“Our mission is to transform research in new technologies into innovation and added value for our customers and society”

**SOME INFO**

- Spin-off of CSIC-UAB (1999)
- Turnover 2009: ~8 MM €
- Team: ~100 employees
- Departments:
  - innovationLAB (I+D)
  - Intelligent Content Management
  - Sourcing Transformation
- Some R&D projects:

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Purpose of this talk

- Social Software Web2.0
- Context
- Knowledge Processes
- Mining
- Semantic Tech.
Introduction

- What is a Knowledge Process?

Approaches

1) Knowledge Filters
   - Ask the Wiki, Contextual Search, Word Plugin

2) Framework for Knowledge Processes
   - The Task Pane, the Task Wizard, the Task Recording
   - The Context Visualizer

3) Refactoring and optimization
   - The Refactoring tool
   - Contextify

4) Security and Privacy Framework
Agenda

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  4) Security and Privacy Framework
The Knowledge Worker

“One who works primarily with information or one who develops and uses knowledge in the workplace.”

Peter Drucker, 1959
Knowledge Worker Revisited

- Thomas Davenport has defined *knowledge workers* as people who “think for a living” and discusses who they are, what they do, and how their number is growing [2005].
  - For an increasing proportion of people in the world economy, work is to a large extent mental rather than physical.
  - To significantly increase economic productivity it is necessary, therefore, to increase the productivity of this knowledge–based and knowledge–driven work.
The typical situation of a Knowledge Worker

- What to do?
- How to do?
- Where to look?
- Who knows what?
- Who and what can I trust?
- When to act?
- How to share?
- Anything new?

What's happening?
ACTIVE’s Knowledge Worker

A knowledge worker is a specialist or an expert dedicated to a specific knowledge intensive work domain within an enterprise.

He principally uses his experience, skill, and current working context to understand summaries and create new knowledge from exiting pieces of work.

Knowledge workers bring ingenuity and inventiveness along with intuitive dissension making in their daily work as well as for the team.

Related tasks and workers benefit in terms of learning, modifying and enhancing their workflows.
The Long Tail of Business Processes

- Business Processes
  - High repetition rate
  - Mature
  - Involve defined roles
  - Enterprise driven

- Knowledge Processes*
  - Scope – user or small team
  - Repetition rate is low
  - Depend on skill, experience, and judgement of the knowledge worker

*aka Artful Processes, Informal Processes
People, empowerment, collaboration, ...

The basis of the operation is the structure of the activities

Knowledge-based

The basis of the operation is the knowledge of individuals.

Structured-based

Procedures, control, compliance...

Workflow is a finite set of sequential/parallel activities triggered by events.

*taken from: Computer/Supported Coorperative Work, Uwe m. Borghoff and Johann H. Schlichter, Springer, 2000
Business Process is a collection of sequential/parallel activities necessary for processing of economically relevant objects.*

*taken from: Computer/Supported Coorperative Work, Uwe m. Borghoff and Johann H. Schlichter, Springer, 2000
Knowledge Process is a collection of loosely defined and ramified activities necessary for processing of user relevant data.
Workflows, Business Processes, Informal Knowledge Process

- **Workflow** is a finite set of sequential/parallel activities triggered by events.*
- **Business Process** is a collection of sequential/parallel activities necessary for processing of economically relevant objects.*
- **Knowledge Process** is a collection of loosely defined and ramified activities necessary for processing of user relevant data.

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## Workflows, Business Processes, Informal Knowledge Process

<table>
<thead>
<tr>
<th></th>
<th>Business Process</th>
<th>Knowledge Process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>Business–goal driven</td>
<td>User–goal driven</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Enterprise</td>
<td>Individual</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Static</td>
<td>Ramified</td>
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<tr>
<td><strong>Description</strong></td>
<td>Formal</td>
<td>Informal</td>
</tr>
<tr>
<td><strong>Guided</strong></td>
<td>Externally Coordinated</td>
<td>Ad–hoc/ Spontaneous</td>
</tr>
<tr>
<td><strong>Analyzed</strong></td>
<td>Monitored, Analyzed, Optimized</td>
<td>Not Monitored, Emerging</td>
</tr>
</tbody>
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**ACTIVE**
Knowledge-Powered Enterprise
www.active-project.eu
An example – Hiring process

**Vacancy**
- Information about vacancy
- Mail about job description
- Add open position to website
- Ask to search for candidates
- Search online services
- Send applicants per mail

**Post and Search**
- Review and forward
- Set up interview with candidate
- Phone interview
- Taking notes
- Inform about candidate
- Send offer

**Review**

**Screen**

---

Alice
Hiring Expert

Bob
Alice’s assistant

Dave
Hiring Manager

Boss

Chris
The candidate

ACTIVE
Knowledge-Powered Enterprise
www.active-project.eu
Business Processes trigger KPs (BPC)

- KPs can trigger BPs (KP2)
- KPs can connect business processes (KPA–KPB)
Evolving Knowledge Processes

- KPs can transform to business processes over time when they become stable and static/mature.

- There are KPs without a business process context.
  - Example:
    - Start-ups usually do not have well-defined business processes. Knowledge worker just executing knowledge processes.
A knowledge process is a collection of tasks (ramified, non-structure at the beginning)
Actor makes a decision influenced by a driver about a follow-up tasks out of the admissible tasks
The driver is derived from the state of the context and the environment (situation)
A follow-up tasks could trigger another knowledge process
Multiple Knowledge Processes

E.g. Prepare presentation

KP#1
(Bob)

T1 Go to url
T2 Identify information
T3 Copy information
T4 Open Powerpoint
T5 Paste information
T6 Talk to another person
T7 Save presentation

KP#2
(Alice)

T1 Go to url
T4 Open Powerpoint
T2 Identify information
T3 Copy information
T5 Paste information
T6 Talk to another person
T7 Save presentation

KP#3
(Bob)

T1 Go to url
T6 Talk to another person
T2 Identify information
T3 Copy information
T4 Open Powerpoint
T5 Paste information
T7 Save presentation

experience, knowledge and skills

with pre/post conditions
non-system event
system event
other KP or BP

triggers System Event
trigger non-system Event
Triggers another KP
However, a company can provide Knowledge process templates as a standard process to be reused by knowledge workers which can be defined either manually or from the mining process (from logging).
A *Knowledge Process* (KP) is…

- loosely defined and structural ramified collection of actions.
- not fully defined in terms of structure and the order of action are at its point of initiation.
- in which actions require a decision by an actor about the follow-up action.
- in which the actor uses his knowledge and the context to decide for the successor action.
- in which decisions have to been taken during execution time over the process development path and lead to emerging structural ramification constituted by admissible alternatives.
- **in which dynamic ramification is the one of the key features.**
What is a knowledge process? Motivation in ACTIVE

- Besides formal processes within the enterprise there are several informal processes
  - *Writing a proposal, scheduling a meeting, preparing a bid ...*

- Use of formal process systems is reserved for enterprise level, not on user level
  - Common workflow modelling tools are considered as too complex

- Need for a ...
  - lightweight
  - knowledge worker–driven
  - context–aware
  - support of informal process
  - ... solution!
Knowledge Processes in ACTIVE

- In ACTIVE we will support knowledge processes with innovative application systems by transforming informal knowledge processes into more formalized knowledge processes.

- The developed "formalized knowledge processes" will support knowledge workers in their daily business.

- The worker still remains the driver of this process.

- The ACTIVE Knowledge Work is going to analyse the informal knowledge processes and tries to identify recurring sequences and patterns within a process of a single person or a team so that tacit knowledge becomes explicit as a result of knowledge process actions

- Enhance knowledge workers‘ effectiveness and efficiency
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  - What is a Knowledge Process?

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     - The Refactoring tool
     - Contextify
  4) Security and Privacy Framework
Approaches for Pro–active Knowledge Processes Support

- Framework for Knowledge Processes
- Knowledge Filters
- Refactoring and Optimization
- Security and Privacy
The Knowledge Refinery

Framework for Knowledge Processes

Goal: Provides methods to (re)structure processes during runtime in a
• Lightweight
• User-driven approach
• Top-down approach

Components:
- Task Pane offers manual facilities to create and manage processes
- Task Recording automatic recording of actions
- Task Wizard guides users through a set of steps with a particular purpose
- Task Service
  • Provides methods to store processes.
  • Logs task executions for mining and prediction
- Semantic Media Wiki as template repository
Framework for Knowledge Processes – Task Service

- It is the core of the knowledge process framework.
- It offers an interface to manage tasks, and to associate tags and resources
- It connects the top-down approach and the bottom-up approach.
- Available as a web service
Task Pane:
User-oriented approach to deal with Knowledge Processes

Features:
- Basic process and resource manipulation (create, delete, modify)
- Assign resources and open resources
- Connection to Task Service and Semantic Media Wiki
- Synchronize with AKWS services
- Security for processes

ACTIVE Knowledge Workspace Software Package available at:
http://www.active-project.eu/publications/active-knowledge-workspace.html
Context Visualizer:
Visualization of elements and relationships within a context

Features:
- Elements related to a working context: people, resources, KPs
- Contextual information about context and elements
- Direct relationships between some elements in the context (red line).
- Filtering options (e.g. Based on resource type)

ACTIVE Knowledge Workspace Software Package available at: http://www.active-project.eu/publications/active-knowledge-workspace.html
Task Wizard:
A tool for guiding knowledge worker to perform some generic actions.

Support in:
- Creating a process template
- Selecting a particular process
- Sharing processes

ACTIVE Knowledge Workspace Software Package available at: http://www.active-project.eu/publications/active-knowledge-workspace.html
Framework for Knowledge Processes – Process Recording
Framework for Knowledge Processes – Process Recording
Framework for Knowledge Processes – Semantic Media Wiki
Framework for Knowledge Processes – Semantic Media Wiki
Knowledge Filters

- Knowledge Filters are software components that provide the user with means for:
  - retrieving, refining, and inspecting snippets of knowledge maintained within formal knowledge bases

- Tools on SMW:
  - AsktheWiki
  - Office Smart Tag Plug-in
Knowledge Filters – Ask The Wiki

- Semantic search based on a translation of keyword-based queries into structured queries against graph-structured data

How:
1) Articulation of the information need – keywords
2) Query interpretation using keyword translation – structured conjunctive queries
3) Result presentation and refinement – facets
Knowledge Filters – Ask The Wiki – Demo

Ask The Wiki

Step 1: Enter keywords → Step 2: Choose interpretation → Step 3: View and refine results

- Enter keywords for your search
- For example you might enter *mitarbeiter email*, or *projekt wissensmanagement kontaktperson*.

Semantic Wiki Search

publications Semantic Web       Wiki Search!

Demo available at:
http://www.aifb.kit.edu/web/Spezial:ATWSpecialSearch
E.g. publications Semantic Web
Knowledge Filters – Ask The Wiki – Demo

Ask The Wiki

- New Search
- Step 1: Enter keywords
- Step 2: Choose interpretation
- Step 3: View and refine results

- Your search returned 6 interpretations.
- Choose the interpretation that fits your needs best by clicking on.
- Note: You can add/remove concepts and relations in the next step.

Legend: Concepts, Relations, Labels, Literals

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<tr>
<td>There are 198 more results...</td>
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Knowledge Filters – Ask The Wiki – Demo

Ask The Wiki

New Search | Step 1: Enter keywords | Step 2: Choose interpretation | Step 3: View and refine results

- There are 200 results matching your interpretation.
- Use the Facets to the right to expand or narrow the results.

Legend: Concepts, Relations, Labels, Literals

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Facets
- Open/close a menu.
- Remove a concept.
- Add/remove a relation.
- Define a concept.
Knowledge Filters – Office Smart Tag Plug-in

Deliverable D3.2.2

Knowledge is used by

Wiki Tag: Knowledge
- Responsible
- Scope: Active
- Short description
- View All Information...
- Go to wiki page
- Smarttag: jochsen
- Erkennung von "Knowledge"
- Smarttag: Optionen...

Knowledge
- Knowledge is defined (by the Oxford dictionary) as (i) expertise and skills, (ii) what is known, or (iii) awareness gained by experience of a fact or situation.

Reference
- Responsible: FIR
- Scope: Active

Category: Gloss
Refactoring and optimization

By definition:
- KP are informally defined and highly flexible.
- KP can become complex and complicated.
- KP can be executed in several ways.

This leads to the need of a framework for:
- Comparing efficiency and performance.
- Increase flexibility and simplicity.

Images taken from: Refactoring Process Models in Large Process Repositories
Refactoring and optimization

Approach – Framework:
1) Metrics to quantify knowledge processes
2) Knowledge Process Trace Indicator
3) Tools for refactoring and optimization
   - The Refactoring Tool
   - Contextify – Increasing email–related productivity
Metrics to quantify KPs

**Objective Measures**

- **Size S**
  \[ S(G) = \text{count}(N) \]
- **Dependability D**
  \[ D(G) = \text{count}(N_{in}) + \text{count}(N_{out}) \]
- **Diversity V**
  \[ V(G) = \sum_{i=1}^{n} \text{count}(T_i) \]
- **Separability Y**
  \[ Y(G) = \sum_{i=1}^{n} (N_{U_i} - N_{C_i}) \]
- **Structural Complexity SC**
  \[ SC = \sum_{i=1}^{n} \text{count}(N_i) \]
- **Performance, external costs**

**Subjective values**

- **Quality of the result**
- **Satisfaction with the process**

**User–dependable values**

- **Skill Value Vector**
- **Feasibility**
Knowledge Process Trace Indicator

(Eq. 1) \( g_i(x_i) = \frac{\max(x_i) - x_i}{\max(x_i) - \min(x)} \) with \( \min(x) \leq x_i \leq \max(x) \) and \( \min(x) < \max(x) \)
Refactoring

- Applying a series of simple transformations while the cumulative effect of each of these transformations is quite significant.
  - No Impact the final goal
  - A new structure provide better design or performance

Examples:

1. **Process Schema S**
   - A → B → C
   - D → G
   - Unused branch
   - DeleteTask (E), DeleteTask(F)

2. **Process Schema S1**
   - A → B → C → D → E
   - CreateTask (X)

3. **Process Schema S1’**
   - A → B → C → D → E
   - X → C
The Refactoring Tool – Demo
Contextify

- Contextify is a tool that displays relevant contextual information
- Implemented as an add-in for Microsoft Outlook
  - The most popular email client (40% market share)
  - Extensible – support for add-ins
- Existing add-ins that display contextual information
  - XOBNI, ClearContext, Taglocity, Gist, Lookeen, ...