Centre for Advanced Learning Technologies (CALT)
of the
European Institute of Business Administration (INSEAD)

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1. INSEAD - CALT

INSEAD, the European Institute of Business Administration, located in Fontainebleau (France), is the largest European Business School. Its objective is to train present and future executives and managers operating in European businesses. It currently has more than 3000 European executives active on its courses plus many others in the process of completing an MBA. The **Centre for Advanced Learning Technologies** (CALT) is a research centre of INSEAD. It was founded in 1994 and it now counts 16 collaborators. CALT has participated, and is currently involved in, many EC projects and has a number of ongoing collaborations with companies and organisations such as XEROX, IBM Europe, ABN AMRO, Swedish Trade Council, etc. CALT research on education has historically been focused on investigating the more innovative forms of learning such as e-Learning communities and experiential learning (business simulations) rather than just the evolution of the traditional classroom model. For a historical overview of CALT's objectives and projects see the document "Advanced Learning Approaches & Technologies: The CALT Perspective" available on CALT's web site.

2. CALT's Research agenda

CALT Research Projects focus on learning and change/ innovation at the individual as well as at the organisational and community level. From a HCI perspective we are interested in learner / user centred design. In particular we have explored models of cognitive and social motivations to the use of specific technologies. We aim at designing systems responding to these motivations and capable of adapting as the user's motivations change. Our agents systems strive to interact with the users, getting them involved in an evolving learning process, adapting to their specific needs. As described below, two key drives in our design are the achievement of adaptive/adaptable and believable systems.

2.1. Individual learning systems

One of our main research line focuses on learning at the individual level. Our objective is to design, develop and analyse the impact of two types of advanced learning models and systems: Intelligent Learning Agents (InCAs) and Advanced Simulations of Organisational Dynamics.

Intelligent Learning Agents (InCAs) operate primarily at the individual learning level. Their objective is to accelerate the acquisition and the adoption of relevant new concepts and practices by individuals. InCAs are a very advanced approach to technology-enhanced or e-learning. They operate first at the motivational level, and then gradually involve the learner in an interactive process, in which an individual first better understands and develops interest for the new concepts and practices, and then successfully integrates and adopts them, individually as well as in his/her organisational or social context. In our current projects and research plans, we are modelling, designing and developing prototypes of InCAs operating in different application domains such as making people learn to manage and share knowledge in organisations better and faster (K- InCA), generate and extract value from virtual communities (C- InCA), or become more learning- oriented (L- InCA).

Advanced Simulations of Organisational Dynamics are experiential learning systems exploiting technologies such as multimedia or virtual reality to accelerate the understanding and learning of organisational processes. Such simulations are built on models of human behaviour and social processes in organisations, and their design and evaluation helps us to understand the opportunities and the limits of supporting learning through the design and creation of highly realistic, simulated learning experiences. In our current projects and research plans, we are modelling, designing and developing extensions of the kernel (organisational behaviour processes) as well as of the interactive components (learning in multi- user virtual reality environments) of the first simulation software created at CALT, the EIS Simulation. This simulation addresses learning in the domain of change management and resistance to change in organisations. It is currently extensively used as a pedagogical and research tool in a number of universities and organisations world-wide (e.g.

Harvard, Wharton) providing a rich continuous flow of feedback data for evaluation research.

2.2. Organisational learning systems

Our other research projects completing the CALT Research Agenda focus on learning and change/innovation processes taking place at the organisational or community level. Here, our objective is to understand the design and the social dynamics of Virtual Communities and to analyse how the Internet and the emerging Net Economy is a source for new models of learning, knowledge and value creation (we call these E-nnovation Studies).

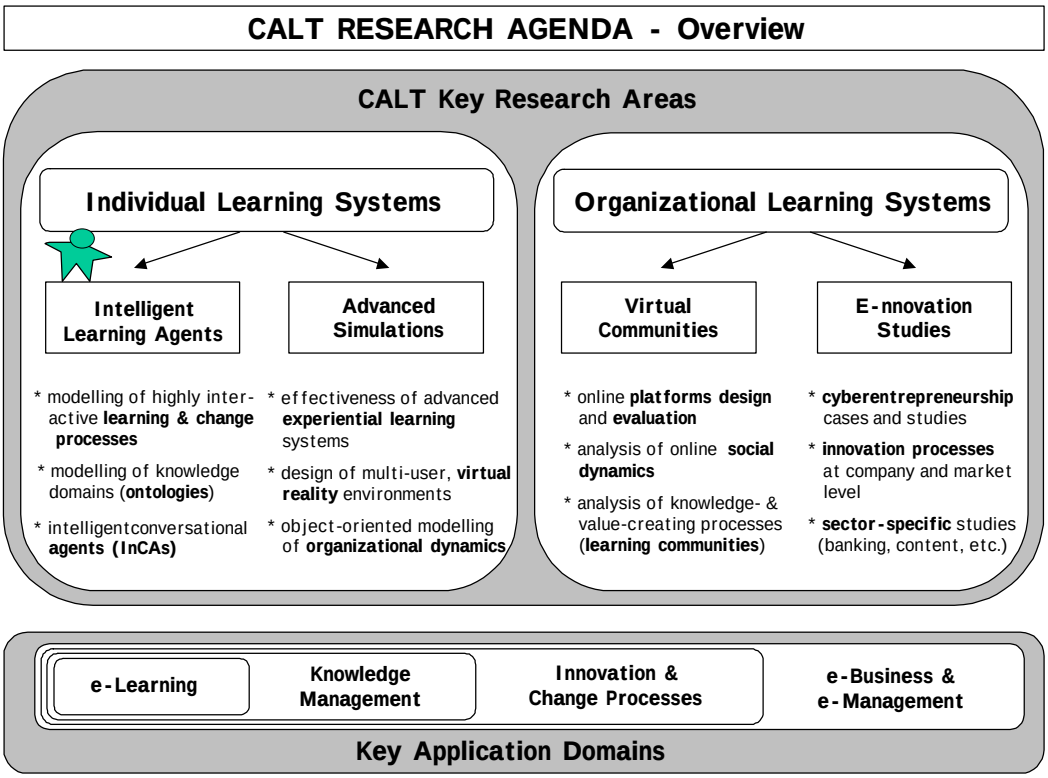
In the domain of Virtual Communities, our research projects address and contribute to knowledge creation in the field of the design of effective online environments in which communities (of researchers, employees of one or more companies, customers, service providers, etc.) learn, structure and manage knowledge as well as knowledge- and value- creating processes. In our current projects and research plans, we are extending further the technical features, the underlying social dynamics model, and the evaluation of the ICDT (Information, Communication, Distribution & Transaction) Platform, a virtual community environment which is used in a variety of research projects, knowledge management and e- learning contexts.

In the domain of E-innovation Studies, our research projects aim at better understanding the phenomenon of "innovation in the Information Age" by studying new models and forms of innovation taking place at the individual level ("CyberEntrepreneurs"), in organisations (e.g. through the introduction of "incubators"), as well as in whole market or industry sectors (e.g. the transformation and evolution of the content, of the banking, and the education sectors).

3. HCI AT CALT

The multidisciplinarity of the CALT team as well as the continuous exchange with INSEAD faculty members and external collaborators makes it possible to concretely design for usability and to study, from the earliest stages of system definition, its integration in organisational contexts. The emphasis on user centred design is a direct consequence of the focus on cognitive and social aspects of individual and organisational learning processes. The systems developed try to interpret the user's information needs and to tailor the context of interaction accordingly so that learning takes place, in an environment that favours incremental cognitive processes.

Several multimedia technologies (including 3D and speech based technologies) are used in order to ensure that the user's learning experience takes place in a believable environment and that interaction with the system is as natural as possible. Networked delivery is used to support wide access to the system and interaction amongst several users. The continuous feedback we receive from current and future users of our systems is used to build adaptive systems as well as to adapt existing systems to new user needs.



Overview of Key Research Areas and Application Domains

4. Key People

Below are the profiles of some of the members of CALT.

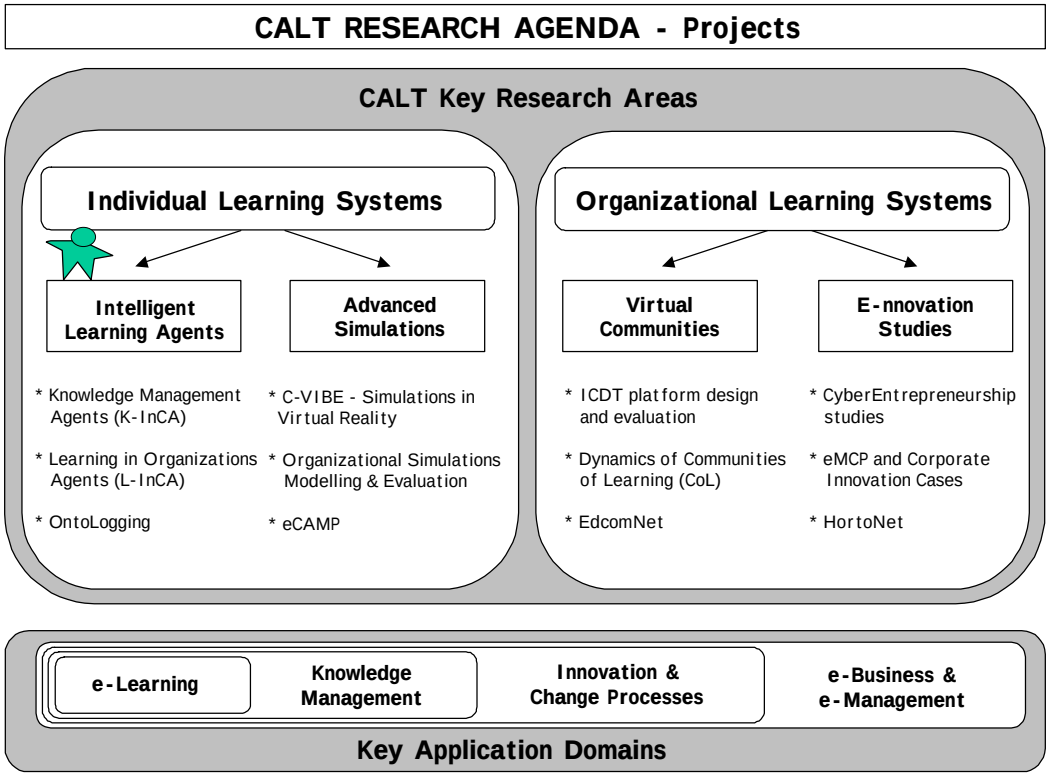
Professor **Albert A. Angehrn (Director of CALT)**
Professor of Information Technology and Entrepreneurship; Alcatel Chaired Professor of Net Economy and E-Management; Director, Centre for Advanced Learning Technologies (CALT).
Professor Albert A. Angehrn's research, teaching and consulting activities concentrate on the design and dynamics of Virtual Environments in business and learning, the analysis of Internet Strategies and the application of Intelligent Agents to Electronic Commerce, as well as the study and evaluation of IT-enhanced organisational decision and learning processes, with a focus on Advanced Learning Technologies and multimedia simulations.
His research work has received different international awards, and his publications can be found in academic journals such as Communications of the ACM, Journal of Management Information Systems, European Management Journal, Interfaces, Behaviour and Information Technology, and others, including articles in the Financial Times and the Wall Street Journal. Recent research projects include the cross-European analysis of Internet strategies, Intelligent Agents and advanced forms of Electronic Commerce, and new approaches to learning and knowledge management in educational institutions and corporations (Virtual Learning Communities). In the frame of INSEAD's Centre for Advanced Learning Technologies (CALT), Professor Angehrn has designed a variety of Multimedia- and Internet-based management learning and development tools, including the EIS Simulation, used in international universities such as Harvard, Wharton, and London Business School, and is currently managing large projects in the domain of Internet strategies and advanced learning technologies with companies such as Apple Computers, Lotus Corporation, IBM, Pfizer, Reuters, Andersen Consulting and with the European Community.
Recent research projects include the cross-European analysis of Internet strategies, Intelligent Agents and advanced forms of Electronic Commerce, and new approaches to learning and knowledge management in educational institutions and corporations (Virtual Learning Communities).
Teaching-wise, Professor Angehrn directs the INSEAD Executive Programme "Competing in the Information Age," teaches MBA courses such as "CyberEntrepreneurship" and Workshops such as the one organised by the European Roundtable (ERT) on the subject "Are European managers ready for leadership in the Information Society".

Panagiotis Damaskopoulos
Research Fellow at CALT, INSEAD, France.
Panagiotis Damaskopoulos holds a MA and a PhD in international political economy/global finance from York University, Toronto, Canada. His career spans both the academic and business worlds. He has taught for several years advanced topics in global finance and international political economy at York University. His non-academic work has involved several years of research, the most recent of which have been as chief of studies at a Paris-based multinational group specialising in the organisation of world markets and trade fairs. His current research concentrates on processes of restructuring of financial markets and problems of management of organisational capital in the transition to the Internet-enabled "new economy". Central aspects of this research are knowledge and change management, customer relationship management and the evolution of corporate strategies of business model innovation.

Thierry Nabeth
Research Fellow at CALT, INSEAD, France.
Thierry Nabeth's research is focused on the application of advanced information technologies (Internet-related technologies, groupware, agent technologies, virtual reality) to support new models of organisational strucures, new economic models and new forms of learning. Thierry is very much interested in the underlying theoretical models such as experiential learning (the virtual laboratory), cognitive sciences (advanced HCI, behaviour modelling), dynamics of virtual worlds and digital social environments (virtual communities), distributed control (agent-based architecture), learning (adaptive systems, artificial life), knowledge management (learning organisation, knowledge ecology, active knowledge portals), technology management (innovation adoption, entrepreneurship).
He has worked on knowledge representation in the domain of management (modelling of social networks, modelling of companies' alliances in the domain of multimedia, modelling of people's behaviour in organisations). He has also participated in several projects in virtual reality such as the TIBM project with the IBM Centre for Advanced Studies in Toronto whose objective was the creation of the next generation 3D shop (issues addressed: model of the 3D shop, interaction with the clients, artificial salesperson). He has worked (ESPRIT project WCSN) on issues related to mediation in virtual communities (according to Computer Mediated Communication, CSCW and agents perspectives). His current work includes (1) agent enhanced portal platforms (2) cognitive agent models for artificial characters in the context of a digital social environment (3) bots architectures in a 3D environment.

Liana Razmerita
Research Assistant at CALT, INSEAD, France; Junior Lecturer at the University of Galati-Romania.
Liana Razmerita's research work is mainly in the domain of interactive/intelligent learning environments, user/student modelling and intelligent agents. She is training for a PhD. Over the last 5 years, she worked on different research projects, which involved artificial intelligence techniques, student/user modelling, human-computer interaction and web/programming techniques. As a research assistant at CBL in Leeds, she worked on an Esprit funded, I3 project: "Networked Interactive Media in Schools (NIMIS)" concentrating on the design, development and implementation of a pedagogical agent, called Louisa.

Professor **Claudia Roda**
Senior Research Fellow, Centre for Advanced Learning Technologies (CALT), and Associate Professor of Computer Science and International Communication, The American University of Paris;
Professor Claudia Roda's research focuses on the study of personal agents and multi-agent systems supporting cognitive and social processes underlying learning. Much of her research has focused on inter-agent and human-agent communication. She has worked on the analysis of cognitive and social processes at various degrees of granularity: from collaborative work and learning, to task oriented dialogues, from management of change in organisations to digital interaction. Her research has resulted in the implementation of multi-agent systems with a wide variety of applications (e.g. support of the adoption of best practices in knowledge management, industrial process control, support to the navigation of instructional Web sites). Claudia has published and presented her work in several international conferences. She has cooperated in research projects with internationally recognised Universities, research centres and large corporations (such as Jrc, Cern, Xerox, Framenton, Krupp). She has taught many classic computer science courses as well as innovative courses in digital communication for Communication majors



Overview of Current Research Projects

5. Projects

CALT participates (or has participated) actively in many projects including the following:

AWSdkJava bot library *CALT (ongoing)*
Java-based library for designing bots operating in the Active Worlds 3D multi-user environment. Active World AWSDKJava is a Java and JavaScript encapsulation of the Active World SDK toolkit. AWSDKJava consists in the development of a set of abstract Java Classes, allowing to model using Java, and, at a relatively high level of abstraction, bots (agents) for the active world environment. JavaScript, which has been wrapped into the library, can be used as an application/glue/macro language.

ECAMP *EC-IST (ongoing)*
This project aims at developing innovative and dynamically networked virtual environments called "corporation modelling platforms". The system will provide interested parties with the platforms, technological resources, business guidance, and real-world environments necessary for the building, business development, maintenance and growth of their own on-line merchant corporations.

EDCOMNET *EC-IST (ongoing)*
EDCOMNET is an educational communal net, that will act as a portal stimulating the active learning of social skills by citizens, with the aim of enhancing the social integration of individuals within urban communities. Main characteristics of EDCOMNET include:

- A workspace consisting of multi-user 2D/3D representation of organisation and knowledge assets.

- Existence of bots and agents with specific roles for promoting available content material, assessing the specific needs of citizen users, tracking their development and dialogue.
- A support for self-organising social processes in urban communities through e.g. events organisation, virtual social places etc.
- Emphasis on motivating individual users to use virtual information, learning processes, forums and platforms as an important means for personal development.

K-InCA *In collaboration with and founded by XEROX Corporation (ongoing)*
K-InCA -Knowledge Intelligent Conversational Agents - uses Intelligent Conversational Agents to address change processes in organisations by helping people to adopt "knowledge sharing" behaviours and practices.

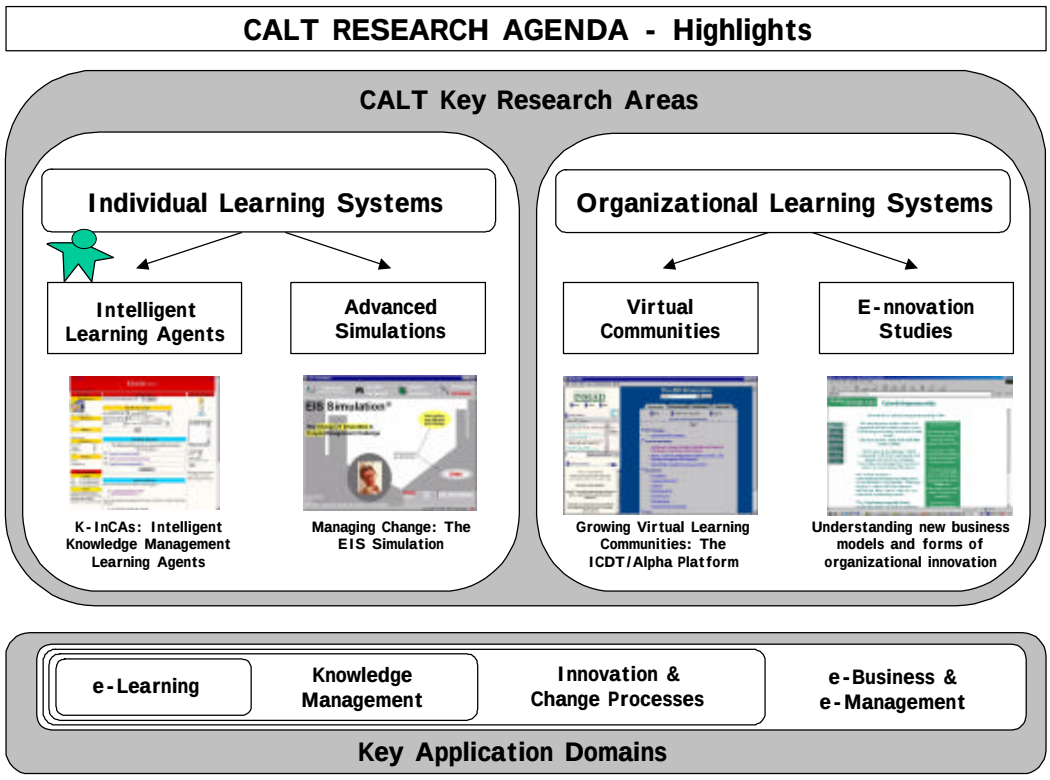
ONTO-LOGGING *EC-IST (ongoing)*
This project aims at developing a next generation distributed Knowledge Management system, supporting different independent ontology and knowledge bases and providing the basis for transparent inter-operability and knowledge exchange.
Some lines of action include: (1) Developing an ontology formalization distributed system; (2) Developing and incorporating metrics which would allow quantification of the relative success and merit of competing ontology; (3) Incorporating recent developments in related fields, like intelligent category extraction from users' search activities or via intelligent agents, and authority/directory convergent partition of knowledge creators. CALT's role is the study of user models, the context of Knowledge Management, the definition of ONTO-LOGGING user modelling tools, etc.

RAP *EC-IST (completed)*
"Reengineering Airline Critical Processes" - the role of CALT was to design a change management game for helping the transition process in the airline industry.

T-IBM *Founded by the IBM Centre for Advanced Studies, Toronto (completed)*
"T-IBM (1997) - IBM Next generation 3D shop" explored the idea of 3D virtual shops. The project addressed issues such as shop representation (realistic or not), interaction modes (how does a sales person behave in such an environment), and the use of bots (what could be the role of an agent as a way of supporting the sales process).

VirtINSEAD *INSEAD (completed)*
The Virtual INSEAD prototype provided a digital version of the INSEAD Days Event, an important INSEAD communication event that happens every year, and in which INSEAD presents its activities to large international companies. In this digital version, the visitors that could not be physically present were able to see a VR presentation of INSEAD activities such as the research centres and the executive programmes, and were also able to access the videos of the presentation of the INSEAD days event.

Overview of Four Learning Systems Developed at CALT



6. Prototypes and learning systems

6.1 Publications

CALT members have extensively published in domains related to new methods for learning (in particular change management) and knowledge management (in particular organisational aspects). A few examples of titles of publications and cases include:

- A. Angehrn, T. Nabeth, B. Subirana, *Designing Virtual Communities to support E-Commerce adoption;* The eBusiness and eWork Conference, Venice, Italy, 2001, to appear.
- A. Angehrn, *C-VIBE: A Virtual Interactive Business Environment addressing Change Management Learning*, Proceedings of ICALT'2001, Madison, 2001, to appear
- A. Angehrn, T. Nabeth, L. Razmerita, C. Roda, *K-InCA: Using Artificial Agents for Helping People to Learn New Behaviours*, Proceedings of ICALT'2001, Madison, 2001, to appear
- C. Roda, A. Angehrn, T. Nabeth *Matching competencies to enhance organisational knowledge sharing: An Intelligent Agent approach*, 7th International Netties conference, Fribourg, 2001, to appear
- A Angehrn and J. Atherton, *A Conceptual Framework for Assessing Development Programmes for Change Agents*, ECIS '99, COPENHAGEN, 1999.
- S. Jarvenpaa, K. Knoll, and D. Leidner, *Is Anybody Out There?: The Development of Trust in Virtual Teams*, Journal of Management Information Systems, Vol. 14, No. 4, 1998, pp. 29-64.
- A. Angehrn, *An Agent-Centered Framework for the Analysis and Diagnosis of Organisational Groupware Platforms*, in Design of Computing Systems: Cognitive Considerations, G. Salvendy et al. (eds.), Elsevier, 1997, pp. 289-292.
- A.Angehrn and T. Nabeth, *Leveraging Emerging Technologies in Management Education: Research and Experiences*, European Management Journal, Vol. 15, No. 3, 1997, pp. 275-285.
- A. Angehrn and J.-F. Manzoni, *Understanding Organisational Implications of Change Processes: A Multimedia Simulation Approach*, Proceedings of the Thirtieth Annual Hawaii International Conference on Systems Sciences, Vol. II, IEEE Computer Society Press, 1997, pp. 655-664.
- T. Nabeth, *Beyond the Web: Educational Experiences & Research in Virtual Worlds*, CASCON '97 Conference, Toronto, November 1997.
- A. Angehrn, Y. Doz, J. Atherton, Business Navigator: *The Next Generation of Management Development Tools*, CALT report 37, 1993.

5.2 Prototypes and learning systems

EIS simulation (change management simulation software)

EIS is a computer-based multimedia business simulation involving the implementation of organisational change. During the simulation, participants can develop and implement change strategies, select among many different tactics to meet their goal and incrementally change the attitude of the EuroComm managers, influencing their willingness to adopt the proposed innovation.

In the "EIS Simulation", participants working in groups are challenged to introduce an innovation in a division of the EuroComm Corporation. They have up to 6 months of (simulated) time to convince as many of the 22 members of the division's management team as possible to adopt an EIS (Executive Information System).

This simulation relies on change management models that follow the four phases: awareness, interest, trial and adoption. In addition, this simulation incorporates social network theories and teaches the importance of social factors for the adoption of change. The EIS Simulation has been extensively tested in top schools and universities world-wide to train managers in the theory and the practice of managing change and organisational transformation. For more information on the EIS simulation please see http://www.calt.insead.edu/eis/

The CALT Encyclopaedia and the Knowledge Wrapper

The CALT Encyclopaedia consists of a structured set of pages that reference all the Web resources related to research projects conducted within CALT and at INSEAD in general. Two elements in particular are addressed in this system: (1) The design of a web architecture representing information and knowledge that is able to scale well as the content of the system grows (this content consists of a complex semantic network); (2) The identification of categories of sources of information & knowledge (article in magazine, journal, personal home page, newsgroup, etc.) providing a rich perspective of how knowledge and information is made available to the user. This project is now extended with the Knowledge Wrapper project which consists of an object-oriented portal approach for managing easily sources of information of different types. This project may integrate in the future agent-based mechanisms that would be used to automate maintenance tasks (or provide more advanced capabilities), as well as collaborative & social features (opinions, voting, etc.). See: http://www.insead.edu/CALT/Encyclopedia/.

The Alpha Platform

This is the virtual learning community platform developed by CALT. This platform, developed using Lotus Notes Domino technology, relies on structuring a "community space" based on the ICDT model (ICDT: Information, Communication, Distribution & Transaction). This platform is currently used to support distance-interaction amongst participants in management courses.

7. Material to be presented

Programme talk: presentation of CALT's research agenda and current and future projects.

Presentation room: The EIS simulation, K-InCA prototype. Several papers and presentation brochures will also be available.