Keeping Artifacts Alive: Towards a Knowledge Management System

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Outline

- Introduction
- Artifacts in cooperated work
- The lifecycle of artifacts
- Mechanisms for knowledge management
- Conclusions
Introduction

- Artifacts
  - host information
  - trigger action
  - document processes
  - maintain knowhow and experiences
  - used to provide services
  - created, used, modified, communicated, stored, destroyed
Introduction

- Frameworks and systems provided for
  - organizational memory
  - common information spaces
  - workflow systems
  - coordinated work environments
  - concepts analyzed and validated in ethnographic case studies
- New systems were designed
- No study on artifacts as central entities for knowledge management in organizations
Introduction

- I analyze the lifecycle of artifacts in a cooperative work environment
  - how to follow central common artifacts in a networked setting
  - that artifacts have a lifetime before they disappear from the use field
  - how to keep artifacts and with them the information that is included or attached to them alive
Artifacts in Cooperaed Work

- Artifact is a permanent symbolic construct.
- Artifacts act as mediators of the coordination.
- Artifacts are used to clarify ambiguities.
- Artifacts mediate articulation work by acting as an intermediary with a specific material format between actors.
- Artifacts can be shared for manipulation and transformation by the participants of the activity.
  - Instruments, signs, procedures, machines, methods, laws, forms of work organization, plan, a common idea ...
Artifacts in Cooperated Work

- **mediating artifacts** - primary artifacts, secondary artifacts, tertiary artifacts, what-artifacts, how-artifacts, why-artifacts, where-to-artifacts

- **specialized artifacts** - time tables, schedules, catalogues, classification schemes for large repositories

- **material artifacts** - accessible artifacts

- **representational artifacts** - objectifications of things-to-come, objectifications of things-in-the-process

- **multilayered artifacts** - annotations, notes

- **coordinative artifacts** - material artifacts with coordinative role
Artifacts in Cooperated Work

- coordinative artifacts
  - communication objects and persuasive
  - create a common understanding of an idea or task
  - remind principles, approaches and methods applied, questions that are still open
  - help keeping track of activities and materials
  - as boundary objects enable crossing organizational and professional boundaries
  - capture decisions made in a project
  - traces, templates, maps, scripts
Artifacts in Cooperated Work

- common artifact
  - implements the basic functionality to fulfill the requirements
  - its structure and operation is predictable
  - actors need to see any time what others are doing and a common artifact offers this required overview of the cooperative work
  - enables implicit communication within a team
  - serves as a template representing a limited model of the work to be done by leaving enough space to be filled by its users
  - if templates are filled then they become records of the work
The Lifecycle of Artifacts

- ethnographic study in a European STREP project called MAPPER
  Model-based Adaptive Product and Process Engineering IST-016527
  - a company that produces car parts like gearshifts, head strains, and seat heating for automotive industry
  - several branches all over the world
  - projects are multinational
  - could observe several meeting and carry out in-depth interviews with some of the key actors
The Lifecycle of Artifacts

- to-do list of the project manager
  - a list of open issues related to an ongoing project
  - each open issue was named, described, assigned to a person, got a deadline and a status
  - had a long life, almost certain phases of a project, because they were used to report things done or issues that could not be solved in further meetings with top management or suppliers or even directly with customers
  - no to-do lists of past projects

<table>
<thead>
<tr>
<th>Week.no</th>
<th>Issue</th>
<th>Resp.</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.1</td>
<td>D-FMEA to be performed, component level. Meeting scheduled w545.</td>
<td>TOEK</td>
<td>w 539</td>
</tr>
<tr>
<td>40.3</td>
<td>Verify styling on L-shape carrier due to open slots for brace. Meeting with customer w 544.4.</td>
<td>ANKV</td>
<td>w 42</td>
</tr>
<tr>
<td>44.1</td>
<td>Track outstanding issues in TR.</td>
<td>TOEK</td>
<td>Follow up</td>
</tr>
</tbody>
</table>
The Lifecycle of Artifacts

- to-do lists of participants
  - handwritten, unstructured, messy, very specific
  - used until the next meeting to remind project members to things what they have to do
Mechanisms of KM

- architecture based on the interaction modes applied by work groups in dealing with artifacts

- ways of exchange of (common) artifacts shape the mechanism that is needed to support, on the one hand, the interaction between cooperating actors or groups, and on the other hand, the knowledge management between all

- ordered exchange vs. shared space
## Mechanisms of KM

<table>
<thead>
<tr>
<th>System properties</th>
<th>Ordered exchange approach</th>
<th>Shared space approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Artifacts move from one actor to another.</td>
<td>Shared artifacts are located in common information spaces.</td>
</tr>
<tr>
<td>Access onto common artifact</td>
<td>Sequential</td>
<td>Simultaneous and sequential</td>
</tr>
<tr>
<td>Interaction paths</td>
<td>1:1, 1:n, n:1</td>
<td>n:m</td>
</tr>
<tr>
<td>Temporal arrangements</td>
<td>One actor occupies the artifact for a period of time.</td>
<td>Artifact is available for all actors all the time. Restrictions by write access through lock mechanisms, not concurrent access, use of configuration management.</td>
</tr>
<tr>
<td>Use of views</td>
<td>Artifact is the view, otherwise a new artifact must be created (for the access by a specific actor, e.g., only on a part of the artifact).</td>
<td>Artifact is not necessarily the view. Views are necessary to filter data for access by specific users.</td>
</tr>
<tr>
<td>Access order</td>
<td>Ordered access</td>
<td>Unordered access</td>
</tr>
<tr>
<td>Access initiator</td>
<td>Actor or the system used deliver artifacts to actors.</td>
<td>Actors are responsible to get and put the common artifact.</td>
</tr>
</tbody>
</table>
Mechanisms of KM

- knowledge management with snapshots
  - not only to store the content contained in artifacts
  - store also the location, size, deadline, responsible person in to-do lists
  - store also from and to fields in e-mails
  - ...

- a snapshot-based knowledge management mechanism creates a network of projects, people and artifacts including content- and meta-level information

- additional to this meta-level information, links between artifacts created by users, tags and comments given to artifacts to make more sense of them and ease their useful retrieve can be provided
Mechanisms of KM
Conclusions

‣ common artifacts to exchange work in progress implicitly, to support articulation work, e.g., by representing work carried out, to point out possible and actual gaps in coordinating dependencies between tasks, to communicate the to-dos explicitly, to assign tasks to persons, to define and refine work to do, etc.

‣ common artifacts host valuable information about processes, people’s knowledge, experiences, and habits, conventions and decisions made

‣ artifacts have their life times

‣ if they disappear the information embedded in them disappears too → a gap in accessing knowledge and experiences of an organization
Conclusions

- Based on the use of artifacts by cooperating people, the ordered exchange and shared space approaches help us to design the right work environment for work groups.

- This makes the use of temporal arrangements and views more transparent and accessible.

- The concept of snapshots for knowledge management:
  - Demonstrates the usefulness of these two approaches for making artifacts permanent,
  - Presumes their existence.

- Can everything be captured in artifacts?

- Can the exchange of artifacts replace the face-to-face interaction of people working together?
Thanks for your attention!

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