

Project Management Knowledge Management, and Case Based Reasoning

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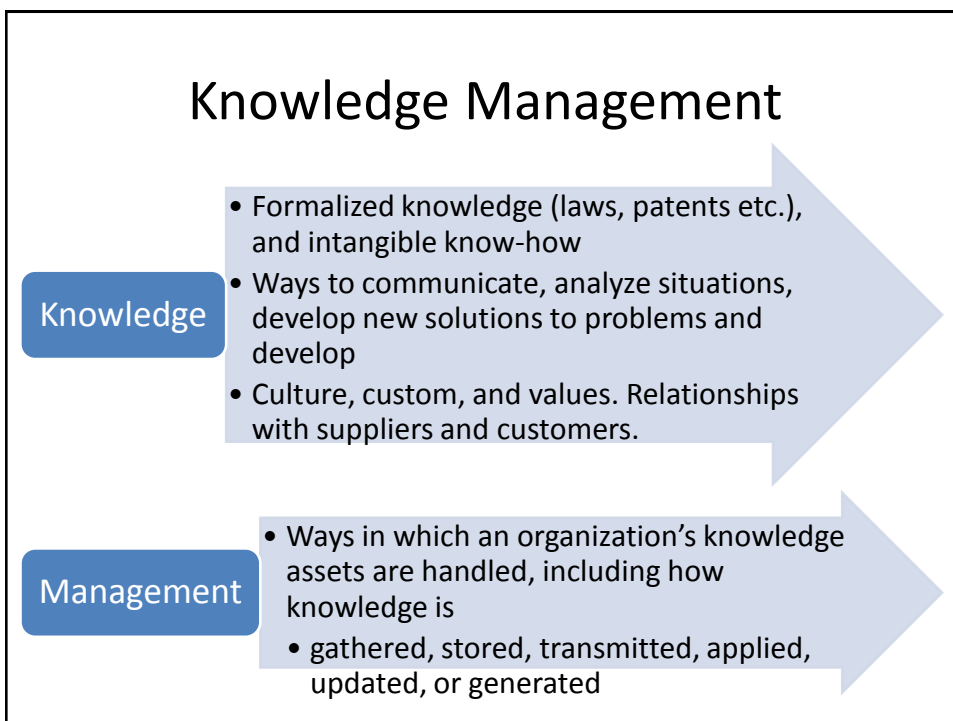
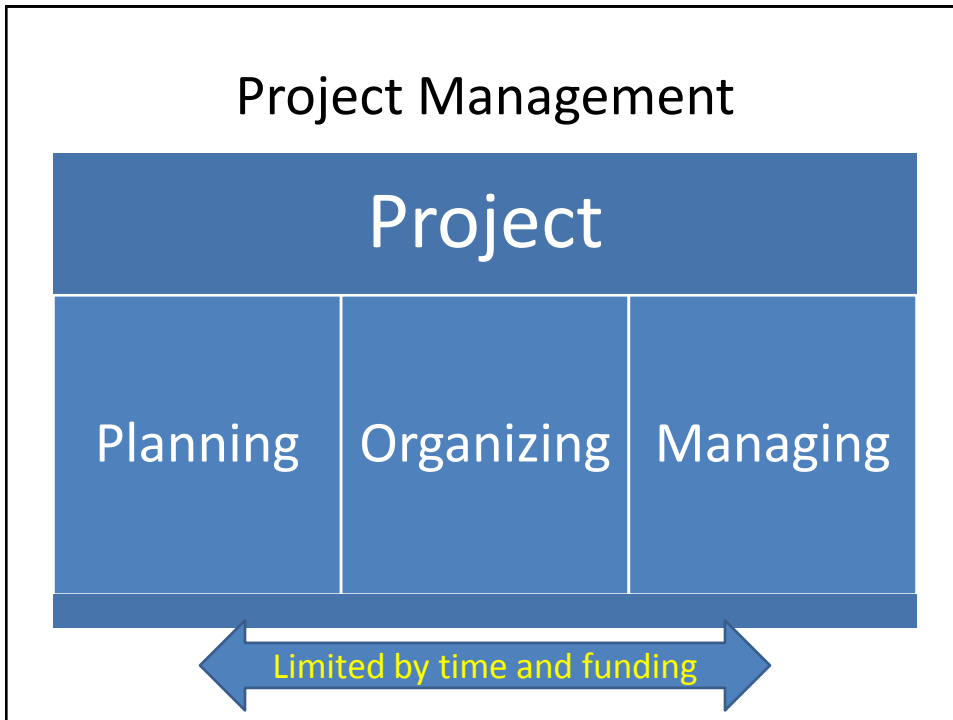
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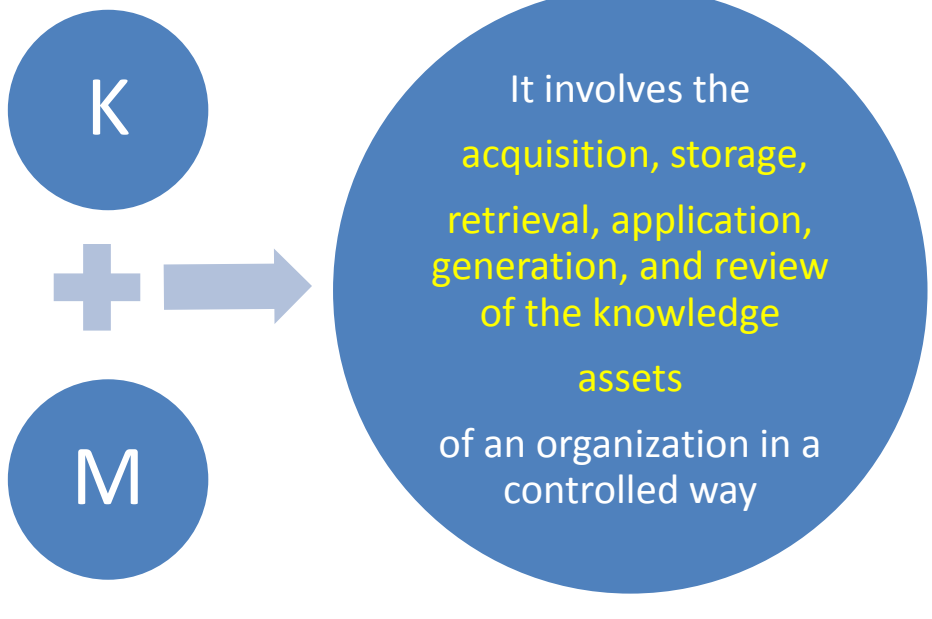
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Agenda

- Project Management
- Knowledge Management
- Integrating PM, and KM
- Case Based Reasoning
- Role of CBR
- Case Studies
- Conclusions

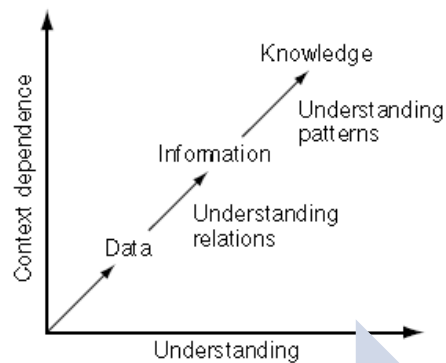


Defining KM



What is Knowledge ?

- What is 9 ?
- We understand it as number, but what is it representing.
- Only the context will tell us.
- House No=9 will be much more understandable than simply 9
- What would be knowledge ?
- Some thing that would help us in finding a house



Data

9

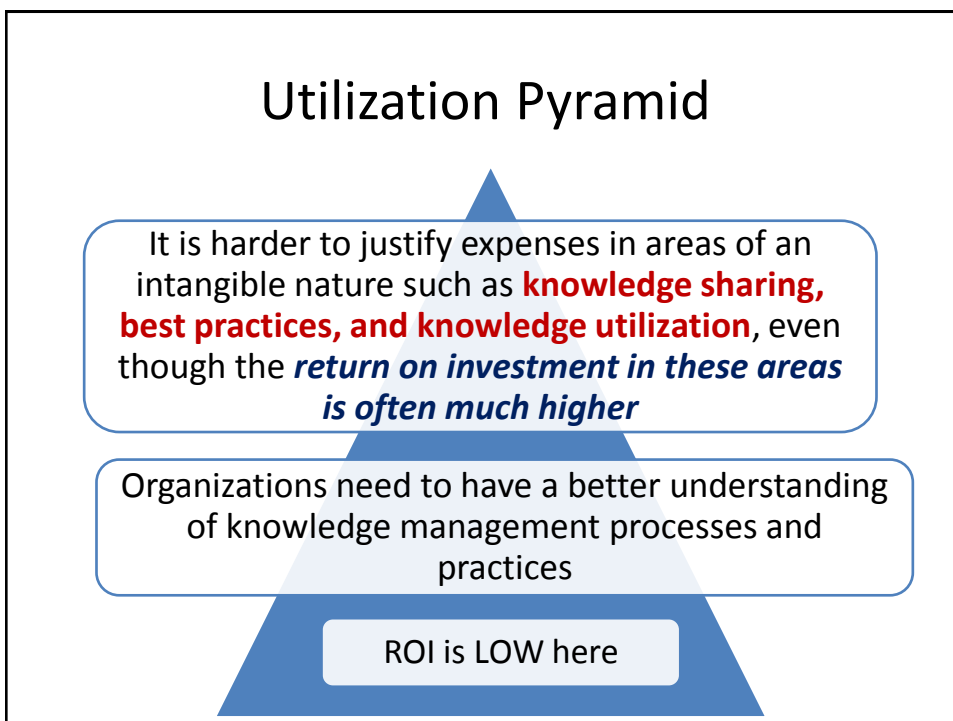
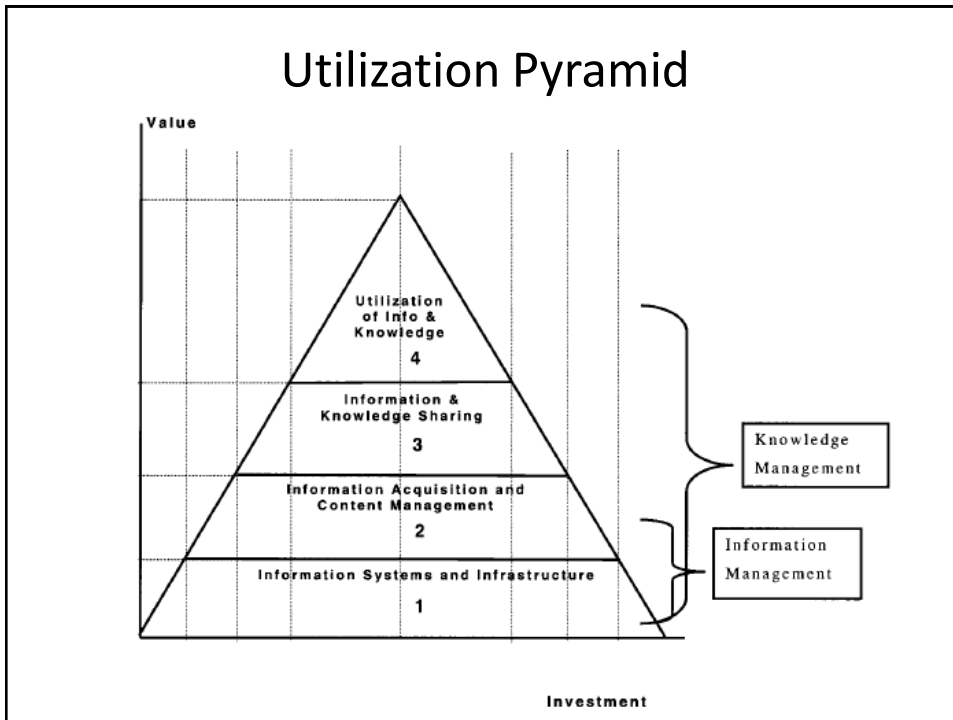
Information

H. No=9

Knowledge

Even No. On Right

Odd No. On Left



Managing Knowledge in Projects

PMBOK identifies 9 areas of Knowledge

Managing Knowledge in Projects

Project integration management.

- Deals with project knowledge concerning choices of where to concentrate resources during the project.
- It includes the knowledge of processes and activities to identify, define, combine, coordinate, and integrate the various activities.

Project Scope management.

- Describes the processes involved in assessing the work required to complete the project successfully.
- It includes planning, scope breakdown structures defined in clear

Project Time management.

- Describes the processes concerning timely completion of the project.
- It includes activity definition, activity resource estimation,

Project Cost management.

- Describes the processes to ensure that the project is completed within the approved budget.
- It includes planning, estimating, budgeting, and controlling costs.

Project Quality management.

Project communication management.

Project Risk management.

Project Procurement management.

Project Risk management.

Knowledge is created and flows through all nine areas of project management and in all phases of the project life cycle.

KM in PM

Past

- Project managers and staff constantly seek knowledge to address various problems:
- resources, deadlines, deliverables, goals/objectives, team, planning, communications, and conflicts.
- The emphasis for project management was on developing tools and techniques such as networks and earned value analysis

Present

- The project management focus has shifted toward managing the knowledge resources in projects including capturing or transferring implicit knowledge.
- Project teams in organizations need to learn to manage more effectively the knowledge that they acquire and accumulate from their projects so that other projects in organizations can benefit.

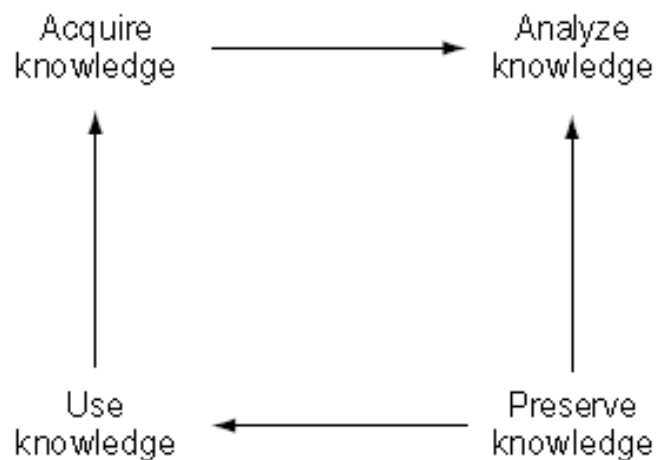
KM in PM

- Dealing with “gray” situations with greater confidence
- Encouraging greater collaboration among employees
- Identifying best practices
- Improving the capacity for product and processing innovation
- Increasing the competencies of existing employees
- Minimizing the negative impacts of employee turnover
- Responding cost effectively to rapidly changing environments

KM in PM: In Addition

- **Fast Knowledge Access:**
 - Provides faster access to knowledge and/or information to project members, leading to new ideas and creativity.
 - In virtual project management KM becomes essential as it helps in sharing the same knowledge and information easily at all locations. This leads to less confusion among team members at distributed locations.
- **Enhanced Productivity**
 - Helps in improving productivity and providing better customer relations and satisfaction.
- **Improved decision-making**
 - Decision making process improves in terms of quality and time if knowledge is shared efficiently.
- **Quality Training**
 - Helps in improving the quality of training and reducing the training time for trainees in projects.
- **Improved Collaboration and Coordination**
 - as teams look at the same knowledge base.
 - helps in creating a collaborative environment.
- **Collective Wisdom and Experience**
 - Reflects intellectual capital through the collective wisdom and experience of human capital assets.
 - This helps in improving performance in the project and the quality of project work.
- **Risk Identification**
 - Identifies risk by addressing the various risks existing in a project and its related tasks.
- **Risk Mitigation**
 - It improves the flow of knowledge in all directions, integrating processes.

KM Cycle

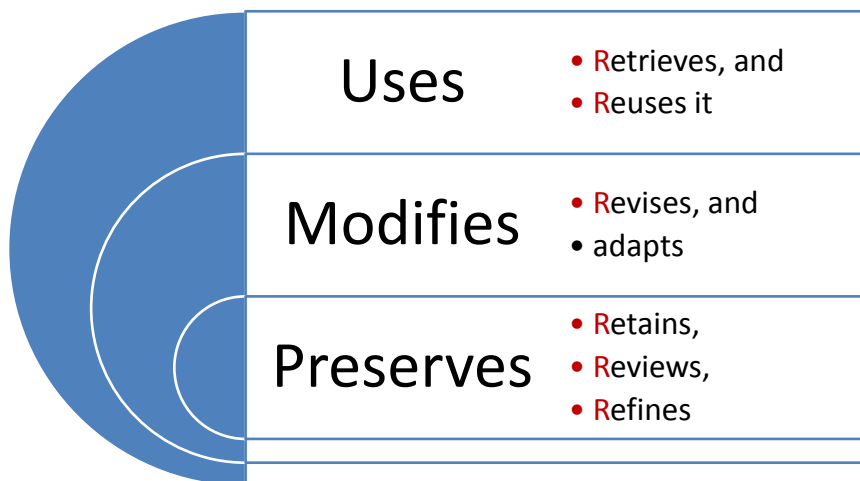


Our Focus:

How to use past knowledge ?

- Looking for a method that solves new problems using old problems
- How ?
 - By applying the old problem directly, or
 - By Adapting the old problem before applying

Case Based Reasoning



R-Six Model

Basic Assumptions

Regular Place

A case-based reasoner assumes the world is regular; it cannot work in an irregular, random, or chaotic environment

Repeat Situations

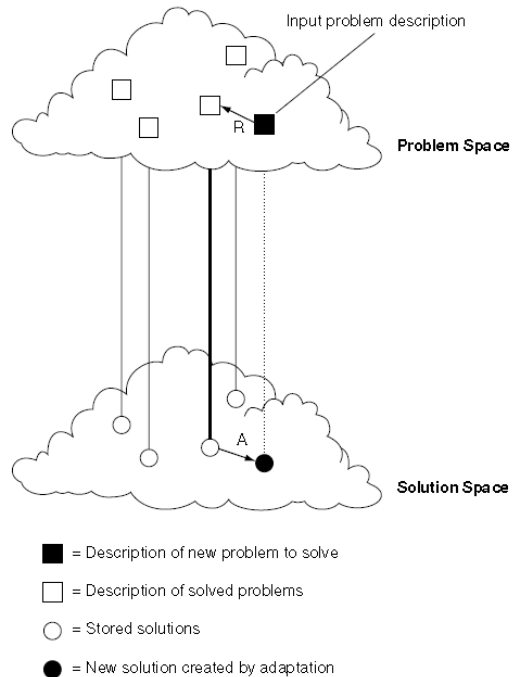
A case-based reasoner expects situations to repeat. If they do not, there is no point in remembering them.

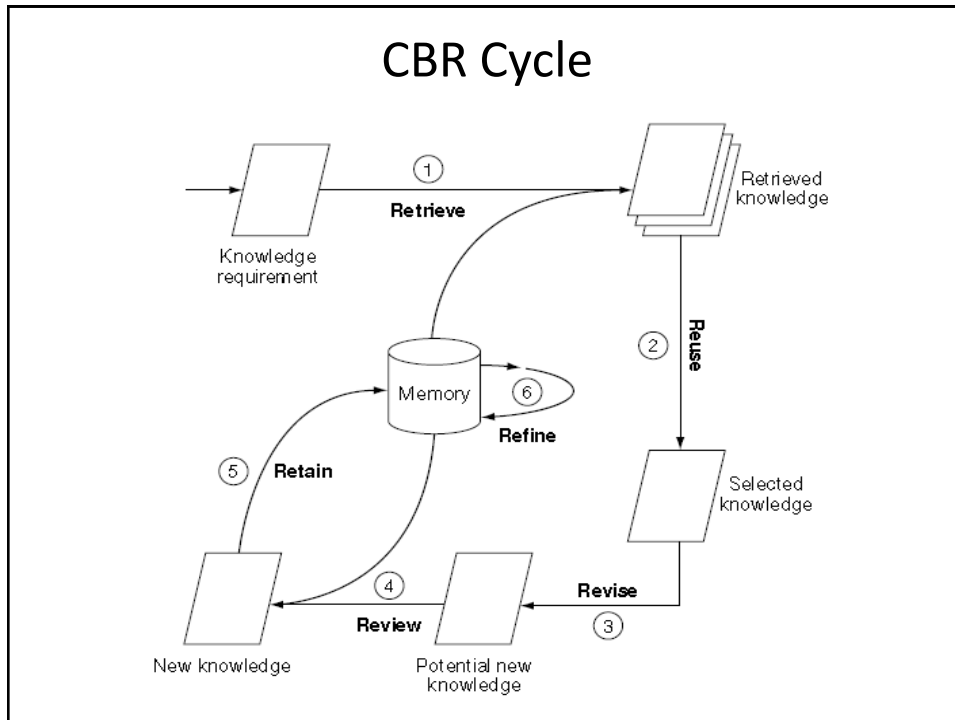
Similarities

Similar problems have similar solutions. If similar problems have very different solutions, a case-based reasoner may give inaccurate advice.

CBR

- Search Problem
- Store
 - Description – Solution Pair
- Present a new problem
- Retrieve Similar cases
- Adapt the solution and apply





CBR @ Microsoft

"Last year our customer satisfaction data identified two areas for improvement in the customer care arena,"

...

"Customers were finding it difficult to contact us and, once contact was made, the experience was inconsistent. In order to address this we put together a strategy that focused on both access and service."

By Helen Pickup, Director of Microsoft's Customer Care Centre
Glasgow, Scotland

CBR Strategy Implemented

- Within **nine months** following the implementation of a CBR knowledge management system, Microsoft reported:
 - a **10 percent improvement** in overall customer satisfaction rating;
 - a **28 percent increase** in “first-time-fix” success rate;
 - a **13 percent increase** in the “agent is informed” customer survey score;
 - a **significant reduction in the time** required to train new agents, as well as to elevate existing agent skill sets to the expert level;
 - a **much wider range of customer care** issues handled by individual agents, who also delivered more consistent responses, regardless of the problem.

CBR: Cases

CBR Cases

Cases are records of experiences that contain knowledge, which can be both explicit and tacit.

Cases

a description

the respective outcome or solution



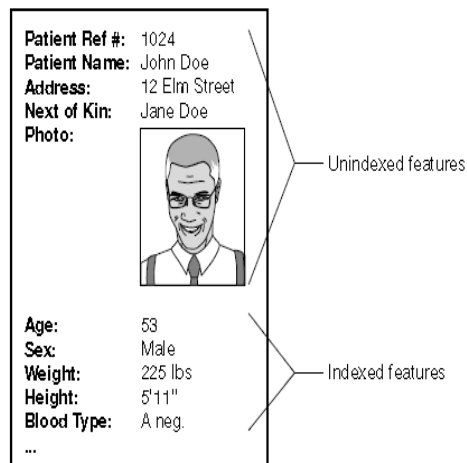
Cases: Storage and Indexing

Storage / Indexing

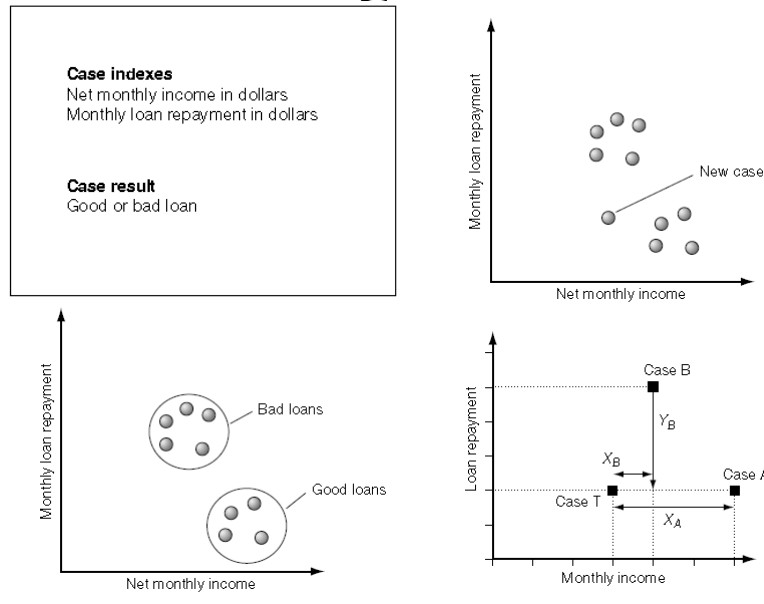
- An index is a computational data structure that can be held in memory and searched very quickly.
- This means the computer does not have to search each record stored on disk

Indexing

- Indexed information that is used for retrieval (this will tend to be explicit knowledge), and
- Unindexed information that may provide tacit and contextual knowledge of value to a user but is not used directly in retrieval.



CBR @ Work



Total Recall @ National Semiconductor

- The company:
 - Established in 1959
 - \$2.1 billion in fiscal 2000
 - About 10,500 employees worldwide
 - Fabricating units located in Arlington, Texas; South Portland, Maine; and Greenock, Scotland.
 - Test and assembly sites in Malacca, Malaysia, and Singapore
- The Problem:
 - National ships hundreds of millions of semiconductor components to thousands of customers around the world.
 - Customers returned approximately 4,000 individual parts where verified failures were analyzed.
 - This corresponds to customer report defect rates of approximately **thirty parts per million**.

Expected Benefits

- Being able to depend on deliveries with
 - “zero defects”
- permits manufacturers to achieve
 - lower costs in handling and testing of parts, and helps
 - “just in time” manufacturing schemes.
- The result is a
 - higher overall value
- that provides a competitive advantage to National’s customers

Software Support

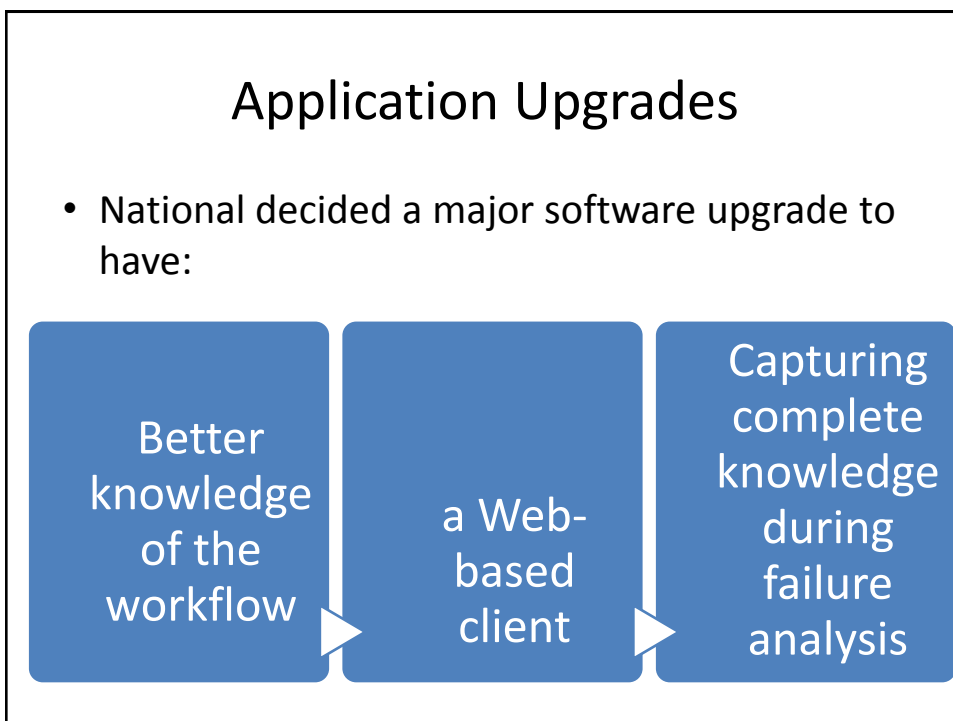
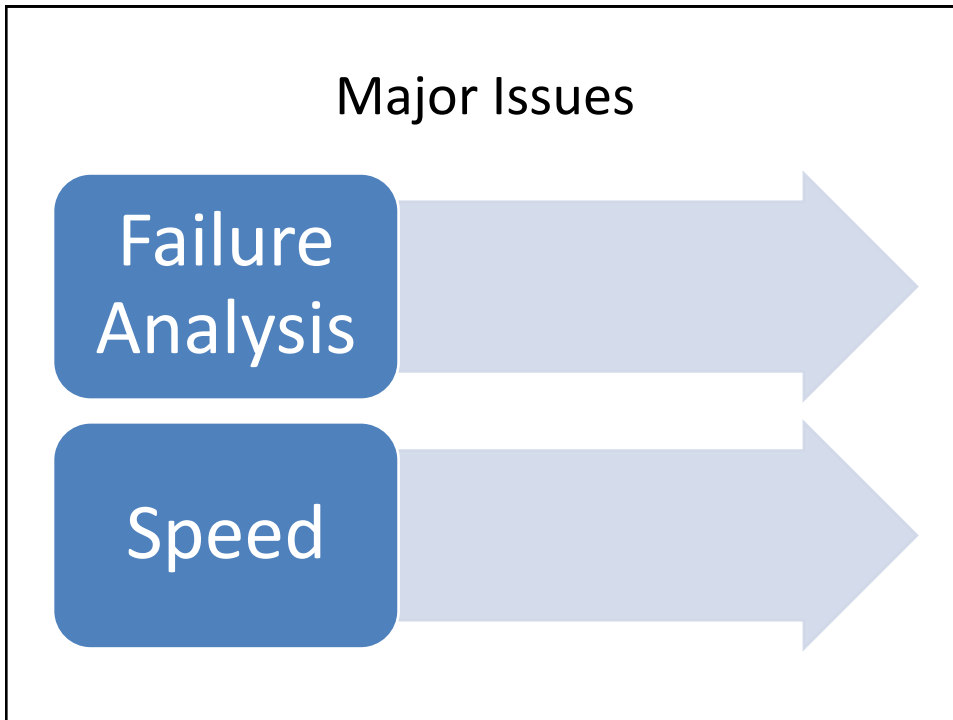
- National previously adopted the Eight Discipline (8D) problem-solving methodology, originally defined by Ford Motor Company,
- The software in place had the Failure Analysis (FA) module of
 - Aquaris (Advanced Quality and Reliability Information System)

Problems

- Many users perceived the performance of the system to be **slow**. They would accumulate information over a period of days and only *update the database on a weekly basis*.
- As a result, data was not in synch with the work being done, and status information passed on to customers was *not necessarily current*.

Problems

- The key concern when a failure occurred was whether or not the failure was indicative of a manufacturing process that might have moved out of control affecting continuing reliability of the parts negatively .
- To address this concern, and maintain confidence in products received from National,
 - *customers demand a rapid and complete failure analysis.*
 - *customers also look for corrective actions to be taken to ensure the root cause of any problem has been identified, and*
 - *that steps have been taken to guarantee it will not recur*

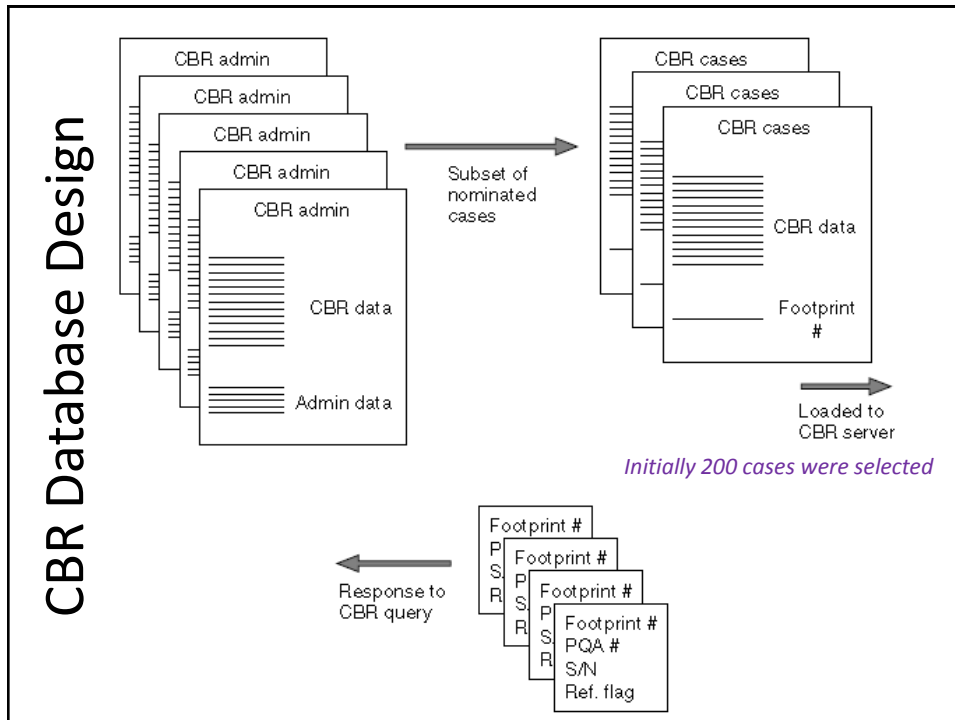


CBR Module

CBR was selected to resolve the Problems

Project Plan

Date	Activity
Sep 1999	Initial PQA team formed
Oct 1999	Interviews of QA and FA engineers
Oct 1999	Review of CBR vendors
Nov 1999	Recognition of ad hoc workflow
Dec 1999	Merge of PQA and CBR teams
Feb 2000	Completion of first pass spec
Mar 2000	Extensive CBR training in Paris—divergence of team for focus
Apr 2000	Detailed CBR model (case representation) defined
May 2000	Notes tool for initial case capture
Aug 2000	Initial case base in place
Aug 2000	First functional Total Recall modules available
Sep 2000	Introduction of Total Recall to select users
Nov 2000	Definition of “don’t care” segmentation
Jan 2001	CBR administrative functions defined for system
Feb 2001	Training material prepared
Mar 2001	Beta testing
Apr 2001	Worldwide rollout



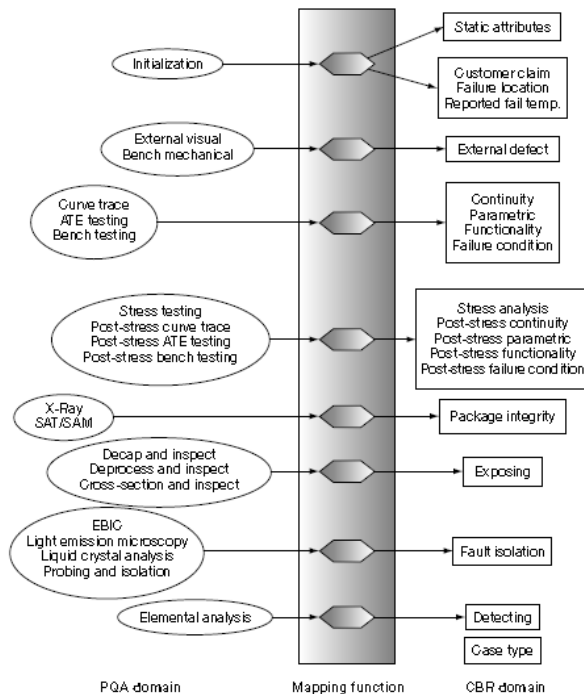
Case Representation

- Work Flow Model:
 - Listed all the activities that were needed to conduct the failure analysis
 - These were the **OBSERVATIONS**
- Different sites had different processes therefore domain attributes were added
- These are shown next...
 - Initialization
 - External visual
 - Bench mechanical
 - Curve trace
 - ATE testing
 - Bench testing
 - Stress testing
 - Stress analysis
 - Post-stress curve trace
 - Post-stress ATE testing
 - Post-stress bench testing
 - X-ray
 - SAT/SAM
 - Decap and inspect
 - Deprocess and inspect
 - Cross-section and inspect
 - Light emission microscopy
 - Liquid crystal analysis
 - EBIC
 - Probing and isolation
 - Elemental analysis

Domain Attributes

Static Attributes	Dynamic Attributes
Customer special	Customer claim
NSID	Failure location
Parent die	Reported fail temp.
Family code	Continuity
Technology	Parametric
Fab process	Functionality
Package	Failure condition
Leads	Post-stress continuity
Date code	Post-stress parametric
Fab location	Post-stress functionality
Assembly location	Post-stress failure condition
Die rev	Stress analysis
Customer name	Package integrity
Customer location	Exposing
Device type	Fault isolation
	Detecting
	Case type

Mapping between workflow model and domain attributes



Resources

- Four main servers were deployed
- Approximately 1000 man hrs were required to get the first draft specification report.
- National had about 150 personal in their IS division, a product quality assurance group was engaged for CBR implementation.
- Traditionally National Instruments spend 10 million dollars in software support

Benefits achieved

The first version of the
Total RECALL system saved
approximately
1 million dollars
in a year.

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