# Cost-Benefit Analysis for the Selection, Migration, and Operation of a Campus Management System

Universities today face a number of challenges and problems on a global scale, but especially in Europe, due to both the Bologna Process and increasing numbers of students. Efficient, integrated campus management systems are professional, supportive information systems that represent a partial solution. Universities must act economically, which means that alternative systems must also be investigated and compared with regard to their cost-effectiveness. A cost-benefit analysis of selected campus management systems is presented in this paper. The goal is to provide IT experts and decision makers at universities with guidelines for investigating the cost-effectiveness of campus management systems.

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## 1 Challenges Facing Universities

Universities are facing a variety of challenges, both on international and national levels. This is especially valid in Europe due to the Bologna Reform and to the increasing numbers of students (Konsortium Bildungsberichterstattung 2006, p. 121; Statistisches Bundesamt 2008, pp. 15–19). Changes resulting from the Bologna Process are also having an effect outside of Europe (Crosier et al. 2007, p. 10) and are being followed with interest elsewhere (Zgaga 2006, pp. 12 ff). For example, Asia is looking at the extent to which the Bologna Process can be transferred to the educational system there (BMBF 2008). The erstwhile goal of creating a common European university area by 2010 seems to have failed in part (Stegemann 2007). In pursuing this goal, inefficiencies in historically growing structures are continuing to be broken down (Dohmen and Günzel 2007, p. 6). As part of the study "Cost-Efficiency Analysis of Selected Campus Management Systems as a Task of TU9" (called TU9 Report in the following, Breitner et al. 2008), associated inefficiencies were revealed (**Fig. 1**). The focus of this study, which was the task given by nine technical universities in the summer of 2007, was three campus management systems (CMS) chosen as part of a previous market analysis (TU9 2007). The goal was to check the cost-effectiveness of the CMS and compare the systems with one another, using two universities as reference (Technical University of Munich and the Leibniz University of Hanover).

In current discussions, in addition to the classic expectations (excellence in research and instruction), supportive measures, such as customer-oriented services and service offerings are increasingly gaining in significance. These are being demanded by the students as paying "customers", who expect, as a return service for the tuition they are paying, an immediate improvement in studying conditions, for example in their courses and in administrative processes (Pfeiffer et al. 2007, pp. 52 f).

Campus management includes all relevant, administrative-intensive areas across the entire academic cycle (**Fig. 2**) that students go through during their studies, including those that take place before and after their actual time at university. This means that campus management begins when prospective students receive information about the university, and continues through the application process, allocation of places, matriculation and course planning, as well as organization of exams, checking academic performance and alumni administration (Janneck et al. 2009, p. 453).

Efficient design of these processes can be made more difficult by mature IT structures already in place. The IT structures are often comprised of isolated applications (Böhm et al. 2007, pp. 11 ff) and a service-oriented administration of IT is often insufficient (Wild 2008, pp. 155–163). In order to be able to adequately deal with these challenges with a level of resources that is not increasing, universities require professional support from information technology (Böhm et al. 2007; Brune et al. 2009, pp. 483 f; Degenhardt et al. 2009, p. 463; Ederleh 2003; Weber 1996, pp. 32 ff). An integrated CMS can provide this support to a large extent, and the structural and organizational changes that come with the CMS can lead to an increase in efficiency and effectiveness in the universities.

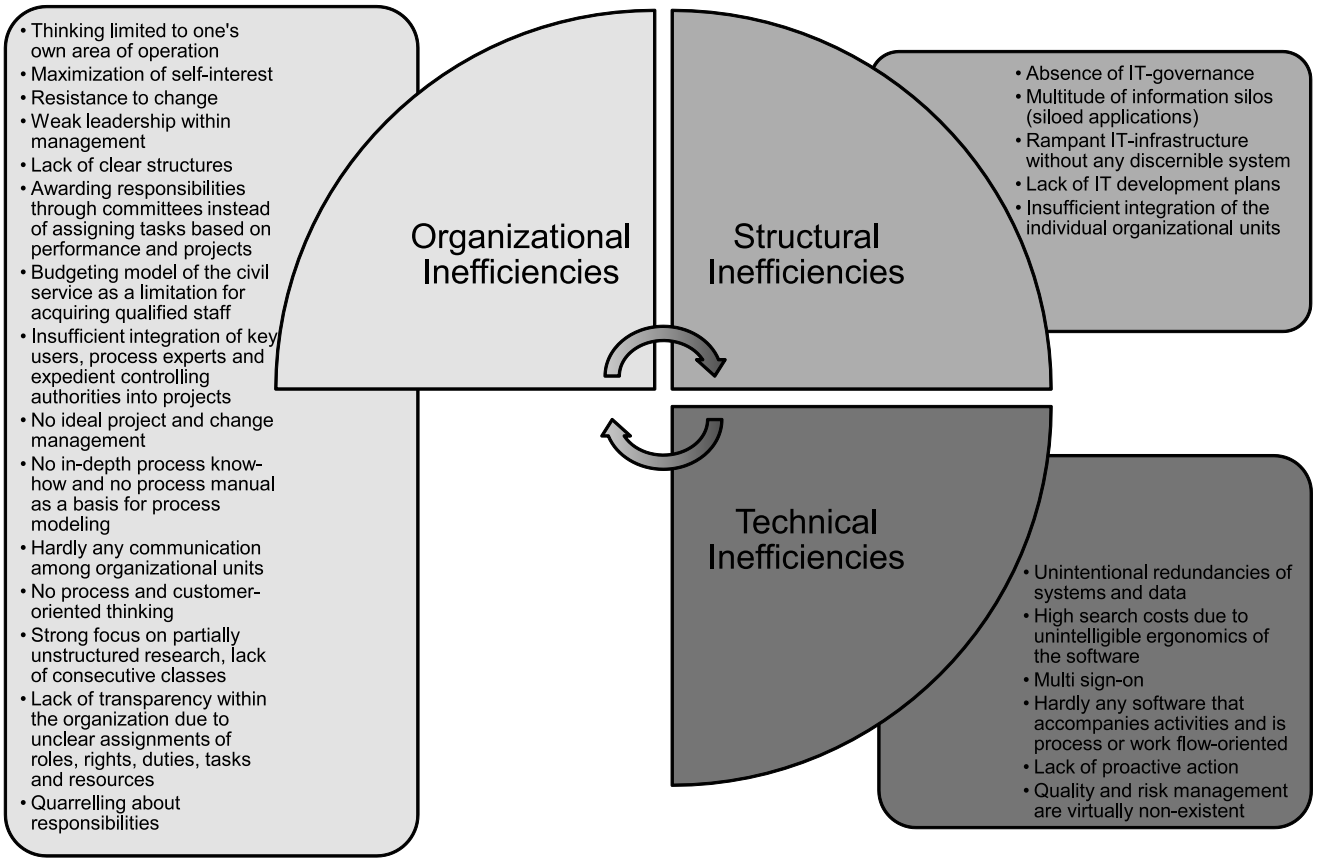


**Fig. 1** Identified system-based inefficiencies at universities

A CMS is seen as an instrument to support business processes in both a course of studies and in the courses themselves (TU9 2007). It indicates IT-supported coordination of organizational processes and optimized workflows of a process bundle for campus management in an academic cycle. These include the mostly digitalized and automated application, admission and registration processes for new students, for example. Other examples include constitutive characteristics such as Web-based exam registration, grade recording and performance documentation, booking rooms and reservations for events, including automatic place assignment when there is a limit to the number of participants allowed. CMS also enables fee and tuition management, as well as evaluation of courses and delivery of official statistics. Beyond that, CMS provides digital student files and Web-based options for self-administration by students (master data maintenance, status display, progress checks). In this way, a CMS can contribute toward reducing inefficiency due to manual processing and repetitive tasks, as well as media disruptions. The integrated data storage of a CMS helps connect the process worlds of central university administration, faculties and institutions.

## 2 Procedure Model for Determining the Cost-Effectiveness of Campus Management Systems

A university's basis for action, which also applies to the use of an IT system, is focusing on cost effectiveness. In German universities, this does not depend on any special public law status (BHO 2009, §7). It is also important to act economically in order to position oneself successfully within the international arena of universities (Janetzke 2001, p. 6; Klug 2009, p. 473; Pfeiffer et al. 2007, pp. 9 and 25 ff). Thus many universities have to decide whether to modernize existing systems or discard them (Sneed 2003, p. 599). With regard to the introduction and migration of a CMS, which is seen as a large IT project, a cost-effectiveness analysis of the alternative systems must be performed as part of a pre-project phase (Zarnekow et al. 2004, p. 181), because introducing such a system comes with high costs (Bensberg 2009, p. 493). On the basis of and expanding upon the procedure model for the software selection process according to Ahlemann (2004, pp. 63 ff), a cost-benefit analysis should be performed based on the definition of requirements, a rough selection and a pre-selection, as explained above. The goal is to forecast the success of future investments in the alternative systems and to analyze them in relation to one another (Ney et al. 2006, p. 16).

The term "cost-effectiveness" describes the relationship between total costs and total utility, but it distinguishes between monetarily assessable uses; quantifiable, but not monetarily assessable uses; and non-quantifiable uses (Kloock et al. 2008, pp. 68 f; Krcmar 2005, pp. 404 ff). Based on the TCO approach (Elram and Siferd 1989; Wild and Herges 2000, pp. 9–16), direct and indirect costs both need to be determined. The assessment of costs has been solved to a great extent in the research, but the assessment of benefit still represents a challenge (Milis and Mercken 2004; Pietsch 2003, p. 37). In sci-

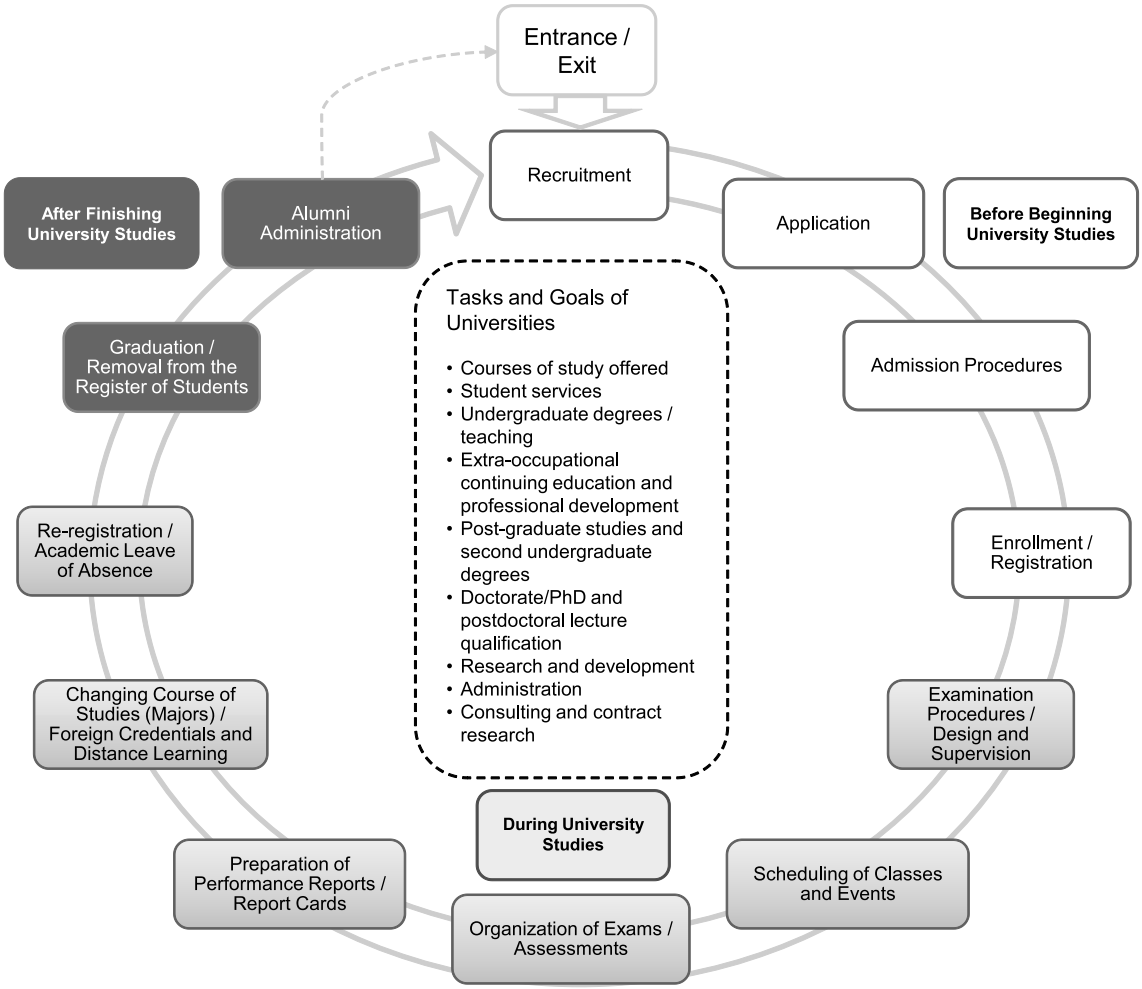


**Fig. 2** Academic cycle: process bundle of campus management

entific literature, various approaches and procedures have been discussed with regard to cost-utility assessments. This field of research is extended with specific approaches from consulting companies, but these are frequently not explained clearly. To develop this further, reference is made to a comparison of methods done by Pietsch (2003, pp. 161 ff).

To determine the cost-effectives of alternative systems, it is necessary to ascertain the costs and the benefits of such a CMS. To this end, and with the intention of using it again in the design of other, similar models, the Institute for Information Management at the Leibniz University of Hannover developed a procedure model for cost-benefit analysis in selecting a CMS. The model was applied in a TU9 report in concrete scenarios with two universities, taking empirical data into account.

The procedure model comprises four basic models (**Fig. 3**) and the resulting ten steps, based on (IT) project management approaches, for determining the cost-effectiveness of CMS (**Fig. 4**).

First, an existing organizational structure is derived as a formal image in the descriptive model (Saliger 2003, pp. 2 f). The organizational structure of a typical university should be described from the perspective of a process landscape and then on sub-process level (Porter 1999, pp. 63 ff). The descriptive modeling of a university, with its processes, data and functions, targets imaging, assessment and applicability of the process requirements that form the basis of the CMS upon the existing process landscape. Modeling is also used as the basis for the assessment of the adjustment costs that result for the CMS and the organization itself.

As part of the TU9 report, existing structures were modeled descriptively within the context of the academic cycle and the associated actual data (eEPCs) was attained. For a number of process bundles, the actual processes located in the academic cycle as easily structurable problems could be compared conceptually with target processes based on the identified potential of the respective CMS alternative. The organization itself determines which processes the system executes (Krieger 1996, p. 21).

The target processes to be assessed as part of the descriptive model, however, were in part not available or could not be completely determined down to the sub-process level due to work and data protection regulations. Problems that are difficult to structure included time recording for work processes in the process bundle for the testing organization or alumni management, which was only partially available at the time of the TU9 report to the universities.

In the explanatory model, the information from the descriptive model is extended with conclusions as reasoning for real, existing connections and is reduced to a sample that is practical to illustrate. Based on the problems above, not all ac-

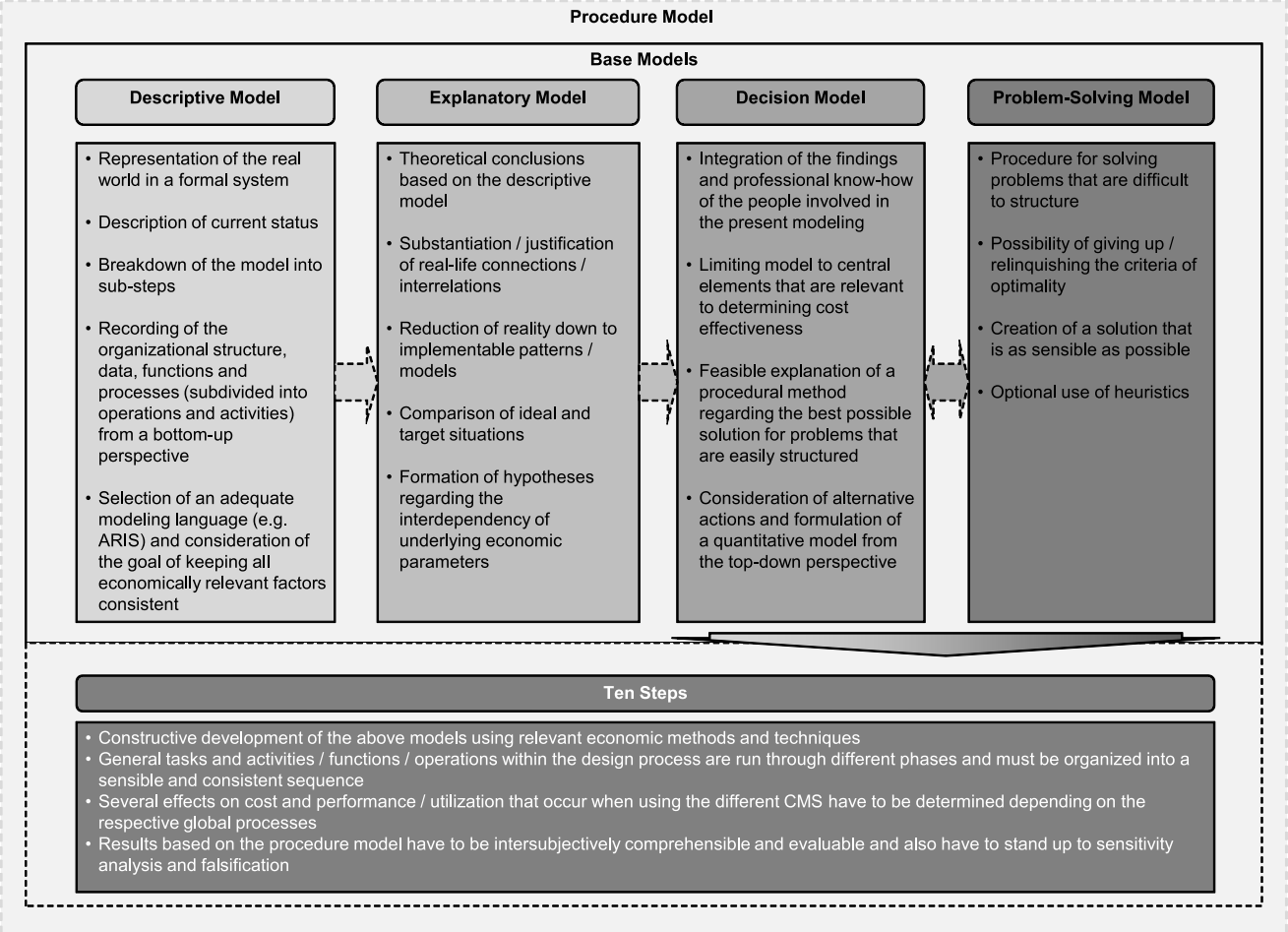


**Fig. 3** Procedure model for determining the cost-effectiveness of campus management systems

tual processes could be compared to the target process concepts within the explanatory model, however. The comparison is subject to limits of formalization.

In order to take into account both the problems from the explanatory model that are easy to structure and those that are difficult to structure, it is necessary to develop, in combination with the decision and problem-solving models, a top-down approach that includes all relevant cause variables for calculating the cost effectiveness of alternative CMS. This can include heuristics for determining percentage valuations with regard to duration, cost and quality of a process bundle of campus management software, and the benefits of a CMS. This is achieved using the three-tiered cost method, included in the ten-step procedure for data acquisition and calculation, as well as qualitative evaluation of the alternative CMS.

The three-tiered cost method enables a combined consideration of the easy and difficult to structure problems and forms the basis of the calculation in the steps that follow. An analysis is able to be performed without taking all of the sub-processes into consideration by including experts from the university and providers, as well as a detailed analysis of the CMS to be considered.

To determine the cost-effectiveness of the CMS, the costs are assessed and calculated in steps 1 to 4. The benefit is considered in steps 5 and 6 as cost reduction effects by means of quantified benefit effects (Götze and Weber 2008). The results of steps 1 to 6 are used in step 7 for a comparative overall calculation of the cost effectiveness of CMS. Steps 8 and 9 lead to a supplementary, qualitative analysis. Based on the results of steps 1 to 9, in step 10, a management summary is created.

The steps, which are performed sequentially and are dependent on one another for the calculations that follow, are explained in the following sections. A prototype based on Microsoft Excel that was developed by the authors is used for calculation, analysis and display of the results (**Figs. 5**–**7** and **Table 1**).

### 2.1 Step 1: Three-Tiered Cost Method and Cost Matrix for Universities

The quantitative three-tiered cost method (**Fig. 5**) was developed as the starting point for the calculation of cost effectiveness. Then it was translated into the procedure model and evaluated. The method has a business basis, in addition to the technical part. The selected procedure is process oriented, which has been the suggested approach to investigations of cost effectiveness of administrative processes since the mid 1990s (Wolf and Krcmar 2005, p. 338 as well as the references given there). The procedure leads to practical results. It enables the analysis of the most important process bundle of a university, taking the involved organizational units into account, in addition to the later cost and benefit effects of the CMS to be considered. It

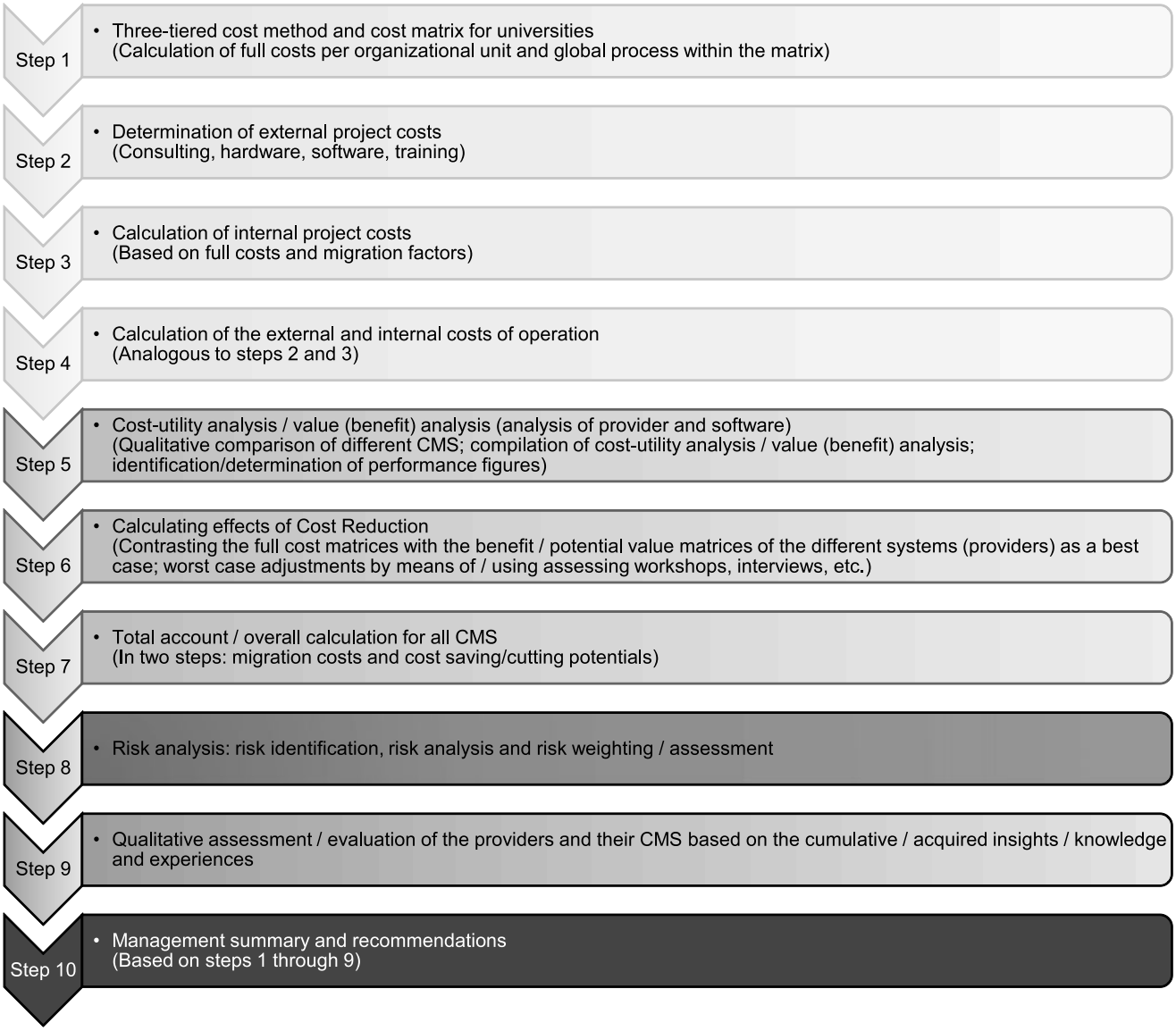


**Fig. 4** Ten steps in the procedure model for determining the cost-effectiveness of campus management systems

is a construct for cost assessment that is independent of provider, valid for a typical university structure, and that is divided into three tiers: central university administration, faculty and institution. The three functionally different tiers can each be divided hierarchically into more detailed organizational units. In order to be able to make sound statements within the procedure, the affected and involved areas are identified and included in the initialization phase (Brugger 2005, pp. 227–250). These provide the figures, data and facts relevant to the assessment, and their inclusion is a critical factor to the success of later use of a CMS. Working together with the employees of the organizational unit, the data is assessed that is to be used to determine the costs for campus management by organizational unit. The people involved divide the amount they think is the percentage of their overall time spent into individual steps of the academic cycle (process bundle) (BMI 2007, pp. 118 ff and 176). In a combined matrix, the individual organizational units are illustrated horizontally and the steps of the academic cycle as process bundle vertically. The combination of the three steps with the process bundles into one matrix (**Fig. 5**) enables detailed determination of the costs for campus management within a university. In addition to determining the costs for each organizational unit, the approach is also used to determine the costs for each process bundle across the board, horizontally over the borders of the organizational unit and beyond. Bensberg (2009, p. 497) emphasizes the high amount of effort required to explicitly assess time required for a TCO calculation. In the procedure shown here, the tiered model means that one does not need to act on the level of the individual work steps to achieve analyzable data. Instead, analytical estimation procedures are combined with analytical calculation procedures (self-recording of the respective organizational units). The effort required for the assessment is thus reduced.

**Figure 5** shows the scenario of a TU9 report for a university to illustrate the three-tiered cost method, the combination of the three tiers with the pro-

| Organizational Unit | Administration 1 | | | | | | Schools 9 | | | Departments 155 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Public Relations | Student Counseling | Student Registration Office | Office for International Affairs | Examination Authority | Service / IT | Deanery of Student Affairs | Dean s Office | Department / Faculty Representatives | Registration Office | Lecturer / Instructor / Academic |
| **Total Number of People** | **5** | **7.19** | **14.5** | **9.55** | **17.25** | **7** | **1** | **2.5** | | | |
| Proportion of Overal Activities | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 75.00% | 30.00% | 100.0 | | | |
| **Full-Time Equivalent** | **5.0** | **7.2** | **14.5** | **9.6** | **17.3** | **5.3** | **25.2** | | | | |
| % of Activities for the CM | 15.00% | 50.00% | 80.00% | 35.00% | 90.00% | 95.00% | 96.00% | | | | |
| **CM Full-Time Equivalent** | **0.8** | **3.6** | **11.6** | **3.3** | **15.5** | **5.0** | **24.2** | | | | |
| Proportion of Service Class (Group) | | | | | | | | | | | |
| Higher Grade 102,375.0 € | 80.00% | 15.00% | 0.00% | 50.00% | 0.00% | 0.00% | 64.00% | | | | |
| Upper Grade 76,050.0 € | 0.00% | 0.00% | 7.00% | 0.00% | 10.00% | 100.00% | 0.00% | | | | |
| Middle Grade 62,887.5 € | 20.00% | 85.00% | 93.00% | 50.00% | 90.00% | 0.00% | 36.00% | | | | |
| (sum = 100%) | | | | | | | | | | | |
| **Total Costs** | **70,858 €** | **247,374 €** | **740,183 €** | **276,195 €** | **996,763 €** | **379,299 €** | **2,132,755 €** | | | | |
| Average Full Costs | 94,478 € | 68,811 € | 63,809 € | 82,631 € | 64,204 € | 76,050 € | 88,160 € | | | | |

| Academic Cycle | Administration 1 | | | | | | Schools 9 | | | Departments 155 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Organizational Unit** | Public Relations | Student Counseling | Student Registration Office | Office of International Affairs | Examination Authority | Service / IT | Dean of Student Affairs | Dean's Office | Department / Faculty Representatives | Registration Office | Lecturer / Instructor / Academic |
| **% of Activities for the CM** | **15.00%** | **50.00%** | **80.00%** | **35.00%** | **90.00%** | **95.00%** | **96.00%** | **20.00%** | **20.00%** | **6.50%** | **3.00%** |
| Recruitment | 4.5% | 25.0% | 0.0% | 5.0% | 0.0% | 5.0% | 2.0% | 1.5% | 2.0% | 0.0% | 0.3% |
| Application | 0.8% | 10.0% | 12.8% | 12.0% | 0.0% | 5.0% | 2.0% | 0.0% | 2.0% | 0.0% | 0.0% |
| Admission Procedures | 0.0% | 5.0% | 13.6% | 2.0% | 0.0% | 5.0% | 0.0% | 0.0% | 2.0% | 0.0% | 0.3% |
| Enrollment / Registration | 0.0% | 0.0% | 14.4% | 2.0% | 0.0% | 2.5% | 2.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Examination Procedures | 2.3% | 0.0% | 0.0% | 0.0% | 14.0% | 10.0% | 20.0% | 3.0% | 0.0% | 0.0% | 0.5% |
| Scheduling of Classes & Events | 3.0% | 0.0% | 0.0% | 0.0% | 1.0% | 22.5% | 20.0% | 7.0% | 4.0% | 1.5% | 0.5% |
| Organization of Exams / Assess. | 0.0% | 0.0% | 0.0% | 0.0% | 66.0% | 0.0% | 20.0% | 2.5% | 0.0% | 2.0% | 0.5% |
| Preparation of Performance r. | 0.0% | 2.5% | 0.0% | 0.0% | 2.0% | 5.0% | 5.0% | 1.0% | 2.0% | 1.0% | 0.3% |
| Change / Foreign Credentials | 0.4% | 5.0% | 13.6% | 12.0% | 1.0% | 0.0% | 20.0% | 0.0% | 2.0% | 0.0% | 0.3% |
| Reregistration / Academic I... | 0.4% | 2.5% | 12.8% | 0.0% | 0.0% | 5.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Graduation / Removal fr Register | 0.4% | 0.0% | 12.8% | 0.0% | 5.0% | 5.0% | 5.0% | 1.0% | 2.0% | 0.0% | 0.3% |
| Promotion | 0.4% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 4.0% | 0.0% | 1.0% | 0.3% |
| Alumni Administration | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| IT Base Activities | 3.0% | 0.0% | 0.0% | 2.0% | 1.0% | 30.0% | 0.0% | 0.0% | 4.0% | 1.0% | 0.0% |
| **Control Line** | **15.00%** | **50.00%** | **80.00%** | **35.00%** | **90.00%** | **95.00%** | **96.00%** | **20.00%** | **20.00%** | **6.50%** | **3.00%** |

| Academic Cycle | Administration | | | | | | Schools | | | Departments | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Organizational Unit** | Public Relations | Student Counseling | Student Registration Office | Office of International Affairs | Examination Authority | Service / IT | Dean of Student Affairs | Dean's Office | department / faculty representatives | Registration Office | Lecturer / Instructor / Academic | Σ |
| **% of Activities for the CM** | **15.00%** | **50.00%** | **80.00%** | **35.00%** | **90.00%** | **95.00%** | **96.00%** | **20.00%** | **20.00%** | **6.50%** | **3.00%** | |
| Recruitment | 21,257 € | 123,687 € | 0 € | 39,456 € | 0 € | 19,963 € | 44,432 € | 24,156 € | 88,452 € | 0 € | 102,375 € | 463,780 € |
| Application | 3,543 € | 49,475 € | 118,429 € | 94,695 € | 0 € | 19,963 € | 44,432 € | 0 € | 88,452 € | 0 € | 0 € | 418,990 € |
| Admission Procedures | 0 € | 24,737 € | 125,831 € | 15,783 € | 0 € | 19,963 € | 0 € | 0 € | 88,452 € | 0 € | 102,375 € | 377,141 € |
| Enrollment / Registration | 0 € | 0 € | 133,233 € | 15,783 € | 0 € | 9,982 € | 44,432 € | 0 € | 0 € | 0 € | 0 € | 203,429 € |
| Examination Procedures | 10,629 € | 0 € | 0 € | 0 € | 155,052 € | 39,926 € | 444,324 € | 48,313 € | 0 € | 0 € | 204,750 € | 902,994 € |
| Scheduling of Classes & Events | 14,172 € | 0 € | 0 € | 0 € | 11,075 € | 89,834 € | 444,324 € | 112,730 € | 176,904 € | 141,497 € | 204,750 € | 1,195,286 € |
| Organization of Exams / Assess, | 0 € | 0 € | 0 € | 0 € | 730,960 € | 0 € | 444,324 € | 40,261 € | 0 € | 188,663 € | 204,750 € | 1,608,957 € |
| Preparation of Performance r, | 0 € | 12,369 € | 0 € | 0 € | 22,150 € | 19,963 € | 111,081 € | 16,104 € | 88,452 € | 94,331 € | 102,375 € | 466,826 € |
| Change / Foreign Credentials | 1,771 € | 24,737 € | 125,831 € | 94,695 € | 11,075 € | 0 € | 444,324 € | 0 € | 88,452 € | 0 € | 102,375 € | 893,261 € |
| Reregistration / Academic I... | 1,771 € | 12,369 € | 118,429 € | 0 € | 0 € | 19,963 € | 0 € | 0 € | 0 € | 0 € | 0 € | 152,533 € |
| Graduation / Removal f Register | 1,771 € | 0 € | 118,429 € | 0 € | 55,376 € | 19,963 € | 111,081 € | 16,104 € | 88,452 € | 0 € | 102,375 € | 513,552 € |
| Promotion | 1,771 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 64,417 € | 0 € | 94,331 € | 102,375 € | 262,895 € |
| Alumni Administration | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € |
| IT Base Activities | 14,172 € | 0 € | 0 € | 15,783 € | 11,075 € | 119,779 € | 0 € | 0 € | 176,904 € | 94,331 € | 0 € | 432,043 € |
| **Total Costs of CM** | 70,858 € | 247,374 € | 740,183 € | 276,195 € | 996,763 € | 379,299 € | 2,132,755 € | 322,086 € | 884,520 € | 613,153 € | 1,228,500 € | 7,891,687 € |
| **Costs of CM per Student** | 3 € | 11 € | 32 € | 12 € | 43 € | 16 € | 93 € | 14 € | 38 € | 27 € | 53 € | 343 € |
| **Person-Days for CM** | 138 | 661 | 2,134 | 615 | 2,857 | 918 | 4,451 | 828 | 1,590 | 1,794 | 2,208 | 18,194 |

**Fig. 5** Three-tiered cost method: example of a selected scenario

cess bundles of the academic cycle, and software-supported calculation.

### 2.2 Step 2: Determining the External Project Costs

The costs that occur during the introductory phase (project costs) and the cost of operating the system (operating costs) are different (Keen 1991; WiBe 2004, pp. 39 ff). Both cost phases can be subdivided.

External project costs are one-time costs that occur during migration and can be invoiced through external instances. They are provider and product specific and are to be determined separately. When a CMS is introduced, these include costs for a pre-analysis by the CMS provider, licensing costs for the CMS software, acquisition costs for hardware, and costs for the required consultant days by the provider. The resulting software and hardware costs are to be assessed individually, taking the existing IT infrastructure for the university being examined into account. The consultant costs are the ones invoiced by the provider for consultant days required to introduce the system and for reorganization efforts. Here it is important to look back at offers or estimates previously made by providers. The calculations are supplemented with an interval of plus/minus 15 percent. Here the selected percentage, considering uncertainties, is based on estimations made in consultation with the TU9 experts.

### 2.3 Step 3: Calculating Internal Project Costs

Internal project costs are one-time costs that occur during migration to a new system. These must be subdivided into project-related internal personnel costs (internal project team) and additional expenditures that occur at the university as a result of the software conversion and organizational transition. This cost category is frequently forgotten when project costs are being assessed (Brugger 2005, p. 66). With regard to project-related internal personnel costs, costs that are the result of internal part-time or full-time employees being assigned to the project directly are assessed. The internal team is formed according to the requirements of the provider and an analysis done by the university. Personnel costs are determined using absorption costing. The assumed extra expenditure that occurs within the organizational units during the migration phase is charged to the project as internal costs. These include an increase in amount of time needed for coordination, lack of routine while performing regular tasks, time spent searching and time spent in training. These are activities that lead to an employee neglecting his or her actual core tasks and result in cancellation costs (Bensberg 2009, p. 496). The processing time required to perform the tasks to be learned is reduced with routine, which means that the extra expenditure is only taken into account as a migration factor.

The resulting extra expenditure should be estimated analytically. Reference is made to the data attained in the three-tiered cost method during calculation. Migration factors that illustrate the extra expenditure are determined for each organizational unit as a result of surveys, work groups and individual interviews, along with specific workshops. The forecast costs are still uncertain, which is illustrated in the calculation of a percentage cost interval of plus/minus 15 percent.

### 2.4 Step 4: Calculation of External and Internal Operating Costs

In the application case explained here, the external operating costs include the licensing costs for the CMS, platform costs including required licenses, and costs for external services such as consulting costs, with regard to training, minor and major releases, adaptations and support packages. Platform costs take the individual IT landscape into account. With regard to consulting costs, information and/or contract variants from the provider are to be taken into account. Usually providers offer support contracts that include a contingent of personnel.

The internal operating costs include costs that are needed to operate the respective software solution within the university. The proportion is found in the total costs of campus management and is determined incrementally in the form of a relative change when looking at the alternative system. To determine the operating costs as relative changes (for example, the required number of new employees to operate the system), estimations should be made by the provider and the university and costs determined on an absorbed cost basis.

### 2.5 Step 5: Cost-Utility Analysis (Provider and Software Analysis)

Since the alternative systems evaluations are not solely based on monetary data, a qualitative method is a suitable supplementary means of analysis. It is used to determine factors that support a monetary estimation of cost reduction effects. The objective is to determine measurements that provide support when measuring the expected performance effect (Pietsch 2003, pp. 31 ff). The goal of this extended cost effectiveness is to include all relevant aspects (Ney et al. 2006, p. 32). In addition to the cost-utility analysis, there are other techniques that provide support for multi-criteria decision problems such as the analytical-hierarchy process and processes based on fuzzy logic (Friedrich et al. 2010, p. 609; Renkema and Berghout 1997, pp. 10 f). The cost-utility analysis and the combination of quantitative and qualitative rating methods are recommended in practice (Lech 2005, pp. 298).

The cost-utility analyses applied in the TU9 report scenarios were divided into three steps (according to Götze 2008, pp. 181 ff). In the first step, a system of objectives is formulated in which each criterion is given a weight. The total of the weights was 100 percent.

In the second step, a rating of the suitability toward fulfilling the respective criterion in the objective system is done for each CMS (scale: 0 = non-existent, 1 = poor, 2 = average, 3 = very good).

In the third step, for each criterion, the rating is multiplied with the associated weight, resulting in a partial utility value. Then all partial utility values are added to calculate the total utility value. The result represents a basis for information and decisions. The objective of the process is to rank the provider depending on a number of rating aspects. The alternative with the highest total value is the one that is most suitable. The argumentative approach analyzes the strengths and weaknesses of each alternative system. The analysis reveals cost and utility associations that can be used as a basis for measuring cost reduction effects. Workshops, discussions and interviews with external and internal system and process experts and providers, as well as surveys and evaluations after system trials, were used as the frame of the survey. To illustrate this, a scenario from the TU9 report will be used.

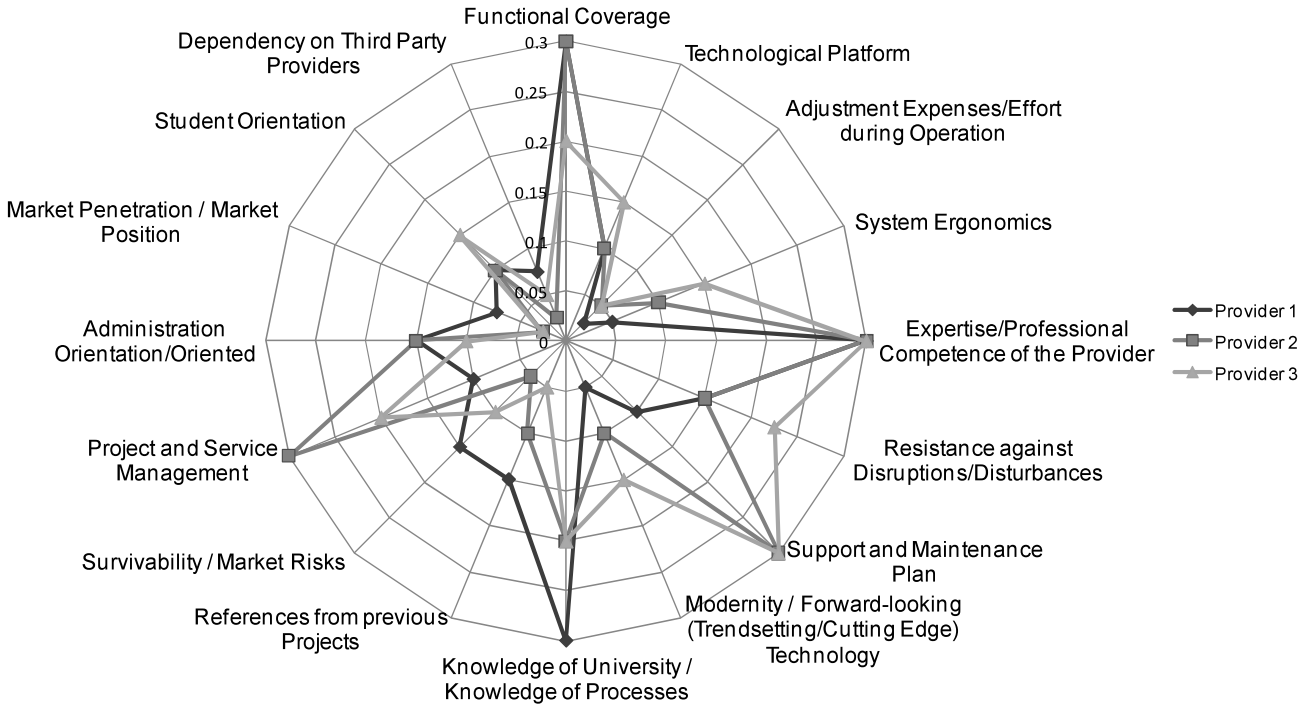


**Fig. 6** Provider analysis with a selected scenario as an example

**Figure 6** shows the partial utility value of the provider analysis. The relevant criteria are prioritized like a decision model and an individual cost reduction ranking will be assigned later. The intention is to examine the CMS with regard to both functionality and provider characteristics.

In the software analysis (**Fig. 7**), the system characteristics are examined. The goal is to make informed statements on the direct influence of functionality of the respective piece of software on the process bundle of the academic life cycle in view of its cost reduction potential. The analysis is based on criteria for evaluation of software according to DIN 9126, 55350, ISO/EN/ISO 8402, 9001, DIN/ISO/IEC 12119.

### 2.6 Step 6: Calculation of the Cost Reduction Effects

The cost reduction effects are the benefit potential weighed against the costs that are the result of the specific CMS and its effect on the process bundle. The individual situation of the university is taken into consideration, because the cost reduction is effect is calculated based on that. The cost reduction effects also help to make the economic effects of a CMS (cost and benefit) more transparent. Both the provider and the software analysis are taken into account during analytical estimation of the cost reduction effects. Also, on the organizational unit level, the level of support that can be expected with regard to the process bundle of the academic cycle is relevant is determined. Furthermore, system differences that affect the respective process bundle are offset with correction factors. Based on self-estimations from providers, these take the differences into account with regard to the supportive effect of a CMS for each process bundle

In the TU9 report, all providers gave detailed comments on the utility of their CMS along the process bundle of the academic cycle. This information was checked very carefully by the process experts.

An electronically supported test organization with data entry performed by students and docents can reduce, for example, the large amount of routine tasks that arise in the registrar's office. Preparation and assignment of appointments, rooms and people are part of this process bundle, together with registration and investigation of the preconditions for a confirmation of a reservation. This also includes post-processing with documentation of performance and creating certificates, as well as the final degree and checking all preconditions and creating report cards. Depending on the CMS, the degree of support varies. This is determined by percentage, applied to the three-tiered cost method and then calculated as a cost reduction effect. It is important to be very sensitive when rating the savings potential of a CMS with regard to overall costs of campus management. Calculations show uncertainties, which are confronted with an interval of plus/minus 20% on top of the calculated values (percentages are determined as in step 2).

### 2.7 Step 7: Total Calculation for All Campus Management Systems

The representation of the four cost categories (steps 2 to 4) and the total cost-oriented approach create a framework for controlling. In order to evaluate the various action alternatives, the expected benefit potential (cost reduction effects) are compared to the calculated costs. The overall calculation is done in two steps. In the first step, the migration costs (plus/minus 15 percent) that are charged with uncertainties are looked at. In the second step, a calculation with both high and low cost saving potential is made for the two limit values of the migration cost interval (plus/minus 20 percent).

For example: The lowest investment costs (calculated investment costs minus

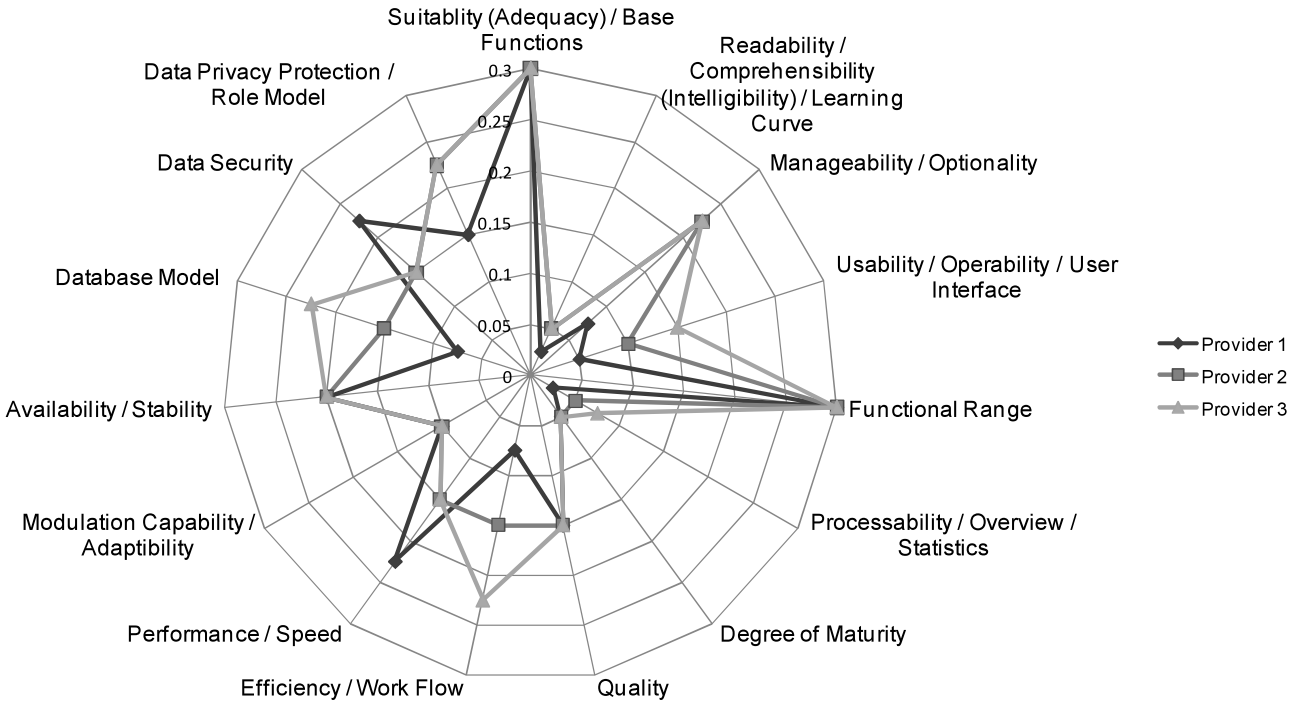


**Fig. 7** Software analysis with a selected scenario as an example

15 percent) lead to the best case when combined with the highest cost reduction effects (calculated cost reduction effect plus 20 percent).

The procedure model leads to four possible scenarios for each provider, of which one of each is considered the best case and worst case. The software-supported calculation is illustrated in **Table 1** using a university from the TU9 report as an example. The extreme scenarios describe the area of conflict for the possible developments. The omission alternative is also taken into account: The option of deciding against a CMS and keeping the system as it is without further investment.

It must also be taken into account that the costs of campus management (wages and salaries, infrastructure, system and software maintenance, requirements of students and university administrators, etc.) are increasing year by year. A suitable operating cost factor, together with the forecasted annual cost increase of five percent, is part of the calculation.

### 2.8 Step 8: Risk Analysis

In general, the risks that accompany investments in IT systems are high (Milis and Mercken 2004). Rating and selecting alternatives is part of strategic project planning tasks (Wehrmann and Zimmermann 2005, p. 248). The restructuring that is part of the introduction of a modern IT system is also not without risks (Janneck et al. 2009, pp. 456 ff). Taken these risks into account qualitatively sensitizes decision makers toward specific risk factors of a CMS project. Analysis is performed in relation to the absolute results of the cost-benefit analysis (Brugger 2005, p. 330).

The CMS that are investigated show clear differences, for example, in the form of organization of the provider and thus the dependencies on market uncertainties, and risks that come with technology, scheduling, feasibility and costs. A risk analysis with identification and classification, as well as weighing the risks and determining preventative and curative measures tailored to the respective university is required.

In the TU9 report, risks for the introduction of a CMS were identified. These include acceptance issues among personnel due to processes and services that are somewhat forced upon them, as well as standardization and centralization. A reluctance to make decisions during migration on the side of administrators, and also a lack of expertise in the university environment, can hinder the success of migration. Non-defined processes and procedures, improvised solution, and tolerance of deviations from the target value also incur risk. Finally, a lack of functionality and product quality can lead to the hoped-for benefit potential of a CMS not being achieved or only partially being achieved.

The weighing and rating of risks was done by decision makers from the universities that were part of the two scenarios described above. This was done following the procedures used in the cost-utility analyses. When supplemented with estimated probability of occurrence, these results were later used for the qualitative analysis.

### 2.9 Step 9: Qualitative Analysis of Providers and Their Systems

According to the knowledge and experience gained during the cost-benefit analysis, a look at the strategic conformity and degree of freedom given by the providers and their systems during process design is also relevant for universities. These aspects are also significant in addition to the calculations. A decision based solely on monetary factors does not appear to fulfill the objective, because not all of the important criteria for system selection can be measured in monetary

**Table 1** Total calculation for the three campus management systems for a selected scenario

| | Migrations Costs | Effects of Cost Reduction | | Period of Operation t0 | t1 | t2 | t3 | t4 | t5 | t6 | t7 | Σ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Costs of CM | 7,891,687 € | 8,286,271 € | 8,700,585 € | 9,135,614 € | 9,592,395 € | 10,072,015 € | 10,575,615 € | 11,104,396 € | 75,358,578 € | |
| Provider 1 | 906,657.83 € | -20% | Investment Costs | 453,329 € | 453,329 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 906,658 € | |
| | | | Operating Costs | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 2,517,760 € | |
| | | | Cost Reduction | 0 € | 317,245 € | 666,214 € | 699,525 € | 734,501 € | 771,226 € | 809,788 € | 850,277 € | 4,848,777 € | |
| | | | Difference | 768,049 € | 450,804 € | -351,494 € | -384,805 € | -419,781 € | -456,506 € | -495,068 € | -535,557 € | -1,424,359 € | |
| | | | Costs of CM-scenario | 8,659,736 € | 8,737,075 € | 8,349,091 € | 8,750,809 € | 9,172,613 € | 9,615,508 € | 10,080,548 € | 10,568,839 € | 73,934,219 € | |
| | | 20% | Investment Costs | 453,329 € | 453,329 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 906,658 € | |
| | | | Operating Costs | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 2,517,760 € | |
| | | | Cost Reduction | 0 € | 475,867 € | 999,322 € | 1,049,288 € | 1,101,752 € | 1,156,840 € | 1,214,682 € | 1,275,416 € | 7,273,165 € | |
| | | | Difference | 768,049 € | 292,182 € | -684,602 € | -734,568 € | -787,032 € | -842,120 € | -899,962 € | -960,696 € | -3,848,747 € | BestCase |
| | | | Costs of CM-scenario | 8,659,736 € | 8,578,453 € | 8,015,983 € | 8,401,046 € | 8,805,363 € | 9,229,895 € | 9,675,654 € | 10,143,700 € | 71,509,830 € | |
| | 1,227,184.12 € | -20% | Investment Costs | 613,592 € | 613,592 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,227,184 € | |
| | | | Operating Costs | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 2,517,760 € | |
| | | | Cost Reduction | 0 € | 317,245 € | 666,214 € | 699,525 € | 734,501 € | 771,226 € | 809,788 € | 850,277 € | 4,848,777 € | |
| | | | Difference | 928,312 € | 611,067 € | -351,494 € | -384,805 € | -419,781 € | -456,506 € | -495,068 € | -535,557 € | -1,103,833 € | WorstCase |
| | | | Costs of CM-scenario | 8,819,999 € | 8,897,338 € | 8,349,091 € | 8,750,809 € | 9,172,613 € | 9,615,508 € | 10,080,548 € | 10,568,839 € | 74,254,745 € | |
| | | 20% | Investment Costs | 613,592 € | 613,592 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,227,184 € | |
| | | | Operating Costs | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 314,720 € | 2,517,760 € | |
| | | | Cost Reduction | 0 € | 475,867 € | 999,322 € | 1,049,288 € | 1,101,752 € | 1,156,840 € | 1,214,682 € | 1,275,416 € | 7,273,165 € | |
| | | | Difference | 928,312 € | 452,445 € | -684,602 € | -734,568 € | -787,032 € | -842,120 € | -899,962 € | -960,696 € | -3,528,221 € | |
| | | | Costs of CM-scenario | 8,819,999 € | 8,738,716 € | 8,015,983 € | 8,401,046 € | 8,805,363 € | 9,229,895 € | 9,675,654 € | 10,143,700 € | 71,830,357 € | |
| Provider 2 | 2,543,057.30 € | -20% | Investment Costs | 2,543,057 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 2,543,057 € | |
| | | | Operating Costs | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 746,320 € | |
| | | | Cost Reduction | 0 € | 863,986 € | 907,186 € | 952,545 € | 1,000,172 € | 1,050,181 € | 1,102,690 € | 1,157,824 € | 7,034,584 € | |
| | | | Difference | 2,636,347 € | -770,696 € | -813,896 € | -859,255 € | -906,882 € | -956,891 € | -1,009,400 € | -1,064,534 € | -3,745,207 € | |
| | | | Costs of CM-scenario | 10,528,034 € | 7,515,575 € | 7,886,689 € | 8,276,359 € | 8,685,513 € | 9,115,124 € | 9,566,215 € | 10,039,862 € | 71,613,371 € | |
| | | 20% | Investment Costs | 2,543,057 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 2,543,057 € | |
| | | | Operating Costs | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 746,320 € | |
| | | | Cost Reduction | 0 € | 1,295,980 € | 1,360,779 € | 1,428,817 € | 1,500,258 € | 1,575,271 € | 1,654,035 € | 1,736,737 € | 10,551,876 € | |
| | | | Difference | 2,636,347 € | -1,202,690 € | -1,267,489 € | -1,335,527 € | -1,406,968 € | -1,481,981 € | -1,560,745 € | -1,643,447 € | -7,262,499 € | BestCase |
| | | | Costs of CM-scenario | 10,528,034 € | 7,083,582 € | 7,433,096 € | 7,800,087 € | 8,185,426 € | 8,590,033 € | 9,014,870 € | 9,460,949 € | 68,096,079 € | |
| | 3,268,018.71 € | -20% | Investment Costs | 3,268,019 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 3,268,019 € | |
| | | | Operating Costs | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 746,320 € | |
| | | | Cost Reduction | 0 € | 863,986 € | 907,186 € | 952,545 € | 1,000,172 € | 1,050,181 € | 1,102,690 € | 1,157,824 € | 7,034,584 € | |
| | | | Difference | 3,361,309 € | -770,696 € | -813,896 € | -859,255 € | -906,882 € | -956,891 € | -1,009,400 € | -1,064,534 € | -3,020,246 € | |
| | | | Costs of CM-scenario | 11,252,996 € | 7,515,575 € | 7,886,689 € | 8,276,359 € | 8,685,513 € | 9,115,124 € | 9,566,215 € | 10,039,862 € | 72,338,332 € | WorstCase |
| | | 20% | Investment Costs | 3,268,019 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 3,268,019 € | |
| | | | Operating Costs | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 93,290 € | 746,320 € | |
| | | | Cost Reduction | 0 € | 1,295,980 € | 1,295,980 € | 1,295,980 € | 1,295,980 € | 1,295,980 € | 1,295,980 € | 1,295,980 € | 9,071,857 € | |
| | | | Difference | 3,361,309 € | -1,202,690 € | -1,202,690 € | -1,202,690 € | -1,202,690 € | -1,202,690 € | -1,202,690 € | -1,202,690 € | -5,057,518 € | |
| | | | Costs of CM-scenario | 11,252,996 € | 7,083,582 € | 7,497,895 € | 7,932,925 € | 8,389,705 € | 8,869,325 € | 9,372,926 € | 9,901,706 € | 70,301,060 € | |
| Provider 3 | 1,124,424.94 € | -20% | Investment Costs | 1,124,425 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,124,425 € | |
| | | | Operating Costs | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 2,592,000 € | |
| | | | Cost Reduction | 0 € | 922,092 € | 968,196 € | 1,016,606 € | 1,067,437 € | 1,120,808 € | 1,176,849 € | 1,235,691 € | 7,507,680 € | |
| | | | Difference | 1,448,425 € | -598,092 € | -644,196 € | -692,606 € | -743,437 € | -796,808 € | -852,849 € | -911,691 € | -3,791,255 € | |
| | | | Costs of CM-scenario | 9,340,112 € | 7,688,179 € | 8,056,388 € | 8,443,008 € | 8,848,958 € | 9,275,206 € | 9,722,766 € | 10,192,705 € | 71,567,323 € | |
| | | 20% | Investment Costs | 1,124,425 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,124,425 € | |
| | | | Operating Costs | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 2,592,000 € | |
| | | | Cost Reduction | 0 € | 1,383,138 € | 1,452,295 € | 1,524,909 € | 1,601,155 € | 1,681,213 € | 1,765,273 € | 1,853,537 € | 11,261,520 € | |
| | | | Difference | 1,448,425 € | -1,059,138 € | -1,128,295 € | -1,200,909 € | -1,277,155 € | -1,357,213 € | -1,441,273 € | -1,529,537 € | -7,545,095 € | BestCase |
| | | | Costs of CM-scenario | 9,340,112 € | 7,227,133 € | 7,572,290 € | 7,934,705 € | 8,315,240 € | 8,714,802 € | 9,134,342 € | 9,574,859 € | 67,813,483 € | |
| | 1,521,280.80 € | -20% | Investment Costs | 1,521,281 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,521,281 € | |
| | | | Operating Costs | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 2,592,000 € | |
| | | | Cost Reduction | 0 € | 922,092 € | 968,196 € | 1,016,606 € | 1,067,437 € | 1,120,808 € | 1,176,849 € | 1,235,691 € | 7,507,680 € | |
| | | | Difference | 1,845,281 € | -598,092 € | -644,196 € | -692,606 € | -743,437 € | -796,808 € | -852,849 € | -911,691 € | -3,394,399 € | |
| | | | Costs of CM-scenario | 9,736,968 € | 7,688,179 € | 8,056,388 € | 8,443,008 € | 8,848,958 € | 9,275,206 € | 9,722,766 € | 10,192,705 € | 71,964,179 € | WorstCase |
| | | 20% | Investment Costs | 1,521,281 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 0 € | 1,521,281 € | |
| | | | Operating Costs | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 324,000 € | 2,592,000 € | |
| | | | Cost Reduction | 0 € | 1,383,138 € | 1,452,295 € | 1,524,909 € | 1,601,155 € | 1,681,213 € | 1,765,273 € | 1,853,537 € | 11,261,520 € | |
| | | | Difference | 1,845,281 € | -1,059,138 € | -1,128,295 € | -1,200,909 € | -1,277,155 € | -1,357,213 € | -1,441,273 € | -1,529,537 € | -7,148,239 € | |
| | | | Costs of CM-scenario | 9,736,968 € | 7,227,133 € | 7,572,290 € | 7,934,705 € | 8,315,240 € | 8,714,802 € | 9,134,342 € | 9,574,859 € | 68,210,339 € | |

terms. Although a qualitative observation is enabled with the extensive investigation of the providers and their products as part of the previous steps, a generally applicable rating cannot be made. The respective decision criteria with regard to a CMS provider are to be rated individually, taking the strategic alignment and internal know-how of a university into account.

It is also important to remember, for example, that the CMS providers have

had products on the market for different lengths of time, and that they have different types of customers, which means that their experiences are also different. The provider organization and its long-term strategy with regard to conforming to the strategy of the university must also be predicted. It is also important when seeking a solution to be aware of whether a high degree of freedom is desired or good practice processes and structures of a CMS need to be adapted. The degree of desired and required reorganization consultancy from the provider, which goes hand in hand with this, must also be determined.

### 2.10 Step 10: Management Summary and Recommendations

One of the most important characteristics of an integrated CMS is automation of sub-processes, in which the amount of process steps that were previously done manually can be reduced. Often-achieved concomitant effects include reduction of error proneness, reduction of the amount of time required for correction, and the commitment of personnel who can create value in other places. This increases the quality of processes as material benefits, which should also be included (Pietsch 2003, pp. 14 f). The development of an automated control circuit within the context of a process bundle of an academic cycle can supplant this cost-intensive methodology. Results include a higher quality and availability of data, as well as increased transparency and quality of information.

With regard to cost-effectiveness considerations for the possible introduction of a CMS, migration costs and migration paths must also be examined. These are compared with the calculated cost savings potential. It is also important to identify and consider both non-monetary benefit potential and critical factors of success (Klug 2009; Rieger et al. 2009, p. 531), as well as risks of migration and long-term operation.

Those responsible for IT are given a central function, because they have to analyze the business processes and the structural framework for the introduction and/or migration of a CMS. Those involved in assessing the analysis criteria are also to be included. Putting together a competent project team that has a sufficiently high budget and the required expertise and social skills, teamed with university-specific and technological knowledge, is another critical factor of success.

Once the decision has been made to migrate a CMS, a holistic concept for planning and controlling the IT project must be worked out together with the external provider on the basis of the level of maturity of the previous campus management system. The tasks of the external provider and internal organizational units are specified and associated with the establishment of the operating and maintenance environment.

In this context, the particularities of the work environment of a university are to be taken into account. The amount of benefit that cannot be measured by monetary means is especially clear in teaching and research processes. A high value proposition from a CMS can only be achieved when the heterogeneously structured organization of the system is maintained both centrally and decentrally: both with regard to data integrity and daily commerce with the system by administrators and instructors. Training staff and providing key users on various levels is also important. A service-oriented organization and IT structure to support instructors and research is recommended.

## 3 Summary

Many universities strive towards top instruction and research. This goes hand in hand with the requirements toward a high level of service and a high quality of service for students. To promote this, campus management can be designed efficiently and effectively using an integrated CMS.

Investment decisions are among the most significant of business tasks (Dobbins and Witt 1988, pp. 3 ff). The cost effectiveness analysis introduced here for selecting, migrating and operating a CMS uses decision-oriented methods in which as much relevant data and information as possible is converted into an aggregated total value, enabling a quantitative and qualitative comparison of alternative systems. The results are afflicted with uncertainties, and these are confronted with intervals. The procedure offers an approach to taking interdependencies and their consequences into account. The economic effects that the introduction of an integrated CMS can have are demonstrated. A decision based solely on monetary factors is not useful because not all of the criteria that are important can be quantified. As a result, other non-monetarily assessable aspects that are relevant for a university are included. The university strategy describes the path toward achieving the long-term goals and the means used to that end. It is an important factor in selecting a CMS. A CMS can be seen as a technological instrument that, together with its provider, must fit the strategy of a university. Another important part of the strategic question is whether a university can effect changes to the structures itself or if it requires external, professional help with the restructuring.

Using the procedure model described here, the cost-effectiveness of CMSs could be analyzed when it was applied as part of a TU9 report. Difficulties in assigning costs and benefits are addressed using process-oriented procedures. Beyond that, comparable calculations that show the differences with regard to monetary consequences depending on the choice of provider and on the alternative of not choosing a provider at all are possible. The procedure model can thus offer decision support. The design of the procedure model also allows individual steps to be adapted to different situations. Furthermore, the three-tiered cost method enables adaptation to different academic life cycles and/or university structures. The procedure model can even be specifically adapted to determine the cost effectiveness of a CMS at universities in other countries.

In the future, universities will have to distinguish themselves by constantly improving their course and service offerings, securing their position in the educational market, even in the areas of extra-occupational and further education. Clear structures within the organization and a process-oriented overall strategy are just as important. It is necessary to reduce the inefficiencies presented here, because universities can only be successful in a competitive international market by doing so. This can be supported by an integrated CMS. However, because the introduction of a CMS is associated with considerable costs and risks, an a priori cost-benefit analysis that reveals potential and justifies the use of a CMS in an intersubjective, clear way is required.

## Abstract

**Jon Sprenger, Marc Klages, Michael H. Breitner**

### Cost-Benefit Analysis for the Selection, Migration, and Operation of a Campus Management System

An increasing number of students, together with organizational and technological requirements, pose new challenges for universities. For these reasons, Campus Management Systems provide a solution for the necessary IS-support in student administration. In order to ensure cost-effectiveness, an extensive cost-utility analysis of the campus management systems under consideration is required. The process model illustrated here facilitates a ten-step cost-utility analysis for the selection, migration and operation of a campus management System. The process-oriented approach addresses the challenges posed by cost and benefit allocation. The subsequent ten steps, using the case analysis of two large German universities, show that the implementation of an integrated campus management system can lead to significant cost saving effects. The presented process model enables comparative calculations of differences with regard to the alternatives. The approach enables a comprehensive decision-support system for the selection of a university-specific and individually applicable campus management system.


**Keywords:** Campus management, Campus management system, Student administration system, Cost-utility analysis, Process model

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