

Reflections on Experience Base in Software Engineering

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NICTA Members



NICTA Partners

Papers included

- “The Software Industry: A State of the Art Survey”, May 1983
- “An Evaluation of Expert Systems for Software Engineering Management”, 1989
- “Software Defect Reduction Top 10 List”, 2001
- “Vic Basili’s Experience Base Papers”, 2004 (Boehm)

Work at UNSW/NICTA

- NASA SEL Workshop paper - "Lessons Learned from the Failure of an Experience Base Initiative Using a Bottom-up Development Paradigm", *Proceedings NASA Software Engineering Workshop*, December 1999, Greenbelt, Maryland. (with Koenneker and Low)
- Allette Systems projects - Scott L, Carvalho, L, Jeffery, D.R. "A process-centred experience repository for a small software organization, *Proceedings Asia-Pacific Software Engineering Conference*, Eds. Paul Strooper; Pornsiri Muenchaisri, Gold Coast Australia, 4-6 Dec., IEEE Computer Society, Los Alamitos, California, USA, 2002, pp603-609.
- Report of the Software Quality Accreditation Working Party, Department of Communications, IT and the Arts, Government of Australia, 2005

Topics (thanks to Barry)

- Goal driven QIP/GQM
- Success criteria
- E-base - what it is
- E-base - generic and specific
- Organization scale
- E-base purpose

Topics

1. Consideration of the differences in the application of experience bases between individual organizations own experiences and industry level experiences.
2. Complexity of the nature of useful experiences.

Improvement Goals

1. Organizational specific
 - In Allette:
 - need for defined process
 - need to improve documentation
 - In NASA SEL probably more quality and productivity driven and in the experience factory model
2. The contrast between single organization and industry

NASA/SEL and Allette contrast

- SEL
 - Quantitative
 - Large
 - Quality and productivity
- Allette
 - Qualitative and quantitative
 - Small
 - Customer relations and consistency

Success Criteria

- Business plan
- Management commitment
- Suitable infrastructure
 - policies
 - processes
 - procedures
 - tools, etc

The Lucent Australia experience

- The repository
- Success at the software engineer level
- Lack of senior management commitment
- No major economic benefit

The result –

- Closed

The experience base

- What is it?
- Possibly –

a set of lessons learned
a set of quantitative relationships
packaged conclusions to research hypotheses
information from prior practice of value in the future

- Arranged as –

a data base?
a set of rules – can we develop ripple down rules?
a message to be delivered at an appropriate time?

Experience Repositories

- Models
- Text-books
- Experience repositories
 - Generic
 - Specific

BACKGROUND

- NASA SEL Experience Factory
- Daimler-Chrysler
- Recent case studies
 - Profes 2000
 - LSO 2001
 - LSO 1999
- Plus the many other instances of industrial adoption over many years e.g ICL, IBM, etc etc etc.....

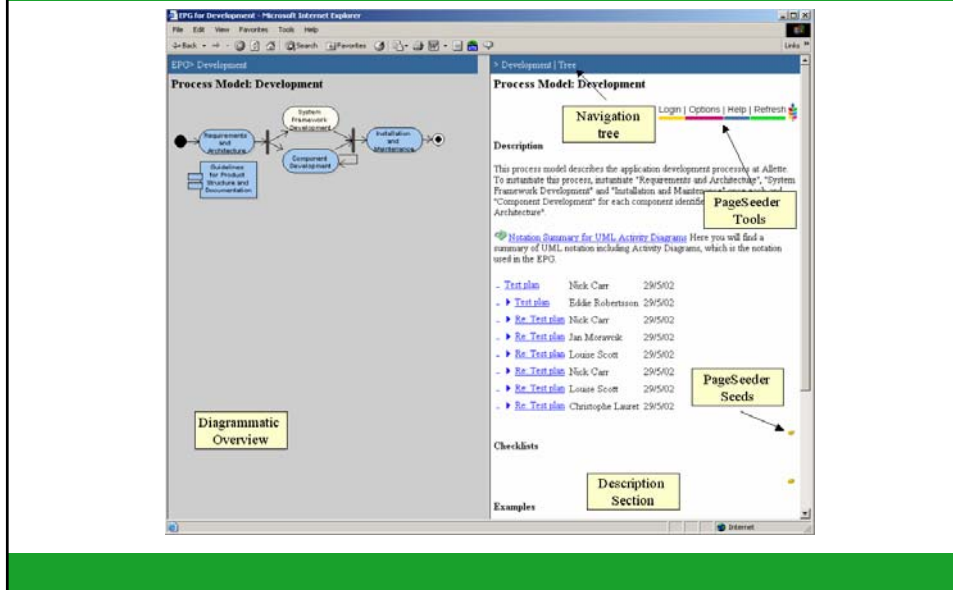
In Allette Systems

- Exploratory case study on the use of an experience repository in a small software organization
- Use in understanding a relatively new phenomena
- Little data available on the use and structure of experience repositories
- Useful in formulating hypotheses for future studies

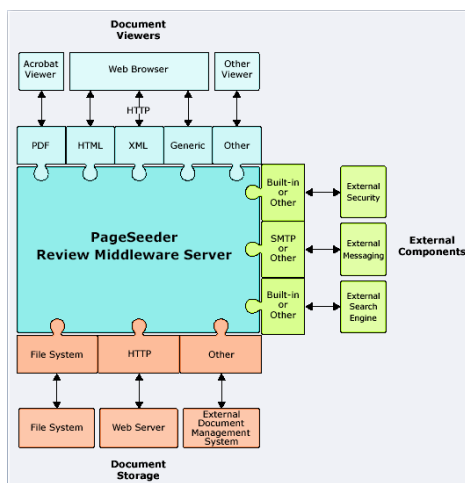
INTRODUCTION

- The repository was implemented as an extension to a web-based electronic process guide
- Twelve developers over six months
- At end of six months:
 - 279 entries
 - Templates
 - Example Documents
 - Code examples
 - Positive attitude to the e.r.

Sample Screenshot from Alette



Experience Repositories Specific



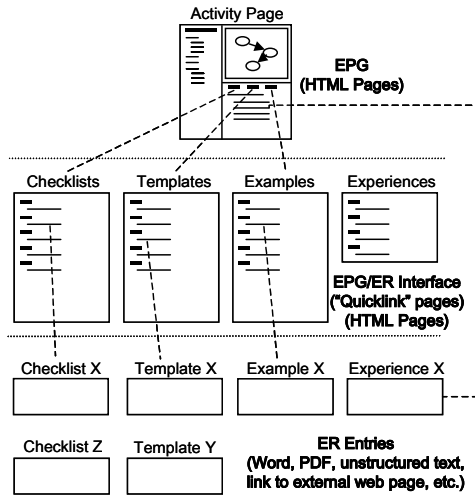
PageSeeder Functions

- Main experience management tool
- Collaboration Tool
- Acts as a server to manage and distribute email to lists
- Manages documents and associated annotations contributed by document readers. Formats include HTML, Microsoft and PDF

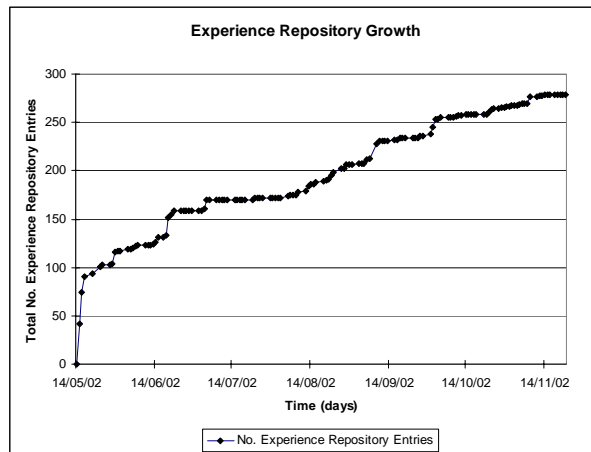
ER Structure

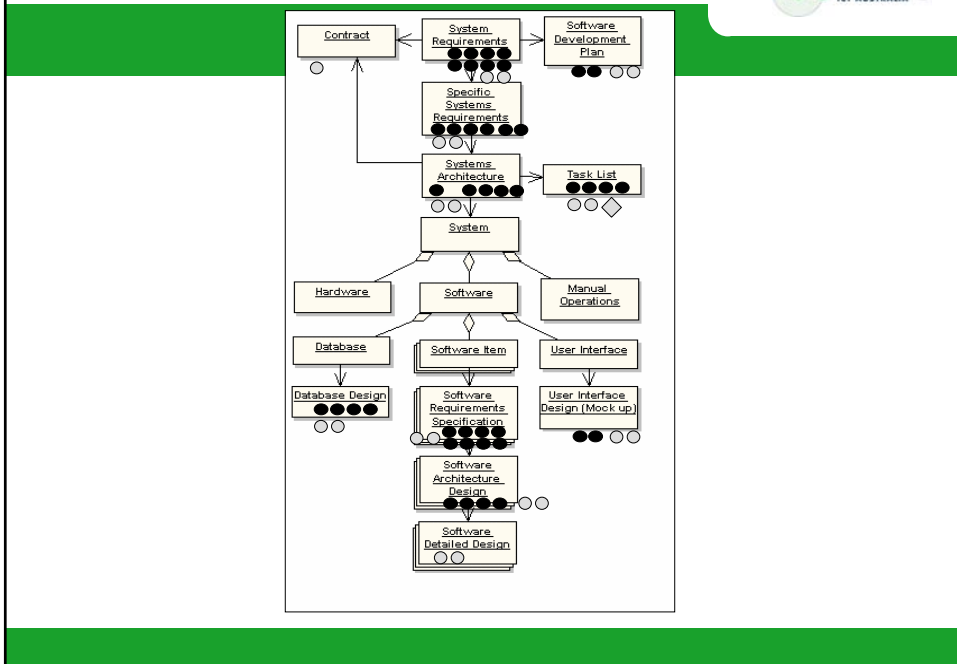
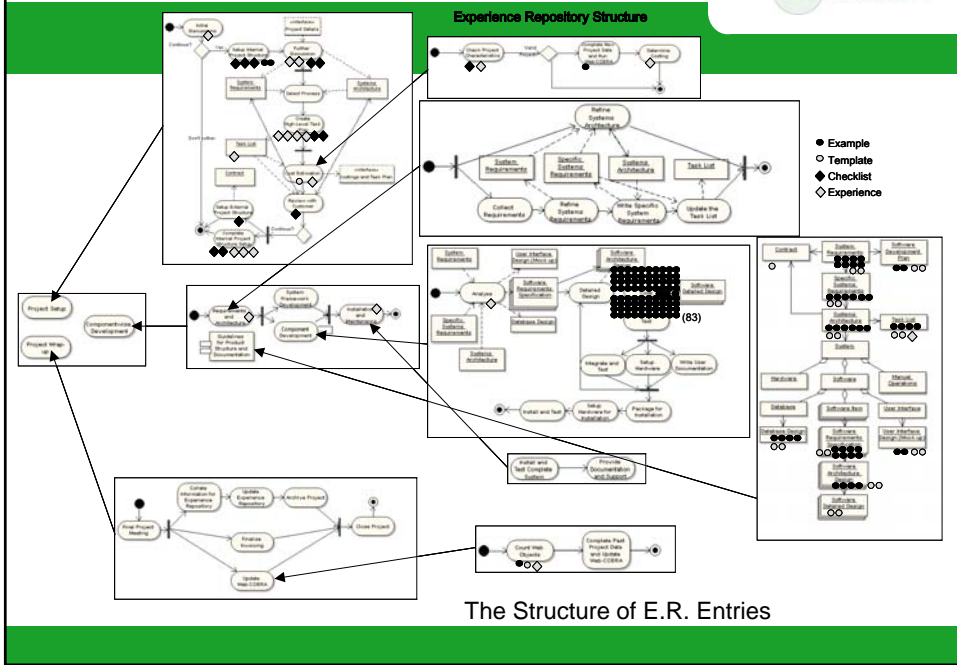
- Checklists
- Examples
- Templates
- Generic Experiences
- (Unstructured entries. Anecdotes, Lessons learned, Code fragments, Links etc.)

EPG/ER Architecture



Experiences





The Results

- In evaluating this technology we found that during the first six months, the EPG/ER was extensively used in the organisation and remained in regular use after approximately a year since its installation.
- Users retain a positive attitude towards the tool
- Users have learned to create apparently more sophisticated forms of experiences such as lessons learned for reuse. The results validated the effectiveness of the tool as an SPI tool by bringing about not only benefits such as improved documentation and release of experts from guidance of novices, but also a bolstered confidence in the organisation to plan and execute software projects.

A Tailored Development Cost Estimation Tool

Artifex
Online CUBAA System

Current Model: Demo Ltd | Mon, Wed Apr 13 09:09:16 EST 2003

Main

- Create New Model
- View All Models
- Delete Model
- Change Profile
- Change Password
- Log Off

Model

- Manage Members
- View Status
- Develop Model
- Apply Model

Quick Access

Demo Ltd [Go]

Help

- About Artifex
- Using Artifex

Demo Ltd > Application Process > Demo

- View Cost Estimation
- View Risk Analysis
- View Benchmarking
- View All New Projects
- View Project Info
- Update Project Questionnaire

Cost Estimation

View: Cost Estimation Summary Report

Cost Estimation Summary Report

The total cost overhead and project size are produced by the Monte Carlo simulation. The effort is computed from the estimate equation below. The choice of estimate equation is based on the goodness-of-fit of the relationship model between cost and cost overhead. For more details about the relationship models, view the analysis Relationship Between Cost And Cost Overhead.

Regression Slope: 0.82
 Project Size: 200 (± 4) web objects
 Total Cost Overhead: 238 (± 39) %
 Effort: 555.19 (± 63.43) person-hours

Effort Probability Distribution

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Experience Base – What is it?

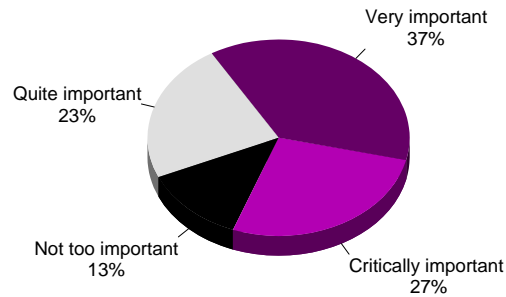
- In the Allette example
- Two different approaches – one macro process focused and largely qualitative and one focused only on the estimation task and quantitative.

Experience at the industry level

- In 1983:
 - 45% had defined methods
 - 27% used test tools etc...
- based on a survey of 25 organizations

SPI Importance

Importance of Software Process Improvement



Q. I'd like to ask you about Software Process Improvement - sometimes called Capability Improvement or Continuous Process Improvement. How important would you say this is to your business. Would you say it is...

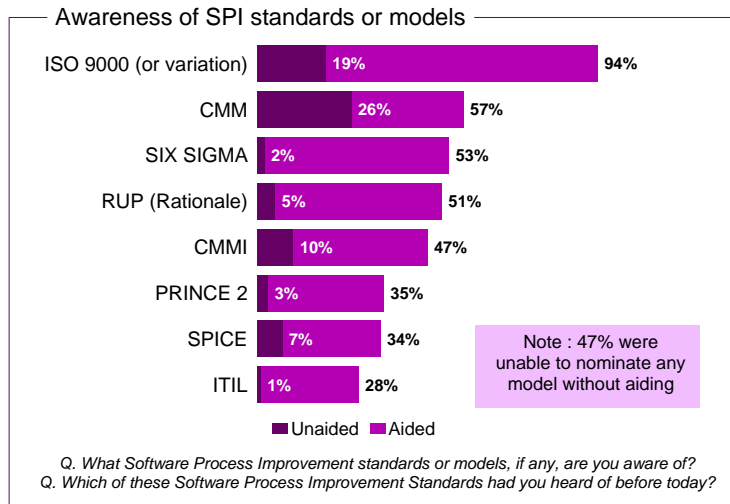
* Software Engineering Australia, "What's Bugging the Australian Software Industry" 2003 Report, Sweeney Research.

Software Process Improvement*

- Virtually all recognise the importance of SPI to their business – with just over a quarter seeing it as 'critically' important and two thirds as, at least, 'very important'.
- However, when we asked software development professionals to nominate a SPI model or standard, only about half (53%) were able to recall the name of one or more of those tools. After prompting, awareness lifted somewhat with the best known models being, in order...
 - ISO 9000 (94% aware)
 - CMM (57%)
 - Six Sigma (53%)
 - RUP (51%)
 - CMMI (47%)

* Software Engineering Australia, "What's Bugging the Australian Software Industry" 2003 Report, Sweeney Research.

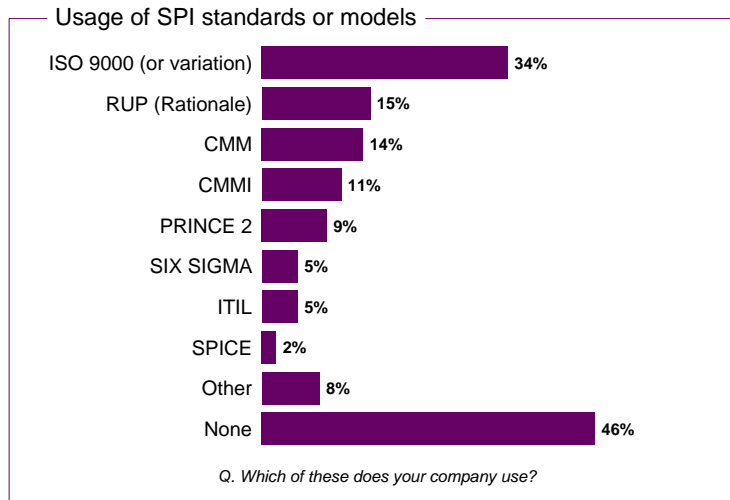
Model Awareness



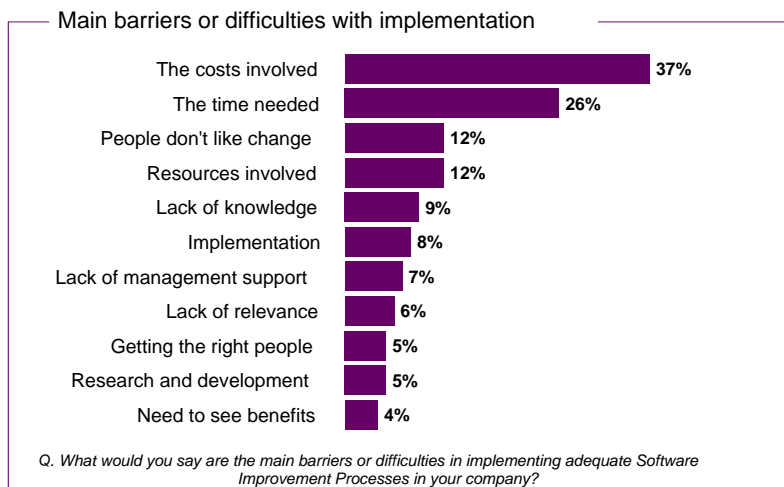
SPI

- Just over half (54%) claim to be using SPI models – most often ISO 9000, RUP, CMM and CMMI – although usage levels are significantly higher amongst the larger concerns.
- When it comes to implementation of SPI, the results reveal that cost (ahead of time) is the major barrier or difficulty. Resistance to change (either by the customer or within their own organisation) is another key hurdle to overcome.
- Only 29% of organisations appear to have a budget for SPI – although some six in ten have a person in the organisation charged with responsibility for this discipline

Model Use



Barriers to Use



Industry Concerns

Getting the job done

<i>Rate as major concern..</i>	Total	3-19 staff	20+ staff	Developer	Manager	Produce for sale	Produce for own use
Difficulty in delivering projects on time	38%	28%	44%	37%	40%	28%	53%
Difficulty in delivering projects on budget	34%	19%	44%	39%	32%	21%	54%
Difficulty in delivering projects with all the required functionality	29%	20%	35%	32%	28%	19%	44%

Conclusions

- The Basili lead on experience base in software engineering management
- The variety in experience types
- The variety in experience storage and use
- The apparent industry weakness in using or knowing about generic experience
- Significant challenges ahead