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Increasing Change Readiness in Higher Educational Institutions through a Simulation-based Change Management Experience

Albert ANGEHRN
Katrina MAXWELL
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Simulation-based Change Management Experience

By

Albert A. Angehrn*

and

Katrina Maxwell**

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* Professor of Information Technology, Director, Centre for Advanced Learning Technologies (CALT), at INSEAD, Boulevard de Constance, 77305 Fontainebleau Cedex, Email: albert.angehrn@insead.edu Tel: +33 (0)160724361

** Senior Research Fellow, at INSEAD, Boulevard de Constance, 77305 Fontainebleau Cedex, Email: katrina.maxwell@insead.edu Tel: +33 (0)160724166

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Albert A. Angehrn holds a doctoral degree in Mathematical Sciences and is Professor of Information Technology at INSEAD, where he directs the Centre for Advanced Learning Technologies (CALT). His research concentrates on the design and analysis of simulations and games in management education and on online collaboration dynamics.
Email: **albert.angehrn@insead.edu** Tel: +33 (0)160724361

Katrina Maxwell is a Senior Research Fellow in the Centre for Advanced Learning Technologies at INSEAD. She holds a Ph.D. in Mechanical Engineering and is the author of *Applied Statistics for Software Managers*. Her current research interests include the social aspects of information systems, ICT-based career development, and the measurement of learning.
Email: **katrina.maxwell@insead.edu** Tel: +33 (0)160724166

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ABSTRACT

Although higher educational institutions are increasingly faced with demands for deep changes and innovations, they have a very distinctive culture which makes rapid change difficult. In order to address this challenge, we have developed and validated a new multimedia, team-based simulation, EduSynergy, which provides a rich, realistic experience of a change management project in a university setting, including individual behaviors, group dynamics and cultural factors. Our quantitative research shows a significant measurable increase in players' understanding of change management.

THE CHALLENGE OF CHANGE IN EDUCATIONAL ORGANIZATIONS

Organizations operating in the educational and academic arena are increasingly faced with various demands for deep changes and innovations of different types; for example, the adoption of new learning and knowledge diffusion approaches which take advantage of technological developments like the Web, or the capability to re-orient their services in an increasingly competitive, demanding and fast changing market. However, their "change readiness" is often perceived as limited at many levels.

Fostering change and enhancing collaborative behavior in any organization is a challenging task. Although the ability to successfully manage change should be a core organizational competency, several studies indicate that more than 70% of large organizational change projects fail (Harung et al, 1999; Burnes, 2005). Compared to the corporate world, higher educational institutions have a very distinctive culture which makes rapid change even more difficult. For instance, university professors are trained to be independent thinkers, are used to significant autonomy, and might expect to be consulted on matters related to the effective governance of their institution (Allen & Fifield, 1999; Rowley, 2001). In addition, such organizations are not just made up of teachers and researchers, but also management staff, support staff, students and a variety of external stakeholders. This coexistence of diverse discipline-specific subcultures with their own values, beliefs, aspirations, specialized languages and skills can make it very difficult for people to understand, trust and collaborate with each other (Becher & Trowler, 2001; Brown & Jackson, 2001).

In order to address this challenge, we focused our research on developing a rich, realistic experience of a change management project in a university setting in order to help individuals become aware of their own beliefs, and limitations, concerning change. This has resulted in a new multimedia, team-based SmallWorld simulation, EduSynergy, which models the dynamics of change in higher educational institutions, including individual behaviors, group dynamics and cultural factors.

THE VALUE OF SIMULATION-BASED CHANGE MANAGEMENT EXPERIENCES

EduSynergy is based on an existing simulation, *EIS*, which provides intensive and productive learning experiences related to the dynamics of change in a company (Angehrn, 2005; Angehrn, 2006; Manzoni & Angehrn, 1997). The *EIS* simulation is built on founded research in organizational dynamics (Gilbert, 1993; Pfeffer & Sutton, 1999; Salen & Zimmerman, 2003; Van der Vegt & Bunderson, 2005; Yilmaz & Oren, 2003). In the *EIS* simulation, participants working in small groups have 6 months of simulated time to convince members

of an acquired company's management team to adopt the corporation's Executive Information System (EIS). Players can interact with these members and learn by trying out, and receiving immediate feedback, on 18 different managerial actions such as face-to-face meetings, pilot tests and covert lobbying.

The *EIS* simulation was designed as a teamwork experience stimulating collaborative learning and knowledge exchange (Lainema & Lainema, 2007; Nonaka, 1994; Van der Vegt & Bunderson, 2005). Participants not only have to decide what tactics to use on individuals in the simulation, they also have to attempt to convince other members of their team to follow their advice. Teams seem to provide a very good setting for games, as they regroup different users with different experiences and approaches to a given problem. They are especially interesting because they trigger debate and discussion as to how to best solve the current situation, thus making everyone even more engaged in the game scenario. The educational experience is enriched by group discussions before, during and after the simulation experience (Nonaka, 1994). The *EIS* simulation has been deployed successfully in management schools and universities, as well as private and public organizations world-wide, for nearly ten years.

We adapted *EIS* for deployment in Higher Education contexts by adjusting the mission, the characters, the relationship networks, and the culture modeled in the underlying simulation dynamics. Two criteria have guided the progressive fine-tuning of all the simulation components and the dynamics generated when the players intervene in the model scenario:

(1) maximizing realism/believability, and
(2) maximizing the value of the experience in terms of triggering as many new insights as possible in each individual player.

Thus in order to validate this new simulation, we surveyed more than 200 deans, professors and administrative support personnel. Feedback from workshop participants indicates that the simulation is realistic, and that it contributes to the participants' understanding of change management more effectively than a lecture. We have also begun to collect evidence supporting the learning effectiveness of the EduSynergy simulation by measuring the participants' knowledge of specific learning objectives before and after the workshop.

The reminder of the paper is structured as follows: first we provide an overview of the underlying simulation dynamics. We then explain how the simulation was adapted for the Higher Education sector. This is followed by a section describing how the simulation's realism and learning value was validated. We then present the results of our first learning effectiveness experiment. Last, we discuss our plans for further development and validation of the EduSynergy simulation and conclude the paper.

OVERVIEW OF UNDERLYING SIMULATION DYNAMICS

Over the years, a number of models and insights from the literature on change management, as well as more generally from psychology and social psychology, organizational behavior and social network analysis, have been integrated into our simulations in order to (i) reflect specific organizational dynamics to increase the realism of the individual or collective behavior displayed by the simulated agents, and (ii) provide the basis for a rich, theory-based discussion of the players' teams experience during the debriefing sessions following each simulation run.

A first model embedded in the EduSynergy simulation reflecting change at an individual level corresponds to a progressive evolution of attitudes which is based on Roger's adoption

and diffusion studies (2003). Targeted management team members progress through four stages of adoption: aware, interested, trying, and adopter. These characters can move incrementally from awareness to adoption, or can move backwards towards awareness depending on internal or external factors in the simulation. This can be related to Conner and Patterson's work on building commitment to organizational change (1982). A particularly important transition is the one between the interest and trial phases where targeted individuals need to be willing and able to start experimenting with the new change. During debriefing sessions, this transition can be linked to the "Knowing-Doing Gap" of Pfeffer and Sutton (1999).

The simulation also teaches the importance of considering that the adoption process takes place differently in different people as a function of their unique individual characteristics (e.g. history, personality), and their initial attitude towards change. The first aspect is modeled by the diversity of the management teams' profiles. The simulated characters are given various stereotypical personalities to increase the possibility that players will recognize themselves or their collaborators. Each character also has an inter-personal communication preference; some individuals prefer face-to-face meetings, while others prefer email. The initial attitude towards change of the characters is based on the innovation adoption curve of Rogers (2003): innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%). The degree of difficulty in moving an individual through the different stages of the change management process is inspired by the typical BDI (Beliefs-Desires-Intentions) architecture as described by Rao and Georgeff (1991).

Increasing players' awareness of social networks is another goal of the simulation. Social influence or contagion models (Friedkin & Johnsen, 1990, 1997; Leenders, 1995; Marsen & Friedkin, 1993) and power networks (Pfeffer, 1992) assume that opinions and attitudes of actors in a social system only partially depend on individual characteristics but are also shaped by social influence. This is modeled in the simulation by networks determined by a subset of individuals, a formality level, an internal influence pattern matrix, and an updating frequency. The importance of the dominant opinion of the network on individuals not belonging to the network is also modeled. The tipping point concept (Gladwell, 2000) has also been incorporated into the simulation and can be discussed during the debriefing sessions. Pivotal roles have been given to five members of the management team. These characters play the role of "mavens", "salesmen" and "connectors" in Gladwell's terminology, and determine in large part the optimal diffusion dynamics and the system's reaction to players' actions; for example, some actions are not successful unless these five individuals have already been convinced to adopt. Thus, the importance of gathering information about individuals and informal networks early in the change implementation process is particularly important in the simulation and leads to an interesting discussion.

The culture of the simulated organization is also based on theoretical models which can be a basis for class discussion. Deal and Kennedy (1982) describe culture as the single most important factor accounting for success or failure of change in organizations. They emphasis four key dimensions: values – the beliefs that lie at the heart of the corporate culture, heroes – the people who embody these values, rites and rituals – routines of interaction that have strong symbolic qualities, and networks – the informal communication system or hidden hierarchy of power in the organization. The cultural layer of the simulation influences individual's reaction to specific change management tactics that are considered as appropriate or inappropriate in the modeled organization. For example, an organization can be modeled which values direct tactics such as face-to-face meetings over indirect tactics such as emails, and which has rites such as expecting people to persist meeting and reporting back to key individuals regardless of their negative attitude. The cultural layer also includes dynamics

related to participative management (Bower & Lawler, 1992) and distributive justice (Kim & Mauborgne, 1996, 1998, 2003). Both of these factors have a significant influence when players use strong-arm or covert tactics, which typically generate long-lasting negative reactions in the majority of characters. Usually at least one group of players discovers this during the game, making for a lively discussion about the underlying theories. The extent to which impatience can drive us to use these tactics and their impact on trust-building can also be discussed (Simmons & Crouch, 1997; Kolb & Bartunek, 1992).

In addition, other tactics have been modeled to trigger the discussion of specific issues related to pedagogical objectives. For example, the small impact of inviting external experts while resistance is still strong leads to discussion about internal versus external approaches to managing change processes, and the appropriateness of outsourcing parts of the process (Greer et al, 1999; Thomas, 2004). Players also learn about how people articulate different forms of resistance to change through feedback given by characters during the simulation expressing fears of losing identity, quality and job satisfaction, ethical arguments, trust-related issues, values such as openness and connectedness, attitudes such as status-quo satisfaction or unwillingness to produce additional efforts, discomfort with the pace of change, tendencies to protect existing processes and power structures, or fear of incompetence (Thompson, 1994). External events have also been progressively added to the simulation to trigger discussion on specific points such as facing budget problems, allocating too little or too much time to the initial strategy-building phase, reacting to time pressure from headquarters, or what happens when key individuals suddenly leave the company during the implementation process.

These theoretical concepts have guided the development of the simulation (Angehrn et al, 2005; Schönwald et al, 2006) and have resulted in the following core learning objectives which can be directly related to the simulation's impact dynamics (see Figure 1):

- Organizational change is a long-term process, not an event (success requires the right interventions on the right people at the right time).
- Individuals react differently to change (intervention, individual diversity).
- Resistance to change is to be expected (individual diversity).
- The importance of formal and informal social networks (formal structure, informal networks).
- Organizational culture is important (cultural aspects).
- The change process is subject to unexpected events (unplanned events).

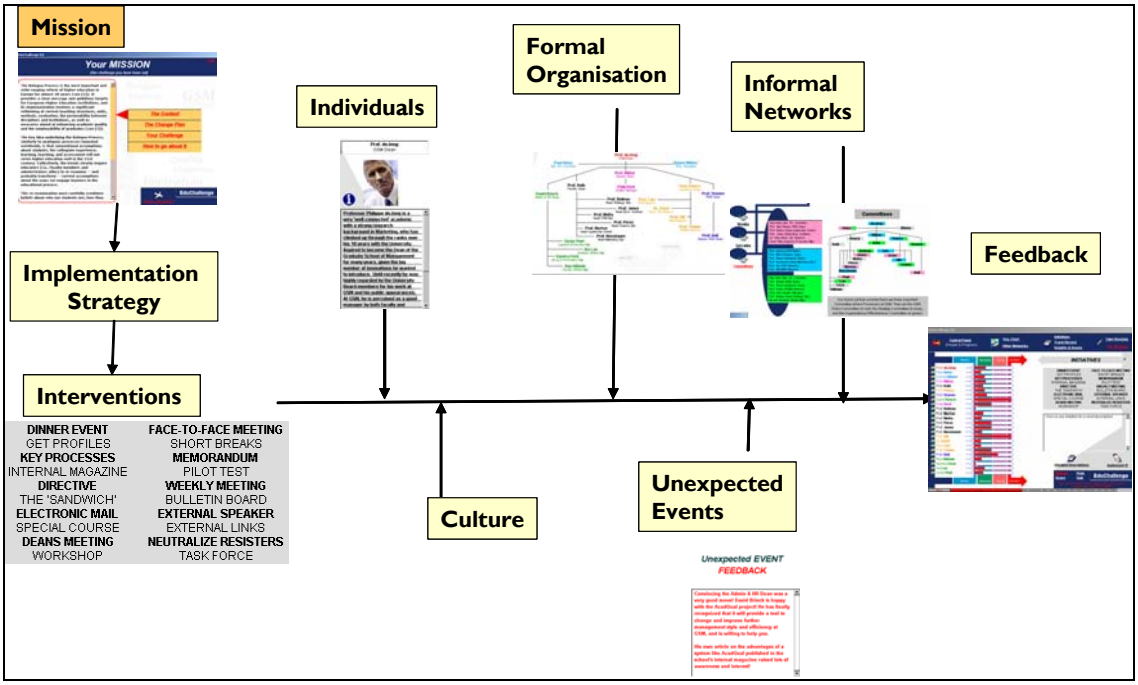

Figure 1: Design of the EduSynergy simulation dynamics

SIMULATION ADAPTION

We adapted EduSynergy by modifying the mission, the characters, the relationship networks, the culture, the interventions, and the unplanned events in *EIS* to reflect specific features of change dynamics in academia.

The EduSynergy mission

The mission can be briefly summarized as follows: Humfeld University wants to implement a university-wide quality assurance system called AcadQual. The implementation process has successfully evolved so far, apart from one exception. Humfeld University's Graduate School of Management (GSM), a successful and highly renowned business school, is reluctant to adopt the new system. The president of Humfeld University has now selected a number of faculty members and high-level administrative personnel (i.e. your group) to undertake a challenging mission: persuade the Dean as well as the academic and administrative staff of GSM to adopt the new quality assurance system within the next six months.

The characters

The 24 simulated characters represent various stereotypical personalities found in academia to increase the possibility that players will recognize themselves or their collaborators. Profile descriptions provide hints about the individual's history, motives, habits and opinions. These profiles are only available if players choose to spend some time getting them. Figure 2 shows two character profiles found in EduSynergy.

Prof. de Jong
GSM Dean

Professor Philippe deJong is a very 'well-connected' academic with a strong research background in Marketing, who has climbed up through the ranks over his 18 years with the University. Aspired to become the Dean of the Graduate School of Management for many years, given the big number of innovations he wanted to introduce. Until recently he was highly regarded by the University Board members for his work at GSM and his public appearances. At GSM, he is perceived as a good manager by both faculty and administration personnel, in spite of his tendency of approving of innovations only if the ideas come from him. Internally, he has developed a select team of collaborators who are very loyal. Father of 2 grown-up children, he is active in local politics and business councils.

Prof. Peters
Head of Inst. of Social Science

Professor Carl Peters is struggling with a pretty undisciplined faculty group. Some of the faculty members in the Institute of Social Science are producing good quality research, but many are not. A number of colleagues left two years ago after a dispute with the Dean on the school's strategy, and now even the teaching dimension is problematic, with students complaining that they just get young and inexperienced faculty members to teach the courses. Knows that his job is at risk if results do not improve quickly.

Figure 2: Two examples of personal profiles

The relationship networks

Formal relationships among individuals can be seen in the organizational chart. However, groups must decide to spend their simulated time in order to gather information about informal networks (five groups of people who meet regularly), external links (three groups of people who meet at either bridge club, tennis club, or local political events) and committee membership (R&D, Organizational Effectiveness, and Academic Programs).

The culture

Universities have a very distinctive culture compared to the corporate sector. Permanence, rather than change readiness, appears to be one key characteristic. According to Kerr (1982), universities are among the few organizations which have remained pretty much unchanged since medieval times. Other key characteristics are participation and shared governance (Rowley & Sherman, 2001), autonomy (Allen & Fifield, 1999), and the diversity and coexistence of discipline-specific subcultures (Becher & Trowler, 2001). This cultural dimension leads to a high degree of change resistance (Blackwell & Preece, 2001; Pellert, 1995). The University culture is modeled in the simulation by a preference for direct interventions such as face-to-face meetings, social protocols which include the necessity to persist meeting and reporting back to key individuals in spite of their rejecting attitude, and a general dislike of taking orders or covert interventions.

In addition, the intellectual skills and attitudes of academics makes them skeptical of emotion-charged sermons exhorting change and warning of grim consequences if they don't (Taylor, 1999). The not-invented-here syndrome also appears to be especially relevant in higher education where academic staff are often perceived as unwilling to adopt new teaching methods, learning approaches, and material developed elsewhere (Blackwell & Preece, 2001). Therefore character feedback during the simulation has been fine-tuned to express the

way higher educational organizations might express different forms of resistance (see Table 1).

Table 1: List of sample argumentations reflecting resistance

Source of Resistance	Sample argumentations
Fears of losing Identity, Quality and Job Satisfaction	"GSM is different from other schools within the university, we have a very specific identity and we want to keep it."
Fear of Incompetence (particularly when faced to new technologies).	"You shouldn't forget, my friend, that our people don't like the idea of storing and accessing certain type of information using information systems. Technology kills true information exchange and communication"
Trust-related issue	"And what about trust? Today, within GSM, we all trust the information sharing and feedback systems and processes we have put in place!"
Values such as Openness and Connectedness/ Belonging,	"Thank you for the memo, but please don't forget that here at GSM we know how to interpret the information we collect and distribute through our own systems. Will people in theUniversity Board be able to do the same once your AcadQual system will be in place?"
Attitudes such as Status-Quo Satisfaction or Unwillingness to produce additional Efforts,	I'm really sorry, currently we are all too busy. We are really working day and night and don't have much time these days, unfortunately. As you see, I am very busy with extremely important issues related to making this school successful. Maybe another time!" or "You know, we already spent a lot of time to make our current systems at GSM really efficient and at the same time user-friendly!"
Discomfort with the Pace of Change,	"You know, deep down I believe that too much innovation is not necessarily a good thing!"
Tendencies to protect existing Processes and Power structures,	"I care about employee's satisfaction and I am afraid that the type of innovations you want to introduce with your AcadQual system will have a negative impact!"

Interventions and Unplanned Events

The interventions found in *EIS* have been adapted for the academic environment and include a dinner event, information about committee membership, writing an article in the internal magazine, the "sandwich" (inciting interested individuals to go over their unconvinced superior's head directly to the Dean), electronic mail (general and selective), organize special course, hold special school management meeting, brown bag lunch, face-to-face meeting, see who takes short breaks together, send a memorandum, organize a pilot test, present in regular weekly management meeting, distribute questionnaire, invite external speaker, observe who meets outside work, neutralize resistors, set up task force, post on bulletin board, and one-legged interview (trigger "unplanned" brief encounter with top person to talk informally about project progress.). More details about the interventions can be found in Angehrn et al (2005). Three external events have been included in the simulation to make teams aware that good and bad things they hadn't planned on can happen at any moment during a change management project, like receiving an email with useful information, finding out that some people are meeting informally and spreading negative feelings about the project, or that other stakeholders are pursuing a parallel agenda and employing their own tactics (see Table 2).

Table 2: Unplanned Events

Event	Trigger (of this event)
The Secretary of the University Board just sent an email with some more information about Dean deJong, and David Brinck, Admin & HR Dean, which	This Event is displayed for every team at the very beginning of the simulation (before they start implementing their first decision). It introduces the

should be useful to you. This additional information has been directly inserted in Prof. deJong's and David Brinck's Personal Profiles which you can access directly by CLICKING on the 'bubble' icon next to their names.	fact that events might occur in an unplanned way, and it provides information about 2 key persons in the organization (which otherwise would have been accessible only after using the GET PROFILES tactic). It is also a way of showing that the team has the support of the University Board.
Today doesn't start well! You heard that Prof. Grind met informally Polly Kent during a recent lunch break, and succeeded in spreading negative arguments about the project, particularly related to GSM losing control on the whole quality assurance process. Apparently, Polly Kent was sensitive to Prof. Grind arguments, which is not really a motivation booster.	This Event is displayed to make the players aware of the regular informal meetings taking place in the organization and the consequences of influence networks. The consequence of this particular event (which can take place among other individuals than the ones indicated in the example) is that Polly Kent loses her interest for the project.
The results of a survey conducted among the resident students by Paul Heinz just appeared. It comes out very clearly that the students strongly support the harmonization of the processes of GSM (particularly all those in which they are directly involved) to the one of the rest of the University. Many students already know the AcadQual system and are used to its user interface.	This Event is displayed to make the players again aware that the attitude towards the innovation might be also a function of events which happen in parallel to their intervention. In this particular case, the representative of one of the stakeholders (the students) conducted a survey. The results are fortunately favorable and this event has a positive impact on a number of individuals sensitive to such students' surveys.

VALIDATION

To validate the realism and learning value of EduSynergy, we surveyed 223 individuals, including professors, support staff and deans, after they had played the simulation. All respondents were from UK universities, and 151 were also members of the British Joint Information Systems Committee (JISC). The survey asked the participants' opinion about fifteen different statements using a seven point Likert scale (strongly disagree=1,…,strongly agree=7). Six statements concerned the contribution of EduSynergy to the understanding of change management, seven statements asked their opinion about the realism of the simulation, and two statements asked for their overall assessment of the simulation's value as a training tool. Table 3 shows the percentage of participants who agreed with each statement (i.e. gave a score greater than or equal to 5). The results indicate that EduSynergy reflects very well the change dynamics in Higher education contexts and can provide the basis for high quality learning experiences. An overwhelming majority of participants agreed with each statement. 90 percent of participants feel that the simulation was more effective than a lecture, and the simulation scores very high in improving the understanding of change management and realism. The lowest scores, while still high, have to do with the role and impact of cultural factors in the simulation. Further modifications to the simulation and/or debriefing could be focused on this area.

Table 3: Percent of EduSynergy participants in agreement with survey statements

Part 1: Contribution to Understanding of Change Management *The simulation improved my understanding of…*	**Agree**
…the role and impact of individuals on the success or failure of a change process	91%
…the role and impact of formal and informal relationship networks on the success or failure of a change process	91%
…the role and impact of cultural factors on the success or failure of a change process	74%
…the different phases of a change process	86%
…the impact of different change tactics/initiatives which can be used in a change process	94%
…the impact of different forms of resistance appearing in change processes.	86%
Part 2: Realism of the Simulation *The simulation realistically reflects…*	
…the role and impact of individuals on the success or failure of a change process	85%
…the profiles and behavior of individuals in Higher Educational contexts	75%
…the formal and informal relationship networks in Higher Educational contexts	79%
…the role and impact of cultural factors on the success or failure of change process in Higher Education contexts	70%
…the different phases of a change process in Higher Education contexts	82%
…the different change tactics/initiatives which are used in a change process in Higher Education contexts	82%
…the different forms of resistance appearing in change processes in Higher Education contexts	79%
Part 3: Overall Assessment	
The situation and dynamics presented in the simulation corresponds to real situations and dynamics in Higher Education contexts.	71%
The simulation is more effective than a lecture/seminar.	90%

MEASUREMENT OF LEARNING EFFECTIVENESS

As the learning objectives of the EduSynergy simulation are to increase participants' understanding of the dynamics of change and innovation, we are now focusing our research efforts on developing a survey instrument and gathering data to test the following hypothesis:

Hypothesis 1: *The EduSynergy Workshop will increase the participants' understanding of the dynamics of change and innovation in educational institutions.*

In order to collect evidence to verify this hypothesis, we now require workshop participants to complete pre and post workshop surveys designed to measure specific learning objectives of the EduSynergy simulation. The pre-workshop survey asks their opinion about 30 different statements (see Appendix) using a five point Likert scale (strongly disagree=1, disagree, neutral, agree, strongly agree=5). We also collect information about their gender, age, nationality, academic institution, highest educational degree, years work experience, and current position. The post workshop survey includes all statements from the pre-workshop survey as well as six additional statements. We measure learning by testing the equality of matched pairs of the participant responses to common survey items before and after the workshop.

We had a first opportunity to measure the learning effectiveness of EduSynergy during a 5-hour EduSynergy workshop at the EC Integrated Project TENCompetence (TENC) Winter School in Innsbruck in February 2008. This workshop 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 actual time use during the workshop was as follows:

1. Introduction and discussion of the difficulties of change (20 minutes)
2. Discussion of change and sustainability (25 minutes)
3. 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.

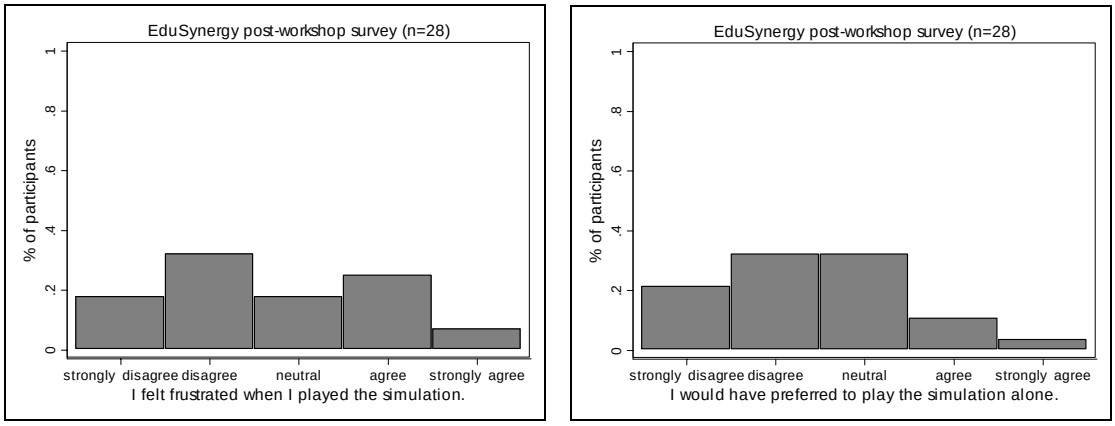

Figure 3: Distribution of responses - frustration level & play alone preference

Everyone enjoyed the workshop, and thought playing the simulation was fun. All participants agreed or strongly agreed with these two statements. Participants experienced various levels of frustration during the simulation. 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.

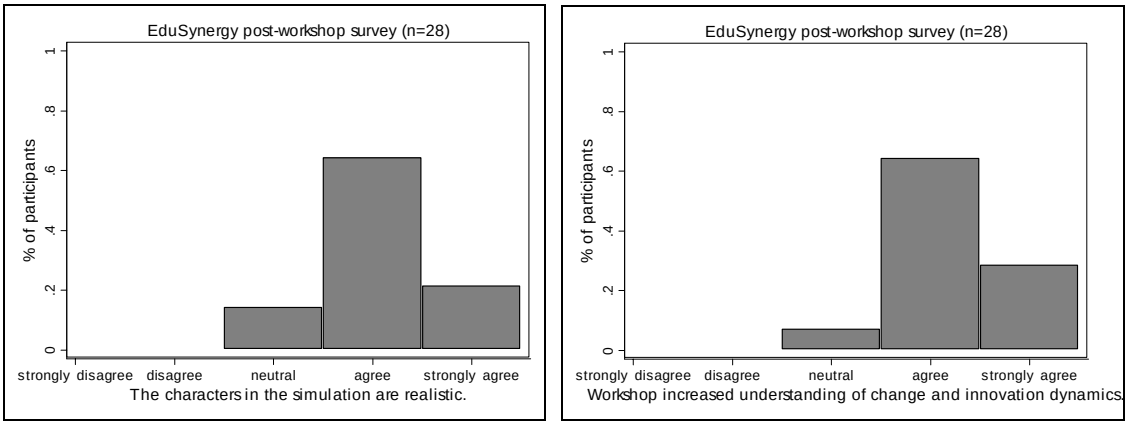

Figure 4: Distribution of responses – realistic characters & self-assessed learning

Nearly all participants agreed or strongly agreed that the characters in the simulation are realistic, and that workshop increased their understanding of the dynamics of change and innovation in educational institutions; approximately ten percent of the responses were neutral (see Figure 4). Nonetheless, in order to validate our hypothesis, we measured their learning of specific issues by testing the equality of matched pairs of the participant responses to the 30 common items before and after the EduSynergy workshop. We found significant change for fourteen of these items. Table 4 shows the median and mean values of these fourteen items.

Table 4: Difference of Median and Mean Tests – Pre-workshop vs. Post-workshop

*Indicates significance at the one percent (***), five percent (**) and ten percent (*) levels, based on the Wilcoxon matched-pairs signed-rank test for medians, and the t-statistic assuming unequal variances for the means.

		Pre-workshop	Post-workshop
People in higher educational institutions do not like to use new technologies.	Mean Median	2.4 2	3.0*** 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**
Some people need lots of convincing in different ways before they will change their working habits.	Mean Median	4.2 4	4.5** 4**
When the Dean is convinced something is the right thing to do, people do it.	Mean Median	2.3 2	3.2*** 4***
It is important to be aware of which people socialize outside work.	Mean Median	3.2 3	4*** 4***
It is important to be aware of the changing emotions of key individuals.	Mean Median	3.8 4	4.3*** 4**
Email is an effective way to communicate with people in higher educational institutions.	Mean Median	3.5 4	2.9*** 2.5***
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**
People like changing their working habits.	Mean Median	1.8 2	1.5*** 1***
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***
Secretaries/personal assistants do not have a lot of power in higher educational institutions.	Mean Median	2.7 2	2.0*** 2***
People who work in higher educational institutions are open to adopting innovative practices.	Mean Median	3 3	2.5*** 2**
In a higher educational institution, all decisions are based on logic and everything is under control.	Mean Median	1.6 2	1.9** 2**
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 disagreed that it is effective to order people to change, they are now significantly more likely to strongly 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. This may be due to the fact that its effectiveness depends on the targeted individual's characteristics. 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. However, as the median score for this item 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).

CONCLUSIONS AND FURTHER WORK

Fostering change and enhancing collaborative behavior in any organization is a challenging task. Compared to the corporate world, higher educational institutions have a very distinctive culture which makes rapid change even more difficult and their "change readiness" is often perceived as limited at many levels. Thus, in this paper we have described our research efforts to develop and validate a rich, realistic change management experience in a university setting. This has resulted in a new multimedia, team-based SmallWorld simulation, EduSynergy, which models the dynamics of change in higher educational institutions, including individual behaviors, group dynamics and cultural factors.

In order to validate this new simulation, we surveyed more than 200 deans, professors and administrative support personnel. Feedback from workshop participants indicates that the simulation is realistic, and that it contributes to the participants' understanding of change management more effectively than a lecture. We have also begun to collect evidence supporting the learning effectiveness of the EduSynergy simulation by measuring the participants' knowledge of specific learning objectives before and after the workshop. We will continue to refine our survey by dropping, or rewording, questions that do not have a clear "correct" response; for example, concerning the effectiveness of emails, as well as "common sense" questions which are persistently answered correctly before the workshop. As we collect more data, we will also be able to employ more sophisticated analysis techniques to better increase our understanding of its learning effectiveness.[1] In another related study of the learning effectiveness of *EIS* in the development of advanced social skills (Maxwell & Angehrn, 2008), we found after factor analysis that the fifteen survey items concerning workplace behavior are heterogeneous and measure different underlying properties of the social skills needed in the workplace. These fifteen items are also included in the EduSynergy survey.

It should also be stressed that the learning value of an EduSynergy workshop is not the result of simply playing the simulation, but also depends on the skill of the facilitator in managing a successful debriefing session and developing connections between change management theories and the players' simulation experiences and prior knowledge (Zantow et al, 2005). The EduSynergy workshop was designed as a teamwork experience stimulating collaborative learning and knowledge exchange. The educational experience is enriched by group discussions before, during and after the simulation experience. A number of models and insights from the literature on change management, as well as more generally from psychology and social psychology, organizational behavior and social network analysis, are integrated into the simulation in order to provide the basis for a rich, theory-based discussion of the players' teams experience during the debriefing sessions following each simulation run.

These quantitative as well as qualitative insights have encouraged us to pursue further the diffusion and further development of this simulation-based learning approach in Higher Education. We have recently developed an enhanced version of the simulation which

[1] These simulations can be run in higher educational institutions free of charge in exchange for pre and post workshop data.

addresses both change and collaboration dynamic, and are currently measuring its learning value as well as documenting its deployment in different types of higher educational institutions.

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APPENDIX

Pre-workshop survey

We use an online pre-workshop survey to gather individuals' opinions about 30 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. Outspoken individuals who resist change should be neutralized (e.g. by sideways promotion).
5. It is important to follow institutional rules.
6. Most people read internal magazines and/or bulletin boards.
7. The diffusion of innovation in an organization is a gradual process of bringing everybody along step by step.
8. It is easier for academic institutions to change than it is for other organizations.
9. Some people need lots of convincing in different ways before they will change their working habits.
10. Prior experience and technology proficiency affects an individual's willingness to use a new technology.
11. Face-to-face meetings, planned or unplanned, are an effective way to convince people to change.
12. When the Dean is convinced something is the right thing to do, people do it.
13. It is important to involve stakeholder groups early.
14. It is important to be aware of which people socialize outside work.
15. Hands-on training and continuous support is necessary for a new system to become widely adopted.
16. It is important to be aware of the changing emotions of key individuals.
17. People react differently to new ideas.
18. Email is an effective way to communicate with people in higher educational institutions.
19. An effective way to convince someone to change their working habits is to get to know them better.
20. If you want to get results, you should create a special task force.
21. People like changing their working habits.
22. The source of resistance to change is mainly rooted in the tendency to preserve current practices and power structures.

23. In a higher educational institution, all decisions are based on logic and everything is under control.
24. It is a good idea to go over your hierarchical superior's head directly to the Dean if you want to get results.
25. At work, it is important to be aware which people regularly see each other during the day.
26. If the solution to a problem is good, people will change their working habits.
27. Inviting a well-known academic to speak is an effective way to convince people in a higher educational institution.
28. Secretaries/personal assistants do not have a lot of power in higher educational institutions.
29. People who work in higher educational institutions are open to adopting innovative practices.
30. When their hierarchical superior is convinced something is the right thing to do, people do it.

Europe Campus
Boulevard de Constance,
77305 Fontainebleau Cedex, France
Tel: +33 (0)1 6072 40 00
Fax: +33 (0)1 60 74 00/01

Asia Campus
1 Ayer Rajah Avenue, Singapore 138676
Tel: +65 67 99 53 88
Fax: +65 67 99 53 99

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