Proceedings of the
*Introducing Requirements Management into Organizations Workshop: Requirements Management Transition Packages*
November 11-13, 1996
Priscilla Fowler
Mac Patrick

April 25, 1997
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Priscilla Fowler
Mac Patrick
Transition Enabling Program

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Software Engineering Institute
Carnegie Mellon University
Pittsburgh, PA 15213
Table of Contents

1. About This Document .............................................................................................................. 1
   1.1 Purpose of This Document ................................................................................................. 1
   1.2 Intended Audience ............................................................................................................. 2
   1.3 Organization of This Report ............................................................................................. 2
2. Background ............................................................................................................................. 3
   2.1 Transition Packages ........................................................................................................... 3
   2.2 Workshop Background ....................................................................................................... 4
   2.3 Prior Technical Work ........................................................................................................ 4
3. Workshop Description ............................................................................................................. 6
   3.1 Participants ....................................................................................................................... 7
   3.2 Workshop Purpose ........................................................................................................... 7
   3.3 Overview of Activities ..................................................................................................... 9
   3.4 Description of the Workshop Activities ............................................................................ 9
      3.4.1 Day 1 (11/11/96) ....................................................................................................... 9
      3.4.2 Day 2 (11/12/96) ..................................................................................................... 10
      3.4.3 Day 3 (11/13/96) ..................................................................................................... 11
4. Data Gathered at the Workshop ............................................................................................. 12
   4.1 Organization and RM Process Profiles ........................................................................... 13
   4.2 Characteristics of Artifacts and Materials ....................................................................... 16
   4.3 Inventory of RM Artifacts Brought and Displayed .......................................................... 18
   4.4 Proposed Artifacts for RM Transition Packages ............................................................. 20
5. Proposed Next Steps .............................................................................................................. 27
   5.1 Users and User Needs ...................................................................................................... 27
   5.2 Artifacts, Samples, and Examples .................................................................................. 28
List of Tables
Table 1: Organization and RM Process Profiles, Part 1 .................................................. 14
Table 2: Organization and RM Process Profiles, Part 2 .................................................. 15
Table 3: Artifact & Support Characteristics, Part 1 ......................................................... 16
Table 4: Artifact & Support Characteristics, Part 2 ......................................................... 17
Table 5: The “Wall Chart” - Matrix of Artifacts Grouped and in Sequence (Abridged) .... 21
Table 6: Legend .................................................................................................................. 57
Table 7: The “Wall Chart” - Matrix of Artifacts Grouped and in Sequence (Complete) .... 58
Proceedings of the
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 (CMM)-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.

Capabilities 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\textsuperscript{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.\textsuperscript{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.

\textsuperscript{1} DOORS is a trademark of Quality Systems and Software, Inc.

\textsuperscript{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) 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 raw data from the wall chart exercise, mapped to phases of a generic life cycle and also to the IDEAL model.

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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.

5IDEAL is a service mark of Carnegie Mellon University.
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 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>
<thead>
<tr>
<th>RM Characteristics</th>
<th>Aimware, Ltd.</th>
<th>Hughes Aircraft Company</th>
<th>KPMG Peat Marwick</th>
<th>Naval Oceanographic Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>software</td>
<td>military, aerospace, commercial</td>
<td>federal / military</td>
<td>military</td>
</tr>
<tr>
<td>Type of product</td>
<td>software engineering database</td>
<td>electronics</td>
<td>large application systems</td>
<td>environmental prediction SW systems</td>
</tr>
<tr>
<td>Length of product life</td>
<td>new release each 6 months</td>
<td>weeks to decades</td>
<td>approx. 10 years</td>
<td>one year</td>
</tr>
<tr>
<td>Organization size</td>
<td>8</td>
<td>40000</td>
<td>Govt. = 200, prime contractor = 300</td>
<td>60</td>
</tr>
<tr>
<td>Levels of management</td>
<td>2</td>
<td>6</td>
<td>multiple govt. levels</td>
<td>2</td>
</tr>
<tr>
<td>Size of applications</td>
<td>current code base = 30 MB</td>
<td>varies</td>
<td>varies</td>
<td>450K - 40 applications</td>
</tr>
<tr>
<td>Size of user community</td>
<td>900</td>
<td>very large</td>
<td>50000</td>
<td>Navy fleet, other DoD users</td>
</tr>
<tr>
<td>Characteristics of user community</td>
<td>software engineering groups</td>
<td>defense and commercial</td>
<td>split user base with differing expertise</td>
<td>Navy spread throughout world and at sea</td>
</tr>
<tr>
<td>Size of req'ts supplier community</td>
<td>5 organizations</td>
<td>no</td>
<td>same as user community</td>
<td>same as user community</td>
</tr>
<tr>
<td>Characteristics of req'ts supplier community</td>
<td>SEPGs</td>
<td>diverse</td>
<td>same as user community</td>
<td>various</td>
</tr>
<tr>
<td>Requirements type (market-oriented, contractual)</td>
<td>market = 50%, contractual = 50%</td>
<td>market-oriented and contractual</td>
<td>contractual, system, functional</td>
<td>new capabilities, upgrades in existing capabilities</td>
</tr>
<tr>
<td>Number of req'ts supported</td>
<td>1000</td>
<td>not provided</td>
<td>thousands: 50,000 function points</td>
<td>300 change request forms/project release</td>
</tr>
<tr>
<td>RM introduction steps</td>
<td>PDCA</td>
<td>not provided</td>
<td>CMM training, req'ts doc's reviews, re-use POS</td>
<td>currently deriving</td>
</tr>
</tbody>
</table>
### Table 2: Organization and RM Process Profiles, Part 2

<table>
<thead>
<tr>
<th>Company &amp; RM Characteristics</th>
<th>PRC</th>
<th>Texas Instruments</th>
<th>Thomson CSF</th>
<th>United Defense</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry</strong></td>
<td>system integration, mostly govt. oriented</td>
<td>Various—semiconductors, defense, digital imaging, software, calculators, notebook computers</td>
<td>THICKS</td>
<td>Defense</td>
</tr>
<tr>
<td><strong>Type of product</strong></td>
<td>Info systems—e.g., automated patent system, weather systems, criminal justice</td>
<td>Semiconductors, software productivity tools, mobile computing products, consumer electronics products, electrical controls, and metallurgical materials</td>
<td>professional electronic</td>
<td>tracked ground vehicles</td>
</tr>
<tr>
<td><strong>Length of product life</strong></td>
<td>9 mos. to multi-years development &amp; maintenance</td>
<td>weeks to decades</td>
<td>0.5 to 5 years</td>
<td>20 years</td>
</tr>
<tr>
<td><strong>Organization size</strong></td>
<td>5600</td>
<td>Approximately 60,000 employees world-wide</td>
<td>37,000 ppl—4600 SW engineers</td>
<td>60 engineers</td>
</tr>
<tr>
<td><strong>Levels of management</strong></td>
<td>4 plus</td>
<td>4 plus</td>
<td>5 to 6</td>
<td>no</td>
</tr>
<tr>
<td><strong>Size of applications</strong></td>
<td>all sizes &lt; 12 to ??</td>
<td>varies</td>
<td>50 KLOC to 2,000 KLOC</td>
<td>1 MLOC</td>
</tr>
<tr>
<td><strong>Size of user community</strong></td>
<td>various</td>
<td>customers world-wide</td>
<td>government administration</td>
<td>Army</td>
</tr>
<tr>
<td><strong>Characteristics of use community</strong></td>
<td>various</td>
<td>varies</td>
<td>Administration, Ministry of Defense</td>
<td>distributed</td>
</tr>
<tr>
<td><strong>Size of req's supplier community</strong></td>
<td>various</td>
<td>varies (1 to thousands)</td>
<td>1 to 50 people; average ~5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Characteristics of req's supplier community</strong></td>
<td>various</td>
<td>various</td>
<td>various</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Requirements type (market-oriented, contractual)</strong></td>
<td>marketing, contractual</td>
<td>market-oriented, contractual, enhancement requests</td>
<td>enhanced</td>
<td>contractual</td>
</tr>
<tr>
<td><strong>Number of requirements supported</strong></td>
<td>50 to 20K</td>
<td>varies widely (less than 10 to thousands)</td>
<td>200 - 3000 system req's allocated to software</td>
<td>1700</td>
</tr>
<tr>
<td><strong>RM introduction steps</strong></td>
<td>various</td>
<td>tailored to the organization and domain</td>
<td>best-practices-&gt; guidelines -&gt; training course -&gt; implementation</td>
<td>various</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Artifact &amp; Support Characteristics</th>
<th>Aimware, Ltd.</th>
<th>Hughes Aircraft Company</th>
<th>KPMG Peat Marwick</th>
<th>Naval Oceanographic Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Templates and examples of plans</td>
<td>yes</td>
<td>no</td>
<td>configuration management plan, release plan</td>
<td>charter, tactical action plan</td>
</tr>
<tr>
<td>Process model and guide for RM</td>
<td>SEI operational Framework, SR-007</td>
<td>Hughes built, based on CMM and P1220</td>
<td>deployment chart &amp; ETVX</td>
<td>meeting minutes, project status mgs. w/ mgt., mgt. sponsor for each TWIG.</td>
</tr>
<tr>
<td>Education and coaching materials for sponsors</td>
<td>not needed</td>
<td>ad hoc</td>
<td>change management training</td>
<td>meeting minutes, project status mgs. w/ mgt., mgt. sponsor for each TWIG.</td>
</tr>
<tr>
<td>Document examples, templates and guidance</td>
<td>yes</td>
<td>no</td>
<td>provided</td>
<td>CSCI SRS-Mil -Std-498 D/D</td>
</tr>
<tr>
<td>Annotated bibliography</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>&quot;Sales&quot; briefings for RM</td>
<td>not used! used workshop instead</td>
<td>yes</td>
<td>no</td>
<td>mgt. briefs dept.</td>
</tr>
<tr>
<td>Requirements and specifications for training</td>
<td>no</td>
<td>some</td>
<td>no</td>
<td>compiling notes for RM departmental (based on FASTRAK &amp; Alan Davis' book, Software Requirements)</td>
</tr>
<tr>
<td>Criteria for selecting subject matter experts and vendors</td>
<td>no</td>
<td>no</td>
<td>functionally organized, chosen by user representatives</td>
<td>can relate and directly apply their expertise to your organization</td>
</tr>
<tr>
<td>Subject matter expert list</td>
<td>no</td>
<td>some</td>
<td>no.</td>
<td>FASTRAK, Dave Close; Union Switch &amp; Signal; David Maibor Associates- Military Standards</td>
</tr>
<tr>
<td>Consulting scenarios</td>
<td>search conference</td>
<td>some</td>
<td>no</td>
<td>consulting with FASTRAK</td>
</tr>
<tr>
<td>Strategies for adapting to different domains</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>divide responsibilities for defining req'ts, scientist defines req'ts in functional terms &amp; describes math and physics in standard mathematical notation, coders define design constraints; scientist does operational testing, user support, req'ts elicit.</td>
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<tr>
<td>Training selection &amp; customization criteria</td>
<td>no</td>
<td>not yet</td>
<td>yes</td>
<td>workshops</td>
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<tr>
<td>Tool selection, customization, &amp; installation guidance</td>
<td>internal tools</td>
<td>no</td>
<td>RTM tool</td>
<td>no</td>
</tr>
<tr>
<td>Reprints of commonly cited reference papers</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>Crosstalk - Requirements Traceability article - Air Force</td>
</tr>
<tr>
<td>Artifact &amp; Support Characteristics</td>
<td>PRC</td>
<td>Texas Instruments</td>
<td>Thomson CSF</td>
<td>United Defense</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----</td>
<td>-------------------</td>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Templates &amp; examples of plans</td>
<td>Yes, SPIP action plans</td>
<td>In some organizations</td>
<td>Yes - company restricted but can show</td>
<td>yes</td>
</tr>
<tr>
<td>Process model &amp; guide for RM</td>
<td>Yes, corporate and tailored for RM processes</td>
<td>yes</td>
<td>Yes - company restricted but can show</td>
<td>yes</td>
</tr>
<tr>
<td>Education &amp; coaching materials for sponsors</td>
<td>2 yr. executive sponsor status review (ESSR), tech. Seminars, courses in managing quality improvement, SW process improvement, briefings</td>
<td>High level requirements engineering briefing</td>
<td>yes - company restricted but can show</td>
<td>yes</td>
</tr>
<tr>
<td>Document examples, templates &amp; guidance</td>
<td>PRC policies, systems integration manual - SRS DIDs, sample RM databases</td>
<td>In some organizations</td>
<td>Yes - company restricted but can show</td>
<td>yes</td>
</tr>
<tr>
<td>Annotated bibliography</td>
<td>Yes - from SEI</td>
<td>yes</td>
<td>Yes - company restricted but can show</td>
<td>no</td>
</tr>
<tr>
<td>&quot;Sales&quot; briefings for RM</td>
<td>no - not particular for RM, lots for general SPI</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Training req'ts &amp; specs</td>
<td>yes - training dev't process collects training req'ts</td>
<td>In some organizations</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Criteria for selecting SMEs and vendors</td>
<td>no - not particular for RM, lots for general SPI</td>
<td>In some organizations</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>SME list</td>
<td>for some KPAs, not RM</td>
<td>Yes, for internal contacts; also have requirements working groups and requirements interest groups with group message address</td>
<td>no</td>
<td>FASTRAK, Software Systems Quality Committee (SC2C), Brian Lawrence, Performance excellence, Davis Systems</td>
</tr>
<tr>
<td>Consulting scenarios</td>
<td>Included in general consulting training</td>
<td>yes</td>
<td>several: writing training</td>
<td></td>
</tr>
<tr>
<td>Strategies for adapting to different domains</td>
<td>only conceptual</td>
<td>Some guidance on methods appropriate for various situations</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Training selection &amp; customization criteria</td>
<td>tried this; didn't work</td>
<td>Pointers to available training for requirements engineering</td>
<td>still in work</td>
<td>no</td>
</tr>
<tr>
<td>Tool selection, customization, and installation guidance</td>
<td>selection criteria, vendor list</td>
<td>Some organizations have groups to do this</td>
<td>can make a copy of ours</td>
<td>no</td>
</tr>
<tr>
<td>Reprints of commonly cited reference papers</td>
<td>included as appendices to training material</td>
<td>Pointers to these as well as web page links to key requirements sites and sources on the Internet and internal web pages*</td>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

*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
  - 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

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

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

<table>
<thead>
<tr>
<th>Generic Life-Cycle Phase</th>
<th>IDEAL Groupings</th>
<th>Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Req'ts Initiate</td>
<td>Standards &amp; policy</td>
<td>guidelines for working groups, interest groups</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Standards &amp; policy</td>
<td>policy: cost value criteria for decision-making board(s)</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Directions</td>
<td>roles and responsibilities of RM, magma, domain expert</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Directions</td>
<td>documentation list of relevant domain experts</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Role definitions</td>
<td>support: process champion</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Role definitions</td>
<td>support: internal consultant</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Role definitions</td>
<td>support: game integration plan</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Planning support</td>
<td>training required</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Standards &amp; policy</td>
<td>training: methodology</td>
</tr>
<tr>
<td>Req'ts Establish</td>
<td>Standards &amp; policy</td>
<td>documentation selection criteria for domain experts</td>
</tr>
</tbody>
</table>

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
### Artifacts Grouped and in Sequence by Life-Cycle Phase

<table>
<thead>
<tr>
<th>Generic Life-Cycle Phase</th>
<th>IDEAL Groupings</th>
<th>Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
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<td>Directions</td>
</tr>
<tr>
<td>Design</td>
<td>Establish</td>
<td>Directions</td>
</tr>
<tr>
<td>Design</td>
<td>Diagnose</td>
<td>Standards &amp; policy</td>
</tr>
<tr>
<td>Design</td>
<td>Establish</td>
<td>Directions</td>
</tr>
<tr>
<td>Design</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
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<td>Design</td>
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<td>Standards &amp; policy</td>
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</tr>
<tr>
<td>Design</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
</tr>
<tr>
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<td>Establish</td>
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<td>Design</td>
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</tr>
<tr>
<td>Implement</td>
<td>Action</td>
<td>Training</td>
</tr>
<tr>
<td>Implement</td>
<td>Action</td>
<td>Training</td>
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<tr>
<td>Implement</td>
<td>Action</td>
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</tr>
<tr>
<td>Implement</td>
<td>Action</td>
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</tr>
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<td>Establish</td>
<td>Samples</td>
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<tr>
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</table>

CMU/SEI-97-SR-001 23
## Artifacts Grouped and in Sequence by Life-Cycle Phase

<table>
<thead>
<tr>
<th>Generic Life-Cycle Phase</th>
<th>IDEAL Groupings</th>
<th>Artifact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrate</td>
<td>Establish</td>
<td>Transition tools</td>
</tr>
<tr>
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<td>Transition tools</td>
</tr>
<tr>
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<td>Action</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Establish</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Leverage</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>SRS template</td>
<td>Action</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Leverage</td>
<td>Deployment tools</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
</tr>
<tr>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
</tr>
<tr>
<td>Integrate</td>
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<td>Tool support</td>
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<td>Tool support</td>
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<tr>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
</tr>
<tr>
<td>Verify</td>
<td>Action</td>
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</tr>
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</tr>
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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 Engineering 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 are planning 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
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- 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, 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.

---

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].
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 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?


   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.

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.


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

<table>
<thead>
<tr>
<th>Legend of Abbreviations for the “Who Creates or Uses Artifacts” Column</th>
<th>Legend of Abbreviations for CMM Common Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbreviation</td>
<td>Full name</td>
</tr>
<tr>
<td>ct</td>
<td>change team (group leading effort to introduce requirements management)</td>
</tr>
<tr>
<td>ct mgr</td>
<td>change team manager (e.g., SEPG or Action Team lead)</td>
</tr>
<tr>
<td>eng</td>
<td>engineer</td>
</tr>
<tr>
<td>eng mgr</td>
<td>engineering manager</td>
</tr>
<tr>
<td>PM</td>
<td>project manager</td>
</tr>
<tr>
<td>sme</td>
<td>subject matter expert (person knowledgeable in requirements management)</td>
</tr>
<tr>
<td>sp</td>
<td>sponsor of change effort</td>
</tr>
</tbody>
</table>

<sup>6</sup> “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)

<table>
<thead>
<tr>
<th>Sequence Number</th>
<th>Generic Life-Cycle Phase</th>
<th>IDEAL Model Stages</th>
<th>Original Groupings from Workshop</th>
<th>Groupings with missing names added</th>
<th>Artifact</th>
<th>Who Creates or Uses this Artifact?</th>
<th>CMM Common Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plan</td>
<td>Leverage</td>
<td>Motivation &amp; support</td>
<td>Motivation &amp; support</td>
<td>support: human aspects, rewards, ownership</td>
<td>mgt, ti</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plan</td>
<td>Leverage</td>
<td>Motivation &amp; support</td>
<td>Motivation &amp; support</td>
<td>goals</td>
<td>ct, eng</td>
<td>oo</td>
</tr>
<tr>
<td>3</td>
<td>Plan</td>
<td>Leverage</td>
<td>Motivation &amp; support</td>
<td>Motivation &amp; support</td>
<td>motivation: why should this be done?</td>
<td>ct, eng mgt</td>
<td>oo</td>
</tr>
<tr>
<td>4</td>
<td>Plan</td>
<td>Initiate</td>
<td>Motivation &amp; support</td>
<td>Motivation &amp; support</td>
<td>Initiate</td>
<td>mgt, ct</td>
<td>ti</td>
</tr>
<tr>
<td>5</td>
<td>Plan</td>
<td>Establish</td>
<td>Planning support</td>
<td>Planning support</td>
<td>Planning support: project plan</td>
<td>ct</td>
<td>ac</td>
</tr>
<tr>
<td>6</td>
<td>Plan</td>
<td>Establish</td>
<td>Planning support</td>
<td>Planning support</td>
<td>Planning support: charter/tactical activities, plan deriving</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>7</td>
<td>Plan</td>
<td>Diagnose</td>
<td>Planning support</td>
<td>Planning support</td>
<td>Planning support: process model: how to introduce the process</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>8</td>
<td>Plan</td>
<td>Diagnose</td>
<td>Planning support</td>
<td>Planning support</td>
<td>Planning support: risk of pkg &amp; process</td>
<td>ct</td>
<td>ti</td>
</tr>
<tr>
<td>9</td>
<td>Plan</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy: policy: waivers/deviation policy</td>
<td>ct</td>
<td>ti</td>
</tr>
<tr>
<td>10</td>
<td>Plan</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy: policy: how to change &amp; approve</td>
<td>ct</td>
<td>ti</td>
</tr>
<tr>
<td>11</td>
<td>Plan</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy: policy: exception policy</td>
<td>ct, mgr, sp</td>
<td>oo</td>
</tr>
<tr>
<td>12</td>
<td>Plan</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy: policy standard</td>
<td>ct, mgr, sp</td>
<td>oo</td>
</tr>
<tr>
<td>13</td>
<td>Plan</td>
<td>Establish</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy: standards</td>
<td>eng, mgt, ab</td>
<td>ab</td>
</tr>
<tr>
<td>14</td>
<td>Plan</td>
<td>Initiate</td>
<td>Standards &amp; policy</td>
<td>Standards &amp; policy</td>
<td>policy standards: and the associated process to develop and introduce the policy (what is the role of the sponsor for that)</td>
<td>ct</td>
<td>ti</td>
</tr>
<tr>
<td>15</td>
<td>Plan</td>
<td>Establish</td>
<td>Team support</td>
<td>Team support</td>
<td>guidance on who should be on team</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>16</td>
<td>Plan</td>
<td>Establish</td>
<td>Team support</td>
<td>Team support</td>
<td>team charter</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>17</td>
<td>Plan</td>
<td>Action</td>
<td>Team support</td>
<td>Team support</td>
<td>team building</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>18</td>
<td>Plan</td>
<td>Action</td>
<td>Team support</td>
<td>Team support</td>
<td>prerequisites — mgt-approved team members &amp; time commitment</td>
<td>ct, mgr</td>
<td>ab</td>
</tr>
<tr>
<td>19</td>
<td>Plan</td>
<td>Action</td>
<td>Team support</td>
<td>Team support</td>
<td>roles &amp; responsibilities: Action</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>20</td>
<td>Plan</td>
<td>Diagnosis</td>
<td>Diagnostics</td>
<td>Diagnostics</td>
<td>problem solving strategy (e.g. as is?)</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>21</td>
<td>Plan</td>
<td>Diagnosis</td>
<td>Diagnostics</td>
<td>Diagnostics</td>
<td>assessment report - e.g. internal process improvement (IPM) report</td>
<td>all</td>
<td>mE</td>
</tr>
<tr>
<td>22</td>
<td>Plan</td>
<td>Establish</td>
<td>Diagnostics</td>
<td>Diagnostics</td>
<td>situation assessment: project priority vs. process priority</td>
<td>ct</td>
<td>ti</td>
</tr>
<tr>
<td>23</td>
<td>Plan</td>
<td>Initiate</td>
<td>Diagnostics</td>
<td>Diagnostics</td>
<td>case study (instrumentation and tracking to prepare case description)</td>
<td>all</td>
<td>ab, me, ve</td>
</tr>
<tr>
<td>24</td>
<td>Plan</td>
<td>Initiate</td>
<td>Communication support</td>
<td>Communication support</td>
<td>conference materials</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>25</td>
<td>Plan</td>
<td>Establish</td>
<td>Communication support</td>
<td>Communication support</td>
<td>meeting minutes</td>
<td>all</td>
<td>ab, ac</td>
</tr>
<tr>
<td>26</td>
<td>Plan</td>
<td>Action</td>
<td>Communication support</td>
<td>Communication support</td>
<td>facilitation (description of what, when, how)</td>
<td>ct</td>
<td>ab</td>
</tr>
<tr>
<td>27</td>
<td>Reqs</td>
<td>Diagnose</td>
<td>No heading</td>
<td>Directions</td>
<td>doc. (input) lessons learned</td>
<td>ct</td>
<td>ti, ab</td>
</tr>
</tbody>
</table>

58
Table 7: The “Wall Chart” - Matrix of Artifacts Grouped and in Sequence (Complete)

<table>
<thead>
<tr>
<th>Sequence Number</th>
<th>Generic Life-Cycle Phase</th>
<th>DEAL Model</th>
<th>Original Groupings from Workshop</th>
<th>Groupings with missing names added</th>
<th>Artifact</th>
<th>Groupings with missing names added</th>
<th>Who Creates or Uses this Artifact?</th>
<th>CMM Common Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Req's</td>
<td>Initiate</td>
<td>No heading</td>
<td>Standards &amp; policy</td>
<td>requirements from standards (CMM, SE CMM, ISO)</td>
<td>ct</td>
<td>ti</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Req's</td>
<td>Initiate</td>
<td>No heading</td>
<td>Standards &amp; policy</td>
<td>guidelines for working groups, interest groups</td>
<td>ct, eng</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Req's</td>
<td>Establish</td>
<td>No heading</td>
<td>Standards &amp; policy</td>
<td>policy: cost value criteria for decision making</td>
<td>mgr</td>
<td>ab</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Req's</td>
<td>Establish</td>
<td>No heading</td>
<td></td>
<td>roles and responsibilities of RM, mgt, domain</td>
<td>ct</td>
<td>co</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Req's</td>
<td>Establish</td>
<td>No heading</td>
<td>Directions</td>
<td>documentation list of relevant domain experts</td>
<td>ct</td>
<td>ti, ab</td>
<td></td>
</tr>
<tr>
<td>33</td>
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Table 7: The “Wall Chart” - Matrix of Artifacts Grouped and in Sequence (Complete)

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

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<td>eng, ac</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>Integrate</td>
<td>Action</td>
<td>Tool support</td>
<td>Tool support</td>
<td>tool documentation</td>
<td>eng, ac</td>
<td></td>
</tr>
<tr>
<td>117</td>
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<td>Action</td>
<td>Tool support</td>
<td>Tool support</td>
<td>tool descriptions</td>
<td>ct, ac</td>
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</tr>
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<td>Tool support</td>
<td>tool smiths</td>
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<tr>
<td>120</td>
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<td>Establish</td>
<td>Tool support</td>
<td>Tool support</td>
<td>information technology: RM tool implementation plan and procedure</td>
<td>mgt, eng</td>
<td>ti</td>
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<tr>
<td>121</td>
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<td>Establish</td>
<td>Tool support</td>
<td>Tool support</td>
<td>tool executables</td>
<td>eng, ac</td>
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<td>122</td>
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<td>Action</td>
<td>Tool support</td>
<td>Tool support</td>
<td>RM tool tailoring support</td>
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<td>Action</td>
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<td>performance appraisal forms</td>
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<td>ve, co, me</td>
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<tr>
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<td>No heading</td>
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<td>introduction effectiveness measures</td>
<td>ct, mgt</td>
<td>me</td>
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<td>senior management review record</td>
<td>ct, mgt</td>
<td>ve</td>
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<tr>
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<td>project management review record</td>
<td>ct, mgt</td>
<td>ve</td>
</tr>
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<td>Action</td>
<td>No heading</td>
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<td>SOA review record</td>
<td>ct, mgt</td>
<td>ve</td>
</tr>
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<td>128</td>
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<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>public relations for (good) results</td>
<td>ct, sme</td>
<td>o</td>
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<tr>
<td>129</td>
<td>Lessons Learned</td>
<td>Action</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>documentation: annotated bibliography</td>
<td>all</td>
<td>il, ab</td>
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<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>risks of package &amp; process</td>
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<td>ab</td>
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<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>lessons learned</td>
<td>ct</td>
<td>ab</td>
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<tr>
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<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>experience reports</td>
<td>ct</td>
<td>li</td>
</tr>
<tr>
<td>133</td>
<td>Lessons Learned</td>
<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>pilot/roll out case studies w/critical success factors</td>
<td>sp, mgt</td>
<td></td>
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<tr>
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<td>Lessons Learned</td>
<td>Leverage</td>
<td>Experience reports</td>
<td>Experience reports</td>
<td>success stories</td>
<td>all</td>
<td>ab</td>
</tr>
<tr>
<td>135</td>
<td>Lessons Learned</td>
<td>Action</td>
<td>Media</td>
<td>Media</td>
<td>information technology: web page &quot;newsletter&quot;</td>
<td>mgt, eng</td>
<td>ti</td>
</tr>
<tr>
<td>136</td>
<td>Lessons Learned</td>
<td>Action</td>
<td>Media</td>
<td>Media</td>
<td>technical notes of newsletter</td>
<td>ct, sp, mgt, eng</td>
<td>others</td>
</tr>
</tbody>
</table>
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 users)
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
- Process
- Procedure
- Standards
- Training
- Tools
  - Laws or Regulations
  - What happens over time
  - How to or 'step by step'
  - Definitions & Acceptance
  - Knowledge & Skills
  - 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.
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).

To ensure that the requirements of the client are baselined and if necessary changed and to ensure that all ideas for new products or changes to old products are consistently recorded and to ensure that these baselines drive (changes to the) software plans, work products and activities.
The Development Manager will annually review the number of changes to requirements requested by customers after the requirements have been agreed, in order to assess whether the Requirements process is effective.

50% of all requirements must come from external customers.

Requirements - 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:

<table>
<thead>
<tr>
<th>Key Practice</th>
<th>Relevant Y/N</th>
<th>Local Reference</th>
<th>Strengths/Weakness</th>
<th>Improvements Needed</th>
</tr>
</thead>
</table>

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 Delivery
- Customer Service
- Organisation
- People
- Process Definition
- Process Focus
- Peer Reviews
- Configuration Mgmt.
- Operations
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

Maximise Benefits

Assess the deployment options

Implement

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 may be 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

<table>
<thead>
<tr>
<th>Description</th>
<th>Status</th>
<th>Estimated Effort</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donal Connan</td>
<td>New</td>
<td>2.25</td>
<td>10</td>
</tr>
<tr>
<td>Eamonn McGuinness</td>
<td>New</td>
<td>0.12</td>
<td>1</td>
</tr>
<tr>
<td>System Achieve2 V1.0</td>
<td>New</td>
<td>0.10</td>
<td>1</td>
</tr>
<tr>
<td>Sub-System SPM V1.1</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>840 Project Role, has a field 'Report Type' as does Project Group1</td>
<td>New</td>
<td>0.10</td>
<td>1</td>
</tr>
<tr>
<td>This is also used by the Project Report form which means that</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>843 Determine what should be done to change view structure within 'projectware'</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>846 Performance, how can we improve it</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>Sub-System SPM V2.0</td>
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<td>1</td>
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<tr>
<td>595 Financial Year functionality to Charter Estimate</td>
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<tr>
<td>Sub-System SQA V1.0</td>
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<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>84 Remove Risks fields and implement field from actioned section</td>
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<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>406 Split SQA database into 217</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>594 Add workflow to Improvement form as follows</td>
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<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>595 Distinguish between Process and Project Improvements</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>590 Let who can be selected as the Improvement Manager to a select group (team leaders in Motorola)</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>593 Pull all project information into one place - Improvements, peers</td>
<td>New</td>
<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>reviews etc</td>
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<td>0.03</td>
<td>1</td>
</tr>
<tr>
<td>System Achieve3 V1.0</td>
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<td>1</td>
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<td>Sub-System ORG V2.0</td>
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<td>1</td>
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<td>[that I can see] Evaluation</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>Rory Boyle</td>
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</tbody>
</table>

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*SEI Reqs Mgmt  Transition Package  Éamonn McGuinness  v1.0 1996, Slide 43*
## Sample Requirement

### Requirements

**593**

**Summary**
- **Requirement Number:** 593
- **Originator:** Finlan Manning
- **Requirement Type:** Application Functionality
- **Date Submitted:** 27/03/96
- **Parent Requirements:**
- **Reason for Requirement:** Bug
- **Customer:** Motorola
- **Source:** Customer Visit
- **Target System:** Achieve2 V1.0
- **Source System:**

**Short Description:** Pull all project information into one place - Improvements, peer reviews etc.

**Detail**

**People Responsible:** Éamonn McGuinness

---

SEI Reqs Mgmt  Transition Package  Éamonn McGuinness  v1.0 1996, Slide 44
Teaching the Elephant to Manage Requirements
(Adopting Process & Tools Across the Corporation)

Dr. Jock Rader
Hughes Aircraft Company

Overview

- 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
**Hughes's Goals**

- 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

---

**Hughes Engineering Councils**

- Hughes Aircraft
- Radar & Communications
- Weapons
- Electro-Optical
- Information
- Systems/Software Engineering Council (SSEC)
- Process Owner Councils (POCs)
- SSEC Tools
- PMAST
- Executive Council
**Tech Transfer Concepts**

<table>
<thead>
<tr>
<th>Tech transfer phases</th>
<th>Transfer team roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build transfer team</td>
<td>Sponsor</td>
</tr>
<tr>
<td>Awareness</td>
<td>Champion</td>
</tr>
<tr>
<td>Selection</td>
<td>Change agents</td>
</tr>
<tr>
<td>First victim</td>
<td>First victim</td>
</tr>
<tr>
<td>Second victim &amp; beyond</td>
<td></td>
</tr>
</tbody>
</table>


**Rqts Mgt Selection Team**

- 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
Selection Chronology

- 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 MOL
- Sept    combined order --
          60 licenses, 12 classes,
          50 consulting days

DOORS Selection Drivers

- 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)
Goals

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).

Objectives

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
Process & Tools Efforts Need Alignment

- 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.

CASPs: Computer Aided SubProcesses

SubProcess: process fragment, e.g., reqs mgmt, CM

Methods/Procedures: e.g., str analysis, project mgmt

Tools: e.g., link reqs, proj mgmt, design, testing

Abstract levels of services

"... document each input & output for each major function"
Choice of First Victim

- 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

RCS First Victim History

- 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
First Victim’s Support

- 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

Excellent First Victims

- 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
Good Toolsmiths Critical

- 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

Internal Support Activities

- 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
Keeping the Caribou Strong

♦ Old Indian saying
   "It is the wolves' 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

Hughes Win Conditions

♦ 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
QSS Win Conditions

- 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

Summary

- 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
The purpose of this briefing is to introduce the requirements management process to the SEI RM

1. Firm Background and RCAS Program Summary
2. RCAS Restructure and Introduction of the RM Process
3. Post-restructure RM Execution

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.

United States
- KPMG Peat Marwick
- 16,600 Professionals
- 135 Offices
- $2.3 Billion Gross Revenues

Worldwide
- KPMG
- 136 Countries
- 76,200 Professionals
- 650 Offices
- $5 Billion Gross Revenues
Within the Public Services line of business, our clients and services are very broad-based.

**Clients**
- Federal Government
- State Governments
- Local Governments
- Colleges & Universities
- Aerospace & Defense Industries
- Research Institutions
- Not-for-Profit Organizations
- Utilities

**Services**
- Software & Systems Solutions
- Acquisition and Program Management
- Business Process Reengineering (BPR)
- Assurance
- Cost Management
- Information Management
- Systems Integration

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.
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.

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

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

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.
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.

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.
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.

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.
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 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.

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.
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.

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.
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.
- Four levels of management responsible for development
- Number of requirements ranges from 0 to 20K+
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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<tr>
<th></th>
<th>Define</th>
<th>TO/WG</th>
<th>Project</th>
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<tbody>
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<td>Tailor</td>
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<td>Tailor Org. Process</td>
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<td>Tailor Org. Training</td>
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<td>Implement</td>
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<td>Enact Process</td>
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<td>Refine Process</td>
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</table>

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
Process Tailoring and SPI/QI

Continuously Improving Reusable Processes
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."

SEI WIRMIO
November 11-13, 1996
sei-wirmio.ppl. Page 15

Extras
## PRC's QI and SPI Programs

<table>
<thead>
<tr>
<th>What We Need for SPI</th>
<th>How We Use QI</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>The QI Story</td>
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<tr>
<td>Improvement Planning</td>
<td>(problem-solving)</td>
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<tr>
<td>Process Definition, Documentation, Measurement</td>
<td>QIDW</td>
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<tr>
<td>Cultural Change - Process Focus, Measurement, Continuous Improvement</td>
<td>Principles, Rules of Conduct, TeamWorks, Training</td>
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# The Process Tailoring Process

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<th>Project Tailoring Team</th>
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<td>Tailor</td>
<td>Select Corporate Process</td>
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<td>Tailor Customer &amp; Reqs Info</td>
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<td>Tailor Interface Info &amp; Quality Ind.</td>
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<td>Tailor Procedural Info &amp; Process Ind.</td>
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<td>Automate</td>
<td>Automate Process</td>
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<tr>
<td>Test</td>
<td>Integrate &amp; Test Process</td>
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<tr>
<td>Review</td>
<td>Get Local SEPG Final Approval</td>
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<td>Store Process in PAL</td>
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</table>
Phoenix Projects: Before and After

April 1993

3.4 ISM
3.5 SPE
3.6 IC
3.7 PR
2.6 SCM
2.5 SQA
2.4 SSM
2.3 PTO

Defined Level

Repeatable Level

80% Target

Jan 1996

3.4 ISM
3.5 SPE
3.6 IC
3.7 PR
2.6 SCM
2.5 SQA
2.4 SSM
2.3 PTO

Defined Level

Repeatable Level

80% Target

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

SEI WIRMIO
November 11-13, 1996
sei-wirmio00, Page 19
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, QM/W Process Management
  - Life of a Process
  - "Define, Document, Train, Implement" paradigm
  - 9 Steps to EPA Happiness
  - SPIN QuickStart
- Templates and examples of plans for introducing RM into one or more organizational units
  - SEIP and Active Pan Template
- Process model and guide for doing RM
  - Reusable Processes
  - Process Architecture
- Education and coaching materials for sponsors
  - Relevant/ESiS 2 FRC Technical Sessions, Course in Managing QM, Managing SP
  - Viable/Relevant Briefings for Teams and Management
- Document examples, templates and guidance, e.g. for a policies or a software requirements specification
  - FRC policies
  - SEIP/ESiS Effort & 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 analysis 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 other 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

SEI WIRMIO
November 11-13, 1996
sei-wirmio.ppt, Page 20
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

proposals (got 15 more than they expected) - output: SDPs
Introducing Requirements Management Into Organizations Workshop

November 1996
Lana Cagle
Systems Integration Department
Naval Oceanographic Office

R&D Transition

TRANSITION

R&D Community

Data Base Models

Requirements

Systems Integration

Operational Community

Products

NAVOCEANO Products

Requirements
Resources: Diverse Workforce

- Oceanographer 8
- Tech Writer 1
- Secretary 3
- Program Analyst 2
- Equip. Specialist 4
- Meteorologist 6
- Management 4
- Physical Scientist 3
- Computer Spec. 5
- Mathematician 15
- Geophysicist 1
- Other 4
- Elec. Engineer 2
- Process Improvement Infrastructure

- Systems Integration
  - Systems Definition
  - Systems Design
  - Met Equipment
  - Systems Baseline
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

<table>
<thead>
<tr>
<th>User or Sponsor</th>
<th>SQA</th>
<th>SW Engineers</th>
<th>N544</th>
<th>N542</th>
<th>N541</th>
<th>Contractor</th>
<th>Management</th>
<th>Project Manager</th>
<th>Infrastructure</th>
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<td>Baseline SRS</td>
<td>Get sponsor/user</td>
<td>Use SRS for</td>
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- Decide to do design
RM workshop

Pittsburgh - November 1996
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

THOMSON-CSF  Réserve Groupe  TTM / DIRECTION LOGICIEL ET SYSTEMS
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.
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,
    o the Project Manager (PM),
    o the "Chef de Service" (a manager per technical discipline),
    o 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 developed 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 have strong influence in developing 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)

- Requirement Management
- Traceability of SW work products
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

<table>
<thead>
<tr>
<th>93-94 PAT</th>
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<tbody>
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<td>PM activities</td>
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After # 10 months for PAT, 3 months for designing a corporate training module for each
The corporate 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

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CMU/SEI-97-SR-001 133
Infrastructure

Management
Goals and Priorities, Policies, Reviews, Resources

Project RM

Organization RM

SEPG, RM Group

Supporting Groups/Assets
SQA, SCM, Training, Corporate SEPG

Basic Development Cycle

Plan

Evaluate

Design

Implement

Requirements
Requirements Engineering Process

Quality Performance Standards

Inputs

Roles and Responsibilities

Outputs

Equipment/Facilities

Represent

Experiences Introducing Requirements Management

11/11/96

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Requirements for RM

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

Plan
- Schedule/Plan Requirements Elicitation

Evaluate
- "Analyze" the Requirements
- Prioritize the Requirements
- "Review" the Requirements

Requirements
- Identify and Research the Problem Domain
- Define the Types of Requirements Needed

Design
- Identify Potential Sources for Requirements
- Determine the Elicitation Strategy
- Develop or Acquire Elicitation Aids

Implement
- Elicit the Requirements
- Record the Requirements

Experiences Introducing Requirements Management - 7
11/11/96

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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
Deployment Plans

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
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Outline

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

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

About the SW Eng. org.

- 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
The SPI initiative

- 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.)

- 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
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

- Management
  - Reviews

- Minutes

- Project Leader
  - Activities

- Mgt Review package

- SQA
  - Audits

- Audit Report

- Project Folder

UDLP: 1996 SEI RM workshop

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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.