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GLOBAL UNIVERSITY ENTERPRISES AND INTER-ENTERPRISES COLLABORATION BASED ON INTERNET AND GROUPWARE TECHNOLOGY

Practical impacts of communications branches of science lead to business areas and enterprises oriented to the market economy. Among many possible fields of co-operation, university and enterprises collaboration based on internet and groupware technology are very reasonable. The paper indicates the main assumptions and possible solutions of applying internet facilities, as well as teamwork approaches. The requirements for setting the mentioned collaboration are regarded in the context of Polish information and communication technology infrastructure. The proposed levels of supporting business companies are limited to three points: mail, promotion, and integrated business- oriented.

1. INTRODUCTION

It is an economic challenge to establish international business contacts between enterprises of Central Europe on one side and Western Europe on the other, to enhance joint ventures and subcontracting among companies. Enterprises wanting to do business on a broad geographical scale require a range of information services, therefore support by university centres with experience and technological equipment seems to be natural. In addition, the university centres are usually advanced in groupware technology, which offers problem solving using collaborative strategies (Coleman et al. 1995)

The starting point of the paper is stressing the meaning of information services for companies – in Section 2. The information and telecommunication infrastructures are basic requirements, so this topic is covered in the next part. A global university enterprise and inter-enterprises collaboration has to be built, to stimulate and to support local and international business contacts. Structure of this collaboration is presented in Section 4. The last part of the paper is devoted to a

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presentation of the implementation of Information Communication Technology (ICT) facilities supporting enterprises via Internet.

2. A GLOBAL MARKET PLACE FOR ENTERPRISES

The information that is involved with the enterprises' activity is of a very different character. They can be grouped into several categories listed below:

a. Information required by the enterprises. Information requirements can be identified as: directory services, reliable and detailed company profiles, catalogues of products and services allowing an enterprise to broaden its suppliers and partners; market intelligence information; in particular: market trends, product trends, consumer behaviour, competitive positions, statistics, market data, marketing studies, information on local markets, business rules; government information (regulations, standards, administrative requirements and forms, taxes, incentives, list of contact points) in several international languages; financial and credit rating information; information on world-wide physical delivery to support virtual trading (logistic information, international payment systems linked with delivery to customer); sector specific information.

b. Information that enterprises want to make available to their co-operatives. Information delivery can be identified as: means to be present and noticed by providing on-line information and advertising with good chances to be easily located; presentation of products and services, of know-how and experience via electronic catalogues; commercial terms and conditions.

c. Access to government information. Most of the information required to operate over different states comes from government organizations. This includes product regulations, employment aspects, taxes and so on. An opportunity for our local and national authorities is to make their information available on the web at a very low cost for users. However the exact requirements from the enterprise on that topic need to be investigated. In the provision of such government information, the role of intermediaries should be stressed, i.e. publishers and trade associations.

d. The necessity to access remote transaction services. The buyers can move from the informative part of the global information network to effective procurement and payment. How it should be done needs to be defined. Integration of existing EDI standards and transaction services is an issue. Solutions for the business to business transaction may be different from those for the consumer market.

Enterprises, especially small and medium sized enterprises (SME's), need to understand the unprecedented opportunities to access global markets, which the

worldwide web offers. In the long distance-selling industry, the Internet will be integrated into their marketing and order-fulfilment strategies. Electronic commerce offers improved transaction management and enhances business efficiency. In such a context the training of employees in modern enterprise appears. Let us consider the chosen aspects of the problem.

There are many new possibilities in training staff, with respect to traditional sending them to courses or organizing training session on site. These possibilities involve training using Internet. Using Internet, the problem posed by the limited resources available for staff training, will be partly solved too. Industrial organizations and associations and universities will be encouraged to publish case studies, disseminate training materials and to use electronic commerce themselves.

Exploiting the opportunities offered by the development of a global information system will facilitate participation in global trade. This global electronic environment will deliver an open and non-discriminatory exchange of information (e.g. data on technologies, products, and human resources) overcoming obstacles of distance, time and country borders.

Enterprises also have to evolve to a life-long learning strategy for their employees. Flexibility of employees is a vague word. It does not only imply the organization of tasks (night, weekend and continuous production), but also a regular change of tasks. For this, the skills have to be expanded and the employees have to be re-educated regularly. The education has to be seen as a set of different kinds of learning aspects. It comprises:

- information search for products or services, procedures and legislation,
- learning of the use of methods and tools,
- call for specialized advice.

The learning activity has to be organised taking into account the limits of time and resources. Distance learning and distributed learning will be a solution.

3. INFORMATION AND COMMUNICATION TECHNOLOGY INFRASTRUCTURE AND INTERNET IN THE EAST EUROPEAN COUNTRIES (WITH A SPECIAL FOCUS ON POLAND)

The overall Internet and electronic information importance awareness in society, education and research, mass media, advertising, business community and government is growing very fast. This revolution has several visible signs: many new commercial Internet service providers appearing in the market, a lot of local information published on the net, some governmental and company intranets are being developed and through firewalls they interface with Internet.

The communication infrastructure in organizations is improving (in connection with ICT). At present in the medium size enterprises it is very common that a computer network is operating. Most frequently it is Novell software in an environment of microcomputers. It uses very different application software, mostly in bookkeeping, payroll and assets management. They come from many software suppliers. Presently the proportion of Polish software is about 40 per cent on average, and is much higher in smaller enterprises. Since Poland signed The Treaty of Intellectual Property Protection all major software makers supply their products. Slowly comprehensive software like ADIFO, Impact Award or others are spreading. The increase of foreign application software is enhanced with its translation into Polish. In view of the widespread use of computer networks it must be said that it is relatively seldom connected to Internet. The listing of companies in Poland that are connected to Internet is relatively short and comprises mostly of bigger companies.

The Internet in East-European countries is viewed mostly as a gateway for direct access to Western knowledge and culture, from which those countries had bean cut off for decades. It is to a lesser degree seen as the medium for business contacts, especially among small and medium enterprises.

Internet access is widespread and intensively used in Poland. For example in the city of Wrocław there are 13 Internet providers. Several applications are developed in all kinds of industries (transport, airline reservation, tourist services, and bank systems). They support all kinds of business functions. There are several communication nets, which support business organizations. In Poland we have 2 large networks, the NASK (academic network) and the Poland-BIZ (business).

Customers of NASK are, besides the education and research world, also business organizations, as well as telecommunication operators. In January 1997 about 500,000 NASK users were registered.

Telecommunications Equipment and Services are crucial for the development of computer networks. For Poland to achieve a "European level" of telephone density (35 phones per 100 inhabitants) by 2005, broad development targets include the installation of 3.6 million new digital lines by the end of 1995, replacing one million analogue lines. Of these, more than two million are to be installed by some 20 local independent operators. By the end of 1995, overall network digitalization rates should reach nearly 60%, up from 9%. An overall telecommunications plan for Poland still needs to be defined. However, Polish operators are making a wholehearted effort to develop Polish telecommunications, and it is entirely feasible that market demand will push Polish telecommunications to the European level before the end of the century.

In the domain of electronic commerce, especially EDI and financial EDI, the number of applications is increasing. "Doctor Q" (agreement with General Electric

Information Services) is the first provider of EDI services in Poland. Most Polish branches of international companies are using it.

To conclude the characteristics of ICT infrastructure, let us stress the basic opportunities for the future. First of all, to underline that search methods have still to be improved. It is likely that the information network will require better search systems than simple hypertext. What users need is an efficient mechanism to find a particular SME on the Web through a form based search, using agreed codes and keywords. Currently there are already well known search engines working on web pages. But these are not specific, they retrieve any kind of information. To what extent and how specific search engines need to be included, remains an open issue. Currently each organization tends to set up its own search engine on its site. A global or a pan-European search for companies is missing. Second, distance learning has to be implemented. Broadly defined, distance learning is any approach where education is delivered anytime and anywhere using computer technology and learning-team facilities. In such an understanding learning objectives are learning-team centred and mental model change focused (Jonassen 1993). Third, universities and enterprises are natural partners in such undertaking. Therefore, co-operation between universities and enterprises has to become more intensive in the defined field. Such collaboration can exist for many purposes, but here the roles of both sides are very clearly defined.

4. A STRUCTURE OF GLOBAL UNIVERSITY ENTERPRISE AND INTER-ENTERPRISES COLLABORATION

Co-operation between enterprises and the local university centre has to be built. In present day Poland universities can be seen as centres of knowledge and expertise. Many academic workers take part in business as members of boards of directors, consultants or part time employees in enterprises. There was also drainage of universities by various enterprises, especially the banking sector. Therefore if one considers future co-operation between the university and business, one must first define its essential character. It must be said that once some kind of equilibrium between university and business, in the sense of salary vs. duties is attained, the character of this co-operation should be defined.

In our opinion the know-how of the university will support the business organization regarding management and training capabilities. These capabilities are one of the most important missions of the higher schools and

the main role these schools have in the modern economy. Let us define the crucial features of the university-enterprise collaboration.

First, the co-operation will expand and become global. There are already some experiences in organising this co-operation. For many years schools have organized postgraduate studies tailored to the needs of partners from enterprises. These studies led to the fostering of adaptation of business people to the conditions of the market economy. Another form co-operation between business and universities is organizing and aiding new businesses in the field of technology. There are already several enterprise incubators in Poland, where new businesses obtain space, logistics, bookkeeping service and consulting in the field of technology. More remarks on this topic follow.

The global aspect of the collaboration mentioned before is depicted in Figure 1. How partners react with each other, will be detailed on the next pages.

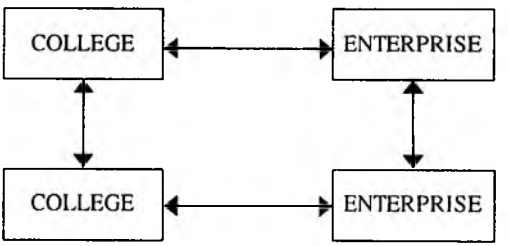

Fig. 1. Globalization of university-enterprise collaboration
Source: own elaboration.

The university support can be split into three business support domains: business, training and information. Figure 2 includes these domains.

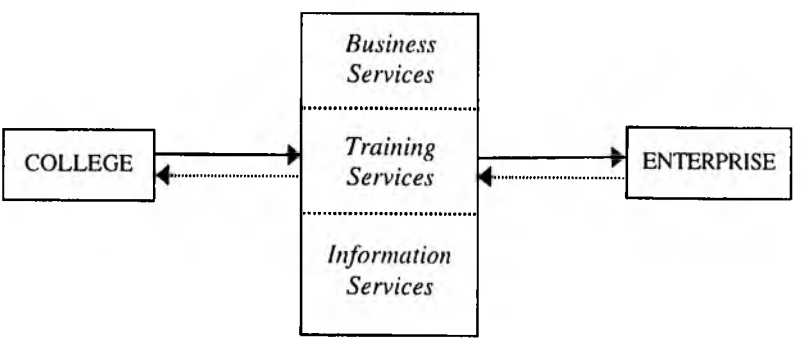

Fig. 2. Business support backbone
Source: own elaboration.

In reality, the university may co-operate with other enterprise support agencies. This has been expressed in extending the previous picture – Figure 3.

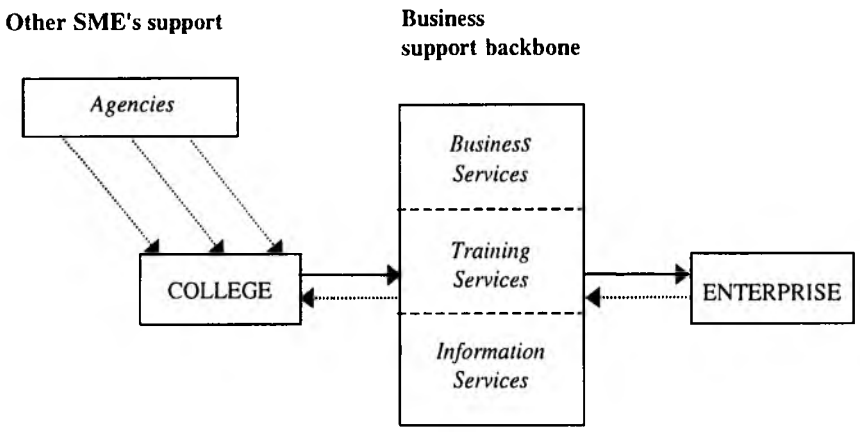

Fig. 3. Extended *business* support backbone
Source: own elaboration.

Examples of these agencies include: Local Business Link, Local Vat/Paye Office, Trading Standards Office, Legal/Financial Advice Online, Local Authority Information Services University (Virtual Science Park), Middle–Nets and the like.

The final architecture of the described university enterprise collaboration is pictured at Figure 4.

There are many evident advantages of the proposed collaboration structure. For instance "Pre-selected Internet pages" offered by a college save time for preparation, the results are more relevant and easier to use, as a consequence lead to less abuse. The second component expressed as "Integrated content & infrastructure" allows for detailed and assignment submission. "Offline usage" by SME's assures lower running costs as well as faster and easier Internet and groupware facilities. In turn, "Normal telephone connect" results in fast and cheap implementation and creates conditions possible for lasting solution.

"Local discussion forums" initiated by a college create specialist interest groups and in some way energizes local SME's community. The last part, "Training audit trails" delivers more management information and improves auditability of training. All the itemised characteristics of co-operation should be achieved in the Polish reality.

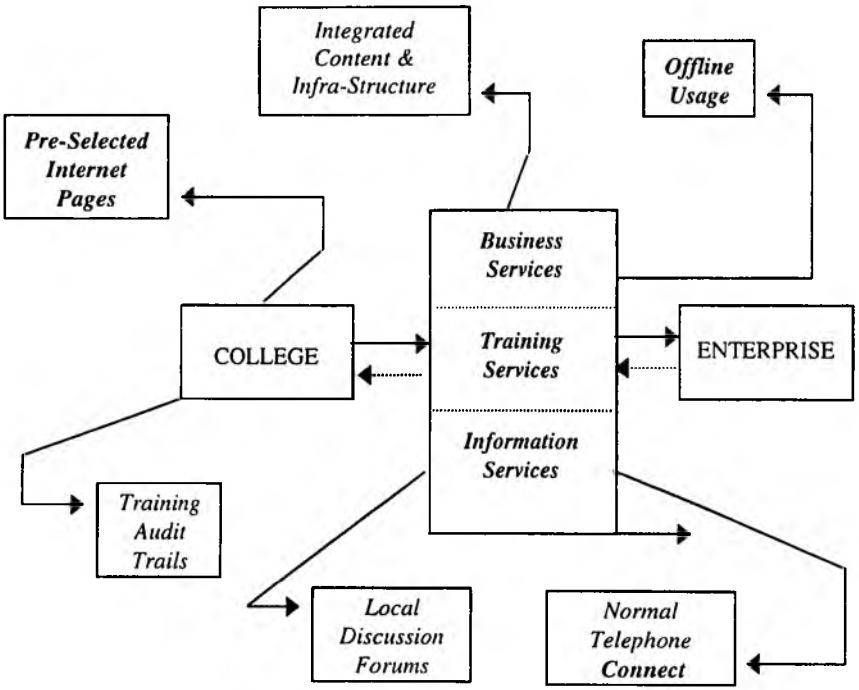

Fig. 4. An architecture of university-enterprise collaboration
Source: own elaboration.

5. A MAIN ACTION POINT: THE IMPLEMENTATION OF ICT FACILITIES IN THE ENTERPRISES LINKED WITH INTERNET

Undoubtedly, the enterprises interested in using ICT facilities represent a big diversity of computer equipments, experiences with the technology and so on. Therefore, we can identify three groups of business organizations, each with a different ICT maturity level:

– the mail oriented organization,
– the promotion (www) oriented organization,
– the integrated business oriented organization.

Assuming the above, we can develop a three-phased Internet implementation plan for each level. Generally speaking, the plan includes the following phases:

– basic network and connectivity infrastructure,
– www-promotion activity,
– the advanced commerce application integrated with the business IS and the DB.

A challenge for the university is to implement Internet as an efficient tool supporting managerial functions including distributed learning. Intelligent search agents have to be developed to customize and to update continuously the information base. They must be provided with user profile identifiers. Intelligent interfaces have to be built to integrate the promotion and commerce applications with the internal business IS. Intelligent distance learning solutions have to be developed to support the learning organizations.

6. CONCLUDING REMARKS

The problems of the effective usage of Internet by SME's are very current. In addition, new challenge of groupware technology applications can be regarded as very urgent. Enterprises are not able to be successful without some external support. University community seems to be a very attractive partner for collaboration.

In this paper, we proposed a structure for such collaboration, pointing out the benefits and roles of both sides. This has been elaborated as an extended model of widely recognized relationships between colleges and SME's, after analysing state of the art information and communication infrastructure of Polish enterprises. Finally, a three-phased implementation of introduction the ICT and Internet facilities has been proposed. The plan can be performed on the basis of bilateral project involving Universities in Flanders and Poland (as a college side) and chosen Polish SME's as representatives of enterprises.

REFERENCES

Baborski, A. (1996): *Integracja europejska i współczesne media komunikacyjne.* [*European Integration and Modern Communication Media*]. Materiały seminaryjne "Dydaktyczne aspekty wstąpienia Polski do Unii Europejskiej" [Materials of the seminar "Didactic Aspects of Poland's Association with the European Union"]. AE Wrocław, p. 17–24].

Becker, J., Schütte, R. (1996): *Handelsinformationssysteme* [*Marketing Information Systems*]. Verlag Moderne Industrie, Landsberg.

Coleman, D., Khanna, R. eds. (1995): *Groupware: Technology and Applications.* Prentice Hall, London.

Jonassen, D. H. (1993): *Thinking Technology*, "Educational Technology", January, pp. 35–37.

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