K-InCA: Using Artificial Agents for Helping People to Learn New Behaviours

Albert Angehrn, Thierry Nabeth, Liana Razmerita, Claudia Roda
{thierry.nabeth, claudia.roda, albert.angehrn, liana.razmerita}@insead.fr
INSEAD - Centre for Advanced Learning Technologies
Bd. De Constance, F-77300 Fontainebleau France
http://www.insead.fr/calt/
Tel : 33 1 60 72 43 12
Fax : 33 1 60 74 55 50

Contact author: Thierry Nabeth

Abstract

This paper describes an artificial agent system, designed to help people to adopt new knowledge sharing behaviours. This agent continuously observes the actions of the user in order to build and maintain a "behavioural profile" reflecting the level of adoption of the "desired" behaviours. Using this profile, and relying on a model borrowed from change management theories, the agent provides customised guidance, mentoring and stimulation, supporting the user change from his old behaviours to the new ones.

Keywords:

Behavioural learning, social learning, change management, artificial agents, knowledge management.

K-InCA: Using Artificial Agents for Helping People to Learn New Behaviours

Albert Angehrn, Thierry Nabeth, Liana Razmerita, Claudia Roda
{albert.angehrn, thierry.nabeth, liana.razmerita, claudia.roda}@insead.fr
INSEAD - Centre for Advanced Learning Technologies
Bd. De Constance, F-77300 Fontainebleau France
http://www.insead.fr/calt/

Abstract

This paper describes an artificial agent system, designed to help people to adopt new knowledge sharing behaviours. This agent continuously observes the actions of the user in order to build and maintain a "behavioural profile" reflecting the level of adoption of the "desired" behaviours. Using this profile, and relying on a model borrowed from change management theories, the agent provides customised guidance, mentoring and stimulation, supporting the user change from his old behaviours to the new ones.

1. Introduction

In recent years, organisations have increasingly recognised the value of the "knowledge capital" distributed amongst their members. Managing this knowledge effectively represents a key factor for company's success in a competitive economy. In particular support is needed for all the phases of (1) knowledge acquisition (by creation or learning), (2) knowledge manipulation, (3) knowledge sharing and (4) knowledge exploitation and transformation into value.

Setting-up effective Knowledge Management (KM) processes is not only a matter of time and resources. The process impacts on the structure of the organization and on the role of its members [3, 4]. One effective strategy to overcome this problem is to guide the members of the organization to the adoption of the desired KM behaviors.

The system described in this paper (Knowledge Intelligent Conversational Agents - K-InCA) relies on the idea of offering to each user an artificial agent that helps him to progressively adopt new behaviours. The agent continuously inquires the user in order to build and maintain a "behavioural profile" reflecting the level of adoption of the different "desired" behaviours. This agent provides guidance (such as suggesting some resources), mentoring (such as proposing some exercises to complete) and stimulation (such as questioning provocatively the user's beliefs [1]), leading to the progressive adoption of the behaviours.

2. Designing K-InCA: Key concepts

K-InCA agents rely on some key concepts and models borrowed from different domains such as Organizational Behaviour (change management), KM (knowledge sharing behaviours & attitudes) and Artificial Intelligence (user modelling, interface agents).

2.1. K-InCA as a change management agent.

The change management model embedded in the K-InCA system is based on the work of Everett Rogers on innovation diffusion [5]. Roger describes the innovation-decision process as "the process through which an individual [...] passes (1) from first knowledge of an innovation, (2) to forming an attitude toward the innovation, (3) to a decision to adopt or reject, (4) to implementation of the new idea, and (5) to confirmation of this decision" [ibid, p.161].

K-InCA agents support this model by guiding the learners through a set of adoption stages (awareness, interest, trial and adoption), and by providing them with information and stimuli customised to their profiles and levels of adoption. Rogers' model also distinguishes different categories of users according to their attitude towards innovation. K-InCA agents choose an "interaction style" adapted to the attitude towards innovation of the user, providing more information to the innovators, whereas the social component will have a more important role for less innovative categories of population.

2.2. K-InCA Behaviours and User Model

K-InCA agents can be thought of as customisable agents, supporting the adoption of behaviours within a given domain. In our first implementation, K-InCA agents are designed to support KM behaviours. Behaviours are

stored in a hierarchical repository. Action descriptors are associated to the leaf behaviours of the hierarchical structure. K-InCA agents use these descriptors to recognise the behaviours that can be attributed to a user who has performed a given action.

K-InCA agents maintain a user model in order to adapt their actions to the specific level of adoption of the user and to his preferences. The components of the user model most relevant to this discussion are:

- **Change state** - the user's state with respect to the adoption of the desired behaviours (e.g. the user is unaware of the "I recognise expertise" behaviour).
- **KM agenda** - KM activities that have been proposed to the user by the agent.
- **Preferences** - user's interests and skills.

Other components of the user model include descriptions of the user's personality (e.g. resistance to change, learning preferences), his social network (friends, acquaintances, superiors, peers, etc.), and a history of his actions.

3. A K-InCA Scenario

The following scenario presents a typical exchange between a user and his K-InCA agent. Figure 1 is a screenshot of the interaction space at the end of the scenario.

Figure 1 – K-InCA system screenshot

The left frame reflects the content of the user model[1]. The user reports an action he has performed and expects to receive a diagnosis on how well he is managing his knowledge, how he could improve his management process. Table 1 shows a sample of the user-KInCA agent interaction. Following the initial user input, from the *Specify your Action* panel, the agent attributes a set of behaviours to the user and displays them in *Identified Behaviours* panel and updates the user model

The User: *In a 'Meeting', I have 'asked' 'information about' 'XY project' to/from 'Claudia' in order to 'acquire knowledge'.*
The Agent: *identifies the associated behaviours (the users uncheck the wrong ones):*
*e.g: * I talk to the most knowledgeable person*
** I use face-to-face communication*
Claudia is added to user's acquaintances.
The User: Validates the identified behaviours
The Agent's proposal: *Have you thought about asking advice outside the company? etc.*

Table 1 - Sample of user-KinCA agent dialogue

The user may continue by supplying a new action description, or by clicking on any of the behaviours names to browse the behaviours' repository, or to update the user model.

4. Conclusions

A first prototype of the system was realised using Zope/Python web application server system. A second version is being developed in java (using servlet technology). However, the K-InCA system is in an early stage to evaluate the soundness of the approach from a user and organization perspective (will it not be considered too intrusive for the user? what will be its substantive pedagogical value for the organization?). However, this work seems to indicate that it is possible to create learning tools offering deep support of the learning process, and covering the entire knowledge acquisition cycle.

5. References

[1] Angehrn, A.A., "Computers that criticize you: Stimulus-based Decision Support Systems," *Interfaces*, 23, 3, 1993, pp. 3-16.

[2] George Lawton, "Industry Trends: Knowledge Management: Ready for Prime Time?", *Computer*, Vol. 34, No. 2, February 2001.

[3] Jonathan D. Day and James C. Wendler, "Best practice and beyond: Knowledge strategies" *The McKinsey Quarterly*, 1998 Number 1.

[4] Jean-François Manzoni, Albert Angehrn, "Understanding organizational dynamics of IT-enabled change: a multimedia simulation approach" *Journal of*

This research work is funded by Xerox Corporation

management information systems, vol. 14, no. 3, (winter 97-98) pp. 109-140
[5] Everett M. Rogers, "Diffusion of Innovation", 4th edition, Free Press, NY, 1995. First edition by Everett 1962, same title.