community, both requirements suppliers and product users?
8. where you get your requirements: from a marketing organization looking for business opportunities? from a customer in the form of a statement of work or RFP? from another part of your organization as a change request?
9. number of requirements supported

ATTACHMENT 2: SUGGESTIONS FOR DESCRIBING HOW YOU INTRODUCED RM PROCESSES, METHODS AND/OR TOOLS

1. Describe the "before" and "after" situations, using any time frame that makes sense

2. Describe what you had to develop or adapt internally, including any or all of these:

- steps for introduction of RM and guidance on executing the steps
- templates and examples of plans for introducing RM into one or more organizational units
- process model and guide for doing RM
- education and coaching materials for sponsors
- document examples, templates and guidance, e.g. for a policies or a software requirements specification
- annotated bibliography
- "sales" information and briefings for the RM action team to use for buy in
- requirements and specifications for training or orientation for all

participants
- criteria for selecting subject matter experts and vendors
- subject matter expert list, with contact information (list does not imply endorsement)
- vendor list, with contact information (list does not imply endorsement) cost/benefit analyses and related
- consulting scenarios (how to help projects adopt)
- strategies for adapting these approaches to different domains such as information systems, embedded systems, and software products
- training selection and customization criteria
- tool selection, customization, and installation guidance
- reprints of commonly-cited reference papers

3. Describe what you had to buy, including either products or services; you can refer to the list in 2 above for this as well.

4. Keep in mind we are trying to compare experiences related to time and nature of effort, and costs in introducing RM

ATTACHMENT 3: SUGGESTIONS FOR MATERIALS TO EXHIBIT

Anything identified as something you have developed or adapted, per the list in Attachment 2, would be of interest. Also:

- meeting minutes that show how membership in working groups or action teams changed over time, what topics were considered, etc.
- reports on expenditures of effort and funds
- tool demos (please let us know requirements if you aren't bringing everything you need on a lap top!)
- anything quantitative in the form of reports on effort, progress, impact of improved RM on quality, cost, cycle time, etc.
- be creative!

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Appendix B: Specific Workshop Results

Develop a definition and some criteria for "best practice"

The definition, "complete, feasible, and appropriate guidelines for executing an activity; a common procedure that improves its performance efficiently and effectively," is very good, in that it considers both executing the "best practice" process and improving that process.

"Best practice" criteria for RM introduction, as proposed by the four groups, would be as follows:

- It is defined based on customer requirements.
- It has a defined audience & customer.
- It is appropriate for the maturity and context of the organization's target audience.
- It is a well-defined, formalized practice that can be easily applied across multiple organizations or projects.
- It is CMM compliant.
- The results are identifiable.
- It is tailorable.
- It is measurable (able to validate its claim).
- It is effective and efficient.
- It includes templates and examples.
- It is trainable.
- It is user friendly (easy to use).
- It is easy to train and implement.
- It is proven effective in multiple applications or contexts.
- It is appreciated by participants.

After these exercises, we asked participants to talk about the materials they had brought and presented, and how they fit these criteria. This proved to be a very interesting discussion that provoked intense discussion about the possible generalization of some of the tools and documents developed and used by participants in the workshop. This discussion focused the information that had been presented the first day and gave people a forum for discussing the possibility of sharing or borrowing each others' artifacts.

What are our assumptions (e.g. "cars must have roads," "cameras need film") to test whether we are solving the right problem.

The assumptions about the introduction of RM that were identified were as follows:

- It is valuable & useful to have an RM transition package.
- An RM transition package is possible.
- It is possible to define the requirements for an RM transition package.
- All the main problems encountered by software developers can be identified.

- There is customer need for the transition package.
- RM is difficult, confusing, and time and labor consuming.
- A process for introduction will save time and money.
- Senior management wants it.
- The organization is ready and has the need for RM introduction.
- There are people who are responsible for managing requirements.
- The resources to support technology introduction exist.
- A process for introduction can be tailored and adjusted for business situations.
- Tailoring is required.
- There are training hours and training development hours committed to RM introduction.
- There is management support.
- People at different organizational levels see things differently.
- There is an SEPG or similar group that is a champion and oversees the implementation.
- SME's are present.
- Introducers understand RM or can easily obtain training and coaching.
- There is access to the customer (or surrogate) base.
- Templates and examples are useful.
- There is access to technology and tools.

Although we did not challenge or test these assumptions, they provide an excellent starting list to use as we go forward with the RM transition package and the transition package concept.

Who would want a transition package and why?
We were concerned about who the users of a transition package are. The following list resulted from this nominative-technique brainstorming session:

- corporate SEPG
- SEPG leader
- SEPG members
- oversight bodies
- PAT/TWG
- training group
- software managers
- lead system engineer
- system engineers
- sponsor
- internal financial controller
- functional manager of software department
- chef de service (chief technical officer)
- project manager
- customer of SW project
- customer—user
- customer "buyer"
- customer—PM manager/systems engineers
- manager of RM database
- software engineer
- software quality assurance
- configuration management
- software architecture design
- test team
- proposal manager
- source selection board
- subject matter experts
- external consultants
- vendors

Next, we had intended to talk about issues in general.

Discovering issues in making transition packages available (costs, technology, etc.; small vs. large organization strategies)

The participants felt that the first issue that must be dealt with was, "Who are the customers for the RM transition package and who will pay for it?" Clearly this was a natural extension of the brainstorming exercise which had resulted in the previous list. Participants wanted to uncover issues concerning finding and cultivating the real customers. We used a "thinking technique," TEC,[5] to discuss and present issues on this topic. Issues resulting from this exercise were as follows:

• *In all organizations there are people who recommend (probably the SEPG) and there are people with the money; both groups need to be identified, supported, and coordinated.*

• *Buyers might be a small company with little infrastructure—often the controller would be the person to commend.*

• *A large company would want licensable materials— corporate SPI sponsor would be a chief stakeholder.*

• *Contributors should not have to pay.*

• *Organizations with known multiple usage would tailor their own*

-• *Organizations with only a few deployments would want little or no tailoring*

• *Transition package should have different levels for marketing purposes.*

• *Additional support (e.g., for SEPG leader) should be included (releases, consulting, maximum price).*

Specific groups or individuals who might benefit from and pay for a transition package may include

• *SW process improvement budget holders*

• *external consultants*

• *executive managers*

• *DoD software Development Centers (LCSAs/CDAD)*

• *training companies or departments within companies*

• *franchise holder*

• *universities*

• *standard - setting organizations*

• *SEI - like organizations*

Discussing these results led to an open discussion about marketing, particularly how to characterize potential customers. One participant proposed that we use the general categories of "finders, minders, and grinders," mapping to sponsors, managers, and

[5] "Task-Explore-Conclude" (TEC) is a timed thinking exercise useful for groups of from 2 to 4 people or for individuals to use for "focusing thinking and making of it a deliberate task" [De Bono 94].

engineers, respectively (and respectfully). A transition package is used to make a change; therefore, for the primary customers the questions are

- What is the change?
- Who needs the change?

Who helps make the change?

We envisioned a transition package that is given to a change agent (whether that is an individual technology adopter or a manager planning a change for an entire organization) who is responsible for managing the change. That person is the primary customer and the transition package should address their needs and requirements.

What are the "next steps" for RM transition packages?

This is an open discussion about what next steps are appropriate for the development of transition packages. If these packages are viable, then who should build them? (the SEI? vendors? a special interest group [SIG]?) What makes the most sense from the community perspective?

How do we get the word out, if this is a good idea. For example, a report, a web site, an on-going SIG, more meetings, a steering committee to be formed?

This discussion shouldn't imply that commitments are being made. This is a place to capture and store all of the ideas about possible next steps concerning the development of transition packages. Then, if any of the steps are clearly appropriate and are going to be done, that can be highlighted. Also, some mechanism for prioritizing and structuring these tasks, as well as known constraints, should be discussed.

Some 39 ideas were proposed for next steps; these are listed below. Chapter 5 of this report (Summary of the Next Steps) discusses the proposed next steps, organizing them into clusters of possibilities.

Next steps on how we should build RM transition package(s)

NOTE: Annotations for clarification are in italics following most items.

1. Do basic outline/steps to get feedback (similar to "Wall")

Do the basic outline/steps as a strawman to get response from those who might use it.

2. Very complex issues: different mix of people might have different response

We can't decide what/how to build in a Transition Package until we've checked with a more diverse group, or made sure we've gotten input from an adequately representative group.

3. Transition Package itself vs. promoting it

Should the SEI and/or group of interested parties build the transition package or promote the idea of one so others would build it/them?

4. Next step: condense workshop into skeleton package & do another workshop.

This would build on the suggestion in number 2 above, tapping another group's perspective, plus getting a reaction to a strawman package. Creating the skeleton package would be faster than trying to create a full-blown one.

5. Build two packages: RM Transition Package; other, at several levels (for different sizes & types of companies & organizations).

Dao Vu sent email suggesting that there are two packages. One package contains what someone needs to enact or perform Requirements Management, and one contains what is needed to introduce the practice of Requirements Management. Dao's message from follows:

> *To resolve the suitability and the appropriateness requirements of the RM transition package I thought we might want to develop two separate packages. One is for the RM itself (whatever needed to do RM right). To me the data for this package is pretty much posted on the wall already. The other package addresses the different situations that one wants to roll out the RM package (consultant, large, small organizations, SEPG etc.).*
>
> *Better yet I think we just need to produce RM package only and leave the latter one for the responsible person/organization to deal with depending on their situation/environment."*

6. When defining the Transition Package, have representatives of each user role give input (versus speaking only with change agents).

Comment implies that most attendees at this workshop are, in effect, change agents, and represent primarily, if not only, that view.

7. Logistical model: road map style, SE-CMM authors.

This comment refers to how the SEI worked with the community to create the Systems Engineering Capability Maturity Model (SE-CMM), and how the SEI is currently working to create a software technology "road map". In both these cases, authors come from the community, and the SEI serves as a facilitator and coordinator, convening meetings, compiling contributions and editing documents, etc. The suggestion is that this might be a way of working to build the RM Transition Package.

8. Worth doing especially samples.

This comment endorses creating the RM Transition Package, noting especially the value of providing sample materials as part of the package.

9. One next step: look at aspects of Transition Package with regard to the life cycle model; then work on artifacts (provide samples, tailored). Then do another workshop with representatives from industry—that is, users.

This comment suggests considering what components should be in the RM Transition Package, if viewing the package using the life cycle model (similar to what was laid out of the "wall"). Decide what artifacts support each component, locate them, then tailor them. Then do another workshop with potential users of the package.

10. Synthesis of workshop: issues & conclusion.
11. Survey of potential customers.

Items 10 and 11 go together. The suggestion is to synthesize the workshop issues and conclusions, and then use these as input to a survey of potential customers for an RM Transition Package.

12. Review the artifact work & workshop outputs.

Gilles added the following:

> *I gave this thought and I meant that we may have been very quick with the "wall-work" and that a review of the content and the grouping should be necessary.*

13. RE artifacts: need to address issue of nondisclosure as part of sanitizing for publication in Transition Package.

14. Take artifacts, match to "wall" column, review for best practice, then generalize.

Suggests the need to determine quality of artifacts, with its reference to best practice.

Lana Cagle explains her comments further:

> *Compile best samples of Transition Package artifacts. Then, make best samples generic enough to apply to multiple organizations. (This doesn't imply there is one best way to do something. For example, one group may use a tool and another may not. The end results should be the same.)*

15. Do "as is" on how people worked in introducing RM in "real world"-what are the needs? Identify what are difficult areas & address in the package.

Lana elaborates as follows:

> *Based on feedback from people who have introduced RM, include artifacts and/or guidance in the transition package that addresses problem areas.*

16. Models were [a] "hang up" - next time, provide time to work in smaller groups & how artifacts relate to each model - e.g. 1 day/Working Group/model.

This comment notes how our discussion of "models" for how to organize the transition package was a significant roadblock to progress in the workshop. The suggestion seems to be that in the next workshop, small groups organized for an entire day around one model might make better progress.

17. RE business view: who the user/customer/buyer is needs to be explored. Partnering & collaboration needs review.

This comment refers to potential problems of organizing a group or groups to work on an RM Transition Package. Who is the user? Who is the customer? Who is the buyer (that is, of the package)? How could contributors to the package collaborate smoothly and successfully?

18. Hold another workshop in 4-6 months to do work per 16,17.

19. Do 18 at SEPG [conference] 17-21 March - San Jose???

20. "If we build it, they will come..." but [it is a] serious undertaking to build a quality product—needs to be a development project.

This comment alluded to a perceived high demand for an RM Transition Package. In addition, the implication is that building the package must be a bona fide development effort, organized like a project.

21. Maximum reuse of SEI stuff: shorten time to market, trade on recognition of CMM— leverage existing SEI "stuff".

Reusing existing SEI materials (not sure what these are?) would expedite getting the package out, as would using the connection to CMM as a recognition factor to get attention for the package.

22. RE ISO 9000 - People sell manuals as fast track - Disastrous! Package should carry a health warning.

This comment noted that no matter how well done, documented guidance can be dangerous if not properly used. Any transition package should carry caveats about its use.

23. Two ways: Develop integrated package. OR component set. If package: small team; if artifacts/components - use working group in periodic meetings.

The style of working on the package should be chosen depending on the approach to building the package. If an integrated package is the desired outcome, then a small team needs to be formed and work together. If the package isn't integrated, but is a set of components or artifacts, working groups in periodic meetings is a good strategy.

24. [Software CMM] Level 2 KPA Transition Packages: Humongous undertaking; MUST link Requirements Management to Requirements Engineering. RM may not be best place to start:

-need to focus on a specific set of requirements. e.g. do survey
-prioritize & use concurrent Software Development Life Cycle (SDLC).

This comment notes the size and complexity of any undertaking to build an RM Transition Package. It also draws out a sub-theme in the workshop from several participants, and that is that RM can't be considered independent of Requirements Engineering (RE). The comment also notes the need for focus, and to have requirements for the transition package.

Gilles adds:

> *I agree that RM is very much connected with RE but seems to me that the*
> *essential connection to SPP [Software Project Planning] (commitments on costs, schedules...) has been a little forgotten !!*

25. Assumes this is right thing to do; have a package on SPI [software process improvement]? On introducing software technology into an organization?

This comment questions whether the focus on RM (that is, on a KPA) is the right focus, and suggests considering a more general transition package about SPI or about introducing any software technology into an organization.

26. Modular & evolutionary.

Anything we build should be built in a modular and evolutionary manner.

27. Would package include tool support? Considerable value-added from this but

also adds complexity & issues.

28. Assuming SEI has wide customer set, many organizations...many factors: process architecture, interfaces exist? How [can these be] made real? Policy? Process models? Application-domain specific? Maturity Level? Structure of organization? Other Maturity Models? CMM V2-maturity with KPA—how should we address?

Craig Hollenbach elaborated in email:

> *Assuming that the SEI seeks to benefit as wide customer set as possible, there are many factors that it must consider before designing transition packages (TP):*
>
> *- process paradigm (functional/OO/etc)*
> *- process architecture (high-level multi-process design)*
> *- process interfaces—e.g., does RM reuse/call a change control process? is it called from RE, use peer reviews?*
> *- organizational SPI context (including TQM?)*
> *- organizational context—org. size, structure, policy approach, etc*
> *- project size, structure, duration, complexity, locality, communication infrastructure*
> *- application domain and required knowledge*
> *- maturity level*
> *- process maturity model (SE-CMM implies Level 5 RM maturity)*
> *- industry and company standards (life cycle, discipline {RM}, process stds)*
> *- process description formats (graphical notations, text fields)*
> *- tailoring methodology and guidance*
> *- process customers, requirements, and indicators/metrics*
> *- usage metrics (at least how long its been implemented on a project)*
> *- caveats*
>
> *The SEI should decide if it will define and match a transition package (TP) to a set of organizational and project characteristics that apply to the majority of its customer base, or just provide a well-thought out sample TP. An ironic situation exists: the more general the TP is, the less specific and therefore less applicable it is to an organization.*
>
> *Perhaps the SEI should first provide a general framework for TPs and then the SEI or other organizations can provide instances applicable to defined contexts.*

Gilles adds:

> *Provided CMM-V2 release is planned soon, an analysis of how RM is evolving in it, is neccessary!*

29. More generic model, from which to derive more detailed models?

30. Add value by showing examples? Need caveats!

Examples add value but can only be provided accompanied by caveats in their recommended use

Gilles adds*:*

> *Agree but still seems to me that we have not sufficiently addressed the RM difficulties/resistances for implementation .*

31. If shrink-wrapped package included consulting, who would do it [the consulting]?

32. Focus on team/collaboration issues; and on mechanisms to assure commitments of key contributors.

This comment concerns how any group working together on transition packages might actually do the work together.

33. Do assessment of representation—What's missing from this group?

Similar to item 2 above and others, and addresses the issue of how representative the attendees at this workshop were (of an audience for an RM transition package).

34. Figure out conditions for participation at beginning. Assumption—this is work that MUST be collaborative for credibility.

35. Serious survey of vendors (SPI)—opportunities for co-development missing here.

This comment addresses the lack of presence of SPI vendors at the workshop, and notes the potential for leveraging their contribution.

36. Scope has to be defined & made crisper—prerequisite to getting commitment from collaborators.

37. The architecture of a transition package is not RM specific—and may be the most valuable aspect of a package—do early & use to test.

Is the most valuable part of a transition package the architecture? To test this, do an architecture early and get feedback.

38. Address systems engineering requirements—the Software/System interface.

39. Either well-defined & specific to one environment, or it will have to be reinvented anyway

-so do basic architecture

-provide basic information & support to "invent here" e.g. work groups.

This comment suggests that a transition package needs to be well-defined and specific to a given environment. It also suggests that since the package will be reinvented for each environment, doing a basic architecture and providing support for the reinvention is the best strategy.

Appendix C:The “Wall Chart” - Matrix of Artifacts Grouped and in Sequence

Table 7 shows the names of all artifacts proposed for possible inclusion in an RM transition package (Table 6 is a legend to accompany Table 7). The workshop participants discussed at length how best to organize the artifacts listed here. They finally agreed to use a generic life cycle model because the artifacts represented materials used in a life cycle of moving from no or limited RM processes in place, to having RM processes in place. The life cycle is the life cycle of solution development to achieve satisfaction of RM at Software CMM Level 2. But while they agreed to use this model, there was general dissatisfaction about how well it served the notion of describing the materials in a transition package, including the process of tailoring those materials, and the process of introduction. Was the life cycle that of developing the package? Of tailoring the package? Of introducing RM practices? The group determined that much more work needed to be done to come up with a better way to organize the set of artifacts.

Material in Table 7 represents the work of participants and some additional work immediately following the workshop by workshop facilitators. The latter included cleaning up ambiguities by adding missing words, etc., and also mapping the artifacts to the IDEAL cycle. Artifact names are grouped exactly as they appeared after the workshop exercise, and then also under an enhanced set of groups (some names were omitted in the workshop exercise). This is a preliminary list, of possible use as a starting point for developing a comprehensive inventory.

Table 6: Legend

Legend of Abbreviations for the "Who Creates or Uses Artifacts" Column		***Legend of Abbreviations for CMM Common Features***	
Abbreviation	***Full name***	***Abbreviation***	***Full name***
ct	*change team (group leading effort to introduce requirements management)*	*ti*	*technology introduction*[6]
ct mgr	*change team manager (e.g., SEPG or Action Team lead)*	*ab*	*ability to perform*
eng	*engineer*	*ac*	*activities performed*
eng mgr	*engineering manager*	*co*	*commitment to perform*
PM	*project manager*	*me*	*measurement and analysis*
sme	*subject matter expert (person knowledgeable in requirements management)*	*ve*	*verifying implementation*
sp	*sponsor of change effort*		

[6] "Technology introduction" is not a common feature of the Software CMM but was added as a similar category during the workshop exercise.

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
1	Plan	Leverage	Motivation & support	Motivation & support	support: human aspects, rewards, ownership	mgt	ti
2	Plan	Leverage	Motivation & support	Motivation & support	goals	ct, eng	co
3	Plan	Leverage	Motivation & support	Motivation & support	motivation: why should this be done?	ct, eng mgt	co
4	Plan	Initiate	Motivation & support	Motivation & support	support: mgt sponsorship	mgt, ct	ti
5	Plan	Establish	Planning support	Planning support	project plan	ct	ac
6	Plan	Establish	Planning support	Planning support	charter/tactical activities, plan deriving	ct	ab
7	Plan	Diagnose	Planning support	Planning support	process model: how to introduce the process	ct	ab
8	Plan	Diagnose	Planning support	Planning support	risk of pkg & process	ct	ti
9	Plan	Establish	Standards & policy	Standards & policy	policy: waivers/deviation policy	ct	ti
10	Plan	Establish	Standards & policy	Standards & policy	policy: how to change & approve	ct	ti
11	Plan	Establish	Standards & policy	Standards & policy	policy: exception policy	ct mgr, sp	co
12	Plan	Establish	Standards & policy	Standards & policy	policy: policy standard	ct mgr, sp	co
13	Plan	Establish	Standards & policy	Standards & policy	standards	eng mgt	ab
14	Plan	Initiate	Standards & policy	Standards & policy	policy standards: and the associated process to develop and introduce the policy (what is the role of the sponsor for that)	ct	ti
15	Plan	Establish	Team support	Team support	guidance on who should be on team	ct mgr, sp	ti
16	Plan	Establish	Team support	Team support	team charter	ct	co
17	Plan	Action	Team support	Team support	team building	ct	ab
18	Plan	Action	Team support	Team support	prerequisites— mgt -approved team members & time commitment	ct	ab
19	Plan	Action	Team support	Team support	roles & responsibilities	ct, eng	ab
20	Plan	Diagnose	Team support	Team support	problem solving strategy (e.g. as is?)	ct	ab
21	Plan	Diagnose	Diagnostics	Diagnostics	assessment report - e.g. internal process improvement (IPI) report	all	me
22	Plan	Establish	Diagnostics	Diagnostics	situation assessment: project priority vs. process priority	ct	ti
23	Plan	Initiate	Diagnostics	Diagnostics	case study (instrumentation and tracking to prepare case description)	all	ab, me, ve
24	Plan	Initiate	Communication support	Communication support	conference materials	ct	ab

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
25	Plan	Establish	Communication support	Communicationsupport	meeting minutes	all	ab, ac
26	Plan	Action	Communication support	Communicationsupport	facilitation (description of what, when, how)	ct	ab
27	Req'ts	Diagnose	No heading	Directions	doc. (input) lessons learned	ct	ti, ab
28	Req'ts	Initiate	No heading	Standards & policy	requirements from standards (CMM, SE CMM, ISO)	ct	ti
29	Req'ts	Initiate	No heading	Standards & policy	guidelines for working groups, interest groups	ct, eng	ab
30	Req'ts	Establish	No heading	Standards & policy	policy: cost value criteria for decision making board(s)	mgr	ab
31	Req'ts	Establish	No heading	Directions	roles and responsibilities of RM, mgtdomain expert	ct	co
32	Req'ts	Establish	No heading	Directions	documentation list of relevant domain experts	ct	ti, ab
33	Req'ts	Establish	No heading	Role definitions	support: process champion	sp, ct	ab
34	Req'ts	Establish	No heading	Role definitions	support: internal consultant	ct, eng, mgr	ab
35	Req'ts	Establish	No heading	Role definitions	support: integration plan	mgr	ab
36	Req'ts	Establish	No heading	Planningsupport	training required	ct mgr, sp	ab
37	Req'ts	Establish	No heading	Standards & policy	training: methodology	ct	ab
38	Req'ts	Establish	No heading	Standards & policy	documentation selection criteria for domain experts	ct	ti
39	Design	Establish	No heading	Standards & policy	policy: requirements control board charter	mgr	co
40	Design	Establish	No heading	Requirements	customer requirements	ct	ti
41	Design	Establish	No heading	Planningsupport	QA recommendation	ct	ab
42	Design	Establish	No heading	Directions	guideline	ct, sp	ab
43	Design	Establish	No heading	Directions	procedure	ct, eng	ab
44	Design	Establish	No heading	Directions	standard	ct, sp	ab
45	Design	Establish	No heading	Directions	process model: process description and guide	all	ti, ab
46	Design	Establish	No heading	Directions	requirements review template	ct, eng, sp	ac
47	Design	Establish	No heading	Requirements	requirements from user	ct	ti
48	Design	Establish	No heading	Standards & policy	doc. checklists for practice	eng	ac
49	Design	Establish	No heading	Directions	software requirements specificationreview checklist	eng	ti
50	Design	Establish	No heading	Standards & policy	documentation—operating instructions template	eng	ac
51	Design	Establish	No heading	Planningsupport	process model: RM program manager's plan	mgt	ab

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
52	Design	Establish	No heading	Directions	change request form	eng	ve
53	Design	Establish	No heading	Directions	change request database	ct	ac
54	Design	Establish	No heading	Directions	training: education and coaching materials for all sponsors	ct, sp	ti, ab
55	Design	Establish	No heading	Directions	training: training selection and customization criteria	ct	ti
56	Design	Establish	No heading	Directions	training :how to tailor	ct	ti
57	Design	Establish	No heading	Directions	doc. tailoring guidance per domain (loose definition of)	ct	ti
58	Design	Establish	No heading	Standards & policy	workshop guidelines	eng	ab
59	Design	Establish	No heading	Standards & policy	information technology – tool selection criteria	ct	ti
60	Design	Establish	No heading	Directions	tools	ct, eng, mgr	ab
61	Design	Establish	No heading	Directions	tool evaluation reports	ct	ti
62	Design	Establish	No heading	Directions	tool descriptions	ct, eng	ab, ti
63	Design	Establish	No heading	Standards & policy	doc. output (artifact) templates	ct	ti
64	Design	Establish	No heading	Directions	doc. requirements traceability matrix	ct	ti
65	Design	Establish	No heading	Directions	other: reqts and change metrics reports	mgr	me
66	Design	Establish	No heading	Directions	documentation? measurement templates for RM	eng mgr	me
67	Design	Establish	No heading	Directions	threshold measures	mgt, eng	me
68	Design	Establish	No heading	Directions	baseline measures	mgt, eng	me
69	Design	Establish	No heading	Directions	measurements	sme	me
70	Design	Establish	No heading	Directions	metrics	ct mgr	me
71	Design	Diagnose	No heading	Standards & policy	traceability matrix to CMM	ct ,sp	co
72	Design	Establish	No heading	Directions	documentation: metrics templates	ct	ac
73	Design	Establish	No heading	Standards & policy	examples of indicators for RM measurement according to: stability/instability scenarios, type of process, type of commitments with SE people for defining "allocated requirements"	ct mgr, sp	me
74	Design	Diagnose	No heading	Standards & policy	process integration: link to other KPA process architecture	ct	ti
75	Design	Diagnose	No heading	Standards & policy	process integration: link to other KPA	ct	ab
76	Design	Establish	No heading	Standards & policy	process integration: interfaces to other procedures	ct	ab
77	Design	Establish	No heading	Directions	process model: cross-reference between transition package elements & local organization	ct	co

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
					command media		
78	Design	Establish	No heading	Standards & policy	information technology-compatible documentation formats	all	ab
79	Design	Establish	No heading	Directions	information technology-common connectivity for communicating	ct	ab
80	Design	Establish	No heading	Planning support	pilot & roll out plans scenarios	ct	ti
81	Design	Establish	No heading	Directions	documentation list of solution component sources	ct	ti
82	Design	Establish	No heading	Directions	documentation samples	ct	ac
83	Design	Establish	No heading	Directions	documentation: operational concept description	sp	ab
84	Design	Establish	No heading	Directions	example use of the RM transition package (documentation)	ct, sp, mgt, eng	ti
85	Design	Establish	No heading	Directions	documentation: 1 page definition for proposals	ct, sme	o
86	Design	Establish	No heading	Directions	documentation materials & job aids for user types	all	ti, ab
87	Design	Establish	No heading	Directions	job aids: checklists: templates surveys	ct, eng	ab
88	Implement	Establish	Pilot plans	Pilot plans	pilot and roll out plans symbolic acts by managers	ct mgr, sp	ti
89	Implement	Establish	Pilot plans	Pilot plans	pilot and roll out plans: operation strategy: check and balance	ct	ti
90	Implement	Establish	Pilot plans	Pilot plans	pilot and roll out plans : communication strategies	ct	ab
91	Implement	Establish	Pilot plans	Pilot plans	pilot/roll out plan and schedule to roll out for PM	ct	ac
92	Implement	Establish	Training	Training	training tools	ct	ab
93	Implement	Action	Training	Training	training: process training for users, other affected groups	ct	ab
94	Implement	Action	Training	Training	training: brown bag presentation (modular)	ct, sme	ab
95	Implement	Action	Training	Training	documentation/training: introductory material	sp	ab
96	Implement	Action	Training	Training	videos	all	ab, ti
97	Implement	Action	Training	Training	support: external consultants	sp	ab
98	Implement	Establish	Samples	Samples	"DIDs": documentation, document templates w/ instructions on filling on	ct	ac
99	Implement	Establish	Samples	Samples	commitment form (standard), between the project manager, the software project manager and the "chef de service"	mgt	ac
100	Implement	Establish	Samples	Samples	communications: charts, templates	ct, sp, mgr, eng	ab

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
101	Implement	Establish	Samples	Samples	requirements test criteria	eng	ab
102	Implement	Establish	Samples	Samples	commitment forms	sp, mgt, eng	co
103	Implement	Action	Samples	Samples	change agreement reports	ct mgr	ac
104	Integrate	Establish	Transition tools	Transition tools	documentation change agent handbook, check list	ct	ti
105	Integrate	Establish	Transition tools	Transition tools	transition package	ct	ti
106	Integrate	Establish	Transition tools	Transition tools	process integration— links to other models (e.g., ISO 9000, SE-CMM)	ct	ti
107	Integrate	Establish	Transition tools	Transition tools	link to other KPA's: with CM for RM-Ac3	ct	ac
108	Integrate	Action	Deployment tools	Deployment tools	pilot/roll out testimonials from "1st victim" for roll out events	sp, mgr, eng	ti
109	Integrate	Establish	Deployment tools	Deployment tools	documentation: reprints of standard references	ct, eng	ti, ab
110	Integrate	Leverage	Deployment tools	Deployment tools	documentation: cost/benefit analysis and related briefings	mgt, sp	ti, me, ve
111	Integrate	Action	Deployment tools	Deployment tools	documentation: sample agenda for periodic senior management reviews	sp, mgt, eng	ve
112	Integrate	Action	Deployment tools	Deployment tools	documentation: primer and frequently asked questions (FAQ)	sp, mgt, eng	ab
113	Integrate	Action	Deployment tools	Deployment tools	software requirements specification template	ct, eng	ac
114	Integrate	Leverage	Deployment tools	Deployment tools	information technology? process implications for using tool/method X	eng	ti
115	Integrate	Action	Tool support	Tool support	tool administration	eng	ac
116	Integrate	Action	Tool support	Tool support	tool documentation	eng	ac
117	Integrate	Action	Tool support	Tool support	tool descriptions	ct	ac
118	Integrate	Action	Tool support	Tool support	tool smiths	eng	ac
119	Integrate	Establish	Tool support	Tool support	RM tool environment set up	eng	ac
120	Integrate	Establish	Tool support	Tool support	information technology. RM tool implementation plan and procedure	mgt, eng	ti
121	Integrate	Establish	Tool support	Tool support	tool executables	eng	ac
122	Integrate	Action	Tool support	Tool support	RM tool tailoring support	eng	ac
123	Verify	Action	No heading	Evaluation tools	performance appraisal forms	all	ve, co, me
124	Verify	Establish	No heading	Evaluation tools	introduction effectiveness measures	ct, mgt	me
125	Verify	Establish	No heading	Evaluation tools	senior management review record	ct, mgt	ve
126	Verify	Action	No heading	Evaluation tools	project management review record	ct, mgt	ve
127	Verify	Action	No heading	Evaluation tools	SQA review record	ct, mgt	ve

Table 7: The "Wall Chart" - Matrix of Artifacts Grouped and in Sequence (Complete)

Sequence Number	Generic Life-Cycle Phase	IDEAL Model Stages	Original Groupings from Workshop	Groupings with missing names added	Artifact	Who Creates or Uses this Artifact?	CMM Common Feature
128	Lessons Learned	Leverage	Experiencereports	Experiencereports	public relations for(good) results	ct, sme	o
129	Lessons Learned	Action	Experiencereports	Experiencereports	documentation: annotated bibliography	all	ti, ab
130	Lessons Learned	Leverage	Experiencereports	Experiencereports	risks of package & process	ct	ab
131	Lessons Learned	Leverage	Experiencereports	Experiencereports	lessons learned	ct	ab
132	Lessons Learned	Leverage	Experiencereports	Experiencereports	experience reports	ct	ti
133	Lessons Learned	Leverage	Experiencereports	Experiencereports	pilot/roll out case studies w/critical success factors	sp, mgt	ti
134	Lessons Learned	Leverage	Experiencereports	Experiencereports	success stories	all	ab
135	Lessons Learned	Action	Media	Media	information technology: web page "newsletter"	mgt, eng	ti
136	Lessons Learned	Action	Media	Media	technical notes of newsletter	ct, sp, mgt. eng	co/others

Appendix D: Slides and Handouts

The following section contains the slides presented and handouts distributed at the workshop.

Aimware

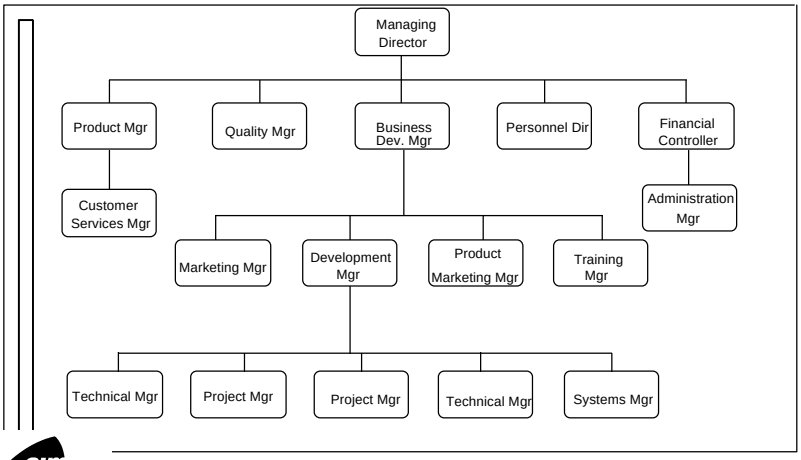
Contents

- Context / Background
- Before and After picture
- Deployment: Initial, Settling & Improvement Steps
- (RM) Process Model
- RM Policy, Status Levels and Types
- Internal Consulting approach
- Exhibit List annotated

Context 1: Introducing aimware

- Commercial Software Devel. Company
  - a groupware enabled software engineering database that is integrated to the internet
  - covers key areas of the SEI CMM and ISO 9001 / TickIT
  - aimware is 11 months (& 3 days) old!
  - major release every 6 months building on the previous releases

Context 2: Software Role Chart



Context 3: aimware numbers

- 30 MB of code
- 300 entities/objects (data and code)
- 8 employees
- 1000 requirements so far

Context 4: Requirements Source

- 50% internally generated
  - RM policy says … be on the lookout!
  - Ideas from the team
  - Change Requests
  - Defect analysis
  - Improvement analysis

Context 5: Requirements Source

- 50% externally generated
  - we don't build product without customers!
  - Customer visits, projects, RFPs, changes ..
    - Motorola (50 users)
    - Telecom Eireann (230 users)
    - STORM Technology (15 users)
    - CSK Software (SEGA) (120 users)
    - Kindle Banking Systems (Misys plc) (400 user)

Starting Picture - RM Before!

… this slide is left intentionally blank!

Today's Picture - RM After

- RM Policy, Process, Template
- ER/STD Model, Reqs Catalog, Prototypes, Incremental deliveries
- Software to support the above
- Requirements drive all work, releases
- Requirements drive the workflow in the development organisation
- Ongoing improvements to the above

RM Deployment: Initial Efforts

- Built the process library on Lotus Notes
- Wrote RM policy, process, template online
- Development & policy deployment plan
- Recruited staff!
- Trained staff in RM process (and others)
- Designed software for RM process support
- Built RM software v0.1

RM Deployment: Settling Efforts

- Use software to manage RM of projects
- ISO 9001/TickIT awareness and audits
- Updates to RM process and software v0.2
- Internal CMM assessment workshop
- Updates to RM process and software v0.3
- Customers request RM software!
- Updates to RM process and software v0.4!

RM Deployment: Next Efforts

- 'IDEAL' improvement plan (cf. later slides)
  - 0.5 day per person per week
  - full-time quality manager being recruited
    - responsible for:
      - process quality (beginning)
      - product quality (middle)
      - service quality (end)
- 'aim' technology plan (cf. later slides)

aimware RM Process Definition used SEI Operational Framework

- Policy — Laws or Regulations
- Process — What happens over time
- Procedure — How to or 'step by step'
- Standards — Definitions & Acceptance
- Training — Knowledge & Skills
- Tools — Supports and automates
  - Required for each KPA (or equivalent)
  - Refer to SEI-93-SR-007 for more details

RM Policy - Extract 1

- It is the Company Policy to ensure that requirements:
  - are documented in an agreed fashion
  - are reviewed and agreed by the customer
  - are reviewed and agreed to by the Project Manager
  - drive the software plans, work products and activities.

RM Policy - Extract 2

- It is also policy to ensure that there is a mechanism to allow changes to requirements at any stage in a project but that this mechanism also drives changes to the software plans, work products and activities.

RM Policy - Extract 3

- Finally it is policy to capture all ideas, requirements for old and new systems in the company requirements database, whatever and whenever the source of these requirements (i.e. inside or outside the scope of a project).

Requiements - Status Levels

- New
- Open - Evaluation Stage
- Open - Execution Change Stage
- Sign-off Stage
- Sign-off - No Change required
- Closed - Complete
- Closed - No Change

Requirements - Types

- aimware feature
- customer feature
- post-release defect
- pre-release defect
- mid-project change request

Requirements Software

- Requirements records and metrics
  - by source system
  - by target system
  - by customer
  - by reason, priority, status, type & sub-type
  - by project
  - by relationship to other requirements
  - by author, currently assigned

Internal Consulting Approach

- Can't (hard-)sell process improvement
  - staff have to "buy" it themselves
- we used a group assessment in a workshop
  - "Search Conference Style"

Workshop Assessment Agenda

- Ask if RM is an issue
  - answer will be yes!
- Collate all RM issues / problems
- Show project team the RM KPA
  - group surprised with match!
- Group complete a wall chart for RM
- Next steps planning

Mini Assessment Wall Chart

Requirements Management Key Process Area:

Key Practice	Relevant Y/N	Local Reference	Strengths/ Weakness	Improvements Needed

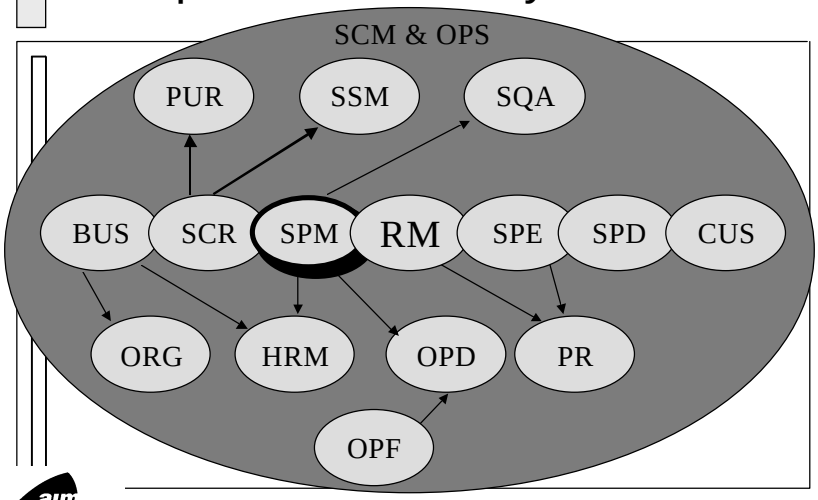
Initial Exhibits

- aimware process map
- Process Deployment
  - critical success factors
- IDEAL improvement map
- aim technology deployment cycle
- list of other available exhibits

Sample: aimware Key Processes

- Business Management
- Contract Review
- Purchasing
- Subcontract Mgmt.
- Project Management
- Quality Assurance
- Requirements Mgmt
- Product Engineering
- Product Delivery
- Customer Service
- Organisation
- People
- Process Definition
- Process Focus
- Peer Reviews
- Configuration Mgmt.
- Operations

Sample: aimware Key Processes



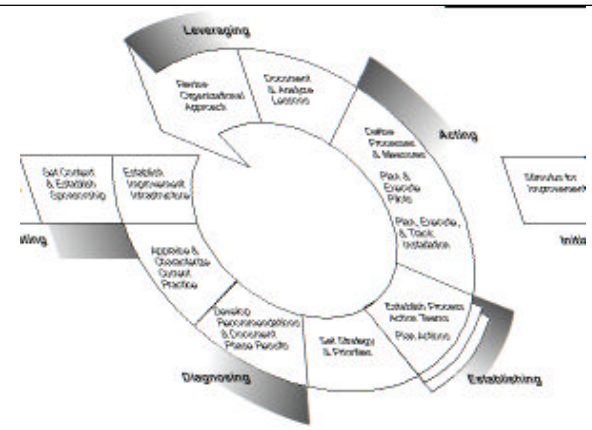
Sample: aimware Tool Support

- Integrated set of Lotus Notes modules for:
  - Requirements Management(CMM L2 RM)
  - Project Management (L2 SPP & SPTO)
  - Configuration Management (L2 SCM)
  - Quality Assurance (CMM L2 SQA)
  - Process Focus (CMM L3 OPF)
  - Process Definition (CMM L3 OPD)
  - Peer Reviews (CMM L3 PR)
  - Organisation, Customer & Supplier

Process Deployment Critical Success Factors

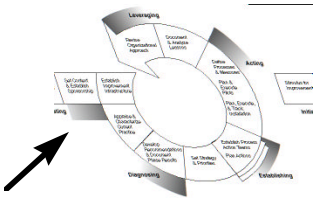
- A committed and strong sponsor
- A sensible assessment approach- the start
- A clear improvement lifecycle (e.g. IDEAL)
- Resource & manage as a best project
- Plenty of on the job training and coaching
- Measure the results on the way
- Automate defined process where possible
- Keep investing the energy - it's like fitness!

An “IDEAL” Improvement Cycle



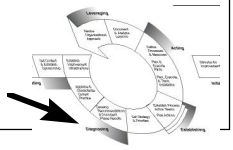
Sample ‘IDEAL’ Plan - ‘I’

- Initiating
  - Recognise or get improvement impetus
  - Set improvement business context & goals
  - Ensure Senior Sponsorship is in place



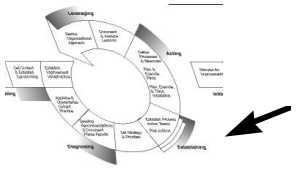
Sample ‘IDEAL’ Plan - ‘D’

- Diagnosing
  - Decide ‘measures’ to take
    - Process - CMM Assessment (many forms)
    - Product - Defects pre and post-ship
    - Resource / Cost - Size and cost of projects
    - Revenue - Cost and benefit
    - Productivity - Size and / or cost over time
  - Take ‘measures’



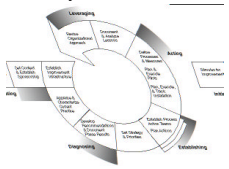
Sample ‘IDEAL’ Plan - ‘E’

- Establishing
  - Set Strategy and Priorities
    - (refer to CMM and business priorities)
  - Finalise Improvement Infrastructure
  - Establish Process Improvement Teams (PITs)
  - Plan PIT team actions



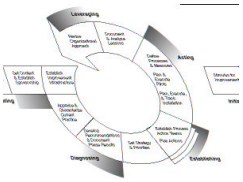
Sample ‘IDEAL’ Plan - ‘A’

- Acting
  - For each priority set:
    - Define process, tool support and measures
    - Plan pilots
    - Execute pilots
    - Plan company/group wide implementation
    - Installation
    - Track installation

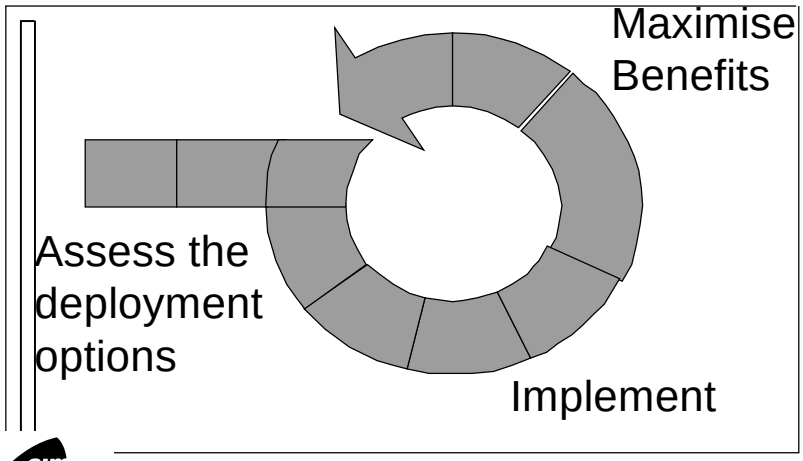


Sample ‘IDEAL’ Plan - ‘L’

- Leveraging
  - Analyse and Document lessons learned
  - Consider taking a break
  - Start the next IDEAL Loop



The “aim” Deployment Cycle



Sample ‘aim’ plan - ‘a’

- Assess the deployment options
  - Ensure Senior Sponsorship is in place
  - Assess current projects (wrt process, product & resource)
  - Deploy and install software
  - Evaluate best usage of software
  - Draft processes for using software
  - Train the first users in software
  - Use software on selected projects

Sample ‘aim’ plan - ‘i’

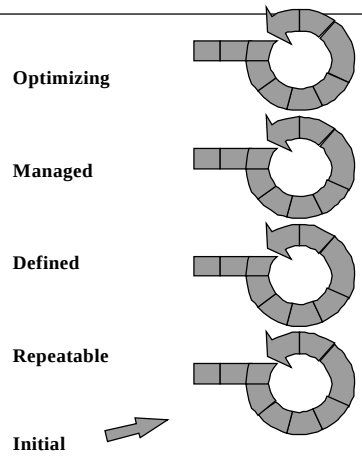
- Implement
  - Evaluate the initial rollout results
  - Enhance software processes
  - Deploy software on a wider basis
  - Train the new users
  - Provide coaching, support to new users
  - Track usage

Sample ‘aim’ plan - ‘m’

- Maximise Benefits
  - Assess new projects (wrt process, product & resource)
  - Analyse and Document lessons learned
  - Publish lessons learned (successes!)
  - Contact vendor with new requirements
  - Consider taking a break
  - Start the next aim loop

Improvement Cycles

- There maybe more than one improvement cycle per CMM level (especially getting to SEI CMM Level 2)



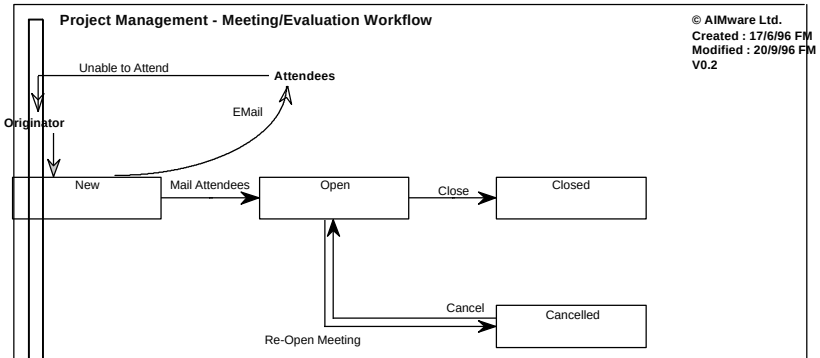
Other Exhibits available - 1

- RM Policy, Process, Template
- Weekly Project Meeting Minutes
- CSE aimware case study
- Software RM form template and reports
- Change Request & Defect Templates
- aimware demo disk
- Original Process deployment & Software Development Plan

Other Exhibits available - 2

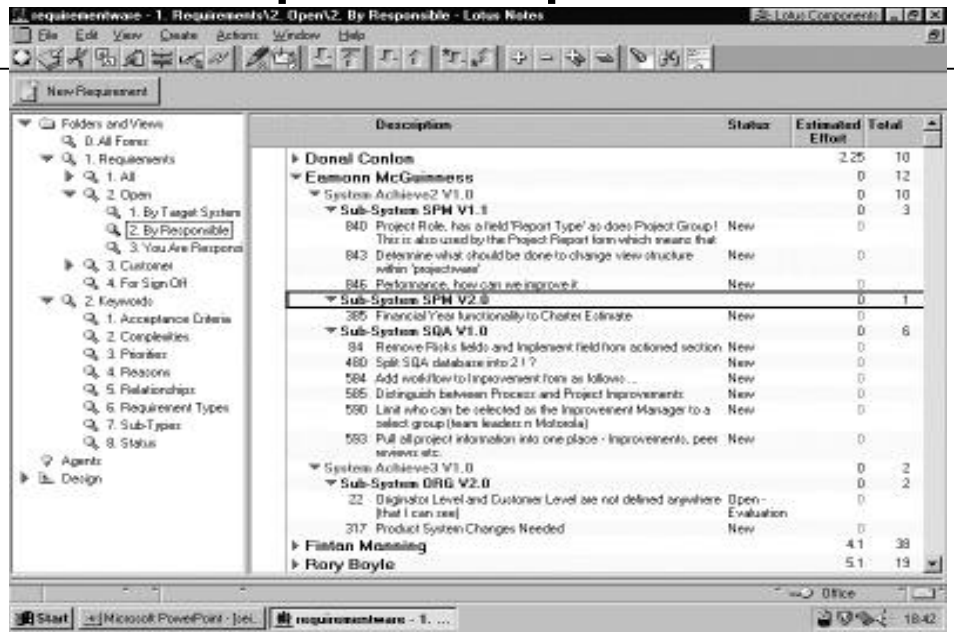
- Sample Entity Relationship Model
- Sample State Transition Model
- Findings from CMM assessment
- White Paper describing next phase of IDEAL improvement

State Transition Diagram: Meeting/Evaluation

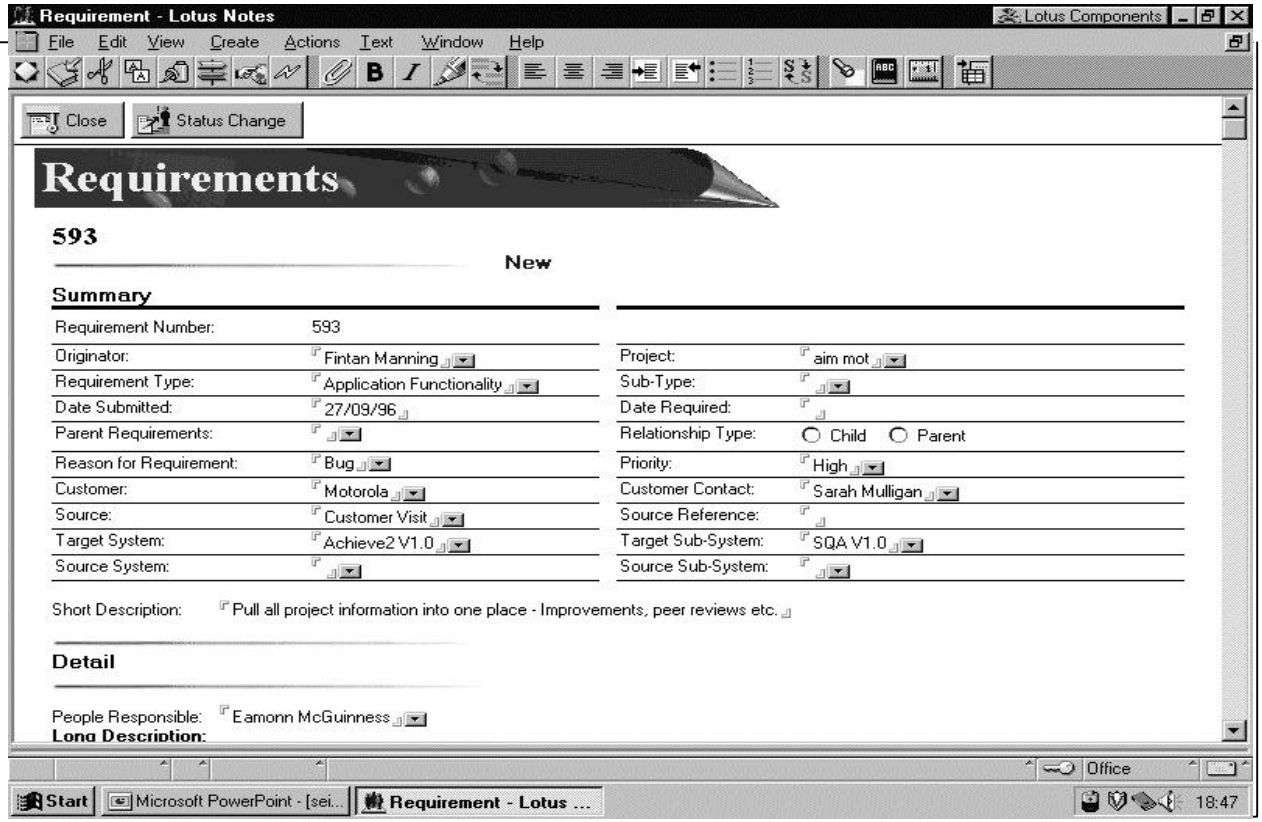


This diagram shows an email going to the attendees and also shows how the action of sending the email, changes the document status from New to Open

Sample Requirement Views



Sample Requirement



HUGHES
Hughes Aircraft Company

Teaching the Elephant to Manage Requirements

(Adopting Process & Tools Across the Corporation)

Dr. Jock Rader
Hughes Aircraft Company

Overview

HUGHES

- **Introduction -- common process & tools goals, technology transfer concepts**
- **Selection process -- requirements management tool selection: team formation & chronology**
- **Deployment & operational use -- choice of first victim, history in RCS**
- **Win-win vendor relations -- structuring the relationship so that a win for either is a win for both, keeping the caribou strong**

2

Hughes's Goals

HUGHES

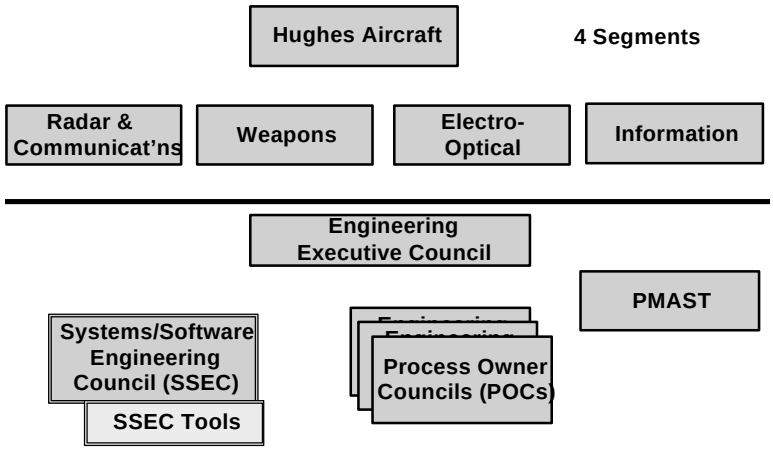
- Ultimate goal: common processes and tools across all engineering disciplines in Hughes
- An early focus: common requirements management processes & tools
  "Teaching the elephant to manage requirements"
- Milestones: individual project adoption

Importance of requirements management
- *affects large engineering population*
- *methods are well known*
- *reasonable supporting tools exist*

3

Hughes Engineering Councils

HUGHES



4

Tech Transfer Concepts

HUGHES

- *Tech transfer phases*
- Build transfer team
- Awareness
- Selection
- First victim
- Second victim & beyond

Transfer team roles

- Sponsor
- Champion
- Change agents
- First victim

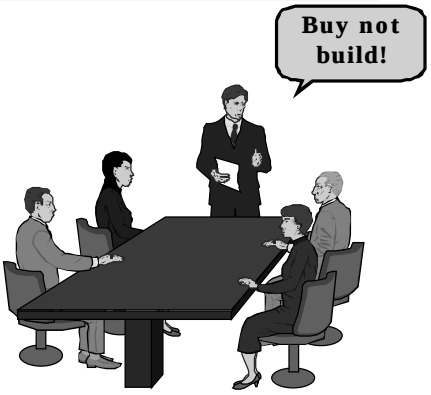
Reference: J A Rader, CASE Adoption: A Process Not An Event, Advances in Computers, Academic Press (1995)

5

Rqts Mgt Selection Team

HUGHES

- Subteam of SSEC tools team
- System rep and software rep from each of the four Hughes segments
- Met 2 days/week for about 3 months
- Followed disciplined process (Hurta)
- Asked to wear Hughes hats

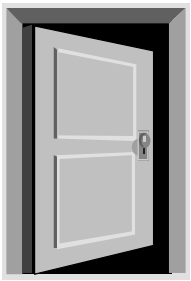


6

Selection Chronology

HUGHES

- Mar '95 — form selection team, build list of candidates
- April — RFI sent to 7 vendors, evaluate responses
- May — demos by 4 vendors, structured & unstructured
- June — evaluate, RFP to 2 vendors
- July — negotiate & select, sign MOU
- Sept — combined order -- 60 licenses, 12 classes, 50 consulting days



DOORS Selection Drivers

HUGHES

- Dramatically better user interaction paradigm
- Application program interface (API)
- Product architecture
- User support
- High end & low end solution
- Independent choice (Brilliant Eyes, RASSP, etc.)
- Movement of personnel between vendors
- Vendor credibility
- Scoring (reflecting most of above)

8

Goals

HUGHES

To establish an environment where engineers and managers routinely use DOORS to capture and manage requirements throughout Hughes in accordance with the corporate product development process (PDP).

9

Objectives

HUGHES

- **1.0** To create and maintain a DOORS Technology Transition Team
- **2.0** To collect and display metrics
- **3.0** To maintain a generic CASP (Computer Aided SubProcess) as a starter kit for new projects
- **4.0** To establish and exercise methods for dissemination of information
- **5.0** To make each segment and site largely self sufficient
- **6.0** To influence the product direction and priorities of DOORS

10

Process & Tools Efforts Need Alignment

HUGHES

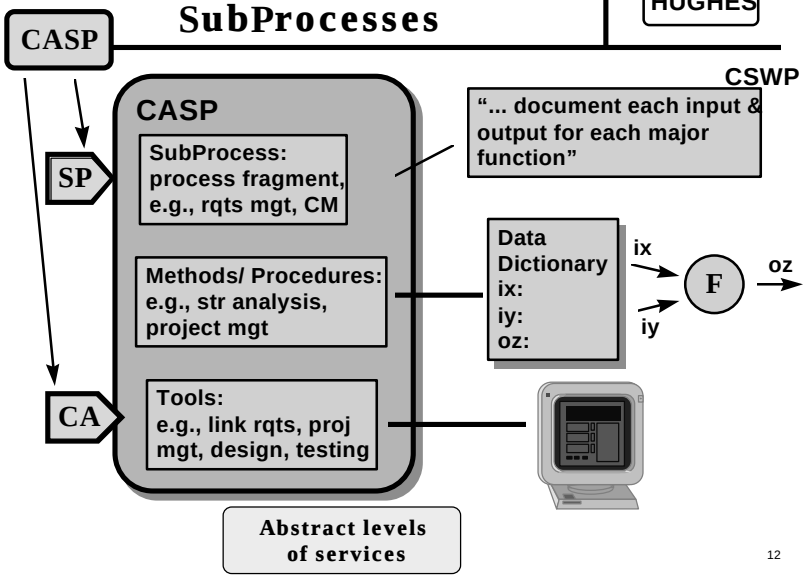
- What part of your process do your tools support? If you don't know, why are you using them?
- If your process is not supported by friendly tools, how many people will likely follow it?

Process architects need to understand what tools are available and what their abilities & limits are -- just like building architects need to understand their building supplies, e.g., lumber, plumbing, etc.

11

CASPs: Computer Aided SubProcesses

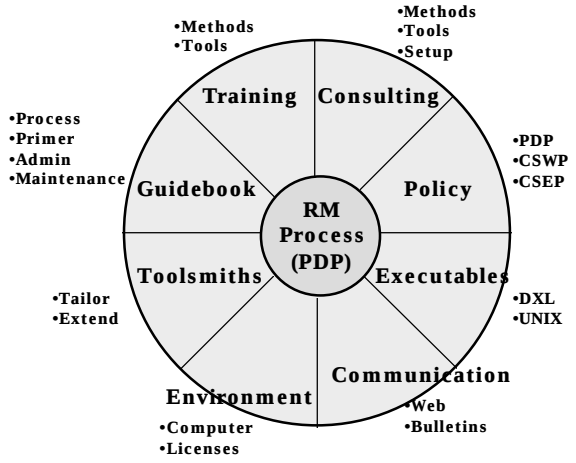
HUGHES



12

CASP Whole Product

HUGHES



13

CASP Folders (Represent Different Roles)

HUGHES

- Ia. SubProcess Definition
- Ib. Tool Supported SubProcess
- IIa. DOORS Primer
- IIb. DOORS Admin Guide
- IIc. DOORS Users Ref. Manual
- IId. DOORS DXL Prog. Usage Notes
- III. CASP Admin
- IV. InterCASP Interactions

14

Choice of First Victim

HUGHES

- Lead engineers must be flexible, innovative, collaborative and have a high tolerance for risk
  - literature suggests only one in six
- First victim must be guaranteed to succeed !!
- Sponsor provides resources
  - e.g., a flexible, innovative and collaborative transition team
- Sponsor provides legitimacy
  - e.g., definition of success, leadership

15

RCS First Victim History

HUGHES

- Started with different tool in 4Q93
- Learned to link requirements, generate reports, generate documents in '94
- Frustrated with tool shortcomings willing to try new corporate standard for engineering database (new application 3Q95)
- Toolsmiths develop old tool to new tool filter
- Project moves to maintaining requirements in DOORS in 4Q95

16

First Victim^2 Support

HUGHES

- DOORS licenses were acquired, free to project
- SSEC paid for 4 tool training classes
- SSEC sent 2 people to methods class
- SSEC paid for 10 consulting days
- Segment and SSEC provided several staff months of toolsmith support
- Toolsmiths and victim were well known to one another from first requirements tool adoption

17

Excellent First Victims

HUGHES

- Project engineers very flexible and adaptable in accepting solutions
- Have carefully verified & documented tool deficiencies
- Have consulted to new projects
- Have proactively helped spread usage
- Have developed super users plus some toolsmith expertise among the project staff

Strong collaborative relationship developed with transition team

18

Good Toolsmiths Critical

HUGHES

- Vendor tools are not whole products
- Someone has to tailor, extend and integrate to support project's subprocesses
- Most effective to codevelop enhanced tool and enhanced subprocess
- Good toolsmiths a scarce resource
  - takes many months to develop one
  - need critical mass

19

Internal Support Activities

HUGHES

- Local and corporate user groups
- Coordinate product change requests
- Coordinate strategic voice to vendor
- Share product enhancements & integrations
  - e.g., document generation
- Share toolsmiths & subprocesses
- Maintain index of projects
- Share transition experience

20

Keeping the Caribou Strong

HUGHES

- Old Indian saying

  "It is the wolves[1] that keep the caribou strong"

- Old cowboy saying

  "If you don't take care of your customers, somebody else will"

[1] customer requests and complaints

21

Hughes Win Conditions

HUGHES

- Wide-spread operational use at a reasonable price
  - influence product evolution
  - advance information
  - best pricing
  - wide user acceptance
  - responsiveness
  - advantages of buying from a market leader
  - economies of scale

I Win You Win	I Win You Lose
I Lose You Win	I Lose You Lose

22

QSS Win Conditions

HUGHES

- Increased sales & good publicity
  - increased market share
  - increased profits
  - reduced cost of sales
  - strong referrals from a satisfied customer
  - capable product feedback
  - recognition as a market leader

23

Summary

HUGHES

- Hughes adopting common processes & tools across engineering disciplines
- Technology transfer concepts are applicable
  - significant resources & schedule required
  - need sponsors, champions, agents, victims
- The process view and tool views of software engineering must be in alignment order to achieve best results with either
- Toolsmith support crucial
- Relationship with vendor of vital importance

24

KPMG Peat Marwick

KPMG Peat Marwick LLP

Requirements Management on the Reserve Component Automation System (RCAS)

Presentation for the SEI
November 1996

Please refer questions regarding this presentation to:

Brian J. Snarzyk, Senior Manager
Francis L. Gangemi, Senior Consultant
Federal Services Group 2001 M Street, NW, Washington, DC 20036 (202) 467-3030

KPMG is a leader in providing professional services to both the Government and industry throughout the world.

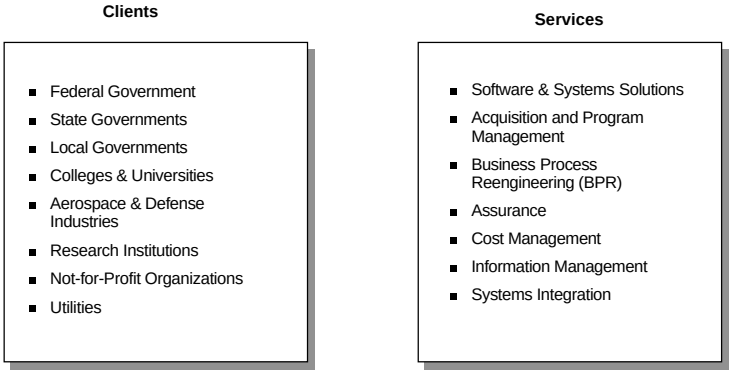
KPMG Peat Marwick LLP, the U.S. member firm of the multinational co-partnership, is organized along five lines of business:

- Financial Services
- Health Care and Life Sciences
- Information, Communications, and Entertainment
- Manufacturing, Retailing, and Distribution
- Public Services

With business roots tracing back to 1897, KPMG is a major business in the U.S. and around the world.

1

Within the Public Services line of business, our clients and services are very broad-based.



2

The Reserve Component Automation System (RCAS) is an automated information system designed to support the decision-making needs of the U.S. Army Reserve and National Guard.

The fully developed system will allow the Reserve Components to more efficiently execute their mission. More specifically, the RCAS will:

- Provide timely and accurate information needed to support mobilization.
- Meet the decision-making information needs of commanders and managers throughout the management structure.
- Improve the accomplishment of recurring administrative tasks that support day-to-day operations.
- Enable the automated exchange of data between the U.S. Army Active and Reserve Components.

The RCAS will be installed at approximately 5,000 locations in all 50 states, Guam, Puerto Rico, the Virgin Islands, Europe, and the Pacific Rim, supporting more than 50,000 users.

3

The RCAS is a state-of-the-art system that supports 11 functional areas.

The RCAS solution utilizes state-of-the-art office automation, hardware and telecommunications, as well as Government- and Commercial-off-the-Shelf (GOTS and COTS) software.

Workstation	Pentium 133 MHz computers with 2GB HD
Database Server	UNIX-based processors migrating to Intel servers
OA Suite	Microsoft Office Professional
Operating System	Microsoft Windows NT V.3.51
Application Software	Based on GOTS, COTS, or new development supporting 11 functional areas. These include human resource management, training, logistics, maintenance, and force authorization.

As a gauge of the size of the software development effort, the is estimated to encompass 50,000 function points.

4

Using the rapid application development (RAD) methodology, the RCAS development activity encompasses thousands of high-level requirements.

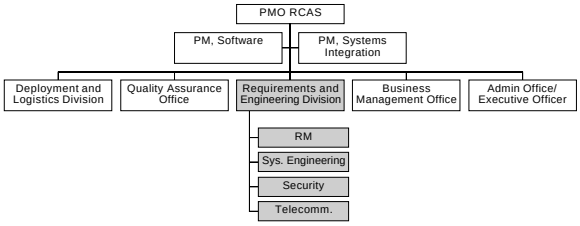
The RAD methodology is characterized by:

- Development of applications in **small increments** that are constrained in scope to be implementable in a short duration "timeboxes."
- Development of each timebox application by a **small team** comprising both developer and end-user personnel.
- Extensive use of **prototyping** --applications that are built by evolving an operational prototype, rather than by the traditional "design it all, code it all, test it all" paradigm.
- Exploitation of opportunities for **software reuse** and for use of **modern software development tools**

5

From an overall management perspective, the RCAS Program Management Office (PMO) is responsible for executing the RCAS contract.

The Requirements and Engineering Division, with approximately 15 Government and 60 contractor support personnel, fully integrates both the requirements management and development activities within the Government's PMO.

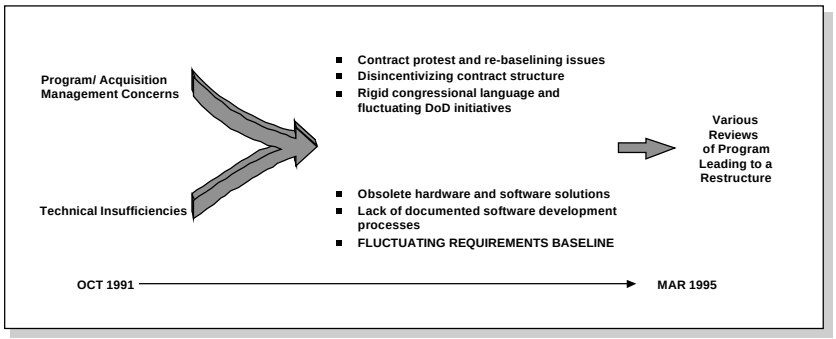


The Requirements and Engineering Division interfaces directly with the Prime Contractor's hardware and software engineering organization and is directly involved in all phases of functional timebox implementation, with particular emphasis on requirements analysis and development.

6

The initial RCAS Program suffered from a series of technical and program management obstacles.

From October 1991 through March 1995, the RCAS Program was formally reviewed by over 30 external agencies. Finally in April 1995, the Chief, National Guard Bureau commenced a major restructure of the program. Among the many initiatives of the restructure effort was the reengineering of the RCAS requirements management process.



7

In the first four years of the program, the RCAS suffered from a fluid functional requirements baseline.

The RCAS Functional Baseline was several years old at the time the contract was initiated. Consequently, many of the user business processes and external interface requirements were no longer valid.

In addition to validity issues, the requirements were defined and documented at an extremely high level of detail. This had two effects:

- It hindered proper decomposition; and, in conjunction with the age of the baseline,
- Led to multiple changes.

8

In addition to the shortcomings associated with the actual requirements, the program had difficulty integrating a split user base into the RM process.

ARNG's and USAR's differing view of the program's role in the Reserve Component, coupled with the two organizations' distinct business processes, hindered the program's ability to execute a credible RM process. In addition, a single, empowered advocate for functional requirements did not exist.

Therefore, during the restructure, a Customer Focus Team (CFT) was created to address these user issues. The CFT, co-chaired by senior-level representatives from the USAR and ARNG, has several responsibilities:

- Define and prioritize a detailed set of user needs that drive the technical solution.
- Through discussions with the Prime Contractor, group functional requirements into logical development packages that map to functional communities in the ARNG and USAR.

During the restructure activity, the CFT was instrumental in obtaining user "buy-in" on the restructured technical solution, and establishing a functionally-oriented budget baseline.

9

After the program restructure, the CFT established a Requirements Control Board (RCB) for the long-term management of the requirements baseline.

The primary function of the RCB includes:

- identifying and prioritizing RCAS functional requirements as outlined in the Operational Concept Description (OCD); and,
- managing requirements change requests submitted by the user community.

Co-chaired by the CFT, the RCB is comprised of representatives (Functional Proponents) from the user community's 11 functional areas. Each Functional Proponent is responsible, as a member of the RCB, for providing coordination, direction, and prioritization for the functional areas within their purview.

After the RCB identifies its requirements baseline, it is their responsibility to submit these requirements to the Technical Configuration Control Board (TCCB) for implementation. While the RCB is responsible for identifying and prioritizing the requirements of the system, the TCCB, comprised of representatives from the PMO RCAS, is responsible for developing the solutions which enable the requirements to be met.

10

The RCAS RCB is also responsible for identifying user support to the program.

While the major focus of the RCB is on requirements, the board is also involved in the identification and resolution of Government Subject Matter Expert (GSME) support requirements. The GSMEs provide day-to-day support to the program, offering valuable expertise on the entire RM and development phases. This includes:

- enterprise and data modeling and development;
- requirements analysis and decomposition;
- GOTS/COTS identification;
- Timebox development; and,
- timebox integration and testing evaluation.

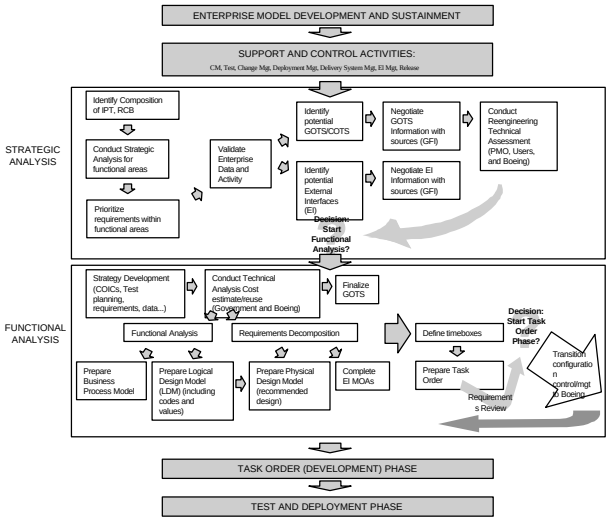
11

While the Government was restructuring to meet the RM needs of the new solution, the restructured contract required SEI CMM compliance by the Prime Contractor.

Within the requirements management key process area, the Prime Contractor CMM team focused on several initiatives, including:

- Defining and documenting processes and procedures that ensured the traceability and evolution of product requirements.
- Identifying and assessing candidate requirements management tools based on their ability to comprehensively trace requirements through the entire project lifecycle. The Requirements Traceability Manager (RTM) was selected because of its strength in relating requirements with:
  - analysis and design information
  - test cases and results
  - release information
- Developing and implementing processes that ensured GSME support and accurate Government-furnished information (GFI) were provided at appropriate intervals in the project.

In addition to leading the SEI CMM Level 2 initiative, the Prime Contractor introduced a new requirements management process.



The RCAS Program requirements management process is documented as part of both the Contractor and Government CM Plans.

The CM Plans include detailed processes for:

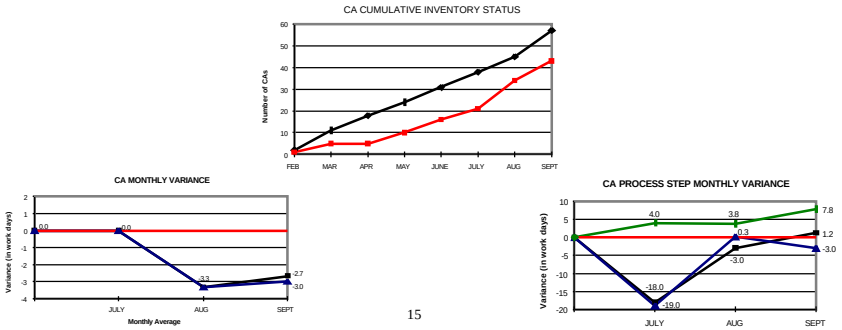
- requirements identification and control during the development phase (to include the RCB and TCCB interaction);
- procedures for conducting release assessments to ensure the product meets the requirements; and,
- managing requirements changes.

14

We have developed a requirements change metrics program to measure the efficiency of our RM process.

While detailed metrics regarding requirements stability and traceability are currently being developed as part of the ongoing RTM implementation, we have taken the first step in measuring the overall RM process.

Often, changes would take months or years to implement. With the introduction of our metrics program, processing times have been reduced to an average of 45 days.



15

Litton/PRC

Introducing Requirements Management at Litton/PRC

Craig R.Hollenbach
hollenbach_craig@prc.com

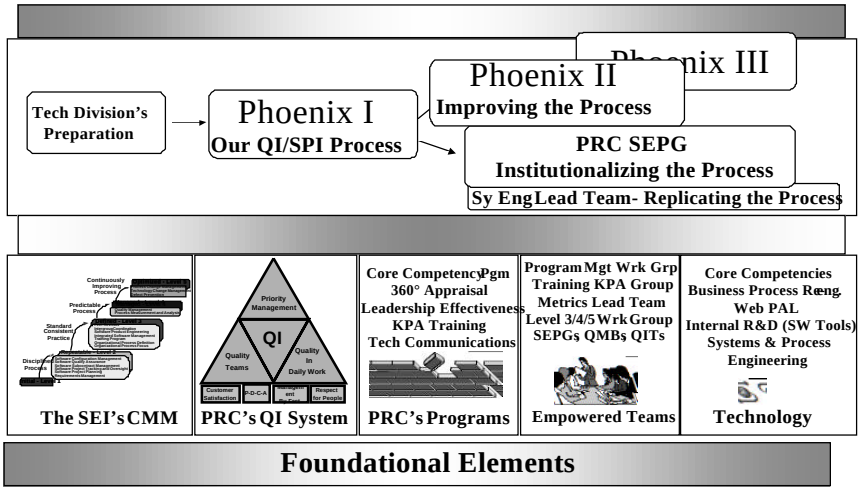
Agenda

- PRC Company Context (slide 2)
- PRC SPI Context (slides 3-5)
- Process Reuse (slide 6-10)
- Small Project Experiences (slides 11-15)

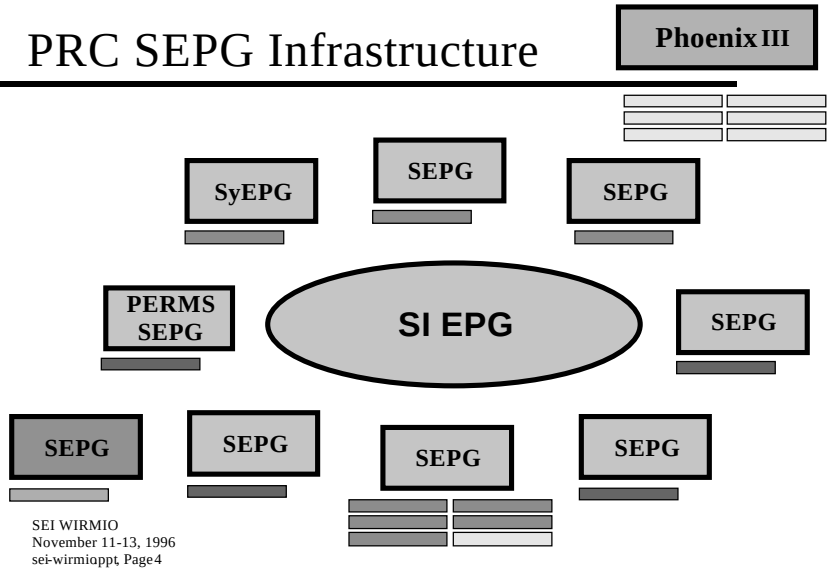
PRC Company Context

- PRC is a leading provider of information technology and systems-based solutions for the US Government and commercial clients. A subsidiary of Litton Industries, Inc., PRC has more than 5,600 employees in 300 offices nationwide.
- PRC focuses its work on six priority markets: defense/intelligence, criminal justice/public safety, electronic commerce, health, education and environment.
- Four levels of management responsible for development
- Number of requirements ranges from 0 to 20K+

Software Process Improvement at PRC



PRC SEPG Infrastructure



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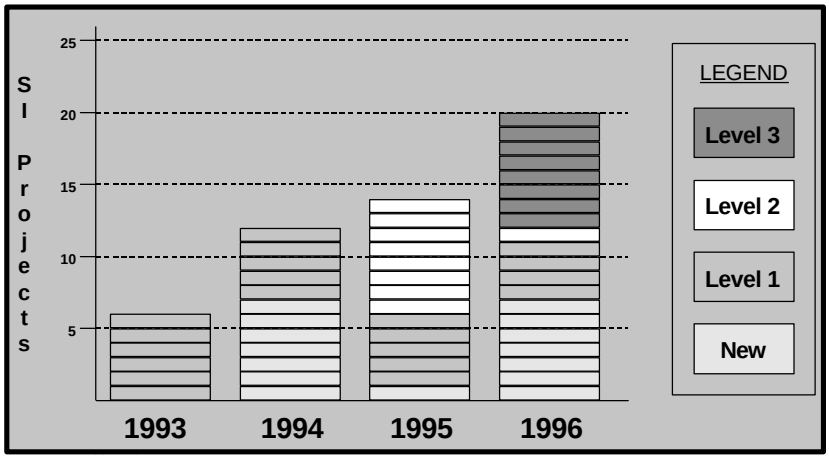
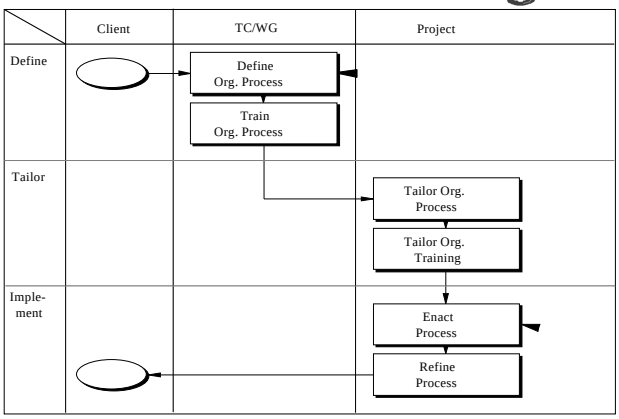
PRC/SI Progress in SEI Maturity



Process Reuse and Tailoring

- Uses domain engineering principles to create reusable processes
- Uses Process DID (ETVX + QIDW)
- Projects tailor reusable processes to their environment
- 55% of project processes were tailored from reusable corporate processes in 1995

Life of a Process



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PRC Process Data Item Description

- Provides overall template for describing a process
- Includes:
  - General Information
  - Customer Description
  - Interface Description: Inputs, Outputs, When to Start and Finish
  - Process Tasks
  - Metrics
  - Process Context
- PRC Standard

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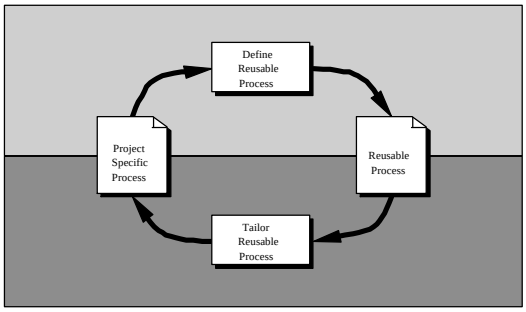
Process Tailoring and SPI/QI



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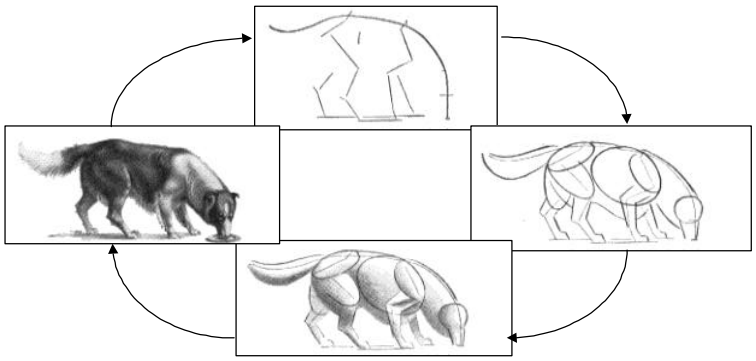
Continuously Improving Reusable Processes



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Small Project Case Study #1 - Context

- Business unit level effort (60 people)
- Part of Phoenix II
- Types of Products:
  - Defense Information Management Systems
  - Commercial Electronic Agent Systems (voice,bbs, & fax)
  - Defense Multimedia Systems
- +/- 40 Sole Source Task Orders (95% LOE, maintenance work with some OO/PowerBuilder tasks)
- Task order duration ranges from 3 weeks to 1 year
- +/- 50 Requirements per task order
- 1-7 People per task order

Small Project Case Study #1 - Before & After

- Before: SPI/KPA-clueless
- After:
  - Entire business unit involved in KPA teams,
  - Set of level 2 & 3 reusable process assets,
  - Presently implementing tailored processes,
  - Received unsolicited 15 extra task orders this year

Small Project Case Study #1 - Improvement Process (14 months)

- Created 13 KPA teams; each team had 1 SEPG member, 1 manager, & 1-3 technical staff
- Each team used QI Story to drive improvements
- SEPG member/manager attended corporate KPA training, Team Leader Training
- All members attended QIDW training
- Tailored corporate processes to business unit (with corporate consultation)
- Trained task order managers on all business unit processes
- Managers tailor business unit processes/assets to individual task orders
- Managers train task order staff
- Task order implements tailored processes & collects process metrics

Small Project Case Study #1 - Developed Assets & Reuse

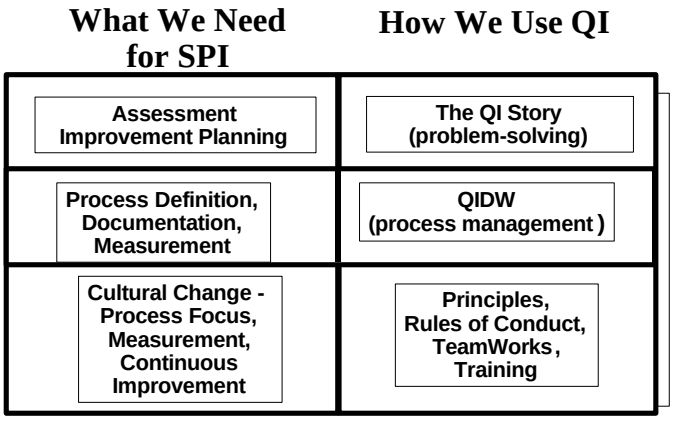
- Assets
  - (RM) Template - Excel spreadsheet
  - (RM) Processes, including metrics
  - Task Order plan templates
  - Introduction scenarios
- Reuse
  - Business Unit B (similar characteristics) tailored Business Unit A's process assets in 7-8 months
    - » Used Business Unit A as consultants
    - » Streamlined training and QI story steps
  - Business Unit C tailored 80% of Business Unit A's process assets in 6 months

Small Project Case Study #2

- 10 person, 12 month government project
- Requirements from government client, with users from 2-3 government organization
- Delivered level 2 KPA training; each session included:
  - 1 hour training of reduced KPA process set
  - 1 hour process tailoring workshop
  - Homework: finish tailoring processes
- Done in 3 week timeframe
- Tailored from Corporate processes and assets from case study #1 business unit
- Additional process consultation
- "Following process training with process tailoring was invaluable."

Extras

PRC's QI and SPI Programs



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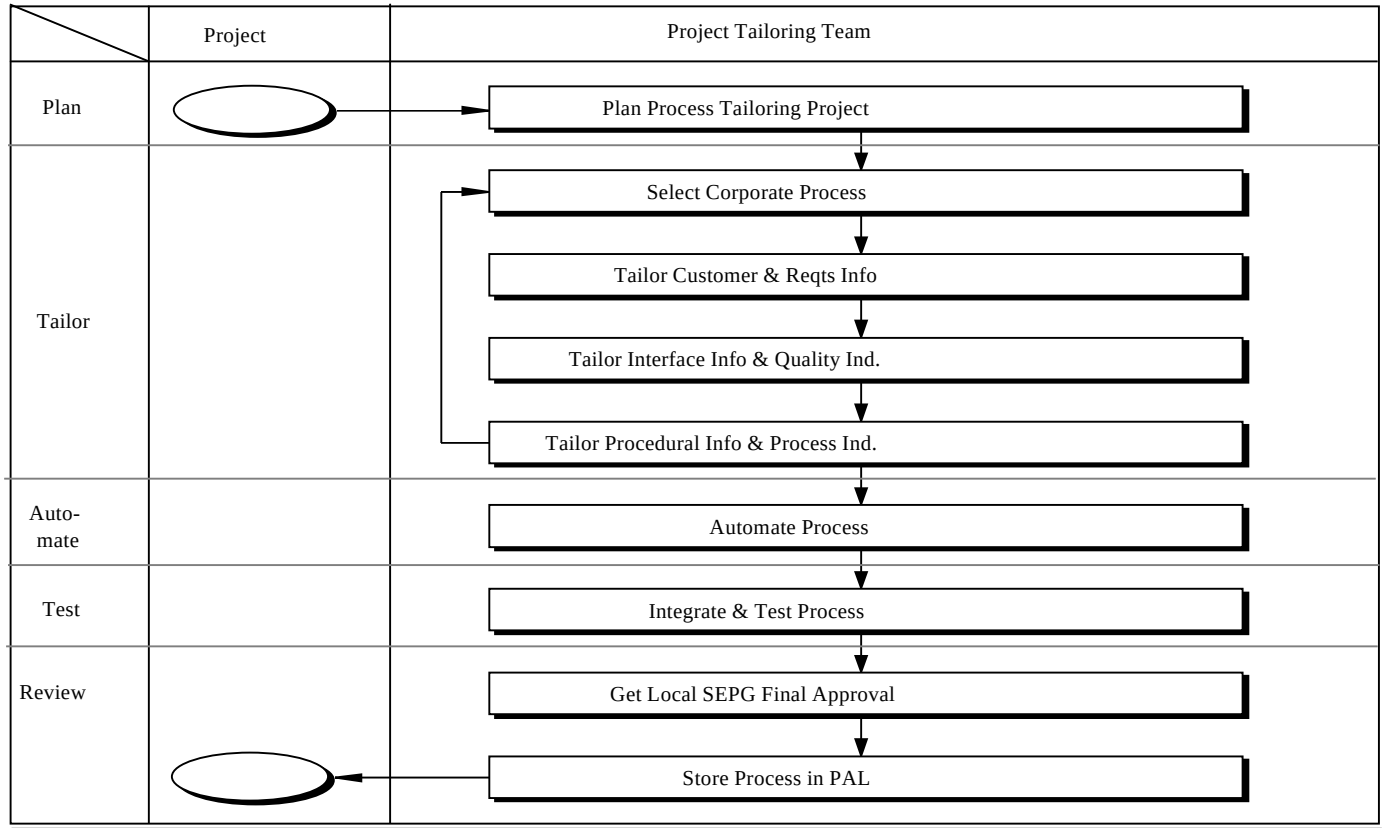
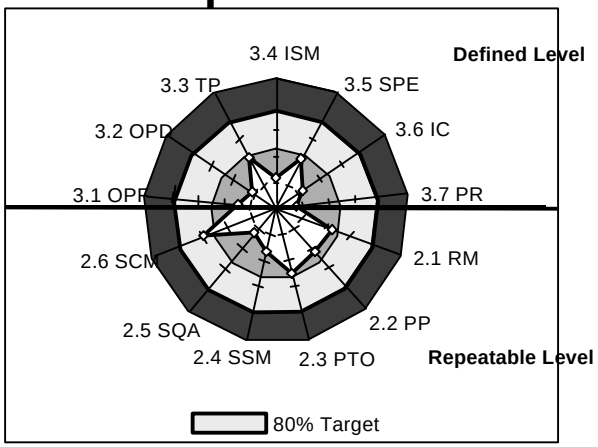
The Process Tailoring Process



Phoenix Projects: Before and After

April 1993



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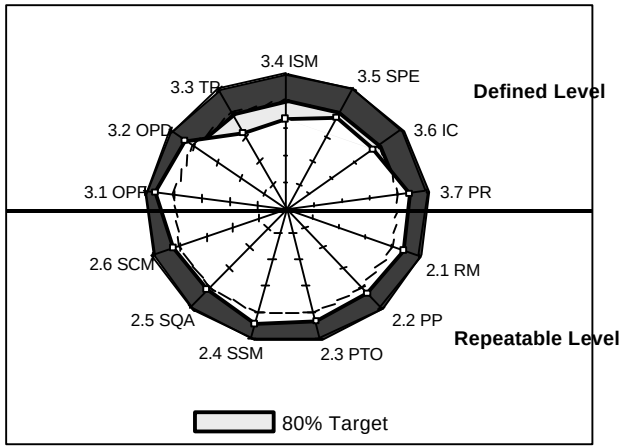


Maturity as measured by the % of 'yes' questions toPRC's Maturity Questionnaire (which is more extensive than the SEI Maturity Questionnaire 1.1)

Phoenix Project RM Scenario

- 2. Describe what you had to develop or adapt internally, including any or all of these:
- Steps for introduction of RM and guidance on executing the steps
  - APS Used Action Plan, QI Story, QIDW Process Management
  - Life of a Process
  - "Define, Document, Train, Implement" paradigm
  - 9 Steps to KPA Happiness
  - SEPG QuickLooks
- Templates and examples of plans for introducing RM into one or more organizational units
  - SPIP and Action Plan Templates
- Process model and guide for doing RM
  - Reusable Processes
  - Process Architecture
- Education and coaching materials for sponsors
  - Biennial ESSRs, 2 PRC Technical Seminars, Courses in Managing QI, Managing SPI
  - Innumerable Briefings for Clients and Management
- Document examples, templates and guidance, e.g. for a policies or a software requirements specification
  - PRC policies
  - SIM SRS DIDs & Project Documentation standards and examples
- Annotated bibliography
- "Sales" information and briefings for the RM action team to use for buy in
- Requirements and specifications for training or orientation for all participants
  - Jeannette Holstein
- Criteria for selecting subject matter experts and vendors
- Subject matter expert list, with contact information (list does not imply endorsement)
- Vendor list, with contact information (list does not imply endorsement) cost/benefit analyses and related
- Consulting scenarios (how to help projects adopt)
- Strategies for adapting these approaches to different domains such as information systems, embedded systems, and software products
- Training selection and customization criteria
- Tool selection, customization, and installation guidance
- Reprints of commonly-cited reference papers
- 3. Describe what you had to buy, including either products or services; you can refer to the list in 2 above for this as well.
- 4. Keep in mind we are trying to compare experiences related to time and nature of effort, and costs in introducing RM

Reuse: L. Dwinnell's group tailored DODIM processes in 7-8 months

- lessons learned from DODIM streamlining process - oral tradition & consulting
- where DODIM got best bang for the buck - cut out QI Story
- set of tailored processes that matched org structure
- setup cross teams for expert guidance in CMM learning curve
- didn't take corporate training - just talk to our guys
- could use DODIM templates: plans, checklists, policies, processes, etc.
- SEPG KPA team structure

Mgrs tailored DODIM processes for IM, PP, RM for 40+ TO sole-source proposals (got 15 more than they expected) - output: SDPs

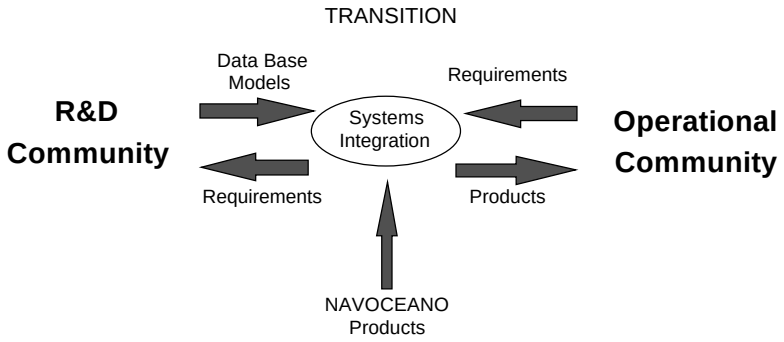
Naval Oceanographic Office

Introducing Requirements Management Into Organizations Workshop

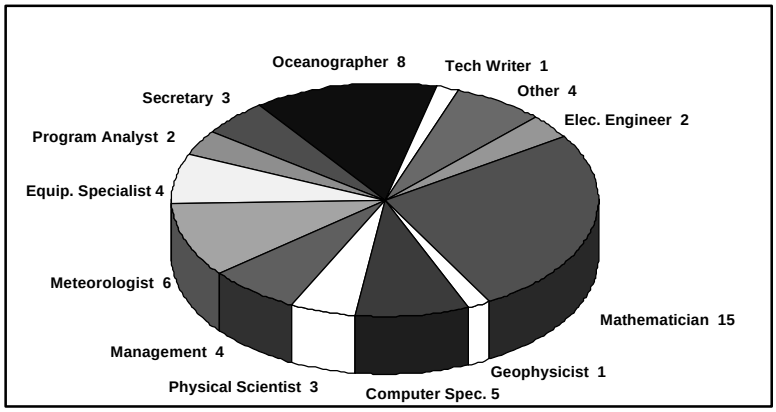
November 1996

Lana Cagle
Systems Integration Department
Naval Oceanographic Office

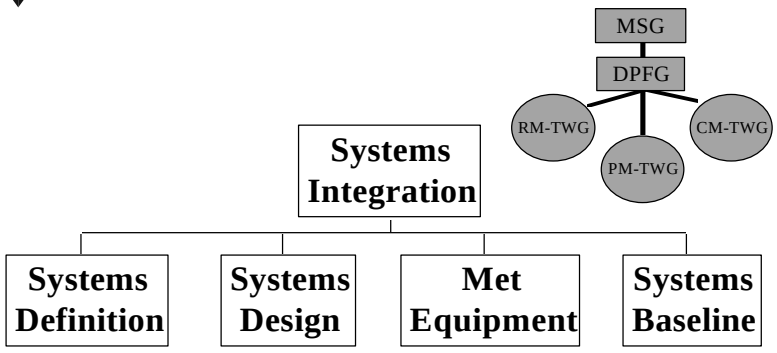
R&D Transition



Resources: Diverse Workforce



Process Improvement Infrastructure



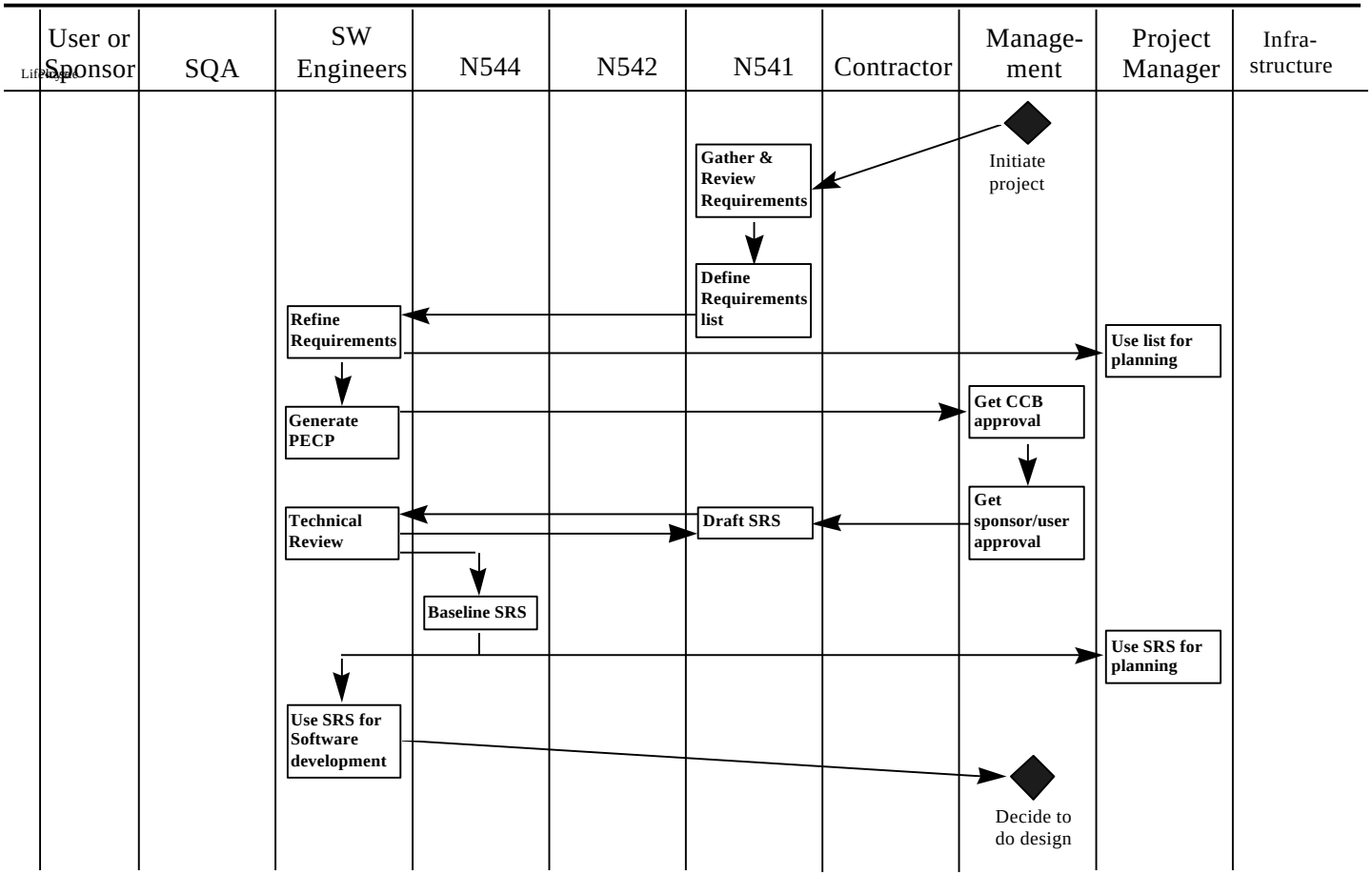
Deriving the TO BE Process

- ✓FASTRAK Training
- ✓Team Charter & Plan
- ✓Initial TO BE
- ✓AS IS
- ✓Refining TO BE

Current State

- ◆Verbal Requirements
- ◆Misinterpreted Requirements
- ◆No Traceability
- ◆No Clear Boundaries
- ◆Project Phases Overlap
- ◆Angry Personal Attacks

Establish & Control S/W Requirements for a New Project



THOMSON-CSF
TTM / DIRECTION LOGICIEL ET SYSTEMES

RM workshop

Pittsburgh - november 1996

TTM / DIRECTION LOGICIEL ET SYSTEMS

The THOMSON-CSF context (1/3)

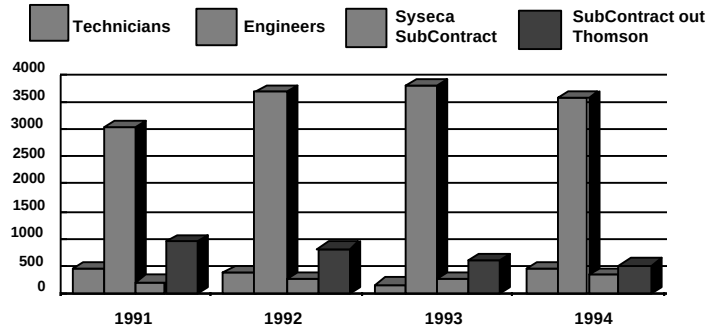
SOFTWARE is one of the main (and increasing) added values in our systems (between 13% and 90% of the total of our principal projects).

Significant figures in SW:

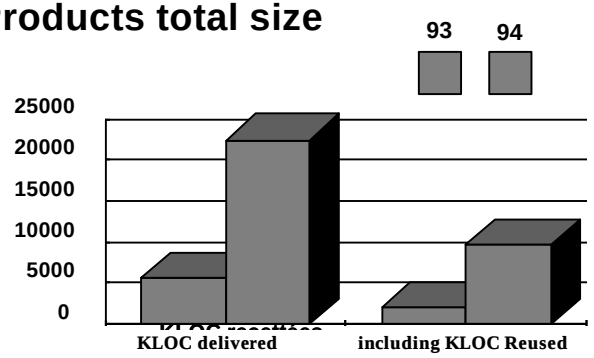
- **4600 people, where approx 1600 are SYSECA engineers and 500 are subcontractors;**
- **more than 20 million source instructions* delivered (30% in Ada, 50% in C).**

* Without SYSECA

Staffing



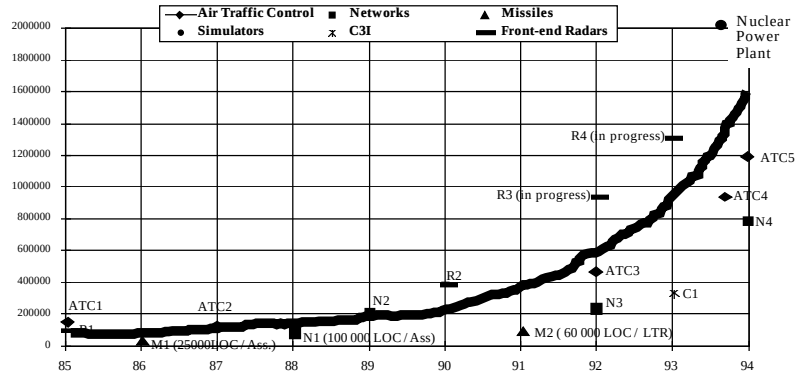
Products total size



93, Without: DSI, RGS, SDS, SYSECA
94, Without: RCC, SYSECA, NCS Hengelo

THOMSON-CSF

The THOMSON-CSF context (2/3)



THOMSON-CSF

The THOMSON-CSF context (3/3)

- Typical stories on domains:
  - ✧ Starting a "Product Line Approach" (ATC, Surveillance Radar...), a PBL is partially in place !
  - ✧ Avionics, with successive builds as Aircraft Manufacturers are "designing", but where sometimes, req. evolves in an unplanned manner
  - ✧ Optronics, where performances are key,
  - ✧ Simulators, where req. are generally stable (the actual system generally already exists),
  - ✧ Good and bad experiences of IPT (Army C3, ACCS...) and incremental developments.

THOMSON-CSF

Key dates in THOMSON-CSF

- 1990: a corporate SW methodology based on 2167-A
- 1992: first SPA assessments
- 1993: the methodology for programs is stabilized; one feature is:
  - 3 key persons in a project,
    - the Project Manager (PM),
    - the "Chef de Service" (a manager per technical discipline),
    - and the Work Package Manager.
- 1993: a methodology and a tool for system engineering

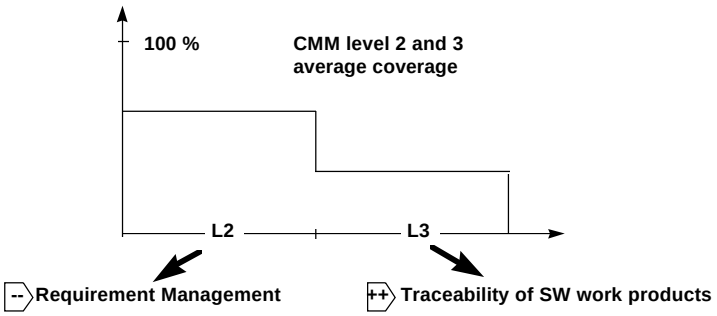
Status in 1992/1993 (1/3)

- Typical SPA findings were:
  - System specification/design was weak (not always fully developped or fixed before SW development begins),
  - inconsistencies in requirements were sometimes discovered during integration,
  - Roles, responsibilities, activities and goals of SW project management not always clearly defined and assigned,
  - SW management did not always had strong influence in developping internal schedule,
  - no systematic, documented commitment process;

Status in 1992/1993 (2/3)

- Typical findings were (cont.):
  - ✧ SW project management was fragmented among several managers,
  - ✧ Position of SW project leader in the organization was weak v.s. system engineering,
  - ✧ SW management was not responsible for the SW specification and interfaces,
  - ✧ Scope of relationship of the PM and the "chef de service" was not clearly defined.
- Abstract:
  - ✧ SSDD was weak,
  - ✧ Little place for enabling the SW-PM to commit,
  - ✧ RM was one of the weakest KPA.

Status in 1992/1993 (3/3)



Presently: some remaining difficulties

- Think RM without regressing on traceability practices,
- Which provisions to make, if the SW-PM only reviews SRS/STP and not SSDD,
- Lower focus on acceptance criteria and non-technical req.,
- Tool minded,
- The SE tool v.s. the SW work product traceability tool,
- A few Units where SW-PM is still not responsible of SRS/IRS.

The SPIce-Th corporate action: *SPICE II*

93-94 PAT

SW Indicators	Unit 1 in charge
SW planning, tracking and oversight	Unit 2 in charge
SW Quality Assurance	Unit 3 in charge
Requirements Management	Unit 4 in charge
SW Configuration Management	Unit 5 in charge
SW Subcontract Management	Unit 6 in charge
Peer Reviews	Unit 7 in charge
SW Reuse	Unit 8 in charge
SW Risks Management	Unit 9 in charge
SW Estimation	Unit 10 in charge

After # 10 months for PAT, 3 months for designing a corporate training module for each

The corportate RM training at Campus THOMSON

- about 200 persons trained (from end of 1994 to now),
  - ✧ some for intra-Unit training follow-up (CS),
  - ✧ mainly PM, SW-PM, CS, SQA persons and Product Manager (Prime Item),
  - ✧ a one day training with,
    - ▫ introduction on the SE methodology,
    - ▫ experience sharing in SE (...interdisciplinary teamwork...) and RM,
    - ▫ a formal module on RM (CMM),
    - ▫ exercises (ETVX on KPA RM, "assessing the Unit practices", "find problems in req. statement"...).

The commitment Form (1/2)

- Initiated before 1993 as a "Work Package Form";
- For SW, a simple 4 pages (average) form,
  - ✧ Entry documents (SSDD...),
  - ✧ Critical dependencies,
  - ✧ Cost, schedule commitment,
  - ✧ Deliveries and milestones,
  - ✧ Top ten risks,
  - ✧ Sign-off by PM, SW-PM (*) and "Chef de Service".

(*) Normally applicable for each WPM and his CS

The commitment Form (2/2)

- Advantages:
  - ✧filling each heading, forces to implement a lot of level 2 practices...
  - ✧a synthesis of the commitments, the quotation, the SOW...
  - ✧allow to commit simply on small projects or proposal efforts...
  - ✧is part of the key elements that can be simply kept updated.

Acronyms

- C3: Command-Control-Communication
- CMM: Capability Maturity Model
- CS: Chef de Service
- ETVX: Entry-Task-Verification-Exit
- IPT: Integrated Product Team
- IRS: Interface Req. Specification
- PBL: Product Baseline (DoD-2167-A)
- PM: Program/Project Manager
- SE: System Engineering
- SPIce-Th is not ISO-SPICE: Software Process Improvement and Capability Evaluation - Thomson-CSF
- SRS: SW Req. Specification
- SSDD: System/Segment Design Document
- STP: SW Test Plan
- SW: Software
- SW-PM: SW Project Manager
- WPM: Work Package Manager

Experiences Introducing Requirements Management

Linda Fay McCalla, Ph.D.
Texas Instruments Software Core Competency

Software Engineering at TI

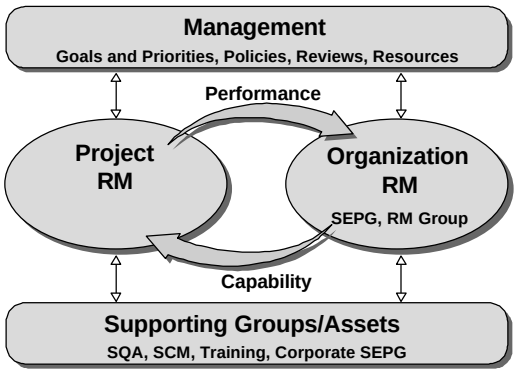
Runs Our Businesses

Sold As Products

Embedded In Products

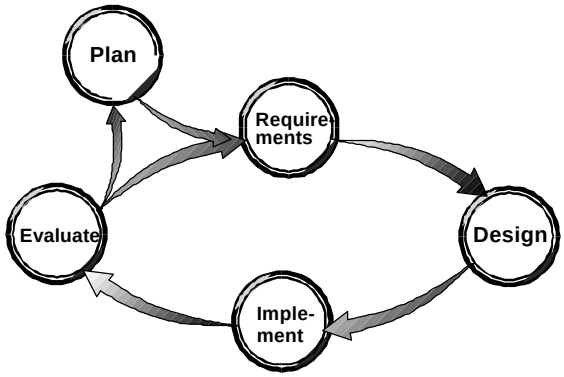
Texas Instruments

Infrastructure

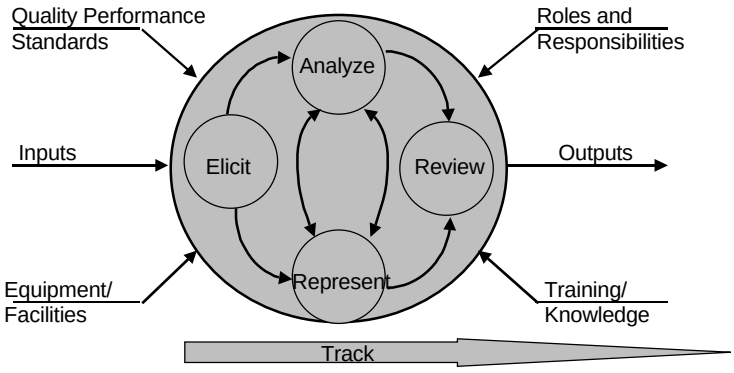


Texas Instruments

Basic Development Cycle

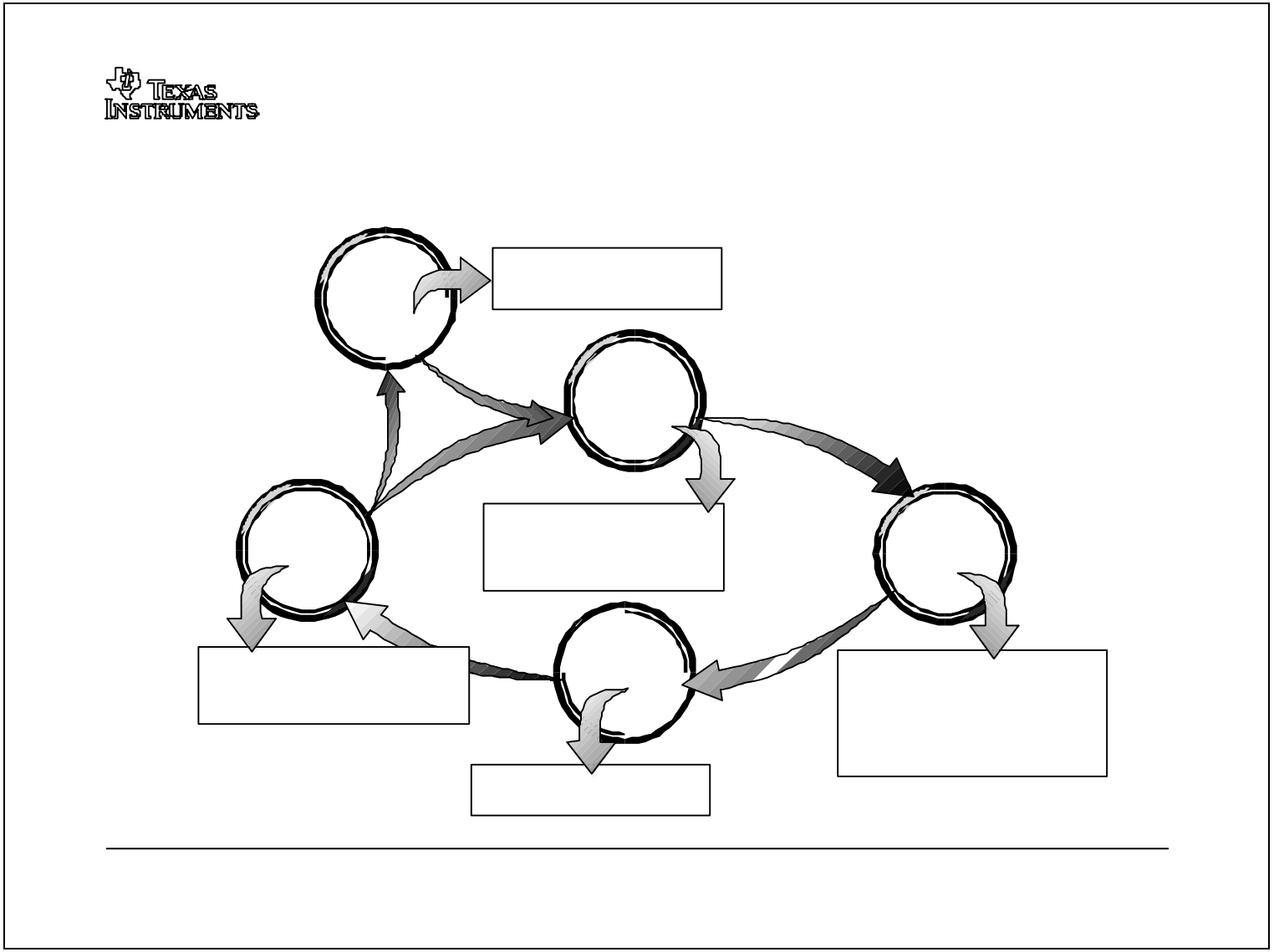


Requirements Engineering Process



Requirements for RM

- **Identified sponsors for RM**
- **Used requirements elicitation process**
- **Analyzed results**
- **Developed initial plans**
- **Reviewed needs and plans with sponsors**

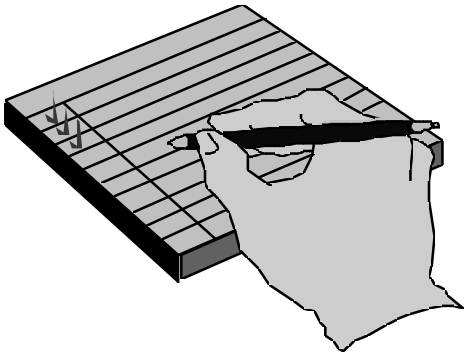


Deployment Materials

- Reviewed requirements
- Identified available material
- Made reuse/buy/build decisions
- Designed materials
- Tested/piloted materials

Deployment Mechanisms

- Surveys of requirements practices
- Videotapes (with slides and scripts)
- Technical Interchanges
- TechNotes
- Process definitions
- Training classes
- Checklists



TEXAS INSTRUMENTS

RM Deployment

- **Corporate level**
- **Organization level**
- **Project level**

Deployment Review

- Maintained communications with organizations and projects
- Reviewed lessons learned
- Updated processes and materials as warranted

Deployment Lessons Learned

- Select your sponsor early
- Understand needs of target audience
- Work with organizations - don't dictate
- Use unusual approaches and humor
- One method doesn't work in all situations
- Examples and templates are essential
- Checklists help
- Be flexible

United Defense

UDLP - Ground Systems Division

Requirements Management
Stuff That Works

11-18-96
Dao Vu
408 289 2737 Fax 408 289 4950
dao_vu@fmc.com

United Defense

Outline

- About the company
- Software Process Improvement initiative
- Requirements Management activities

About the company

United Defense

- Mechanical, electrical, manufacturing background
- Objective: maintain leading position in ground combat vehicle integration
- Bradley A3 is the first major software development effort

UDLP. 1996 SEI RM workshop

3

About the SW Eng. org.

United Defense

- Functionally aligned, SW engineers matrixed to programs
- 60 engineers: mix of contractors and permanent employees
- Bradley A3 is the largest SW work. BFIST and C2V are smaller efforts
- Bradley A3 uses incremental development approach
- Programs have complete control of cost and schedule

UDLP. 1996 SEI RM workshop

4

The SPI initiative

United Defense

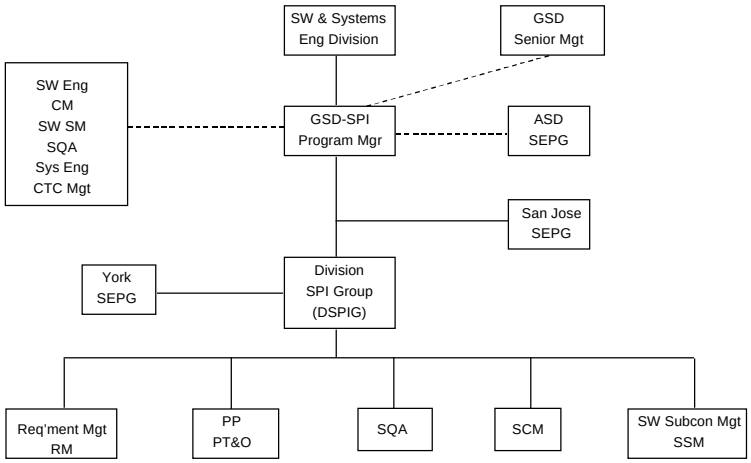
- Start from ground level
- Total support from senior management
  - SEPG budget
  - Visible support: award, opening remarks
  - SPI program status update
  - Make SPI a performance factor

The SPI initiative (cont.)

United Defense

- SPI approach
  - Start with process activities that produce immediate return-on-investment
  - Establish infrastructure: training, SEPG, SPI newsletter, reading materials, build up relationship with other groups (SCM, SQA, RM etc.)
- SPI structure

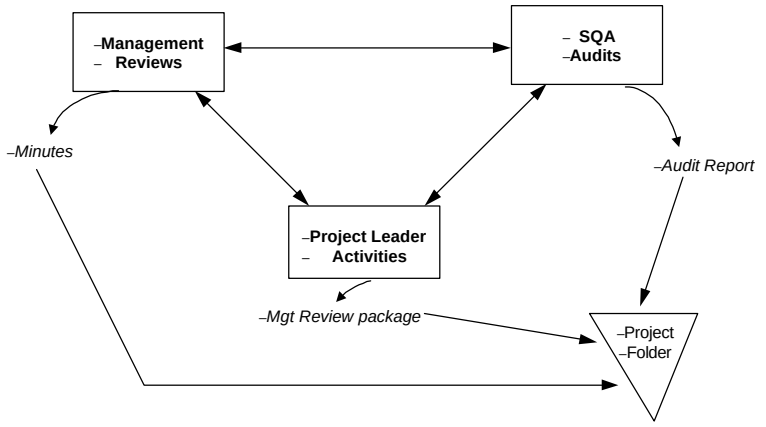
SPI structure



The SPI initiative (cont.)

- SPI implementation plan
  - Achieve CMM level 2 in June 97
  - Three phased plan
  - Division Software Process Improvement Group
  - Check-and-balance system: triad operation

Triad operation



REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (LEAVE BLANK)	**2.** REPORT DATE April, 1997	**3.** REPORT TYPE AND DATES COVERED Final from 11/96 to 4/97
4. TITLE AND SUBTITLE Proceedings of the Introducing Requirements Management into Organizations Workshop: Requirements Management Transition Packages November 11-13, 1996		**5.** FUNDING NUMBERS C — F19628-95-C-0003
6. AUTHOR(S) Priscilla Fowler and Mac Patrick		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15213		**8.** PERFORMING ORGANIZATION REPORT NUMBER CMU/SEI-97-SR-001
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) HQ ESC/AXS 5 Eglin Street Hanscom AFB, MA 01731-2116		**10.** SPONSORING/MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES		
12.A DISTRIBUTION/AVAILABILITY STATEMENT Unclassified/Unlimited, DTIC, NTIS		**12.B** DISTRIBUTION CODE

13. ABSTRACT (MAXIMUM 200 WORDS)

This document summarizes the findings and presents the raw data from the Introducing Requirements Management into Organizations workshop hosted by the SEI (Software Engineering Institute) in November 1996. A transition package consists of a process description, related materials for users of the description, and materials for use by change agents in action teams and technical working groups introducing requirements management processes and tools into their organizations. The workshop participants considered the feasibility of building a transition package to expedite the adoption of effective requirements management practice and concluded that a transition package can and should be built for requirements management. This document records and publicizes the findings of the workshop, including problems and opportunities related to requirements management transition packages identified by workshop participants.

14. SUBJECT TERMS requirements management, transition, transition package			**15.** NUMBER OF PAGES. 159
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	**18.** SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	**19.** SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	**20.** LIMITATION OF ABSTRACT UL