

ADVANCED LEARNING APPROACHES & TECHNOLOGIES:
PERSPECTIVES FROM THE CENTER FOR ADVANCED LEARNING
TECHNOLOGIES (CALT)

By the CALT Team.

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CALT: a centre exploring new approaches in management education

CALT research focus: management, business & education in the “new economy”

The Centre for Advanced Learning Technologies (CALT) is a research centre of The European Institute of Business Administration (INSEAD). Its mission is to identify/invent/explore new tendencies in the field of technology that are likely to transform radically the way people carry out management & business activities. In this context, CALT addresses the ways in which companies and individuals acquire and adopt these new ideas and put them into practice. As part of its mission, the Centre articulates standards for **the next generation of management learning** in schools and companies and of continuous education at the individual and organizational level.

CALT is involved in projects in the domains of Knowledge Management, Organization Learning, & E-Commerce. CALT research on **advanced technologies & methods for learning** focuses on how virtual learning communities, experiential learning (in particular business simulation games in change management) and management of knowledge can support the learning process.

CALT continuously **monitors** the different **areas** that are likely to have implications on its research work.

CALT’s concept of technology: an enabler of social innovation

The primary objective of CALT is not the analysis of technological trends per se. Instead, the Center considers technology as a key enabler of the new management and business practices. The focus of CALT is therefore not so much on how these **technologies** are created but rather on how they **can be applied** to introduce radical social innovation.

Our interest in technologies (Internet technologies, groupware technologies, agents technologies, Virtual Reality, etc.) is not purely conceptual, but is reflected in the **prototypical work** that the research centre implements in the different projects.

CALT activities in the new learning approach & educational technologies

CALT research covers three different learning modes:

- Learning by elicitation and absorption of theories
- Learning by interacting with others
- Learning by doing (doing projects, simulation, etc.).

Learning by elicitation and absorption of theories is the more traditional one and consists in presenting to the student (in lectures, in the classroom) a high level theory of the field. The students are then expected to solve problems by applying the theory to a specific context. The process underlying this approach is clearly top down.

Learning by interacting with others consists for the “students”, and people in general, to acquire knowledge by interacting with others and sharing experiences. Virtual learning communities represent a typical illustration of this approach. This process is centred on the social process.

Learning by doing is a mode of learning in which the student is able to experiment, and progressively discover and/or construct (by trial and error) knowledge in a domain. Practically, the students may play a simulation, do projects, etc. The underlying process in this case is bottom-up.

The different “pedagogical” methods (lectures, cases, simulation, learning communities, etc.) are positioned differently in this space of learning modes as indicated in fig. 1.

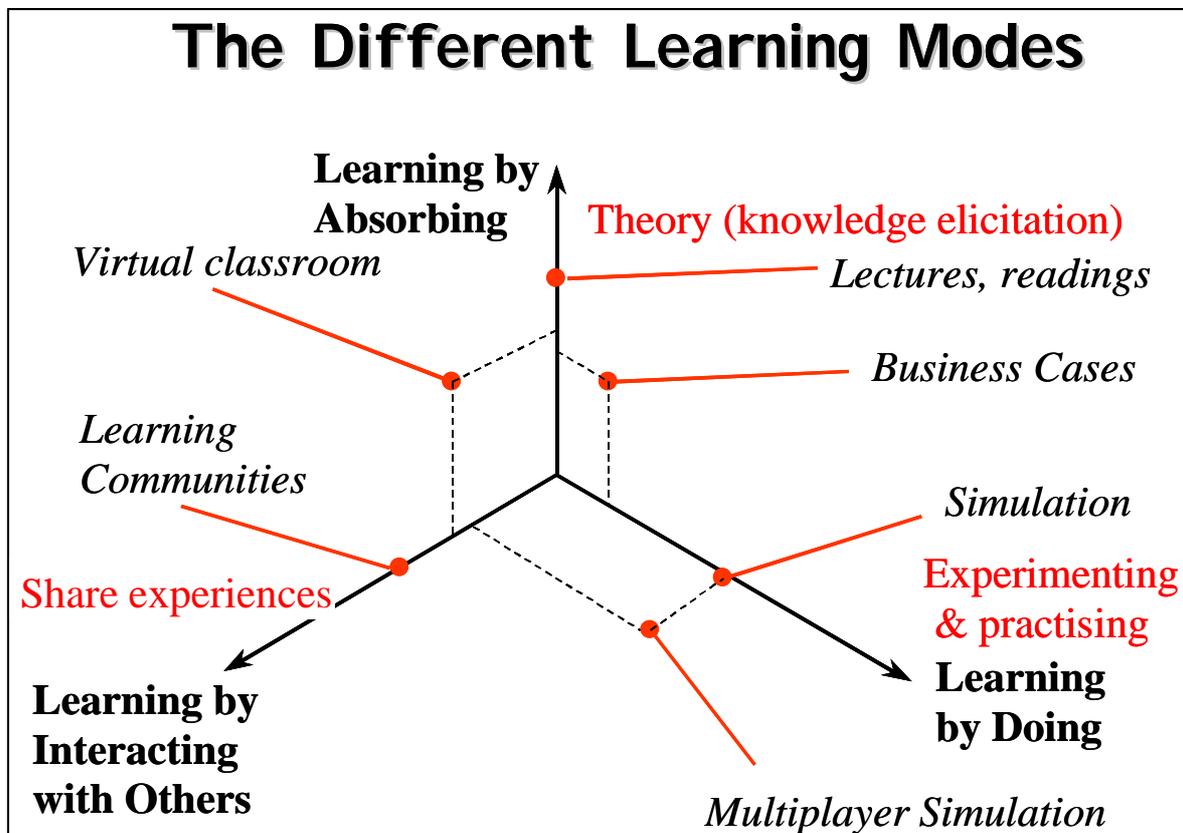


Fig.1

CALT research covers these different dimensions (fig. 2), with a particular focus on the less traditional one (which is more subject to radical innovation).

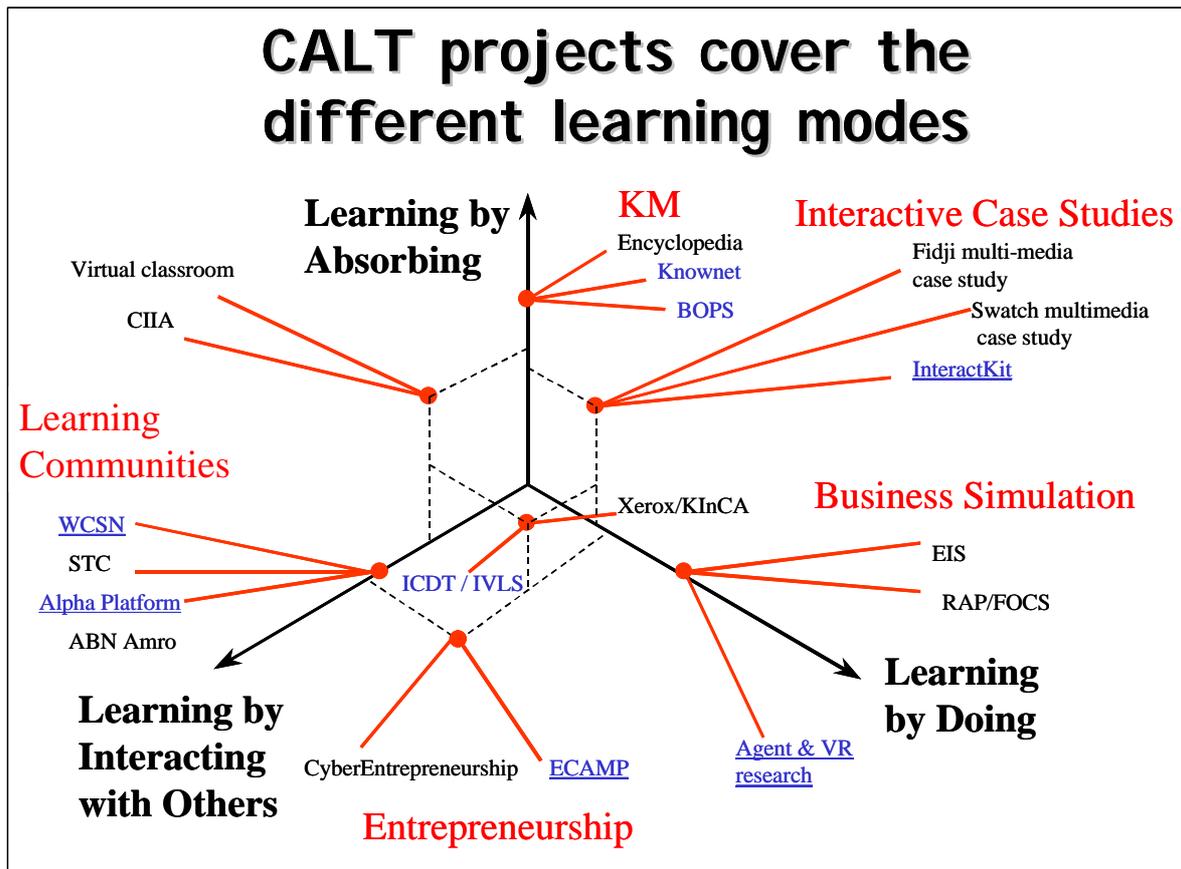


Fig.2

Research on the mode of education based on Presentation and Absorption
(Learning by absorbing knowledge)

Traditional education methods rely to a large extent on the impregnation of the student with knowledge that is delivered in a relatively passive (and mainly theoretical) way. Examples of ways of delivering this knowledge include lectures, reading (articles), courses delivered in a classroom, etc.

CALT has therefore tried to explore and improve this pedagogical process, first by improving the presentation and interactivity of the existing materials (CALT research on multimedia case studies), then by going deeper into how the knowledge is managed (CALT research on Knowledge Management).

An important part of this research is focused on how to better **structure** (organize, scenarize, etc.) information and **knowledge** to be delivered to the student.

Interactive Case Studies

CALT has been one of the first research centres to work on interactive case studies, and one of the first to stop working on interactive case studies. Our experience has been that multimedia case studies do not appear to radically improve the learning process (certainly not to any significant extent).

The first part of the work consisted in transforming existing business case studies into more interactive ones, and in particular in enhancing them with multimedia components (sound, videos, etc.).

Several **multimedia case studies** were therefore translated and made available through CDROMs. “Fidji Multimedia Case Study” and “Swatch Multimedia Case Study” for instance address how to define a communication campaign.

Next, CALT designed **web-based multimedia cases** which had the advantage of providing a much more practical delivery channel than CDROMs. For instance, the “Internet Challenge Interactive Case Study” was written to show students how companies could use the Internet as a new marketing & sales channel.

Finally, CALT tried to systemise this experience with the design of a **Web Authoring System, InteractKit**. The objective was to develop and refine on an ongoing basis an authoring toolkit that enables the testing of a pedagogical methodology that is based on the logic of viewing learning experiences as a path through a series of individual "learning units". Each of these units has a number of "standard components" such as problems, hints, extra information, other responses, solutions and so on. The toolkit is currently built on standard HTML templates, but the architecture was defined so that it could evolve to take advantage of the latest technologies, such as Java or Macromedia Flash.

The results of this research, although interesting, did not show sufficient benefits to justify any further efforts.

Knowledge management:

A second area of research originated from the idea that the new Internet economy would give the student (or indeed anyone) access to a huge amount of good (and not so good) quality sources of information and knowledge. The availability of these sources would transform radically the process of knowledge acquisition by the student (and the manager). The student would therefore have to dedicate more of his attention in the process of selection of relevant knowledge (available in a quasi infinite quantity) and in the process of aggregating it in a creative way.

CALT research in the domain of knowledge management covers several dimensions such as:

- Knowledge structuring & wrapping (**Encyclopedia** project, the **Knowledge Wrapper** project using a portal architecture)
- Knowledge management methodology (**KnowNet** project)
- Knowledge delivery (**BOPS** Project).

Another reason for the interest of CALT in Knowledge Management is that managing knowledge efficiently (and setting up learning organizations), has become a key success factor for companies in the new economy. It is therefore important that CALT gains an in-depth understanding of an area so critical to companies. CALT, however, has focused its attention more on the management of tacit knowledge, exploring issues such as the dynamics of circulation of knowledge in virtual communities or knowledge management behaviour, rather than on the management of explicit knowledge (such as companies' documents). The research work on virtual communities and on knowledge management behaviour (e.g. the KInCA project) will be presented later. (The objective of the KInCA project is to use personal interface agents to help managers acquire "knowledge sharing" behaviour).

The CALT Encyclopedia and the Knowledge Wrapper

The CALT Encyclopedia 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.) that provides 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 which would be used to automate maintenance tasks (or provide more advanced capabilities), as well as collaborative & social features (opinions, voting, etc.).

KnowNet

EC-IST project.

Topic: Knowledge management methodology and knowledge networking.

The KnowNet project addresses the knowledge management needs of business entities by developing, applying, testing and evaluating an ICT-based Knowledge Tool and a set of methods that will enable the creation, retention, sharing and leveraging of knowledge assets and enhance the performance of knowledge operations and learning capabilities of business organizations.

CALT contribution: KM methodology.

BOPS (Back Office Performance Support)

EC-IST project.

Topic: On the job knowledge management and education.

The objective of BOPS is to propose an environment that fosters the dynamics of organizations and supports employees in improving best practices through continual learning. The approach promoted by BOPS for offering such an environment is to mingle back office processes with training, and to embed 'strategic analysis of business performance and customer satisfaction' in training management.

CALT contribution: Architecture & web-supported offline conferences.

ONTO-LOGGING

EC-IST project.

The project **aims to develop** a next generation distributed Knowledge Management system, able to support different independent ontology and knowledge bases and provide the basis for transparent inter-operability and knowledge exchange.

Some lines of action:

- Developing an ontology formalisation distributed system.
- Developing and incorporating metrics, which would allow quantification of the relative success and merit of competing ontology.
- 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.

Proposed CALT role:

- “User modelling issues in the context of Knowledge Management”, ONTO-LOGGING user modelling tools, etc.

Research on Learning Communities (Learning by interacting with others)

Exploiting the social dimension (and in particular interaction between people) to support knowledge dissemination and acquisition has been an important subject of interest for CALT for a long time. For instance, before the advent of the web, pre-CALT members were using Lotus Notes as a way of supporting the learning process (by improving student to professor and student to student communication) inside communities of managers (**LEAPNET** project).

Then, acknowledging all the advantages of web-related technology, CALT decided to focus a lot of attention on web-based collaborative systems. These systems were used to enhance the INSEAD MBA and Executive programmes with the objective of facilitating the communication (anytime, anyplace) among the students, and between students and professors.

This experience was later extended with virtual community external projects in which a system is used to facilitate the dissemination of knowledge among groups of managers (such as **STC** and **ABN AMRO**). Finally, CALT also participated in the design of more sophisticated virtual community platforms (**WCSN**) before working on the design of its own platform (**Alpha**).

STC (Swedish Trade Council Communities)

INSEAD project.

Topic: Managing communities of practices.

This project aims to design and validate an innovative approach to Internet-based learning for a community of geographically distributed managers. It addresses specifically the needs of the community of Swedish managers working in SMEs and coordinated by the Swedish Trade Council (STC).

ABN AMRO: experiences in knowledge and change management

INSEAD project.

Topic: Managing Knowledge and Change in the “new economy”

This project aims at identifying key shifts in the valorization process associated with the transition to the “new economy”. More specifically, the main objective of the project is to identify the changing parameters of value creation which prioritize the intangible assets of corporations, such as knowledge and the capacity to adjust to a changing economic ecology.

Other similar projects include the **LEAPNET** project (supporting the learning process of a community of managers of TeleDanmark).

WCSN (World Class Standard Network)

EC project (completed).

The mission of WCSN was to create an electronic community of business people interested in exchanging best business practices. One important output of this project was the design of a virtual community platform used for facilitating the interaction of professional organizations. CALT role: Mediation in virtual communities according to a CSCW, a CMC (Computer-Mediated Communication) and an agent perspective. Utilisation of a computer-supported platform for the work of a distributed consortium.

The Alpha Platform

This is the virtual learning community platform that is being 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).

Research on Learning through Action (Learning by doing)

An active, highly cognitive and situated learning environment in which the student is able to learn by experimenting (trial/error) is an approach which has received a lot of attention from CALT. In fact, we can consider that this is the area in which CALT has some unique expertise. More specifically, this expertise consists in the design and the use of computer simulation games for teaching change management and organizational learning.

SAM (Simulation And Multimedia) was the first project (Delta programme) conducted by future CALT researchers (CALT did not exist at this time) following the learning by experimenting approach. The objective of the SAM project was to define a framework for simulations for learning.

However, the work that laid the foundation of the vision of CALT in experimental learning was the paper "Business Navigator" (written in 1993 by A. Angehrn and Yves Doz). Subsequently, a first implementation of this vision was the EIS change management computer simulation game. This simulation, which has gained considerable success, is now used by some of the most important business schools (Harvard, Wharton, etc.).

Another area, which can be considered as related to learning through action, consists of entrepreneurship (such as the **CyberEntrepreneurship** MBA course) research which will be presented later.

EIS simulation (change management simulation software)

EIS is a computer-based multimedia business simulation involving the implementation of organizational 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.

Other related/derived projects:

- Online Marketing Simulation with Brands (managing brand adoption by the market)
- Building and Managing sustainable relationship
- RAP (see the next paragraph)

RAP (Reengineering Airline Critical Processes)

EC Project (completed).

The aim of the RAP project is to enable airlines to efficiently and safely redesign their Flight Operations business processes.

Most significant CALT contribution: FOCS Airline Critical Change Simulation, which is a (Java) adaptation of the EIS simulation for the airline industry.

Holistic (next generation) approaches to Learning: agent-enhanced social virtual worlds

Research in this domain represents the unifying work of CALT and to some extent the natural evolution of the vision that was introduced in the Business Navigator project.

CALT research has shown that a pedagogical process has to rely on three main learning modes to be really effective:

- Learning by elicitation and absorption of theories (traditional mode of education)
- Learning by interacting with others (virtual learning community work)
- Learning by doing (doing projects, simulation, etc.).

In fact, many pedagogical processes include these three modes even if one of them is predominant. For instance, a business simulation session such as the EIS simulation does not only consist in running software. The context of this simulation is generally introduced at the beginning by a lecture. At the end of the session, the results are analysed in the classroom: the idea is to elicitate and generalise (theoretic) the knowledge generated in the simulation. In addition, the simulation is usually not played individually by each student, but by teams of (4 to 5) students. The idea is that the interaction between the students in groups will facilitate the creation and the sharing of knowledge.

As a long-term perspective, CALT considers that the systems which will implement these ideas the most effectively will be agent-enhanced highly cognitive social virtual spaces since they provide in a powerful way the possibility to:

- present highly structured knowledge (such as theories) in a straightforward way (by wrapping it into highly cognitive entities)
- facilitate interaction between people (these spaces are multi-user and also agents can provide social mediation mechanisms)
- create active mock-ups of real systems in which the student is able to experiment.

In order to achieve this vision, CALT has worked on more basic (generic) research (such as research on technologies).

This research includes:

- Research on Virtual reality (experimentation with active world technology, and application to the virtual university and to e-commerce)
- Research on agent technologies (AWJavaBot, agent psychology & personality, user modelling, etc.)
- Research on knowledge and collaborative platforms (community portals, etc.).
- Research on change management (different phases in the dynamics of adoption, motivation & drives, etc.)

The projects that address more directly this holistic approach are **KInCA** and **EdComNet**.

Xerox KinCA (Knowledge Intelligent Conversational Agent)

INSEAD Project.

Topic: Agents, knowledge management, change management.

The aim of this project is to validate a new approach to enable managers at every level or function in an organization to effectively learn, understand, and then apply Knowledge Management concepts and techniques. The approach is based on the concept of a “Personal KM Agenda” and consists in providing managers access to an interactive, web-based system, helping them to identify knowledge management opportunities in their jobs, to achieve their targets and objectives, and in their business environment (individually or in teams). Manager(s) are hence helped to understand better the key principles of Knowledge Management, to develop stepwise their own Personal KM Agenda, and then act upon it.

EDCOMNET

EC-IST Project

EDCOMNET is an educational communal net, a virtual learning community platform for adult citizens to be set up in many regions of the European Union and associated countries like Israel. The net will act as a portal stimulating the active learning of social skills by the citizen, thus enhancing the social integration of individuals within urban communities. It will empower the individual citizen to be a self-reliant part of society, fostering creativity and autonomous opinion forming as well as decision-making.

Technology-oriented and basic research projects at CALT

Virtual Reality research

CALT has conducted quite a lot of research in the use of the Active Worlds multi-user 3D virtual reality technology in 2 main areas:

- The Virtual University (or how to use 3D multi-user virtual worlds to enhance the Virtual University). An example of a prototype: the virtual INSEAD Days, which was an online (3D version) of the INSEAD event. In this space, the visitors were able to see a VR presentation of INSEAD activities such as the research centres and the executive programmes available, and were also able to access the videos of the presentation of the INSEAD days event.
- Research on Electronic Commerce (or how to use 3D multi-user virtual worlds as a new space to conduct commercial activities). For instance, the T-IBM explored the idea of a 3D virtual shop, including 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).

Agent technologies research

CALT research on agent technology originated from the desire to provide the “Business Navigator” model with stronger technical and conceptual foundations. For instance, in the EIS business simulation (an implementation of the business navigator model), the operating of the game relies on the modelling and simulation of people in an organization. The idea is that the learning will take place through the interaction with those artificial characters. Agent technology research was useful first for identifying technologies and a technical approach for implementing the next generation of the Business Navigator model (more flexible, modular, multi-user, etc.). Other research was useful to clarify the internal structure of the artificial characters, and in particular to make the connection with research in the fields of psychology. For instance, the traits of the Big Five Factor Model of personality (openness to experience, agreeableness, conscientiousness, extroversion, emotional stability) may provide some better scientific foundation to the “traits” of personality chosen for the EIS agents (openness to innovation, helpfulness, competence, dynamism). Note: The team roles theory (such as the “Belbin Team Roles theory”: he identified eight categories of roles in a team) may also be considered as a candidate to be incorporated in a future version of the system.

Finally, advanced user modelling (a sub-area of agent research) may prove to be very useful in many of the fields in which CALT is conducting research: student model in education, personalisation in knowledge & information management, better relationship management in the domain of e-commerce.

AWSdkJava

This is a 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 which allow one 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.

Domain specific work: e-commerce and entrepreneurship, etc.

Different domains, which represent a special interest for CALT, represent perfect areas of application for experimenting and deploying the knowledge generated by CALT in education. We have already mentioned the domains of knowledge management and change management. Another important domain is entrepreneurship, in particular for an application in e-commerce. Several relevant projects are described below:

ECAMP

EC-IST Project

This project aims to develop innovative and dynamically networked virtual environments called "corporation modelling platforms." These "Merchant Corporations" will draw their revenue by obtaining memberships and interfacing with existent web affiliate programmes. The created 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. These real-world market business development environments will lead to unique business-led consensus e-commerce model building between all the participants.

CyberEntrepreneurship

INSEAD Project/Programme.

The CyberEntrepreneurship elective course aims to help MBA participants who are seriously considering starting their own E-Business to acquire the necessary skills and understand the management implications of Internet start-ups.

In parallel to the whole process, the CyberEntrepreneurship website is the reference platform that hosts the knowledge base as well as the on-line discussion forum. The site is also open to INSEAD Alumni, who have already been taking part in it since May last year.

CyberEntrepreneurship awards a special prize for the best project at the end of P5:

Each project will be evaluated by 2 INSEAD faculty and 2 external reviewers (alumni). The best project will receive a gift of 10.000 Euros, on top of which Viventures will invest 20.000 Euros if the company is created within 3 months after graduation.

HORTONET 3 (A Global Horticultural Network)

EC-IST Project

Topic: Social and business models for multimedia content.

Future Heritage faces the problem of how to exploit the enormous potential of gardenslive.com in terms of social & business models. This is a new area of business requiring an effective model which spans Member States, USA & Japan. The objectives are to:

1. Identify the most effective social & business model for gardenslive.com
2. Study available best practices to identify the most suitable business model
3. Prepare the findings for exploitation.

ABN AMRO e-commerce strategies

INSEAD Project.

CALT is in the process of analysing complex e-commerce strategies in financial markets. It is currently advancing research in the domain of e-commerce in the fields of treasury and fixed income markets, customer relationship management, and e-procurement. A central

preoccupation of this research is to identify knowledge and change management processes that are increasingly becoming critical for competitive success in the “new economy”.

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