# RETURN ON EXPERIENCE ABOUT IMPLEMENTING KNOWLEDGE MANAGEMENT SYSTEMS IN SOFTWARE ENGINEERING: MOTIVATIONS, OPPORTUNITIES AND CHALLENGES

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## Presentation Plan

- Overview
- Our Experience
- Motivations
- Opportunities
- Challenges

# Overview

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## Software Engineering

- Software Engineering (SE) is the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software

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## Software Engineering

People

Tools

Methods

Techniques

Technologies

Activities

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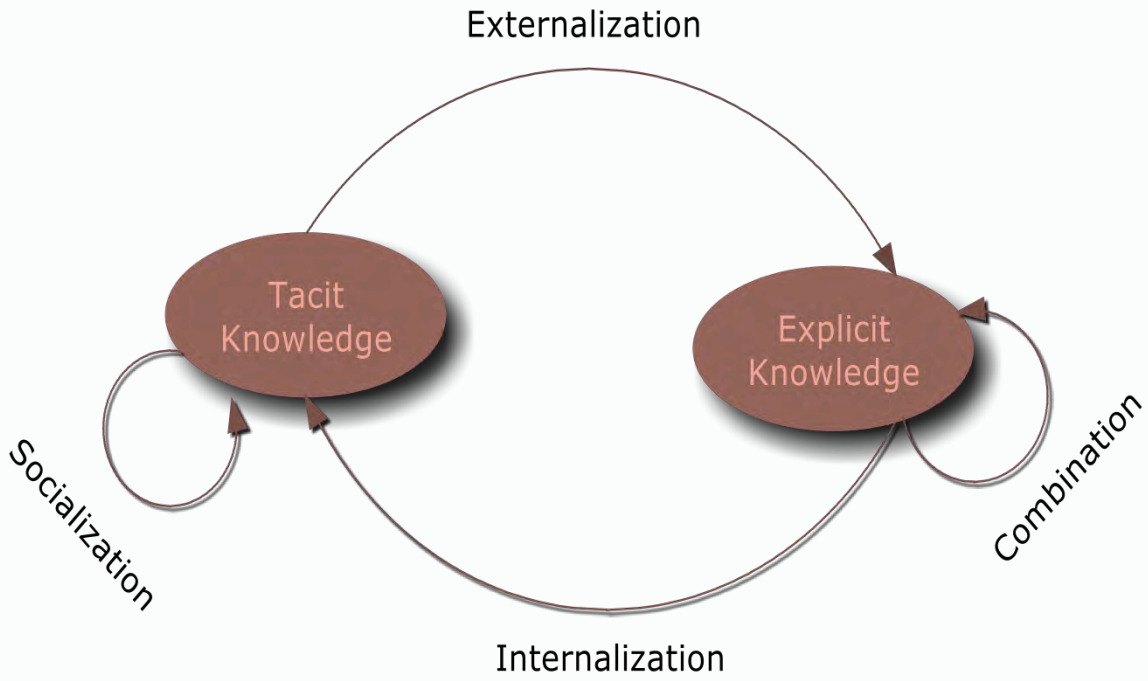
## Software Engineering

- During SE activities, collaborators produce and consume Knowledge
- SE is a knowledge-intensive activity (Robillard)
- The effective sharing, capture and application of this Knowledge is vital to the competitiveness and the survival of SE organizations

## What is Knowledge ?

- Knowledge is a justified belief that increases an entity's capacity for effective action. Knowledge is always associated to action and experience (Nonaka)

## Knowledge Typology



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## What is Knowledge Management ?

- KM is the collection of processes that govern the creation, dissemination and utilization of knowledge to fulfill organizational objectives
- Knowledge management systems (KMS) refer to a class of information systems applied to managing organizational knowledge. That is, theyare IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application

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## KM Processes

- Knowledge Capture
- Knowledge Storage
- Knowledge retrieval
- Knowledge Transfer
- Knowledge Application

## KM and ontologies

- Ontologies are one of the best conceptualization of Knowledge
- It is the foundation on what the KMS represents and stores Knowledge

# Our Experience

## Our Project

- Our Project was about the design and an implementation of a KMS in a software Engineering organization

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## Our Results

An Ontology

A methodology

A KMS

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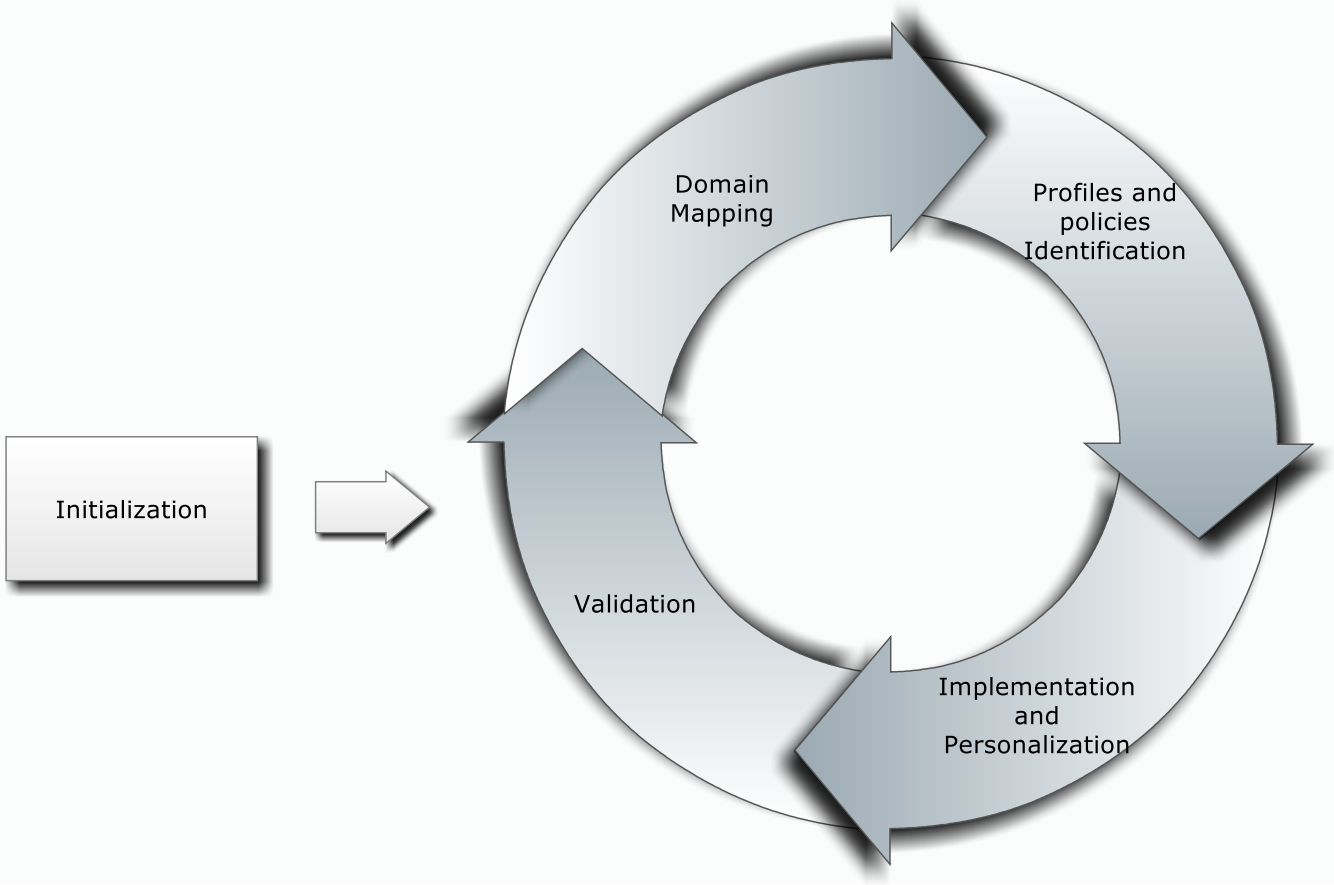
## A Methodology



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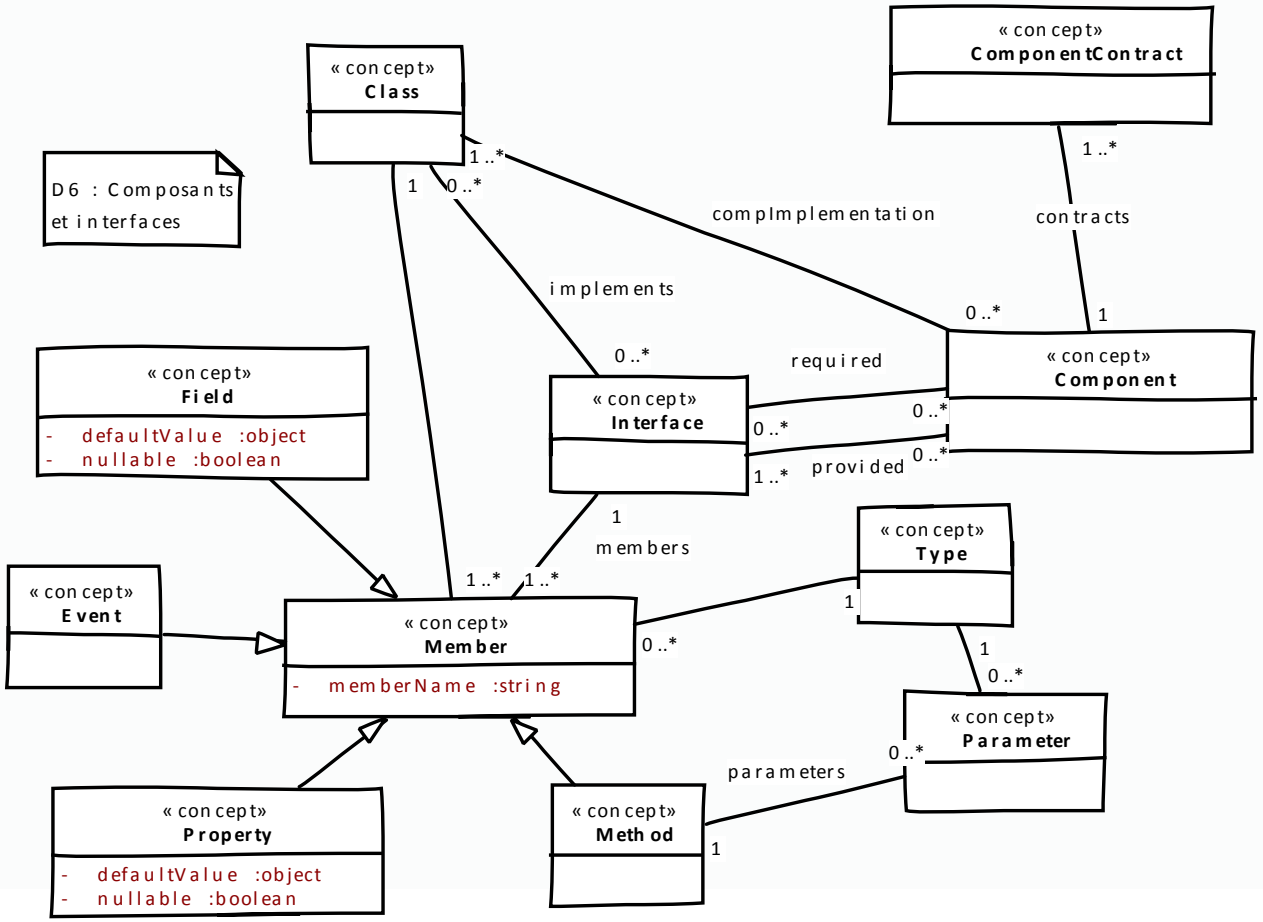
## An Ontology



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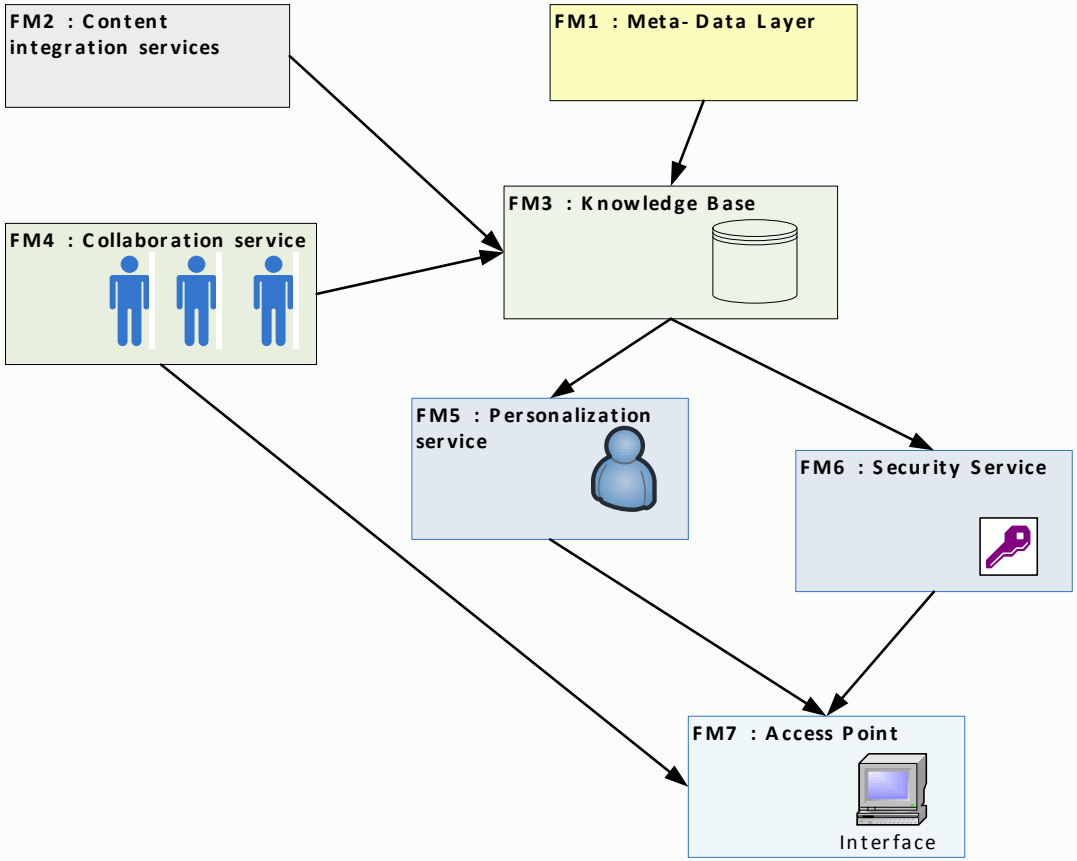
## An KMS



## The Paper Objectives

- Use the capitalized experience in similar projects
- Share the synthesis on the motivations, the challenges and the opportunities of implementing KMS in a SE context

# Motivations

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## Decrease Time and Increase Quality

- Avoid error repetition
- Promote success factor reproduction
- Capture past experiences

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## Acquire Knowledge Abou New Technologies

- The technology evolution rhythm is very fast
- KM is a good channel that allows the acquisition of knowledge concerning new technologies quickly and efficiently

## Access Domain Knowledge

- the acquisition of the domain knowledge is a time-consuming activity
- KMS provides an infrastructure that facilitates the access to domain knowledge

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## Quickly Adopt Organization Culture

- KM provides a mean that allow new developers to adopt in a reasonable delays the cultural requirements of their new company and integrate efficiently the active development teams

## Skill Identification

- If implemented well, KMS will provide the right tool that permits to identify the right person to the right task in an organization

# Opportunities

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## An important part of SE knowledge is explicit

- It is difficult to access tacit knowledge
- More the Knowledge is explicit, the easier is its exploitation.
- Fortunately, in SE a considerable amount of the knowledge assets are already explicit

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## The SE environment is a friendly environment

- SE organization do already have the requirements of a KMS infrastructure : networks, servers,…

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## CASE Tools are extensible

- Most of CASE (Computer-Aided Software Engineering) tools are extensible (API, …)
- This openness facilitates the integration with the KMS

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## KMS are not necessarily developed from scratch

- Most of SE organizations have a basis system for the KMS : (intranet system, document management or Enterprise Content Management)
- The adaptation of these systems needs development efforts which are the core of SE

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## Research is converging to a SE ontology

- Many projects are conducted to the development of an ontology for software engineering
- Most of these projects are based on the SWEBOK project

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## The knowledge sharing culture is well-established

- SE practices encourage Knowledge sharing
- The developers psychology is a pro-sharing psychology

# Challenges and propositions

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## Software Engineering is a vast domain

- This makes the conceptualization difficult
- Many misconceptions and conflicts
- **A conceptualization project should be based on a consensus source such as SWEBOK**
- **Focus on ontology reutilization**

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### Convince software engineers to use the KMS

- Software Engineers are overloaded
- Many reasons hamper knowledge sharing : fear, time, selfishness
- **Put strong motivational practices**
- **Encourage sharing**
- **Accelerate sharing procedures**

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## KMS impacts are difficult to evaluate

- some metrics have to be developed to measure the impact of the KMS in increasing the product quality and / or decreasing the delays and costs
- **Continuous feedback**
- **Top Management Support**

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## Domain Knowledge Is difficult to integrate

- Software development can target infinite and various domains such as finance, banking, education, healthcare or gaming
- **Some efforts have to be considered to target a domain conceptualization**
- **Encourage reutilization**

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## Knowledge Obsolescence

- Knowledge valid for a certain version of a product or programming language could be very quickly obsolete when later versions are released
- **Use metada and feedback**

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## KMS Integration

- SE includes many tools
- It's difficult to integrate these tools with the KMS
- **Exploit the open nature of most of CASE tools**

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## The Security

- Knowledge is the organization force or weakness
- This knowledge have to be protected to ensure the value of the organization
- **We have integrated the security requirements with the operating system layer (security framework)**

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### The KMS should support software processes

- software process is a set of activities whose goal is the development or evolution of software
- Software projects implement these processes
- It's vital to integrate software processes and KM processes to capture this strategic Knowledge
- **We considered Software processes as KM processes too**

# Thank You !