

A Framework for Collaborative-Learning Systems Based on Agent Technologies

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- 1 About Existing e-Learning Platforms
- 2 Toward a Conceptual Framework
- 3 Case Study
- 4 Conclusion and Future Work
- 5 Bibliography



Outline

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About Existing e-Learning Platforms I

- Some useful remarks about existing distance learning platforms can be drawn from [Dimitracopoulou, 2005, Van der Pol et al., 2008, Mühlpford and Stahl, 2007, The 1st Report of Minerva-RESET Project, 2007]
- Platforms often provide collaboration tools that:
 - ▶ are **juxtaposed** and **not truly integrated** with one another
 - Collaborating people are exposed to a series of problems coming from the visually and functionally separate nature of such tools [Dimitracopoulou, 2005, Mühlpford and Stahl, 2007]
 - Several results have shown the advantage of using integrated collaboration tools [Mühlpford and Stahl, 2007, Van der Pol et al., 2008]



About Existing e-Learning Platforms II

- Moreover:

- ▶ provide statistical data related to on-line social interactions of students, but often they not provide an **automatic analysis of such interactions**
→ Teachers are subject to an added overhead to make an analysis of such data
- ▶ do not lie on top of a **suitable conceptual framework**
→ Difficult to exploit such collaboration tools altogether in a coherent and effective way



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What is needed

- A **conceptual framework** aimed at designing integrated tools for
 - ▶ supporting collaborative activities
 - ▶ monitoring collaborative learning, in order to automatically **analyse social interactions** and **give feedbacks** to students and teachers



Multi-Agent Systems (MAS)

- MAS is a set of autonomous, pro-active, and interacting computational entities called **agents**...
- ...situated in an **environment** where they interact typically producing a coherent global behaviour [Omicini and Poggi, 2006]
- In literature, MAS has been proven to be **suitable** for dealing with the **engineering** of complex software systems [Jennings, 2001] like **distance learning systems**...
- ...which are, by definition, interaction-oriented, distributed, dynamic, and open



Agents & Artefacts (A&A) Meta-model

- Meta-model for MAS engineering [Omicini et al., 2008]
- Takes inspiration from **Activity Theory** and **Distributed Cognition**
 - ▶ **artefacts** enable and constrain agent actions, mediate agent interactions with other agents and with the environment
 - ▶ cognition and knowledge representation does not belong to agents only, but artefacts encapsulate knowledge too



A&A as a Conceptual Framework for Distance CL Systems

- A&A seems to be a suitable conceptual framework for supporting the development of MAS-based collaboration environments
- By means of the A&A abstractions a designer could design mediation instruments for human collaborative activities. In particular
 - ▶ **artefact** abstraction makes it possible to design the reactive part of mediation instruments, in terms of the operations provided to users
 - ▶ **agent** abstraction makes it possible to design the pro-active part of mediation instruments, for example in order to automatically monitor and analyse human social interactions and give feedbacks to students and teachers



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Moodle Platform as Case Study

- Moodle is a wide-used, open-source, Web-based platform in e-learning
- Presents the previous mentioned limits
 - ▶ Provides several collaboration tools that are physically and functionally dissociated
 - ▶ Allows to access statistical data related to on-line social interactions of students, but does not provide any tool for automatic analysis of such interactions
- Do not lie on top of a suitable conceptual framework that allows to overcome such limits



Moodle Design Abstractions vs. A&A Meta-model I

- Moodle realizes collaboration tools in terms of [Web pages](#)
- A collaboration tool can be seen as a [service](#) that provides a set of functionalities
- → it is difficult to explicitly represent concepts that describe a service.
In particular
 - ▶ [service interface](#), which is set of functionalities provided by the tool
 - ▶ [service behaviour](#), i.e. how the service implements the provided functionalities



Moodle Design Abstractions vs. A&A Meta-model II

- An A&A **artefact** it is defined in terms of
 - ▶ **user interface**, by which an artefact can act for a specific purpose, i.e. the set of operations provided by an artefact
 - ▶ **structure and behaviour**, representing how the artefact is implemented in order to provide its function
- → A&A artefact allows to explicitly model any collaboration tool



Moodle Design Abstractions vs. A&A Meta-model III

- In order to automatically monitor social interactions, entities able to observe in a proactive way are suitable
- **Web page** does not represent a viable abstraction to explicitly model the aforementioned entities
- A&A provides the **agent** abstraction that can exploit artefact properties, in particular **inspectability**, in order to observe student social interactions at runtime and to automatically
 - ▶ analyze such interactions
 - ▶ give feedbacks to students and teachers



Chat & Wiki Integrated

Questo wiki è utilizzato dagli studenti per creare in modo collaborativo una relazione di gruppo

View Edit Links History Attachments

Thank you for your contribution.

Tesina

Metodologia di lavoro, obiettivi e tempi di sviluppo

1) Obiettivi

Studiare come i principali negozi di informatica si relazionano con il Web.

1. Generare valore aggiunto per i propri clienti (tipicamente consumatori finali).
2. Realizzare una gestione efficiente dell'innovazione tecnologica.

Analizzare i dati rilevati dall'analisi dei principali siti Web di informatica: ad esempio Computer Discount, Essedi, Vobis, etc.

Trarre considerazioni in merito ai dati analizzati: che valore aggiunto hanno del Web i rivenditori esaminati come strumento per generare un valore aggiunto.

Related Messages

Chat del Corso

Monday, 25th August 2008, 22:03 Mike Green: Penso che il primo obiettivo sia quello di studiare come i principali negozi di informatica si relazionano con il Web. In particolare per: 1) Generare valore aggiunto per i propri clienti; 2) Realizzare una gestione efficiente dell'innovazione da un punto di vista tecnologico

Monday, 25th August 2008, 22:04 Fiona Nixon: ok, allora come seconda cosa dovremo analizzare i dati rilevati dall'analisi dei principali siti Web dei rivenditori di informatica.

Participants

 Fiona Nixon ide 1 min 11 secs  Mike Green ide 45 secs

Send message

☐ Show only new

Messages

21:03 Fiona: ok, allora come seconda cosa dovremo analizzare i dati rilevati dall'analisi dei principali siti Web dei rivenditori di informatica

21:03 Mike: sì, ad esempio possiamo considerare Computer Discount, Essedi, Vobis, etc.

21:02 Mike: Penso che il primo obiettivo sia quello di studiare come i principali negozi di informatica si relazionano con il Web. In particolare per: 1) Generare valore aggiunto per i propri clienti; 2) Realizzare una gestione efficiente dell'innovazione da un punto di vista tecnologico



Forum Analysis

 comandi shell che non funzionano!
Fiona 25 Agosto 2008

ciao a tutti io uso perSeO (boot da DVD)
 Nonostante i miei tentativi ho notato che non funzionano i metacaratteri []

(es
 Il t
 Qu

Selection	Group	Learner	Active Participation (*)	Inctive Participation (*)	Centrality
☐	Gruppo 1	Fiona Nixon	4 (3)	4 (3)	0.0
☐	Gruppo 1	Mike Green	4 (4)	4 (4)	0.0
☐	Gruppo 1	Ronald Winters	3 (2)	3 (2)	0.0
☐	Gruppo 1	Jonny Welsh	3 (3)	3 (3)	0.0
☐	Gruppo 1	Ronald Winters			0.0
☐	Gruppo 2	E			0.0
☐	Gruppo 2	C			0.0
☐	Gruppo 2	F			0.0

o del tipo:
 , i quali
 o | Cancella | Rispondi

Send the following message to all selected learners:

Send the Message

(*) For active and inactive participation much less than others) and 4 (highest –
 tickets), and it is between 1 (lowest –



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Conclusion and Future Work

- Distance learning lack of a **conceptual framework** aimed at designing integrated tools for
 - ▶ supporting collaboration activities
 - ▶ monitoring collaborative learning, in order to **automatic analyse** social interactions and **give feedbacks** to students and teacher
- As shown through a comparison with Moodle design abstractions, MAS, in particular A&A meta-model, seems a suitable conceptual framework to design collaboration tools overcoming the previous mentioned limits
- In our future work, we will:
 - ▶ analyze other e-learning platforms
 - ▶ develop a completely new A&A-based framework for supporting collaborative systems



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