

# SOCIAL AND TECHNICAL ASPECTS OF AN ACADEMIC VIRTUAL ENTERPRISE IN THE GLOBAL MARKET

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## **ABSTRACT**

The aim of this paper is to describe some fundamental issues concerned with an organisation, described as an academic virtual enterprise, and its place in today's global market. This involves consideration of both social and technological factors.

A virtual Enterprise can be described as a temporary network of groups that comes together to share skills or principal competences and resources in order to provide enhanced response to business opportunities. Cooperation is supported by computer networks. An enterprise integrates into a single business/academic equity with the objective of delivering a product or services to the market.

The emergence of the academic virtual enterprise is strongly connected with the development of the global market, which nowadays forces companies to introduce an ever increasing variety of products and services that maximise quality while minimising cost and time. New ways of communication are introduced to support information networking not only in today's progressive industries but also increasingly in the education process. In order to better understand the motivation, requirements and challenges of an academic virtual organization this paper concentrates on the European Global Project Realisation course as a case study.

*Keywords: Academic virtual enterprise, cultural background, communication technologies, social aspect, global market*

## 1 INTRODUCTION

The rapid development of computer networks and their wide availability has resulted in the development of new forms of communication in product development both at business and academic levels. The emergence of new technologies has enabled new forms of organization to be created to fulfil the expectations of global consumers. One of these is the virtual enterprise (VE) and it is the shift from 'local' to 'global' that makes it virtual. The early stages of evolution of the VE concentrated on the need to design and develop horizontal infrastructures, aimed at supporting the basic collaboration needs of enterprises. The current situation shows trends in vertical business model development together with supporting communication tools [1].

The European Global Project Realisation (EGPR) is a final year undergraduate design project organised as an academic virtual enterprise formed by an Industrial Partner and the final year students from 5 European universities in the United Kingdom, Croatia, Switzerland, Slovenia and The Netherlands. Starting in February each year and lasting for only four months, the project consists of three main stages, each of them being

concluded with detailed project reviews. The first phase consists of the analysis of the given task, in which students ought to consider all aspects of the product, look at the market, analyse the company capabilities and potentials, analyse the assignment, gain additional information and initiate general conceptualisation. The needs to evaluate all available resources, the requirements of the industrial partner and a product specification to fit the global market, are done during market research in the first phase of the project. The second phase is conceptualisation when students use the expertise and in depth development of the concepts initiated in the first stage. This phase also requires detailed presentation of the concepts in order to determine their suitability for the specified market and to select the most appropriate one on which to continue working. The final, materialisation stage, involves elaboration of the chosen model by detailing all its elements and making the necessary preparations for a prototyping workshop. More about the design process can be found in [2]. Both students and academics involved in the global product realisation project, working over a distance, are supported by communication tools. These bond all knowledge and available resources in order to meet the requirements of the industrial partner. The course therefore gives an opportunity for students to develop skills and competences for their future industrial enrolment [2].

The establishment of a virtual enterprise requires all individuals participating in the academic project to combine their skills. Different personalities 'meet' together on one platform in order to produce the goods or services required by the global market. The communication tools and technologies used ease cross border communication, but there are still social aspects that have to be considered when forming a virtual institution. Students from each country approach the problem from different cultural, behavioural and organizational perspectives and hence suggest a variety of solutions. The participants have to establish a shared platform of consultation in order to overcome their differences. The same problems occur when examining the case from an individual's perspective. Thus, previous experience and knowledge as well as aspects specific to each nation will have an impact and will direct the product realization process. By participating in the project, both professionals and students have an opportunity to develop their knowledge of advanced communication technologies and operational skills. However, because their contact is based on distance communication it has an impact on the process, interaction and overall outcome of the project. Students finally meet only once at the end of the project for assembly of the prototypes and their final presentations.

Published literature identifies several primary causes that delay the process of product development in an educational environment. These are related to the use of technology, IT skills, the language of communication and cultural differences. Technical problems are estimated to take up to 20% of the overall causes for project difficulties. Issues associated with IT skills constitute up to 15% of the students' problems [3]. The remaining 65% difficulties are related to social aspects. These may be related to the sociological issues of using technology, lack of understanding, language problems and cultural differences as well as overall confusion. Also, the activities involved in an academic virtual enterprise are not always well understood by all the students. This influences both motivation and the overall approach to the problem. The unconventional nature of an academic virtual enterprise causes more questions to be asked and more time needed for interaction and problem solving. Because of the impersonal and 'faceless' character of their communication, students must use other routes to bridge the gaps where electronic communication is the only and often a more time consuming solution [4]. More time is needed to communicate purely electronically and together

with the lack of human interaction and other, personal or/and professional commitments, the project becomes more challenging. Therefore greater motivation is needed for students to commit themselves to the course. There is also a great risk that, within the virtual enterprise students may try to interact in modes more suited to face-to-face group design but which does not always exploit the full potential of the technology. This may limit the whole potential of the project. As a result, only selective use of the supporting tools slows down the progress of overall communication and solution finding [5].

## 2 TECHNICAL ASPECT

In order to make the interaction process more effective and because of the global nature of a virtual enterprise, idea transfer is determined by communication technology and specific organisational aspects. A number of technical tools and applications are used to help personal contact. In contrast to a traditional enterprise model, where communication is based on regular meetings and creative sessions, participants in a virtual enterprise meet only in virtual space. Thus, a virtual enterprise is more of an action rather than an institution [6]. A virtual enterprise is decentralised i.e. there isn't a single central control unit, and therefore discipline has to be sustained and individual IT skills have to be well developed in order to enhance cooperation. Unlike activities in a traditional institution, where communication tools are only the implementation of everyday communication, and project reviews take place at an interpersonal level, communication within a virtual enterprise is on an international scale. Associated with its international character, a virtual enterprise benefits from subcontracting, remote working and most importantly, globalisation. More resources can be dedicated to develop the product instead of paying accommodation costs. Interpersonal communication is still needed, although it is more time consuming than communication through internet enhanced technology.

All participants have the opportunity to develop their skills using a dedicated platform where they can share their ideas and make them visible to other students and supporting staff. A Digital Learning Environment (DLE) is based on library technology where all project materials are organised and presented to show the objective concept of the academic virtual enterprise and can be accessed by its participants. In the EGPR, students share their concepts and solutions on a 'Blackboard', a content management system initially adopted by TU Delft. It is an e-learning platform where files, publications, progress reports are shared and where discussion forums take place. In other words it is an e-learning platform that can ease communication within a distance enhanced educational environment.

The internet enables all ideas to be exchanged during videoconferencing sessions. Point-to-point or multi-point conferences enable students and academics, who participate in EGPR in five different universities, to talk face to face over high quality audio and video links.

Apart from regular sets of virtual meetings, day-to-day communication is fulfilled by email and SMS exchange, instant messenger and audio communication over telephone or Internet. A detailed review of the tools used and the skills that students gain by using these tools is given in [10].

## 3 COMMUNICATION AND THE SOCIAL ASPECT

Effective communication does not only depend on tools that are used to support the whole process of course realisation. All participating students and academics meet face-to-face only once and that is during the final workshop at the very end of the project. This may obstruct the progress significantly. However, the lack of previous personal

contact is not the only factor to influence the progress of product development. A number of social factors may also exacerbate the gap between internationally spread students.

Working in teams is considered as a very important aspect in the course not only in establishing long-distance impersonal communication but mainly because the different, cultural and educational backgrounds may alter the communication level. Students who participated in the EGPR in previous years have suggested that if they all met at the beginning of the course, they would have been able to recognize the way in which their team mates work and this would have had an impact on the whole communication process. However they also realize that this is not possible due to the way virtual enterprises are usually organised. The necessity of adjusting to other people's working methods, trust in other's expertise and efficient professional communication were considered as the biggest benefits of the EGPR. Some students found the prototyping phase to be both the most troublesome and the most valuable. This is because each team member has a different field of expertise and mode of expressing their knowledge. Students from last year's course explained that it took up to two days in the final workshop to find their own places within the group and to readjust to the new working situation. Nevertheless at the end everybody was proud and happy with the outcome. The fact that for the past four months they could only communicate using new technologies and communication tools made the project even more challenging. They realised that, in order to produce the most suitable and advanced product and create a shared platform of communication, all previous boundaries had to be overcome and their impact-minimized.

### **3.1 Problem approach and cultural background**

Each international team is formed from couples of students from different universities. Accordingly, problems often arise when, as a result of cultural and educational differences, any team member tries to persuade the others what the best method of solution should be. In this case compromise is the best but not the easiest way to find the right solution. Agreement has to be achieved at all stages of the course in order to achieve the goals effectively. Trust plays an important role in selecting methods. Sometimes students might not be keen on foreign methods because they know that after the project is ended they might not apply these methods again. It is very important that supporting academics make students aware of all possible methods so that during the project students can decide on and apply that which is the most appropriate.

The way students approach different problems is also an area which generates various sociological issues. Some may approach a problem enthusiastically and search for a solution by applying available tools and computations to achieve the desired result. Others see the same problem as impossible to solve. Differences in attitudes may affect the project especially at the very early stages.

Geert Hofstede developed a model that identifies four primary dimensions to assist in differentiating between educational cultures. These are Power the Distance Index (PDI), Individualism (IDV), Masculinity (MAS), and Uncertainty Avoidance (UAI) [7]. The Power Distance Index is the extent to which more powerful members of the organization, usually academic staff, expect less powerful members to accept the power to be distributed unequally. In other words this represents inequality. It suggests that a society's level of inequality is endorsed by the followers as much as by the leaders [8]. This phenomenon can be applied to student - academic staff relations. PDI is different in all countries participating in EGPR and has an impact on communication. As a means

of respect, in some countries, such as Croatia and Slovenia, it may be unacceptable for students to disagree with the opinion of academics whereas other countries, such as The Netherlands, encourage students to present their own ideas, even if different to the academic's, as equally valuable. The lower the power distance the greater equality and opportunity to rise within a society. This is reflected in the academic virtual enterprise; when students coming from low PDI countries, where citizens have an opportunity to express themselves in society, are ready to continue discussion even if they disagree with a more powerful member. At the same time, a student from a high PDI country will generally agree with the staff. In this situation, discussion will no longer exist between students from low and high PDI backgrounds [9]. It is however noted that sometimes student members from countries with a low PDI discourage colleagues from countries with a higher PDI from engaging in dialogue to express their ideas fully. By this means, students from low PDI countries sometimes find it easy to promote their own ideas.

### **3.2 Language as a shared communication platform**

Although most Students and Academic staff participating in EGPR have different first languages they are all expected to communicate in English. The level of knowledge of the commonly agreed language is different and this affects the message and the idea transfer. Some of the participants might not be able to express themselves in the engineering field in a foreign language in the way they would like. As the consequence they might not be understood by fellow students and this will result in confusions. Also, explaining ideas in a foreign language is time consuming and other methods for communication could be applied, for example a graphical representation of the idea. Inability to rapidly grasp the issues discussed often causes feelings of inequality. Students with more advanced English skills regard others with lower English skills as unequal participants. The quality of communication between students with different English skills tends to improve when communication platforms other than video and teleconferencing are used. These are email exchange, instant messaging or even one-to-one telephone conversations.

### **3.3 Area of interest and level of involvement**

The structure of the EGPR course causes different levels of involvement among the participating students. Because of various interests, students may contribute more to the product development at some stages and less at others. For instance, students that specialize in engineering might not fully participate in the initial stages of the project simply because their area of interest is connected with some other discipline. Some students may feel undervalued and therefore rejected.

Another important dimension is individualism as a level of independence of individual students and their ability to promote their own goals and ideas. Hofstede [7] describes Individualism (IDV) as the level of integration between individuals in a group. Some societies encourage individuality, other might encourage interdependence. Highly individual countries believe that a single person is the most important unit and highly collectivist countries, concentrate on the group as the strongest component. Therefore students with a collectivist background will believe in the strength of a group and make their best to form a team with great potential, but at the same time students with more individualistic tendencies will not be so keen to share their ideas and confront the group with them.

It is important that all students contribute to the project by sharing their ideas and possible solutions not only as part of the project but also to learn the most from it.

#### 4 CONCLUSIONS

Although the European Global Project Realisation benefits from new technologies and dedicated people working towards certain goals, special consideration is needed in order to overcome all issues connected with cultural and technical differences. Students need to find a shared platform of communication not only on a linguistic level, but also in the ability to adjust to the way other people work and share ideas, to be able to compromise and do their best to form proactively working teams.

Certainly it is not possible to eliminate all cultural boundaries but more consideration must be given to minimise their interference both in the performance of the course and the final product. Also because the course lasts only for four months, students must concentrate on the product development from the first moment it is introduced and this gives them little or no time to get used to new students, schedules and methods of communication. Participating students should be encouraged to do their best to overcome all obstacles and thereby benefit from this great academic experience, thus building strong foundations for their future careers.

#### REFERENCES

- [1] Hamideh Afsarmanesh , Luis M. Camarinha-Matos, *Federated Information Management for Cooperative Virtual Organizations*, Proceedings of the 8th International Conference on Database and Expert Systems Applications, p.561-572, September 01-05, 1997 .
- [2] Horvath, I., *Design Competence development in Academic Virtual Enterprise*, Proceedings of IDETC/CIE 2006 ASME 2006 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, September 10-13, 2006, Philadelphia, Pennsylvania, USA
- [3] Jones, P., Packham, G., Miller, C., Davies, I., Jones, A. “*e-Retention: An Initial Evaluation of Student Withdrawals within a Virtual Learning Environment*”, Proceedings of the 2<sup>nd</sup> European Conference on eLearning, Ed. Roy Williams, Academic Conferences International, Reading (2003) pp.239-248.
- [4] Kent, T. *Supporting staff using WebCT at the University of Birmingham in the UK*, Electronic Journal of e-Learning, Volume 1 Issue 1, (February 2003) pp. 1-10
- [5] Beasley, N., Smyth, K. *Students’ Selective use of a Virtual learning Environment: Reflections and Recommendations*, Proceedings of the 2<sup>nd</sup> European Conference on eLearning, Ed. Roy Williams, Academic Conferences International, Reading (2003) pp.71-79.
- [6] Katzy, B. R. and Schuh, B., *The Virtual Enterprise*, University St. Gallen and Erasmus University Rotterdam, (1999).
- [7] Hofstede, G., *Culture's Consequences, Comparing Values, Behaviors, Institutions, and Organizations Across Nations*. Thousand Oaks CA: Sage Publications, (2001).
- [8] Geert Hofstede *Cultural Dimensions*. Available at: <http://www.geert-hofstede.com>
- [9] Chan, F., Kamminga, R., Van de Langkruis, A. S., Lankhaar, J., Pastoor, J. L., Zeedijk, W. and Moes, C. C. M. *Communication in International Academic Virtual Enterprise*, International Design Conference- Design 2006, Dubrovnik.
- [10] Kovacevic, A, *Competence Development in an International Product Design Course*, International Design Conference- Design 2008, Dubrovnik.

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