L2C – IST-2005-027288

Final Activity Report

AUTHORS	INSEAD
MAIN CONTRIBUTORS	Laurent De Clara, Albert Angehrn, Alicia Cheak
CATEGORY	Final
STATUS	Final version 27.03.08
DUE DELIVERY DATE	February 29, 2008
ACTUAL DELIVERY DATE	March 27, 2008
ABSTRACT	This report describes the results of the L2C project. Specifically, it provides an overview of the project's accomplishments, as well as looks at the potential of the different outputs for deployment and diffusion beyond the project's lifespan.
IDENTIFIER	**L2C-T7.4-PC-001:** Final Activity Report

Table of Contents

Executive Summary, Final Status & Outlook

Overall, at least from our perspective, the L2C Project has been an extremely successful experience. What had been just an idea and a challenge when the project started 2 years ago has transformed itself gradually into a wide knowledge base, sound design principles, and a variety of simulation-based Learning Experiences, some of which were ready to be deployed successfully in very demanding professional contexts even before the end of the project.

All of this has been made possible by a group of committed partners, to whom the L2C Project has provided the opportunity to:

- Study **collaboration dynamics and technologies** from multiple perspectives;

- Design a **framework to support effective learning of collaboration competences through Simulations**, and demonstrate its viability through the implementation and assessment of a set of **Simulations Prototypes** addressing the development of collaboration competences;

- Bring a number of these Prototypes to a **maturity level** that makes their diffusion in top management schools and corporations both possible and highly desirable;

- Involve **more than 900 managers**, decision-makers as well as students and academics in our **L2C Workshops and Events** which took place (and still take place) Europe-wide.

Beyond achieving these objectives, we have seen clear evidence that the **results**, **insights**, **design guidelines**, **software components** and **learning systems** we have produced have a high relevance and diffusion potential, and will continue their development and deployment beyond the official project end, February 2008.

Building a Solid Multi-disciplinary Foundation

We started this project with the awareness that we were addressing a knowledge area which is extremely relevant for individuals and organizations operating in today's complex, distributed, and global context: the **capability to Collaborate productively across distance and diversity**.

The coordinated efforts of all the project partners led, over the first 6 months, to the creation of a solid foundation for the design, development and prototyping phases which subsequently followed. At that time we used the metaphor of a Greek Temple (see Figure below) to represent how our extensive literature review, primary data collection (cases), and analysis would provide the key components for conceiving and designing effective leaning experiences in the area of Collaboration Dynamics. This first achievement has today taken the form of a structured online Knowledge Base. It represents for project partners, and other involved readers and educators, a **rich source of reference, ideas and inspirations** for the extension of L2C Simulation prototypes for the design of new simulation-based Learning Experiences addressing Collaboration Dynamics and Dilemmas.

From Design to Prototyping: The L2C Simulations

Adopting a rapid prototyping and high end-users involvement approach, the project entered very early on into the more creative and experimental phase of conceiving **a variety of simulation-based learning experiences**, (L2C Simulation Types), and it then gradually began to produce their detailed design, and finally went on to implement the related software, multimedia and documentation components.

The first versions of **EduSynergy**, **EduChallenge**, the **Pit Stop** Simulation, the **WorldTeam** Simulation and the **Agent**-based Simulation thus emerged, covering a wide spectrum of learning objectives addressing Collaboration Dynamics:

- At different **levels** (individual, team/group, organizational, and inter-organizational);

- For different **types of audiences** (from top managers to students, and professionals operating in higher education contexts);

- Using a variety of **media and technologies** (from videos to intelligent agents technology);

- For a variety of **deployment contexts** (from traditional to online, and distributed settings).

From Assessment to Continuous Improvement

Two rounds of intensive prototyping, supported by tight collaboration between designers, developers, educators/trainers and end users/learners, along with a continuous evaluation and feedback process, have helped us during the second project year to assess, and then extend and improve the L2C Simulation Prototypes so that they have now reached the level of advanced learning experiences including:

- Modular and versatile **software components** which already enabled the rapid development of new simulations, as with the recent **Food Alliance** and **aSAP** Simulations;

- **Pedagogical Instructions** and **underlying concepts/theories;**

- Material for **Facilitators** (slides, videos, handouts);

- **Deployment templates** and documented **experiences** (see for instance the Report from the EagleRacing Simulation Event organized with more than 100 managers in Copenhagen).

With regard to **formal evaluation**, the feedback gathered during several L2C Workshops and Events (including the recent impact study we have conducted with the EduSynergy Simulation) has begun to confirm our hypotheses on the learning value, the quality of the learning process, and the flexibility of the L2C Simulation Prototypes we have developed.

Current Evidence and Outlook

Beyond formal evaluation, the maturity of a number of our L2C Simulation Prototypes has enabled us to gather, over the last months, real **Evidence** about their potential value. This evidence includes:

- The decision, after a successful deployment experience, to integrate an extended version of the **EagleRacing Simulation** into IEP, one of the most important Executive Programs at **INSEAD**;

- The interest of several organizations (from the partners **FIAT** and **UniCredit**, to large companies as **IKEA**, along with public bodies as the **Scottish Government**) to deploy the EagleRacing Simulation in their corporate management development programs - and plans for its professional diffusion – see www.eagleracing.eu;

- The success of the **Pit Stop Simulation**, including the intervention of a Ferrari F1 car and one of their pit stop teams, when we deployed it in Stockholm with more than 100 Swedish **top managers and decision makers**, including the CEOs of companies like Ericsson or SEB (the largest Swedish bank), within a one-day event in which the previous speaker was Bill Clinton;

- The integration of the **WorldTeam Simulation** in its different variations into the teaching programmes of **INSEAD** (Web Trends & Strategies MBA course), **ALBA** (IT courses), and other partners' universities;

- The commitment of **AlphaLabs** to distribute the **EduSynergy Simulation** and the related pedagogical material to Universities Europe-wide in order to help **Higher Education** to address the challenges of change and collaboration currently faced by these institutions;

… and last but not least …

- The successful submission of an EC-funded project called **L4S** (Learning for Security) in which the work conducted during the L2C Project will be extended to design effective learning experiences addressing the area of **Crisis Management** (and special collaboration contexts in which people operate under strong time and emotional constraints, within very diverse teams and contexts, both professionally and culturally).

We are looking forward to the diffusion of the L2C knowledge base within the academic and educational community, and to seeing the design guidelines and the simulation prototypes further develop into reference points for managers and decision-makers interested in **extending their collaboration competences** through high-quality, intensive, and effective / actionable simulation-based learning experiences.

Albert A. Angehrn - INSEAD
L2C Project Coordinator
March 2008

Chapter 1.   Overview of the L2C project

This chapter provides an overview of the L2C project, such as the rationale, the objectives, the approach taken, the project structure adopted as well as a description of the main outputs of the project and the list of the partners involved in the consortium.

1.1   Project Rationale

Effective collaboration dynamics are at the core of learning, knowledge exchange and innovation processes. Nevertheless, in today's global environment, a large number of collaboration initiatives fail to deliver the value expected, as complexity is enhanced by the diversity and the distributed nature of the people, groups, and knowledge sources and by the knowledge integration processes involved.

In this context, the effective development of collaboration dynamics is not something happening 'inside' organizations but rather at the intersection of organizations with individuals, group interactions and network dynamics (e.g. influence networks affecting the diffusion of attitudes in a group), and organizational contexts and dynamics (e.g. specific cultures reflecting a given industry) within which they operate.

Out of that perspective has emerged the need for new types of effective technology-enhanced approaches to experiential learning: simulation- and games-based learning experiences based on dynamic models of human behavior in different contexts, in which learners are given realistic "missions" requiring them to collaborate with other learners or come in touch with and influence the behavior of simulated characters.

This focus was at the core of the research and development work undertaken in the L2C project.

1.2   Project Objectives

The main purpose of the L2C project was to address and significantly advance the state-of-the-art (both theory and practice) in two relevant areas:

- Technology-enhanced learning of Collaboration Dynamics and Competencies Development;

- Design of Advanced Simulations based on models of human behavior in different organizational contexts.

More specifically, the L2C project aimed to understand the factors inhibiting effective collaboration dynamics and leading to the failure of collaboration initiatives ("**Collaboration Traps & Challenges**"), and of the interventions required to reduce these risks ("**Collaboration Management Competencies**").

In terms of concrete outputs, the L2C project sought to develop:

- A dynamic online Knowledge Base (*Advanced Collaboration Dynamics and Technologies – ACDT Knowledge Base*) for capturing the knowledge in the area of collaboration dynamics and related academic disciplines (from motivational psychology, organizational culture, holistic theories of creativity and the social network theory to distributed, technology-enhanced team dynamics, knowledge management, and innovation diffusion studies) combined with best practices and experiences from a number of industry sectors;

- An active Virtual Learning Community (*Advanced Collaboration Dynamics and Technologies* – **ACDT Virtual Learning Community**) contributing to the advancement of knowledge in collaboration dynamics and technologies (theory, practice and learning dimensions), and the development of interdisciplinary exchanges including knowledge creation and collaboration;

- An innovative framework (*Advanced Collaboration Dynamics and Technologies* – **ACDT Framework**) addressing the effective development of collaboration competencies and targeting the design of effective technology-enhanced learning solutions based on Advanced Organizational Simulation Games (based on computer-enhanced collaborative and experiential learning models and simulation games design principles);

- A set of widely deployable, advanced, interactive and experiential technology-enhanced solutions ("**ACDT Simulation Games**") guaranteeing the effective understanding and internalization of (1) cognitive, motivational and attitudinal factors driving collaborations, (2) complexity of knowledge integration processes and distributed, ICT-supported teamwork, and (3) management competencies determining the success or failure of collaboration dynamics in diverse and distributed contexts.

Concerning its methodology, the L2C project adopted a multifaceted perspective with regard to collaboration dynamics. The project approached this challenge from four distinct but interrelated angles.

The *first* looked at collaboration dynamics at different levels from cross-functional project and learning teams in organizations to inter-organizational collaboration projects;

The *second* approached collaboration dynamics from an inter-disciplinary perspective combining a social science, a management science and a technological dimension;

The *third* examined collaboration dynamics in different organizational settings including education, private and public sector organizations, large organizations as well as SMEs;

The *fourth* focused on the various characteristics of collaboration dynamics in different contexts from high to low knowledge transfer complexity.

One of the main objectives of the L2C project was to integrate models of individual behavior (to allow learners to come in touch with different types of individuals or 'characters' displaying different types of attitudes), of group interactions and network dynamics (e.g. influence networks affecting the diffusion of attitudes in a group), of organizational contexts and dynamics (e.g. specific cultures reflecting a given industry, a family business or an SME context), as well as of intervention dynamics (e.g. what happens when the learners try to intervene in the simulated context using different approaches and tactics) into advanced organizational simulations as illustrated in Figure 1 below:
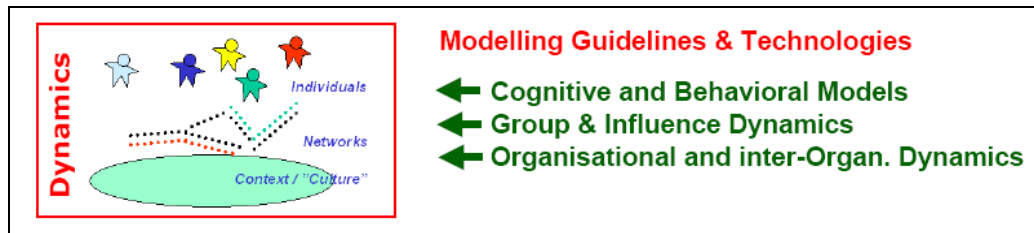
Figure 1: Dynamic models of human behavior

The L2C project, in other words, encompassed much more than simply introducing technology to learning solutions. Effective learning of collaboration dynamics requires addressing the development of collaboration competencies from an inter-disciplinary perspective and through advanced organizational simulations, embedding the direct experience of collaboration breakdowns/collaboration traps covering behavioral (dealing with uncollaborative characters, virtual or real), process-related (virtual teams mismanagement), organizational (factors affecting the motivation or capability to collaborate), and technological (inappropriate application of technological tools) dimensions of collaboration management. This was the fundamental premise of the L2C project.

1.3   Project Structure

The L2C project consisted of several successive phases:

First, the project explored **collaboration models, dynamics and related collaboration management competencies** (Workpackage 1). It particularly sought to document what were the key models (processes, breakdowns and traps, and collaboration management competencies) related to motivational and cultural dynamics, knowledge transfer and integration dynamics, technology-enhanced workgroup dynamics as well as assess the current (individual, group, organizational and inter-organizational) learning solutions addressing advanced collaboration dynamics;

Second, the project focused on the **learning and knowledge processes** dimensions (Workpackage 2). More specifically, It concentrated on the design and development of two online tools- the ACDT Knowledge Base and the ACDT Virtual Learning Community- to store, structure and facilitate the creation of knowledge related to the cognitive, psychological and organizational models gathered in phase one;

Third, the project concentrated on the design and development of an **eLearning framework** and **computer-enhanced learning solutions** (Workpackage 3). It focused in particular on the conception of the ACDT Framework, and the design and development of a set of ACDT Simulation Games embedding the models, dynamics, challenges, etc identified in phases one and two.

Fourth, the project focused on the design and execution of **two pilot rounds** (Workpackage 4). It included the preparation of the pilots, in which different target users experienced the ACDT Simulation Games prototypes, Knowledge Base and Virtual Learning Community, involving first a set of workshops with individuals from the partners' organizations, and then a second one with a broader group of users consisting of individuals from other organizations (not project partners).

Fifth, a **final packaging and dissemination plan** was developed (Workpackage 5) to exploit the potential and ensure the sustainability of the outputs beyond the project's

lifespan. Based on the work conducted in the first four phases, the L2C service has evolved into a full package consisting of the simulation software and a set of supporting material (deployment instructions and guidelines, instructor/teaching notes, pedagogical slides and participant and instructor feedbacks) as well as links to the L2C Knowledge Community, wherein instructors may exchange knowhows and experiences with the simulation workshops and where designers and researchers may collaborate towards the design and implementation of future versions of the simulations.

Finally, the project evolved within a framework of an **embedded and continuous evaluation process** (Workpackage 6)**,** which allowed partners to continuously assess the output and systems developed throughout phases 1-5 and to gradually improve the ACDT Simulation Games Prototypes towards their final version.

An overview of the project outputs and how they result from the different project phases is illustrated in Figure 2 below:
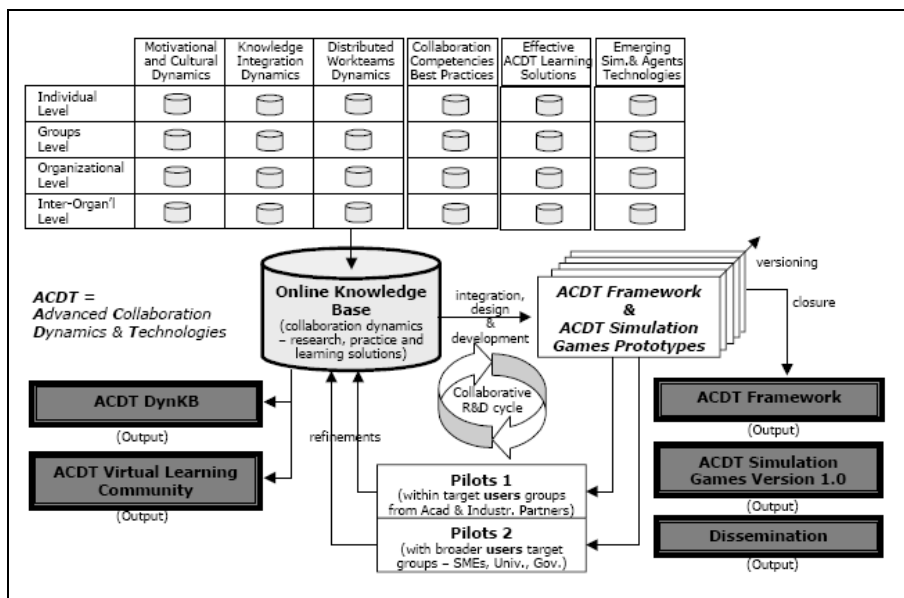
Figure 2: L2C project structure and outputs

1.4   Consortium Description

The L2C consortium drew on the knowledge and expertise of a well-balanced mix of organizations including technical providers, research centers and industrial partners active in the domain of change management, computer based simulation development, learning design, management competencies development, artificial intelligence, and Information and Communication Technologies (ICT) development. The consortium built also on the research and development work done by INSEAD-Centre for Advanced Learning Technologies (CALT) on advanced, technology enhanced learning solutions like the EIS simulation [Manzoni and Angehrn 1997, Angehrn 2004/5] addressing change management dynamics, and which constituted one of the principle starting points in the design of the ACDT Framework as well as in the development of the ACDT Simulation Games.

The L2C consortium is composed of the following partners:

Technical Providers
- Alpha Labs (France)
- Ferrini Valle and Associates (Italy)

Research Centers
- Athens Laboratory of Business Administration (Greece)
- Austrian Research Institute for Artificial Intelligence (Austria)
- INSEAD-Centre for Advanced Learning Technologies (France)
- OPEN University (United-Kingdom)
- St Gallen University– Swiss Centre for Innovations in Learning (Switzerland) Strathclyde University (United-Kingdom)
- University of the Armed Forces Munich (Germany), Università Cattolica Milano (Italy)

Industrial Partners
- Isvor-FIAT (Italy)
- Unicredit group (Italy)
- MeTis Net (Greece)

AlphaLabs is a SME operating since 1999 in the field of management simulation development and distribution, identifying the niche of high-quality business simulations addressing the development of management skills such as change management and innovation. AlphaLabs has become a worldwide leader in the area of Change Management Simulations, which it distributes to top universities and corporations in Europe, the US and Asia.

Ferrini Valle and Associates (FVA) is a SME operating since 1990 in the field of multimedia communication and development of advanced integrated IT solutions and web services for private and public entities. The multidisciplinary expertise between the creative designers and the IT programmers together with the constant monitoring of the market requirement and technological trends gives FVA a wide vision on multimedia and IT enhanced solutions development.

Athens Laboratory of Business Administration (ALBA) was founded in 1992 and operates under the auspices of the Federation of Greek Industries (FGI), the leading employers' union in Greece, the Hellenic Management Association (HMA), the leading executives' association in Greece and the Athens Chamber of Commerce and Industry (ACCI). ALBA is an educational not-for-profit association of Greek corporations, currently numbering 50, whose mission is to foster a new generation of managers, from Greece, but also from other countries in the Eastern Mediterranean, the Balkans and Eastern Europe.

Austrian Research Institute for Artificial Intelligence (OFAI) was founded in 1984 by the Österreichische Studiengesellschaft für Kybernetik with support from the Austrian Federal Ministry for Science and Research, and appointed national key institute for Artificial Intelligence. Research is performed in various areas of Artificial Intelligence, including Intelligent and Emotional Software Agents, Knowledge-Based Systems, Natural Language Technologies, Neural Computation, and Machine Learning. Complementing scientific publications at conferences and in journals, OFAI staff has edited various reference collections on these topics with top publishers, including the MIT Press, Lawrence Erlbaum, and Springer Verlag.

INSEAD-Centre for Advanced Learning Technologies (CALT) is a research centre at INSEAD, one of the world's largest graduate business schools, with two

comprehensive and fully connected campuses in Europe (France) and since 2000 in Asia (Singapore). CALT is one of the leading research centers in the field of new learning technologies in management education in Europe and has been involved in a number of large projects addressing the development of innovative approaches to learning. It has developed a specific expertise in the design of simulations for management development which are used extensively worldwide. Other domains of expertise include Knowledge Management, and the design and development of Agent Technologies and Virtual Communities platforms employed in several distributed learning contexts.

OPEN University is the world's largest distance teaching institution whose mission is to promote educational opportunity and social justice by providing high-quality university education to all who wish to realize their ambitions and fulfill their potential. Already a world leader in blended learning and with extensive e-learning expertise the university is committed to extending its e-learning provision of learning materials. For example, the University is home to the Knowledge Media Institute, a world-class R&D centre at the leading edge of web, semantic, learning and new media technologies and COROUS, a specialist division that provides bespoke e-learning solutions to organizations using the extensive resources and expertise of the University.

St Gallen University – Swiss Centre for Innovations in Learning (SCIL) promotes competent and meaningful use of new technologies in university and corporate education by providing consulting, coaching, research, and moderation to accelerate progress towards enhanced quality in education. The centre was founded in 2003 with the support of the Gebert Rüf Foundation. The centre is incorporated into the Institute of Business Education and Educational Management (IWP-HSG) at the University of St.Gallen. The research activities of SCIL cover the creation of new theoretical approaches as well as its application in developmental activities to create exemplary learning environments.

Strathclyde University has over 200 years' experience of providing "useful learning" to industry and commerce. Its mission is to provide quality learning that is related to cutting edge research, industry and management practice. It is internationally recognized as one of the UK's leading business schools, having pioneered MBA delivery in the UK as long ago as 1966. In addition to its UK-based full-time, part-time and flexible learning programmes the School operates its MBA from 10 centers in the Far East, Middle East and Europe. It also operates a large research degree programme, more than 20 specialist masters programmes in Business and Management topics, executive education and an undergraduate programme.

University of the Armed Forces Munich (UAFM) was founded in 1973 and is located in the community of Neubiberg close to Munich, Germany. The University takes an outstanding position among German academic institutions and in comparison to their military counterparts abroad. The University is no military academy but an academic institution under Bavarian Law which prepares officers for future professional tasks in the civilian life. On the University campus, the Gesellschaft zur Foerderung der Weiterbildung (gfw), one of the leading German university-based centers for management development is located. From its foundation 17 years ago, it has been at the forefront of management education as a provider of high-level programs especially in General Management, International Management, Project Management und Strategic Management.
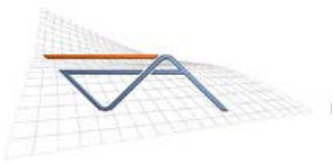
Università Cattolica Milano (UCSC) was founded in 1921 and is among the most comprehensive and complete universities in Italy. It particularly excels in the humanities sciences and scientific domains. One of the key research centers is CeTIF

(research centre on information technology for Finance) which has been in operation since 1990. The central focus of the Centre's activity is the development of studies and projects for the application of advanced and innovative information and communication technologies in the financial and banking industry.

Isvor-FIAT is Fiat Group's corporate university in charge of developing, maintaining and deploying the knowledge related to the business core competencies of the Fiat Group. With rough revenues of 30 millions Euros (2004), Isvor represents one of the largest companies fully focused on education in Italy. In order to better satisfy business needs of a multination industrial group, Isvor operates through local offices in several European countries and in Brazil.

Unicredit Group is the leading banking group in Italy in terms of market capitalization (over €28 billion as of mid-February 2004). It is also one of the top European banking groups in terms of efficiency and profitability (57% cost/income ratio, a 16.7% ROE with total assets of €258.409m as of September 2004). Unicredit Group is the leading banking group in Central and Eastern Europe. UniCredit was born out of the union of seven large Italian banks, each with deep roots in its local economy.

Metis Net Ltd has been founded in December 2000 and provides a set of customer-specific and tailor-made services divided in two key categories: Public Policy Services (PPS) and Corporate Development Services (CDS). Metis has developed an extended co-operation network both at national and international levels and has participated in a number of European research projects such as RURAL WINGS, KLAB, CONNECT and KNOWLABORATION.

Participant Name	Country	Role
	France	Technical Provider
	Italy	Technical Provider
	Greece	Research Centre
	Austria	Research Centre
	France	Research Centre

	United Kingdom	Research Centre
	Switzerland	Research Centre
	United Kingdom	Research Centre
	Germany	Research Centre
	Italy	Research Centre
	Italy	Industrial Partner
	Italy	Industrial Partner
	Greece	Industrial Partner

Figure 3: The L2C Consortium

Chapter 2.   Outputs of the L2C project

This chapter summarizes the main outputs of the L2C project, such as the ACDT Knowledge Base and Virtual Learning Community, the ACDT Framework and the ACDT Simulation Games. For each of them, a description of their main characteristics and features are provided.

2.1 ACDT Knowledge Base and Virtual Learning Community

The L2C project produced a large quantity of knowledge that was collected and structured within a dynamic **Knowledge Base** accessible online and complemented by a **Virtual Learning Community** platform designed to attract all types of contributions related to advanced collaboration dynamics and technologies (theory, practice and learning dimensions) and supporting discourse and collaboration on the theory, design and deployment of L2C simulations.

The **Knowledge Base** was designed to specifically support the collection of the conceptual background (collaboration models and dynamics) of the project as well as the design-diffusion-deployment of the various simulation-based learning solutions. It adopts a multi-level, hierarchical menu based on the three simulation steps (i.e. dynamics, design and diffusion) to categorize, store and access all L2C-related knowledge assets. Additionally, it relies on a flexible technical framework using a .net architecture and XML structure easy to maintain, upgrade and customize according to user's needs.

In terms of functionalities, the Knowledge Base provides a set of key features which include the following:

- **Search engine**: The L2C search engine provides easy access, using several criteria and filters, to all the knowledge generated within the L2C project, including contributions made to the forums, events, etc.

- **Internal links between contributions**: Cross-linking between knowledge assets provides alternative navigation paths within the L2C system. Links can be made to any knowledge asset or space within the L2C platform (e.g. contributions, profiles, events, forum discussions, etc).

- **Direct access from the main page**: The L2C main page provides the user direct access to knowledge assets, following pre-defined filters. Some of these filters can be changed by specifying the preferences in the personal profile of the user.

- **Member's profiles**: From the Member's profile, it is possible to access all contributions created by the profile's owner and to see/access the owner's favorite entries.

- **E-mail alert system**: L2C knowledge assets can also be accessed from an e-mail notification feature. This notification, when activated by the user, can be sent to registered L2C members or to external users by any L2C member.

- **Customized views**: To reinforce personalization, the first page appearing after logging into the L2C Knowledge Community is customized to reflect the specific characteristics and interests of a User, providing direct access to relevant

contents (according to a user's own specification), the last visited and favorite entries (contributions, discussions, spaces, projects, etc.) and to the entries the user has created.

- **Rating system**: The L2C system offers the possibility to rate any other member's contributions by displaying the rating in terms of the number of yellow dots. The average rating is calculated and displayed with all contributions.

- **Comment space**: Any L2C member, independent of the editability level of the contribution, can post a comment to a contribution. All the comments related to the contribution are displayed on the bottom of the page.

The **Virtual Learning Community** was designed to help groups within the L2C Knowledge Community (i.e. researchers, educators, etc) to share, create and diffuse knowledge. It is composed mainly of three elements:

- People-related features (profiles, groups, etc)
- Tools to support collaboration among groups (collaborative authoring tools, shared work spaces)
- Features supporting spontaneous exchanges (synchronous communication tools, forums)

In terms of functionalities, the Virtual Learning Community offers several key features including:

- **Roles**: The L2C system offers different permission levels which are associated with different roles within the community, namely (1) Administrators (who have rights to modify all the elements within the community), (2) Core Team (all the L2C partners) and (3) Visitors (anyone, not part of the Core Team, who registers in the site).

- **Personal profile**: Beyond the typical identity-related information, the L2C system enables individuals to describe themselves and their objectives/ ambition/interests/development in a blog-like way, and to provide an overview of the Groups/Teams they belong to, in their user profile.

- **Teams**: The L2C system allows for the creation of teams in an easy and efficient way by associating their profiles to them (links to Individuals).

- **Forums**: The L2C system supports asynchronous exchanges initiated by members.

- **Spaces**: These spaces provide a specific context in which members and teams can interact (e.g. about a particular project or initiative).

- **Events**: The L2C system offers the possibility to post events, which are opportunities to focus the member's attention on a certain topic at a given time (e.g. for an online meeting or event) or to announce relevant external events (conferences, etc). Events whose date is past are automatically inserted into a Past Events list.

- **Who Is Online**: The L2C system enables users to access immediately information about other online members and to initiate interaction with them.

- **Instant Messaging**: Members can contact other online members by simply entering their profile and launching Skype which is embedded within the L2C system.

- **Internal E-mail system**: The L2C system offers the possibility to its members to send messages to (1) a L2C member, (2) the L2C administrators, (3) the L2C core team, (4) all L2C members and (5) selected L2C members (with the list of all members to choose from).

- **Send to a friend**: The L2C system allows a member to forward an interesting contribution to someone else, either within the L2C community or outside.
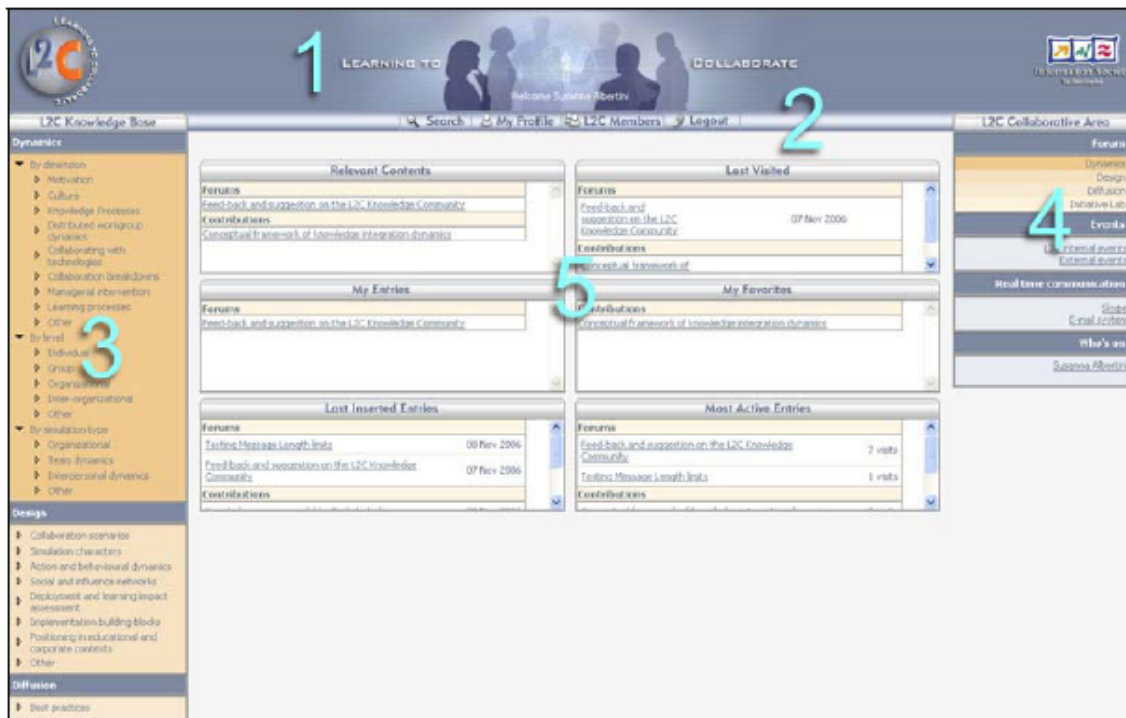
Figure 4: The ACDT Knowledge Community

1. The L2C Logo area (L2C logo, IST logo, System name)
2. The Members area (My profile, L2c Groups, Authentication) + Search function
3. The L2C Knowledge Base
4. The L2C Learning Virtual Community
5. Personal knowledge management area allowing direct access to relevant contributions

The Knowledge Base and the Virtual Learning Community are accessible from the following link: http://l2c.fvaweb.net.

2.2   ACDT Framework

Another key dimension within the L2C project was the development of an **eLearning framework** (ACDT framework) based on the research work on conceptual models for technology-enhanced learning processes, cognition and learning, and individual, team, network, organizational and inter-organizational dynamics (design guidelines). Besides this, the framework supports the selection and design of appropriate modeling approaches and technologies (implementation guidelines), and development of the simulation kernels (engines and integration of specific dynamics) and user interface components of the ACDT Simulation Games. It provides also pedagogical guidelines describing the ideal educational settings and processes in which ACDT Simulation Games can be deployed in universities or corporations as illustrated in Figure 5 below.
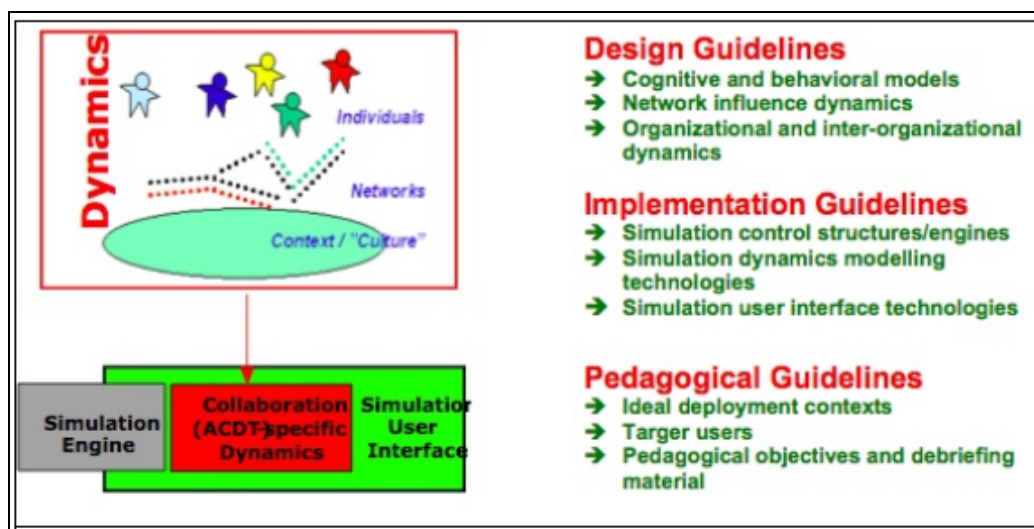
Figure 5: Design, Implementation and Pedagogical Guidelines

Theses pedagogical documents are stored in the Knowledge Base and are available at: http://l2c.fvaweb.net/.

The analysis of existing knowledge about Collaboration Dynamics which resulted from the ACDT Framework and identifies various quality criteria, requirements and recommendations for designing learning environments was extensively used to develop the resulting simulations which integrate complex models of human behavior (including attitudes towards knowledge exchange and integration, reciprocity, trust building processes, involvement in group dynamics). For instance, in the Intermediary Agent simulation prototype, five 'big personality' models (i.e. realizing an agreeable and a disagreeable Intermediary Agent variant) were implemented including profiles such as Neuroticism, Extraversion, Conscientiousness, and Openness to Experience.

2.3   ACDT Simulation Games

One of the major outcomes of the L2C Project was the development of a set of advanced organizational simulations (**ACDT Simulation Games)** based on computer-enhanced learning solutions and that represent the conclusion of the research and development work in the area of advanced collaboration dynamics and technologies.

Following the definition of the ACDT Framework, five simulation game prototypes were developed addressing different collaboration scenarios. Their main characteristics are summarized as follows:

- **EduSynergy**: This simulation game addresses the challenge of adopting collaboration processes and systems in higher education contexts. It specifically targets faculty, staff, and decision makers in universities interested in gaining a number of insights related to the theory and practice of collaboration in organizations. During the simulation, the players/learners, operating in small teams, enter gradually into the role of a team, put in charge by the University Board to support the diffusion of a new university-wide collaboration system, called Synergy, designed to support and enhance collaborative processes university-wide. Through the experience, teams will come into contact with a number of obstacles and 'resistances to collaboration' which they will have to manage effectively in order to achieve their mission.

- **World Team**: This simulation focuses on collaboration in diverse and distributed contexts, and the challenges that come when teams and individuals have to collaborate with different guidelines, minimal face-to-face interactions and restricted communication channels. It targets in particular staff members of a team or department within an organization, such as Human Resources, Marketing, Financing, Publicity, Research and Development, etc. The World Team simulation provides a short term intensive simulated learning experience in which teams of players are asked to work with other teams on a common objective i.e. determining the Acquisition Strategy of an International bank, GLOBank. The World Team simulation exists in four other versions including World Tech[1], Food Alliance[2], aSAP[3] and Knowledge Fusion[4].

- **Eagle Racing**: This simulation is conceived as an opportunity to experience how collaboration technology can change the way people work and take difficult decisions together, individually, or in groups. It is particularly designed for teams and groups of decision-makers, managers, and professionals interested in the dynamics of advanced collaboration in co-located contexts, and technologies applicable to supporting such processes. It consists of a set of interactive video simulations presenting three dilemmas players have to collaboratively solve. Through this type of simulation learners can experience a number of practice-related collaboration challenges and situations (concerning inter-organizational as well as internal collaboration contexts complicated by factors like cultural differences and short-term vs. long-term thinking) whilst experiencing collaborative decision-making in real-time mode.

- **Intermediary Agent**: This simulation addresses the challenges of collaboration at the individual level, their manifestation in inter-personal interaction contexts, and the possibility to influence them through direct exchanges. A distinguishing characteristic of this prototype, the Intermediary Agent, is a reusable entity developed to interact with the player in specific mission scenarios, where success or failure of the player can be highly dependent on these interactions, given that the IA may largely hold the exclusive right to issuing activities and reporting information crucial to accomplishing a player's mission. Target users

---

[1] IT scenario in which teams of players are given a mission to maximize collaboratively the strategic value and competitiveness of an IT project investment portfolio.

[2] Scenario based on the expansion plans of a Supermarket ('Summerspree') into a region ('Erewhon')"

[3] Scenario based on emerging web trends, in which teams of players are given a mission to determine the Innovation Plan for a high level collaboration technology for business enterprises, focusing mainly on incorporating a number of Web 2.0 technologies.

[4] Under development

are faculty, staff, decision makers in universities and organizations interested in extending their understanding of collaboration challenges at the interpersonal level. It is designed to provide teams of players/learners with an experience of how difficult inter-personal collaboration can be, enabling them also to observe different types of collaborative/non-collaborative behaviors and the possibility to influence them through one to one interactions and decisions.

- **Pit Stop**: This simulation represents a "luxury" hi-tech/hi-touch line of L2C simulations, designed to address team and performance challenges unique to teams within a particular organization. Here the focus is on a collocated and synchronous hands-on team experience followed by a targeted debriefing session on collaboration practices under extreme time and competitive pressures. The target users are top managers, ideally cross-company but in small groups (the usual CxOs or Board Teams). It is conceived as an intensive and unique learning experience where players are exposed to a concrete scenario in which high-performance teams operate by being a member of a Formula 1 Pit Stop team and facing a number of issues related to roles and responsibilities, team work on a highly interdependent task, in a context of competition and time pressure.
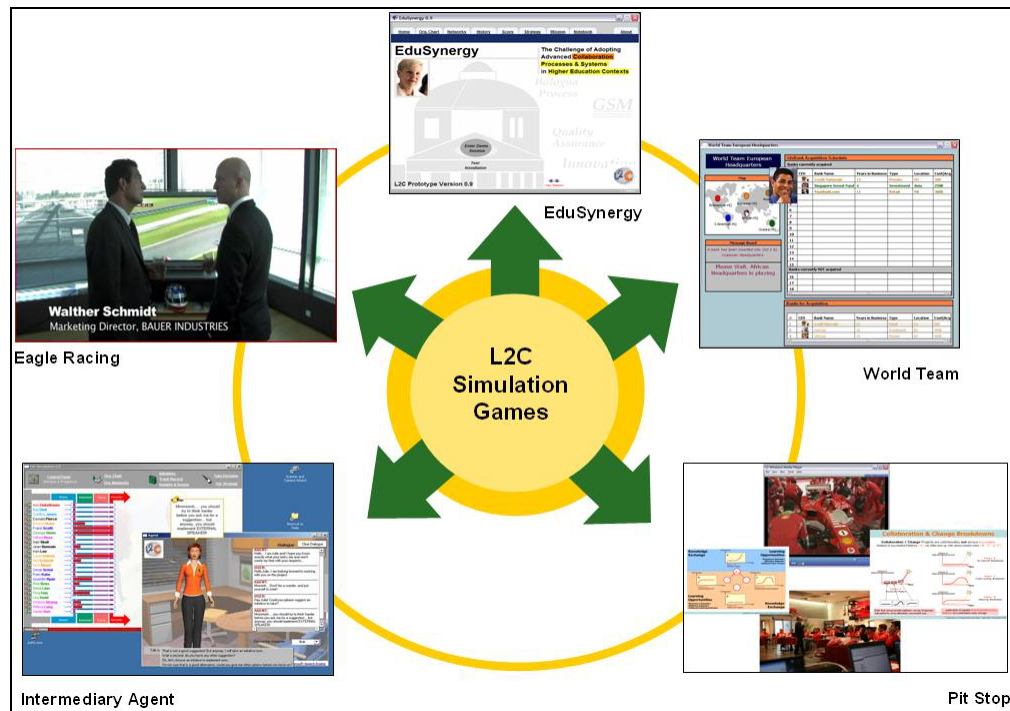
Figure 6: ACDT Simulation Games

2.4   The Online Workshop Tool (OWL)

An Online Workshop Tool (http://owl.fvaweb.eu/Login.aspx) was developed and a first version implemented to enhance the L2C workshop debriefing sessions. This tool is designed to support real-time collaboration by collecting ideas, allowing users to vote on a decision, and collecting feedback and answer to questionnaires. This tool has an interesting market potential, according to preliminary testing with L2C industrial partners. Based on a first round of piloting, a number of areas related to design and usability have been identified for improvement, which will be implemented in the months to come (for more detailed information on the OWL tool, please refer to Deliverable 4.2b).
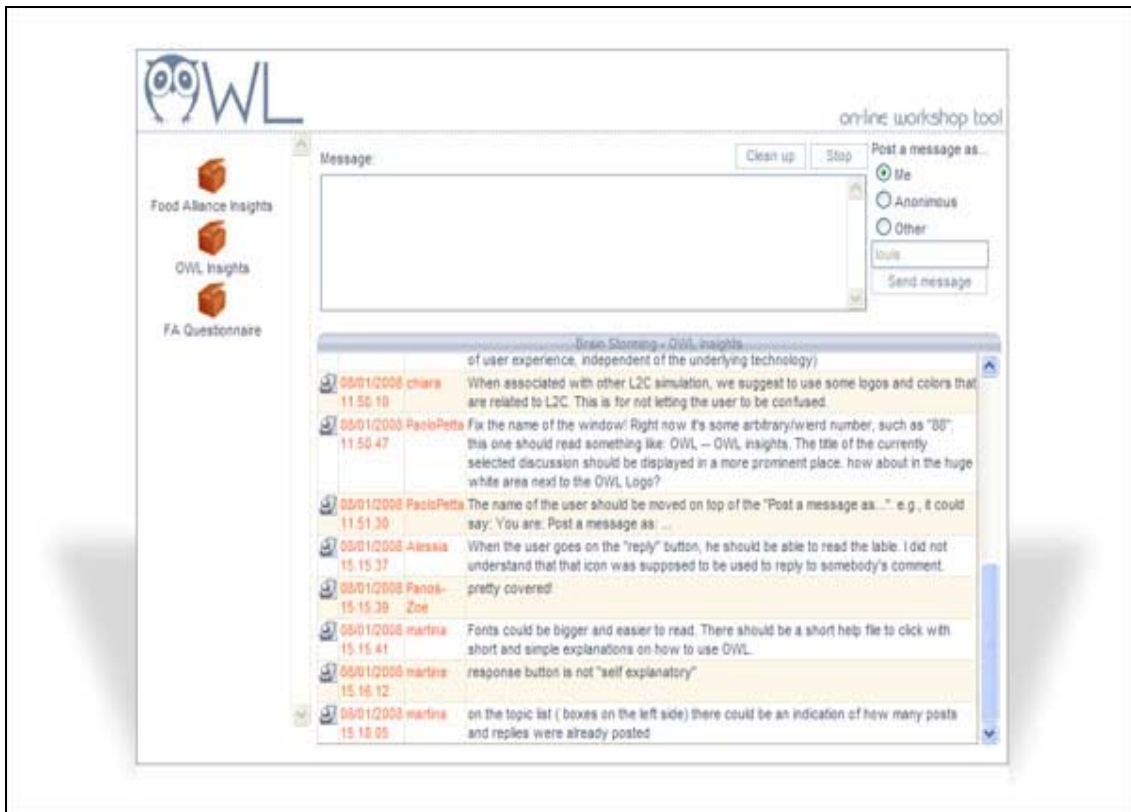
Figure 7: Online Workshop Tool

Chapter 3.   Evaluation of the L2C project

This chapter reports on the main results coming out of the evaluation of the ACDT Knowledge Community and ACDT Simulation Games, and provides for each of them an indication of the degree of achievement for each of the dimensions assessed during the pilot rounds. Finally, a comparative outlook of the different simulations is given to further assess their maturity level.

3.1 The Process of Evaluation

The main targets of the evaluation process were the **ACDT Knowledge Community** (Knowledge Base and Virtual Learning Community) as well as the **ACDT Simulation Games**. The approach taken to measure the outcomes of the L2C project focused on the two following lines of assessment:

- The **pedagogical perspective** and the related learning value and level of acceptance by the users.

- The **usability and level of complexity** of the technical solutions.

A formative and summative evaluation including both pedagogical and usability/technical dimensions were conducted based on a user-centered approach which was adopted in order to involve a wide range of stakeholders (from researchers to designers, to trainers and end users) and validate with them the proposed solutions.

From a methodological point of view, the evaluation process used a mix of quantitative and qualitative techniques to assess the solutions. These instruments of measurement ranged from scenario based questionnaires for the tools and games developed to behavioral data (such as log files) and more extended interviews along with a set of pre-determined criteria and metrics to frame the evaluation process.

With regard to the scope of evaluation, several dimensions of the proposed solutions were observed. They are summarized in Tables 1, 2, 3 and 4 below:

Type of evaluation	Solution(s) tested	Dimensions evaluated
Formative evaluation	ACDT Knowledge Community	Pedagogical: Assessment of the Knowledge Community value including dimensions such as knowledge categorization, knowledge access, quality of contribution, fruitfulness of interaction Technical: Assessment of the realism and value of the Knowledge Community including dimensions such as usability, simplicity and clarity, navigation, capabilities of the system

Table 1: Evaluation scope of the ACDT Knowledge Community (formative evaluation)

Type of evaluation	Solution(s) tested	Dimensions evaluated
Summative evaluation	ACDT Knowledge Community	Pedagogical: Assessment of the Knowledge Community impact on collaboration and how to improve it from the external users' point of view Technical: Assessment on how to improve the KC from a technical point of you adopting the external users' perspective

Table 2: Evaluation scope of the ACDT Knowledge Community (summative evaluation)

Type of evaluation	Solution(s) tested	Dimensions evaluated
Formative evaluation	ACDT Simulation Games	Pedagogical: Assessment of the realism and value of the Simulation Games (i.e. workshops, contribution to understanding of collaboration challenges, impact of the simulation on attitudes) Technical: Assessment of the usability issues including dimensions such as usability, simplicity and clarity, orientation and navigation, completeness

Table 3: Evaluation scope of the ACDT Simulation Games (formative evaluation)

Type of evaluation	Solution(s) tested	Dimensions evaluated
Summative evaluation	ACDT Simulation Games	Pedagogical: Assessment of the effectiveness, the realism of the Simulation Games and their ability to support the learning objectives identified Technical: Assessment of the usability issues (access/login function, manual and instructions, mission statement, initiatives), user interface (colors, animation, multimedia effects, images), level of game play and complexity of the Simulation Game prototypes

Table 4: Evaluation scope of the ACDT Simulation Games (summative evaluation)

The evaluation process took the form of simulation-based workshops to assess the proposed solutions. These workshops were organized to contextualize the use of the solutions, get some feedback to drive the identification of improvements and develop new functionalities in the context of an **evaluation-redesign-implementation** cycle conducted over two pilot rounds. The overall assessment of the proposed solutions is detailed in the following sections.

3.2 Evaluation of the ACDT Knowledge Community

In general, the Knowledge Community received a positive evaluation from users who found it particularly useful to support the knowledge and contributions related to the ACDT Simulation Games and ACDT Framework (corresponding to different dimensions such as theory, practice and learning), and rich in terms of features.

From a **pedagogical point of view**, the results of the formative evaluation showed that the structure underlying the Knowledge Community was relatively effective to access the knowledge assets stored in the Knowledge Base while the functionalities attached to it to search for, create and categorize the knowledge were insufficiently developed as shown in Figure 8. Additionally, some users reported that the Knowledge Community was too document-centric leaving few spaces for communities and their activities, which clearly constitute a critical area for future improvement.

With regard to **the technological aspects**, the results of the summative analysis concerning the functionalities, interface and attractiveness of the Knowledge Community showed an overall balanced development of the system along the seven tested dimensions – usability, simplicity and clarity, orientation and navigation, learnability, effective communication, system capabilities, and completeness – which make it a relatively homogeneous tool as reflected in Figure 8 below. Areas of improvement still exist in each of these dimensions but were not considered as core components of the L2C project and therefore as a primary focus for the development activities which mainly concentrated on stabilizing the system (i.e. performance, technical robustness).
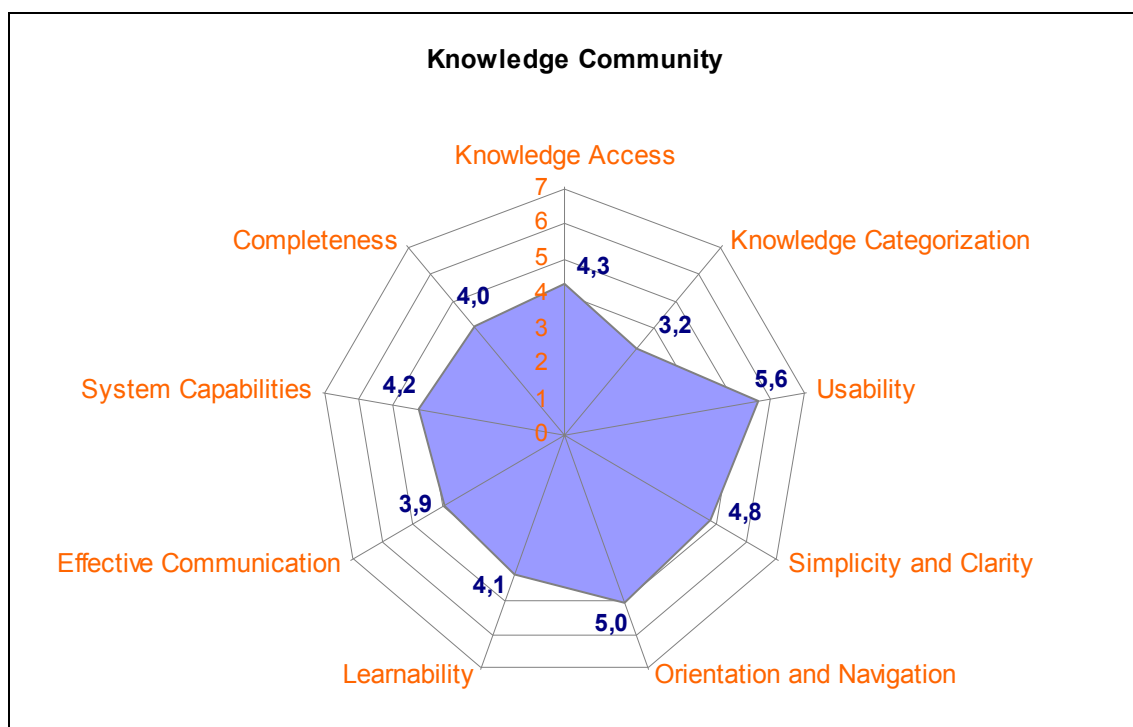

Figure 8: Average rating of Knowledge Community dimensions

3.3 Evaluation of the ACDT Simulation Games

During the user testing phase, 4 of the 5 simulation games generated sufficient feedback out of the 2 pilot rounds conducted between June and December 2007 to assess the proposed solutions. The insights collected were used to drive refinements and extensions of the prototypes on a number of areas including the realism (in terms of believability of the simulated characters and relevance of collaboration scenarios) complexity, and the usability of the software components. The results of the evaluation are summarized in the following paragraphs for EduSynergy, World Team, Eagle Racing and the Intermediary Agent simulations.

3.3.1 EduSynergy

Overall, the simulation was perceived positively for addressing a number of issues/challenges related to collaboration and described as engaging, insightful and valuable.

From a **pedagogical point of view**, the simulation was described as beneficial in terms of professional development in a number of relevant collaboration management issues which exposed players to a number of challenges focusing specifically on resistance, change, power issues, social networks and the strategic management of different stakeholders. Though the simulation is still perfectible in some areas where the dynamics remain insufficiently represented (e.g. clearer connections to collaboration-related topics, such as project management, decision making, and networking), EduSynergy proved to have a positive impact on users' learning experience and was rated particularly high in areas such as effectiveness and clarity (see Figure 9) which shows the learning value of the simulation.

On the **technical side**, the EduSynergy was interactive and complex enough to reach a certain degree of realism, hence making it particularly engaging. Users particularly liked the different forms of resistance to collaboration simulated in the game and the different tactics/initiatives available to manage collaborations. However, as shown in Figure 9, usability lags behind the other evaluation dimensions and can be further improved to make the simulation more user-friendly. Other areas for improvement that were identified include clarity of the user manual and pedagogical material as well as completeness of the pedagogical content to the comprehension of collaboration issues.
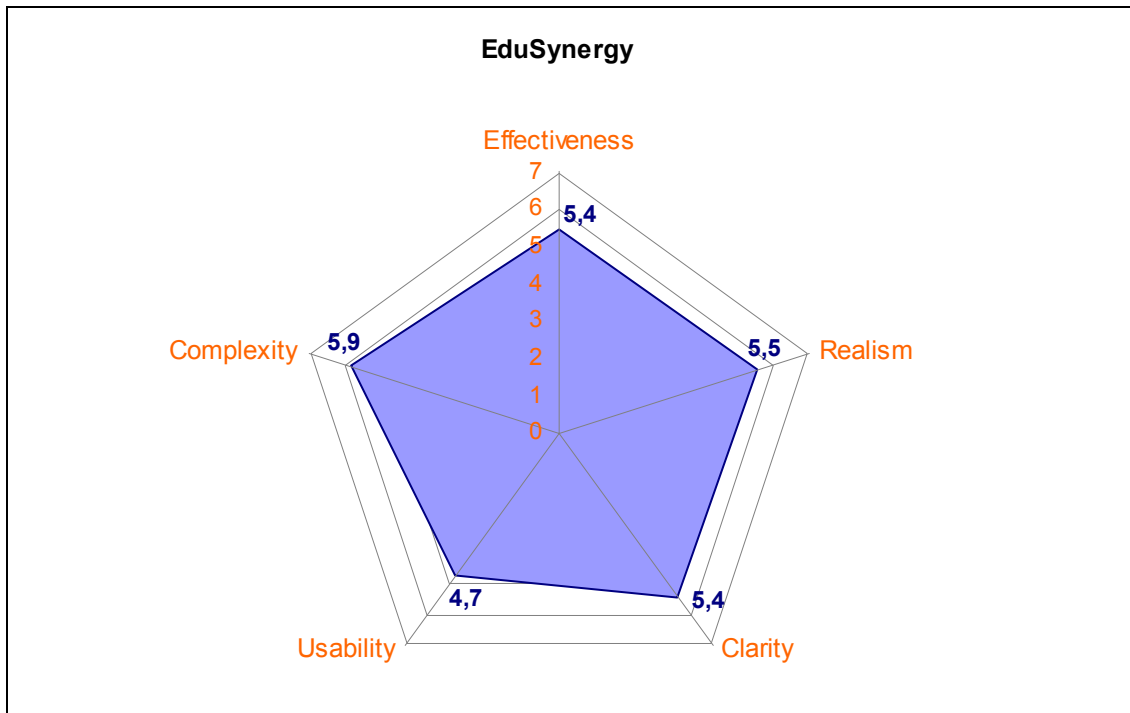
Figure 9 : Average rating of the EduSynergy Simulation

Additionally, an experiment was conducted to measure the impact of EduSynergy on participants' understanding of the dynamics of change and innovation (see Box 1). The results of the assessment concluded by a positive effect of the workshop on participants' learning.

Box 1: The EduSynergy TENCompetence Winter School experiment

The EduSynergy simulation allows people in academic institutions to experience the challenge of introducing collaborative practices and systems in their environment. As the learning objectives of the EduSynergy simulation are to increase participants' understanding of the dynamics of change and innovation, INSEAD launched an experiment to measure the impact of the simulation on the learning process.

Towards this end, two surveys based on the learning objectives of the EduSynergy simulation were developed: a pre-workshop survey and a post-workshop survey. The evaluation setting took place at the TENCompetence Winter School in Innsbruck on February 19, 2008. Participants came from academic institutions and had an interest in personal competence management which made this an ideal setting to test the impact of the simulation.

The results from this study show that nearly all participants agreed or strongly agreed that the workshop increased their understanding of the dynamics of change and innovation in educational institutions. More interestingly, the assessment pointed out that participants' learning of specific issues changed significantly between the pre-workshop and post-workshop survey for 16 of the 47 items tested. Some of the key highlights are as follows:

- Participants agree more that when the Dean is convincing something is the right thing to do, people do it;

- Participants are more likely to agree that people in higher educational institutions do not like to use new technologies;
- Participants are more likely to agree that it is important to be aware of which people socialize outside work and during the day;
- Participants disagree more that secretaries do not have a lot of power;
- Participants disagree more that people like changing their working habits;

The full results of the surveys are provided in Appendix C.

Beyond the numbers, EduSynergy proved to have a positive impact on the learning process of workshop participants.

3.3.2 World Team (GloBank[5], World Tech[6])

In general, the simulation was found particularly instructive for putting from theory into practice a number of collaboration management challenges (within diverse and distributed contexts) and allowing teams and individuals an opportunity to learn how to be flexible in determining strategies.

From a **pedagogical perspective**, the simulation had moderate effects on participants' understanding of team collaboration dynamics though in the case of the World Tech scenario, the game helped users to change their perception of IT project assessments often seen 'from the outside' as being too technical. This moderate impact on users' learning experience is reflected in Figure 10 where the effectiveness and clarity dimensions scored relatively low which makes World Team clearly perfectible in those two areas including the scenario described as difficult to understand and the mission statements perceived as too simple.

On the **technical side**, users reported that the simulation was easy to use and that the interface was quite good. However, as indicated in Figure 10, improvements remain to be done in areas such as realism, usability and complexity to make the simulation more interactive, attractive and engaging. Particular effort should be made to increase the duration and the complexity of the game, foster communication between teams with adapted communication tools, and improve the user and teaching material.

---

5 Alternative scenario of the World Team simulation based on the acquisition strategy of an international bank GLOBank.

6 Alternative scenario of the World Team simulation in which teams of players are given a mission to maximize collaboratively the strategic value and competitiveness of an IT project investment portfolio.
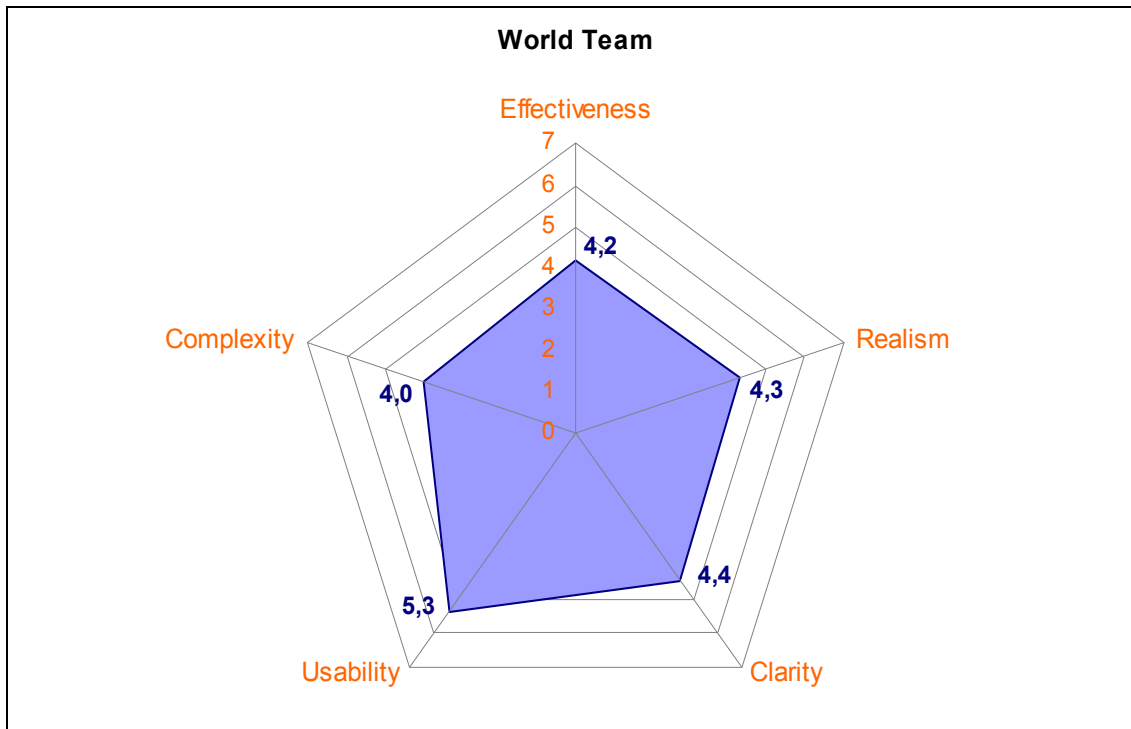
Figure 10: Average rating of the World Team simulation(s)

3.3.3   Eagle Racing

On the whole, participants liked the quality of the simulation with good casting and acting, and the use of interactive technologies such as Think Tank or OptionFinder make Eagle Racing an interesting tool to reflect on collaboration dynamics and decision-making challenges at the team/group level.

With regard to the **learning value**, Eagle Racing had a positive effect on participants and their understanding of collaboration challenges in group decision making processes. This is partly due to the effectiveness of the scenario and the clarity of the mission statement which expose users to a number of collaboration challenges focusing particularly on strategic decision making in a high-risk context, decision biases, cultural conflicts and decision making addressing both the rational and the emotional perspectives. These two aspects are well represented in Figure 11 which shows that Eagle Racing proved to be particularly successful to validate the learning objectives associated with it.

From a **technical point of view**, positive ratings were given to the quality of the video (and believability of the characters), the realism and complexity level of the different dilemmas as well as to the usability of the video cases as reflected in Figure 11 below. Athough particularly complete in all dimensions, improvements remain to be done in some aspects of the simulation to reinforce the learning experience such as enhancing the user manual or adapting the supplementary material that come with the dilemmas (i.e. technical information concerning the car environment in particular when it comes to the technical incidents and engine failures should be more realistic).
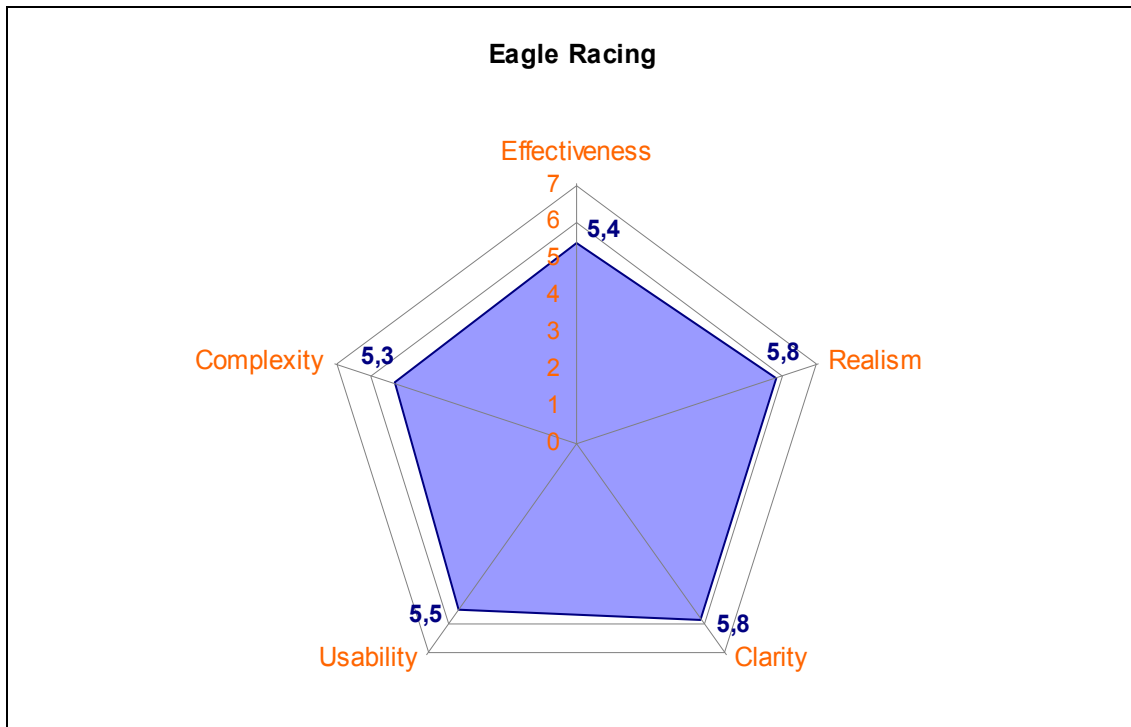
Figure 11: Average rating of the Eagle Racing simulation

3.3.4   Intermediary Agent

In general, participants liked the simulation and found it particularly useful to engage collaboration between "players" (i.e. forcing people to share ideas and choose a common strategy).

In terms of **pedagogical objectives**, the simulation had a positive impact on their understanding of group collaboration and attitudes in interpersonal contexts, and users found it highly effective to experience the role of individual characteristics and the consequences of uncollaborative behaviors at the interpersonal level. Additionally, participants gave a relatively high rating to the clarity of the collaboration scenario presented in the simulation as indicated in Figure 12 below.

With regard to the **technical aspects**, participants appreciated the graphic quality of the agent along with the simple and easy-to-use interface as well as the complexity of the game they described as stimulating and engaging particularly when unexpected events (i.e. collaboration breakdowns) occurred while playing. Although the agent was found particularly effective to stimulate users, a low rating was given to the realism (see Figure 12) of the simulation on aspects related to the tactics available to manage interpersonal collaborations and embedded issues concerning resistance to interpersonal collaboration which do not always fit what happens in reality.
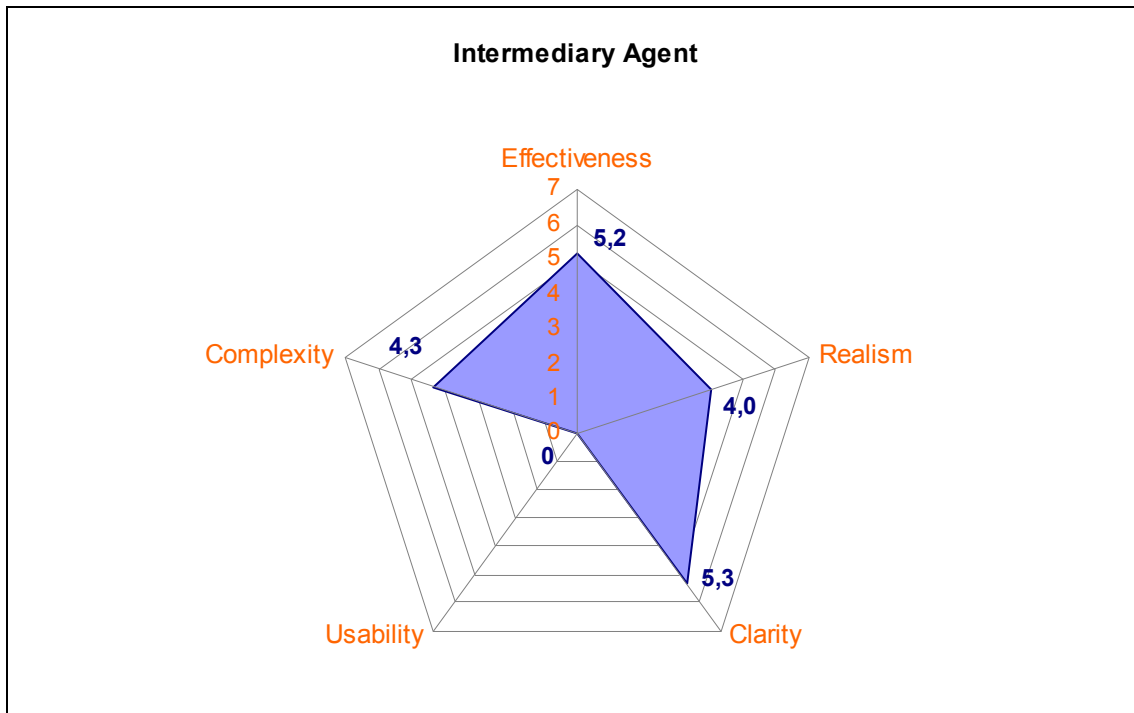
Figure 12[7]: Average rating of the Intermediary Agent simulation

3.3.5 Pit Stop

Insufficient quantitative data were collected to map Pit Stop on the precedent diagrams. However, the qualitative feedback generated out of the pilot runs gave an overall assessment of the 'learning experience' that goes with the simulation. Among them, the workshops held at Ferrari were particularly representative of the results achieved while giving a rare opportunity to test Pit Stop in a high performing environment. Highlights of the workshops are provided in Box 2.

---

7 The data concerning the usability dimension were not available (NA)

Box 2: Pit Stop experience – the Ferrari Case

Pit Stop is designed to provide managers with an intensive one-day workshop experience addressing collaboration dynamics and breakdowns in team contexts in which participants are involved in a variety of activities (from hands-on team experience to a case study addressing group decision making) alternated with reflective feedback exercises in order to identify collaborative practices, both positive and negative, within their organization.

Ferrari's organizational culture is one which operates within a high performance context where innovation and creativity, motivation and skill of staff, collaboration and seamless integration of business, development and manufacturing processes are the key ingredients of company's success making Ferrari the right place to test and evaluate the Pit Stop simulation.

Two workshops led by INSEAD were conducted with a total number of 40 participants (Ferrari managers) in October and November 2006 at Ferrari's headquarters in Maranello, Italy.

From a pedagogical perspective, Pit Stop was revealed to be a successful means to make participants experience a number of collaboration-related dynamics and help them improve their understanding on what are the key ingredients/barriers to team collaborations. In particular, participants were confronted to dynamics such as teamwork, continuous training and improvement, relationship building, stress management, the importance of methodology, and an interplay between both a collaborative (within each team) and competition (with other teams) spirit.

Additionally, Pit Stop served as a good ice breaker and allowed participants to play a more active and creative role in the discussion process while giving them the opportunity to reflect on their own practices, and the ones of Ferrari as a whole, and provide instances within and outside their department where collaboration was perceived as enhancing performance or actually prevented the achievement of set targets. By using Pit Stop as a starting point of reflection, participants identified valuable insights toward improvement.

Taken together, these key ingredients, barriers and other insights into collaborative team practices that emerged during the workshop runs at Ferrari made the Pit Stop simulation a positive learning experience. A video is available at: http://www.fvaweb.it/video/pitstop.html

3.4 Summary of results

The evaluation process showed different degrees of development (maturity levels) for the different outputs, both in terms of learning value and level of completion of the technical solutions.

With regard to the **Knowledge Community**, the tool offers interesting features to document and access a large collection of knowledge, and a robust repository whose design makes the usability of the **Knowledge Base** particularly high and the learning process rather effective in particular domains such as collaboration dynamics. Although the knowledge categorization can still perfected, the XML based architecture of the Knowledge Community provides enough flexibility to adapt the Knowledge Library to any new demands that might arise in the future. Community-wise, the **Virtual Learning**

Community supports synchronous and real-time communication through a Skype function, integrates several features including online forums and team subspaces, and provides different levels of user's categorization and subgroup creation. Although some space for improvements exists, the Virtual Learning Community offers the basic functionalities to create groups of users around areas of interest, exchange knowledge between community members, and facilitate social interactions.

Concerning the **Simulation Games**, a consolidated view of the evaluation results indicates where the prototypes stand to each other (see Figure 13) while providing a comparative assessment of their level of maturity.
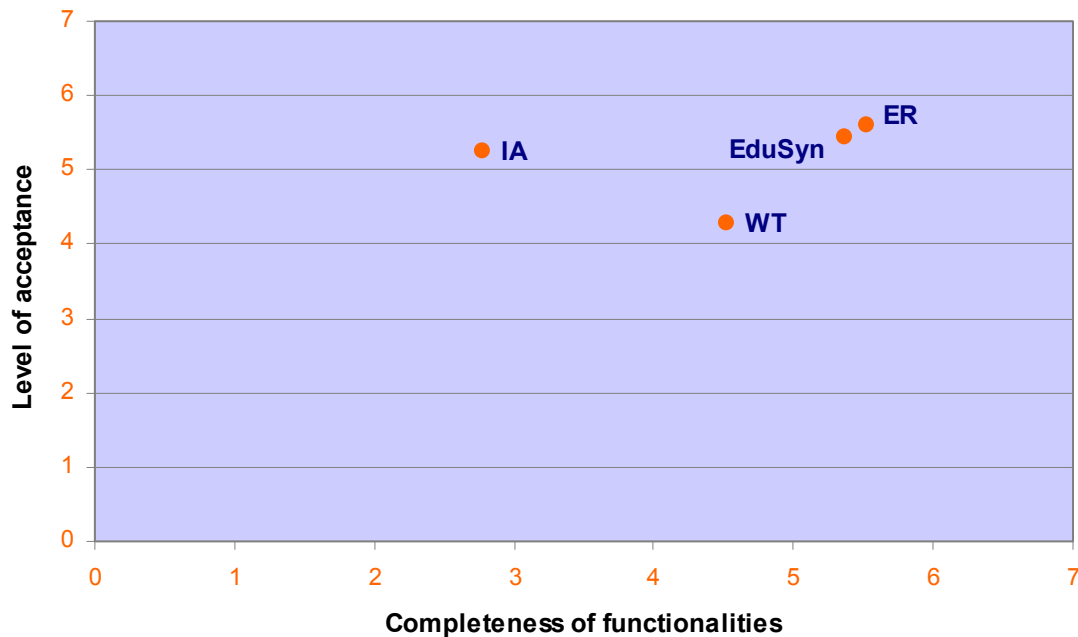
Figure 13: Level of maturity of the L2C Simulations

Legend

EduSyn = EduSynergy
WT = World Team
ER = Eagle Racing
IA = Intermediary Agent

As illustrated in Figure 13 above, **Eagle Racing** clearly stands out by scoring higher than any of the other simulations in each of the two dimensions considered. Particularly attractive with its video based interface and rich in terms of pedagogical contents, Eagle Racing is a simulation easily deployable in a variety of off-line and on-line contexts (via DVDs, on the Web, through existing web platforms, etc) with distributed teams which is innovative in many ways (compared to the majority of simulations addressing collaboration) and complementary to existing/traditional learning approaches.

In the case of **EduSynergy**, which ranks second (see Figure 13), the simulation has demonstrated its high pedagogical potential and learning effectiveness. While some extensions were identified and may be implemented in the future, EduSynergy has some good functionalities that make it a particularly mature solution ready to be deployed in higher educational institutions.

For **World Team**, which comes in at third position as shown in **Error! Reference source not found.**, the simulation has now evolved into a flexible Toolbox that can easily develop (without technical background) a variety of different scenarios and achieve a variety of learning objectives related to collaboration dynamics.

With regard to the **Intermediary Agent**, which is the simulation the least complete as depicted in Figure 13, the prototype has reached a level at which it could undergo the initial user testing that will further determine the evolution of the functionalities to be developed in particular with the intelligent agents.

Finally, concerning **Pit Stop**, which is not represented in Figure 13, the simulation confirmed its learning value and can, in comparison with the other simulations developed, be seen as a 'luxurious' product intended for top managers in organizations (CxOs or Board Teams level). Given the limited target, Pit Stop was not further developed than its current stage.

Chapter 4. Final Packaging and Distribution of the L2C Simulation Workshops

This chapter reports on the dissemination activities that took place in the second year of the project to ensure the continued deployment and diffusion of the different L2C outputs. It provides also an outlook of the final plan for using and disseminating the knowledge that was generated throughout the project.

4.1 Improved L2C Project Website

The project website (http://www.l2c.info/) was greatly improved to increase its attractiveness to the general public. Notably, a new design was introduced and navigation simplified. Furthermore, some sections were reorganized and rewritten to better communicate the project's objectives and outputs. Further plans include provide access to demos of the different simulations as well as video testimonials from participants from different L2C simulation workshops.
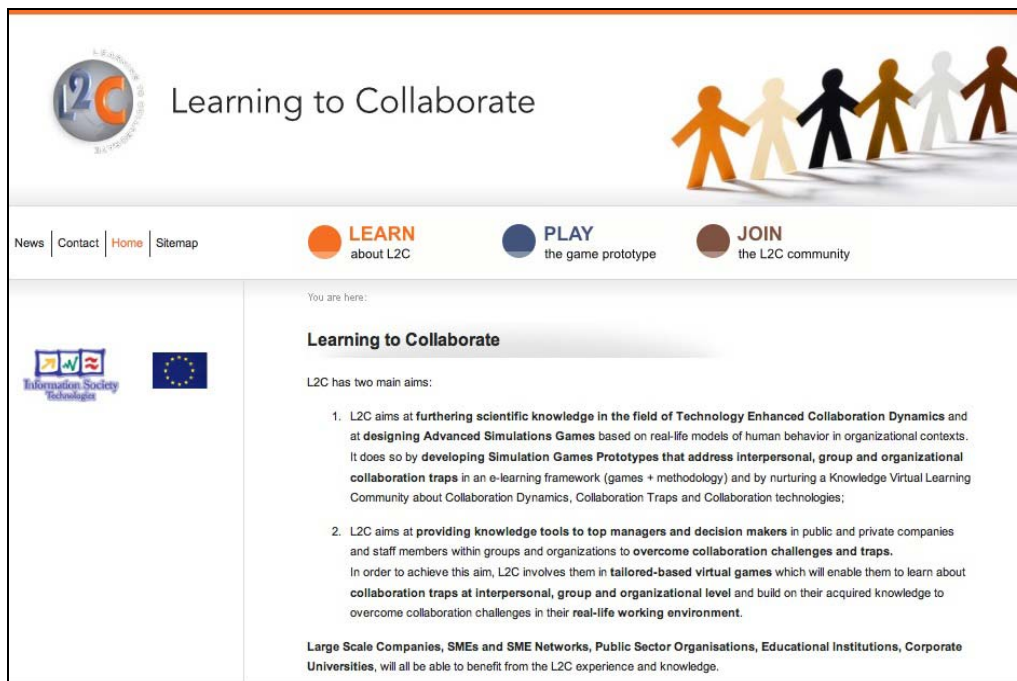
Figure 14: the L2C website

4.2 Dissemination Activities

Dissemination activities consisted of a number of publications, conferences and communication and marketing material such as the L2C video, flyer and brochure (see Deliverable 5.2, Annex A for a full list of activities by each partner).

Furthermore, dissemination also took place through a number of simulation workshops conducted in Pilot Rounds 1 & 2. In total, 906 end users participated in the L2C simulation-based collaboration workshops. These participants are representative of diverse sectors such as higher education, IT, automotive industry, finance and the private sector (see Deliverables 4.1a and b for pilot report).

Notably, the Eagle Racing workshop (http://www.eagleracing.eu/index.htm) in Copenhagen was a huge success, involving 120 participants from a wide range of sectors (trade, industry, telecom, IT, Finance and Consulting) and job functions (top management, HR, OT, Communications, Marketing, Consultant, Sales). This event demonstrated the high deployability (with different group numbers and target users) and flexibility (collocated or distributed) of the simulation, as well as the interest and enthusiasm for simulation-based approaches to learning.

Another highlight is the success of the World Team simulation, whose XML toolkit allows for rapid and easy customization of new scenarios. From the original Globank scenario, four other versions were created by different partner organizations to address their specific teaching needs (see Section 2.3). Again, this simulation has high deployability potential because of its adaptability.

It is intended that, through sessions with end users and documented testimonials from workshop experiences, the L2C workshop may be diffused 'by word of mouth' through the networks of L2C partners.

4.3 Final Packaging and Distribution Strategy

A final packaging and distribution strategy was developed to provide a roadmap for identifying and soliciting potential new markets and users of the L2C Simulation Workshops.

A target segment analysis identified the key attributes of the L2C Simulation package. These include the generic nature of the simulation, adjustability, ease with which to set up and implement the simulations, minimal training required, flexibility and efficiency of use, adaptability to different business contexts and teaching configurations (onsite or distributed), a match between the scenario and real world challenges, pedagogical value generated, and a bridge between formal and informal learning.

Furthermore, a full package has been developed and licensing procedures defined. The full package consists of the simulation software and supporting pedagogical and deployment material. In terms of licensing, a number of options are available from a basic, one time usage license to more advanced licensing packages offering additional support and training for deploying a workshop.

L2C Simulation Workshop Service	

Basic Workshop License	➢ Includes the one-time usage of the edutainment service
	 ➢ Is a Pay-per-use mode
	 ➢ Workshop is designed to last one full-day
	 ➢ Workshop can be delivered :
	      1. at the client's location
	      2. via the internet

Advanced Workshop License	➢ Workshops to be offered in companies in training contexts and corporate events, or integrated in open enrolment workshops offered by intermediaries
	 ➢ Is a Pay-per-use mode
	 ➢ Workshop is designed to last one full-day
	 ➢ Includes the one-time usage of the edutainment service
	 ➢ Service **includes lecture by the Alpha Experiences Instructor** as well as the set up and installation of the software
	 ➢ Workshop can be delivered :
	      1. at the client's location
	      2. via internet
	 ➢ Higher quality of learning experience and impact
	 ➢ Workshop User manual

Annual License	➢ Customers use the Edutainment Services internally
	➢ Can be employable hundreds of time with hundreds of people within the corporation
	➢ **includes "Train-the-Trainer"** session by expert facilitator and material for internal trainers / managers
	➢ Includes L2C simulation software and related material (User manual, Group handouts)
	➢ Right to use the software for unlimited times in internal training sessions during 1 year
	➢ Free access to updates
	➢ 24h Online support for installation, technical and pedagogical questions

Furthermore, a number of diffusion activities have been planned, targeting the corporate (large companies, vocational training centers, SMEs and Public Organizations) and educational (business universities) sectors.

Concerning **EduSynergy**, our plan is to support its wide diffusion in the Higher Education sector. We are going to switch hundreds of users from Higher Education (Universities, schools, educational administration and decision makers) currently from the UK through the JISC diffusion channels but also in Holland, Belgium, Switzerland and Germany. We are also considering language versions.

Concerning **EagleRacing**, AlphaLabs has contributed to the Launch Event in Copenhagen with more than a hundred top-managers and decision makers and is getting ready for the commercial diffusion of a professional version of the Prototype. Furthermore, Eagle Racing has been targeted for a selected numbers of organizations outside the Consortium Partners (e.g. IKEA, Clifford Chance, Comau, Finmeccanica, Scottish Govermnent). All of these organizations are interested in running L2C workshops between March-June 2008.

Concerning **WorldTeam** and all its variations, we are now able to provide a solid platform for the deployment of these simulations and their future developments to mature products in collaboration with INSEAD, ALBA, SU and OU.

Concerning the **PitStop** Simulation, we plan to support the development of a more easily deployable version in collaboration with FIAT/Alfa Romeo partners and INSEAD.

Concerning the **Intermediary Agent** prototype, the components developed by AlphaLabs (the Agent User Interface and the integration of agents and the module of integrating these agents into simulations) are now solid software components to be deployed within different simulations and research projects (e.g. an agent-enhanced User Interface for AlphaLabs simulations like the widely diffused EIS Simulation and the development of special User Interfaces for simulations used at the school children level).

Further diffusion will be achieved through the involvement of AlphaLabs in new projects including the European Commission project L4S (Learning for Security).

For a more detailed description of the distribution and diffusion strategy, please refer to Deliverable 5.3.

Chapter 5.   Conclusions

This chapter provides an overview of the 'lessons learned' during L2C from both the facilitators' and participants' perspective. It gives also additional details concerning a number of activities that are still ongoing since mid-February including the latest developments of some of the simulations.

5.1 Lessons learned

The L2C project has shown that using technology-enhanced learning solutions based on advanced organizational simulation games has a positive impact on the learning effectiveness and users' understanding of the dynamics of collaboration dynamics.

This section highlights a number of lessons learned from the workshops' experiences that took place throughout the project and suggests guiding principles that might be applied to other simulation runs in the future.

- **Increasing diversity in teams**

Diversity is an essential component of the learning process and particularly important to generate debates and contradictory discussions among participants in a team. Efforts should be made to mix people with different professional background and possibly culture to get the maximum benefit out of the simulation workshops.

- **Stimulating doubt within the teams**

As there are no good or bad answers in the simulations, there is always a place for doubt when it comes to take decisions. Part of the learning process implies that participants are confronted to scenarios that challenge their beliefs and assumptions in their decision making process and as such the uncertainty dimension of it which should be stimulated throughout the workshop.

- **Putting a stronger focus on learning targets**

Learning objectives should be clearly identified and communicated when preparing a simulation workshop. A set of specific questions should be prepared to orientate groups' work and facilitate users' systematic reflection on their own experience during the simulation.

- **Preparing handouts for participants**

The learning happens both inside and outside the simulation workshop. For this reason, handouts of the facilitator's presentation (e.g. power point presentation, a copy or summary of the collaboration patterns, team traps, etc) should be given to the participants at the end of the workshop to help them think retrospectively about their learning experience.

- **Increasing time for debriefing**

The debriefing session is the ultimate conclusion of the simulation workshop where participants are given the opportunity to reflect on their experience after the game ended. As such, the time devoted to this exercise should be long enough to review

each participant's impression and discuss any learning points behind the entertainment the simulation provides.

- **Presenting the best solution in the simulation**

Although there is not one but a multitude of solutions in the simulation, there is always one scenario which is preferred among the others. By presenting the best possible solution in the game (i.e. best decision making) to participants, they can assess their own performance and discuss further their results and the reasons of their decision making.

Additionally, a retrospective analysis of the L2C partner organizations about their participation can give another perspective of the knowledge and experience drawn out from the project. For instance, in the case of the Austrian Research Institute for Artificial Intelligence (OFAI), the L2C project has been extremely rewarding and rich in terms of learning as highlighted in Box 3.

Box 3. Highlight of the OFAI experience

L2C has been a prime example of output-oriented collaboration. For OFAI, it has offered an intensive and, if anything, all too short-lived opportunity to engage in a broad range of multi-disciplinary activities (as reflecting OFAI's profile), including not only work on theory, engineering, and deployment of technologies related to product development, but also awareness and understanding of the realities in the management and learner communities as represented in the consortium. Solid personal contacts could be established to peers, poised to outlast the duration of the project.

In L2C it has further been demonstrated how work driven by continuous improvement of artifacts/products is a powerful catalyst for the establishing and development of real working ties across disciplinary barriers. As discussed and illustrated e.g. in (Clancey 2000[8]), the availability of shared references (the knowledge base and its content, the different simulation games, individual technological and pedagogical components) grounds discussions about subjectively perceived properties, deficiencies, and potentials, and thereby enables implicit transfer of insights and construction of reliable joint understanding and know-how. This is key to enabling partners to bring in most of their potential.

Furthermore, L2C demonstrated the significant boosting potential, and indeed the very necessity, of integration of advanced information technologies to obtain sustainable results. It showed how there is a more widespread awareness and pick-up of the possibilities of more loosely _syntax-based_(XML-based) interoperability. At the same time, it also disclosed that similar appreciation of the implications of employment of more advanced _semantic_ (e.g., XML-Schema and process-grounded ontologies) technologies currently still poses more of a challenge. But even in this regard, progress made and insights gained cannot be termed less than a success, especially in the light of the very dense overall work programme.

The competences and knowledge assets acquired by OFAI in this project have already led to tangible follow-up results as detailed in the activity report. This fully

---

[8] Clancey W.J. (2000) Modeling the Perceptual Component of Conceptual Learning: A Coordination Perspective, Cognition, Education, and Communication Technology Symposium, Stockholm, April 2000, Lund University Cognitive Science.

justifies a classification of L2C among the more rewarding R&D exercises.

Experiences vary from one partner to another according to the nature of their work and the perception of the project structure and outcomes. Interestingly, these different experiences show how the L2C project was perceived at partner, organization and individual level as described in Box 4 which highlights the experience of Università Cattolica Milano (UCSC) as an example.

Box 4. Highlight of Università Cattolica Milano's experience

Focus on the L2C internal processes

- Understand and learn how to collaborate and implement collaborative practices in complex international contexts, such as the ones of the L2C consortium. This means acting in order to best manage requests and breakdowns in a context characterized by cultural diversity, long distance interaction and distributed knowledge sources among a big group of partner organizations (13 EU partners).

- Understand how to best coordinate efforts to reach the project objectives and final goals. Understand also that the collaborative process is a continuous one, that commitment has to be high in all the project steps and that "missing a piece" could negatively affect the final outcome.

- Being perceived as effective collaborators who, thanks to the coordinated efforts, integration and strong collective identity created during these two years, have been capable of sustaining innovation processes.

- Learn from partners who have different objectives (i.e. because they are industrial or academic partners) and learn from a multidisciplinary but integrated perspective. Understand that reaching an integrated collaborative perspective does not simply mean to sum up the knowledge domains/contents but implies a mutual learning and comprehension of "what others are talking about", on one side, and providing clear contents to the other partners, on the other side. Only if there is a common understanding collaboration can take off and reach its aims.

Focus on the L2C outputs

- Focusing on the relationship with students, shortening the gap with them is key. They often complain because of the too theoretical approach used during the courses. With the use of simulation games, we reached an effective participation, also with students who usually are not really involved or do not actively participate in the lessons.

- Have fun while teaching a complex issue such as the one of collaboration. The professor is more motivated not just because of the greater number of actively involved students, but also because it is easier to transfer contents than just using words which could not effectively be perceived. In addition to this, giving a result on participants' collaborative behaviors immediately after experiencing the game gives them a tangible output that they will remember probably more than theories and models. Additionally, this experience will better help them understanding the complexity of personal collaborative behaviors and perhaps how to best deal with them and manage them (i.e. "know yourself" paradigm).

5.2 On-going activities

Since February 15th, a number of activities are ongoing in particular those concerning the World Team simulation and its Food Alliance scenario. The Open University and Strathclyde team have continued to develop this scenario plus supporting material for both facilitators and users. This work has been led by Strathclyde and has involved:

- Preparing a list of further refinements to the scenario for the INSEAD simulation developers based on the feedback from the earlier pilots concerning technical issues.

- Finalizing the Food Alliance promotional leaflet.

- Discussing the potential use of the Food Alliance including a demonstration with colleagues developing/teaching:

  1. New undergraduate courses covering the complex business environment and management of change.
  2. A postgraduate MBA elective in Managing Inter-organizational Partnerships and Alliances.

- Explanation of the Food Alliance Simulation to part-time MBA students taking the elective to get their thoughts on its deployment.

- Further refinement of the list of requirements in light of the above discussions.

- Discussion with the developers concerning the reasons for individual requests in the list of further requirements and alternative ways to make the simulation more widely deployable.

- Piloting and the discussions revealed a need to rethink how facilitators might deploy the simulation in light of the time and number of players available to them which has led to further development of the facilitator and user material including:

  - A section in the facilitator manual to suggest ways to play the game with less players or teams.
  - Further individual player briefings developed in order that more players can be accommodated within the current 6 teams.
  - Subject to the developers being able to give the facilitator the ability to introduce extra teams briefings for those extra teams are being developed.
  - The section in the facilitator manual on how to use the simulation is being developed to suggest how it might be deployed given different time frames for the learning experience.
  - A list of external events that the facilitator could introduce to the scenario in order to increase the complexity or the unexpected events that the players have to deal with are being prepared.

- A range of debriefing slides on themes from the Theory of Collaborative Advantage beyond the Aims one on which the scenario was based, e.g. trust, power, will be prepared so that a facilitator can pick up some of the other insights that may arise from a group's experience of the simulation.

Appendix A   Eagle Racing Progress Report

During the period January – March 2008, the EagleRacing Simulation has been deployed in one of the most important INSEAD Programmes (IEP) as an online experience.

This Appendix includes:

Part 1: Slides used in IEP to introduce the simulation: Initial Session Slides

Part 2: Slides related to the Final Session Slides (conducted via videoconferencing)

Part 3: The **first Video Episode** of EagleRacing (**Video and Handouts**) accessed by the participants online: http://www.calt.insead.edu/eis/ERv3/ER.php (use password "IEP").

Part 4: Example of **EagleRacing Team Report** at: Report Team 1

This experience has been evaluated as very positive by the Participants as well as the Programme Director (see email in **Part 5**).

This IEP experience provides solid evidence that simulations like EagleRacing can be successfully deployed even in the context of the most demanding Management Education courses like the ones offered at INSEAD.

Part 1

The full file with the Initial Session Slides are accessible as a pdf file at:
http://www.calt.insead.edu/eis/eagleracing/EagleRacingSimulationOverview.pdf

The Process

➤**Videos (accessible on the Web) addressing Collaboration Dilemmas**

➤**Weekly Episodes** developing over time as a function of previous decisions

➤**Online Exchanges** via Email and Webpages (for Video viewing)

➤**Debriefing** /Reflection

Part 2

The full Debriefing Session Slides are accessible as a mht file (opening in a browser) at:
http://www.calt.insead.edu/eis/eagleracing/IEP08/EagleRacingIEP0308Debrief.mht

15:00 – 15:20	Introduction and Brief Initial Feedback
15:20 – 16:00	• Final Episode (in Teams) • Teams' Insights (in Teams, using ThinkTank)
16:00 – 16:30	In-depth Debriefing (Part 1) • Discussion of Final Episodes • Discussion of Teams' Insights
16:30 – 17:00	Coffee Break
17:00 – 18:15	In-depth Debriefing (Part 2) • Inside Collaboration Dilemma 1 • Inside Collaboration Dilemma 2 • Inside Collaboration Dilemma 3 • Inside Collaboration Dilemma 4 • Distributed Teams & Collaboration Technologies
18:15 – 18:30	Participants Insights on the Simulation Experience (in Teams, using ThinkTank)

Part 3

The **Video Episodes** of EagleRacing (**Video and Handouts**) were accessed by the participants online through webpages like: http://www.calt.insead.edu/eis/ERv3/ER.php (use password "IEP").

Part 4

An example of the Team Reports produced at the end of the Simulation is accessible as a pdf file at: http://www.calt.insead.edu/eis/eagleracing/IEP08/EagleRacingReportTeam1.pdf

Simulation Report
Team 1
IEP 2008
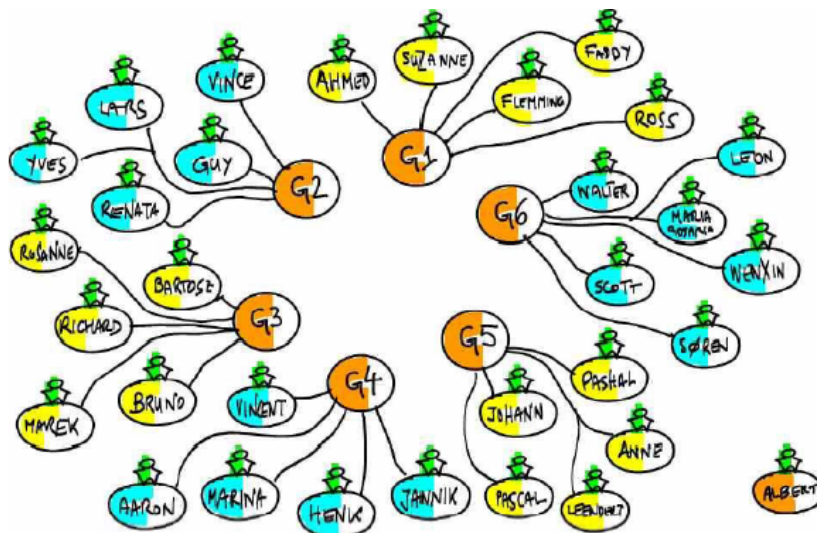
1. Collaboration Dilemma 1: Goodbridge or Bauer?
2. Collaboration Dilemma 2: Racing or Not Racing?
3. Collaboration Dilemma 2&3: Racing or Not Racing + Collaboratively or Individually?
4. Collaboration Dilemma 4: Diplomacy or Transparency?
5. Collaboration Dilemmas Overview
6. Collaboration 2.0: Beyond Email
7. References & Follow-Up Readings

Warning: In sections containing email exchanges, the most recent emails are included first. You might prefer to read such sections "backwards".

Prepared by AAAngehrn/INSEAD   *1*

Part 5

The view of Prof. Michael Pick, Director of the INSEAD IEP Programme:

From: PICH Michael
Sent: Wednesday, March 19, 2008 1:33 AM
To: ANGEHRN Albert; DYAS Gareth; BOULOS Fares; CHILINGERIA Jon; ANGELMAR Reinhard
Cc: ALMSTEAD-TREFFEL Susan
Subject: RE: [CSPs] Proposal for EagleRacing: An Online Management Simulation Experience

Dear Colleagues;

I just wanted to add my two cents worth. Having seen this from the standpoint of a PD (Programme Director), I would say that this was seen by the participants as **very innovative** and **engaging**. We sprung this on them at the last minute without any warning, but they became **immediately engaged** once they saw the "story" being developed in the video. Having seen many of the email exchanges, I can tell you that **they were passionate about their positions** and about the **effect of the group decisions** on the over development of the story.

I have decided to **add on more session** to the debriefing for my next IEP, which was not an easy thing to do. However, I felt the **value-add from this to be high**, especially in terms of **innovation** and **"new" technologies for communication**, **team building** and **on-line communities**: all hot topics for this group.

I highly recommend it.

Best regards,

Mike

Appendix B   Behind the aSAP Simulation

Behind the aSAP Simulation

Albert A. Angehrn, Alicia Cheak and Pradeep Mittal

INSEAD Centre for Advanced Learning Technologies (CALT)
March 2008

Abstract

In this document we (1) briefly describe the objectives and deployment contexts of the aSAP Simulation, a computer-based management simulation addressing collaboration dynamics in distributed teams, to then describe its underlying (2) conceptual basis, and (3) design principles, to then focus on a discussion of the (4) aSAP Simulation key features, describing for each one how these features aim at generating effective learning in the involved group of managers or professionals (achievement of learning objectives), in a way which is perceived as playful (pleasant/motivating) as well as efficient. In our last section, we describe how the (5) XML-based architecture of the aSAP Simulation enables the flexible parameterization of most of its components, to help instructors rapidly create new versions and customize the simulation-based learning experience to the specific needs and focus of the involved group.

This is a Working Paper and subject to many revisions and extensions.

Table of Contents

1. The aSAP Simulation: A Brief Description

The aSAP Simulation is a simulation-based learning experience developed in the context of the L2C Project[9]. It is one of five World Team simulations[10] designed for a facilitated group of participants interested in extending their understanding of team collaboration in diverse and distributed contexts. The aSAP Simulation involves six teams working together to create an Innovation Plan for a high-level collaboration system for business enterprises. Placed in a situation where differences exist and communication opportunities are minimized, these teams will have to confront a number of collaborative challenges and breakdowns. In order to help participants derive meaningful insights from the simulation, a targeted debriefing session following the game aims at creating meaningful links between team collaboration challenges encountered to participants' own experiences.

The different learning points that may be addressed by the aSAP Simulation are:

- Experience the challenge of trying to achieve shared objectives in a diverse and distributed situation.
- Experience the challenge of trying to maintain attention, motivation and participation among teams in a diverse and distributed situation.
- Experience the challenge of building and developing trust among teams in a diverse and distributed situation.
- Experience how an initially collaborative endeavour can quickly deteriorate into a non-collaborative environment, with teams displaying a variety of negative, counter-productive behaviors (e.g. misattributions, distrust, competitive stances, frustration, etc).
- Respond effectively to ongoing and unexpected, external pressures and events that can occur during the collaborative experience.
- Understand the different types of collaboration technologies, especially Web 2.0 tools, currently available to support distributed collaborations.

The aSAP Simulation is usually deployed as a half day workshop composed of an introduction, the simulation run and a debriefing session. The simulation may also be played by teams over the internet. In this case, a good collaboration system is needed to ensure effective group debriefing.

---

[9] L2C - Learning to Collaborate - is an EC co-sponsored research project addressing the design of effective immersive simulation-based learning experiences supporting the development of collaboration competencies at the individual, team and organizational levels. For more information: http://www.l2c.info/, or Angehrn (2006) and Angehrn & Nabeth 2006).

[10] The World Team Simulation was developed in the context of the L2C Project, addressing collaboration challenges at the team level and having the particularity of currently existing in five versions: GloBank, World Tech, Food Alliance, Knowledge Fusion and aSAP.

#	Innovation Project	Type	Risk	Cost (K)	ROI	Alignment	Sponsor	Details
1	Shared work & discussion spaces	COLL	L	15	5	5	COO	Profile
2	Shared calendars	KM	L	10	3	5	COO	Profile
3	Advanced search functionalities	KM	H	75	15	9	VP Sales	Profile
4	Collaborative drawing	COLL	M	20	3	6	CEO	Profile
5	Collaborative authoring	COLL	L	15	5	8	VP Sales	Profile
6	Social bookmarking	KM	L	10	4	8	CEO	Profile
7	Group decision making technology	COLL	H	90	15	7	VP Sales	Profile
8	Mobile technologies	COM	H	10	4	3	COO	Profile
9								
10	RSS aggregator	KM	M	20	5	7	COO	Profile
11	Rating and recommendation systems	COLL	M	75	10	9	VP Marketing	Profile
12	Advanced email system	COM	L	35	10	7	COO	Profile
13								
14	Blog, comments & trackbacks	COM	L	25	5	7	CEO	Profile
15	Online video/media sharing	COM	M	30	5	6	VP Marketing	Profile

Innovation Projects Not To be Implemented

#								
16								
17								
18								

Your Innovation Projects

#	Innovation Project	Type	Risk	Cost (K)	ROI	Alignment	Sponsor	Details
1	Social bookmarking	KM	L	10	4	8	CEO	Profile
2	Advanced search functionalities	KM	H	75	15	9	VP Sales	Profile
3	Views on data, Smart folders	KM	M	50	10	8	VP Marketing	Profile

2. The Knowledge Base Underlying the aSAP Simulation

The aSAP Simulation was designed specifically to address the challenges of collaboration in diverse and distributed contexts. This section presents the underlying knowledge base, which was used to design the mission, scenario, challenges and features within the simulation.

The Challenges of Distributed Collaboration

In today's work environment, new forms of collaborations have resulted in changes in the conditions under which groups work. Organizations now increasingly support highly distributed and cross organizational-spanning collaborations through a variety of media and technologies. Furthermore, advances in information and communication technologies (ICT) have lead to the emergence of virtual teams. These teams are distributed project groups comprised of individuals or teams from different organizations working on mostly short-term projects, and whose primary form of communication is technology-mediated rather than face-to-face interactions.

Hence, adopting traditional team dynamics management processes to such teams has clear limits in terms of sustaining critical factors such the flow and integration of knowledge between partners, the development of shared understanding, the management of diverse partners and separate interests, and the development and maintenance of trust.

2.1.1   Managing the knowledge integration process

The successful outcome of a large number of collaborative projects depends on the efficient management of the knowledge-related processes. These processes include:

Conceptual phase (Problem definition, analysis of knowledge inventory, trial of problem solving with existing means): In this phase it is efficient to start with the compilation and analysis of a "knowledge inventory" because of the risk of "reinventing the wheel". Then, the knowledge-related goals are defined and the problem to be solved is preliminary identified.

Search for knowledge and for people who possess this knowledge in one (presented problems) or more (discovered problems) domains: Here, people look for relevant ideas in data banks, newspapers etc., or ask other people to deliver ideas or at least relevant referrals.

Approaching documents and contacting personal knowledge sources. Important breakdowns deal first with the social skills of the knowledge seeker. Related problems have also to do with the willingness of the giver to spend time explaining the receiver the knowledge: people are more willing to ask questions of others whom they know, than of strangers (Allen, 1971). In many cases, potential knowledge givers are so busy that they don't return calls or answer emails sent by people they don't know (Kelley & Caplan, 1994).

Translation and transfer of knowledge from outside (external domains): This process may be very collaborative: The giver and the receiver collaborate to translate the ideas from the language of the giver's "thought world" into the language, which is used in the receiver's domain. Here, the "translation ability" (Fliaster, 2000) of both receiver and giver is of crucial importance. The receiver (boundary spanning individual) must be able to understand the languages and conceptual frameworks of individuals outside his unit (Tushman & Scanlan, 1981), and on the other hand, to transfer knowledge successfully across a boundary, the source has to frame what he or she knows in a language that the recipient can understand. When the source does not or cannot frame knowledge in a language that the recipient can understand, comprehending that knowledge can be difficult and therefore costly for the recipient (Reagans & McEvily, 2003).

Knowledge sharing among members of the group: Before starting knowledge integration, members of the group can make explicit knowledge they imported from other domains available to each other to develop a common understanding of what must be integrated or taken into account.

Creation of new knowledge through new combinations (knowledge fusion) as well as its further development, refinement and modifications: In this phase new knowledge is created and where "creative frustration" (Sapp, 1992) frequently takes place before illumination, or insight, happens. In many cases, knowledge sharing, transfer and creation are intertwined.

Within these processes, a number of factors come into play for facilitating transfer and transformation of knowledge: diversity, creativity and the role of strong and weak ties.

An important driver for the emergence of knowledge management boundaries is **diversity** between the collaboration partners. Diversity in the form of expert knowledge is critical for the knowledge fusion process while too much diversity on values creates conflicts and is not conducive for the connectivity and cohesion of the collaborative system. Jehn et al. (1999) investigate three different kinds of diversity: social category diversity, value diversity and informational diversity. Their findings show that informational diversity positively influences group performance while social diversity positively influences group member morale and value diversity decreases satisfaction, intent to remain, and commitment to the group.

Yet another critical phenomena is the **creative process**. The classical model of the creative process, which explains the generation of novel and useful ideas was first suggested in 1926 by Walles. This model, which continues to serve as the basis for understanding the creative process includes the following four stages (see as an example Shapero, 1985 and for an overview Lubart, 2000): Preparation, incubation, illumination, and verification. An additional important stage puts highlights the possible breakdowns: Many researchers have suggested that a phase of frustration occurs between incubation and the moment of illumination. According to Lubart (2000), a person may become blocked or fail to find creative ideas during incubation. At this point of frustration one can either start over and fall into the same traps (denial), accept a stagnation and frustration or accept a less-than-optimal solution (rationalization), or push ahead, exploiting further alternatives or moving in a new direction, perhaps reconceptualizing the problem (Sapp, 1992). Thus, the "point of creative frustration" (Sapp, 1992) involves making a decision on how to deal with difficulties encountered during problem solving.

In addition, there is an important connection between the kind of knowledge which has to be searched and transferred (tacit vs. explicit) and the kind of **social ties** between the persons who participate on the search and transfer process. Empirical research shows, for instance, that weak and strong ties have their respective strengths and weaknesses in facilitating search for and transfer of useful knowledge across organization subunits (Hansen, 1999). In particular, weak ties facilitate search but impede the transfer of complex (mostly tacit) knowledge (Hansen, 1999). Transfer of tacit knowledge requires rather strong ties, frequent communications between the participants, and so-called "high-context-communication"- one in which most of the information is either in the physical context or internalized in the person, while very little is in the coded, explicit, transmitted part of the message (Hall, 1977; Hall & Hall, 1990). To put it differently, high-context-communication in strong ties takes place when "when one person looks at another and says, "ah," and other guy says, "un," and that's all they need to understand each other." (Takeuchi, 1996).

Implications for the aSAP Simulation: The flow and transfer of knowledge among different entities become even more challenging when teams and partners are distributed. Technologies become a necessary means to bridge communication and collaboration needs; however, these tools have limitations, especially for high context communication and the transfer of tacit knowledge. The aSAP simulation is designed to magnify these challenges, by removing communication channels, and forcing participants to deal with the frustration of collaborating in the presence of diversity (informational diversity in the form of different teams operating under different guidelines) and in the absence of adequate communication channels (in the form of limited or no communication between teams). Facilitators can also intentionally introduce diversity (social and value diversity) by creating diverse teams such as six teams, each from a

different department/division/level, or put individuals who normally have little contact or experience in the same team, etc.

2.1.2   The complex process of collaborative goal setting

A goal is the object or the aim of an action a person or team wants to realize. Having goals motivate people, both individually and as team members, focuses attention (directs attention towards what is relevant and important both for individuals and for individuals as part of a group), regulates individual effort (the level of individual effort is proportional to goal difficulty), increases persistence (or the effort expanded for the execution of a long term task) and provides incentives to define a strategy to reach objectives and fulfill action plans. Productivity, satisfaction and motivation tend to be higher when the group is able to commonly arrive at an agreement on a challenging goal. Moreover the accomplishment of joint goals leads to a reduction of anxiety, a progressive movement to progressively higher objectives, an increment of capabilities, and growing collective effectiveness (Bandura, 1997).

One of the common assumptions about successful collaborations is that common aims/goals need to be agreed before collaboration makes progress. Huxham and Vangen (2005) argue that getting agreement is difficult in practice and is actually in tension with the fact that collaboration is generally based on bringing together organizations or partners which are different to leverage advantage from those differences. They therefore make the case for aims in collaborations being a complex mix of aims related to the collaboration, the members' own organizations and the individuals themselves, as presented in the following table.

Dimensions	Types		
Ownership	The Collaboration	• The Organization(s)	The Individual(s)
Origin	External Stakeholders	Members	•
Authenticity	Genuine	Pseudo	•
Relevance	Collaboration Dependent	Collaboration Independent	
Content	Collaborative Process	• Substantive Purpose	
Overtness	• Explicit	Unstated	Hidden

In practice different collaborative partners will have different *perceptions of the aims* which will themselves change over time as the collaboration develops. The distinction between the collaboration aims and the aims of the member organizations is the difference between the declared purpose of the collaboration and what each member organization hopes to get from the collaboration with respect to its own purpose(s).

Depending on the type of collaboration the organizations' aims can be subordinate, i.e. collaboration aims 'dictate their aspirations in its sphere of influence' (Huxham and Vangen, 2005), or superordinate, i.e. organizational aims 'dictate what the members are prepared to sign up to collaboratively' (Huxham and Vangen, 2005) to the aims of the collaboration but the potential is there for the adaptation of aims, both of the collaboration and the member organizations, because of the influence of the other parties. There can be an aspect of representatives trying, consciously or otherwise, to include related aims of their organization into the collaboration agenda.

These aims and those of the individuals concerned are all internal to the collaboration but a similar picture of potentially contradictory aims can also be painted with respect to parties external to the collaboration. External aims can arise either because the collaboration itself is mandated, e.g. by government or formed due to pressure from external groups, or because an individual stakeholder has a strong interest in the work of the collaboration, e.g. partnership or

alliance managers. When there is external pressure it is possible that the espoused aims of the collaboration could be categorized as "pseudo-aims" if for instance they are included in order to meet the requirements of funding bodies. This tactic may be seen as legitimate and normal "business" practice by the organizations involved.

The distinction between genuine and pseudo-aims may also apply internally in a collaboration and can be one element used to analyze and distinguish between aims in complex collaborative situations. A further distinction concerns the content of aims; some may be concerned with substantive issues and others with processes such as relationship building or, indeed, destroying the collaboration in terms of sabotage from within.

In terms of managing aims, partners negotiate them in respect of what they believe their organization's aims are and also their own personal aims. In negotiating the collaboration's purpose, Eden and Huxham (2001) argue that there will be cycles of discussion concerning the purpose(s) of the collaboration with the originally stated purpose(s) being challenged and supplemented by different purposes. The later purposes may not contradict the earlier ones but may in fact be complementary to the original ones. They conceptualized the process as occurring as episodes that were triggered by a tension in the group caused by conflicting aims.

The episodes identified are categorized as follows:

- **Cohesive group episodes**: Characterized by agreement to collective action which the participants are conscious would not be regarded as legitimate by their own organizations, perhaps due to disinterest.

- **Disinterested organization episodes**: A situation in which <u>one</u> of the organizations concerned is not interested in the proposed activity and would therefore not be expected to support it but their representative(s) does. This may be because the representative thinks their organization should be interested and hopes to change their organization's aims through the collaboration. Potentially a risky strategy for that individual.

- **Outlying individual episodes:** Again triggered by the desire of an individual for an activity to take place that might not be of interest to their organization but in this case the activity would not be of interest to any of the organizations involved. It might be of interest to the other individuals around the table at a personal level. This type of episode if the activity is not of interest to the other individuals may be characterized by acrimonious discussion aimed at reinforcing boundaries.

- **Spying organization episodes:** These tend to occur when a partner to the collaboration has no real interest in the aims of the collaboration but has in fact joined in order to gain information that is of interest to their organization. The organization's representative is likely to be low key in their involvement in the collaboration. If their behavior is noticed there is likely to be a negative reaction from the rest of the group.

- **Vetoing individual or vetoing organization episodes:** In this situation there is a strong, often emotional, negative response to a proposal. This could be expressed via body language rather than verbally and may run over a series of meetings. At an extreme it could lead to the end of the collaboration. Reactions to this can be influenced by whether the other participants believe the veto is that of the individual or representative of their organization's position.

- **Threatened organization episodes:** This can also be an attempt to veto a proposal but from the standpoint that it is one of a series of proposals that encroach on the organization's territory. It is arguably more strategic and rational than the previous episode and indeed the reason for the organization being involved in the collaboration is that they are perceived to be in competition with each other. The threatened organization hopes to deflect the activity of the collaboration away from its own area but, if not, wants to ensure that it is part of any success particularly where that success might mean the end of the organization normal source of

funding e.g. charities. This could be seen to be a more active version of spying organization episodes.

- **Outlying organization episodes:** Another type which could be linked to the spying organization episode occurs when an organization, through its representative, tries to pursue unstated aims that are out of line with the collaboration. Like the threatened organization episode it is active as the intention is to achieve action and this can consume both time and energy. Reactions to this type of episode can depend on the overall importance of the organization to the collaboration and could range from tolerance of this episode to get buy-in from others to heated discussion designed to reaffirm boundaries.

- **Powerful organization and pragmatic group episodes:** A form of coercion resulting from a power imbalance in the collaboration e.g. due to resources this episode is when a powerful organization succeeds in moving the agenda to its own aims and the group, being conscious of the power issues, allow this. The organization's representative may be able to use the power to further their own agenda but may also themselves be constrained by the power wielded by their organization.

- **Skeptical group or skeptical individual episodes:** Characterized by a general lack of commitment to the collaboration often arising when the collaboration has been set up by senior managers who have then passed membership of the group to others who have no personal commitment to it. At an extreme those senior managers may also no longer have any commitment. There can be a lack of briefing of the representatives, which causes a lack of understanding of their organization's aims for the collaboration. If some individuals are committed to the group they may find the attitudes of the others surprising.

- **Imposed-upon organization and imposed-upon group episodes:** Characterized by a lack of ownership when membership of a collaboration has been forced upon the organizations concerned in order to keep or access resources, e.g. by government.

While all the episodes described above are short term, the influence on the future of collaboration can be lasting.

Implications for the aSAP Simulation: Different types of aims have been integrated into the simulation in the form of different mission statements for the teams, with the goal of having teams collaborate despite operating with slightly different guidelines. The challenge would be for teams to manage these differences without losing sight of the collective goal. There is an opportunity also for a facilitator to inject extra externally-imposed aims or constraints at intervals to increase the dynamic nature of the aims. In terms of negotiating and managing different aims, a lot will depend on how the players act and react with each other but there are a number of things that could be set up with potential to disrupt the "game". Some examples are: 1) Members could become aware that one member is only taking information and have to decide how to deal with this, 2) A character could be set up to veto certain actions or even a couple of characters could be set up to veto different actions one for personal reasons and one on behalf of their team - the other teams would then have to decide how to deal with this, 3) A team could attempt to move the collaboration's agenda away from their own area of expertise to protect their turf, 4) An outlying HQ could be created about which the players have to make decisions in terms of whether the organization is vital and how to renegotiate/reaffirm the boundaries 5) One powerful HQ could be created about which the group has to make decisions 6) At least one team should be a member whose presence has been given to them by a more senior member of their organization who therefore has a relative lack of commitment, 7) Some members either individuals or organizations should be part of the collaboration because they have been mandated to be and therefore should initially be uncommitted.

2.1.3 Importance of trust and trust building for successful collaboration in distributed teams

Trust is popularly considered to be critical to the success of collaboration as it relates to the formation of group identity and group cohesion as well as increasing mutual responsibility for group outcomes. In reality, however, many groups work in environments of suspicion, especially for those who do not have a choice as to who to collaborate with, at times with their competitors or those in an entirely different domain, but are required to do so due to external impositions, e.g. agreement, alliances, policies. Trust building within such arrangements involves a delicate process of initial trust building, by creating expectations about collaboration which can be fulfilled, followed by the reinforcement of trusting attitudes, which in turn serve as the basis for the setting of more ambitious aims.

Trustworthiness and knowledge exchange. Whenever it comes to exchange resources, e.g. knowledge, a more or less considerable extent of risk is involved. Perceived risk is an inherent aspect of trust that is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other part" (Mayer, Davis & Schoorman, 1995). Obviously, the extent to which involved individuals expect they can rely on the others will affect their willingness to provide resources such as their knowledge on a particular issue and in fact, trust is described as being central to knowledge exchange (Davenport & Prusak, 1998) because individuals need to be confident that the knowledge they provide will not be used in a way that turns out to be disadvantageous for them, and furthermore trust improves the quality of communication which in turn facilitates knowledge sharing (Ichijo, Krogh & Nonaka, 2000) and ultimately performance in general (Zaheer, McEvily & Perrone, 1998). For effective knowledge sharing, other team members thus have to appear trustworthy, an attribute which Mayer et al. (1995) found to consist of the elements ability (competence), benevolence, and integrity.

Social identity and trust development. Social identity literature has shown that trust is fostered by identity (e.g., Kramer, 1993), that is the more collective identity there is, the greater the potential for developing trust among its members. Lewicki and Bunker (1996) suggest that a reciprocal effect may operate as well with degree of trust strengthening identity. An initial stage of calculus-based trust is followed by knowledge-based trust, which in turn develops into identification-based trust. "*As the parties come to learn more about each other [through knowledge-based trust], they may also begin to identify strongly with others' needs, preferences, and priorities and come to see them as their own*" (Lewicki and Bunker 1996). The literature on social identity also suggests that identification can increase the salience of group goals and values, and increase the perception that an actor's own goals and values are similar to those of other group members (Kramer and Brewer 1984, Kramer et al. 1996).

However, identity has also a double face. Over-identification, for instance, carries its own set of problems for the organization: organizational members are less likely to countenance alternative views and critically evaluate their own organization, thereby resulting in groupthink, the not-invented-here syndrome, and other forms of constrained thinking. In extreme cases, over-identification can engender inertia and core rigidities that may hinder the organization's or a team's ability to adapt and respond to environmental change.

Trust management. The key factors shaping the approach to trust management concerns the prior absence or presence of trust between the partners and the ambitiousness or modesty of the collaboration. Interrelating these factors in a matrix gives aid to designing an appropriate trust strategy. This matrix is presented below:

	Initiating the trust building loop (weak trust)	Sustaining the trust building loop (presence of trust)
"Comprehensive" trust management (ambitious collaboration)	**Manage risk as an integral part of trust building** Explore complexity of structure and aims e.g. by: · identifying with whom to network and build trust · assessing sources of power and influence · exploring who can act · exploring differences in organizational purposes · negotiating agreement on aims · exploring willingness and ability to enact the agenda *Assess potential for achieving collaborative advantage and whether associated risk can be managed and (given choice) is worth taking*	**Nurture, nurture, nurture!** Facilitate trust building cycle: · keep nurturing relationships by carefully managing *all* aspects of the collaborative process including communication, power imbalances and credit recognition, joint ownership, varying levels of commitment, conflicting views on aims and agendas and so on … *Maintain a high level of trust to create the basis for collaborative advantage*
"Small wins" trust management (modest collaboration)	**Adopt small wins approach to trust building** Initiate trust with relevant partners and aims e.g. by: · beginning to identify with whom to build trust and · getting started by undertaking modest but joint actions *Get started without having to deal with all aspects of trust building*	**Manage instability** Manage dynamics and power imbalances e.g. by: · keeping momentum when trusted members leave the collaboration · putting efforts into fast tracking new members into the trust building loop · recognizing the inevitable effect of power imbalances on members' actions · finding ways of ensuring that shared power is maximised *Sustain trust gained long enough to reach and then work with a comfortable level of trust*

Figure 15. Trust management matrix

Huxham and Vangen state that there is a 'strong case for initiating a collaboration through modest, low-risk initiatives' (2005); the trust building loop presented below is, it is argued, sustained by the demonstration of gains from modest levels of risk. Hence trust is grounded in jointly successfully mutually coordinated action rather than being a matter of faith. As gains are demonstrated in practice so the level of trust is enhanced and the tolerance for, and inclination to undertake, higher risk practices is increased.
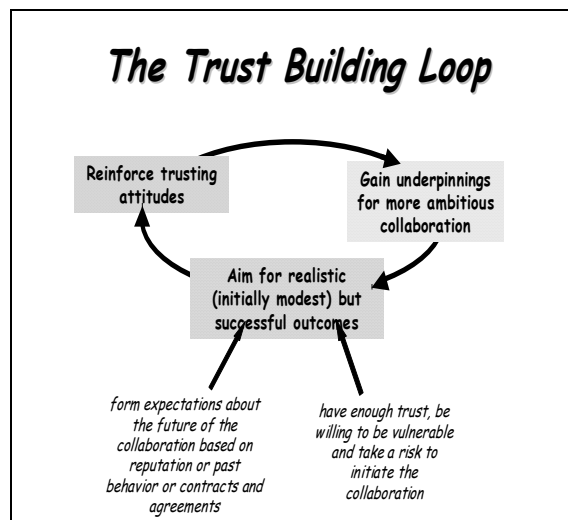
Figure 16. Trust building cycle

Trust management can also take the form of targeting skills, competencies and characteristics of an individual. This may pertain to expertise in some technical area or to specific experiences in project management. Individuals who provide knowledge resources want to have cues that others will not use their contributions in an inadequate way due to a lack of understanding. **Benevolence** refers to the extent to which a focal person (the trustee) is perceived as willing to do something that will create a benefit for the trusting person (the trustor), without being motivated to achieve a personal profit. In the case of knowledge sharing, this implies that the trustee does not intend to use the knowledge provided by others for a personal advantage at the expense of the knowledge providers. Finally, a trustee will be ascribed integrity if the trustor perceives that this person adheres to principles that the trustor himself values. A minimum

extent of shared values thus seems to make it more likely that individuals come to perceive each other as having integrity. Based on two key forms of interpersonal trust mentioned above – trust in a person's benevolence and a person's competence – Abrams et al. (2003) summarized important behaviors and practices for managers interesting in promoting trust and thereby knowledge sharing and creation.

Trust Builder	Benevolence trust	Competence trust
Act with discretion	x	
Be consistent between word and deed	x	x
Ensure frequent and rich communication	x	x
Engage in collaborative communication	x	x
Ensure that decisions are fair and transparent	x	
Create personal connections	x	
Give away something of value	x	
Disclosure your expertise and limitations		x
Establish and ensure shared vision and language	x	x
Hold people accountable for trust	x	x

Virtual trust development in distributed contexts. Most of the trust literature focuses on trust development and maintenance within collocated groups. However, with the rise in distributed team configurations, a new branch of trust research has emerged, looking at the dynamics of trust formation among individuals and groups in the absence of face to face interactions, and whose communication processes are primarily mediated by technology.

The work of Jarvenpaa and Leidner (1999) on swift trust proposes trust processes that differ between traditional and distributed teams. In contrast to classical trust development, which is cultivated over time based on ongoing interpersonal interactions, swift trust develops in the first moments of electronic interaction. Owing to the distributed and limited lifespan of many virtual project teams, the authors observed that members within such groups enter into a work relationship with trust already in place, rather than undergo the progressive and incremental development of trust. Trust levels decrease, are maintained or increase according to the behavior and actions of group members over the course of the project. Additionally, for virtual teams that rarely meet in person, trust level is dependent on action and of contributing critically and swiftly to group processes rather than showing compassion and contributing to the social cohesion of the group.

Management of trust within such a context involves the establishment early on of a clear structure and roles, of social communication among group members, ability to cope with technical uncertainty, and establishing predictable patterns of communication and action (Jarvenpaa and Leidner, 1999). For more stable longer term collaborations which have at their disposal a variety of mediums, the optimal approach is the use of a combination of media: face to face meetings, if possible, during the early stages of a collaboration for group building, setting of identity and goals and shared understanding, followed by technology-mediated communications for more routine task activities, and interspersed with periodic face to face meetings to provide opportunities for interpersonal reconnections.

Implications for the aSAP Simulation: Within the aSAP simulation, trust levels between the different teams can change during the course of the experience, especially during phase 2, where teams have to collaboratively decide on the implementation schedule. While all teams may start out with high confidence in other teams for working towards the same goal, the actions of some teams, which might sometimes be contradictory to the expectations of other teams, and coupled with the lack of communication channels to clarify actions and choices, can lead to a deterioration of trust. This is in line with the theory of virtual trust, in which teams start

out with high levels of trust, which can only be maintained though reliable and trustworthy action.

2.2 Specific Collaboration Breakdowns and Traps in Distributed Collaborative Settings

2.2.1 Motivation

People decide to and are motivated to collaborate if they perceive the personal value of the collaboration. Success and motivation to perform a task is tied to each individual's ability to identify his own values and interests within this context. The connection between personal and organizational objectives is one of the most important factors in enhancing a collaborative relationship, where motivational drive at the individual level can collectively influence the success of the entire organization. Notably, two types of motivation can be distinguished.

Intrinsic motivation is motivation that derives from an individual himself: the meaning that individual gives his job, his sense of competence, his goals for self-improvement, and his expectations and perceptions. Because motivation is internally driven, this form motivation is much stronger than any other external drivers. Hence the cultivation of intrinsic motivation is often the focus for improving collaboration and performance. If an individual is intrinsically motivated to collaborate, his efforts to build cooperative and collaborative relationships will be greater, as will his expectations (about profits, personal improvement) and, above all, the meaning and effort he invests into his work.

Extrinsic motivation refers to incentives provided by an external party to encourage motivation and performance. This form of motivation can be effective for building long time commitment and trust among organizations, but only if individuals continue to receive the rewards and perceive the distribution of incentives as just. In fact perceptions of injustice reduce motivation because people do not have guarantees that their efforts will be evaluated in a fair manner. If individuals suspect the distribution of incentives as unfair, the reward or compensation system will not be able to sustain motivation and, moreover, may even be damaging if it generates individualist and opportunist behaviors rather than collaborative ones to obtain the rewards. This can seriously damage collaboration within an organization and can encourage workers to commit less and less to shared foals. Because it is so difficult to find a delicate balance, reward-based systems are usually classified as being part of worst practices.

Studies show that intrinsic motivation has positive effects on performance, work perseverance and increased motivation. By contrast, under certain conditions, extrinsic motivation may have a lower effect on motivation and can have also a negative effect on intrinsic motivation (Deci and Rayn, 1985). Regardless, motivation is an important driver for successful collaborations and needs to be maintained over the entire collaborative process.

Levels of motivation also depend on objectives and reasons. According to the Goal Theory, people want to demonstrate their competences to manage difficult situations and see their achievement evaluated as a success instead of a failure (Ames, 1992; Dweck and Legget, 1988). The choice of difficult and specific objectives is seen as motivation drivers because challenging but not impossible objectives encourage motivation to meet them. By contrast, too easy or too difficult a task reduces the challenge and interest level or discourages individuals from performing for fear of failure, respectively.

Another motivation driver is the specification of future consequences and long term goals. The perception of long term utility of a present task for a future task or objectives increases motivation in comparison to a task without future implications or value.

Some other practices for increasing the motivation to collaborate include:

- Improving the affect-based relationship through experiences outside the specific goal

- Improving the sharing of ideas, meanings, goals through conversation and face-to-face meetings (reduce physical distance among members, organize meetings and brainstorming etc)

- Promoting the culture of continuous feedbacks to improve the quality and cohesion among members.

- Promoting the development of interpersonal trust

Within distributed environments, sustaining motivation among different partners becomes even more difficult since it reduces opportunities for interpersonal interactions and the development of trust, for the effective transfer of knowledge, especially tacit knowledge and for providing and receiving feedback. In these situations, intrinsic motivation becomes an important driver for individuals and teams to remain motivated.

Implications for the aSAP Simulation: Within the aSAP simulation, motivation to participate and to continue working towards the collective goals is challenged by the different guidelines under which teams make their decisions, as well as the lack of adequate communication channels or sufficient communication opportunities to negotiate understanding. Additionally, in the absence of face to face accountability and direct feedback, teams have a greater chance of losing motivation throughout the course of the simulation. The challenge for all 6 teams will be to remain motivated and focused on the objective despite these obstacles.

2.2.2   Participation levels

Participation level may also be significantly affected when teams are distributed and whose primary form of communication is mediated through technology. Indeed, research has shown that technology-mediated communication is associated with a variety of behaviors that are less likely to manifest themselves during face to face interactions.

Disinhibition is one such behavior characterized as *"an apparent reduction in concerns for self-presentation and judgment of others"* (Joinson and Harris, 1998). "Flaming" is a specific example of disinhibition in which people exhibit rude, impulsive behavior and express extreme views more often than they would do in face to face situations. Barefoot and Strickland (1982) had theorized that the absence of immediate social cues through CMC may allow a greater expression of emotions, especially negative ones since the social cues present in face to face interactions are less accessible as a form of behavioral regulation. Conversely, CMC may also result in hyperpersonal communication, which is the tendency for individuals within CMC groups to exchange more intimate information about themselves than FTF groups do.

Yet another dimension observed within CMC interactions are the opportunities for anonymity, which may broaden participation due once again, to the absence of immediate social controls. However, anonymity can also have the adverse effect of user disengagement, as when individuals disconnect from online discussions to do work on other things since social controls are low. Within CMC, we may also find the occurrence of depersonalization, in which one perceives other participants as lacking personal qualities or individuality. Depersonalization in turn may result in diffused social responsibility and lower levels of reciprocity and participation. Depersonalizations however can be overcome by group building activities and early social communications to establish ties between people.

Implications for the aSAP Simulation: By virture of the way the aSAP simulation is set up (teams are separated from one another, with little or no communication opportunities), a number of behaviors described above may manifest themselves throughout the experience, which if not managed properly, may result in increased frustration, decreasing levels of motivation, and lower levels of productive participation and engagement and higher levels of non-collaborative, competitive and individualistic behavior. All these can have detrimental effects on accomplishing the objectives of the simulation.

2.2.3   Conflict

In contrast to early assumptions of conflict to be inherently negative, moderate levels of conflict are nowadays not only widely accepted as inevitable and ubiquitous (e.g. Hill & Somers, 1988), but even viewed as beneficial to team performance (e.g., Stevens & Campion, 1994).

In general, three different types of conflicts can be distinguished. **Relationship conflict** involves inter-personal incompatibilities such as disagreement on personal values, is associated with distrust and negative emotions (Jehn, 1995) and tends to harm individuals' abilities to assess new information that is provided (Pelled, 1996) and to process complex information (Staw, Sandelands & Dutton, 1981), and a team's capabilities to reach creative and high quality decisions (Amason, Hochwarter, Thompson & Harrison, 1995), as well as knowledge sharing, learning and creation of new knowledge (Panteli & Sockalingam, 2005).

Process conflict involves disagreement on how a given task is going to proceed (Jehn & Mannix, 2001), based on divergent understanding of roles, responsibilities, time schedules and requirements in regard to resources (Panteli & Sockalingam, 2005) which may ultimately hamper shared understanding needed for effective creation of new knowledge.

Conversely, **task conflict** which involves disagreement on task issues, such as goals, decision areas, and appropriate actions to take (Pelled, Eisenhardt & Xin, 1999) may, if well-managed, i.e. multiple perspectives are welcome, diverse aspects on a given issue are considered (Nemeth, 1995), facilitate knowledge-sharing as well as creation of new knowledge (Panteli & Sockalingam, 2005) through open discussion and critical, creative interaction (Amason et al., 1995).

Conflict within distributed environments. Some studies have suggested that conflict may reach higher levels in technology-mediated environments than in face to face communication (Poole et al, 1991). Other studies have found that computer-mediated groups present higher levels of negative conflict (prolonging and escalating conflict, inflexibility, hostility) and lower levels of positive conflict (releasing tension, clarifying and reevaluating goals, creating new ideas, and so forth) than face to face groups do.

One explanation put forth for the presence of negative conflict within technology-mediated groups is the fundamental attribution error (Ross, 1977), which occurs when one makes judgment of another person's actions based on his or her disposition rather than on the environmental situation (e.g. He didn't answer my emails because he is not willing to collaborate). Conversely, people are more likely to attribute their own actions to situational factors than to dispositional factors (e.g. I did not respond to emails because I have been away at a conference). Several researchers have found that mediated communication may heighten the occurrence of the attribution error because distributed groups are diverse, have less interactions with one another and hence knowledge about their partners with which to base their judgments. Other studies have suggested that traditional teams are better able to manage conflict, particularly early on in the group as compared to distributed teams, who first have to overcome distance and diversity barriers; however, these groups are comparable to their traditional counterparts later on in the project lifespan as group relations solidify.

Sources of conflicts. A number of sources of conflicts are presented in the following table:

Source of conflict	Collaboration-related consequences
Distrust	While trust can be defined as mutual faith among different subjects, as regarding intentions and behavior, **distrust** can be defined as a feeling that someone is dishonest and unreliable. When relationships are characterized by distrust, people are afraid to share information and knowledge, the fear of risk increases and the willingness to collaboration and to learn goes down (Nelson and Cooprider, 1996; Roberts, 2000).
High self-reputation	**Self reputation** is a complex process of self-evaluation that an individual has about himself and his value (Branden, 1998). It's worth paying attention to individuals with extremely high levels of self reputation which can impede them from collaborating with others because they believe that they have all the skills to reach the goals by themselves.
Injustice on incentives and recognitions	In Adams' Equity Theory, people in social exchanges seek neutrality and justice and when they perceive **inconsistencies,** cognitive dissonances will be generated. These inconsistencies push people to perform corrective interventions (Festinger, 1967).
	Managers have to pay attention to individual perceptions about equity in politics, procedures, and reward systems because if people perceive

	organizational or interpersonal injustices they may react negatively. In these cases the mood within the team becomes tense, and jealousy and envious feelings may emerge, opposite factions of workers are created and trust, which is the basis for collaboration, can be frazzled or completely destroyed (Goldman, 2001).
Negative, not justified feedbacks	**Feedback** measures how direct and clear is the information that an individual receives related to the job he's doing (Hackman and Oldhman, 1976). Feedback has to be used carefully because it can be misunderstood, badly accepted and can reduce motivation, sense of control and individual initiative. In particular, with destructive as opposed to constructive critiques, feedback can seriously damage collaborative relationships within work groups and generate resentment among workers. Furthermore, non-justified feedbacks can lead to a sense of inequity and reduce the willingness to collaborate because people may start loosing confidence in the job system.
Diversity (gender, age, nationality, political faith	Group composition relates to the diversity among its members: personality treats, opinions, functional background and features (Neale et al., 1998). If, on a hand, **diversity** can increase knowledge, ability, motivation, on the other hand, can generate personal conflicts, negative reactions, less collaboration. The number and the diversity of members within collaborative relationship shouldn't be more than that collaboration requires or can tolerate.
Power distance	**Power distance** is the measurement in which members of a society accept that power is distributed unequally in institutions. This measurement changes depending on cultures: in collectivist cultures power distance is higher than in the individualistic ones, but it's recognized the importance of risk taking (Yi and Ellis, 2000).
Affective-based relationship	**Membership needs** reflect desire of having good relationships with colleagues, of participating in work groups and of having positive relationships with superiors. In some research, it is argued that "having a good friend at the job place" increases commitment and productivity of workers and people with strong group membership spend more time maintaining long social relationships and to participating in group life (McClelland, 1965)
Leadership style	Leadership is defined as an influential social process in which leader look for voluntary participation of collaborators to reach organizational goals (Schriesheim et al., 1978). Leaders who emphasize productivity are more interested in targets achieved and performance, with secondary consideration for individuals and the work group. This type of leader has a more difficult time generating trust, respect and inspiration and encouraging people to collaborate and work together with a team spirit.
Lack of sharing meanings	Job value is defined as "*the opportunity that an individual perceives to follow a right objective. This perception overlaps with the sensation that objective is worth cost and energy that people dedicate to it, that objective has a certain importance in things*" (Thomas, 2000). When workers see that their job is meaningless, they become unsatisfied; they don't understand what their contribution to the final output is. In this case people lose their motivation to collaborate because they don't see any meaning in what they are doing.
Lack of goal orientation	A **goal** is the aim of an action an individual is trying to accomplish. Too many challenging goals, in particular in the first steps of a collaborative relationship, can have a negative impact on collaboration, because people may perceive that it is impossible to reach such unrealistic goals and as such do not bother to try. On the other hand, easy goals can upset collaboration because people are not challenged and motivated enough to work together to reach so modest a goal. Managers have to define the right typology of goals: neither too modest nor too challenging in the beginning followed by increasingly complex and difficult goals over time and as relationships and levels of trust stabilize (Mattessich et al., 2001).

Individualism	Self realization needs represent the highest category of needs for an individual as they related to full development of ones own personal potential, increase in competences and becoming a better person (Maslow, 1943).
	The desires of self realization can be positive within a group context, but if they become too focused on single person, they can be negative for collaboration, as when a single worker focuses on personal realization at the expense of being part of a team.
Presence of formal structure which does not permit to be free and autonomous	Autonomy involves the degree of freedom, independency and will an individual have in his or her professional life and work space.
	If single workers and groups in general do not have freedom and autonomy they will not motivate to collaborate because they know that the results depend only partially on what teams do (Hackman and Oldhman, 1976).
Multiplicity of group identities (not managed)	Collaboration also depends on congruency among values and objectives of different workers and among workers' values and objectives and organization's values and objectives (Van Vianen, 2000). Very often collaborative failures are the consequences of cultural incompatibility: managers are not able to manage differences among people. Just for this managers should consider the importance of organizational culture when creating a new organization or putting together collaborative relationships.

Conflict management. According to Glasl (2004), conflicts that are not managed adequately tend to escalate from the beginning, with task conflicts coming to be extended and „enriched" by relationship-based issues. Whereas conflict parties are motivated to reach a win-win solution or at least a compromise at the beginning, the competitive win-lose motivation dominates in stages of higher escalation, which may ultimately end up in a lose-lose situation, where the predominant goal is to eliminate the other party, even at the expense of own losses. Thus, the dynamic of a conflict is an important factor that affects the conflict parties' preferred strategies to handle a conflict. In view of the different sources and types of conflict, and following Stevens and Campion (1994), team members should possess the ability to recognize and appropriately encourage, rather than to avoid, desirable team conflict, i.e. primarily task conflict, whereas undesirable since probably detrimental conflict, in particular relationship conflict, should be discouraged by team members.

Basically, two main strategies may be employed to resolve conflict via negotiation and bargaining: distributive bargaining is based on the view that a reasonable compromise has to be found, implying that at least one of the conflict parties needs to make minor or major concessions which finally tends to yield a win-lose outcome; the other strategy is integrative bargaining, aimed at achieving a win-win solution which satisfies the needs of all conflict parties. This strategy is characterized by mutual trust and the willingness to engage in straightforward communication. There is evidence that individuals differ in their preferred conflict styles and that use of particular conflict styles tends to differentially impact on subsequent experiences of task and relationship conflict as well as stress in the workplace. Individuals preferring integrative styles experience lower levels of task conflict and relationship conflict which in turn reduces stress whereas the opposite is true for individuals using primarily dominating conflict styles (Friedman, Tidd, Currall & Tsai, 2000).

Conflict management literature is most frequently based on a two-dimensional model. Assertiveness is the extent to which a person pursues own goals, and cooperation refers to the extent to which the goals of others are considered. Combination of low and high levels on these two dimensions reveals four, or including an intermediate type, five conflict management strategies (Rahim, 1997; Thomas, 1992).
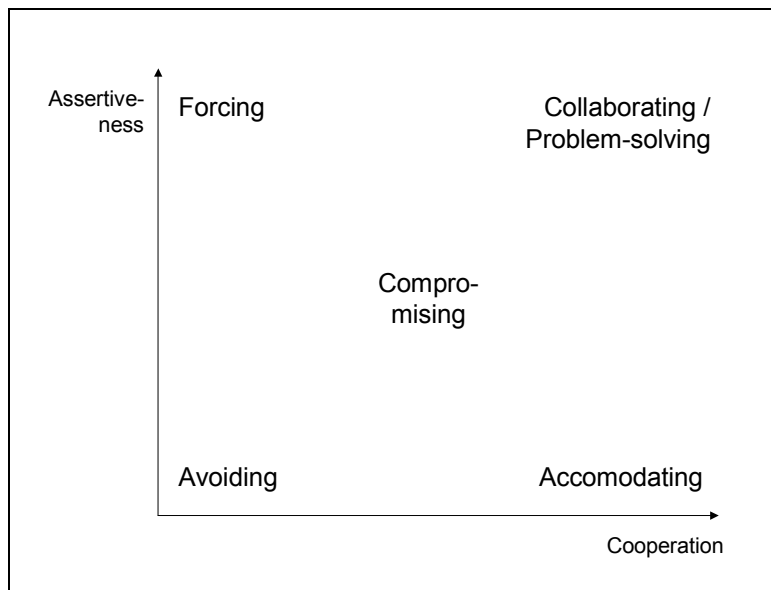
Figure 17. Conflict management strategies

In accordance to the competence model of conflict communication which suggests that individuals who use various conflict styles will be perceived differently in terms of appropriateness and effectiveness, Gross and Guerrero (2000) found that the integrative conflict style is generally perceived by others as the most appropriate (in terms of being both a polite, pro-social strategy and an adaptive, situationally appropriate strategy) and most effective style whereas the dominating style tends to be perceived as inappropriate, at least when used by others. Both the obliging style and compromising seem to be generally perceived as quite neutral, and the avoiding style is largely perceived as ineffective and inappropriate.

More recently, the assumption underlying this model that any of these conflict styles may be used independently and has isolated effects, has been challenged, and two additional "behavioral components", i.e. confronting (demanding attention to the conflict issue) and process controlling (dominating the procedures to one's own advantage), have been proposed (Van de Vliert, 1997). In particular, evidence was found for negative effects of forcing on relational outcomes, and of confronting on both relational and substantive outcomes, whereas both process controlling and problem solving seem to reveal positive effects on substantive as well as on relational outcomes (Euwema, Van de Vliert & Bakker, 2003).

Alternatively, McFarland and Culp (1992) describe three conflict resolution styles: control (direct communication about the disagreement); non-confrontation (avoiding or withdrawing from a disagreement); solution-orientation (integrating the needs of both conflict parties).

Finally, an other model of conflict style is based on two different dimensions as reflected in the Intercultural Conflict Style Inventory (Hammer, 2005): individuals may be rather direct or indirect, and rather emotionally expressive or emotionally restrained in their preferred approach to handle conflicts so that they may be categorized into one of four types: discussion (direct, emotionally restrained), engagement (direct, emotionally expressive), accommodation (indirect, emotionally restrained), dynamic (indirect, emotionally expressive).

Implications for the aSAP Simulation: The simulation is designed to place players in a situation of conflict and frustration, with the objective of provoking reflection and learning. Whereas teams might start off motivated to reach a win-win solution or at least a compromise at the beginning, the competitive win-lose motivation may come to dominate in stages of higher escalation, which may ultimately end up in a lose-lose situation, where the predominant goal is to eliminate the other party, even at the expense of own losses. If this happens, the dynamics experienced provide fertile ground for analysis and discussion. Debriefing can also address in greater and more explicit detail the types of conflict (relational, process or task) observed during the simulation, as well as in participants' own practices and the different conflict resolution approaches that may be employed.

2.2.4   Technology-related collaborative breakdowns

Collaboration breakdowns are generally defined as interruptions to collaboration activities. Breakdowns may be *incidental,* described as an instance in which communication, coordination or collaboration within a group fails, or more *long term* in which the accumulation of incidental breakdowns and the lack of adequate adjustments and solutions can lead to serious consequences in terms of group performance and task outcomes.

Single user communication with technology. This level of analysis involves disruptions to individual work when a user interacts with an application to fulfill some communication or collaboration need. For example, the user may have login, access, server and navigation problems, may have technical difficulties executing certain features and commands within an application, or, depending on one's proficiency levels, lack knowledge on the capabilities and the features available within an application or ineffectively using some of its features.

While these problems affect an individual's work processes, individual difficulties with the technology can also have negative effects on group processes and outcomes within a collaborative situation. For example, when an individual has technology difficulties during online synchronous communication, i.e. online meeting, phone conference, distributed group decision activities, the group itself may have to stop its own activities to wait for a participant to resolve his technology-related problem before proceeding with the common activity. Common video and phone conference challenges include sound and visual quality, which if the transmission speed is poor can disrupt communication rather than enhance it. Additionally, since visual cues are minimized or absent within distributed collaborations, members of a group find it more difficult to perceive breakdown cues or to interpret the reason for the breakdown when they do occur. This can lead to false and negative attributions or frustration and further disrupt the flow of distributed collaborative activities.

Group coordination and collaboration with technology. Likewise, groups can have difficulties when communicating through technology since subtle social and contextual cues are difficult to perceive during the course of online communication. These cues include identifying the speaker, turn taking, demonstrations of understanding or misunderstanding, and disengagement. Lack of experience with the dynamics of distributed discourse may lead to interruptions in conversation flow, participants talking at the same time about different things, some participants not having a chance to say something or misinterpretations of a message. These misinterpretations might be minor or major, and if the latter, may lead to false agreements or faulty decision making (Prates et al, 2001).

Of course, groups with more experience in distributed communication may have developed strategies to cope with the medium's ambiguities and limitations through being more structured and explicit in their discourse. At the individual level, coping strategies include identifying oneself before speaking, being more explicit in ones communication patterns and asking for acknowledgements of understanding or misunderstanding. At the group level, strategies include making explicit team leadership and individual roles to ensure regular, detailed and prompt communication to make sure all members are clear on responsibilities and "emergent leaders" to coordinate team activities and foster communication.

Additionally, if groups lack knowledge of or a shared understanding on how to use a particular group application, this can also lead to interaction problems. Lack of adequate technological knowledge and expertise makes it more difficult for groups to identify the source of problems when they do occur and the actions required to fix them. Lack of agreement on use can also lead to coordination problems as when certain members chose to collaborate through email and others through a shared workspace.

Furthermore, when a technology itself does not provide adequate tools to coordinate the activities of groups, this might negatively impact a group's efficiency. Examples include poor interface design, when an application does not make a distinction among users, when it is

difficult to search for and retrieve relevant resources, or when an application contains either superfluous or not enough of the important features. With regard to the latter, the presence of too many different tools serving the same purpose within a workgroup can lead to coordination problems and the need for consolidation or agreement on which tool group members should use to improve communication efficiency. If unresolved, these limitations in turn place additional cognitive demands on the group, resulting in less effective group work, with groups focusing more on mastering the technology rather than on the task at hand.

Finally, if the technology is inflexible, such that it does not allow for modifications according to the needs of groups, this too might present a problem in the future as users look towards other mediums to fill their emerging communication needs.

Implications for the aSAP Simulation. Participants may experience a number of the described incidental breakdowns at the team and inter-team level during the simulation, hence providing the opportunity to address the effects of these breakdowns, and depending on whether these breakdowns were effectively managed or not, on the positive or negative effects on the collaborative experience. Debriefing can focus on the differential effects of technology, the criteria for how best to chose and deploy technologies, and the actions that may be taken when technology-related breakdowns occur. While the current aSAP simulation exposes participants to only one communication tool, a chat function, other tools might be introduced in the future, to increase the realism of technology-mediated collaboration, which usually involves a number of communication and collaboration tools. Having a variety of tools to choose from (as well as building in breakdowns such as the tools not functioning when teams want them to, or are too difficult to use, etc) will also increase the complexity and broaden the experience to include making decisions on which tools to use for different distributed tasks or communication needs.

2.3   The Potential of Innovative collaboration technologies: What's out there?

2.3.1   The advantages and limitations of communication and collaboration technology

Both theoretical and practitioner research suggest that collaboration technologies can be used to either enhance or obstruct group processes and outcomes, and that the effects of technologies on group work depend on a variety of group, task, context, and technology-related factors. On the positive side, technologies can serve as powerful means to connect people and facilitate the flow of knowledge and work across time, geographical and organizational boundaries, as evidenced by the proliferation of project management systems, collaboration applications and systems, groupware and most recently, knowledge portals, and emerging software such as wikis, social networking sites, blogs, open source projects, etc. The darker side of technology-based communication is that if poorly planned, implemented and managed, such technologies can interfere with rather than enhance the collaborative process. Serious communication or coordination breakdowns related to technology use can occur and if left unresolved, can negatively affect group performance and outcomes in the long term (Grundin, 1988; Orlikowski, 2000; Powell et al, 2004; Thomas et al, 2005).

Implications for the aSAP Simulation. Within the aSAP Simulation, the absence of adequate channels to bridge communication divides opens up the discussion on the role of technology in distributed collaboration. Participants can draw from their own technology experience, analyzing both its advantages and disadvantages as well as discover other types of collaboration technologies (see related section 2.3.2-3) and ways to best use them.

2.3.2   Emergent technologies

Recent approaches have been to look at emergent technologies as a way to facilitate user-driven collaborative knowledge sharing and creation processes. Emergent technologies are net-based technologies which focus on providing lightweight, user-friendly, easily to implement services rather than packaged software, relies on an architecture of participation, is more cost effective in terms of scalability, consists of software above the level of a single device and is most successful only when they are able to harness collective intelligence.

Social software are part of the new breed of user-driven Web 2.0 technologies supporting internet-based communication and collaboration, as exemplified by Wikipedia, Flickr, Del.ici.ous, Opensource and other communities of interests. These mediums encourage self-organized and collaborative knowledge exchange and creation among individuals who are drawn together primarily by common interests.

Wikipedia (www.wikipedia.com), for example, is a living online encyclopedia, the content of which is collaboratively constructed on an ongoing basis by potentially any one with access to the internet and who has something to say about a subject. Through a relatively simple tool, people from diverse, non-technical background are now able to co-create and co-edit web pages through the wiki technology. Similarly, open source communities such as SourceForge (www.sourcefourge.org) are self-organizing project groups that emerge through common interests for the collaborative development of technological products. Knowledge Board (www.knowledgeboard.org), is yet another example of an open community for individuals interested in knowledge management and innovation within which its members may exchange and create knowledge, as evidenced by the release of a report on best practices in knowledge management, with contributions form diverse members within the community.

One clear example on how technology has changed the way people work is the **Open Source Software community.** The success of such diverse and distributed development groups attests that distributed collaborations can indeed exist and thrive, despite the fact that most of the group members rarely meet and work together primarily through the CMC. The OSS community is characterized by *collective action* and *community good*. It produces results that are based on a model of innovation where individual software developers obtain personal rewards from writing codes for their own use, sharing these codes, and collectively contributing to the creation, development and improvements of software (von Krogh et al., 2003). Key characteristics of such groups are voluntary participation, no expectation of monetary rewards, no formal quality control, and no authoritative leadership. Key changes to how traditional development groups work are increased flexibility, responsiveness, lower costs, and improved resource consumption (Yamauchi et al, 2000). Oftentimes, *diverse* individuals work on highly *complex* technologies, which require *knowledge intensive* domain knowledge and intensive *learning* by newcomers who want to participate in the project group (Kohanski, 1998). However, these communities manage to produce high quality results and continued success of this model of software development is reflected in the growing size of the OSS communities as project groups are created and new members join and participate in existing groups.

Implications for the aSAP Simulation. A map of existing technologies are presented in the simulation in the form of Innovation Projects. Profiles are available which provide more detailed information on each technology, as well as key examples. These tools are also represented in the form of a map and can be classified by function level: communication, collaboration and knowledge management. However, it must be noted that many of the individual tools mapped below are multifunctional. In some cases, multifunctionalism is intentional and part of the design; in other cases, users have adopted and adapted the tool to meet their own needs, sometimes in ways different that originally intended.
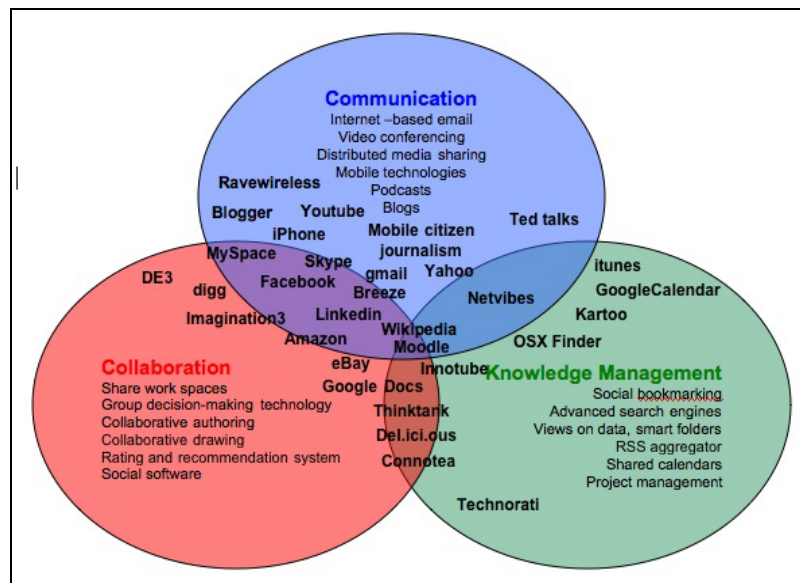
Figure 18. Emerging Web Trends

2.3.3   Managing communication and collaboration technology

Management of distributed collaborations involves a range of dimensions such as supporting technology-mediated teamwork, monitoring progress, identifying needs, addressing breakdowns and resolving conflicts when they arise (Thomas & Bostrom, 2005; Kayworth & Leidner, 2000; Ives & Jarvenpaa, 1991). More specifically, it requires careful planning from the start, properly monitoring the course of a collaboration, setting a framework for ongoing communication evaluation and improvement, being prepared for breakdowns when they occur, recognizing the "triggers" to breakdowns and taking effective action to help groups recover and learn from these breakdowns. Furthermore, some research emphasize the importance of breakdowns as manifestations of gaps in existing practices, providing opportunities for reflection and serving as impetus for change and improvement (Orlikowski, 2000; Majchrzak et al, 2000; Karsten, 1999).

We distinguish two contexts for the management of technology: at the organizational level (top-down implementation of a collaboration system or applications) and at the group level (distributed virtual team selection of collaboration applications).

Technology management at the organizational level. At the organizational level, the implementation of a technology is often driven by attempts to unify and better manage the diverse communication activities of diverse organizational members, to enable the flow and better exchange of knowledge and to provide tools to enhance collaborative activities. Technology management at the organizational level can be divided into two stages: the first includes planning and implementation phases, and the second, the adoption phase, which involves securing a critical mass of users for the integration of the technology into existing practices.

During the implementation phase

- **Careful early planning.** One of the key determinants of effective technology adoption and use is careful planning, especially in the initial stages (Karsten, 1999). Technology deployment plan needs to emphasize people and cultural issues, in addition to the technology issues. Successful groups are those that tie the technologies to specific, tangible and important business objectives/plan and have a plan as to how to integrate communication technologies to existing work practices. Ineffective planning and technology implementations are those that involve blanket implementations (a one technology fits all approach) in which no specific applications are developed or tied to established work practices of users (Karsten, 1999). The planning process also includes taking clear steps to create a shared communication plan, setting up a good technology platform and generating commitment to using the technology (Thomas & Bostrom, 2005). Furthermore, there has to be a way to communicate and make explicit the value

of technology use to improving work processes. Finally, organizations have to be prepared to commit appropriate resources to allow for the training, support, development and adaptations of technology over time. Many organizations in fact underestimate the complexity of technology adoption (Coleman & Young, 2004), with negative consequences for long-term technology adoption.

- **Develop clear understanding of work processes and technology use.** One of the key obstacles to effective collaboration is diversity, in terms of values, characteristics, attitudes and motives. While diversity can be enriching for the creation of ideas, some form of common understanding on work processes and technology use has to be established to ensure smooth workflow. Virtual teams, in particular tend to be cross-functional and cross-organizational, and have more fluid membership that traditional co-located teams. As such, effective management of such teams require the setting of clear goals, objectives and processes early in the project, specifying clear team structure (assignment of roles and responsibilities), and the definition on the role of technology to support work processes (Powell et al, 2004).

- **Provide early training and ongoing technology support.** Early upfront training on the technology is important for addressing lack of knowledge/confidence and creating a shared understanding on how to use a technology (Powell et al, 2004; Kaiser et al, 2000). Training is especially important for groups with low initial levels of experience and whose early experience and impressions of the tool is critical for motivational levels to continue using it (Karsten, 1999). Early training addresses different perceptions by explaining how the tool is going to be used, especially when different cultures are involved. It also provides an opportunity to communicate the value of a tool and impart the skills and sense of self-efficacy so that users can assume technology use on their own. Ongoing training and support ensures that new team members are up to speed with the technologies, that user experiences are constantly taken into account, and adaptations to technology made, when necessary, to continuously meet the needs of users.

- **Team building activities and cohesiveness.** High level of social communication early on in the lifespan of a group, focusing on socio-emotional processes such as trust, cohesion and relationship building have been shown to reduce barriers to communication and to promoting cycles of cooperation and collaboration (Powell et al, 2004). Furthermore early team building exercises have been shown to facilitate socialization and to build common understanding (Thomas, 2005) and to have lasting effects on the development and maintenance of trust (Jarvenpaa & Leidner, 1999). In addition to early team building exercises, managers might also consider including a virtual water-cooler to facilitate ongoing interpersonal relationship and trust building.

- **Team leadership**. Many studies cite the importance of leadership, one who would see the implementation and adoption of a technology through a project's lifecycle. Leadership ensures regular, detailed and prompt communication to make sure all members are clear on responsibilities, to coordinate team activities and foster communication. While a mandate to use a technology can work in some situations (as when a group already has a shared understanding of technology use), more bottom-up strategies include closely working with employees to integrate technology into their work practices. Leadership training is therefore advantageous to help managers identify and deal with collaboration breakdowns when they do occur. Additionally, leaders should also be open to take actions that involve not only adjustments to the technology, but also task and people structures to promote the adoption of technologies (c.f. AST).

- **Establish stable patterns and norms of technology use.** Predictable patterns of communication are important to help groups focus on the task rather than the communication process (Thomas, 2005; Karsten, 1999). Maznevski & Chudoba (2000) observed that successful virtual team interactions are characterized by the following communication pattern: intense face to face meeting early on in the lifecycle of a project for the development of group identity and to establish common understanding followed by distributed communication for routine work, and periodic face to face meetings to address decision making, planning issues and conflict management. Effective teams

had a combination of coordination meetings, regular scheduled conference calls, and impromptu conference calls (according to emerging needs).

- **Achieve large volume of use and big number of users.** Referencing the theories of critical mass (Markus, 1987) and innovation diffusion (Rogers, 1983), technology effects are more pronounced and beneficial if more people use them (Karsten, 1999). This is especially the case with shared project management systems, which require team members to constantly update their activities and work status. Likewise within the area of emergent technologies, meaningfulness and value increase as more people contribute to a shared knowledge space.

During use and adoption phases

Regarding technology management over the course of the project, the literature suggests the following approaches:

- **Approaching technology implementation, use and adoption as a process**. Users and technology developers need time to work towards an increasing understanding of the constraints and capabilities of a particular technology and how this technology can be used to support their work or how their work might be changed to use this technology.

- **Providing appropriate support.** Ongoing support was a characteristic in successful groups, which constantly monitored the technology experiences and opinions of its members.

- **Having a technology champion and support staff.** Leadership, as mentioned is influential and crucial for bringing about expansion and adoption of a technology.

- **Technology implementation requires effort and commitment.** Focused care on how a technology is introduced, as well as continual monitoring of the adjustments that have to be made over time to accommodate different and changing needs.

- **Consider setbacks and difficulties as opportunities, not threats.** Breakdowns and unanticipated developments can serve as an opportunity to reflect on practice and to assess the changes that have to be made.

- **Tailorability of technology.** Related to the former point, when limitations and breakdowns are identified, the technology in use should be flexible enough to allow for constant adaptations and innovations to the way a technology is used.

Technology facilitation at the group level

The strategies described in before apply to the implementation of collaboration-related technologies within an organization, but what about situations in which no clear leadership roles exist as is often the case within distributed virtual teams, and self-organizing project teams within which leadership roles are emergent and responsibilities more likely to be shared (Jarvenpaa & Leidner, 1999)?

Within this context, the management of technology use assumes a more bottom-up approach. The group itself considers what its needs are, takes stock of existing communication mediums, and then decides on a shared approach for group communication and collaboration processes. Some of the strategies described in Section 6.6.1 apply to both organizational and group contexts, such as having a plan, selecting the tool that would best meet group needs, arriving at a shared understanding as to how the technology will be used, providing support to team members, and having a technology champion responsible for tracking the implementation of the technology and for spotting difficulties when they occur.

However, while an organization can mandate the use of a technology by requiring that all of its staff use it, within more non-hierarchical virtual teams, this approach would be less feasible. Without the clear demarcation of authority, decisions on which tool to use are negotiated, rather than imposed. Furthermore, such groups require and are more open to the use of tools that allow radical tailorability, in order to accommodate the volatile conditions under which these

group work: short time frames, diverse and changing memberships, high distributedness of its members and heavy reliance on technology. Conversely, they might also be less constrained by organizational requirements and have greater flexibility to use emergent tools such as social and emerging software to support their work.

Implications for the aSAP Simulation. Following the simulation experience, facilitators can address in greater detail the selection and implementation of any of the technologies mentioned in Section 2.3.2, as well as how best to manage the adoption of technologies in general, to ensure that these tools become integrated into daily work practiced and provide significant (rather than marginal) support for improving collaborative practices.

3. Design Principles

The aSAP Simulation is designed to allow for the emergence of team collaborative behaviors and breakdowns originating from the players themselves. In order to guarantee that a certain level of complexity and challenge is delivered through the experience, a number of design features have been put in place to facilitate conflict and incidents of breakdowns aimed at increasing the richness and value of the simulation experience.

Distributed Teams

Teams have limited direct interactions with the other teams (to emphasize the difficulty of collaborating in a distributed environment), with the only input from the other teams delivered in the form of the decisions that each team makes (e.g. what choices are made and actions taken) as well as occasional opportunities to communicate via online chat to other teams.

To accomplish this, all 6 teams must be separated in order to minimize any communication opportunities. This is usually achieved by having teams located in far corners of a large room, or in different rooms. The simulation may also be played via the internet.

Limited Communication

Limited communication is provided in the form of a chat function, which can be enabled and disenabled by the facilitator during the simulation experience. The limited chat function is intended to provoke frustration among players at the inadequacy of the communication tool (chat may be useful for simple communication needs, but not more complex tasks such as coordination, clarification of major misunderstandings, etc). The unreliability of the tool (sometimes available/functional, other times, not) also calls attention to the challenges of technology-mediated distributed collaboration.

Minimally Different Mission Statements

Oftentimes in collaborations, teams have to operate in the presence of differences. In the aSAP simulation, two different mission statements exist so that teams operate under slightly different guidelines. The result is that an action of a team might contradict or negate the actions of another team, thereby creating confusion and frustration (especially since teams will have few opportunities to explicitly explain their choices to the other teams). However, the game is designed in such a way that a solution exists (a win-win solution) and the challenge is for all teams to remain collaborative, despite the obstacles, towards finding this solution.

Injecting Unexpected Events

A final characteristic of the aSAP simulation is the opportunity for players to manage external, unplanned pressures and events that can occur during the collaborative process. While teams might have established a common understanding and objective and may be working in a

positive direction toward the accomplishment of goals, external events might occur and often do in reality, which might disrupt the momentum, pace and focus of a collaboration. These events include external pressures such as time and financial pressures from top management, change in priorities, a partner exiting or withdrawing from the collaboration, etc.

Hence, an online intervention functionality is available for facilitators to inject real-time during the simulation additional information, stimuli, stress or challenges to further improve and personalize dynamically the learning process.

4.   Key Features and Targeted Impact

This section presents in greater detail the key actions by players, key features of the simulation, desired learning impact as well as insights from existing experience by actual players.

Game Phases, Simulation Features and Targeted Learning Impact

Game phases

The simulation game consists of two main phases. Phase 1 involves nominating Innovation Projects into the Implementation Plan. Each HQ will take turns for positioning one of their proposals in the Innovation Plan (that will appear on the screen). They will able to add your 3 proposals and also to see what other HQs have proposed.

During Phase 2, each HQ, in turn, will be able to propose changes to the order of the list of the 15 Innovation Projects selected (by modifying the position/priority of each Innovation Project).

The Mission for all teams is to collaboratively come up with the best possible aSAP Innovation Plan. Collaboration with the other Innovation HQs will end once all the HQs are happy with the list and priorities of selected Innovation Projects.

Simulation features

The aSAP Simulation is implemented on top of the code of the World Team Simulation, with a combination "Revolution" and php. The inclusion of the collaboration-specific contents and dynamics (e.g. chatting possibility and facilitator intervention) allows players to (1) log in, (2) select their virtual team and access their game-specific mission, and then (3) operate collaboratively on their mission, with the possibility for the facilitator to intervene remotely.

When teams of players first log in, they will be presented with the aSAP Simulation front page, from which teams select their assigned headquarters.
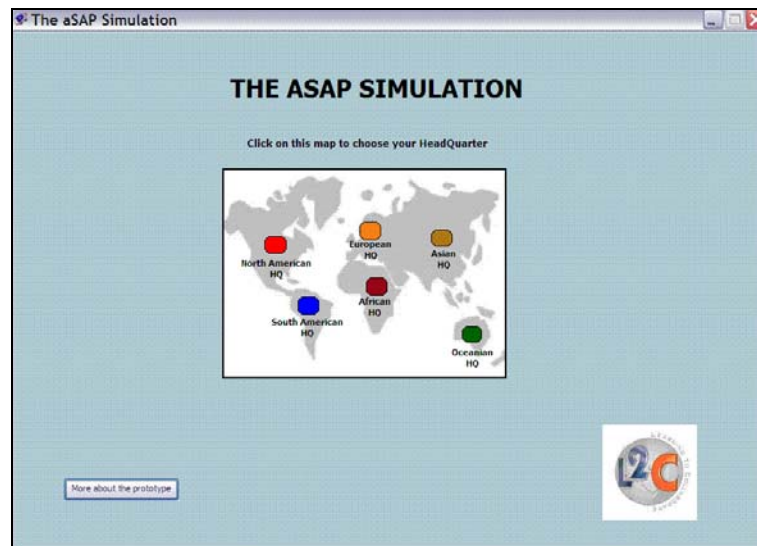
Figure 19. aSAP Simulation Start Page

Mission Statement

A mission statement will be presented and after reading it, teams will have to click on "I have read the mission" in order to proceed onto the next step (Figure 20). All 6 teams have to read and accept the mission before the game can begin.
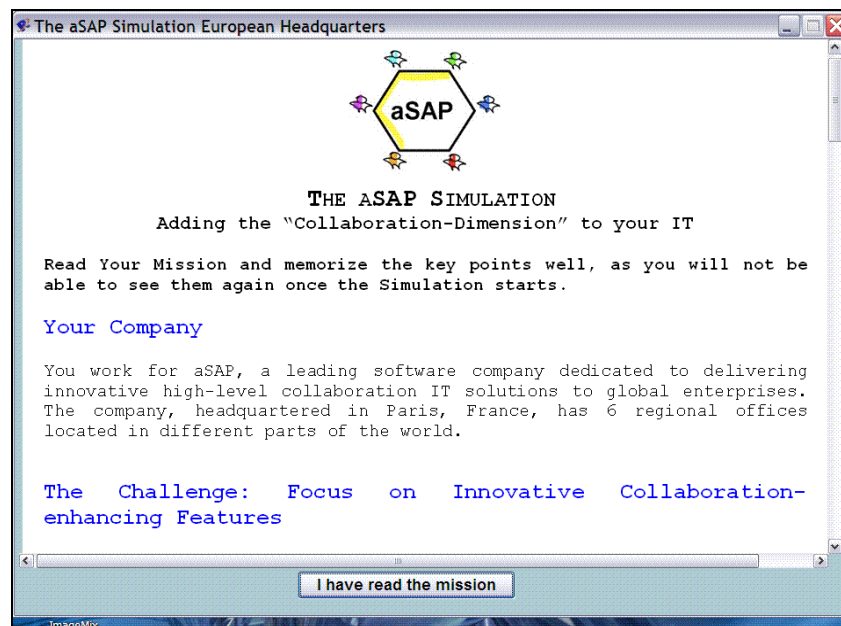
Figure 20. Mission Statement

Innovations projects table

Once all teams have accepted the mission, they will enter the first phase of the game, which is to nominate their Innovation Plans into the Project Table (Figure 21). Teams make a nomination by clicking an Innovation Project from the "Your Innovation Projects" table at the bottom of the page and dragging it to any slot in the aSAP Innovation Projects table.
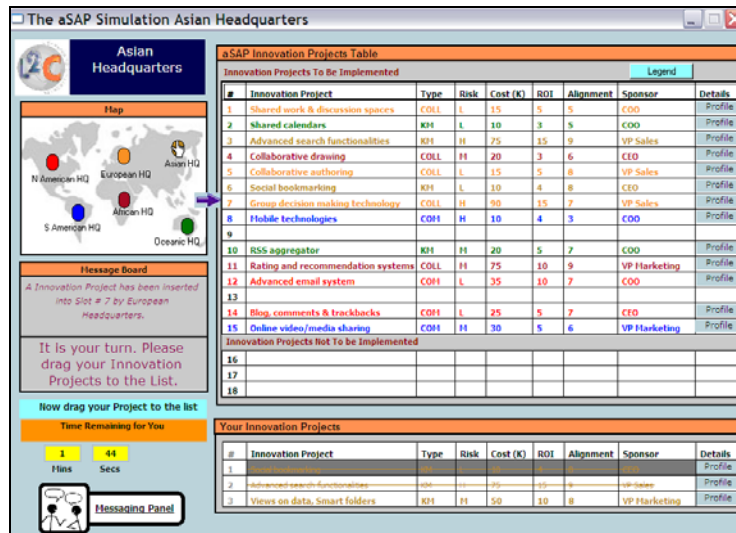
Figure 21. aSAP Simulation Game Page

Project profiles

Players can also view more detailed profiles of any of the Innovation Projects by going to the column "Details" on the Project Implementation Table and selecting the "Profile" of the Innovation Project they wish to see (Figure 22).
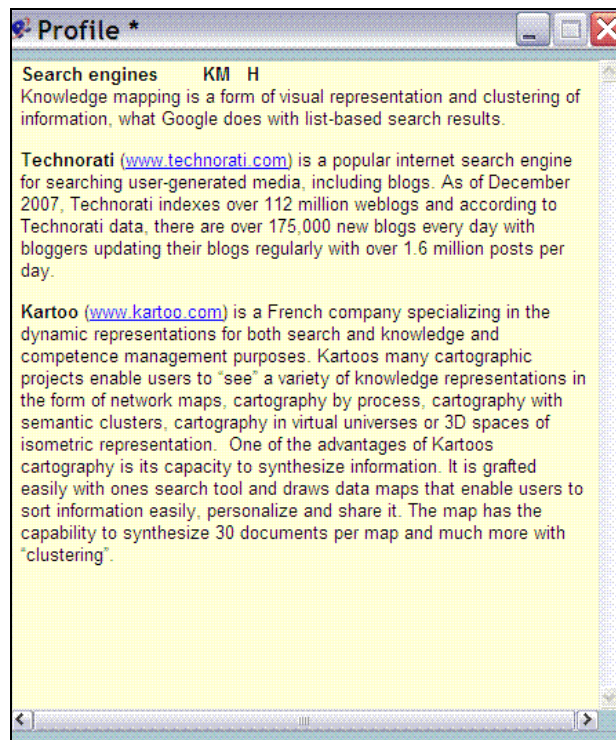
Figure 22. Profile of an Innovation Project

Chat

A chat function is available to allow teams to communicate with other teams (Figure 23). This function can be activated or disactivated by the facilitator. Players send a message by (1) typing a message in box "Type your text here", then (2) selecting the recipient(s) of the message from a pull down list and (3) sending the message. The message will automatically appear in the Messaging Panel above, as will all responses to the message.
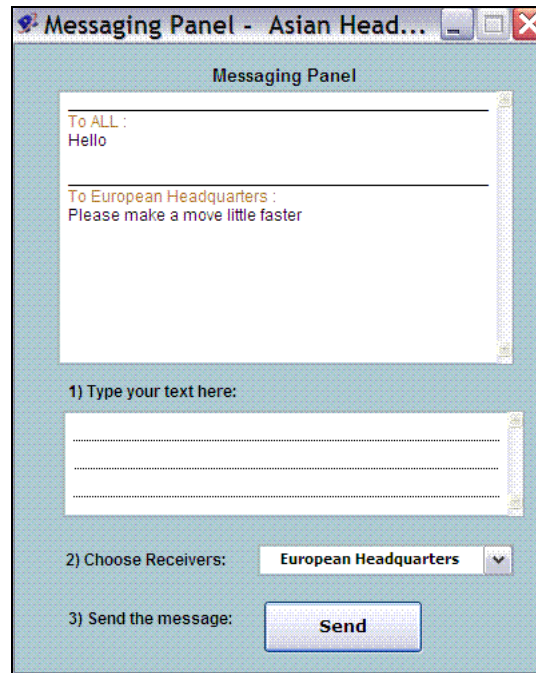
Figure 23. Messaging Panel (Chat)

☐

Administrator panel

In addition, the facilitator has access to certain administrative rights, allowing him or her to modify, reset or create new simulation game sessions. The Administrator Panel (Figure 24) allows facilitators to control the time and chat functions during the simulation itself. Facilitators can also intervene during the game and send messages to one or more Headquarters (Figure 25).
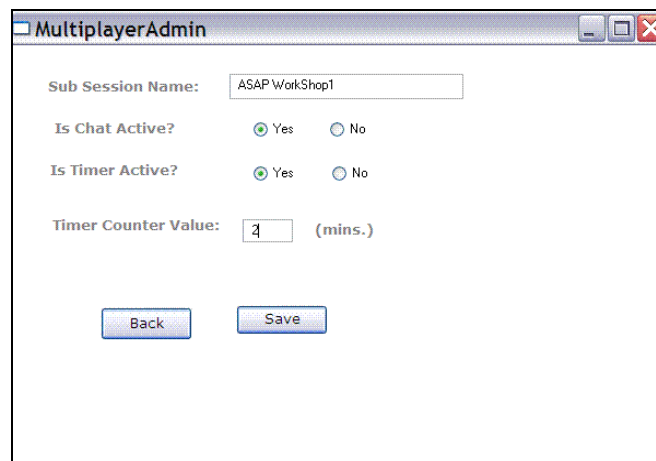
Figure 24. Administrative Panel
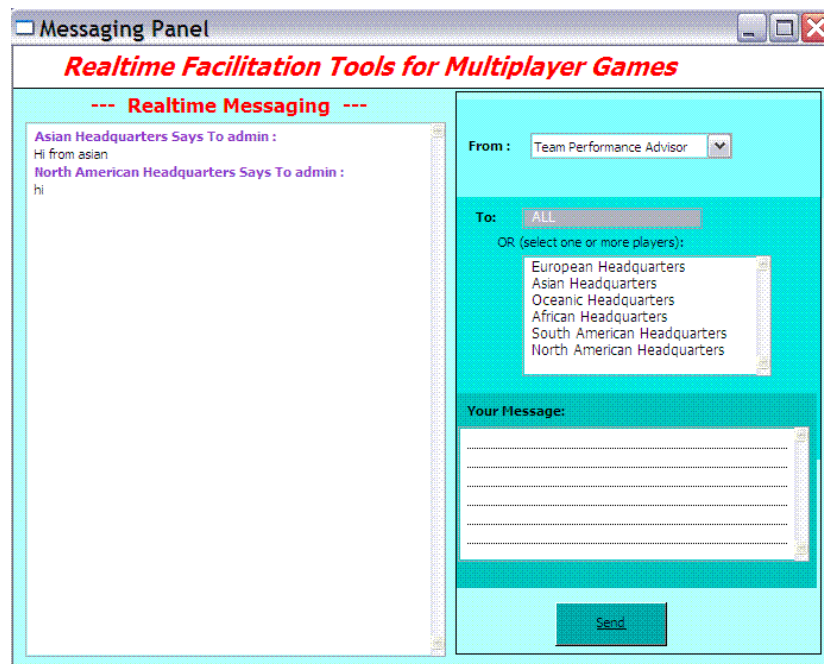
Figure 25. Real-time Facilitator Intervention

Targeted learning impact

Through the aSAP Simulation, participants will be exposed to a number of learning targets:

- The challenge of trying to achieve shared objectives in a diverse and distributed situation.
- The challenge of trying to maintain attention, motivation and participation among teams in a diverse and distributed situation.
- The challenge of building and developing trust among teams in a diverse and distributed situation.
- Experience how an initially collaborative endeavour can quickly deteriorate into a non-collaborative environment, with teams displaying a variety of negative, counter-productive behaviors (e.g. misattributions, distrust, competitive stances, frustration, etc).
- Respond effectively to external, unexpected pressures and events that can occur during the collaborative experience.
- Understand the different types of collaboration technologies, especially Web 2.0 tools, currently available to support distributed collaborations.

Debriefing can be structured accordingly to address in focus in on some or all of the learning targets, in addition to other objectives, based on the needs of the participants and workshop goals. Detailed information on these learning objectives are covered in a related document, "The aSAP Simulation: Deployment How Tos and Experiences".

Evidence from Early Experiences

As mentioned, the aSAP Simulation is one of five versions of the World Team Simulation developed in the context of the L2C Project. Each version differs from the other in terms of the scenario and mission, as presented in the following table.

World	Team	Context/Mission	Targeted collaboration issue

simulations		
GLOBank	Teams from an international bank have to collaborate on defining the acquisition strategy of banks for international expansion.	Selection of Acquisition Strategy.
World Tech	Teams from a global conglomerate in consumer goods have to maximize collaboratively the strategic value and competitiveness of an IT project investment portfolio.	Selection of Strategic IT Projects.
Food Alliance	Teams are part of a Food Alliance, comprised of 6 different stakeholders, brought together by the local council to get the best distribution of food outlets of Summerspree in the Erewhon district.	Complexity of aims in collaborative settings.
aSAP	Teams from a global software company have to collaborate on an Innovation Plan and implementation schedule for improving the company's Collaboration System.	Selection and management of innovative collaboration technologies (Web Trends).
Knowledge Fusion	Still under development	Challenges of the knowledge fusion process in distributed teams.

To date, three of the five World Team simulations (GLOBank, World Tech and Food Alliance) have been used with managers at different levels and functions in different organizations as well as educational staff, faculty and students from different universities. Pilot runs with actual users confirm the attractiveness and high potential value this type of simulations can create (at least from the short-term feedback we gathered throughout the different pilots).

In general, participants enjoyed the simulations and found it particularly instructive to put theory into practice. Participants agreed that the simulation exposed them to a number of important team collaboration issues such as trying to collaborate in a diverse and distributed setting without face to face interactions or dealing with some team breakdowns during the collaborative process, providing insights on searching strategies for win-win situation, basing strategic choices on data and observation, importance of communication, and helping others for common aim.

Interestingly, most of the positive comments were attributed to the importance of the debriefing session to frame the lessons learned from the game experience as collaboration dynamics and breakdowns were not self-evident to the participants. This is one of the important aspects to unlock the potential value of the simulation experience.

Areas for improvement include low levels of engagement during gameplay because of too much time taken by teams to make a move, too much information about the scenario/context which made reading and comprehension of the mission difficult, a mission that was perceived as too simple and inadequate and insufficient communication tools. Other criticisms included the lack of time to find a feasible solution, the lack of individual and collective feedback about the progress of collaboration and consequences of choices, and overall team performance. Many of these early feedback/insights have been used to improve successive versions of the simulations, as well as to the design of new scenarios.

A number of guidelines have also been created for effective deployment of the World Team simulations:

(1) **Identify and make explicit workshop objectives:** It is important for facilitators to specify what they what to accomplish, pedagogically, with the aSAP Simulation workshop, and to design a clear debriefing according to these learning objectives. A set of Introductory slides and Focus Topic slides for the aSAP simulation is available from which you can build your own debriefing session. It is also important to set the learning context for the participants, though a clear introduction, before they play aSAP

simulation.

(2) **Sense-making of phase 1:** It is important to communicate the purpose of Phase 1, i.e. creating a good starting position to reach faster a final solution in phase 2 of the game. Otherwise players may experience this phase as useless.

(3) **Manage time pressure:** This is important to guarantee the flow of the game and can be injected by limiting the duration of the game (e.g. 60 minutes) and of a single move (e.g. 1 minute). In order to guarantee the flow of the game there exists a timer, which can be activated and deactivated during the simulation game. Time limit of a move can be set from the beginning of the game or set later when a single move by a team takes too long. Time limits can be changed during the game at any time. Previous experience with similar simulations has shown that a good management of time pressure resulted in a more positive perception of the simulation game during the pilots. The following are some guidelines for the control of time limits:

> [G1]   If teams are taking too long to make a decision, limit the time allowed to 1 minute.
> [G2] If the facilitator notices that the levels of motivation and interest are still low with the 1 minute allotment, he or she should shorten the time limit accordingly.
> [G3]   A finishing time should be set up and made explicit/visible in order to maintain a certain level of time pressure within the experience.
> [G4]   Make sure that all the teams have their turn in the last round of decisions.

(4) **Control of communication:** Limited communication is a typical breakdown of collaboration in the real world. Within the aSAP simulation, the only form of communication allowed between teams is a chat tool. However in order to prevent teams from overusing the chat tool, the tool itself can be activated and disactivated by the facilitator during the game. When the coordination between the players via the chat function is too efficient, it may be necessary to disactivate the chat tool again. The following are some guidelines for the control of the chat function:

> [G1]   If teams are taking too long to make a decision, limit the time allowed to 1 minute.
> [G2] If the facilitator notices that the levels of motivation and interest are still low with the 1 minute allotment, he or she should shorten the time limit accordingly to maintain the flow and momentum of the experience.
> [G3]   A finishing time should be set up and made explicit/visible in order to maintain a certain level of time pressure within the experience.
> [G4]   Make sure that all the teams have their turn in the last round of decisions.
> [G5]   Increasing the overall duration of the game by allocating participants more time (> 1 hour if necessary) to find a feasible solution.

(5) **Real-time injection of unexpected events:** If the facilitator notices that teams are working towards consensus quickly and without too much difficulty, he or she should intervene and inject unexpected events and obstacles. The facilitator can inject unexpected events by either representing one of the players and/or acting as the Director of one of the headquarters, telling a team to implement a certain Innovation Plan first (e.g. because a competitor also wants to implement their plans) or not at all (e.g. because of the risk involved).

Sample list of unexpected events	
1	Changes in innovation project parameters: Changing economic situation, trends, competition from another innovation project, addition of a project which is not on the list, etc
2	Global headquarter changing the agenda / strategy / budget in the middle of the game
3	Sabotage (two or more teams having their own separate agendas)
4	Adding minor constraints to regional headquarters during the game or pushing for collaboration by the headquarter (e.g. threatening HQs) or giving preference to certain innovation projects
5	Blocking communication once in a while (after implementing a communication

	tool)
6	Exerting time pressures (decreasing the time teams have for arriving at a consensus)

(6) **Deal productively with the frustration of the players**: When playing these types of simulations, players reported negative experiences such as frustration, inefficiencies of collaboration, impatience, information overload, lack of transparency, etc. Because these experiences are the intended effects of the simulation (since they occur in real life collaborative situations as well) it is therefore the role of the facilitator to proactively take these negative experiences as a starting point for the debriefing and learning experience. When the facilitator explicitly addressed frustration in the simulation game, the players eventually had a more positive attitude towards the simulation game.

(7) **Stronger focus on learning targets**: As it is important to build the workshop around specific learning targets, a list of possible focus topics was generated previously. A slide set for many focus topics was generated and made available on the L2C Knowledge Community. When planning the workshop, the facilitator can pick the focus topic(s) he would like to address from the slide set. These slides also contain questions for group work that facilitate the player's systematic reflection of their experience in the simulation game.

5.   Rapid Customization Features and Deployment Implications

The aSAP Simulation was created using a flexible toolbox allowing anyone, even those without a technical background, to easily develop a variety of different simulation scenarios and achieve a variety of learning objectives related to collaboration dynamics.

A major component in this toolbox is a XML layer allowing non-technical people to produce new scenarios which are then processed by the simulation software to automatically generate new versions. Specifically, all the text related to the game (scenario, mission statement, descriptions and values associated with each of the 18 projects, banks, etc) is defined in an XML file. A new game stack is created by loading the XML file for new game into a generic game stack for multiplayer games. Thereby, changing any text in game is very easy. A copy of the XML file and all the constants related to the game is available in Appendix A.

However, if we want to have a different scenario with new sets of condition, then logic of the game server will have to be changed, with some changes required in the game client also.

The flexibility and ease with which changes to the scenario can be made increases the deployability and marketability of the simulations because they can be easily "injected" or adapted to a broader variety of contexts. To date, five different World Team scenarios have been created and deployed by different organizations, fitting with their own specific learning needs.

6. References

Abrams L.C, Cross R., Lesser E., Levin D.Z. (2003). Nurturing interpersonal trust in knowledge-sharing networks, *Academy of Management Executive*, *17, No. 4*.

Amason, A.C., Hochwarter, W.A., Thompson, K.R. & Harrison, A.W. (1995). Conflict: An important dimension in successful management teams. Organisational Dynamics, 24 (2), 20-35.

Ames C. (1992). Classrooms: Goals, structures, and student motivation, Journal of Educational Psychology, Vol. 84.

Angehrn, A.A. (2006); L2C: Designing Simulation-based Learning Experiences for Collaboration Competencies Development; ALT-C 2006; 13th International Conference of the Association for Learning Technology, 5-7 September 2006, Edinburgh, Scotland

Angehrn, A.A. & Nabeth, T. (2006); The L2C Project: Learning to Collaborate through advanced SmallWorld Simulations; ECTEL 2006; First European Technology Enhanced Learning Conference, 1-4 October 2006, Crete, Greece

Bandura A., Social foundations of thought and action: A social cognitive view, Pretince-Hall, Englewood Cliffs, NJ, 1997.

Barefoot, J. C., and L. H. Strickland (1982) Conflict and dominance in television-mediated interactions, Human Relations, 35, 7, 559–566.

Branden N., Self-Esteem at Work: How Confident People Make Powerful Companies, Jossey Bass, San Francisco, 1998.

Coleman, D. and Young, J. (2004) Critical factors for adoption of collaborative technologies. Collaborative Strategies.

Deci EL. and Rayn RM., Intrinsic motivation and self-determination in human behaviour, Plenum, New York, 1985.

Dweck C. and Leggett E., A Social-cognitive approach to motivation and. Personality, Psych. Review, Vol. 95, 1988.

Euwema, M.C., Van de Vliert, E. and Bakker, A.B. (2003). Substantive and relational effectiveness of organisational conflict behaviour. The International Journal of Conflict Management, 14 (2), 119- 139.

Festinger L., A Theory of Cognitive Dissonance, Stanford University Press, Stanford CA, 1957.
Fliaster, A. (2000b): Towards People-Focused Knowledge Fusion Paradigm of Organisational Innovation Management. In: Proceedings of the KMAC 2000 Conference "Knowledge Management Beyond the Hype: Looking Towards the New Millennium", ed. by J. Edwards and J. Kidd. Aston Business
School,   Aston   University,   Birmingham,   UK,   July,   S.   385-396
[http://www.orsoc.org.uk/shop/ors/bob20.htm].

Friedman, R.A., Tidd, S.T., Currall, S.C. & Tsai, J.C. (2000). What goes around comes around: The impact of personal conflict style on work conflict and stress. The International Journal of Conflict Management, 11 (1), 32-55.

Glasl, F. (2004). Konfliktmanagement. Handbuch für Führungskräfte, Beraterinnen und Berater. 8 ed. Bern: Haupt.

Goldman B. M., Toward an Understanding of Employment Discrimination Claiming: An Integration of Organisational Justice and Social Information Processing Theories, Personnel Psychology, Summer 2001, pp. 361-386.

Gross, M.A. and Guerrero, L.K. (2000). Managing conflict appropriately and effectively: An application of the competence model to Rahim's Organisational Conflict Styles. The International Journal of
Conflict Management, 11 (3), 200-226.

Grundin, J. (1988) Why CSCW applications fail: problems in the design and evaluation of organisational interfaces. Proceedings of the 1988 ACM Conference on Computer-Supported Collaborative Work, Portland, Oregon, 85-93.

Hackman J. R. and Oldham G. R., Motivation through the Design of Work: Test of a Theory, Organisational Behaviour and Human Performance, August 1976, pp. 250-279.

Hammer, M.R. (2005). The Intercultural Conflict Style Inventory: A conceptual framework and measure of intercultural conflict resolution approaches. International Journal of Intercultural Relations, 29 (6), 675-695.

Hansen, M.T., Nohria, N., Thierney, T. (1999): What's Your Strategy for Managing Knowledge? in: Harvard Business Review, March-April 1999

Hill, R.E. and Somers, T.L. (1988). Project Teams and the Human Group. In D.I. Cleland & W.R. King (Eds.), Project Management Handbook, 2nd ed. (pp. 771-801). New York, NY: Van Nostrand Reinhold.

Huxham, C. and Vangen, S. (2005), Managing to Collaborate: the theory and practice of collaborative advantage, London:Routledge.

Huxham, C., Vangen, S. (2004): Doing Things Collaboratively: Realizing the Advantage or Succumbing to Inertia?, in Organisational Dynamics, Vol. 33, No. 2, pp. 190-201

Ives, B. and Jarvenpaa, S.L. (1991) Applications of global information technology: Key issues for management. MIS Quarterly, 15, 1, 33-49.

Jarvenpaa, S. L. and Leidner, D. E. (1998). Communication and trust in global virtual teams. Journal of computer-mediated communication, 3, 4. [Online version on http://jcmc.indiana.edu/].

Jehn, K.A., Northcraft, G.B. and Neale, M.A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. Administrative Science Quarterly, 44 (4), 741- 763.

Jehn, K.A. (1995). A multi method examination of the benefits and detriments of intragroup conflict. Administrative Science Quarterly, 40, 256-282.

Jehn, K.A. and Mannix, E.A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. Academy of Management Journal, 44 (2), 238-251.

Joinson, A. N., and P. R. Harris (1998) Causes and implication of disinhibited behaviour on the net, in J. Gackenbach (ed.), Psychology and the Internet: Intrapersonal, Interpersonal, and Transpersonal Implications, San Diego, CA: Academic Press.

Kaiser, P., Tullar, W. and McKowen, D. (2000) Student team projects by Internet. Bus. Comm. Quarterly, 63, 4, 75-82.

Karsten, H. (1999). Collaboration and collaborative information technologies: A review of the evidence, The DATABASE for Advances in Information Sciences, 30, 2, 44-65.

Kayworth, T.R. and Leidner, D.E. (2000) The global virtual manager: a prescription for success, European Management Journal, 18, 2, 183-94.

Kramer, R.M. (1999). Trust and Distrust in Organisations: Emerging Perspectives, Enduring

Questions. Annual Review of Psychology, 50, 569-98.

Kohanski, D. (1998) Moths in the Machine. St. Martin's Press, New York, NY.

Lewicki, R.J. and Bunker B.B. (1996). Developing and maintaining trust in work relationships. In R.M. Kramer & T.R. Tyler (Eds.), Trust in organisations: Frontiers of theory and research (pp. 114-139). Thousand Oaks, CA, US: Sage Publications.

Majchrzak, A., Rice, R.E., Malhotra, A., King, N. and Ba, S. (2000) Technology adaptation: The case of a computer-supported inter-organisational virtual team. MIS Quarterly, 24, 4, 569-600.

Markus, M. L. (1987) Toward a 'critical mass' theory of interactive media: Universal access, interdependence, and diffusion. Communication Research, 14, 5, 491-511.

Mattessich P. W., Murray-Close M. and Monsey B. R. (2001) Collaboration: what makes it work?, Amherst H., Wilder Foundation.
Mayer, R. C., Davis, J. H., and Schoorman, F. D. (1995). An integrative model of organisational trust. Academy of Management Review, 20, 3, 709-734.

Maznevski, M.L. and Chudoba, K.M. (2000) Bridging space over time: Global virtual team dynamics and effectiveness. Organisational Science, 11, 5, 473-492.

McClelland D. C., Toward a Theory of Motive Acquisition, American Psychologist, May, 1965, pp. 321- 333.

McFarland, W.P. and Culp, W.H. (1992). Interpersonal skill training for effective conflict resolution. School Counselor, 39 (4), 304-310.

Neale MA, Owens DA and Mannix EA, The Strategic Formation of Groups, Res. on Groups and Teams, 1, 1998.

Nelson K. M. and Cooprider J. G., The contribution of shared knowledge to IS group performance, MIS Quarterly, Vol. 20, 1996, pp. 409-429.

Nemeth, C. (1995). Dissent as driving cognition, attitudes and judgements. Social Cognition, 13, 273-291.

Orlikowski, W.J. (2000) Using technology and constituting structures: A practice lens for studying technology in organisations. Organisational Science, 11, 4, 404-428.

Orlikowski, W.J. and Baroudi, J.J. (1991) Studying Information Technology in Organisations: Research Approaches and Assumptions, Information Systems Research, 2, 1.

Panteli, N. and Sockalingam, S. (2005). Trust and conflict within virtual inter-organisational alliances: a framework for facilitating knowledge sharing. Decision Support Systems, 39, 599-617.

Pelled, L.H. (1996). Demographic diversity, conflict, and work group outcomes: an intervening process theory. Organisation Science, 7 (6), 615-631.
Pelled, L.H., Eisenhardt, K.M. and Xin, K.R. (1999). Exploring the black box: An analysis of work group diversity, conflict and performance. Administrative Science Quarterly, 44, 1-28.

Poole, M. S., M. Holmes, and G. DeSanctis (1991) Conflict Management in a computer-supported meeting environment. Management Science, 37, 926–953.

Powell, A., Piccoli, G. and Ives, B. (2004) Virtual teams: A review of current literature and directions for future research. The DATA BASE for Advances in Information Systems, 35, 1, 6-36.

Prates, R.Q., de Souza, C.S. and de Assis, P.S. (2001) Categorizing communicability evaluation breakdowns in groupware applications. In Proceedings from the 2nd South African

Conference on
Human.

Roberts J., From know-how to show how? Questioning the role of information and communication technologies in knowledge transfer, Technology Analysis & Strategic Management, Vol.12, 2000, pp. 429-443.

Rogers, E.M. (1983) Diffusion of Innovations. 3 edition, The Free Press, New York, NY.

Ross, L. (1977) The intuitive psychologist and his shortcomings: Distortions in the attribution process," in L. Berkowitz (ed.), Advances in Experimental Social Psychology, v 10, Orlando, FL: Academic Press, 173–220.

Sapp, D. (1992) The point of creative frustration and the creative process: A new look at an old model. The Journal of Creative Behaviour, 26: 21-28.

Schriesheim CA., Tolliver J. M. and Behling O.C., Leadership Theory: Some Implications for Managers, Business Topics, Summer, 1978, p.35.

Shapero, A. (1985) Managing Creative Professionals. Research Management, March-April: 23-28.

Staw, B., Sandelands, L. and Dutton, J. (1981). Threat-rigidity effects in organisational behaviour: A multilevel analysis. Administrative Science Quarterly, 26, 501-526.

Stevens, M.J. and Campion, M.A. (1994). The Knowledge, Skill, and Ability Requirements for Teamwork: Implications for Human Resource Management. Journal of Management, 20 (2), 503-530.

Takeuchi, H. (1998): Beyond Knowledge Management: Lessons from Japan, in: http://www.sveiby.com/Portals/0/articles/LessonsJapan.htm

Thomas, K. (1992). Conflict and Negotiation Processes in Organisations. In M.D. Dunnette & L.M. Hough (Eds.), Handbook of Industrial and Organisational Psychology (2nd ed.), Vol. 3 (pp. 651-717). Palo Alto, CA: Consulting Psychologists Press.

Thomas K. W., Intrinsic Motivation at Work: Building Energy and Commitment, Berrett-Koehler Publishers, San Francisco, 2000.

Thomas, D., Bostrom, R. and Gouge, M. (2005) Making knowledge wok successful in virtual teams via technology facilitation. Forthcoming in CACM.

Tushman, M.L. and Scanlan, T.J. (1981). Boundary Spanning Individuals: Their Role in Information Transfer and Their Antecedents. Academy of Mgmt Journal, 24 (2), 289-305.

Van de Vliert, E. (1997). Complex interpersonal conflict behaviour: Theoretical frontiers. Hove, England: Psychology Press/Erlbaum (UK) Taylor & Francis.

Van Vianen A.E.M., Person-Organisation Fit: The match between newcomers' and recruiters' preferences for organisational ultures, Personnel Psychology, Vol. 53, 2000.
von Krogh, G., Spaeth, S. and Lakhani, K.R. (2003) Community, joining, and specialization in open source software innovation: a case study, Research Policy 32, 7, 1217–1241.

Yamauchi, Y., Yokozawa, M. Shinohara, T. 7 Ishida, T. (2000) Collaboration with lean media: how open-source software succeeds. In Proceedings of ACM Conference on Computer Supported
Cooperative Work, Philadelphia, PA, 329-338, December 2000.

Yi LM, Ellis P., Insider-outsider perspectives of Guanxi: many benefits are associated with cultivating uanxi in business, say both mainland and Hong Kong Chinese. But which

characteristics are most mportant? And what are the costs? Business Horizons Periodical, Vol. 46, 2000.

Zaheer, A., McEvily, B. and Perrone, V. (1998). Does Trust Matter? Exploring the Effects of Interorganisational and Interpersonal Trust on Performance. Organisation Science, 9, 141-159.

Appendix A- ASAP Simulation XML File

```
<multiPlayerGame>
        <!-- Name of the Game  -->
        <gameName>THE ASAP SIMULATION</gameName>

        <!-- Game Title  -->
        <gameTitle>Adding the Collaboration-Dimension to your IT </gameTitle>

        <!-- URL of the server for the Game  -->
        <serverURL>http://fw-
wwwcalt2.insead.edu/l2c/games/aSAP/WMGAction.php</serverURL>

        <!-- Name of the Data folder which contains game data  -->
        <dataFolderName>The ASAP Data</dataFolderName>

        <!-- Type of the object used in the game Ex: Bank, Song  -->
        <objectType>Innovation Project</objectType>

        <!-- Information about Missions  -->
        <missions>

                <!-- Mission Data and Font parameters  -->
                <mission fontName="Verdana" fontSize="10">

                        <!-- There can be many text parts in a mission with different font style  --
>
                        <missionText fontStyle="bold">Read Your Mission and memorize the
key points well, as you will not be able to see them again once the Simulation starts.

                        </missionText>
                        <missionText fontStyle="">Your Company:
You work for aSAP, a leading software company dedicated to delivering innovative high-level
collaboration IT solutions to global enterprises. The company, headquartered in Paris, France,
has 6 regional offices located in different parts of the world.

The Challenge: Focus on Innovative Collaboration-enhancing Features

Currently, the company has a first prototype of the aSAP Collaboration System. This system
has a number of standard communication features that have been beta-tested in the 6 regional
markets.

Your Role

You and your team represent your region's Innovation Advisory Headquarter, in charge of
spearheading the innovative development of the aSAP Collaboration System.


Mission of the 6 Innovation Headquarters

Your team is about to join in conference call with the other 5 regional Innovation Headquarters.
Each of the 6 HQs has already collected insights from their local Web Trends Experts, and
based on trends and needs of the local market, will be asked to propose 3 Value-Adding
Innovation Projects to be implemented and made ready for alpha testing. Additionally, working
together with the other HQs, you will have to decide on the Innovation Plan which lists the order
in which 15 of the retained Innovation Projects will be implemented over the next 15 months.

From past experience you know that the Innovation Projects nominated by your colleagues all
over the world are always of very high quality. Collaborating towards delivering a high-value and
```

competitive Innovation Plan should not be too difficult, especially if you follow the Golden Rule that in this business:

                                                                                                                            </missionText>
                                                                                                                              <missionText fontStyle="red"> You should always avoid implementing consecutively 2 projects of the same Innovation Type (Communication, Collaboration or Knowledge Management). You risk giving the users the impression that too much innovation focus is placed on either communication, collaboration or knowledge management features. </missionText>
                                                                    <

                                                                         <missionText fontStyle="bold">How to Proceed?

Phase 1 is pretty simple and straightforward. It involves nominating Innovation Projects to be considered. Each HQ will take turns for positioning one of their proposals in the Innovation Plan (that will appear on the screen). You'll be able to add your 3 proposals and also to see what other HQs have proposed.

During Phase 2, each HQ, in turn, will be able to propose changes to the order of the list of the 15 Innovation Projects selected (by modifying the position/priority of each Innovation Project).

Your Mission (which is the one of the Global Innovation Advisory Team as a whole) is to come up with the best possible aSAP Innovation Plan. Your collaboration with the other Innovation HQs will end once all the HQs are happy with the list and priorities of selected Innovation Projects. The Innovation Plan you will all have agreed on at this Meeting will then start to get implemented!

And now you are ready to start!

</missionText>

                                                                             </mission>
                                                                             <mission fontName="Verdana" fontSize="10">

                                                                     <!-- There can be many text parts in a mission with different font style -->

                                                                     <missionText fontStyle="bold">***
                                                                     </missionText>
                                                                     <missionText fontStyle="">***
                                                                     </missionText>
                                                                     <missionText fontStyle="red"> You should always avoid prioritizing consecutively 2 Projects with same Implementation Risk Level. Indeed, you should distribute the risk level across the 15 months of implementation, in order to avoid giving investors the impression that the new collaboration features are either too risky or not innovative enough to remain competitive. </missionText>
                                                                     <missionText fontStyle="bold">***</missionText>

                                                      </mission>
                                                  </missions>

                                                  <!-- Information about Players -->
                                                  <players>

                                                                   <!-- Player Data -->
                                                                   <player>

                                                                     <!-- Player Name -->
                                                                     <playerName>European Headquarters</playerName>

                                                                     <!-- Player Colour -->

```
                              <playerColour>DarkOrange</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>1</missionMap>

                              <!-- The Object (innovation project) to which this player has to be
mapped  -->
                              <ObjectMap>7,8,9</ObjectMap>

                  </player>
                  <player>

                              <!-- Player Name  -->
                              <playerName>Asian Headquarters</playerName>

                              <!-- Player Colour  -->
                              <playerColour>DarkGoldenrod</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>2</missionMap>

                              <!-- The songs to which this player has to be mapped  -->
                              <ObjectMap>13,14,15</ObjectMap>

                  </player>
                  <player>

                              <!-- Player Name  -->
                              <playerName>Oceanic Headquarters</playerName>

                              <!-- Player Colour  -->
                              <playerColour>DarkGreen</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>1</missionMap>

                              <!-- The songs to which this player has to be mapped  -->
                              <ObjectMap>16,17,18</ObjectMap>

                  </player>
                  <player>

                              <!-- Player Name  -->
                              <playerName>African Headquarters</playerName>

                              <!-- Player Colour  -->
                              <playerColour>Brown</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>2</missionMap>

                              <!-- The songs to which this player has to be mapped  -->
                              <ObjectMap>10,11,12</ObjectMap>

                  </player>
                  <player>

                              <!-- Player Name  -->
                              <playerName>South American Headquarters</playerName>

                              <!-- Player Colour  -->
```

```
                              <playerColour>Blue</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>1</missionMap>

                              <!-- The songs to which this player has to be mapped  -->
                              <ObjectMap>4,5,6</ObjectMap>

                      </player>
                      <player>

                              <!-- Player Name  -->
                              <playerName>North American Headquarters</playerName>

                              <!-- Player Colour  -->
                              <playerColour>Red</playerColour>

                              <!-- The mission to which this player has to be mapped  -->
                              <missionMap>2</missionMap>

                              <!-- The songs to which this player has to be mapped  -->
                              <ObjectMap>1,2,3</ObjectMap>

                      </player>
              </players>

              <!-- Information about Table  -->
              <table>

                      <!-- Table Headings  -->
                      <headingTop>Innovation Projects Aquisition Table</headingTop>
                      <subHeading1>Innovation Projects To Be Implemented</subHeading1>
                      <subHeading2>Innovation Projects Not To Be Implemented</subHeading2>

                      <!-- Sizes of the columns in the table Ex: 45,60,100,45 if there are 4 columns  --
>
                      <columnSizes>30,50,180,40,40,40,40,60,50,90</columnSizes>

                      <!-- Column Data  -->
                      <columns>

                              <!-- There can be many "column" elements each describing one
column. The description about all the columns can be used as "Legend" for the table  -->

                              <column>

                                      <!-- Name of the column  -->
                                      <columnName>#</columnName>

                                      <!-- Description about that column  -->
                                      <columnDescription>Serial Number</columnDescription>

                              </column>
                              <column>

                                      <!-- Name of the column  -->
                                      <columnName>Innovation Project/columnName>

                                      <!-- Description about that column  -->
                                      <columnDescription>Innovation Project</columnDescription>
```

```
                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>Innovation Type</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>Innovation Types
</columnDescription>

                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>Implementation Risk</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>Implementation Risk</columnDescription>

                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>Cost (K)</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>Cost (K)</columnDescription>

                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>ROI</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>ROI</columnDescription>

                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>Alignment</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>Alignment</columnDescription>

                        </column>
                        <column>

                                <!-- Name of the column  -->
                                <columnName>Sponsor</columnName>

                                <!-- Description about that column  -->
                                <columnDescription>Sponsor</columnDescription>

                        </column>
                        <column>

                </table>

        <!-- Objects Data -->
```

```xml
<objects>

        <!-- 18 object elements have to be defined -->
        <object>

                <!-- The parameters of each object for each column can be defined here
-->
                <columnParameters>

                        <!-- Number of "columnParameter" elements should be equal to
number of "column" elements -->
                        <columnParameter>1</columnParameter>
                        <columnParameter>Advanced email
system</columnParameter>
                        <columnParameter>COM</columnParameter>
                        <columnParameter>L</columnParameter>
                        <columnParameter>10</columnParameter>
                        <columnParameter>7</columnParameter>
                        <columnParameter>COO</columnParameter>

                </columnParameters>

                <!-- Additional Information about each object Ex: SongURL or
ImageURL  -->

                <additionalInfo></additionalInfo>

        </object><object>

                <!-- The parameters of each object for each column can be defined here
-->
                <columnParameters>

                        <!-- Number of "columnParameter" elements should be equal to
number of "column" elements -->
                        <columnParameter>2</columnParameter>
                        <columnParameter>Video conferencing</columnParameter>
                        <columnParameter>COM</columnParameter>
                        <columnParameter>H</columnParameter>
                        <columnParameter>30</columnParameter>
                        <columnParameter>8</columnParameter>
                        <columnParameter>4</columnParameter>
                        <columnParameter>CEO</columnParameter>
                        <columnParameter>EU</columnParameter>

                </columnParameters>

                <!-- Additional Information about each object Ex: SongURL or
ImageURL  -->

                <additionalInfo></additionalInfo>

        </object>

        <!--  Similarly we can define the other 15 objects -->

    </objects>
</multiPlayerGame>
```

Appendix C   Measuring the Impact of EduSynergy on Change and Innovation Resistance Dynamics Awareness

Measuring the Impact of EduSynergy on Change and Innovation Resistance Dynamics Awareness

Albert A. Angehrn and Katrina Maxwell

Fostering change and enhancing collaborative behaviour among the different stakeholders in higher education is a challenging task. Universities are increasingly faced with various demands for deep changes and innovations, including the introduction of collaborative practices and systems. The EduSynergy simulation allows people in academic institutions to experience the challenge of introducing collaborative practices and systems in their environment. As the learning objectives of the EduSynergy simulation are to increase participants' understanding of the dynamics of change and innovation we decided to focus our research on testing two hypotheses:

Hypothesis 1: *Most people who are closely involved with higher educational institutions; for example, students, alumni, non-academic staff, academic staff and industrial sponsors, do not really understand the dynamics of change and innovation in this environment.*

Hypothesis 2: *The EduSynergy Workshop will increase the participants' understanding of the dynamics of change and innovation in educational institutions.*

Analysis of pre-workshop understanding of change and innovation

In order to begin collecting evidence to verify the first hypothesis, we invited all 118 registered partners of the Integrated Project TENCompetence (TENC) project to complete an on-line survey about the dynamics of change and innovation in educational institutions. The aim of the TENC project is to build a European Network for Lifelong Competence Development. Partners in the project have an interest in personal competence management and are from, or work closely with, academic institutions. The pre-workshop survey asked their opinion about 47 different statements using a five point Likert scale (strongly disagree=1, disagree, neutral, agree, strongly agree=5). These statements are based on the learning objectives of the EduSynergy simulation. We also collected information about their gender, age, nationality, academic institution, highest educational degree, years work experience, and current position. Out of 118 people registered on the TENCompetence website we received 48 completed pre-workshop surveys, a response rate of 41%. This sample is quite a diverse group, consisting of 19 females and 29 males from 27 different organizations. They ranged in age from 18 to 57, and had between 0 to 34 years work experience. 87% of the sample had a postgraduate degree (Table 1). Academic staff comprised 71% of the sample (Table 2). Respondents represented 17 different nationalities (Table 3).

Table 1: Highest educational degree

```
                  education |     Freq.      Percent        Cum.
--------------------------------+---------------------------------
    BS/BSc/BA/licence or equivalent |        3        6.25        6.25
MS/MSc/MA/MBA/maitrise or equivalent |       32       66.67       72.92
                  No degree |        3        6.25       79.17
          PhD/doctorat or equivalent |       10       20.83      100.00
--------------------------------+---------------------------------
                      Total |       48      100.00
```

Table 2: Current position in academic institution

```
              role |     Freq.      Percent        Cum.
------------------+---------------------------------
   Academic Staff |       34       70.83       70.83
           Alumni |        1        2.08       72.92
Industrial Sponsor |        1        2.08       75.00
Non-Academic Staff |        5       10.42       85.42
          Student |        7       14.58      100.00
------------------+---------------------------------
            Total |       48      100.00
```

Table 3: Primary nationality

```
nationality |     Freq.      Percent        Cum.
------------+---------------------------------
   American |        1        2.08        2.08
   Austrian |        6       12.50       14.58
    Belgian |        2        4.17       18.75
  Brazilian |        1        2.08       20.83
    British |        6       12.50       33.33
  Bulgarian |        3        6.25       39.58
      Dutch |        9       18.75       58.33
   Estonian |        2        4.17       62.50
     German |        5       10.42       72.92
     Indian |        2        4.17       77.08
    Italian |        1        2.08       79.17
    Ivorian |        1        2.08       81.25
 Portuguese |        1        2.08       83.33
    Russian |        2        4.17       87.50
     Slovak |        2        4.17       91.67
    Spanish |        3        6.25       97.92
   Yugoslav |        1        2.08      100.00
------------+---------------------------------
      Total |       48      100.00
```

The summary statistics for our sample can be found in Table 4. The list of questions that correspond to q1 through q47 can be found in the appendix. We tested the normality of each item based on skewness and kurtosis tests and found that 55% are normally distributed.

Table 4: Summary Statistics for TENC Partners

Variable	Obs	Mean	Std. Dev.	Min	Max
q1	48	3.0625	1.118629	1	5
q2	48	2.458333	.8240619	1	5
q3	48	2	1.129865	1	5
q4	48	4.354167	.5645402	3	5
q5	48	4.041667	.7133479	2	5
q6	48	2.625	.8902546	1	5
q7	48	3.208333	.8240619	1	5
q8	48	4.020833	.956269	1	5
q9	48	3.4375	.7964349	2	5
q10	48	2.666667	.7809796	1	4
q11	48	3.666667	.8336879	2	5
q12	48	2.041667	.8741764	1	5
q13	48	3.479167	1.010363	1	5
q14	48	4.166667	.5586204	3	5
q15	48	4.229167	.691578	2	5
q16	48	3.979167	.837666	2	5
q17	48	2.458333	.8494888	1	4
q18	48	4.666667	.5191373	3	5
q19	48	4.208333	.7978251	2	5
q20	48	3.333333	.8832564	1	5
q21	48	4.083333	.7672369	2	5
q22	48	3.854167	1.051637	1	5
q23	48	3.8125	.8162251	2	5
q24	48	2.333333	.7809796	1	4
q25	48	4.541667	.5441501	3	5
q26	48	3.9375	.7553004	2	5
q27	48	3.5	.9225312	1	5
q28	48	3.6875	.7761402	2	5
q29	48	3.166667	.8588298	1	5
q30	48	2.020833	.7576443	1	4
q31	48	3.958333	.8494888	2	5
q32	48	4.166667	.5954913	3	5
q33	48	3.1875	1.003319	1	5
q34	48	1.708333	.6509676	1	3
q35	48	2.291667	.8741764	1	5
q36	48	3.125	1.084219	1	5
q37	48	3.229167	.9280403	1	5
q38	48	3.229167	.8565041	2	5
q39	48	3.958333	.8494888	2	5
q40	48	3.458333	.8240619	2	5
q41	48	3.416667	.8463522	2	5
q42	48	3.5	.8505317	2	5
q43	48	3.145833	.9890805	1	5
q44	48	2.770833	1.056683	1	5
q45	48	4.291667	.5441501	3	5
q46	48	2.9375	.8355467	1	5
q47	48	2.5	.9453132	1	5

Respondents already mainly agreed with fifteen items. They already believe that people have different attitudes towards collaboration (q4). In order to succeed as an academic, on must be willing to collaborate (q5), Teams with a higher sense of membership tend to be better performing (q8). Some people need lots of convincing in different ways before they will change their working habits (q14). Prior experience and technology

proficiency affects an individual's willingness to use a new technology (q15). Face-to-face meeting are an effective way to convince people to change (q16). Building trust is an important element of any collaborative process (q18). It is important to involve stakeholder groups early (q19). Hands-on training and continuous support is necessary for a new system to become widely adopted (q21). People react differently to new ideas (q25). In order for collaboration to succeed, it is necessary to reach a common understanding of the advantages for all parties (q26). The source of resistance to change is mainly rooted in the tendency to preserve current practices and power structures (q31). Effective collaboration processes are essential to improve the performance of higher educational institutions (q32). Before collaboration begins, all parties should agree on the aims of the collaborative process (q39). Motivation to collaborate increases when individuals understand the objective of the collective work (q45). They already mainly disagreed with four items. An effective way to get someone to change their working habits is to order them to change (q3). It is easier for academic institutions to change than it is for other organizations (q12). In a higher educational institution, all decisions are based on logic and everything is under control (q34). People like changing their working habits (q30). Respondents vary in their responses to the other twenty-eight items.

Table 5: Correlation between items (>0.50)

q47 and q17: 0.64
When their hierarchical superior is convinced something is the right thing to do, people do it.
When the Dean is convinced something is the right thing to do, people do it.
q12 and q14: -0.56
It is easier for academic institutions to change than it is for other organizations.
Some people need lots of convincing in different ways before they will change their working habits.
q18 and q4: 0.54
Building trust is an important element of any collaborative process.
People have different attitudes towards collaboration.
q14 and q16: 0.52
Some people need lots of convincing in different ways before they will change their working habits.
Face-to-face meetings, planned or unplanned, are an effective way to convince people to change.
q38 and q20: 0.52
At work, it is important to be aware which people regularly see each other during the day.
It is important to be aware of which people socialize outside work.

Correlation, calculated using the nonparametric Spearman test, among the 47 items is very low. The highest significant correlations are shown in Table 5. We did not have enough responses to undertake a meaningful factor analysis. Considering that the range of answers to all items is wide, the standard deviation is high, and their correlation is low, many respondents could benefit by improving some elements of their understanding of the dynamics of change and innovation in educational institutions. For example, many respondents do not see the need to be aware of which people socialize outside of work (q20), or which people regularly see each other during the day (q38).

Many also believe that people who work in higher educational institutions are open to adopting innovative practices (q46).

The EduSynergy TENC Winter School experiment

The five hour workshop was held at the TENC Winter School in Innsbruck in February 2008 and was attended by 28 people from 19 different academic institutions who have an interest in personal competence management making this is an ideal setting to test the impact of the simulation. Twenty participants held academic positions, five were students, two were non-academic staff members, and one was an industrial sponsor. Participants represented 13 nationalities and consisted of 12 females and 16 males. They had a very wide range of age (18 to 54) and work experience (0 to 31 years). 82% had postgraduate degree. The only significant differences in the pre-workshop survey, measured using the Mann-Whitney test for numerical variables and the Chi-squared test for categorical variables, between our sample and those TENC partners who did not attend the workshop is that those who attended the workshop were younger and had less work experience.

The actual time use during the EduSynergy TENC workshop was as follows:

1. Introduction and discussion of the difficulties of change (20 minutes)
2. Collaboration; change and sustainability (25 minutes)
3. EduSynergy simulation scenario (15 minutes)
4. Mission and Software demonstration (20 minutes)
5. Lunch and plan strategy (55 minutes)
6. Play Phase (95 minutes) – in teams of 3-5
7. Debriefing : facilitator gets students to talk about their experience so far and relates this to the learning objectives, discussed importance of organizational diagnosis (60 minutes).
8. Post-Workshop Survey (10 minutes)

At the end of the workshop, and before leaving the room, all 28 participants completed a post-workshop survey (a 100% response rate) which was identical to the pre-workshop survey with the addition of six statements: I enjoyed this workshop. This workshop has increased my understanding of the dynamics of change and innovation in educational institutions. I felt frustrated when I played the simulation. I would have preferred to play the simulation alone. Playing the simulation is fun. The characters in the simulation are realistic.

We added these additional questions in order to measure the success of the workshop, and gain additional knowledge that will help us improve the learning experience. We believe that one of the key pedagogical principles behind the EduSynergy simulation is that the difficulty of succeeding in the management mission causes the players to become frustrated. This increases the probably of triggering real learning, as it can touch people at other levels than the purely cognitive or the superficially social exchange level, helping them become more aware of their own limits. We also want to get a feel for the collaborative group dynamics by asking if participants believe that they could have succeeded had they played alone rather than collaborated in a group. We want participants to enjoy the workshop and feel that playing the EduSynergy simulation is fun. We believe that the fun comes from a number of sources, including the laughing generated by the character descriptions, and some of the ironic reactions of the simulated institution, for example, character feedback, unexpected events and

unexpected outcomes of decisions. Finally, we want to verify that people who participate recognize certain characters and situations from their own institutions.

Everyone enjoyed the workshop, and thought playing the simulation was fun. All participants agreed or strongly agreed with these two statements. Nearly all participants agreed or strongly agreed that the workshop increased their understanding of the dynamics of change and innovation in educational institutions, and that the characters in the simulation are realistic; approximately ten percent of the responses were neutral (see Figure 1). Participants experienced various levels of frustration during the simulation (Figure 2). They also have quite different views about playing in groups: about 20% would have preferred to play alone, while 50% preferred group play (Figure 3). Interestingly, in their qualitative study of two business game training sessions, Lainema and Lainema (2007) found that none of their adult participants claimed that he/she would have preferred to work alone. Participants clearly stated that team effort was a key to game success. As we would expect, this appears to be slightly different in academia.

Figure 1: Distribution of responses - realistic characters
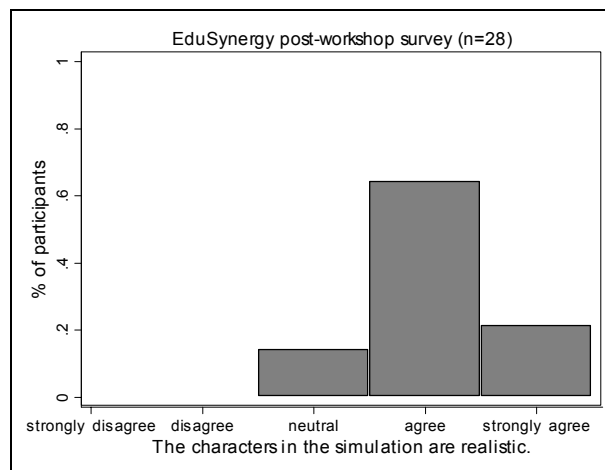
Figure 2: Distribution of responses – frustration during play
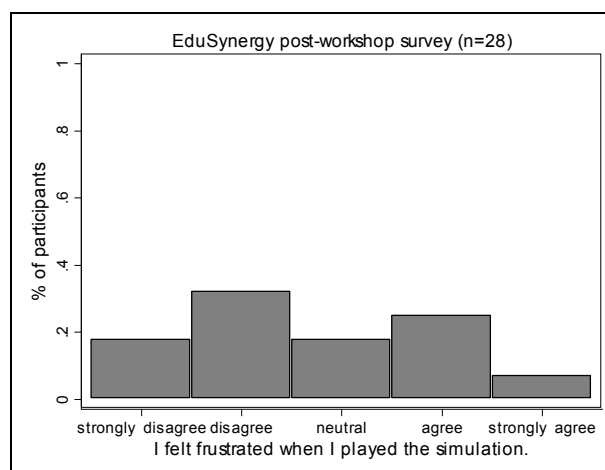
Figure 3: Distribution of responses – play alone
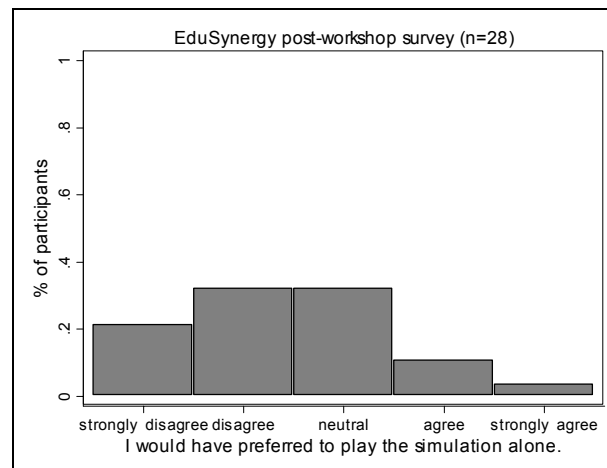
Figure 4: Distribution of responses – self-assessed learning
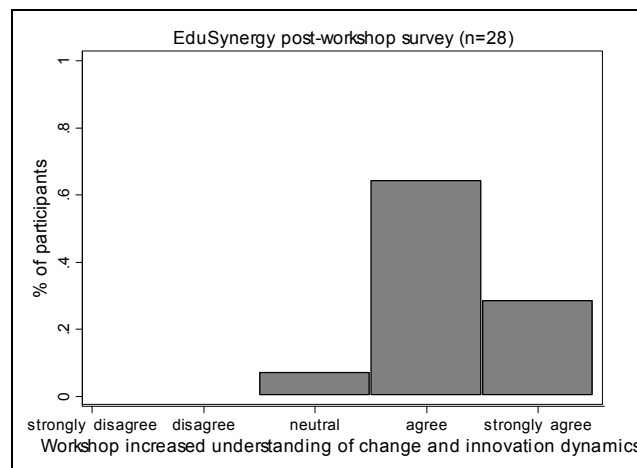
Discussion of Learning Effectiveness Results

Hypothesis 2: *The EduSynergy Workshop will increase the participants' understanding of the dynamics of change and innovation in educational institutions.*

Nearly all participants agreed or strongly agreed that the workshop increased their understanding of the dynamics of change and innovation in educational institutions (Figure 4). Nonetheless, in order to validate the second hypothesis, we measured their learning of specific issues by testing the equality of matched pairs of the participant responses to the 47 common items before and after the EduSynergy workshop using the Wilcoxon matched-pairs signed-rank test. We found significant change for sixteen of these items. Table 6 shows the median and mean values of these sixteen items.

Table 6: Differences of median and mean tests – Pre-workshop vs. Post-workshop

		Pre-workshop[11]	Post-workshop
2. People in higher educational institutions do not like to use new technologies.	Mean Median	2.4 2	3.0*** 3***
3. An effective way to get someone to change their working habits is to order them to change.	Mean Median	2.1 2	1.6*** 1.5**
9. It is very difficult to overcome people's resistance to collaboration.	Mean Median	3.6 4	3.9** 4*
14. Some people need lots of convincing in different ways before they will change their working habits.	Mean Median	4.2 4	4.5** 4**
17. When the Dean is convinced something is the right thing to do, people do it.	Mean Median	2.3 2	3.2*** 4***
20. It is important to be aware of which people socialize outside work.	Mean Median	3.2 3	4*** 4***
23. It is important to be aware of the changing emotions of key individuals.	Mean Median	3.8 4	4.3*** 4**
27. Email is an effective way to communicate with people in higher educational institutions.	Mean Median	3.5 4	2.9*** 2.5***
28. An effective way to convince someone to change their working habits is to get to know them better.	Mean Median	3.7 4	4.1*** 4**
30. People like changing their working habits.	Mean Median	1.8 2	1.5*** 1***
38. At work, it is important to be aware which people regularly see each other during the day.	Mean Median	3.1 3	3.8*** 4***
44. Secretaries/personal assistants do not have a lot of power in higher educational institutions.	Mean Median	2.7 2	2.0*** 2***
46. People who work in higher educational institutions are open to adopting innovative practices.	Mean Median	3 3	2.5*** 2**
34. In a higher educational institution, all decisions are based on logic and everything is under control.	Mean Median	1.6 2	1.9** 2**
45. Motivation to collaborate increases when individuals understand the objective of the collective work.	Mean Median	4.4 4	4.3** 4*
47. When their hierarchical superior is convinced something is the right thing to do, people do it.	Mean Median	2.4 2	3.1*** 3***

After the workshop, participants agree more that it is very difficult to overcome people's resistance to change. They more strongly agree that some people need a lot of convincing in different ways before they will change their working habits. They also agree more that when the Dean is convincing something is the right thing to do, people do it, that it is important to be aware of which people socialize outside work and during the day, and that it important to be aware of the changing emotions of key individuals. They disagree more that secretaries do not have a lot of power, that people who work in higher educational institutions are open to adopting innovative practices, and that people like changing their working habits.

In addition, participants are significantly more likely to agree that people do not like to use new technologies. Median score has increased from 2 to 3. However, about 25% still disagree, so learning could have been better. Although most participants already

---

[11] In the pre-workshop survey, workshop participants disagreed less than the other TENC partners that people like changing their working habits, and agreed less that motivation to collaborate increases when individuals understand the objective of the collective work. There was no significant difference at the 5% level for any of the other 45 variables.

disagreed that it is effective to order people to change, they are now significantly more likely to strongly disagree or disagree with this statement. Participants are more likely to disagree that email is an effective communication tool, but there is still a variety of answers. They also agree even more that an effective way to get someone to change their working habits is to get to know them better.

Contrary to our expectations, although they still disagree, participants strongly disagree less that in a higher educational institution, all decisions are based on logic and everything is under control. They also strongly agree less that motivation to collaborate increases when individuals understand the objective of the collective work. However, as the median score for these two items remained the same, we can consider that there is no big change, even if it is significant. We are slightly perplexed by the finding that they tend to feel more neutral about when their hierarchical superior is convinced something is the right thing to do, people do it, as in the simulation they learn that some hierarchical superiors do not really have any influence, and we expected them to disagree more with this statement. We believe that the greater neutral response may thus be due to the fact that sometimes this is true and sometimes not (i.e. it depends).

References

Lainema, T. & Lainema, K. (2007). Advancing acquisition of business know-how: Critical learning elements. *Journal of Research on Technology in Education*, 40(2), 183-198.

Appendix

Pre-workshop survey
We use an online pre-workshop survey to gather individuals' opinions about 47 different statements using a five point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree).

How strongly do you agree or disagree with the following statements?

1. People with the most important job titles are the most influential.

2. People in higher educational institutions do not like to use new technologies.

3. An effective way to get someone to change their working habits is to order them to change.

4. People have different attitudes towards collaboration.

5. In order to succeed as an academic, one must be willing to collaborate.

6. Outspoken individuals who resist change should be neutralized (e.g. by sideways promotion).

7. It is important to follow institutional rules.

8. Teams with a higher sense of membership tend to be better performing.

9. It is very difficult to overcome people's resistance to collaboration.

10. Most people read internal magazines and/or bulletin boards.

11. The diffusion of innovation in an organization is a gradual process of bringing everybody along step by step.

12. It is easier for academic institutions to change than it is for other organizations.

13. Group diversity increases motivation and group performance.

14. Some people need lots of convincing in different ways before they will change their working habits.

15. Prior experience and technology proficiency affects an individual's willingness to use a new technology.

16. Face-to-face meetings, planned or unplanned, are an effective way to convince people to change.

17. When the Dean is convinced something is the right thing to do, people do it.

18. Building trust is an important element of any collaborative process.

19. It is important to involve stakeholder groups early.

20. It is important to be aware of which people socialize outside work.

21. Hands-on training and continuous support is necessary for a new system to become widely adopted.

22. To get real advantage from collaboration, something has to be achieved that could not be achieved by any of the actors alone.

23. It is important to be aware of the changing emotions of key individuals.

24. It is not possible to diagnose different forms of resistance to collaboration.

25. People react differently to new ideas.

26. In order for collaboration to succeed, it is necessary to reach a common understanding of the advantages for all parties.

27. Email is an effective way to communicate with people in higher educational institutions.

28. An effective way to convince someone to change their working habits is to get to know them better.

29. If you want to get results, you should create a special task force.

30. People like changing their working habits.

31. The source of resistance to change is mainly rooted in the tendency to preserve current practices and power structures.

32. Effective collaboration processes are essential to improve the performance of higher educational institutions.

33. People working in a group try to seek consensus in order to increase their reputation among the others.

34. In a higher educational institution, all decisions are based on logic and everything is under control.

35. It is a good idea to go over your hierarchical superior's head directly to the Dean if you want to get results.

36. Introduction of collaborative practices and systems is more difficult in academic institutions than in other organizations.

37. It is easy to identify individuals who do not want to collaborate.

38. At work, it is important to be aware which people regularly see each other during the day.

39. Before collaboration begins, all parties should agree on the aims of the collaborative process.

40. If the solution to a problem is good, people will change their working habits.

41. Differences in ethics and values are a major barrier to collaboration.

42. In order to succeed in a non-academic staff position in a higher educational institution, one must have high collaboration skills.

43. Inviting a well-known academic to speak about the benefits of collaboration systems is an effective way to convince people in a higher educational institution to adopt them too.

44. Secretaries/personal assistants do not have a lot of power in higher educational institutions.

45. Motivation to collaborate increases when individuals understand the objective of the collective work.

46. People who work in higher educational institutions are open to adopting innovative practices.

47. When their hierarchical superior is convinced something is the right thing to do, people do it.

Post-workshop survey

After the EduSynergy workshop, participants complete a post-workshop survey which is identical to the pre-workshop survey with the addition of the following six statements:

- I felt frustrated when I played the simulation

- This workshop has increased my understanding of the dynamics of change and innovation in educational institutions.

- Playing the simulation is fun.

- I enjoyed this workshop.

- I would have preferred to play the simulation alone.

- The characters in the simulation are realistic.

Appendix

Pre-workshop survey
We use an online pre-workshop survey to gather individuals' opinions about 47 different statements using a five point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree).

How strongly do you agree or disagree with the following statements?

48. People with the most important job titles are the most influential.

49. People in higher educational institutions do not like to use new technologies.

50. An effective way to get someone to change their working habits is to order them to change.

51. People have different attitudes towards collaboration.

52. In order to succeed as an academic, one must be willing to collaborate.

53. Outspoken individuals who resist change should be neutralized (e.g. by sideways promotion).

54. It is important to follow institutional rules.

55. Teams with a higher sense of membership tend to be better performing.

56. It is very difficult to overcome people's resistance to collaboration.

57. Most people read internal magazines and/or bulletin boards.

58. The diffusion of innovation in an organization is a gradual process of bringing everybody along step by step.

59. It is easier for academic institutions to change than it is for other organizations.

60. Group diversity increases motivation and group performance.

61. Some people need lots of convincing in different ways before they will change their working habits.

62. Prior experience and technology proficiency affects an individual's willingness to use a new technology.

63. Face-to-face meetings, planned or unplanned, are an effective way to convince people to change.

64. When the Dean is convinced something is the right thing to do, people do it.

65. Building trust is an important element of any collaborative process.

66. It is important to involve stakeholder groups early.

67. It is important to be aware of which people socialize outside work.

68. Hands-on training and continuous support is necessary for a new system to become widely adopted.

69. To get real advantage from collaboration, something has to be achieved that could not be achieved by any of the actors alone.

70. It is important to be aware of the changing emotions of key individuals.

71. It is not possible to diagnose different forms of resistance to collaboration.

72. People react differently to new ideas.

73. In order for collaboration to succeed, it is necessary to reach a common understanding of the advantages for all parties.

74. Email is an effective way to communicate with people in higher educational institutions.

75. An effective way to convince someone to change their working habits is to get to know them better.

76. If you want to get results, you should create a special task force.

77. People like changing their working habits.

78. The source of resistance to change is mainly rooted in the tendency to preserve current practices and power structures.

79. Effective collaboration processes are essential to improve the performance of higher educational institutions.

80. People working in a group try to seek consensus in order to increase their reputation among the others.

81. In a higher educational institution, all decisions are based on logic and everything is under control.

82. It is a good idea to go over your hierarchical superior's head directly to the Dean if you want to get results.

83. Introduction of collaborative practices and systems is more difficult in academic institutions than in other organizations.

84. It is easy to identify individuals who do not want to collaborate.

85. At work, it is important to be aware which people regularly see each other during the day.

86. Before collaboration begins, all parties should agree on the aims of the collaborative process.

87. If the solution to a problem is good, people will change their working habits.

88. Differences in ethics and values are a major barrier to collaboration.

89. In order to succeed in a non-academic staff position in a higher educational institution, one must have high collaboration skills.

90. Inviting a well-known academic to speak about the benefits of collaboration systems is an effective way to convince people in a higher educational institution to adopt them too.

91. Secretaries/personal assistants do not have a lot of power in higher educational institutions.

92. Motivation to collaborate increases when individuals understand the objective of the collective work.

93. People who work in higher educational institutions are open to adopting innovative practices.

94. When their hierarchical superior is convinced something is the right thing to do, people do it.

Post-workshop survey

After the EduSynergy workshop, participants complete a post-workshop survey which is identical to the pre-workshop survey with the addition of the following six statements:

- I felt frustrated when I played the simulation

- This workshop has increased my understanding of the dynamics of change and innovation in educational institutions.

- Playing the simulation is fun.

- I enjoyed this workshop.

- I would have preferred to play the simulation alone.

- The characters in the simulation are realistic.

Appendix D   Snapshots from the Pit Stop simulation workshop
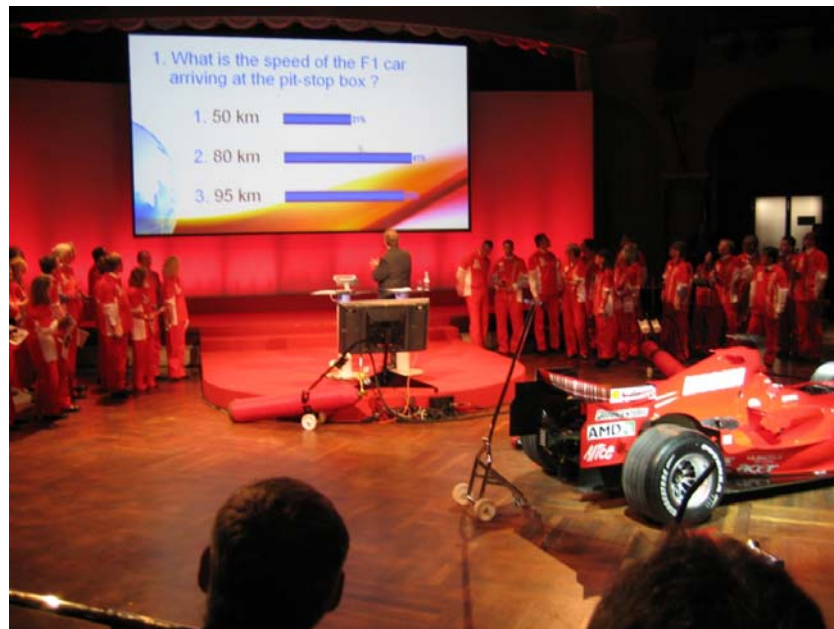
Appendix E   Snapshots from the Intermediary Agent simulation workshop

Appendix F   Snapshots from the Eagle Racing simulation workshop

Appendix G   Copy of an article on the Eagle Racing workshop in a Danish newspapers

Samarbejde med f lder

Racing-team med 100 direkt rer

Et stort anlagt simulations-
spil med brug af lm
og avanceret teknologi
skal trne leder e
og medarbejdere i at
samarbejde om beslutninger.
Brsen var med til pr emieren

AF LASSE HEISGAARD

Omkring 100 erfarne beslutnings-
tagere drfter de mange dilemmaer som
spilet Eagle Racing byder p g. ennem
et ere timer langt forlb med mange
vanskelige beslutninger. Foto: Nanna
Kreutzmann

Appendix H   Workshop Report of the Eagle Racing launch event

INSEAD

**EAGLE RACING LAUNCH EVENT
4 December 2007
Copenhagen, Denmark**

WORKSHOP REPORT

in collaboration with

SYNTASE®   consensus online

1. Background

Effective collaboration dynamics are at the core of learning, knowledge exchange and innovation processes. Nevertheless, in today's global environment, a large number of collaboration initiatives fail to deliver the value expected, as complexity is enhanced by the diversity and the distributed nature of the people, groups, knowledge sources, and by the knowledge integration processes involved.

In this context, the effective development of collaboration dynamics is not something happening 'inside' organizations but rather at the intersection of organizations with individuals, group interactions and network dynamics (e.g. influence networks affecting the diffusion of attitudes in a group), and organizational contexts and dynamics (e.g. specific cultures reflecting a given industry) within which they operate.

INSEAD's Centre for Advanced Learning Technologies (CALT) has long since recognized the growing need of a new type of effective technology enhanced approaches to experiential learning: simulation- and games-based learning experiences based on dynamic models of human behavior in organizational contexts, in which learners are given realistic "missions" requiring them to come in touch with and influence the behavior of simulated characters.

In its efforts to support innovative approaches and learning experiences in the area of collaboration dynamics, INSEAD CALT has developed Eagle Racing, a collaborative decision simulation, in the context of the L2C - "Learning to Collaborate" - project (http://www.l2c.info), an international R&D project funded by the European Commission under the Sixth Framework Programme (FP6). Its specificity is to address collaboration dynamics and challenges at the team/group level, focusing especially on group decision-making as supported by real time collaboration technologies.

The Eagle Racing simulation consists of a number of group collaboration experiences, supported by synchronous collaboration technologies and by a set of linked multi-media cases developed to address different dimensions of group collaboration and decision making. Among the themes that the simulation addresses are strategic decision making in a high-risk context, decision biases, cultural conflicts, challenges to organizing evidences, and decision making addressing both the rational and the emotional perspectives.

The Eagle Racing launch event held in December 4, 2007 in Copenhagen (Denmark) and organized by ConsensusOnline and SYNTASE in collaboration with INSEAD CALT is the conclusion of this research and development work. The workshop brought together over 120 participants from different backgrounds ranging from industry to finance sectors.

The present report provides a synthetic view of the results of the workshop and the main issues that were discussed during the simulation. Its purpose is to assist individuals and organizations to better understand opportunities of developing group decision-making and collaboration competences using synchronous technologies to improve performance in teams.

2. Workshop Objectives

The workshop was designed to allow participants to gain a number of insights and skills in the theory and practice of collaboration, which are relevant to their own team practices. It had the following objectives:

- To identify dimensions and criteria to be taken into consideration when selecting collaboration partners;

- To gain insights from inter-organizational studies/experiences (e.g. about success and sustainability of collaboration depending on the partners' characteristics), particularly in complex and cross-cultural situations;

- To understand strength and weaknesses of collaborative team decision making;

- To explore best practices and theoretical models related to the deployment of synchronous collaboration technologies to enhance the performance of teams and in larger group contexts.

3. Relevant Values

Workshop participants came from different backgrounds, personally and professionally, and each brought a unique set of perspectives and values to the Eagle Racing simulation. Bringing these values to the forefront ensures that the simulation presented during the workshop will address the pertinent issues confronting participants in a collaborative team decision making process.

However, not all perspectives and the values outlined in this report are necessarily shared by all the workshop participants, or by the authors of this report. They were nonetheless presented and openly discussed during the workshop. In order to preserve the integrity of the values and perspectives presented in the workshop the authors of this report have made an effort to present the highlights of each of the interventions, avoiding throughout any synthesis that might violate the letter and the spirit of what was discussed. As such the report is structured as a 'forum' where the reader is allowed to follow different lines of argument.

4. Opening Remarks: The Challenge of Collaboration

Prof. Dr. Albert A. Angehrn, Professor of Information Systems, and Director of the Centre for Advanced Learning Technologies (CALT), INSEAD, Fontainebleau, France

Dr. Angehrn gave the opening speech by introducing the context in which the simulation will be played throughout the half-day workshop and that will particularly address some serious collaboration challenges in a way that is playful. He then presented the research work made at INSEAD which focuses on innovation, diversity, networks (especially social networks) and high-performance, and further introduced the concept of 'games'.

From Dr. Angehrn's point of view, games are an effective means for management development that organizations should more often consider particularly when it comes to developing critical competences in areas such as strategy. The conclusion of the research work done over the years at INSEAD shows that by injecting some games like dynamics and dimensions it is possible to cover subjects that are difficult, hard to address with normal pedagogy as with a lecture or a case, although a case study can help people to realize the limit of their competence or incompetence and finally help them grow.

Dr. Angehrn pointed out that although some people say that games have nothing to do with their organizations, a study made in 2003 by Carnegie Mellon University in the United Sates showed actually that employees were spending a significant amount of time, during their company time, playing games. The study came up for the only year of 2003 with a number of 9 billion man hours for playing one single game: the Solitaire. To give participants a reference point of what such an amount of time represents, Dr. Angehrn took as an example one of the biggest achievements of humankind in America's history - the Empire State Building – whose construction represents an estimate of 7 million total man hours. As another point of reference, he cited the Canal of Panama whose construction represents an estimate of 20 million man hours.

Going back to games in organizations, Dr. Angehrn made the transition from 'non productive' games such as the Solitaire to ones that generate some form of knowledge. He then made the transition to the L2C - "Learning to Collaborate" - project from which the Eagle Racing simulation came out to introduce the fundamental management dynamics (i.e. change, collaboration, innovation) facing organizations and that are critical to address. In the context of the L2C project the focus was put on designing games that expose people to the challenge of collaboration to make them understand collaboration patterns and the reasons why so often collaborations fail. Indeed, Dr. Angehrn stressed the even greater importance of collaboration in high-performance contexts such as those of Pit Stop. Dr. Angehrn then referred to the Pit Stop video which is another simulation coming out from the L2C project – where collaboration in teams can be extremely efficient and a source of unique and sustainable advantage for competence development.

He then explained that many of the projects that companies do from reengineering processes to implementing Customer Relationship Management systems need collaboration competences but unfortunately the sad evidence is that collaboration efforts in most of these projects fail. The reality is that the number of failures is even bigger when Information Technology (IT) is involved in these projects.

Dr. Angehrn introduced the different patterns of collaboration one can find in any collaboration or change projects where typically there are some high expectations and ambitious objectives with supposedly the right people, processes and plans, and all other resources in place. From here comes the idea of games. We know initially that some time will be needed either to learn from each other to collaborate, to adapt, or to define a common way of operating before starting to see some results. Unfortunately, this is a pattern that one does not see in organizations very often, Dr. Angehrn said, before adding that the most frequent patterns one can find are for example the ones with a flat degree of objectives achievement over time and that never take-off (i.e. 'no take-off breakdown' pattern).

Following this example, Dr. Angehrn stressed that most of the companies engaged in projects that require collaboration are often full of tools and systems that were developed and

maintained to have people collaborate and share knowledge as well as plans and strategies of collaboration, but when companies go down to see what actually is done by people they often realize that these collaboration means are not used at all. Another pattern often observed is the one where people collaborate and generate an increasing degree of objectives achievement relatively rapidly until it declines suddenly (i.e. 'crash-landing breakdown' pattern) due to a lack of sustainability of collaboration over time.

In the context of the L2C project, Dr. Angehrn added that collaboration is not a one shot game but rather a multi-stage game. Many of the projects that companies do are not really sustainable as most of the time there is not really the basis or the incentive sometimes in the culture to collaborate. He then made the parallel between the innovation challenge and collaboration, which are very often associated, to stress that 'real' innovation comes only if companies make very different people bringing different perspectives from different sources collaborate. He further added that in Denmark, which is always at the top of the list of the countries ranked for innovation, it might be also the case. Dr. Angehrn additionally explained that according to a study made every year by the Boston Consulting Group, innovation is always at the top of managers' agenda and considered as their number one strategic priority. He pointed out that although innovation received a considerable amount of attention and investments on the part of companies the return is rather disappointing. Indeed, academic studies done until now did not observe any correlation or evidence between R&D spending and any form of return in the domain of innovation.

Dr. Angehrn then introduced in which context the L2C project was developed with a group of universities and industrial partners. Over 2 years some of the issues and breakdowns of collaboration were explored and a number of simulations (i.e. games) were created which address the subject in a kind of playful way. He presented the Eagle Racing simulation developed in collaboration with ConsensusOnline and SYNTASE which is about collaborative team decision making and whose objective is to expose participants to collaboration challenges through which they can assess their capabilities to take decisions with diversified groups of participants to ultimately generate some confrontations and debates as part of the decision making and learning process.

Dr. Angehrn continued with the Eagle Racing simulation and he asked the participants to introduce themselves to each other and by invited them to participate in a small exercise to think about the best advice anybody gave them over their entire professional life while sharing it with the other team members.

5. Questions 2-4: About Participants' Profile

A total of 120 participants attended the workshop who were gathered by groups of 6 and spread over 20 tables in the room. Below is the representation of the statistical distribution of participants' profile:

Job Position	%
Top Management	29,2
HR	5,8
IT	5
Communications/Marketing/Sales	17,5
Consultant	21,7
Other	8,3
No response	12,5
Total	100

Job Domain	%
Trade	2,5
Industry	6,7

Telecom	1,7
IT	8,3
Finance	8,3
Consulting/Service	33,3
No response	39,2
Total	100

Age	%
<30	2,5
30-39	20
40-49	30,9
50-59	23,3
60+	5
No response	18,3
Total	100

Gender	%
Female	17,5
Male	67,5
No response	15
Total	100

6. Eagle Racing: Collaborative Decision Simulation

6.1 Rationale / Scenario

The Eagle Racing simulation features a high-level decision maker of a race car company – Eagle Racing - faced with the dilemma of making a number of decisions affecting the financial future of his company. He is confronted with different options, types of information, and conflicting opinions, which he has to properly manage and process in order to make the best decision. In addressing such a situation he has to be immersed in the dynamics of team decision making and the challenges to decide the best course of action to take when emotions, alliances, perception, interpretation of information, peer pressure, etc come into play.

The Eagle Racing simulation is designed to help participants experience how even collaboration in collocated teams can be significantly improved with advanced collaboration technologies, particularly when facing the challenges and pitfalls of collaborative decision making in teams and larger groups.

6.2 Description

The Eagle Racing simulation consists of a number of group collaboration experiences, supported by synchronous collaboration technologies and by a set of linked multi-media cases developed to address different dimensions of group collaboration and decision making. It is composed of the following three main decision-making dilemmas:

(a) To decide between two different collaborative partner/sponsorships;
(b) To decide whether to compete in an upcoming race or not, given some technical difficulties;
(c) To decide how to respond to/manage potential conflict.

6.3 Dilemma 1: Which deal should Eagle Racing go for?

Dilemma one involves **Joep van de Haar**, Sponsor Director for Eagle Racing. Racing wise, the season has been the best for Eagle Racing in more than 12 years, with Eagle finishing "in the money" (as one of the top 5) in 12 out of the 15 races it has completed. But it has also been a very costly season with technical expenses way above budgets. In addition, the former main sponsor has decided to focus on football sponsorship instead of racing– and has subsequently terminated their sponsorship contract with Eagle Racing. So, in spite of good results on the tracks- the financial performance has been less than optimal and Eagle faces serious economical problems. For the last months the pressure on Joep to sign up with a new main sponsor has been rising. GoodBridge is one of Joeps two last chances to secure a new main sponsor for the season. He also has a shot at Bauer Industries- but if both fail Eagle Racing faces a serious problem.

Joep has already negotiated the terms with GoodBridge's Marketing Manager, **Benjamin Owen,** during the last 4 weeks, and the parties were close to reaching an agreement. The last step in the process is **Sir Ralph Windfield's**, CEO of Goodbridge, approval. Hence, Joep's first meeting is with Sir Ralph Winfield, which despite a difficult start, ends on a positive note. The next day, Joep has a talk with Benjamin from GoodBridge who confirms that he can sign up GoodBridge for a sponsorship worth 10 million Euro/year. This is far below the 18 million Euro/year Eagle Racing needs. But GoodBridge does not demand exclusivity, so there might still be possibilities to draw in other sponsors.

The next meeting is with Marketing Director **Walther Schmidt** from Bauer Industries. Unlike Sir Winfield, Schmidt is direct in his proposal and asks for an exclusive sponsorship of 22 million Euro/year and the rights to bring 10-15 of their most important business contacts for VIP treatment to each race. Joep concludes the meeting by telling Schmidt that he will have to run the proposal though the proper channels at Eagle Racing before giving a response. After the meeting, Joep shares the news with his colleagues in the management group, and is faced with a conflicting perspective/reaction on the two sponsorship deals.

Jennifer Goldbaum is Business Development Director at Eagle, and has spent part of her weekend checking up a little on Bauer Industries. She opens the management meeting by presenting a newspaper article that accuses Bauer Industries of selling weapons to Octania (in direct conflict with the UN weapons embargo). If these accusations turn out to be valid, it can start a negative media storm against Bauer Industries and in turn harm Eagle Racing's reputation. Instead, she supports Sir Ralph, who is much more Eagle Racing's sort of person, with a passion for racing, unlike the sharp shooter Walther Schmidt. However, to date, Bauer has not been convicted on the charges, and Joep is hesitant to give up the deal with Bauer based on rumours. Furthermore, he finds Sir Ralph old fashioned and aristocratic, and believes the Bauer offer amore interesting one, since his bonus is tied to the amount of sponsorship brought in.

Faced with the two different sponsorships and different opinions of Joep and Jennifer, Gianluca Paranelli, Commercial Director at Eagle Racing, has to make a decision: ***Which deal should Eagle Racing go for?***

6.4 Dilemma 1 – Key Arguments

After a short introduction about the interactive response system (OptionFinder from OptionTechnologies) and smart collaborative technologies (ThinkTank from GroupSystems) to be used by workshop participants to collect their responses for each of Eagle Racing dilemmas, Dr. Angehrn invited people in the teams to first share their opinion among themselves and then vote both individually and as a group. The results were displayed on a wide screen to be further discussed with the participants.

The most cited key arguments for Bauer Industries by the teams are i) the financial aspect of the sponsorship deal that can solve Eagle Racing's financial problems for the race season, ii) the fact that rumors are not a tangible element on which one can make a decision and iii) the exclusivity of the sponsorship deal that makes the relation with Bauer easier to handle. Among

the most cited key arguments against Bauer by the teams are i) the exclusivity of the sponsorship deal that ties too much Eagle Racing to Bauer, ii) the risk of bad press coverage for Eagle Racing in case the rumors become a reality.

Concerning decisions in favor of Goodbridge, the most frequent key arguments cited by the teams are i) the non exclusivity of the sponsorship deal that leaves Eagle Racing the freedom to have other sponsors, ii) the passion shared by Sir Ralph Windfield's for cars and racing. Arguments against Goodbridge are i) the budget attached to the sponsorship deal which is far below (8 millions difference) which puts Eagle Racing's season at risk ii) the character of Sir Ralph Windfield which can be eccentric sometime.

6.5 Dilemma 1 – Group Decisions

Following teams' vote for Bauer (choice 1) and for Goodbridge (choice 2), Dr. Angehrn presented the results showing that 15 tables voted for Goodbridge, 3 for Bauer and 3 had no opinion which represent a 71/14 breakdown in favor of Goodbridge. Dr. Angehrn asked some of the tables that voted for Bauer to explain their choice in front of all participants by giving the key argument that influenced their decision in favor of Bauer. Table 3 argued that it is easier to work with one client instead of multiple clients (sponsors) and therefore the exclusivity of the sponsorship deal with Bauer motivated their decision.

Dr. Angehrn closed the discussion of the first episode of by inviting all the participants to go for Goodbridge as a result of the votes made by a large majority of the tables.

6.6 Dilemma 2: To race or not race?

Following the choice of Goodbridge, the next step is setting the meeting place for signing the contract. It is decided that the sponsor and Eagle Racing meet at the upcoming race in Pocono. Benjamin informs Joep that the sponsor would prefer to wait until after he has seen Eagle Racing perform and prefers to sign after the race. Hence, there is a lot of pressure to put in a good performance at Pocono on Sunday.

However, during the day of the race, **Anders Ekman**, Chief Engineer of Eagle Racing, has bad news. He tells **José Jalapento**, the Engine Engineer of Eagle Racing, that he plans to pull Eagle out of the race today because of an analysis of engine failures that have put them out of seven races this year. His assessment of the problem is related to the low air temperature and this morning, the temperature is only a few degrees above freezing point– as it was the last time that the engine blew. Anders thinks the risk of failure is too great as well as the technical costs of another blown engine and suggests pulling out of the race even if the decision is not a popular decision.

José counters Ander's arguments by stating that seven failures is regrettable but not compared to the fifteen races Eagle did finish, and with top 5 positions in twelve of them. José does not believe that there is conclusive evidence for Ander's theory about the temperature effects on the engine. José is in favour of racing but decides to let Anders take the decision since Anders is his boss. Anders, in turn, decides to discuss the situation with Gianluca. As José leaves Anders' office, he bumps into driver Michael Engel's girlfriend **Sofia Theron**, who guesses that Anders might decide to pull out of the race. She immediately call's the CEO of Eagle Racing, **Gerard Theron**, who happens to be her father, and tells him that there is word about pulling out of the race. Gerard is surprised at this news.

Meanwhile, Gianluca has received Ander's assessment of the engines and recommendation to pull out. He is conflicted in his decision as the Sponsor (i.e. Goodbridge) is flying in an hour and ready to sign the sponsorship right after the race. Cancelling might cost them the highly needed sponsorship!

Gerard calls Gianluca for an explanation and they both decide to see Anders for clarification. However, Gerard is not convinced and is not willing to give up the race based on intuition and asks Gianluca to make the final decision. On the one hand, Gianluca believes that Anders is a great engineer who has shown his worth many times in the past and that it is Anders'

responsibility to take the decision; on the other hand, Gerard had told Gianluca that he personally believes that Anders is losing his edge, also he has seen a note from José that questions the correlation between temperature and engine failures.

Faced with different assessment of the situation (the evaluation by Anders and Jose) and different alliances (between Anders and Gerard) Gianluca, has to make a decision: **Overrule Anders and decide to race OR Backup Anders and decide not to race?**

6.7 Dilemma 2 – Key Arguments

After choosing Goodbridge, the groups of participants were confronted to different arguments on either side concerning the decision to race or not to race. To help them in their reflection, Dr. Angehrn asked the participants to have a look at the material distributed to each table that shows a breakdown analysis of the number of gasket failures by air temperature for Eagle Racing of the last 7 races. The most cited key arguments for racing by the teams are i) no hard statistical evidences to pull Eagle Racing out of the race ii) risk is part of the racing business iii) sponsorship deal is at stake with the related financial consequences. Concerning decisions against racing, the most frequent key arguments cited by the teams are i) driver's security at stake ii) risk of loosing the opportunity to sign the sponsorship deal if the engine blows iii) Chief Engineer's recommendations should be trusted.

6.8 Dilemma 2 – Group Decisions

Following teams' decision for racing (choice 1) or for not racing (choice 2), Dr. Angehrn presented the results of the individual group votes: almost less than 2/3 (61%) of the participants decided to race while 38% of them decided not to race which was somehow a little bit surprising given that Eagle Racing is in the racing business noted Dr. Angehrn. Then he asked the participants if a strong 'advocate' of not racing would be willing to share his/her arguments with the other teams. One of them said that *"we should follow the recommendations of our expert engineer and not race, and in our calculations of racing or not racing, if you consider not racing then the result would be that you could postpone some of the consequences later (i.e. signature of the sponsorship deal); if you race and that things went bad then the consequences would be catastrophic"*. To have an opposite argument, Dr. Angehrn asked the participants if a strong 'advocate' of racing would be willing to share his/her decision with the other teams. One of them said *"I do not see really the risks; the worst thing would be that the car stops"*.

Following these interventions, Dr. Angehrn proposed to see the distribution of the votes at the group level and the results showed that apparently the racing advocates succeeded in convincing the non racing ones to go for the race with what seemed to be stronger arguments. More interestingly the breakdown revealed that 4 out of 19 groups (i.e. tables) had a switch in their decision in comparison to the individual group votes. Dr. Angehrn explained that one of the issues in this case was what is called the Asch conformity bias where people tend to think that groups can decide better than individuals before reproducing in front of the participants the Asch experiment through a simple test: first Dr. Angehrn presented three lines of unequal size A, B and C and second a line separately from the three others before asking to the participants if this line is equaling line A, B or C? He then explained that statistics show that 99% of the individuals who are asked this question answer in the right way (i.e. response C). To the contrary, Dr. Angehrn added that if individuals are put together and if only one of them is really tested (meaning the others are simulating the test by giving individually to the group a wrong answer for instance A) it is shown experimentally that the chance he gives the same wrong answer (i.e. A) is more or less 50% before concluding that a group can have a pressure on people's decision that lead them sometime to take the wrong decision than they would normally take individually.

After this parenthesis, Dr. Angehrn closed the discussion by inviting all the participants to see the next and final episode of Eagle Racing by following the decision of the majority of the participants who voted in favor of racing.

6.9 Dilemma 3: Open knowledge sharing or looking good?

Gianluca decides to overrule Anders' recommendation and the result is that Eagle races at Pocono. The day starts great. Driver Michael Engels pushes the car to its limits, and has managed to move up from a start position of fifth on the grid to second position in the race. However, as he pushes for the front position, the engine blows. In the VIP box the Sponsor is the first to regain his ability to speak and states that he is glad he had not signed the contract. Gianluca takes his leave and calls for an emergency meeting.

Gerard believes that there is no need to involve the Sponsor in any of the details regarding past engine failures and suggests that they circumvent the real issue and tell the Sponsor that everybody knows that there is a certain degree of risk in racing. Instead, they should focus on the good results of this year in general, and appeal to the Sponsor's passion for racing, which might preserve the chance that he will sign anyway.

Jennifer however, believes that the main sponsor is a close partner, and thus should be allowed to share both successes and challenges more openly than Gerard proposes. If Eagle Racing were to provide a standard "PR-statement", the sponsor will be rightly disappointed if he ever finds out what really happened. Instead she recommends they share the full story about gasket problems and have confidence that their openness would appeal to him. Gerard leaves the final decision to Gianluca.

Faced with different positions on the situation, Gianluca, has to make a decision: *Follow Jennifer and share problems openly OR Follow Gerard and position the problem as a unique exception?*

6.10 Dilemma 3 – Key Arguments

Following the blow of engine at Pocono, the groups of participants were confronted to the last dilemma of the Eagle Racing simulation namely share all problems openly or focus on general risks in racing. To help them in their reflection, Dr. Angehrn asked the participants to have a look at the material distributed to each table that shows a broader picture of the engine technical problems and includes a breakdown analysis of the number of gasket failures by air temperature of the last 21 races.

The most cited key arguments for sharing the problems openly by the teams are i) honesty vis-à-vis the sponsor and Sir Ralph Windfield ii) the truth will come out anyway iii) Sir Ralph Windfield will appreciate honesty and integrity. Concerning decisions against problem sharing, the most frequent key arguments cited by the teams are i) loose of the sponsorship deal ii) confidential information not to be disclosed to a non-partner iii) Sir Ralph Windfield is not a gentleman interested to hear about technical details.

Concerning decisions in favor of focusing on general risks in racing, the most frequent key arguments cited by the teams are i) sponsors do not need to know about technical details, ii) Goodbridge is not an official sponsor yet so there is no obligation to share problems. Arguments against focusing on general risks in racing are i) bad start for a relationship if hiding problems ii) problem too big to be kept secret.

6.11 Dilemma 3 – Group Decisions

Before asking the participants to vote and discuss the third dilemma, Dr. Angehrn made a short retrospective on the teams' decision and the limited pieces of information (i.e. evidences) available in the second episode of Eagle Racing to explain that the related dilemma models a real decision inspired from the Columbia shuttle accident case substituting the concept of test flights with races and transposing exactly the same number of incidents (i.e. 7) where problems were reported. Referring to the American Space Agency (NASA), he further explained that it was a difficult and complicated situation for the engineers well known for the high quality of their decision making and who ultimately decided to launch the space shuttle with the consequences people know. Dr. Angehrn added that after several years of investigation following the accident,

results showed that there were some serious underestimations of the risks of launching the space shuttle before stressing that like in every experimental situation people tend to take more risks to justify their purposes (i.e. we are in the racing business, we want to race) often ignoring data in their decision making process which are yet there. Dr. Angehrn commented that groups can even reinforce this 'blindness' towards evidences and suggested to further reflect on this in the light of the Eagle Racing experience.

Closing the parenthesis, Dr. Angehrn invited the participants to discuss the third dilemma and vote both individually and as a group either for sharing the problems openly with Eagle Racing's potential future partner or focusing on general risks in racing. Following teams decision, Dr. Angehrn proposed to see the distribution of the votes at the group level and the results showed a 80/20 breakdown in favor of sharing the problems openly (choice 1). He then invited the participants to think retrospectively about the simulation and their decisions to close the workshop.

7. Closing Session

As a final step of the simulation, Dr. Angehrn made a little retrospective about the teams' decisions and outcomes concerning the three dilemmas: after choosing to go with Goodbridge as sponsor, overruling Anders' recommendation not to race and following Jennifer's recommendation to share the problems openly, Sir Ralph finally decided to sign the deal with Eagle Racing. Dr. Angehrn commented the overall result of the simulation which represents in Eagle Racing's ranking a kind of 'silver' position (as represented in Figure 1) that is less than optimal but acceptable as Sir Ralph decided to sign the deal although with an escape clause.
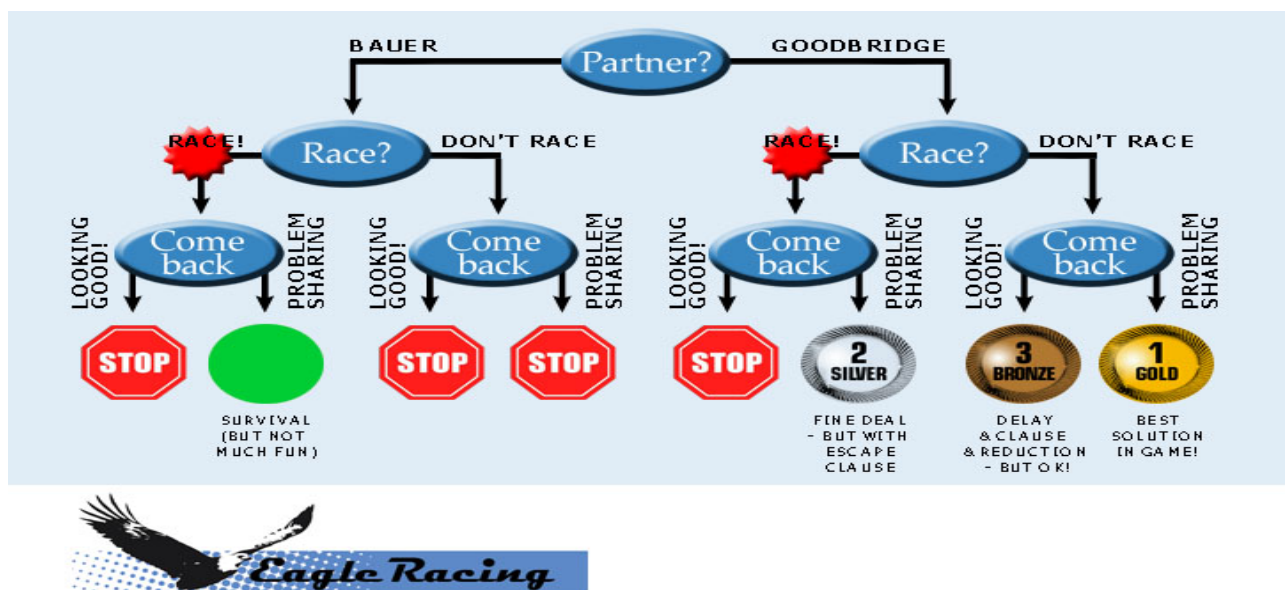

Figure 1: Eagle Racing Decision Tree

He then explained that Eagle Racing has been designed based on the analysis of collaboration breakdowns observed in large organizations whose some of the patterns have been embedded in the simulation to reproduce collaboration traps that people fall into when making decisions. Based on these observations, Dr. Angehrn further stressed that there is a critical need of competence development within organizations to make people collaborate particularly when they are highly diverse before adding that collaboration is easier when most of the people share the same cultural background or language but becomes much more difficult when diversity increases. He pointed out that one of the challenges in collaboration is to integrate the knowledge of different people when they are diverse and distributed.

In the context of the L2C project from which the Eagle Racing simulation emerged, Dr. Angehrn observed many cases that showed it is possible to learn from very diverse organizations and

individuals although some of them often opposed arguments such as "we cannot collaborate with them, they are too different" or "they look at the world in a different way" or "they are in a totally different business". To illustrate his observations, he presented the Ferrari-Great Ormond Street Children Hospital case as an example of successful collaboration between two highly different organizations. The Great Ormond Street Hospital is the largest hospital for children in the United-Kingdom with highly specialized domains such as cardiac surgery where surgeons have to follow very strict operations rules and logistic procedures when operating children at the image of the Ferrari pit stop teams when they operate on Formula One cars. Dr. Angehrn stressed that the highest risks in the hospital are not when the children are operated but actually when they are moved out of the operation room to other rooms such as the reanimation room which implies a lot of movements and logistics. Dr. Angehrn explained that this form of diagonal inter-organizational collaboration across different structures between the Great Ormond Street Hospital and Ferrari pit stop teams proved to be successful by improving significantly some of the handle operations over the bed before concluding that in the light of this example there is the possibility if a number of collaborations are met including the motivation and willingness to learn from people coming from very different contexts and cultures and having a different 'language'.

The last point Dr. Angehrn shared with the participants was about how engaging managers in organizations on discussions about collaboration and collaboration competences not only because they are key but also not enough developed to help them realize there is a need of understanding why previous collaboration projects failed. He added that people in organizations 'love' to learn from past successes and best practices but they should also look at the worst practices in the domain of collaboration as there are many. Dr. Angehrn pointed out that introducing in organizational contexts a better reflection of where are the strengths but also the weaknesses when it comes to collaboration competences is a good way to make managers become more aware about the competence development needs in contexts these competences might become critical.

Finally, Dr. Angehrn thanked all for participating in the half-day workshop hoping the participants enjoyed the videos and learned some practical lessons from the Eagle Racing simulation.

Annex 1: List of Participants

7N A/s	Jeppe Hedaa
A.P. Møller Maersk	Jens Aage Skare Nielsen
A-2 A/S	Lars Rasmussen
Aastroem&Meunier	Johan Aastroem
Accenture	Jakob H. Kragklund
ACTA/Corporate Finance	Lennart Jønsson
Aktivitetskompagniet	John Svendsen
Aleris	Klas Wahlström
Anders Nielsen & Co	Anne Kathrine Steenbjerge
Anders Nielsen & Co	Henrik Steenbjerge
B.T.	John Kristensen
Belin Stenbeck AB	Anders Belin
Bindslev AS	Claus Bindslev
Bindslev AS	Dorthe Pedersen
Bolius Boligejernes Videncenter A/S	Ulrik Heilmann
Canal Digital Danmark	Jens B. Arnesen
CDM A/S	Erik Rosenkrantz

Center for Technology, Economics and Management, DTU	Mads Christoffersen
CFI Group AB	Mats Frid
Change to win	Sandeep Sander
Co + Høgh	Peter Kastrup-Misir
Cordan A/S	Michael Knie-Andersen
Composing A/S	Alexandra Krautwald
Consensus Online	Pål Fevang
Consensus Online	Peter Holm
Consensus Online	Anders Brahe Pedersen
Consensus Online	Emil Oustrup
Consensus Online	Kasper Svaneborg
Consensus Online	Paolo De Mora
Consensus Online	Kirsten Borup Andersen
Copenhagen Living LAB	Thomas Hammer-Jakobsen
Core-Team	Anker Nielsen
Core-Team	Bjørn Ravnbøl
CPH Design	Lars Thøgersen
Danica Pension	Kim Filges

Danisco	Thyge Boserup
Danmarks Forvaltningshøjskole	Bjarne Andersen
Dansk Bredbånd A/S	Birger Hauge
Dansk Energi	Hans Duus Jørgensen
Dansk Erhverv	Søren B. Henriksen
Danske Bank	Pia Haarup Jensen
Danske Bank	Michael Leslie Ahlstrand
DCS Group	Jan Lauridsen
Deloitte Corporate Finance	Anders W. Eriknauer
Devoteam Consulting	Gritt Løschenkohl
Devoteam Consulting	Søren Nielsen
Devoteam Consulting	Peter Høygaard
Devoteam Consulting	Niels Korsholm
Devoteam Consulting	May-Britt Højgaard
DIEU	Mette Ginnerup
DSE Airport Solutions	Anders Midtgaard
Effective Learning	Kristian Rude
Emerge	Jan Werner
Experience Partner	Jakob Askholdt

Experience Partner	Michael Ravn
Fischer & Company	Christine Fischer
Flying Pig	Helle Julin
Folketinget	Liselotte Astrup
Folketinget	Per Anker Hansen
Future Navigator	Anne Skare Nielsen
Future Navigator	Liselotte Lyngsø
Future Navigator	Søren Pedersen
Grey	Sisse Fjelsted Rasmussen
GroupSystems Inc.	Johan Edfeldt
GTAC	Jens Gullberg-Hansen
Gyro Event	Bendik Nicolai Blindheim
H. Lundbeeck A/S	Jakob Langvad
Hedegaard InterSearch	Per Hedegaard
Heidrick & Struggles	Michael Vad
IBM Global Technology	Kurt Jørgensen
Ideas Denmark	Ken Muff Lassen
INSEAD	Prof. Dr. Albert A. Angehrn
INSEAD	Laurent De Clara

Inteventor	Frank Høyer Rasmussen
ISS	Peter Ankerstjerne
Isvor Fiat scpa	Luigi Buson
J. Friisberg & Partners	Jakob Krejsager
JAL	Henrik F. Stoltenberg
JMI Executive Search	Ole Evan
Jyske Bank	Lars Stouge
Jyske Bank	Knud Nørbo
Kaster + Strøm	Benedicte Strøm
Kreab Danmark	Katrine Steen
Kreab Danmark	Thomas Einfeldt
Kreab Sverige	Peder Jonsson
Leo Burnett	Nicolai Schierbeck
Maconomy A/S	Hugo Dorph
Marcura Partners	Jens Lorens Poulsen
Mec Global	Claus Gilbert Clausen
Medialogic	Kate Turch
Medialogic	Kim Turch
Microsoft	Janie Nørgaard

Mortensen & Beierholm, Statsautoriseret Revisionaktieselskab	Peder Davidsen
Nordea Bank	Jan Karlin
North Sails	Lars Ive
Novo Nordisk	Thomas Holbaek
OptionFinder Europe	Neil Mirchandani
Oreco A/S	Michael Moritz Meyer
People & Performance A/S	Niels C.M. Prehn
Post Danmark	Anders Due
Post Danmark	Lars Kaspersen
Post Danmark	Flemming Lorenz
Proshop	Martin Grønvold
Proshop	Mikkel Martins
Proshop	Rune Hegaard
Proshop	Christian Knudsen
PricewaterhouseCoopers	Peder Michael Pruzan-Jørgensen
Rambøll Informatik	Kuno Rasmussen
Roll Company	Anders Roll
Samhall AB	Christina Stange
ScanJour A/S	Claus Nørgaard

Sergel Kredittjänster AB	Magnus Melderg
Shipley Nordic	Michael Steffens
Simcorp	Rikke Dalager
SkatteInform	Inge Nilsson
SkatteInform	William Nilsson
SKI	Niels Fredriksen
Sonofon / Cibercity	Karin Skødt Hindkjaer
SPAMfighter	Martin Thorborg
STICKS`N`SUSHI	Kim Rahbek
Swedish Trade Council	Hasse Karlsson
Syntase	Flemming Fog
Syntase	Søren Dolriis
Syntase	Nico Schou
Syntase	Pernille Guldbjørn
TDC	Tejs Bautrup
TeliaSonera Holding	Håkan Jansson
Tia Technology A/S	Morten B Steiner
Toms Group	Jesper Møller
TVM Executive Skills	Søren Qvist

Ulveman:Bønnelykke	Susanne Ulveman
Unomedical A/S	Hans Holm
Vaekstfonden	Rolf Hauge Kjaergaard
Vestas	Anders Blom Hansen
Vilhelm Lauritzen A/S	Elizabeth Bergmann Brums
VKR Holding A/S	Lars Nilaus Nielsen
Weco Invest A/S	John Tyrrestrup
WingManager	Erik Svaneborg