SOME STRUCTURAL CHANGES
ON THE WAY TOWARDS eUNIVERSITY

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ABSTRACT

In the past eLearning has been introduced by many public universities however a concise IT-strategy was not followed during implementation. Different learning platforms were acquired by different departments and no systematic approach was set up to give support for course development, eTutoring or upgrading and archiving of electronic files. Although contemporary learning management systems had some administrative functions incorporated these data were not integrated with the rest of the universities administrative system. The need to work on integrated solutions offering most of the universities services with "one face to the customer" became obvious. The paper will discuss scenarios to explain the services needed and report on the present discussion about reforming organizational structures and adjusting IT infrastructure to create the future eUniversity.

Keywords: eUniversity, IT-strategy; learning management systems

INTRODUCTION

In the past eLearning has been introduced by many public universities however a concise IT-strategy was not followed during implementation (see Laaser 2006). Historically platform development went through a continuous enrichment of functionalities and also towards more individualization and portability.

Starting from single course development environments with communication tools and presentation of content, systems extended to cover some administrative functions, provide facilities for group learning and actually are on the way to provide really individualized personal learning environments where the environment is not predetermined but is composed by the learner himself dragging the necessary applications into his individual portal. However in the past different learning platforms were acquired by different departments and no systematic approach was set up to give support for course development, eTutoring or upgrading and archiving of electronic files.

More recently other parts of the universities tasks came into focus. Although contemporary learning management systems had some administrative functions incorporated these data were not integrated with the rest of the university´s administrative system.

The need to work on integrated solutions offering most of the university´s services with "one face to the customer" became obvious.

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Platform Development

1st Generation	2nd Generation	3rd Generation	4th Generation	5th Generation
1994 -	1998 -99	2000 -2003	2004 -2005	2007 -
WEB	LMS	MLE	CSCL	PLE
home made systems	Learning Management Systems	Managed Learning Environments	Collaborative Learning Environments	Personalized Learning Environment

Figure: 1
Source: modified slide from FRONTER presentation at FernUniversität in Hagen 2007

As a consequence the commission on new media and knowledge transfer of the German University Rectors developed a scenario to describe the functioning of the future university. The scenario below follows Hochschulrektorenkonferenz (2006). Similar and more recent scenarios for learning environments are formulated by N. Sclater et al. (2010).

ANNA'S SCENARIO

Anna, a university student, receives an SMS message saying that the lecture of professor M is cancelled but she can access a streaming video of last year's lecture on the same topic instead. Usually Anna downloads all relevant material from the internet to her Tablet-PC and makes her notes and links directly on the PowerPoint slides or on her PDF-documents. By instant messaging and Voice over IP she can contact her co-students or faculty. In case that she is not carrying her computer with her, she can access her personal files on a central server from the computer pool. As part of a seminar including group work she uses a WiKi that is part of the learning management system.

In that system she also finds all course materials, calendars, chat and forum facilities as well as blogs. Bibliographic references are directly linked to the library server. Important for her are also the existing possibilities for online enrolment, the composition of an individual online study plan, booking of seminars and exams, checking of her exam scores and immediate certification. She is also able to send relevant data including emails to her PDA or iPhone. Every time when she enrols to the system she gets her individualized and customized portal that contains all information relevant for her personal profile. There is only one password necessary to access all the different services. To pay for university services like hard copies or food in the canteen she can use her service card. The above mentioned requirements correspond quite well to students preferences. A recent large scale study in Germany showed that students have very high preference for online information about their studies and that they prefer to have individualized portals to access such information. Learning platforms and their elements such as forums or chat tutorials have a much lower priority.
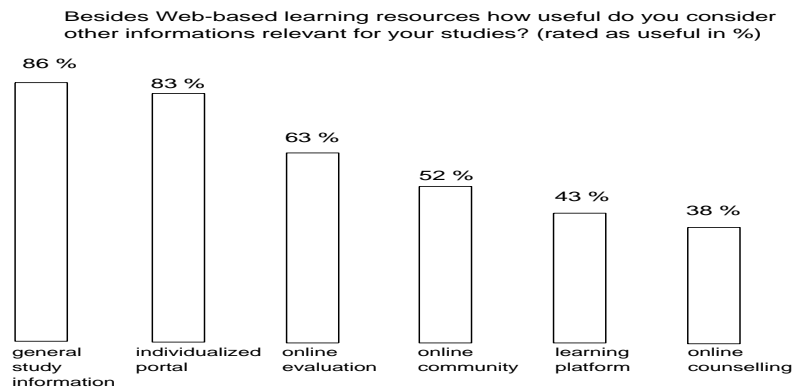
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Besides Web-based learning resources how useful do you consider other informations relevant for your studies? (rated as useful in %)

86 % general study information
83 % individualized portal
63 % online evaluation
52 % online community
43 % learning platform
38 % online counselling

Figure: 2
Source according to B. Kleimann et al. (2008)

So far the scenario and some actual preferences. What follows from this?

REQUIREMENTS

We need a communication and IT infrastructure that integrates the central components such as the learning management system, communication and collaboration tools and the core administrative services into an individualized web portal. In more detail it should include information for all courses and lecturing activities with brief description of the activity, attached personnel, schedules, rooms to allow for individualized planning of learning activities. Individual testing, registering for exams, online examinations, online catalogue for library resources are services that have to be provided via individualized web interfaces. All in all it should support the entire student life cycle starting from first enrolment to the state of "ex alumnus".
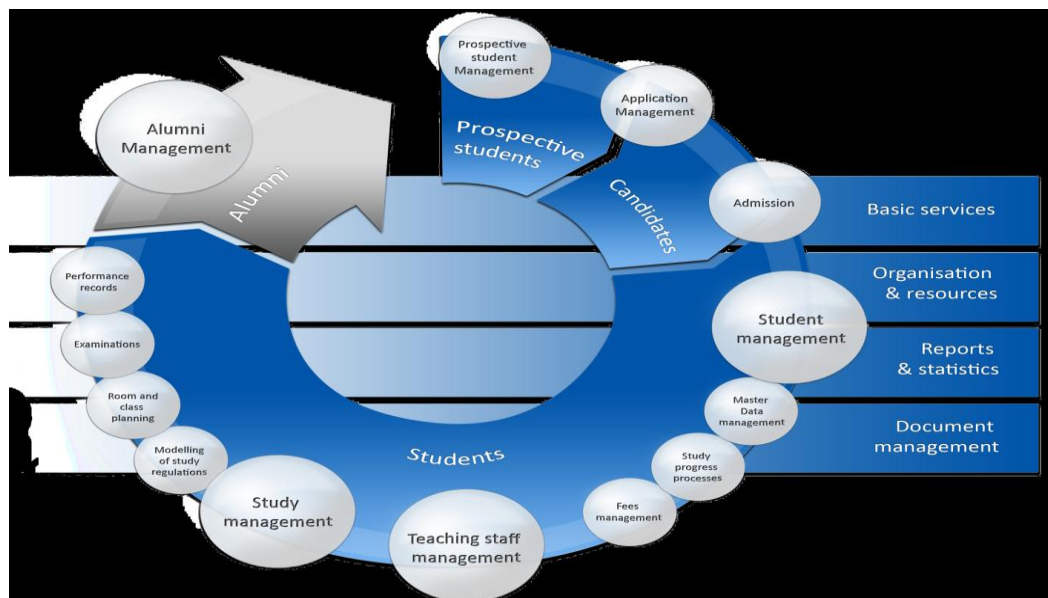

Figure: 3
http://www.datenlotsen.de/en/Documents/CampusNet_english.pdf

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In terms of communication services we need an SMS interface, instant messaging, Voice over IP, shared documents, Wiki functions and file server. We need public and private virtual rooms with access according to the individual role. There should be supportive functions to ease formation of collaborative groups.

Figure: 4
Cure-collaborative web space http://teamwork.fernuni-hagen.de/CURE

Finally the system has to allow for online enrolment, individual updating of personal data, payment and certification of study results on demand. Also web services for university staff such as procurement of office materials or forms to register for business trips should be provided on line.

In most German universities the administrative systems so far used different data models than those of the latter introduced learning platforms. On the other hand learning management systems themselves offered quite a number of administrative functions for small group user administration. So data frequently have to be entered several times by different persons instead of being created only once and then retrieved according to the data bank query. Users have to log in with varying passwords. Integrated solutions therefore need a thorough analysis of existing business processes, documents and data models as well as software used and personnel that is administrating the services. This requirement also has led to new organizational structures within universities.

ORGANIZATIONAL STRUCTURES

First traditional computer centres merged in one way or other with library and media services to operate the basic media and IT infrastructure. Second the position of a CIO (Chief Information Officer) was created and positioned near the Rector's level to coordinate all activities related to the media and IT infrastructure. To illustrate possible solutions we show an example of organizational structures. It is taken from University of Pforzheim, Germany. The Rector of the university appoints a CIO for Media and IT with two deputies.

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The CIO coordinates the tasks of the three central institutions namely the computer centre, the library and the pedagogical services. On the other hand the different academic faculties as well as the administration appoint a media and IT responsible to function as transmission link.
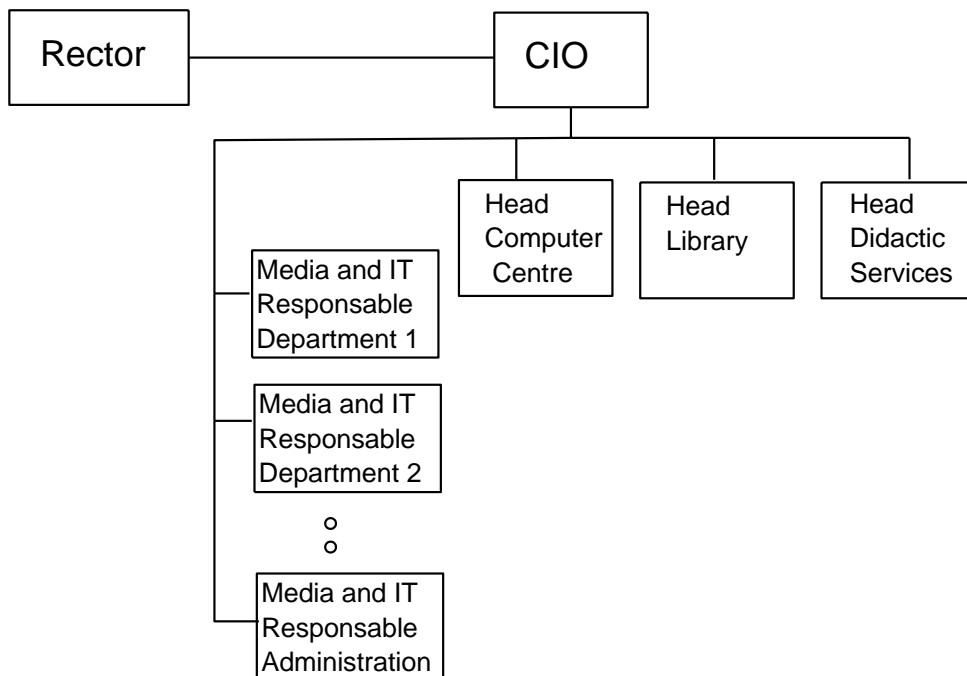

Figure: 5
Chart of organizational changes

However the merging of different institutions such as media units, libraries or computer centres is a complicated task due to different cultures, traditions and values. At some universities already support and training for eLearning are declining as basic competencies are acquired already. As the centres cannot count on special grants anymore because of out- phasing of grant programs self-financing and mergers are inevitable. Furthermore new services have to be established like digital systems and media for research (eScience) (Apostolopoulos et. al.2010).

PLANNING AN INTEGRATED IT-SERVICES INFRASTRUCTURE

The tasks to accomplish by reforming the prevalent information, communication and media infrastructure are as follows:

- **Integration into the central strategic planning of the university**
- **Professionalization of IT support**
- **Optimization and simplification of IT infrastructure**
- **User and service orientation**
- **Avoidance of redundantness of data, activities and functions**
- **Ample application of IT to ease and simplify tasks**
- **Use of central services by decentral responsibility for content and workflow.**
- **Process oriented modelling of workflows.**

A simple example of such a workflow modelling is as follows.
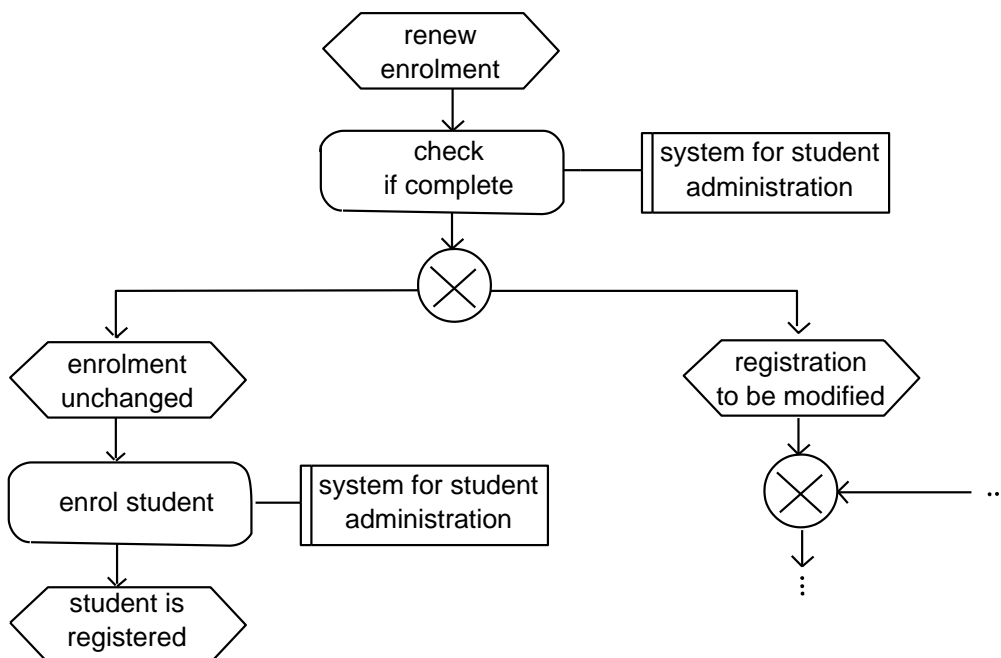
Administrative Business Process

Figure: 6
Work flow of business process

The workflow can be supplemented by organizational data, additional documents and cost items.

However it is obvious that repetitive administrative processes are much easier to model than teaching and developing course content or running research activities. Therefore most initiatives focus on administrative issues rather than teaching and learning.

A lot of German and Swiss universities set up an IT development plan covering a period of 3-5 years duration. E.g. the technical University of Munich set up a five year program with some support of the German Research Foundation to create a central web portal for the university, a centralized web based exam management system, integration with SAP software for financial and personnel management, data warehouse for central planning and management decision systems, integrated document management system, operating of a multimedia server and central archiving of materials.

Similar plans were set up at Eidgenössische Technische Hochschule Zürich, University of Karlsruhe or the Free University Berlin. Plans are quite ambitious and move ahead with differing speed. As solutions are accompanied by substantial financial efforts, smaller institutions look for sharing or out sourcing services.

In contrast to a lot of proprietary solutions developed in the past it is actually mostly preferred to look for commercial suppliers to integrate existing solutions and to model new functionalities. To give an example for the integration necessities: the Technical University of Aachen uses the learning platform of a commercial supplier IMC named CLIX 6.0 to provide functionalities for eLearning. Furthermore a campus-management system has been developed for this university by a medium sized software company CAS to support some main administrative functions such as enrolment, lecture time schedules and overview about courses available. In addition the local computer centre developed some proprietary web components. The different functionalities of the campus management system and the learning platform are now finally integrated into a single sign-on web portal that uses Microsoft Office SharePoint Server technology.

To achieve that a lot of adaptations of the existing systems especially the learning platform were necessary. Other universities like the Technical University Munich were using the open source software elevate IT on the basis of Zope/Plone to create a unified portal. Free University Berlin cooperated with SAP using SAP NetWeaver for integration purposes.

The scope of integrating different systems into a portal solution is quite complex. Portals have to transfer services such as administration of students, study fees, exam organisation and certification, dispatch, controlling, teaching and tutoring into modern system environments like campus management, customer relationship management, content management and resource planning. Furthermore different portals have to be designed for the main stakeholders: students, staff and external providers (Müller 2009). Even within each group of stakeholders different subsets maybe defined, e.g. to acknowledge for different lifestyle patterns of students.

Virtual, technically oriented	Strong web comunication, online games, wikis, learning platform, own website	Engineers, natural scientists, web designers
University culture oriented	Cultural interests, theater, cinema, music	Arts and social sciences
Reality oriented	Normal web activities, eMail, SMS, Sports	Economics, Law, Engineers
Socially oriented	Social networks, Disco, Friends, Soaps	Social scientists, business administration

Figure: 7
Student Lifestyle Patterns Source: DEGW (2010)

However portal solutions need not be exclusive to the educational institution. The British OU's adoption of Google Apps for Education signifies a change from centrally-hosted to externally-hosted or cloud-based educational system. T

he learner's environment is becoming a kind of portal with multiple tools and content made available by both the University and other providers (Sclater 2010).

It shows that integration is the more difficult the greater the variety of systems in use, e.g. the University of Zürich uses four different learning platforms WebCt, OLAT, ILIAS and Moodle. On the administrative side in German and Swiss universities SAP modules are frequently used together with applications of the HIS company. This parallels with the use of a series of different content management systems at the level of the chair professors and institutes to prepare their web pages, e.g. Imperia, Plone, Typo3, Contenido to mention only some of them.

Another important issue is that existing systems will not be replaced at once. Migration of components of the IT infrastructure is usually possible only stepwise. Therefore an analysis of the different interdependencies of the software systems used is a necessary step to guide implementation.

Basically the system redesign follows the steps of analysing current and desired media and IT infrastructure according to the strategic goals of the university. On ground of this analysis a catalogue of requirements for a new system has to be elaborated and technical solutions have to be evaluated. The final step then is the stepwise migration and the final implementation of the new IT infrastructure.
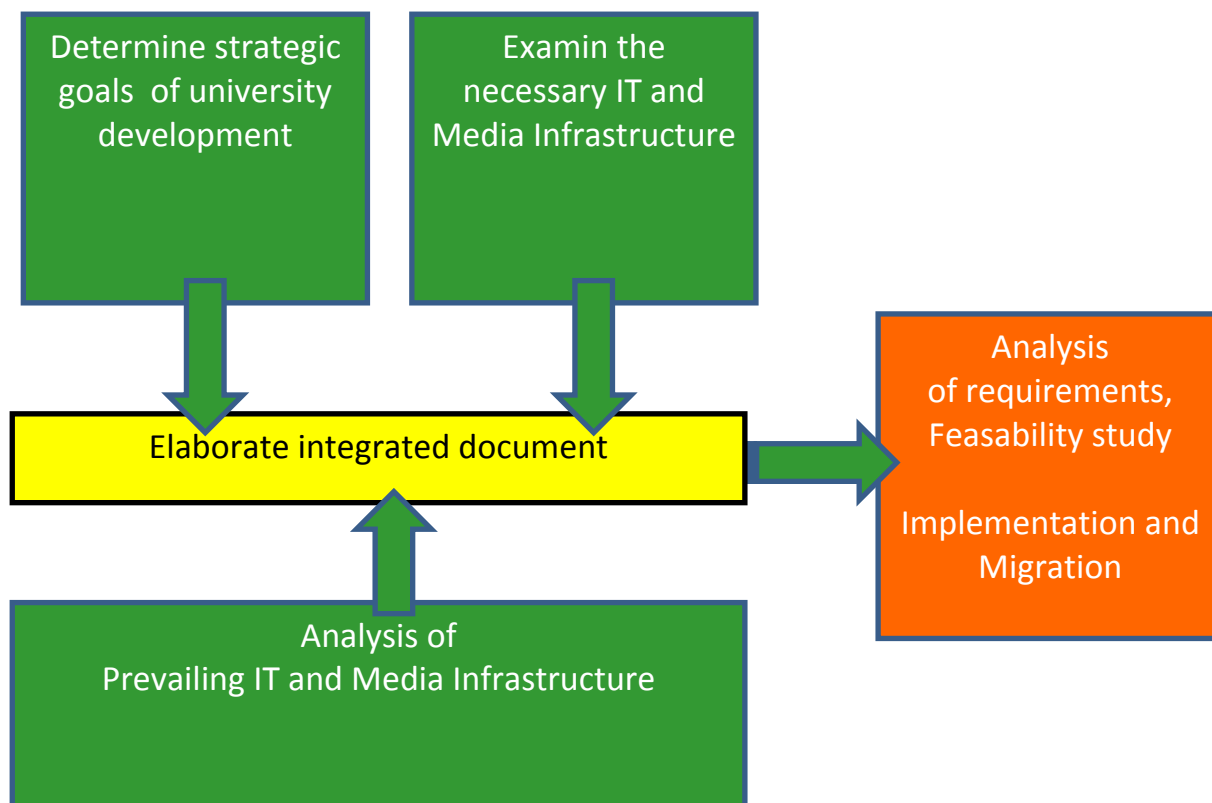

Figure: 8
Tasks to be accomplished when creating a new media and IT infrastructure

Main political obstacles to follow the steps outlines above are:

The modelling of actually existing workflows may reveal inefficiencies of current practises and therefore motivation of employees to cooperate in the systems analysis may be limited.

Design of optimized processes will eventually lack sufficient grounding on university priorities in case that the strategic goals are not clearly fixed.

Consultants hired from private sector companies may not be familiar with public university organizational structures and cultural traditions.

The final acquisition of new systems software may need another redesign of processes and workflows to adjust to the special functionalities of the software.

SPECIFICS OF DISTANCE TEACHING UNIVERSITIES

In a recent report about the Open Universities strategic plans we find the following quotation (Open University 2004, P. 11):

"In examining the practice of our competitors, as well as some of our own leading-edge developments, the following large-scale shifts in Open and Distance Learning philosophy and practice" can be discerned:

> - **from print-dominated courses to modern multi-media courses;**
> - **from materials-based learning to communications-based learning;**
> - **from complete materials delivery to greater exploitation of proprietary or publicly-accessible digital resources;**
> - **from whole course integration to course construction based on smaller modules, and in particular, on learning objects;**
> - **from individual study to collaborative learning;**
> - **from uniform delivery to all students to more personalised provision".**

Recently some additional strategical aspects have been added to the OU's policy (Sclater 2010):

> - **Access for all students to ePortfolios**
> - **Easier authoring, marking and grading assessments online**
> - **Access of the University's System on mobile devices.**
> - **Extension of media services to external platforms (YouTube, iTunes**
> - **University) (Walton 2010).**

Some of the changes listed above lead us to the need for an editing system that at least provides print and electronic output of study material.

One such system is the FUXML system developed at FernUniversität in Hagen.
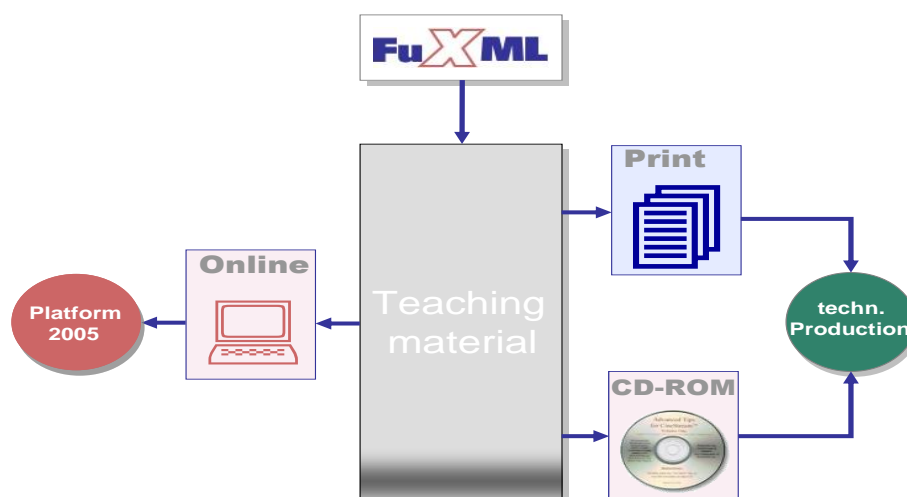
Figure: 9
Structural diagram of FUXML cross media publishing system

With the XML based Microsoft Word version the generation of similar systems might become easier than before however first tests so far have not been encouraging. On top of that we need learning platforms with a rich communication infrastructure that allow for interchange of modules and import and export of learning objects and we need integrated platforms that provide streaming of lecturing activities as well as internet conferencing facilities. Recently the Open University of Britain, FernUniversität in Hagen and The Universitad Oberta de Catalunya in Barcelona increased the use of the Moodle open source platform to compensate for some out of date characteristics of prevailing platforms.

Although Moodle does not cover all desired functionalities of a learning platform (instant messaging, flexible layout, integration of conferencing facilities) the rising community will be able to ease integration of additional software tools.

In distance education the integration issue is even more complex as all traditional logistic services to distribute teaching material have to be integrated too. Here the strategy paper of the British **Open University** suggests cooperation with external suppliers:

> *"One response to which careful thought must be given is that of the desirability or necessity of establishing partnerships in the area of materials production and delivery, to parallel the curriculum partnerships that are presently being pursued. Collaborative publishing is one area in which such partnerships (or commercial agreements) are standard practice; related partnerships in online delivery and learning support need to be examined" (Open University 2004, p. 11).*

One problem however remains: Distance education systems have special characteristics compared to conventional universities. Furthermore they are an exception, not the rule in tertiary education. Therefore software development usually will focus to model the needs and processes of conventional universities rather than tailoring specific solutions for single mode distance teaching institutions.

Furthermore most probably future system re launches will not mean a complete replacement by integrated up to date systems but will consist in portal solution where different software applications can be plugged in. However the future will also show complex solutions that cover most of the so far isolated functionalities embedded in different software packages.

CONCLUSIONS

Actually the focus in eLearning shifted away from production and design of electronic teaching material and as well away from analyzing and offering corresponding eTutoring services.

Actually the information technology transforms the entire university with all its services and organizational characteristics. The process is fuelled by the so called Bologna process that is demanding curricular reforms with flexible choices as well as a more or less permanent certification of study results.

As a consequence this implies that decision bodies and organizational structures of the university have to be adapted and business processes have to be reorganized. The overall objectives are

> - Less regulation from educational ministries
> - More flexibility and autonomy
> - Budget autonomy and self responsibility
> - More competition among universities
> - Better central coordination of decentralized decision bodies
> - Service orientation
> - Evaluation and quality management
> - Modernization of the universities administration

Tomorrows public university will be different from now, that's the good message. Whether it will survive the changes or finally be converted into a private institution is the open question and may not be regarded with enthusiasm from their members. However the changes are needed and latecomers will be the first to drop out.

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