

# Management and Distribution of Course Catalogues with bolognaT3

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## 1. EXECUTIVE SUMMARY

This paper addresses the problems in information management on modularized courses in an interdisciplinary working department. After this, the general system design goals of bolognaT3 are introduced, which is a web based, centralized system for the management of course catalogues at the Faculty of Business Administration and Economics at the University of Duisburg-Essen. The success factors of the system and the rollout-project conclude the article.

### 1.1. Background

Universities in Europe and especially in Germany are facing new conditions due to the Bologna process and the introduction of tuition fees. The Bologna process - intending to make the degrees of universities comparable - requires new structures for study programmes. The introduction of tuition fees - intending to lift the quality of the education by financing a portion of the costs through students - makes students to customers. The first causes a higher need for information guiding students and staff to the new way of studying. The second causes students to request better services and correct information anywhere and anytime. The competition between universities in Europe is hereby no longer only about reputation and academics but also on student service and the use of modern information technologies.

The design of study programmes and academics in German universities are under decentralise control of the departments. The need to create new study courses and to change the structure and content of existing ones results in a high information demand by the committees responsible. The necessary information is often neither available in a central system nor in a formal matter. Often enough some of the information is hidden inside exam regulations at the exam office or inside the content of a lecture.

Once the information is collected it is seldom kept up to date, because there is no possibility to easily look up which information is used where. Especially in departments with interdisciplinary courses which make use of the exchangeability of course modules there is a need to overcome problems of redundancy and out-dated information.

### 1.2. Conclusions

Existing university systems and processes did not fit the need for structured information and information reuse on the one hand and detailed and configurable views on this information for web and print on the other hand. So a new system was necessary that would overcome the problems presented. The TYPO3 based system bolognaT3 was chosen for this purpose.

## 2. The Challenge: Course Catalogues in an Interdisciplinary Faculty

The Faculty of Business Administration and Economics at the University of Duisburg-Essen is split into two institutes: on the one hand the Institute of Business and Economic Studies (IBES) which covers the fields of business administration, economics, health care management and law and on the other hand the Institute for Computer Science and Business Information Systems (ICB) which covers the fields of computer science, and business information systems. The faculty has 34 different research groups which are part of one of the institutes each carrying out multiple courses.

Historically most of these fields (except law and health care management) used to have each one study programme with diploma degrees. Due to the Bologna process these study programmes were shifted to bachelor and master degree. Additionally in the field of health care management study programmes were introduced, resulting in a total of 17 different study programmes for the time being.

Introduced together with the Bologna process was the concept of modules as an aggregation of courses which share similar content in order to expand the learning targets and the abilities a student should gain from the level of a single course, to greater teaching units, even across different research groups or fields.

Regarding the bachelor and master degrees different accreditation agencies are responsible for the cross-university quality assurance. For the IBES the accreditation agency is the ZeVA, for the ICB it is the ASIIN. The requirements concerning the course catalogues are clear: They have to be up-to-date, accessible via the Internet and contain detailed information concerning the study programme, the modules and the lectures.

### 2.1. "Traditional" Process of Maintaining Course Catalogues

To satisfy the requirements of the agencies for accreditation a course catalogue needs to be produced which consists of all the information regarding the study programme. While the specific information requirements differ in some cases between the agencies, the process of acquiring and maintaining the information is the very same:

One large text document was produced consisting of the different descriptions of modules and courses which are requested from the lecturers. This first request and the later calls for updates were in fact text documents sent per e-mail to the responsible lecturer consisting of the representation of his or her course in the course catalogue. A part of the information collected was tabular, while the other part could be any text.

These updates were necessary, because there was no single repository for the information which was needed. Nevertheless the course catalogue and the courses have to be checked for correctness and being up-to-date. Additionally for each course catalogue there were different people responsible, so the process of updating a course description was initiated by the responsible person for the course catalogue and the results from the lecturer were only submitted to this single person.

### 2.2. Resulting Problems

Although this process made it theoretically possible to forbid any kind of additional mark-ups in order to make the output homogenous and to automatically track the changes in the document for version history, neither of them was pursued or could be achieved.

The information acquired by the responsible persons was also in most cases just supplied by the lecturer, leaving no trace of which course was in which course catalogue and in which study programme. So the actual content of a course and the exams taken in it could not be adapted to the circumstances presented by students of different and new fields taking part in the course. It was even not possible for a lecturer to choose a type of exam (like written or oral) for a special course for all participants, because it might or might not be eligible for the participants due to their special exam regulations.

The different accreditation agencies have a different scheme of information necessary for describing a course, resulting in one course being described multiple times in different ways. Due to the discrepancies in update-time of the descriptions and in their use this issue gets even more complex.

Additional problems add to this point in case a professor retired leaving a research group empty, or the appointment of a new professor to an existing or new research group, or if a course gets renamed.

In the best case this whole process consists only of an unnecessary overhead due to the acquirement of current information and due to the misunderstandings resulting from outdated information. In some cases it also results in problems for the students trying to get their degree, as not only the responsible person for the course catalogue has a problem because of this information dilemma, but also other administration roles (and their IT systems), like the exam office.

### **3. bolognaT3**

The main goal for the new system was to make the process of creating and maintaining course catalogues easier. The centralized data storage with a detailed and formalized data model addressed the problem of unstructured, out-dated and redundant information. The dedicated rights management on the other hand, enabled decentralized information maintenance and the possibility to split the tasks to different stakeholders while still preventing them from accessing or altering information they are not allowed to. The web based architecture supports not only access from everywhere for the staff maintaining the information but also for the students as receivers of the information. Additionally the web based architecture enables multi-user scenarios and offers a platform independent solution in an heterogeneous IT environment as faced in most universities.

#### **3.1. Basis of bolognaT3: Open Source Content Management System TYPO3**

TYPO3 is a free open source content management system (CMS) for enterprise purposes on the web and in intranets. Beneath offering the basic content management functionality, TYPO3 uses an extension framework to adapt the single project to its specific needs. While there are many extensions (modules) for different purposes which fit the need of most enterprises, the framework still offers good possibilities to create own extensions. Using the TYPO3 framework as a base for developing an application in form of an extension, it is possible to reuse the basic functions of a CMS like separation of design and content, use of a rich-text-editing-tool as well as complex authentication and authorization management. This offers the possibility to focus on the relevant part of the application, while the other features are maintained by a third party.

The feature-richness of an enterprise CMS and especially TYPO3 enable the use of a single system for multiple purposes. The Faculty of Business Administration and Economics for example uses TYPO3 for the management of the websites of the research groups, the institutes and the faculty (using "chairT3"). An integration of bolognaT3 in this context allows on the one hand direct access for the websites to the study programme data and on the other hand linking from the course catalogue to the current and up-to-date information on research group websites.

#### **3.2. The Overall Application Concept**

The information of a course catalogue is split into two parts: descriptive contents for the introduction and the course information. The course information is represented by multiple modules which themselves contain courses or other modules. This information needs to be grouped on different levels in order to represent the structure of a study programme, for example to reflect which modules are part of core studies and which are part of in-depth studies, or to reflect the different fields of teaching a course is taken from.

This hierarchical structure of modules reflects only one single course catalogue. Regarding the reuse of information, courses and modules in different course catalogues and study programmes it is obvious that the course or module should only exist once. So it should be possible to edit this single course or module and propagate the changes to all the course catalogues consisting of this course or module (Figure 1).

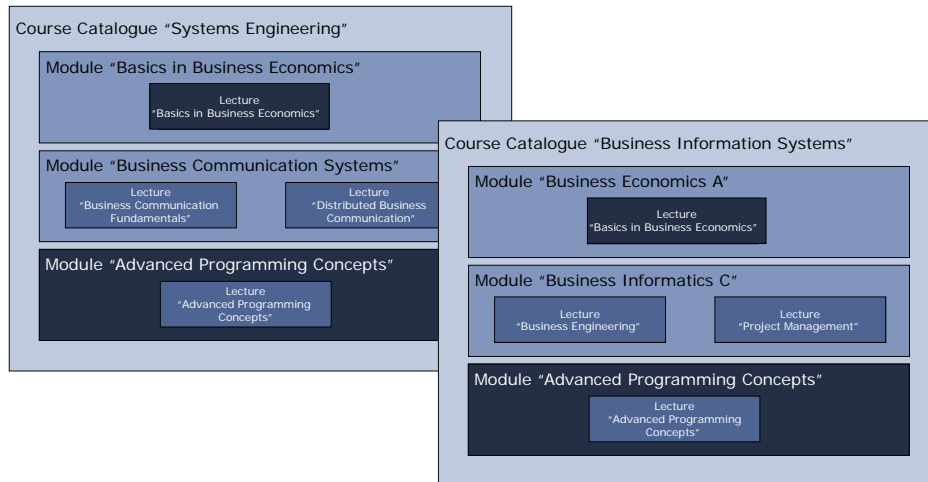


Figure 1: Reusing elements in different course catalogues

After retrieving and structuring the information in the database the application needs also different ways to present the information (Figure 2). On the one hand the application needs to be able to generate print versions of the course catalogue as they were available before. On the other hand - as a web based information system - the application should give the opportunity to present different views on the relevant information a user wants to access. So a template based output mechanism was chosen in order to make this possible. This decoupling of content and design make it possible to reflect the different needs of the accreditation agencies as well as the corporate design guidelines that should be reflected in print (PDF) and web representation of the course catalogues.

Module der Bachelor-Vertiefungsrichtung Network Systems Engineering - 5-6. Semester, Wahlpflicht

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- [Hochgeschwindigkeitsnetze \[6 Credits\], Pflicht im 5-6. Semester](#)
- [Netzmanagement \[6 Credits\], Wahlpflicht im 5-6. Semester](#)
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Pflichtmodule des Masterstudiums	1-3. Semester	Pflicht
Schlüsselkompetenzen ("Soft Skills")	1. Semester	Pflicht
Hauptseminar Wirtschaftsinformatik	3. Semester	Pflicht
Hauptseminar	3. Semester	Pflicht
Studienprojekt	3. Semester	Pflicht
Module der Wirtschaftsinformatik	1-3. Semester	Pflicht
Electronic Learning	1-3. Semester	Pflicht
KI-Programmierung	1-3. Semester	Pflicht
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Modul  
Betriebliche Kommunikationssysteme [6 Credits]

**Workload** 180 Stunden studentischer Workload insgesamt

**Dauer** Das Modul erstreckt sich über 2 Semester

**Modulabschluss** Betriebliche Netze und Verbundsysteme: Klausur und Nachklausur über 3 CP (Februar/März und April)  
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**Bestandteile**

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<b>Dozent</b>	Prof. Dr. Stefan Eicker		
<b>SWS</b>	2	<b>Turnus</b>	Wintersemester
<b>Sprache</b>	deutsch	<b>max. Teilnehmer</b>	unbeschränkt
<b>Teilnehmer</b>	<ul style="list-style-type: none"> <li>• Bachelorstudium Angewandte Informatik - Systems Engineering &gt; Module der Bachelor-Vertiefungsrichtung Business Systems Engineering &gt; Modul "Betriebliche Kommunikationssysteme" 5-6. Semester Wahlpflicht</li> <li>• BWL Bachelor ohne Profile &gt; Kernstudium &gt; Modul "Wirtschaftsinformatik I" 1. Semester Pflicht</li> <li>• Bachelorstudiengang Wirtschaftsinformatik &gt; Basismodule des Bachelor-Kernstudiums &gt; Modul "Wirtschaftsinformatik A" 1-2. Semester Pflicht</li> </ul>		

Figure 2: Different views of course catalogues: Lists, Tables, Details (German)

### **3.3. The Flexible Authorization Concept**

After changing the structure of the information retrieval and assuring the reuse of the information, it is important to control who changes which information when. Using the CMS functionality a dedicated authorization management was established, enabling different user groups.

A concept was developed which divided the information into parts for which the different groups are responsible. This separation was not only possible on the level of objects (like course or module) but on the level of single fields (like "literature for course" or "exam type for course"). For example a lecturer would be able to edit the information about used literature in the courses of his or her research group, but would not be able to change the exam type used for the course or courses of other research groups. On the other hand the exam board might be able to change the exam type of every single course, but is not able to change any other information.

As a user of the application might be a member of different groups at the same time, the application can take care of the special differences between persons and roles faced in universities. The authorization concept is not fixed, but still configurable, so that the special (and changing) conditions faced in the university can be considered.

### **3.4. The Rollout Project**

To rollout the application all the currently available course catalogues needed to be imported one by one. Due to the existing lack of synchronisation in the course descriptions the first course catalogue to be imported was the one with the latest content update and accreditation. This course catalogue supplied many and detailed course and module descriptions.

After this first catalogue was imported and reviewed the other course catalogues were imported one by one. For every module or course in the following course catalogues, prior to adding it as a new element, a search on the database revealed if it already existed. If so the existing one was used instead of creating a new one.

While importing the current course catalogues two new study programmes were developed. Due to the existing database of courses and modules it was possible to create a course catalogue from scratch, by just defining which modules and courses are in it. For the majority of the courses all the descriptions were already there, so that the focus could be on the courses specially designed for this programme.

## **4. Summary**

The system itself has been provided in 2006 - 'tested' against data of the study courses. The first course catalogue fully imported into the system and exported as a PDF file has been the B.Sc. in Business Administration in 2007 editorially entered by staff responsible for the study programme. After this additional course catalogues have been entered and the new process of maintaining the information has been introduced. The public go live of the web frontend for the students will be in the mid of July 2008.

### **4.1. Students Benefits**

Students benefit from the system especially in form of more current, consistent information on their own study programme. The 'simple' information demand which lecture is relevant in their current term can be met by the new system centrally. Additionally the consistency regarding the names of lectures used in different study programmes helps identifying same or different lectures thus enhancing the quality of the content.

The uniform web accessible design of the course catalogues allow future students to inform precisely on the content of the study programmes - especially concerning closely related study programmes. The interactive views allow them to search and explore the information rather than reading a linear document. The defined structure improves even formal aspects of the design of the study programmes, e.g. electives or prerequisites of module.

## 4.2. Staff Benefits

University staff benefits above all in a decrease in the amount of work administering the lectures – primarily concerning the maintenance of the course catalogues, but also concerning the examination processes, e.g. which exam is available to which students in which phase of their studies. The information on the study programmes is accessible not only to students but also to other staff, e.g. of the examination office which is organizationally located outside the Faculty of Business Administration and Economics. bolognaT3 prevents lecturers from providing the same information on a lecture several times for different purposes (exams, university calendar, websites, course catalogues, statistics on the workload). Redundant requests are eliminated or at least reduced. Additionally they now have access to precise information on the study programmes involved and the audience – previous to the lecture.

## 4.3. Faculty Benefits

The main benefit for the faculty is the increased student service. Current and future students access better information representing the variety of the interdisciplinary study programmes at the Faculty of Business Administration and Economics on a central web based platform. The faculty expects to acquire more and especially the right students for its study programmes at the University of Duisburg-Essen.

The number of complaints caused by incorrect planning is expected to be reduced. In the past changes in one study programme often entailed problems in other programmes – often due to misinformation.

The new process of maintaining the course catalogues can be fine-tuned concerning the access through the different staff members. The faculty's administration of the study programmes ensures the compliance of the course catalogues of the different study programmes while the lecturers manage editorial details like descriptions or bibliography. The integration in the IT infrastructure of the faculty enhances the usability and manageability of the system. At the same time the creation of an information system containing structured information on the study programmes principally enables the integration with or the export of this data to other campus management systems in the future.

The saving of time will be used to enhance the content of the descriptions of the learning methods and outcomes in order to communicate the acquirable competencies and to sharpen the profile of studying at the Faculty of Business Administration and Economics.

## 4.4. Obstacles

Despite the mentioned benefits the introduction project encountered several obstacles while introducing the system. The migration of the course catalogues into the system revealed inconsistencies which had to be solved before publicizing the new course catalogues. E.g. changing the name of a lecture in order to eliminate an overlap is easy in the system but needs coordination beforehand in the faculty – involving lecturers, the faculty council and the examination board. The same applies to some bugs in the traditional course catalogues concerning formal aspects like lecturers that left the university or lectures which changed the semester (which has often been only reflected by the most current course catalogue).

Additionally new study programmes have been introduced during the introduction of the system. Course catalogues for these programmes got higher priority because the faculty preferred to avoid the problems with the traditional process in order to ensure the success of accreditation.

## 4.5. Success Factors

The main success factor of the introduction of bolognaT3 is the profound knowledge of the faculty, its study programmes and of course the people involved in the administration of the course catalogues. Additionally the introduction of bolognaT3 has been accompanied by the introduction of chairT3 which created a familiarity with the underlying content management system TYPO3.

Concerning the aspect of aligning IT systems and business processes the system concept enabled to support both the previous processes and future – improved – processes. Especially the ability to

configure the authorization concept very flexibly enabled a sophisticated adoption to the previous centralized process of maintenance whilst at the same time enabling a better process of maintenance for the future - in terms of the decentralized editorial changes through the lecturers itself. This way the system does not force the faculty to a special process of maintaining the course catalogues.