# Mechanized Cultural Reasoning as a Tool to Assess Trust in Virtual Enterprises

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## Challenge

- Define mechanized cultural reasoning
- Treat inter-cultural differences with Artificial Intelligence tools
- Improve trust within virtual enterprises with these techniques

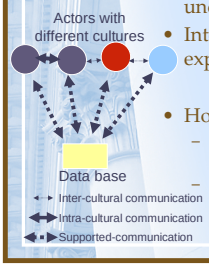
## Context and proposal

- Globalized knowledge society generates virtual enterprises
- Trust is a mandatory feature
- Trust is improved when one understands the behavior of others
  - Not only word translation
- Proposal : a technology leading to handle inter-cultural issues among communities in order to impact trust

A= The abstraction B= Knowledge communities A+B = The proposal

## Troubles into inter-cultural communities

- Trust into a community depends on understanding one's behavior
- Inter-cultural gap should be explained




- How to proceed?
  - Large central data base / lexicon, collection of ontologies
  - Top-down approach, client/server like

Not suited to on-line, flexible solutions

## Search for a new concept

- What we don't want?
  -a top-down approach
  -a global universal unique data mngt
  -a closed system with hard coded data

  Not accepted, Not manageable
  Not doable, not flexible
- What we would like?
  -bottom-up construction
  -a community-based data mngt
  -open-ended system
  -system suited for on-line use

## Overview of the proposal

A= The abstraction (ABIT : Abstraction-Based Information Technology) and its application to Cultural Reasoning

B= A model for corporate knowledge and knowledge communities

A+B = The proposal and its usefulness



## Abstraction-Based Information Technology

- Proposed by Calmet (2009)
- Origin: theorem proving, symbolic computation, open mechanized reasoning
- A generic/high level approach
- Can be used to design tools in artificial intelligence



## Abstraction-Based Information Technology

- An abstraction consists of 3 levels
  - A theory
  - A control on this theory
  - The immersion into an universe and interactions with it
- A trivial example
  - Theory: a wheel, a motor, gas …
  - Control: forward, backward functions
  - Immersion : An universe is a mountain. This implies constrains and consequences (ex: asymmetric effect of the functions)

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## Abstraction-Based Information Technology

- Modeling cultural facts
  - given situations (which appear in multiple cultures) are considered differently depending on the culture
- Example

  Context: doctor cabinet, waiting room, waiting time…

  I am waiting since 20 minutes!

  Is it normal? Or totally abnormal?

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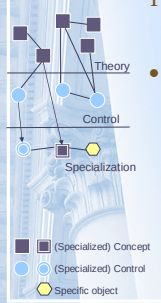
## Abstraction-Based Information Technology




- The model
  - Theory: a given domain (ontology)
  - Controls: related processes, actions
  - Immersion: specialization for a given cultural group

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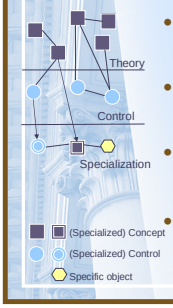
## Example : medical domain




- Concept
  - medical care, consultation, patient, waiting room, chest, etc.
- Controls
  - make appointment, waiting time, listen to patient chest, etc.
- Specialization to Germany
  - Waiting time: normally about 3 min
  - No direct payment
- Specialization to France
  - Waiting time: longer in the evening

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## Agent approach to corporate knowledge

- An agent represents a person, a physical automata, a software, a data base mgt system, …
- An agent detains some knowledge and some capabilities (communication, reasoning)
- Corporate knowledge emerges from the overall agents
- Bottom-up approach

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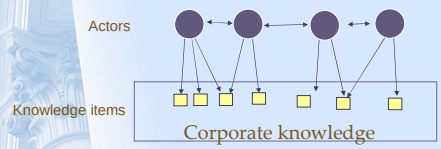
## Agent approach to corporate knowledge

- Agents and their knowledge

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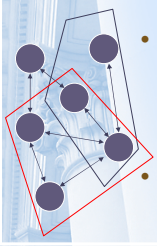
## Agent's Communities

- Community: group of agents sharing knowledge on a common interest
- Concept : Virtual Knowledge Communities (VKC)
  - Agents
  - Knowledge: an agent has knowledge items to share (or not)
  - Dynamic community processes
  - Messages
- Remarks
  - Internal organization of agents is free
  - Knowledge items can be linked without restriction



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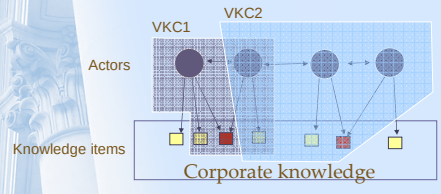
## Agent approach to corporate knowledge

- Agent communities

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## Now, we have…

- On one side: A
  - ABIT : Abstraction-Based Information Technology :
    - Theory (domain description)
    - Control (actions in the domain)
    - Immersion (specialization = cultural context)
- On the other side B
  - VKC : bottom-up approach for communities to get "shared knowledge"
  - With possible cultural gap in-between agents

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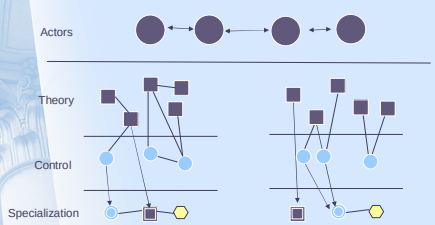
## Now, the proposal…

- Use VKC with ABIT

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## Using VKC with ABIT

- An ABIT theories is a VKC
  - Shared knowledge in-between agents
  - Is limited to a given topic (no huge DB)
  - Use of World wide lexicon/ontologies

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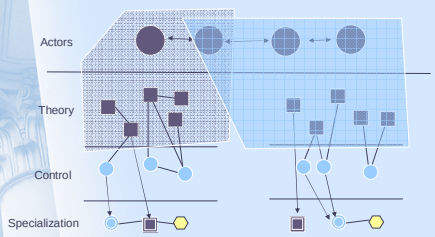
- An ABIT theories is a VKC

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  - Links to the concepts of the theory(ies)

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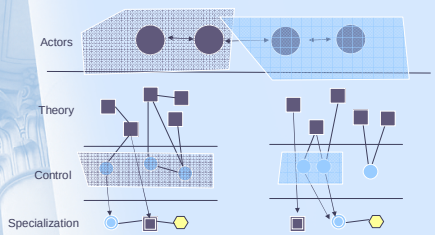


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- A ABIT controls is a VKC
  - Functions, processes (available or to be described – good practices)
  - Links to the concepts of the theory(ies)
- A ABIT specialization is a VKC
  - Cooperative description of the specialization in a cultural context
  - Specialization links and additional low-level items

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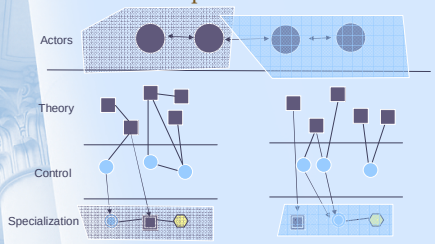
- A ABIT specialization is a VKC

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## Main advantages

- We can support description of several cultural behaviors
- Comparison is possible
- Bottom-up approach (avoids 1 single "objective" view)
- Support incompleteness and late complements
- Topic by topic approach (avoids initial description of "Everything" before starting)

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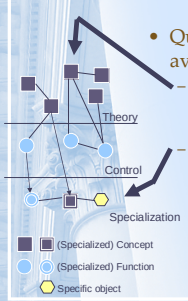
## Using by querying




- Querying system : asking for available information
  - From the theory level (ontology)
    - finds specializations and related controls for different cultures
  - From the specialization level (for a given culture)
    - relates a given fact/action in a given culture to a generic fact/action, "translate" it for another culture

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## Back to Trust

- Trust is possible if one's actions can be explained
- Inter-cultural exchanges can implement ABIT querying system to situate 'explain' differences
- No- or unsatisfactory answers to queries on a topic may lead to new improvements to increase trust
  - Creation of a VKC on the topic (for further contributions)
  - Contribution (additional items) to the models

## Conclusion

- Globalized knowledge society, virtual enterprises
- Trust is a mandatory feature and can arise when one understands the behavior of others

- A = 3 layers abstraction
- B = Virtual Knowledge Communities
- A + B = Proposal = a technology leading to handle inter-cultural issues among communities in order to impact trust
  - avoids top-down lexicons, imposed "objectivity"
  - Compatible with incomplete knowledge, contradictions, additional complements, etc.
- No equivalent model known today
- New frontier for IA : humanities
- Implementation may be difficult but is possible

## The end