

# Information and Knowledge, Knowledge Management, State-of-the-art of Modeling

PA116 – L7

(c) Zdenko Stanicek, Sept. 2010



INVESTMENTS IN EDUCATION DEVELOPMENT

# Discussion

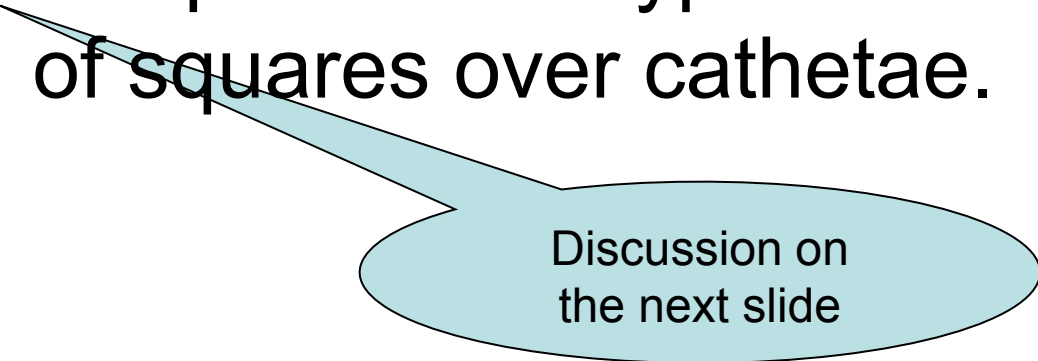
- What is “Knowledge” ?
- What is the difference between knowledge and information?
  - Is there any difference?
  - Is a knowledge a special case of information?
- What definition of “information” we will use?
  - Shannon’s one?
  - Carnap’s one?

# Information

- According to Shannon:
  - Information is a reduction of a ratio of entropy.
    - The measure is relative with respect to a receiver.
- According to Carnap:
  - Information contained in a proposition is measured by a number of “possible worlds” excluded by the “true” value of this proposition.
    - This is an absolute measure.
- **Carnap is our choice !**

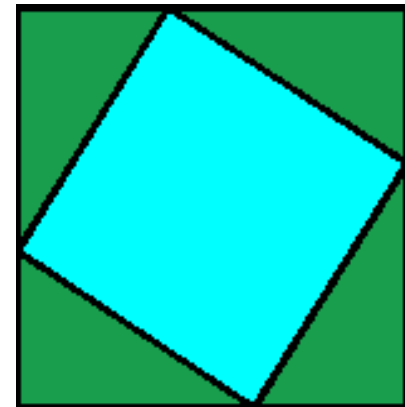
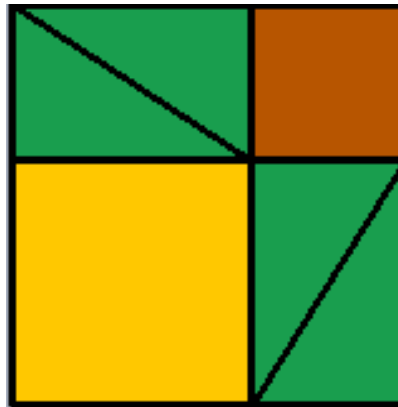
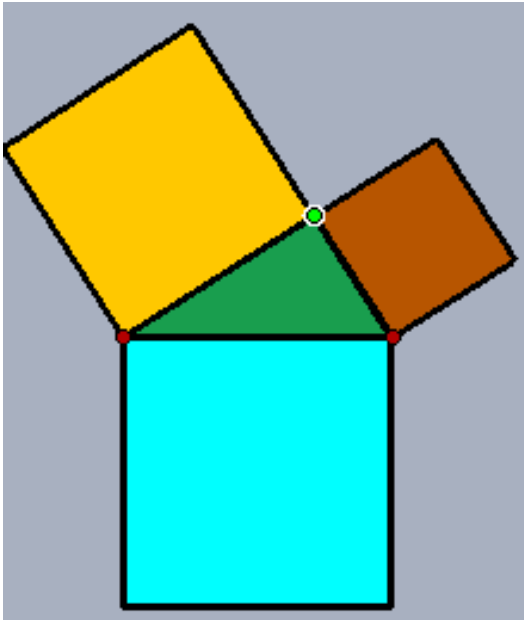
# Classify the following propositions:

- It is raining outside.
- Usually, I have my wallet in the left pocket of my jacket.
- If the rain will go for a long time there will be puddles and morass on country roads.
- A square over hypotenuse equals the sum of squares over cathetae.



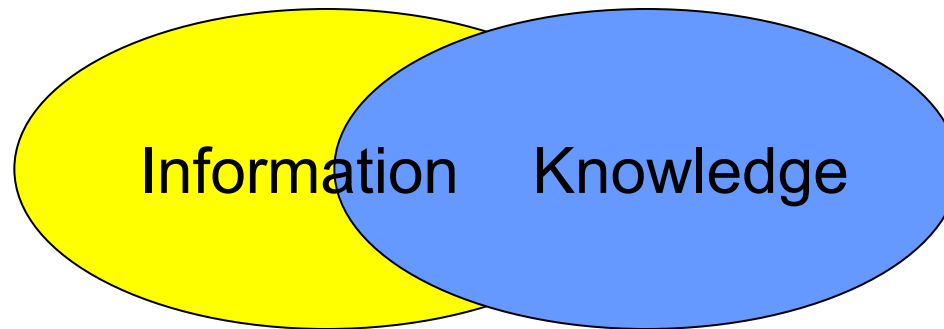
Discussion on  
the next slide

# Pythagorean Theorem



# Knowledge:

- **DEFINITION:** Knowledge is an (intangible) element which helps to a systematic and repeatable management or driving or executing of processes.



Some information is knowledge, some is not !!!  
Some knowledge is not information !!!

# Knowledge: where it dwell and what to do with it ?

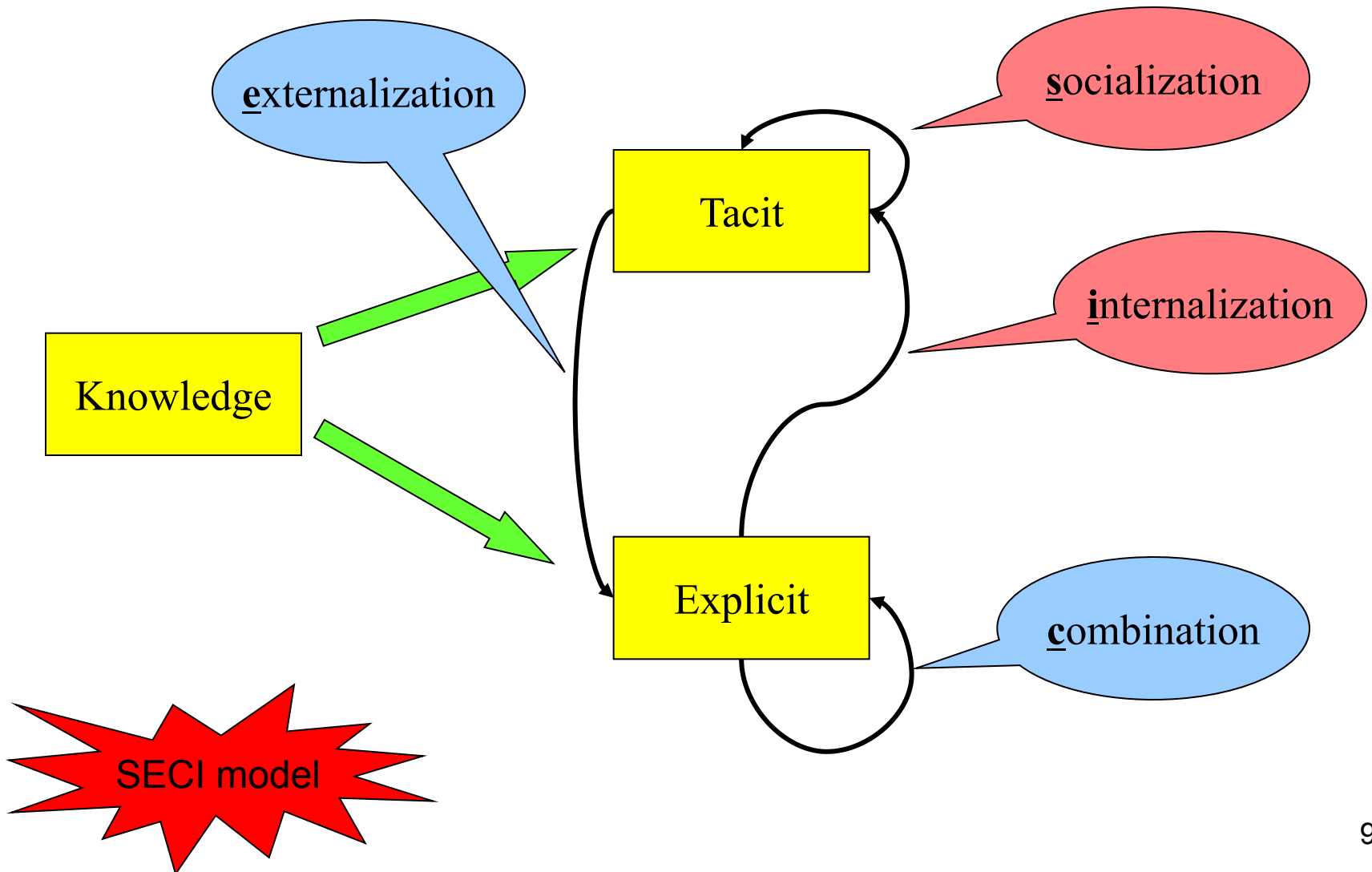
- Knowledge dwells in human heads
- (and maybe in artificial agents simulating people behavior)
- **... in any case it dwells in appropriately organized memory**
- To deal with projects we need knowledge
- Often knowledge is encoded in a program code of applications
- Knowledge has to be developed and maintained
- It is important not to lose knowledge
- Knowledge has to be worked on effectively and efficiently
- **Hence we need “Knowledge Management”**

# Knowledge - Information - Processes

- Performance of a process is influenced by information (input)
- Process produces information (output)
- To execute a process (within a project) we need knowledge
- There is a continual change and evolution
- Knowledge has to be developed
- Appropriate information has to be sought for

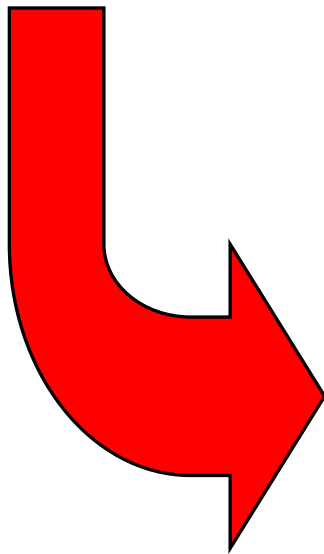


# Knowledge Life-Cycle by Nonaka and Takeushi



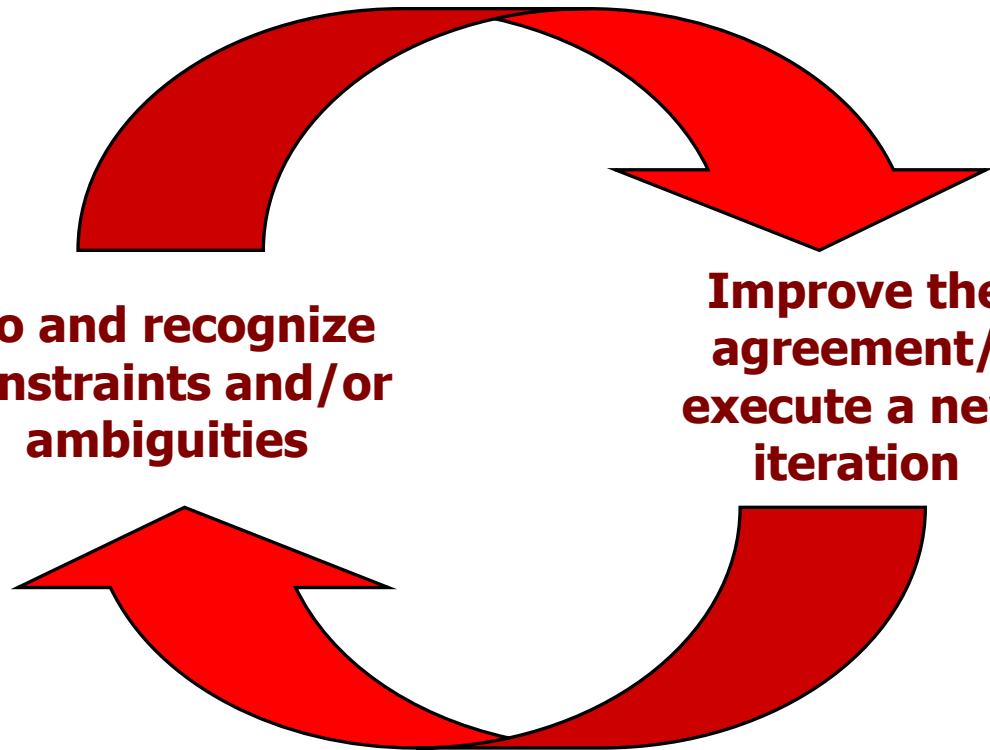
# Agree-Do Paradigm

**Agree what you know  
about the problem**



**Do and recognize  
constraints and/or  
ambiguities**

**Improve the  
agreement/  
execute a new  
iteration**



# Agree-Do Paradigm

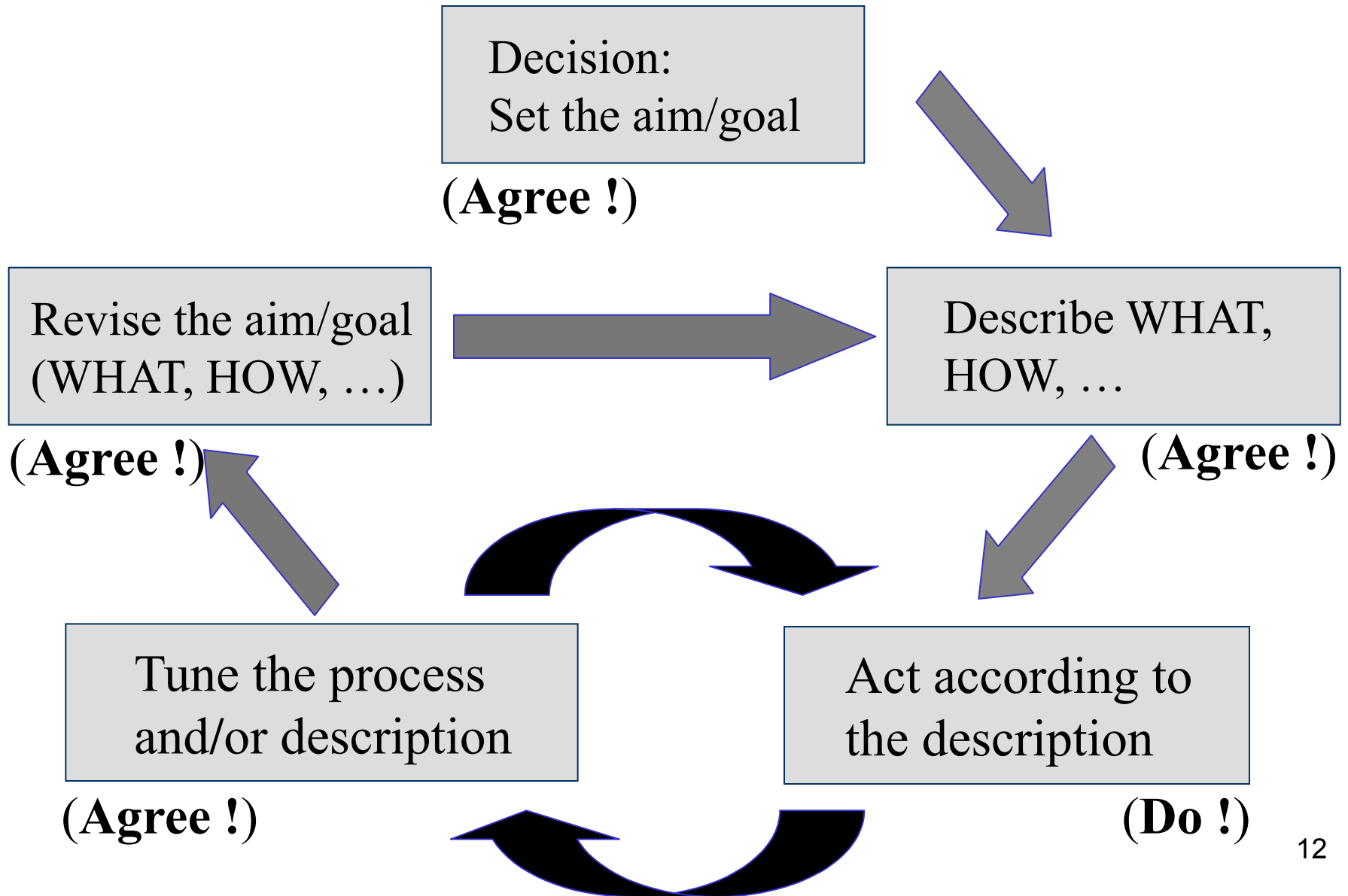
MENTION

MENTION

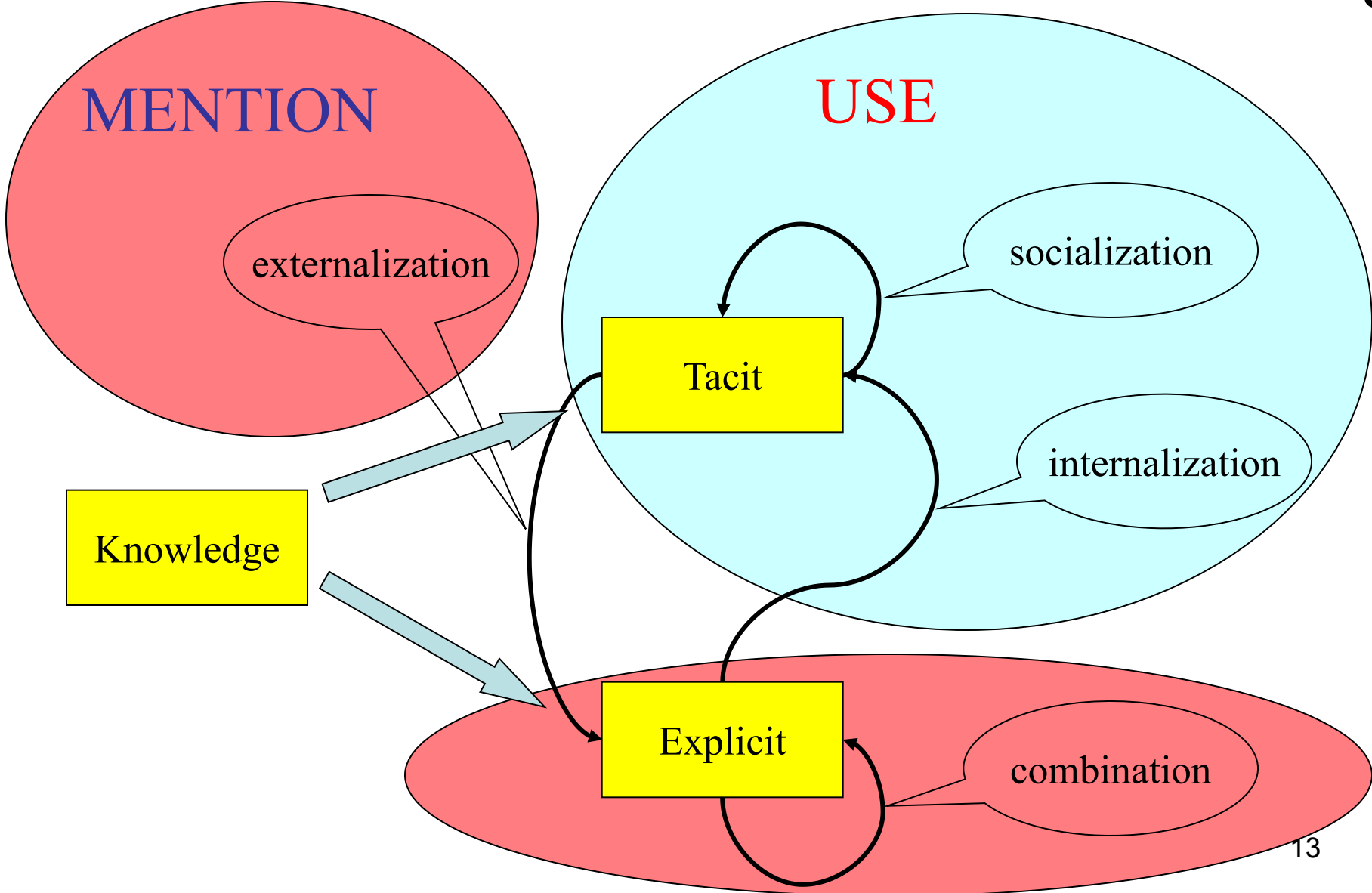
USE

Continual  
Improvement !!!

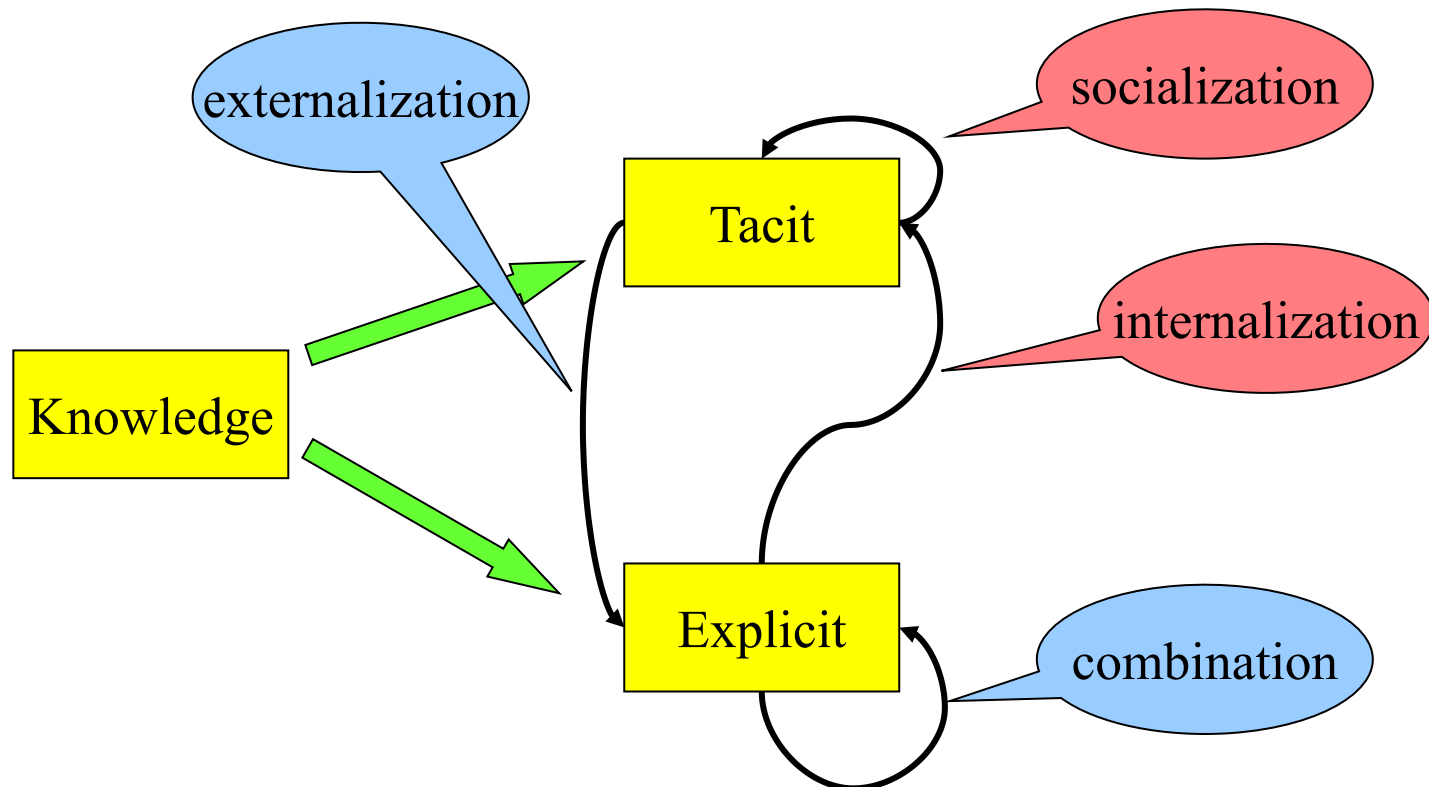
# Cyclical Paradigm



# The Nonaka-Takeushi Life-Cycle in a relation with a MENTION and USE switching



# Knowledge Management means to keep the Nonaka-Takeushi cycle in a run !



MENTIONing Knowledge

means

creating a MODEL of a part of reality (a DOMAIN) containing the particular Knowledge !

# Modeling and modeling tools: state-of-art



# Available modeling tools (MT)

## CASE tools

- CASE: Computer Aided Software Engineering
- any computer-based tool for software product planning, development, and evolution
  
- Editors, Compilers, Debuggers, Edit-Compile-Debug environments, Code Generators, Documentation Generators, Requirements Tracing, Change Management (CM), Defect Tracking, Collaboration tools, Access Control, ...
  
- E.g.: Oracle Designer, System Engineer, Enterprise Architect, Rational, Power Designer, ...

# Available modeling tools (MT)

- BPM tools
  - Business Process Model
  - help enterprises map out their existing processes and optimize them
  - E.g.: Aris Tool Set, Corporate Modeler
- PM tools
  - Project Management
  - E.g.: MS Project, Primavera
- Workflow
  - ...

# Available modeling tools



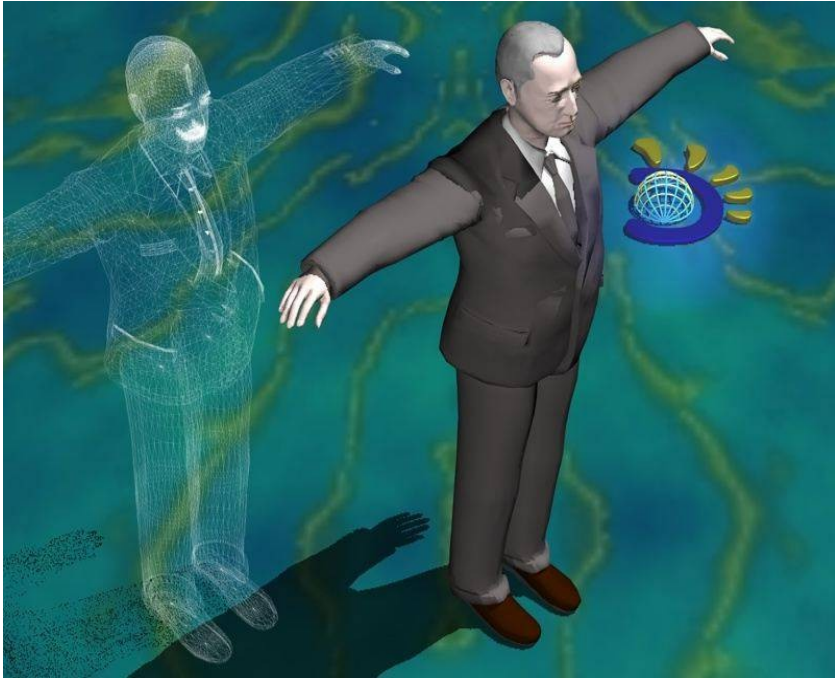
Are we happy with them?

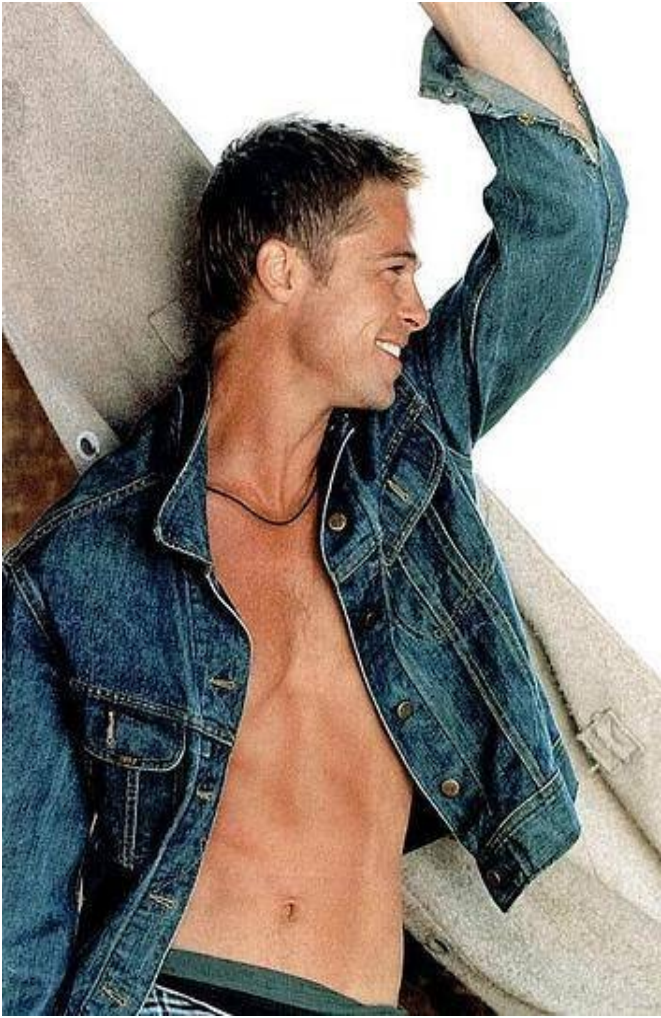
# Current state issues of MT

1. Current CASE tools, BPMT, PMT, ... allow to record only such objects and relationships, which had their creators in **minds** in the time when they were developing the tool.

# Current state issues of MT

2. Objects and relationships, we focus on when modeling various aspects of business, are **continually changing**.
3. Problem of effective communication within any IT project lies nearly always **on boundaries of capability** of a given modeling tool  
(... thus the model doesn't represent the reality appropriately)





# Current state issues of MT

4. Except of some isolated cases, there are only **few ways to extend** used MT by constructs which are needed for current specific requirements.
5. A problem arises in **integration** of some partial views into one common view.



# Current state issues of MT

6. There exists no **criteria** based on modeling capabilities of MT according to which the MTs could be ranked.



# Current state issues of MT

7. In fact we are not able to answer the following question: “What could be **expected** from an MT of a given MT class?”
  
8. Or a question: “What is **missing** in given MT for our specific need and by which other MT could we supplement it?”

# Example 1: Rational

- Built on UML





(UML originally intended to standardize modeling methods; in the end was created a container for all modeling technics – diagrams – which proved to be competent regarding to OOP)

- Operations of this tool give semantics to UML diagrams
- It's possible to add another icons, but only without possibility to add operational semantics
- Mutual connection of various views (diagrams) of a modeled system is a problem
- Actual problems: 1, 2, 3, 4, 5, 6, 7, 8 (all !)

1. Records only what had the creator in mind
2. Objects and relationships are continually changing
3. Problems lie nearly always on boundaries of capability of a given modeling tool
4. few ways to extend used MT by new constructs
5. Problem of integration of partial views into one common view
6. No ranking criteria for MTs
7. “What could be expected from an MT of a given MT class?”
8. “What is missing in a given MT for our specific need and by which other MT could we supplement it?”

# Example 2: MetaEdit+ Method Workbench

- Intention to offer tool enabling easy construction of CASE tool specific for given problem.
- Problems 1, 2 and 4 seems to be solved somehow. But:
- We have to create constructs, that already exists in some other CASE tools.
- Problem 3 is solved slightly: MetEdit+ offers practically only diagram creation. So even problem 4 is solved only slightly!
- Problems 5–7 not solved. Problem 8 – only diagrams without semantics: again nothing.

1. Records only what had the creator in mind
2. Objects and relationships are continually changing
3. Problems lie nearly always on boundaries of capability of a given modeling tool
4. few ways to extend used MT by new constructs
-  5. Problem of integration of partial views into one common view
-  6. No ranking criteria for MTs
-  7. “What could be expected from an MT of a given MT class?”
-  8. “What is missing in a given MT for our specific need and by which other MT could we supplement it?”

# What cause this state?

The reason is obvious:

- A classic of business is: Get USING as fast as possible, there is no time for long MENTIONING !!!
- The result of it is: “Bottom-up approach”.

# Bottom-up building MT

- MT is created for specific particular problem
- ... according to current needs and requirements
- ... without any analysis of a position of a problem within other problems (already modeled or worthy to be modeled)
- In the given specific situation it is a pragmatic and effective approach.

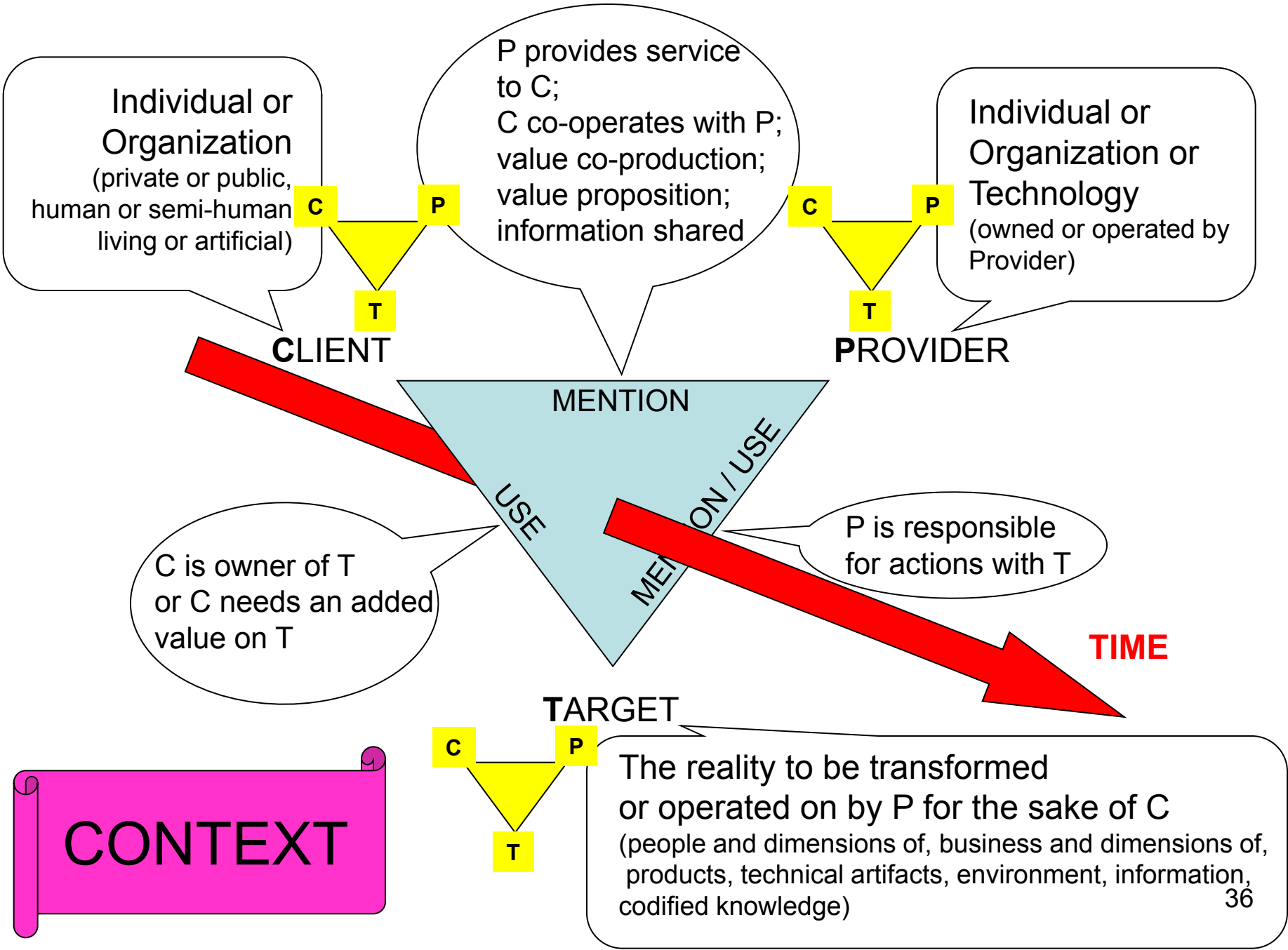


# Facts and consequences

- Bottom-up approach is not supported by any theory of measuring (or more precisely comparing modeling capabilities) of built tools.
- It leads to tools, which are not able to solve previously **unexpected** problems.
- Such tools are “products” but not “Service Systems” or a “good components of Service Systems”.

# Service System

- Service system is a composite of agents (including both, people and artificial ones), technology, environment, and/or organization units of agents and/or technology, functioning in space-time and cyberspace for a given period of time.
- There is always lot of **contexts** from which the service system could be evaluated, explicated and comprehended.
- There exists at least one context from which the roles of Client, of Provider, and of Target could be recognized on agents or environment.



# Evaluation

- Available MTs (modeling tools) are **not satisfactory** for needs of current service oriented business.
- When we extend concept of MT also to company's IS (such IS models reality of the company's business), the situation is pitiful.
- **Current MTs always encounter boundaries of their usefulness!!!**