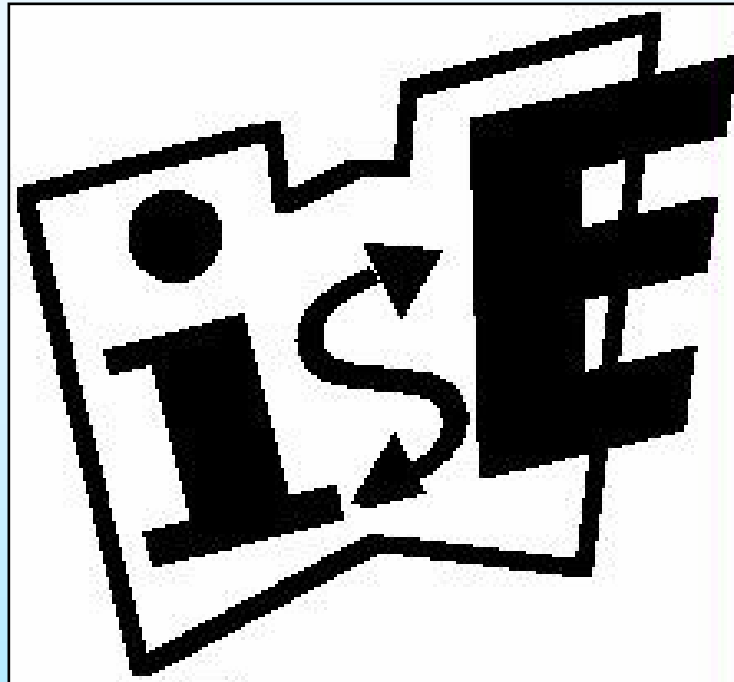


Web-enabled Information Services for Engineering



The WISE project – Knowledge Management for Engineering

Presentation at FINSE conference, 22 May 2002

Arnd Rothe, Airbus Deutschland



WISE – What is it?

- European R&D project in IST programme
 - Web-enabled Information Services for Engineering:
Knowledge Management for Engineers
 - Duration 2001-2004
 - 10 partners :
 - Industrial: Nokia, Airbus
 - Software providers: PACE, Interface, Cyberstream
 - Universities (Helsinki, Berlin)
 - Research institutes (Norske Regnesentral, Eurisco)
 - Approach: State of art, Requirements, Design, Implementation, Test
- today*

www.ist-wise.org



WISE key words

Web-enabled - web technology is becoming the backbone for knowledge & information exchange. WISE intends to design a platform that enables easy integration of existing and future KM tools and approaches and making them easily accessible from everywhere.

Information - what is transferred among people: data, information and knowledge. Data is uninterpreted information, whereas knowledge is already processed information. Engineers need knowledge and data in their work. The scope of KM includes knowledge acquisition (education, training, purchase), formal and informal knowledge, knowledge maintenance, distribution and usage. KM is accomplished through changes in culture and process, supported by technology.

Services - In WISE, services are viewed as functions that need to be developed in order to empower the user – enabling them to design better product in shorter time. And with more fun!

Engineering - WISE supports engineers / designers – during their task of developing complex and safety critical products. Engineers produce a large amount of documents and knowledge. They interact among each other and with external bodies via documents. A goal of WISE is to ease this interaction process in order to improve the engineering processes. Engineering has special requirements towards Knowledge Management.



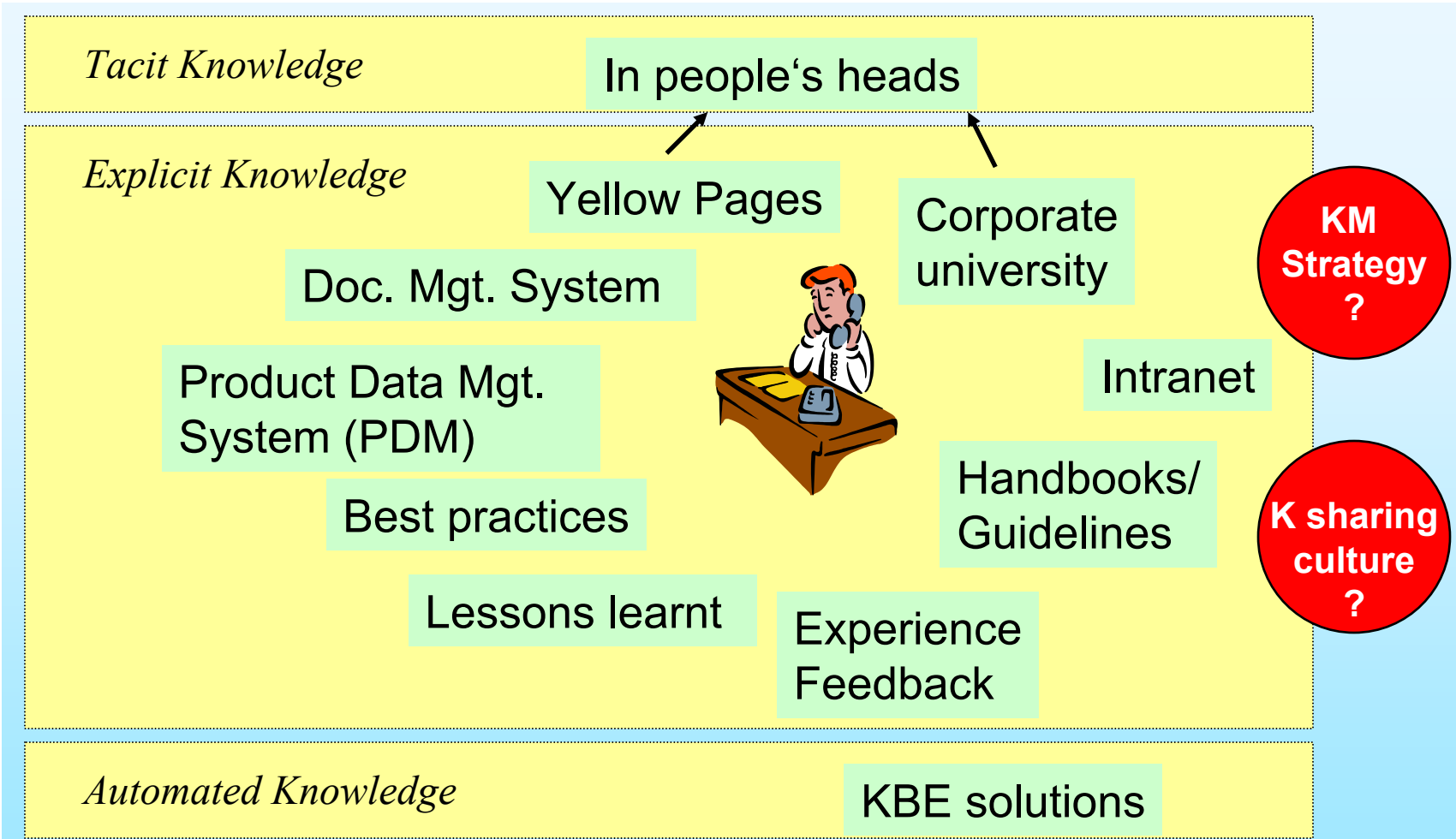
Why KM for Engineering?

- **Engineering = Variation of existing solutions**
 - big re-use potential
- **Complexity**
 - e.g.: new engineer may need 2 years to be productive
- **Safety-critical**
 - Product information and knowledge need to be consistent and traceable
 - Previous decisions need to be understood
- **Specific tools (CAD/PDM, optimisation & computing tools)**
 - KM to be integrated with engineer's workplace
- **Multi-partner cooperation**
 - sharing & protecting knowledge equally important

Engineering has specific & complex requirements towards KM



KM for engineering - today



Knowledge :

- what is valid? what is useful?
- where to find it? how to use it? ...



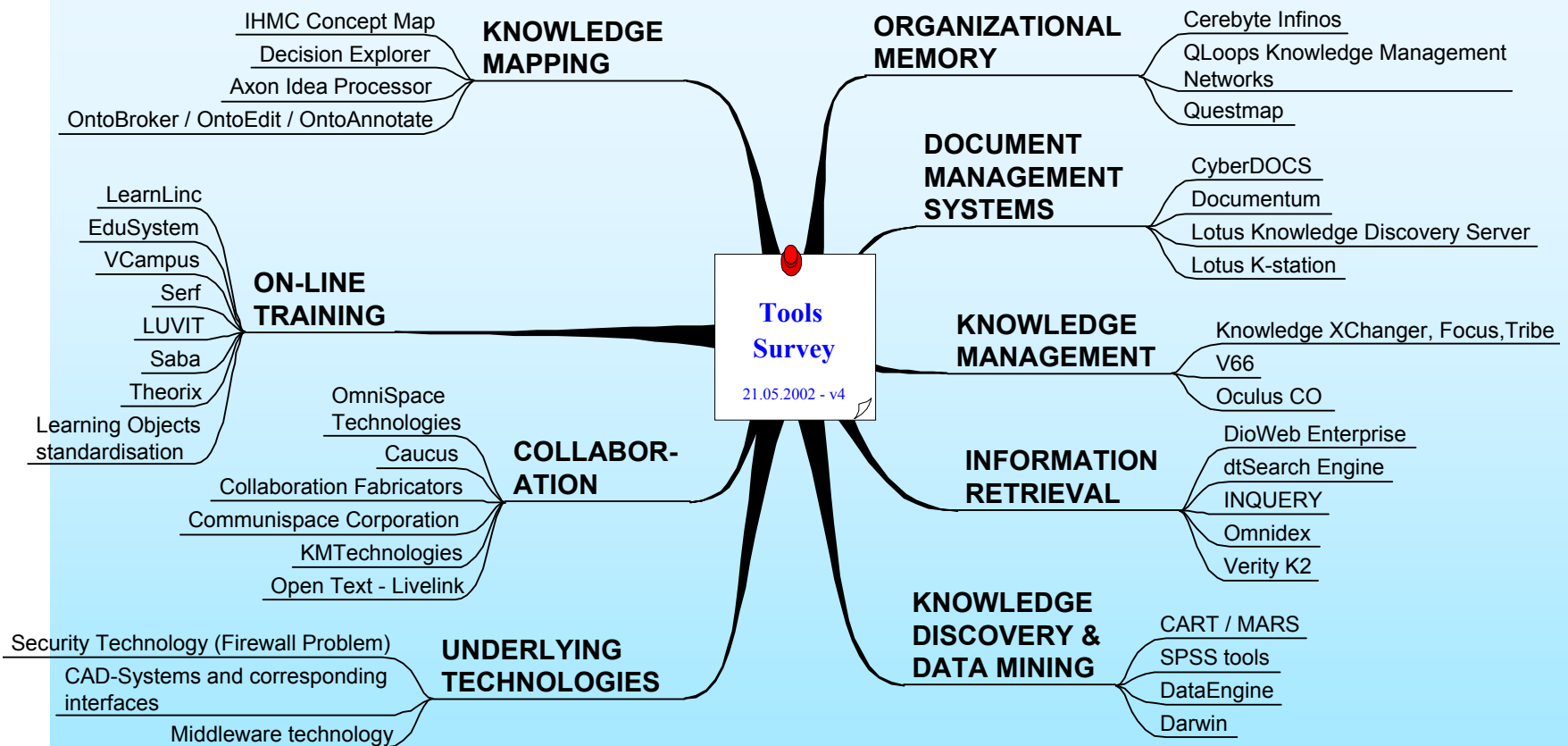
KM in Engineering today – Case Studies

Company	KM-strategy	KM-tools	Informal KM
Hewlett-Packard	X	X	X
Chrysler	X	X	
Sematech	X	X	
Siemens	X		
Ericsson	X	X	X
UK post	X		
Zeneca pharma	X		
Seagate	X	X	X
Skandia	X	X	
Dow Chemical	X		
Teltech	X		X
Microsoft	X	X	
Ernst&Young	X	X	X
ICL	X		
Glaxo Wellcome	X	X	
British Petroleum	X	X	
Xerox			
SAP	X	X	
Lotus	X	X	X
AMS	X	X	X
Ford	X	X	X
PricewaterhouseCoopers	X	X	X
3M	X		X

KM – more than a buzz word?



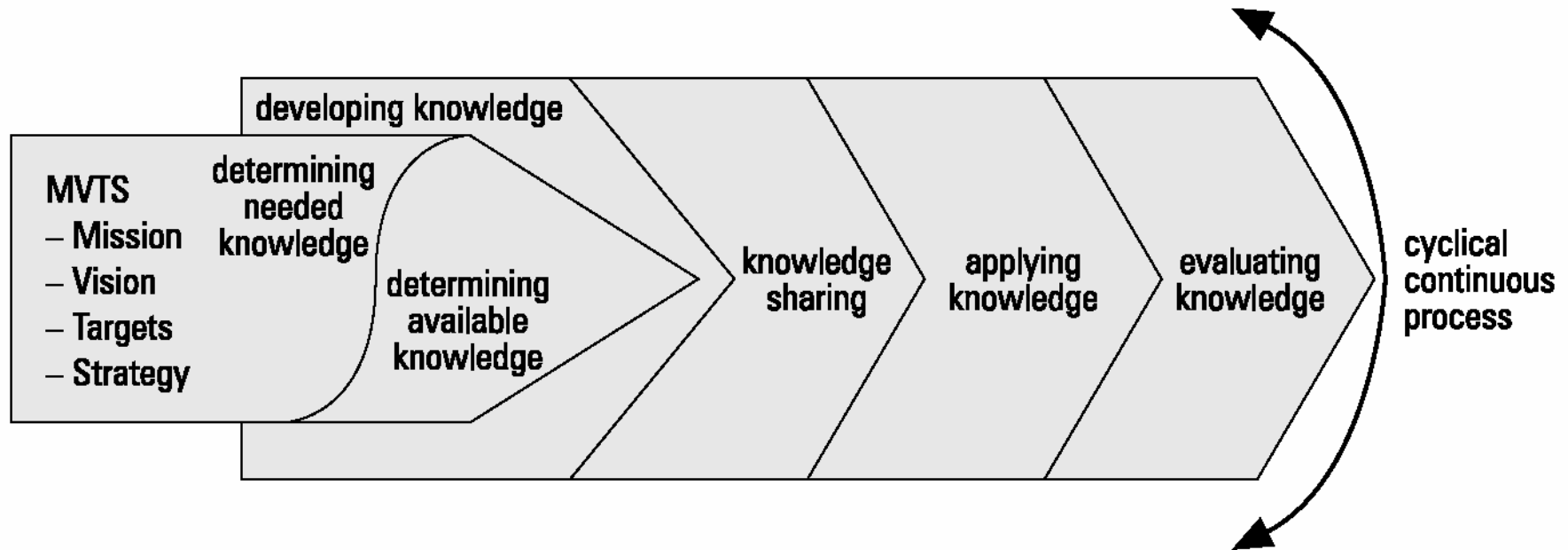
KM Tool Survey



Tool survey can be downloaded at www.ist-wise.org



KM as scientific discipline – multitude of approaches



The Knowledge Value Chain.
(Weggeman 1997, in Beijerse 1999, p. 102)

Scientific survey can be downloaded at www.ist-wise.org



KM scope can be very large

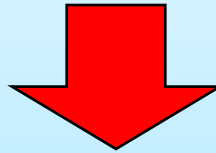
	Socialize	Externalize	Combine	Internalize
Determining knowledge gap	Management by walking around	Intranet	Internet	Detachment
Developing/buying knowldege	Traineeship	Electronic boardrooms	R&D	External training
Knowledge sharing	Project teams	Brainstorming	Computer networking	Cooperation with others
Evaluating knowledge	Informal evaluation	Debriefing	Benchmarking	Reading reports

**Examples of knowledge management instruments.
(Beijersee 1999, p. 105)**



What to we want to do in WISE?

- user interviews at three industrial sites
 - what are the real needs of engineers regarding information and knowledge?
- corporate KM strategies and instruments already in place



- 3 industrial scenarios with big common scope (80%!)

Goal: Build a Knowledge Portal – get a focussed access to all the information you need, integrated with your work tools



Industrial case 1: Systems Safety Process

- Assure consistency
- Trace usage
- Notify on changes
- Find the expert
- Annotate

Search results:

Author	Version	name
Mr Dupont	1.3	Specification for A320
Mr Martin		

Trace for "Specification of A320"

- Revision 1.0 Mr Dupont
- Revision 1.1 Mr Robert
- CDD p.94
- FAQ N° 58

Detail for "A":

Keywords:

Abstract:

Specificat
This plane

Creation: 25/01/00 Last modification: 12/11/01

Navigation:

- WISE
- Search
- Trace
- Experts

Typical knowledge elements : specifications, safety analysis documents, certification documents, experience from usage...



Industrial case 2: Structural parts design

- Find existing knowledge that fits new use situation
- “Knowledge Applets”: existing knowledge bits adapt semi-automatically to new use situations

The screenshot shows a software interface with a menu bar (File, Edit, View, WISE, Tools) and a 3D model of a structural part. A dialog box titled "WISE" is open, asking "Would you like to apply an existing solution for clips?". The dialog box contains a technical drawing of a clip with dimensions and labels. Below the drawing are buttons for "Details", "OK", "Search other", and "Cancel". A yellow arrow points from the "New" menu item to the dialog box, and another yellow arrow points from the dialog box to the "Details" button. The number "1.- 6." is overlaid on the left side of the screenshot, and the number "8." is overlaid on the right side.

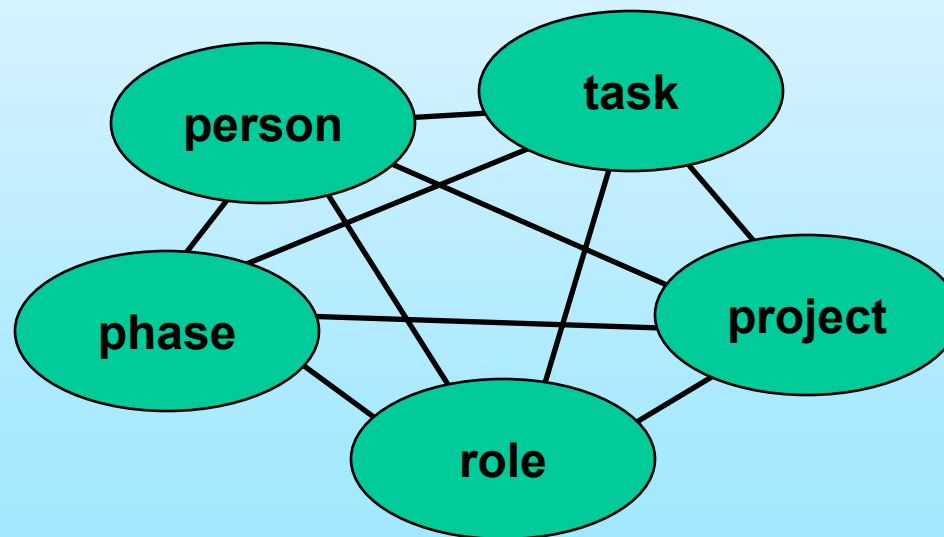
Typical knowledge elements : CAD parts, calculations, documents etc. – in their *use* context



Industrial case 3: Equipment design team support

- knowledge awareness
(what do I need to know for my task?)
- finding experienced people
(who has done this before?)

- knowledge visualisation
- context-sensitive push



Typical knowledge elements : business plans, requirements, specifications, standards, schedules, reports ...



KM in Engineering – Tomorrow?

The screenshot displays an engineering software interface. On the left, a window titled "Engineer's Tool" shows a 3D model of a structure with a red curved beam and purple supports. A menu is open over the model, listing "New", "Open", "Close", and "End". On the right, a window titled "Guideline 9876" displays "Clip 3456" with a list of items: "Where to use", "specification", "calculations", "manufacturing", and "Similar solutions". Below this, a "WISE" dialog box asks, "Would you like to apply an existing solution for clips?" and shows a technical drawing of a clip. The dialog has buttons for "Details", "Search other", "Trace Solution", "Ask an Expert", "Apply Solution", and "Cancel".

My Context
Domain: Structures
Role: Designer
Phase: Detailed Design
Task: 3D Modelling

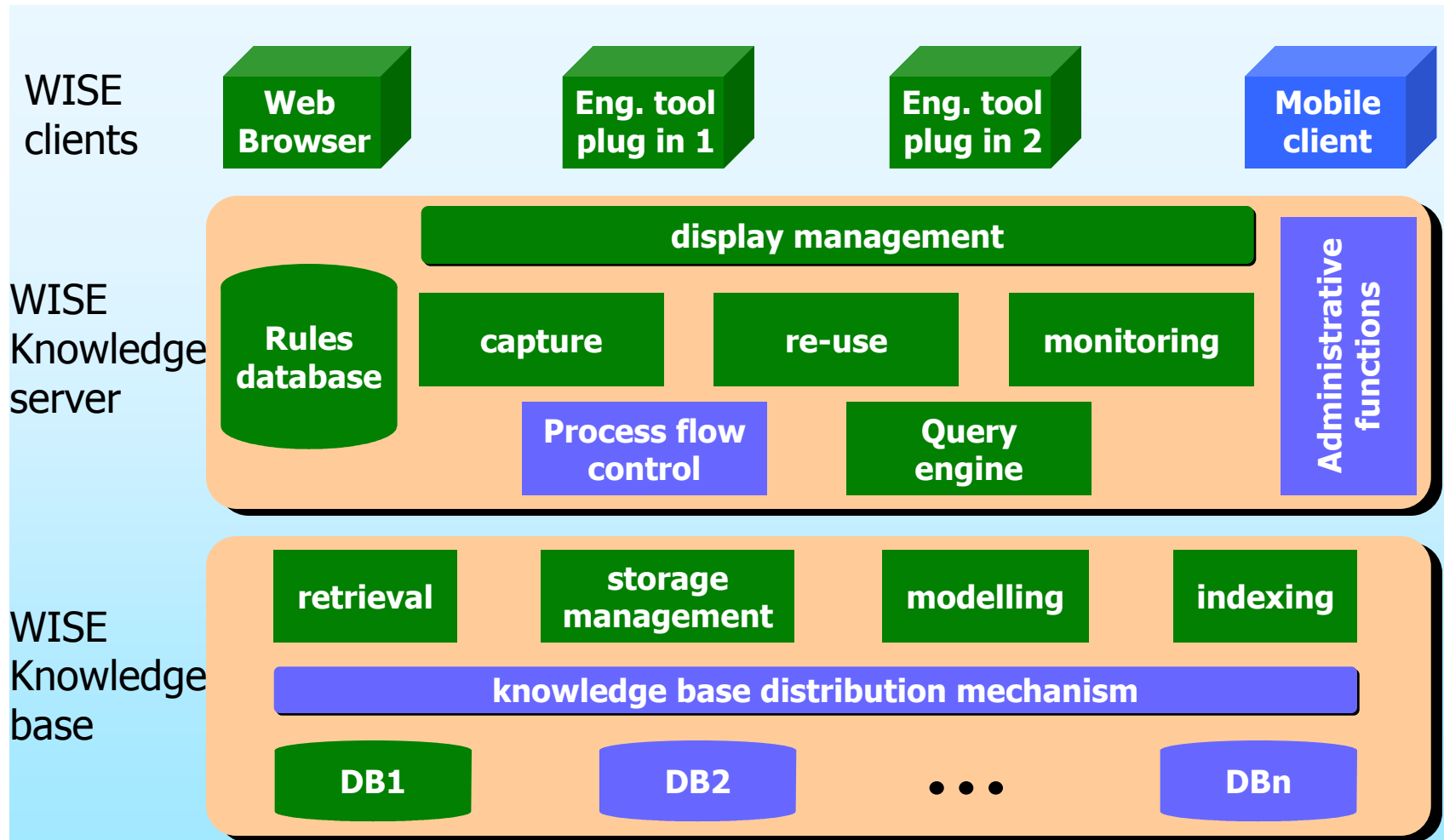
Try these:
Solutions: Part 345
Guidelines: AP9876
Experiences: drilling problem
Experts: Mr. Müller Tel...

Search Browse Trace

- One portal - integrated in engineer's workplace, access to tacit K.
- Context-sensitive , Push & pull, K-applets, Tracing



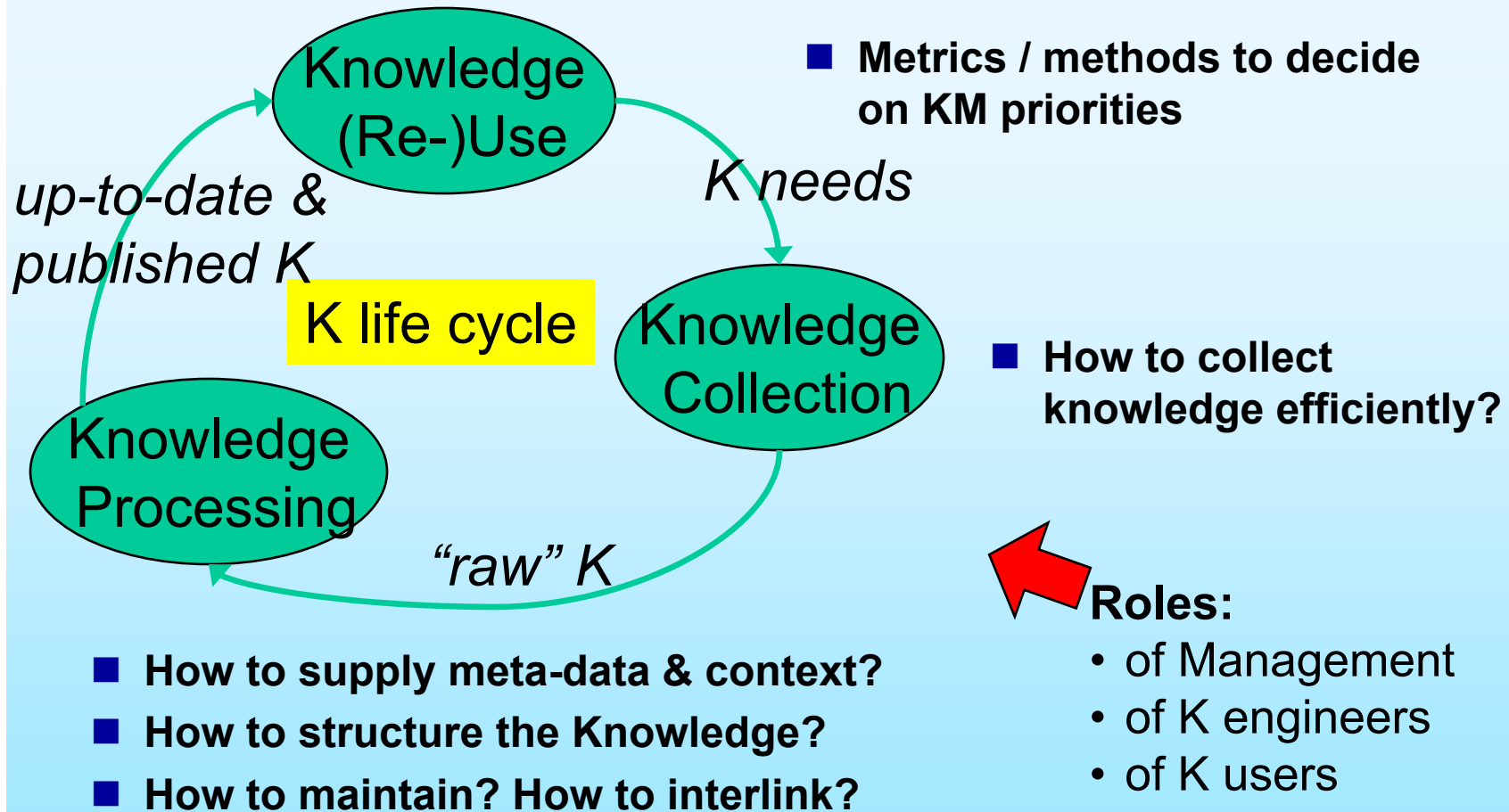
System Architecture



WISE will support engineers with context-sensitive knowledge management functions based on web technologies



KM Processes & Methods Needed



We need easy-to-use guidelines to implement KM.
KM must be driven by the user's needs for knowledge.



Human Factors Issues

- Knowledge = most important personal asset of an engineer in a quickly changing business environment
 - *reluctance to share*
- Time pressure to get the job done
 - *no time* for documentation, making knowledge explicit, abstraction...
- Very high need for knowledge from previous experience, neighboring departments
 - *readiness to share?*
- The internet experience (easy access to tons of useful information)
 - experience that *knowledge exchange works*

HF issues will decide on acceptance of KM



Conclusions

- High need for KM adapted to engineering needs
- Challenges:
 - Multiple platforms & proprietary engineering tools
 - Select information according to context
 - Convince engineers and managers to share knowledge
 - Provide methods and processes for practical KM
- Holistic WISE approach: Looking at technological, organisational and human-factors issues

THANK YOU

Visit us on: www.ist-wise.org

1st Day on KM in Engineering, Brussels, 21 June 2002