

Usage of Intranet Tools for Knowledge Management

Findings from a medium-sized software consulting company

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Overview

- Introduction: Knowledge Management in Software Engineering
- Tool 1: Project guide
- Tool 2: Experience Repository
- Tool 3: Skills Management System

The Search for a Silver Bullet

- *Structured techniques* – using structured analysis, design and programming
- *Fourth generation programming languages*
- *Computer Aided Software Engineering* – tools to support software engineering, mainly in analysis and design
- *Cleanroom methodologies* – techniques for removing defects from software
- ...

Robert Glass: The realities of Software Technology Payoffs, Communications of the ACM, vol 42, February 1999.

Learning Failure in Software Development

“We have failed to learn and learned to fail”

Four barriers for learning:

- Limits of organizational intelligence
- Disincentives for learning
- Organizational design
- Educational barriers

K. Lyytinen and D. Robey, "Learning Failure in information systems development," *Information Systems Journal*, vol. 9, pp. 85-101, 1999.

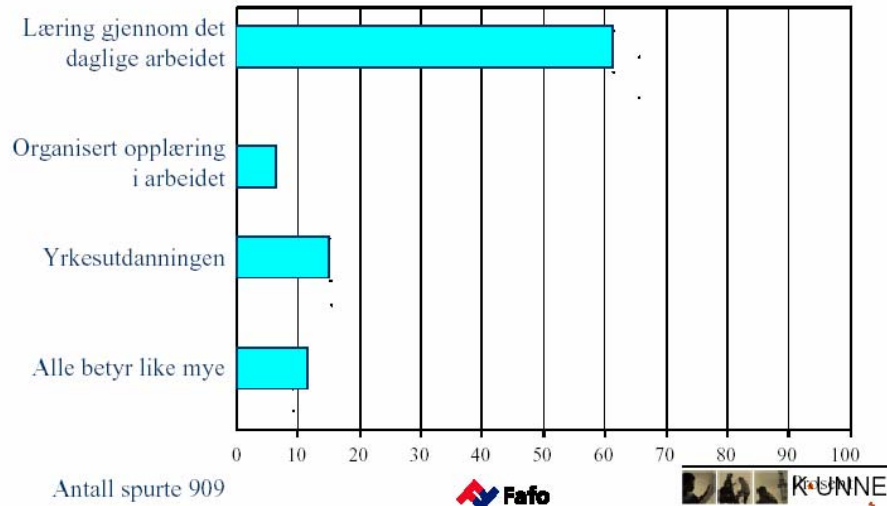
Knowledge Management

- Knowledge Management is "a method that simplifies the process of sharing, distributing, creating, capturing and understanding of a company's knowledge" (Davenport 1998)

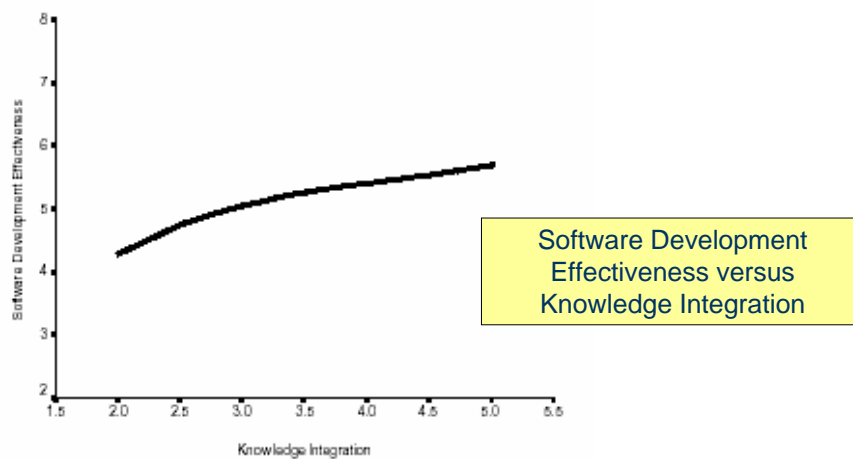
Why Knowledge Management?

- Handles both organisational and technological aspects
- Software engineering is knowledge-intensive work!
- Making use of past experience is a natural task in quality improvement
- Many companies have invested in knowledge management tools, or developed their own

Which learning arena is the most important?

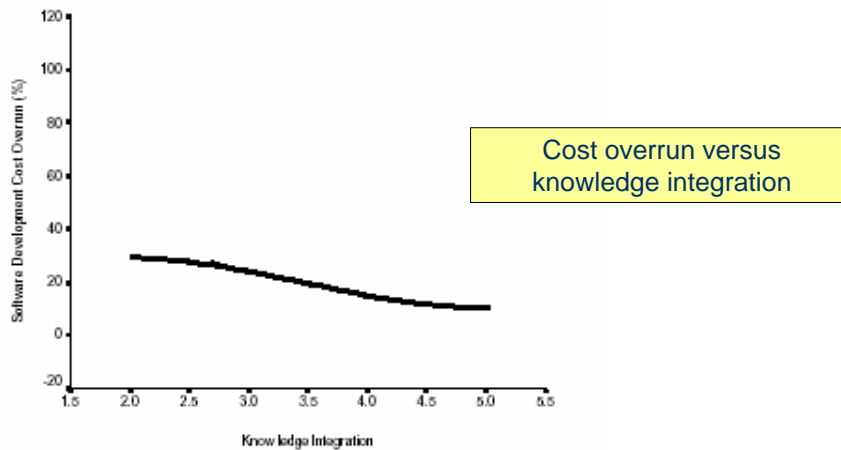


Knowledge and software engineering I



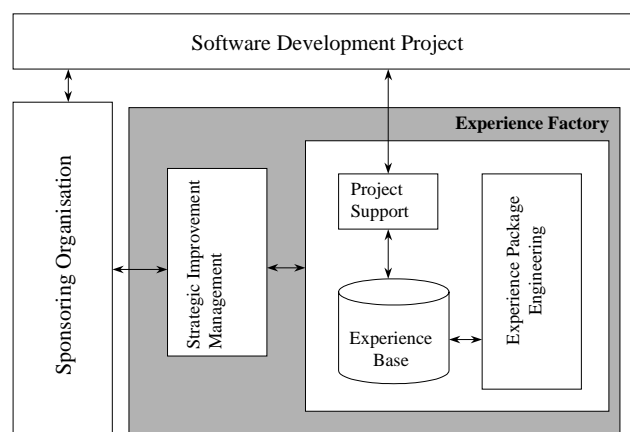
Amrit Tiwana: An Empirical Study of the Effect of Knowledge Integration on Software Development Performance, Information and Software Technology, 2004.

Knowledge and software engineering II



Amrit Tiwana: An Empirical Study of the Effect of Knowledge Integration on Software Development Performance, Information and Software Technology, 2004.

"Experience Factory"



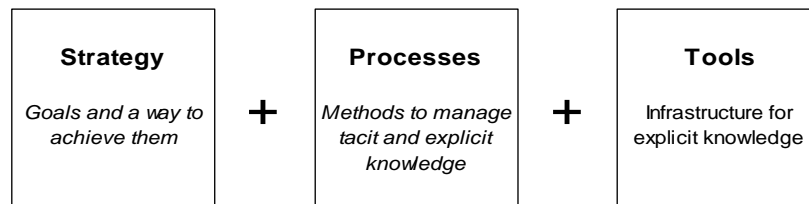
Victor R. Basili, Gianluigi Caldiera, and H. Dieter Rombach, "The Experience Factory," in *Encyclopedia of Software Engineering*, vol. 1, J. J. Marciniak, Ed.: John Wiley, 1994, pp. 469-476.

Experience Factory II

- *Product Packages* - information about the life cycle of a product, information on how to reuse it and lessons learned from reuse.
- *Process Packages* - information on how to execute a life cycle process, and how to reuse.
- *Relationship Packages* - used for analysis and forecasts. Can be cost and defect models, resource models.
- *Tool Packages* - instructions for use of a tool and experiences with it.
- *Management Packages* - reference information for project managers.
- *Data Packages* - data relevant for a software project or activities. Can be project databases or quality records.



Knowledge Management

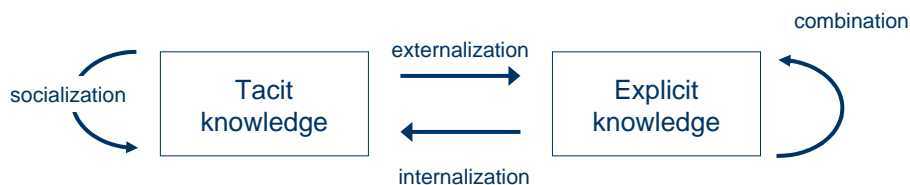


Two Strategies for Knowledge Management

- Codification: to systematize and store information that represents knowledge in a company
- Personalization: to support the flow of information by storing information about knowledge sources

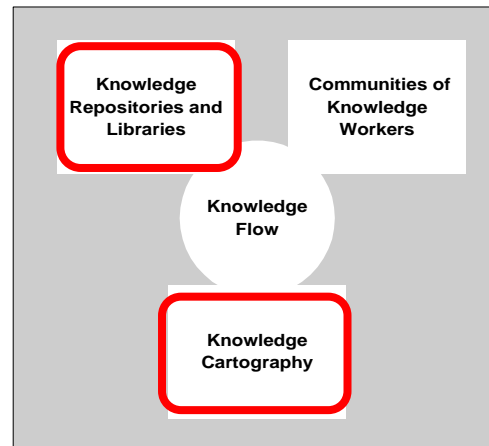
Morten T. Hansen, Nitin Nohria, and Thomas Tierney, "What is your strategy for managing knowledge?," *Harvard Business Review*, no. 2, vol. 77, pp. 106 - 116, 1999.

The SEKI-model



Ikujiro Nonaka and Hirotaka Takeuchi, *The Knowledge-Creating Company*: Oxford University Press, 1995, ISBN 0-18-509269-4.

Knowledge Management Tools



Uwe M. Borghoff and Remo Pareschi, Information Technology for Knowledge Management. Berlin: Springer Verlag, 1998, ISBN 3-540-63764-8.

Knowledge Management Tool Use

Research question:

How do different groups of users in medium-sized consultancy organisations use Intranet-based knowledge management tools to transfer knowledge between software development projects?

Research Method

Research method inspired by ethnography and grounded theory.

Data collection:

- Four weeks fieldwork at consulting company "Alpha"
- Interviews with 8 developers and 6 managers
- Screenshots, Pictures and Logbook

Data analysis:

- Constructed database of tagged information
- Information "coded" for analysis, applied triangulation

Case Company: "Alpha"

- Software consulting company and software house founded in 1985
- Core competence: knowledge management, process-support and implementation of intelligent systems for knowledge-based behaviour
- Development process based on Dynamic Systems Development Method (DSDM)
- Around 150 employees
- Customers: Public sector, marine sector and industry
- A high number of consultants with technical education

Knowledge Repositories

Liebowitz and Beckman:

- Knowledge repository: "on-line computer-based storehouse of expertise, knowledge, experiences, and documentation about a particular domain of expertise".

Davenport and Prusak:

- *External knowledge repositories*
- *Structured internal knowledge repositories*
- *Informal internal knowledge repositories*

Knowledge Repositories/ Libraries

Tool	Description	Company
Project Guide	Description of common processes and work roles in project work, with templates, checklists and examples.	Alpha
Handbooks and policies	Descriptions of common processes and work roles in the company.	Beta
Well of Experience	A knowledge repository ("collective yellow stickers"). Contains everything from bugfixes to telephone numbers.	Alpha
Knowledge Base	A repository of knowledge on competence areas, methods, customers and company-internal courses.	Beta
Knowledge Market	Links to knowledge resources like company-internal information on Java, SmallTalk and in-house libraries.	Alpha
Overview of Processes	Lists all the processes in the company, like consulting, products, sales.	Alpha
Overview of Projects	Gives an overview of ongoing and completed projects, with key information like project name, customer, project manager and status.	Alpha

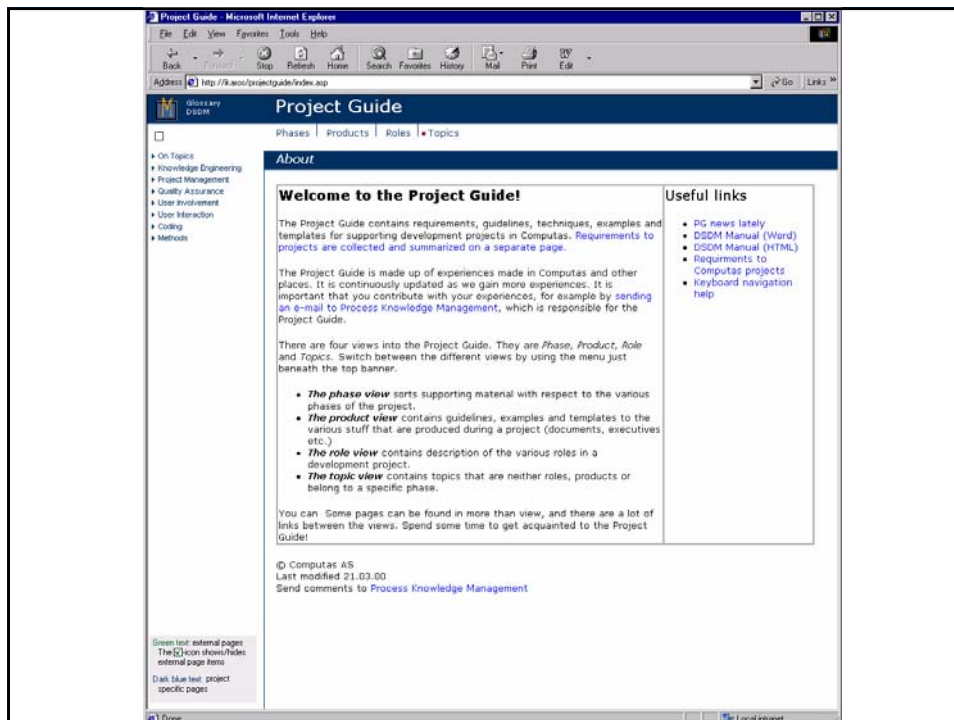
Knowledge Cartography Tools

Tool	Description	Company
Competence Blocks	A list of company-internal courses with brief descriptions, schedule information and the possibility to sign on any evaluate courses.	Alpha
Skills Manager	An overview of the skill level of all employees on about 250 different skills that are considered important for the company.	Alpha
People	An overview of the skills of all employees, in categories like "Java programming".	Beta
Software Tools	A list of the software that the company is using for software development, with a contact person for each tool.	Alpha

Tool 1: The Project Guide

The Project Guide

- An electronic process guide
 - "A structured document that describes the workflow for one or more processes"
- Contains descriptions of processes that are common, such as project start-up and closure, how to do testing.



Not in daily use

- "A thing that I could have used more" – a manager.
- "no, I do not use that... At least not deliberately" – a developer
- "no, there is no need for me to use it. It is maybe aimed more towards project managers, but to be honest I have not used it as project manager either. Maybe because the projects have been too small. Or that it has been clever people on the projects that have not needed any training" - a project manager / developer.
- "I do not like it a lot... maybe because it is available electronically" – a developer

Conclusion

- Used mainly for tips and advice in project start-up and execution
- Not in wide use in the company
- A tool the company had invested a lot of resources in

Tool 2: The Well of Experience



The Well of Experience

- "Rather than using the post-it-note, write your private yellow sticker in the WoX system so that others can make use of them"
- 2003
 - 1,024 Experience notes
 - 15,508 searches
 - 262 users
 - 2,379 keywords in the repository
 - 358 comments on experience notes
 - 1,323 credits given



Wox

[\[Search\]](#) [\[Add Note\]](#)
[\[My Notes\]](#) [\[My Credits\]](#) [\[My Comments\]](#)
[\[Latest 10\]](#) [\[Popular Keywords\]](#) [\[All Keywords\]](#)

Search

Search Query [\(Help\)](#)

Words:

Include: Text/subject Comments

You are **TUX**. [\[prefs\]](#)
Your credits: 0 <mailto:sh@comcast.net>

Well of Experience Search Interface

ICT

Computas Wox

[\[Search\]](#) [\[Add Note\]](#)
[\[My Notes\]](#) [\[My Credits\]](#) [\[My Comments\]](#)
[\[Latest 10\]](#) [\[Popular Keywords\]](#) [\[All Keywords\]](#)

A Note of Experience

Subject
How to import data from MS access to SQL Server

Text
Warning:
If you wish to import an entire table that has already been imported, rename the original table first. If you import into an existing table, you may end up with redundant data. (The import will not overwrite data in all cases)

Easy first steps:

1. Start SQL Enterprise Server Manager
2. Navigate to the database you wish to import the data to.
(If you get an error message here, patch the system to the latest version)
3. Navigate to the listing of tables for the database.
4. Right-Click in the table listing and choose All tasks-import data

In the wizard:

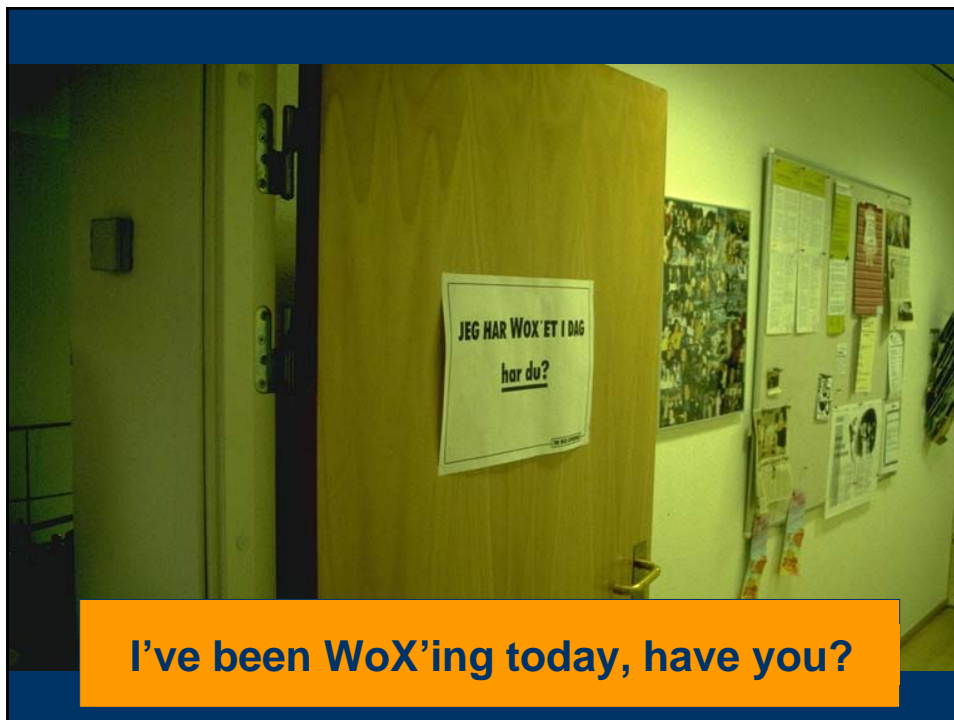
1. Press next to get to the data source screen
2. In the source drop-down select Microsoft Access
3. Browse to the database (Most of our databases are on //Mimesis/Databases/)
4. Username "developer" and password "" (blank) should work for most of our databases. (Don't include the " in the string of course)
5. IMPORTANT: Press the "Advanced" button.
6. In the field "Jet OLEDB: System Database", enter //Mimesis/Databases/CX.MDW, or use the drive letter if this is mapped.
- 6b. If you are using another system database, enter this. You can find out which system database you are using by starting the "MS Access User Manager" located in the Office subfolder under "Program files" on your computer.
- 6c. If you don't need to logon to the database to view it, you should be able to access the database without providing a system database. Leave user name and password blank in this case. (Or try Admin as user name if this does not work)
7. Press next and select your target database. Use SQL Server authentication and your SQL Server password to log on.
8. Use copy table to import an entire table, or use a query for custom imports.
9. Select your tables.
10. Select when to run and proceed to running the transfer.

Keywords
Access, SQL Server, Import, database, export

Author	Date

[\[Add Comment\]](#) [\[Give Credit\]](#) [\[Mail Tip to Someone\]](#)

You are **TUX**. [\[prefs\]](#)
Your credits: 17



I've been WoX'ing today, have you?

Knowledge Repository: WoX

■ Usage Groups

- Almost all developers say they use it
- Seven out of eight developers interviewed have written experience notes

■ Usage Situations

- Solve a technical problem [detailed]
- Getting an overview of problem areas
- Avoiding rework: having to explain many people the same thing
- Improve work situation by better set-up of technical tools
- Find who knows what in the organisation

Conclusion

- Informal knowledge repository WoX used widely, especially amongst developers
- WoX used for transferring "instrumental knowledge", to increase "problem understanding" and to strengthen "personal and political ties"
- Fruitful: easy-to-use tool combined with social incentives
- Emphasis on formal structures, techniques and procedures generally overrated in software engineering, while power of social aspects are underestimated



Tool 3: Skills Manager



Skills Management

Skills Management is to index employees knowledge in a company, which can contain:

”Knowledge profiles, skill profiles, personal characteristic profiles that define subjective assessments of the knowledge, skills, and personal traits required for the different work-roles within the function” (Wiig 1995)

Like a company-internal ”yellow pages”.

Karl M. Wiig, *Knowledge Management Methods*: Schema Press, 1995, ISBN 0-9638925-2-5.

The screenshot shows a web browser displaying the 'Alpha Skills Manager' interface. The main content area is titled 'View skill: OOD (ONT/UML/...)' and shows a list of skills under the category 'Technology & Methods'. The skills listed are 'AI - Artificial Intelligence' and 'UI - User interface'. A legend below the main content area defines the skill levels from 7 to 0:

7	6	5	4	3	2	1	0
Expert	Masters fully	Experienced	Can Use	Basic knowledge	Cursory knowledge	None/irrelevant	Not yet evaluated
Jon E T (6)	Henrik F (6)	Aksel H (6) Are S (6)	Knut-Helge B (7)	Stig W (7)	Stefano T (7)	Svein Olav G N (6)	Agata W (6)

The interface also shows a sidebar with navigation options like 'Show single skill' and 'Show single person', and a top navigation bar with 'Personal Update', 'View', 'Configuration', 'Administration', and 'Help'.

What do people say about usage?

Four types of usage:

- 1) Searching for competence to solve problems.
- 2) Resource allocation.
- 3) Finding projects and external marketing.
- 4) Competence development.

Searching for Competence: Short Term

“Of course, when I wonder if there are *anyone who can help me* with something, I look up in the skills management system to see if anyone has the knowledge that I need”

“Then I find a list, and look at what level they have [...] and then I *go around in the house and ask them*”

”So, it is very dependent on that people *update it right*. And to describe a level is not that easy, so some *overrate* themselves and other *underrate* themselves strongly”

”What you can get information about now is if someone knows about ‘web’ – and that *contains quite a lot!* ...maybe it is not that general, but not too far off. It is based on the core competency areas of the company, but when it comes to more detailed things, like who that in fact can write a computer program, and who that can find a solution – you do not find that there

Searching for Competence: Long-term

One developer said he would e-mail a group of "experts" about questions, and after if only some people reply, he would ask them directly the next time.

Resource Allocation

“You are today *allocated* to projects on the basis of what you have in the Skills Manager”

“I think that the skills manager is a useful tool, but a tool that still has got a lot of potential when it comes to practical use. Those who do the *resource-management* they already use the tool a lot in the daily resource allocation work”

“And the skills manager is a tool that is very important for the resource allocation process [...] Therefore, many employees come up with *suggestions* to new content, new elements, in the skills database.”

Finding Projects & Marketing

“Even sales can use it [the skills management system], to think out new directions to go in”

”Proof” of a skilled workforce (although we did not hear this from anyone, maybe because we talked only with developers and managers)

Competence Development

“Such tools are very good indicators for *accounting intellectual capital*. You are able to see in the long term what kind of competencies we will need, evaluate it, and compare it to what competence we already have in the firm, and then say that we have that many man months with C++ competence, or Java, and we see that there is an increase in this competence, and then we can evaluate that”

If a project cannot find people that *know* about a topic that is needed, they select someone who wants to *learn* about it.

Conclusion

- Four types of usage:
 - Problem solving
 - Short term
 - Long term
 - Resource allocation
 - Find new projects for the company
 - Develop internal competency

- Most people use the tool, some are critical to subjective evaluation of skills, and to the skill "topics".

Key findings

- Informal knowledge repository used more than the structured knowledge repository
- Informal knowledge repository in heavy use amongst developers
- Structured knowledge repository used by project managers
- Knowledge cartography tools can have several types of usage

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