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Customer Success Is Our Mission

A Universal Classification System for CMMI Artifacts

NDIA/CMMI Conference

Julie Schmarje

Raytheon Corp.

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Agenda

- Introduction
- Current Classification Systems
- Proposed System for CMMI Artifacts
- Examples
- Questions

Introduction

- **Raytheon Space and Airborne Systems (SAS)**
  - Achieved CMMI Level 3, Systems Engineering, Dec. 2003 and CMMI Level 5, Software Engineering, Sept. 2003, PSAS
    - ~ 400 employees
  - Achieved CMMI Level 3 for Software & Systems Engineering, Nov. 2003, El Segundo & Goleta
    - ~ 6500 employees
    - 6 Appraisal Programs
    - Over 7800 artifacts collected
    - Appraisals Conducted
      - 3 - Internal mini-appraisals (Summer 2003)
      - 1 - Class C (Sept 2002)
      - 3 - Class B (Dec 2002, Mar 2003, Aug 2003)
      - 1 - SCAMPI (Nov 2003)

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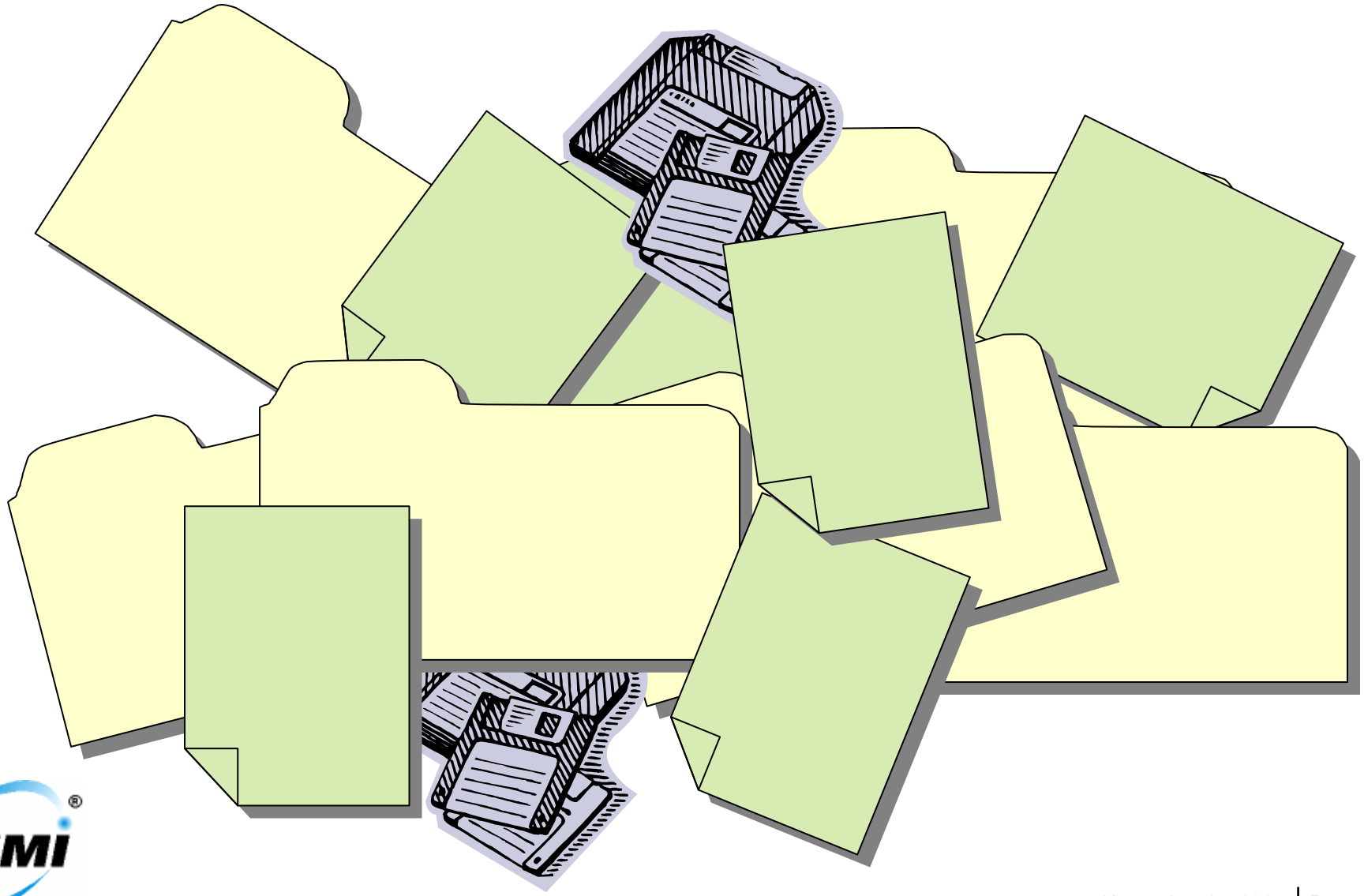
Artifact Data



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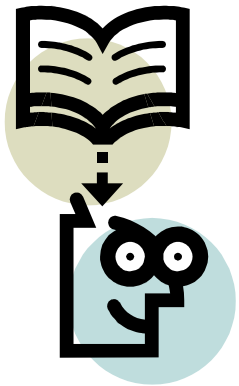
Artifact Management Issues

- Organizations can spend enormous amounts of time and money gathering program and org artifacts in preparation for CMMI appraisals.
- The number of artifacts gathered can be very large depending on the scope of the appraisal (target CMMI Level or capability, number of programs participating, etc.).
- When there are several Class B and C appraisals leading up to the SCAMPI, ensuring that the artifacts are not out of date can be overlooked.
- Managing this data from all the appraisals can be a daunting task.

Artifact Classification

- **Tools for use in appraisals can be utilized to catalog and maintain artifacts.**
- **Artifacts can also be cataloged using a classification system that would enable any organization large or small to manage their appraisal artifacts on a server or desktop.**
- **Two widely used classification systems could be used to establish a CMMI-based system.**
  - Library of Congress
  - Dewey Decimal System



Current Systems – Library of Congress

- **The Library of Congress Classification System consists of letters and numbers whose placement lends significance to the publication it's identifying. (For Example: QE 534.2 B64)**
- **Library of Congress Call Numbers begin with one, two, or three letters ("QE")**
  - The letters represent one of the 21 major divisions and their related subdivisions in the Library of Congress system.
- **Numbers follow letters ("534.2")**
  - Numbers help identify the publication's subject. The first three numbers are within a defined subject range, a "." followed by numbers help to further define a subject within the range.
- **Cutters ("B64")**
  - Cutters are coded representations of the author, organization's name, or the title of the work

Current Systems – Dewey Decimal System

- **The Dewey Decimal System (DDC) has been likened to a gigantic outline in which the broadest topics (classes) are followed by more specific types (subclasses and sub-subclasses) and indented in the outline. Example 796.082**
- **The DDC consists of ten main classes:**
  - 000: Computers, Information, and General Reference
  - 100: Philosophy and Pyschology
  - 200: Religion
  - 300: Social Sciences
  - Etc.
- **Each class has subclasses numbered 000-999 for one thousand sub-subclasses. (“796” for Sports)**
- **Further definition is added using a decimal followed by numbers. (“082” for Women’s Sports)**

CMMI Artifact Classification System

- **Any classification system would need to be:**
  - Easily understood: in order to be useful in other languages
  - Flexible: in order to be utilized (tailored) by different organizations
  - Manageable: in order to aid in managing the appraisal artifacts and avoid duplication
- **Options:**
  - Organize the numbering by:
    - CMMI categories (Process Management, Project Management, Engineering, and Support)
    - Process Areas (PAs)
    - Outputs

Basic Proposed System (1)

CM . 000 . P1 - CMPRev-.doc
PA Area Project Instance or Filename

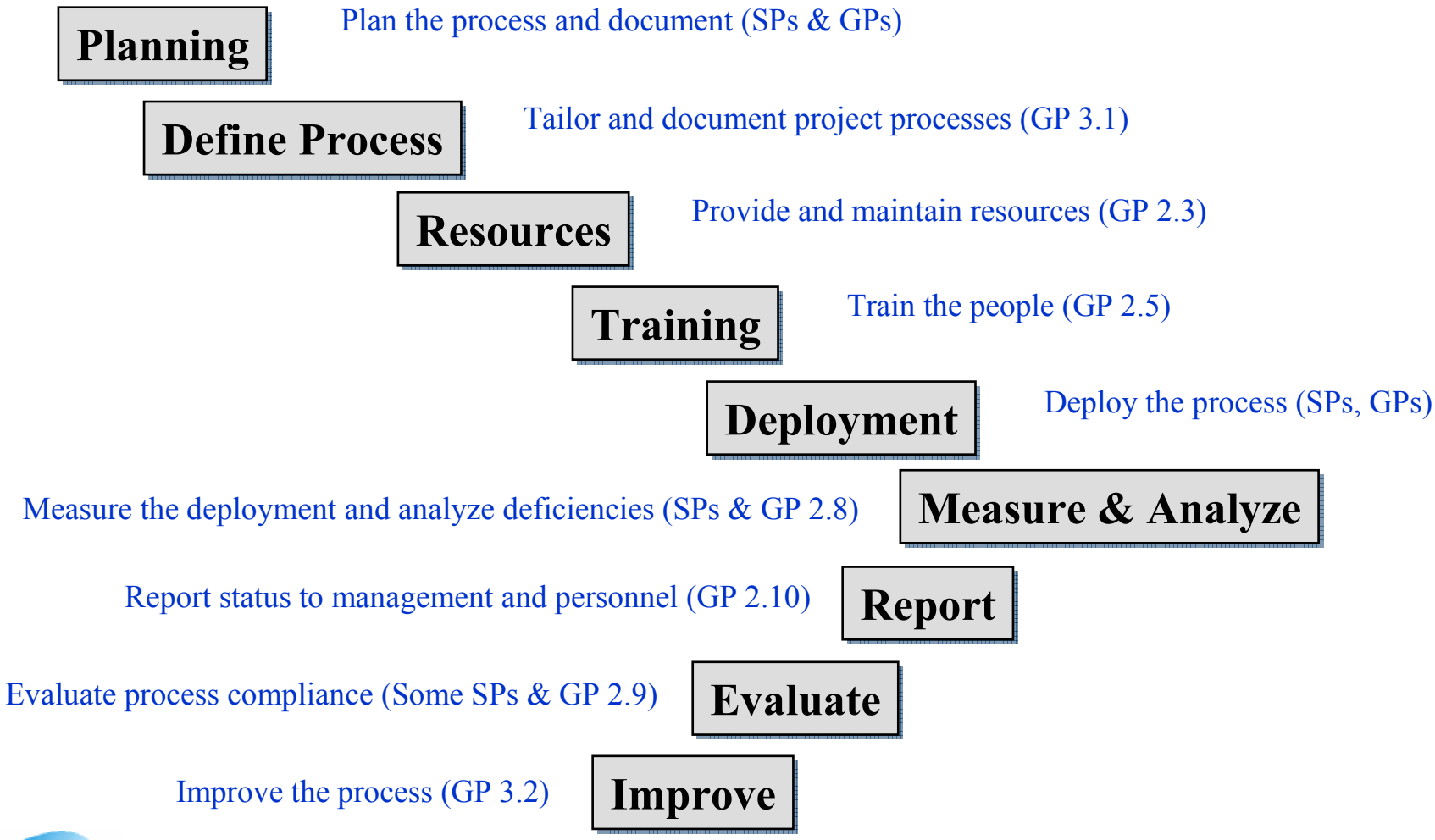
- **PAs (CMMI acronyms)**
- **Area (see next slide) – relates to the important activities that must be present to institutionalize the related process area.**
- **Project – the specific project that generated the artifact. An acronym or related number could be used.**
- **Instance of Filename**
  - Instance – when using a tool that maintains the artifact metadata, instance can be used to either indicate a specific version or revision of an artifact
  - Filename – when using a server to maintain the data, using the filename would provide the means for effective identification and sorting

Basic Proposed System (2)

CM . 000 . P1 - CMPRev-.doc
PA Area Project Instance or Filename

- **Area**
  - 000 Planning (including stakeholder ID, assigning responsibility, managing configuration)
  - 100 Defined Process (including establishing an Org Policy, tailoring, project work instructions, etc.)
  - 200 Resources (including staffing, budget, tools, facilities, etc.)
  - 300 Training (People performing and supporting the PA)
  - 400 Deployment (including the execution of the planned processes and activities)
  - 500 Measures & Analysis (including metrics, causal analysis, etc.)
  - 600 Reporting (including reports to functional, project, and senior management)
  - 700 Evaluations (including Reviews & Audits)
  - 800 Improvements (including Lessons Learned, Best Practices, Templates, Improvement Proposals, etc.)
  - 900 Miscellaneous

Data and the Area Fields



Analysis Example (1)

- **The second digit in the Area field could further define the type of data. This could be defined for each PA by analyzing the major activities.**
- **Using CM as an example – there are five functional areas:**
  - Planning
  - Configuration Identification
  - Configuration Control (consisting of Change Management and Product Management)
  - Status Accounting (including reporting)
  - Reviews & audits
- **Since Planning and Evaluations (reviews and audits) are part of the Area fields, 3 functional areas remain.**

Analysis Example (2)

- **The remaining functional areas can then be used to define sub areas within each area:**
  - CM Process (X0)
  - Identification (X1)
  - Change Management (X2)
  - Product Management (X3) (including the CM System)
  - Status Accounting/Reports (X4)
  - Miscellaneous (X5 – X9)
- **The third digit can be used to provide artifacts with a unique number for that type of area. If needed the number of digits used for the Area field could be increased.**

Artifact Examples

- **Tailoring**
  - CM P1 Tailoring Report (CM.100.P1),
  - CM P1 Tailoring Workshop Minutes (CM.101.P1)
- **Change Management**
  - P1 Change Mgmt Planning Minutes (CM.021.P1)
  - P1 Change Mgmt Work Instruction (CM.121.P1)
- **Product Management**
  - P1 ClearCase Licenses (CM.234.P1)
  - P1 User ClearCase Training (including materials, attendance, etc.) (CM.334.P1)
  - Change Request Report (containing change statistics) (CM.532.P1)
  - Baseline Report (from ClearCase showing the configuration of items under control for a baseline) (CM.634.P1)
  - Evaluation Report (report showing the results of an audit of the CM System, ClearCase) (CM.732.P1)

Classification System Advantages

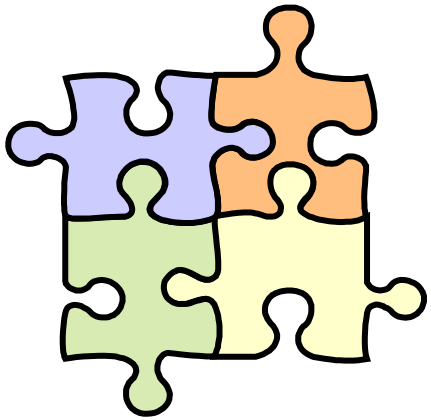
- **Easy to identify an artifact is without opening it up.**
- **For those artifacts used by multiple PAs and practices (e.g., plans), its easier to see if the artifacts have been collected.**
- **Easier to see how many artifacts have been collected, at a given point in time by:**
  - PA
  - Program in each PA
- **Easier to review the data for consistency (Level 3 on up) since the artifact listing would group all data from the appraisal programs together for each practice in a PA.**
- **Easy to utilize in database implementations due to its hierarchical nature.**

Artifact Collection Identification

- **It can be used to identify all of the types of artifacts that need to be collected.**
  - CM.000, CM Plan
    - Direct – SP 1.1 (identifies the CIs), (GP 2.2, GP 2.6 (identify WPM), GP 2.7 (identify stakeholders), GP 3.1 (project defined process)
    - Indirect - SP 1.2 (defines the CM System), SP 1.3 (describes baselines), SP 2.1 (describes the change process), SP 2.2 (describes the product mgmt process), SP 3.1 (describes the status accounting process), SP 3.2 (describes the configuration audit process)
  - CM.001, CM Plan Peer Review Results
    - Indirect – GP 2.2, GP 2.7 (showing stakeholder involvement), GP 3.1
  - CM.021, CM Change Management Planning Minutes
    - Indirect – SP 2.1, SP 2.2, GP 2.2, GP 2.3 (if tools discussed), GP 2.6 (if CM work products are included), GP 2.7 (for stakeholder involvement)

Summary

- **Managing the amount of artifacts collected for an appraisal can be chaotic.**
- **Identifying artifacts using a classification system can help manage them.**
- **Using a basic framework, organizations can tailor this example for their use by:**
  - Analyzing each PA for its important activities to include in the numbering
  - Establishing their complete classification methodology based on their business processes



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