

Dynamic Agent Communities Facilitating to Distant Learning in a Virtual University Information Space

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Motivation and Background

VUIS

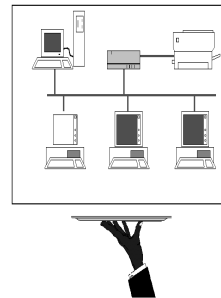
It's like CA Real World
or Microsoft Encarta



I guess I know
how to use this!!!
It's like doing
my everyday work,
but electronically!!!



Layered mediator
University IS
with unified interfaces



Hierarchy of distributed
wrapped legacy IS
and information resources

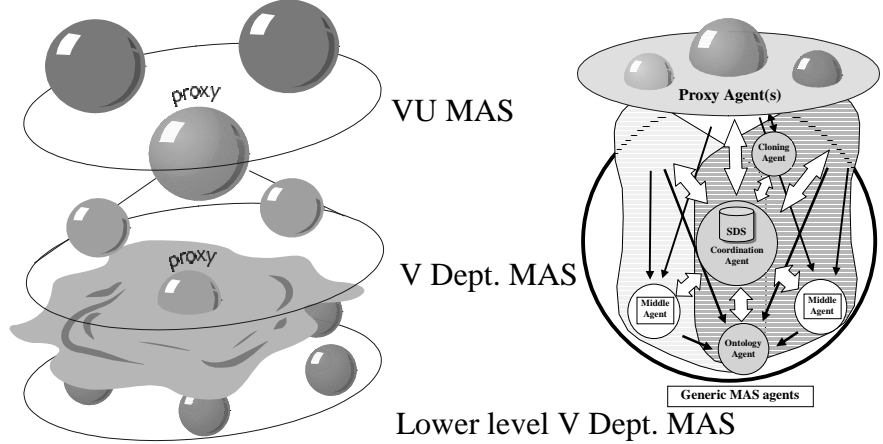
VUIS is considered to be a passive media inhabited by active “beings”
(agents) representing real life actors...

EVA: IS2000-VUDE, 06.11.2000

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Active VUIS Inhabitants

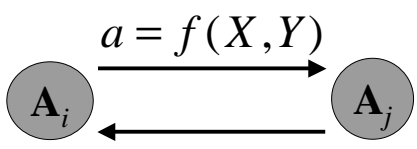
Persistent MAS and Member Agents



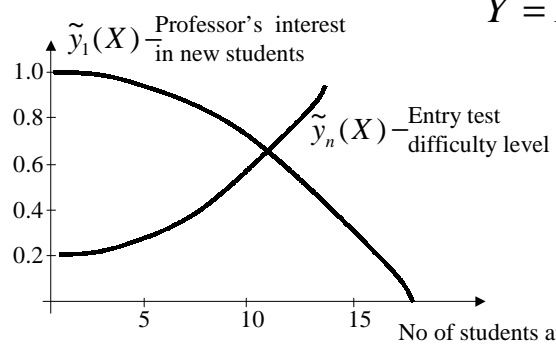
Proxies “wrap” respective MAS and are the representative members in the higher level MAS

Agents' Interactions – Parametric Feedbacks

a – accept a new student to the class



$$\tilde{Y} = \tilde{Y}(\tilde{y}_1(X), \dots, \tilde{y}_n(X))$$



Parametric feedbacks – expressed **attitude**, **capability** to perform requested action (policy) at a certain state

Agent Communities

as dynamic coalitions for performing tasks (sets of works)

Why? – there are MAS already

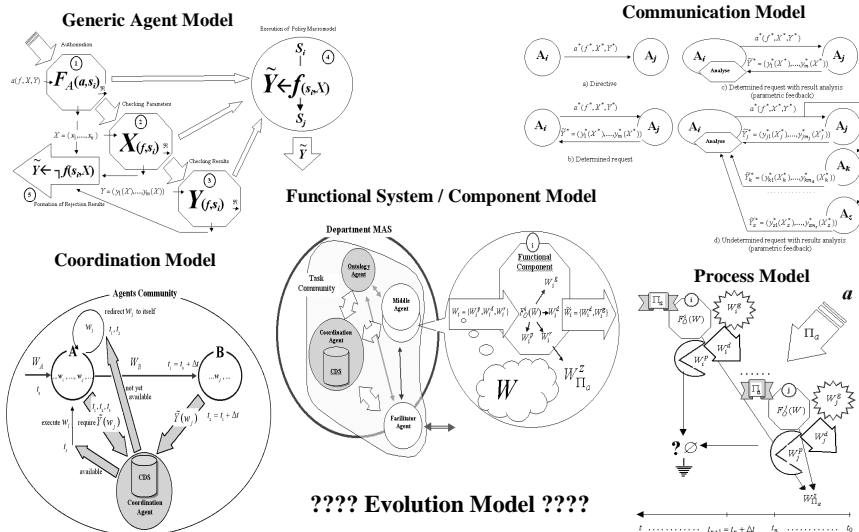
- tasks emerge and are soon accomplished
- agents join the coalition if they are capable to contribute to the task execution
- an agent may participate in more than one coalitions at a time

How? – accept or reject the work, react with parametric feedbacks

What is changing in time?

- the coalition – agents join and move out
- agent's state – capability to perform a work
- agent's knowledge (beliefs) about the capabilities of the other MAS members

Framework Models

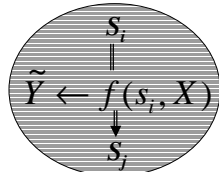


???? Evolution Model ?????

Agent's Evolution Model

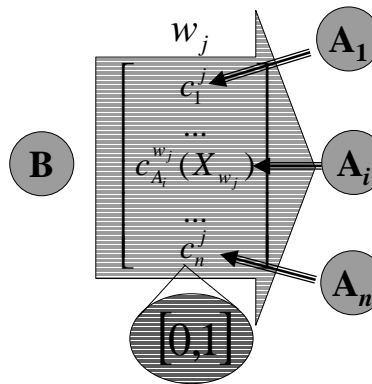
Agent's proactive self-development and self-adaptation in response to the changes in MAS and environment caused by task(s) execution

Capabilities

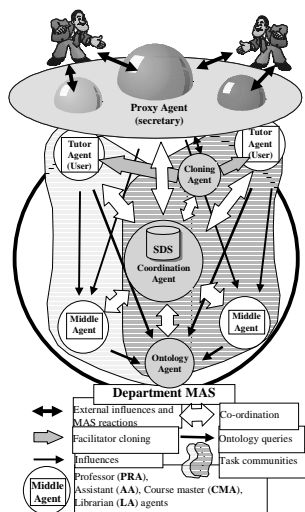


$s_i, s_j \in S_A$
 $s_i = \{r(X_A), q(F_A), t(F)\}$
 $r(X_A)$ - parameter constraints
 $q(F_A)$ - policy constraints
 $t(F)$ - transition function

Beliefs



Case Study – VUDE Domain



PhD recruiting scenario:

Phase 1: A PhD candidate submits the CV and indicates his/her intention to become a PhD student (**PA, CA, TA**)

Phase 2: The CV is analysed and the best Professor Match is searched (**TA, PRA-s**)

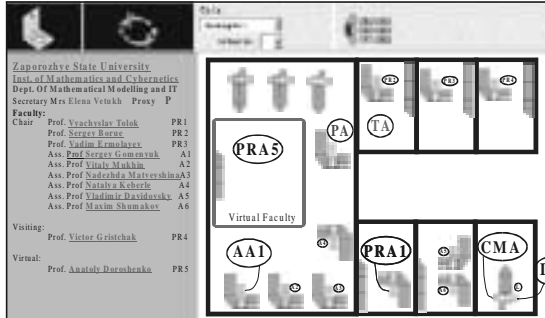
Phase 3: Qualified candidate passes the test from the chosen professor (**TA, PRA, PA**)

Phase 4: Successful candidate is interviewed and assigned to a research project (**TA, PRA**)

Phase 5: The professor and his assistant prepare the individual curriculum for the accepted candidate as well as the list of recommended reading (**TA, PRA, AA, CMA, LA**)

VDept Agents and their Roles (w.r.t. the Case Scenario)

Proxy Agent: PA – accept outer influences,
order to clone TA, pipeline the candidate to his TA



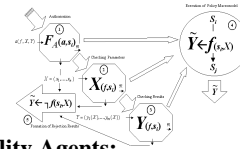
Middle Agents:

PRA1-PRA5 – evaluate candidates' qualifications; provide a test, evaluate test results,
arrange the interview, provide course recommendations

AA1-AA6 – prepare working plan, prepare curriculum

CMA – provide electronic courses, issue calls for new courses

LA – provide electronic textbooks, issue calls for new teaching materials



Utility Agents:

CA – Clone a TA each time
a new PhD candidate comes
to **PA**

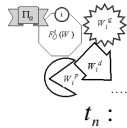
COA – Monitor agents activities,
Accept work results to its SDS,

Provide work params on request.

OA – Provide common dept.
ontologies on request

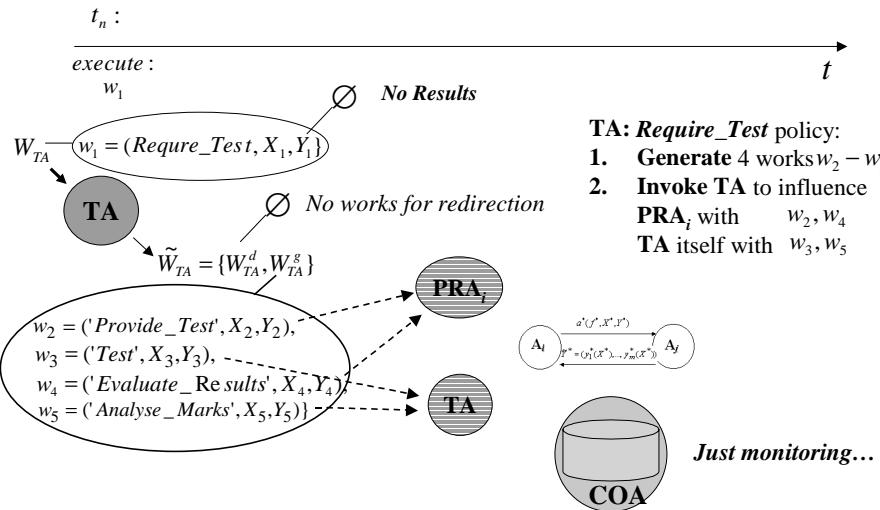
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Modelling (How did they play their roles?):

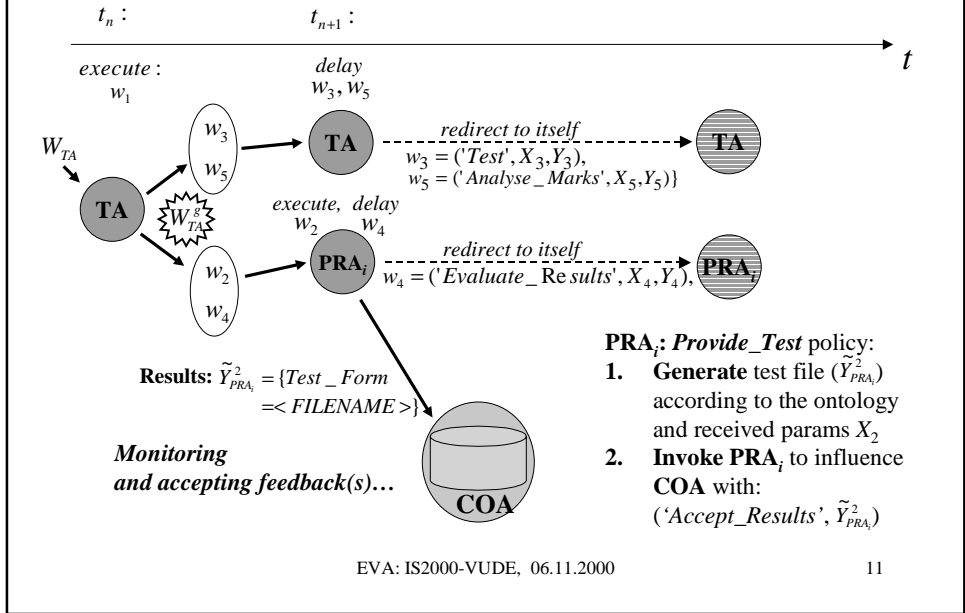
Phase 3. Testing, Step 1 – Test is ordered.



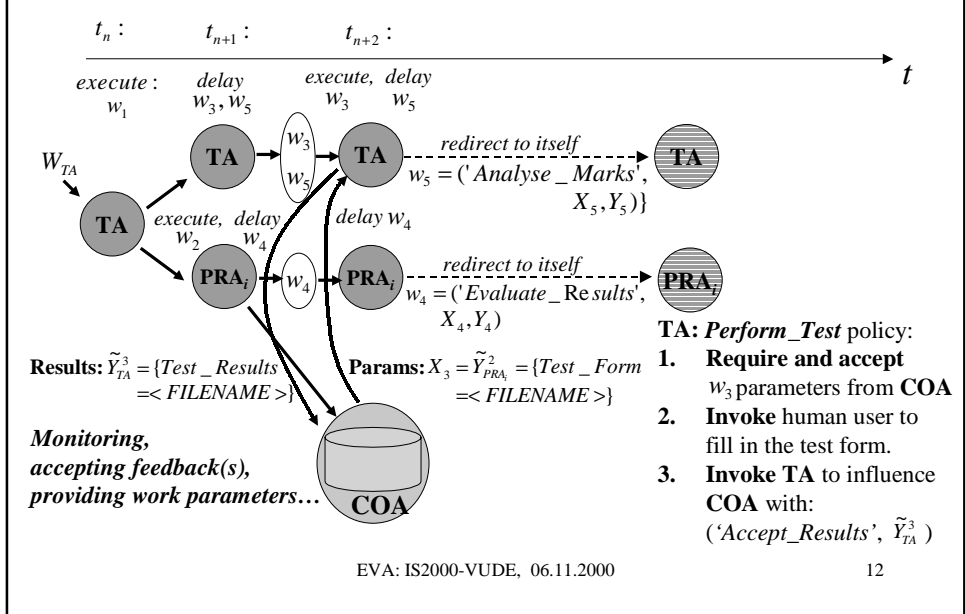
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Modelling (How did they play their roles?): Phase 3. Testing, Step 2 – Test is provided.

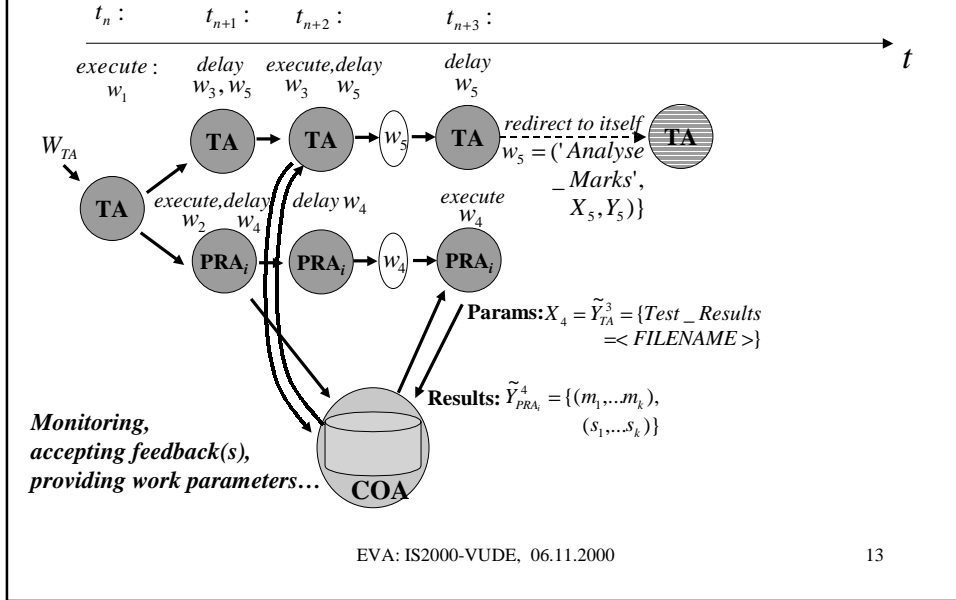


Modelling (How did they play their roles?): Phase 3. Testing, Step 3 – Test is performed.



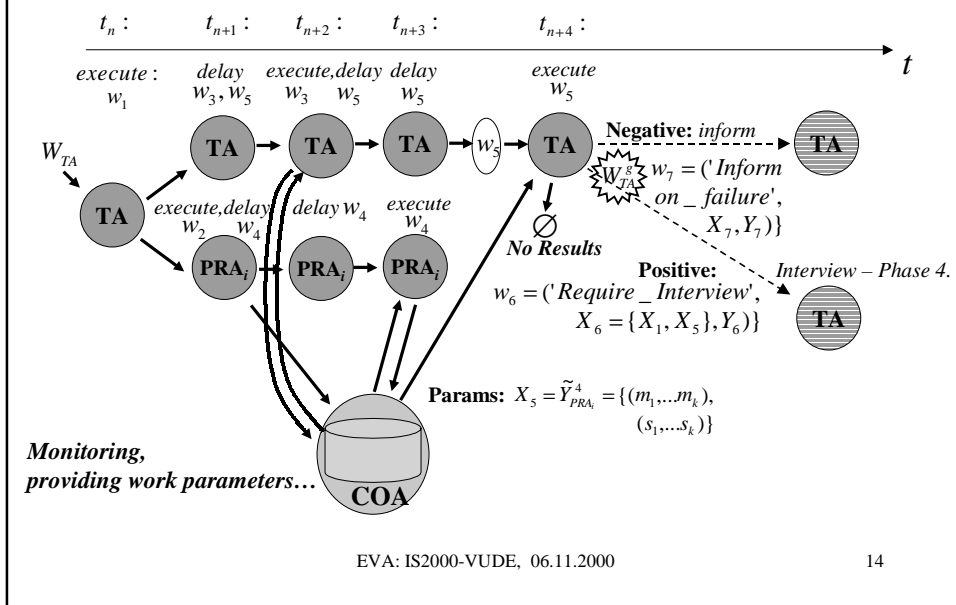
Modelling (How did they play their roles?):

Phase 3. Testing, Step 4 – Test results are evaluated.



Modelling (How did they play their roles?):

Phase 3. Testing, Step 5 – Parametric Marks are analysed.



Summary

What has been done:

The **processes of DE may be modelled and executed**

as tasks without pre-defined task plans

in frame of the formal agent-based approach to modelling and management of the processes of **information interchange**.

The **particularities of the framework**:

- **generic agent** skeletons,
- **parametric feedbacks**,
- agents **ability to evolve** provide for the **scalability** and **pro-active dynamic character** of the approach.

What has been not, yet:

Planned for short-term:

- **Architectural framework** on the base of the presented formal approach
- **Semantic issues:** Ontology representation, interoperability, knowledge sharing among generic agents, within MAS and task communities.

Planned for middle-term:

- Design and implementation of the **prototype** for a Virtual University Department
- Further **evaluation** of the applicability of the approach to VUDE, BPM, DLIB domains