System for Survey-based Evaluation in Education

System for Survey-Based Evaluation in Education

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EvaSys™ – System for Survey-Based Evaluation in Education.

Universities are more than ever confronted with how to best have their teaching evaluated by students and with how to optimize and further develop it. In fact all parties concerned expect universities to have coherent concepts for quality and organizational development. The universities themselves are especially interested in improving their quality as it gives them a edge in competition for the best students. This paper shows how a highly optimized process for self-evaluation based on surveys can support universities wishing to measure diverse aspects of quality.

A major requirement of contemporary quality management processes such as ISO or the European EFQM is the regular surveying of the main "layers" in the organization. In a university then of students and their teachers, but also the internal customer and supplier relationships are being evaluated: central administration services, cafeteria, library for example.

To save resources questionnaires were often created using the resources at hand – Word, Excel, form letters and manual data entry, often using SPSS for statistical analysis. Sometimes programs were specially developed using these tools (often by students). This wide-spread approach to evaluation has been shown on closer examination to be expensive, error-prone and for regular surveys – and only then can change processes be measured – as unattractive. This approach fails to take advantage of all of the opportunities presented by teaching evaluation. The expense of maintaining specially developed programs over longer periods of time was also seen to be considerable.

The solution presented here – EvaSys™ – offers relief by uniting a structured approach to the almost full-automation of processes creating a holistic tool that is highly effective. The opportunities presented by evaluating teaching can be maximized using this instrument. EvaSys™ enables the survey to be carried out either centrally or by the individuals involved in the evaluation. When EvaSys™ is made available through the central IT infrastructure, it makes few demands on the resources of the computer center, because once installed it can be accessed in the university intranet.

Requirements / Interests

Interest groups in the evaluation landscape

In close cooperation with a number of universities and researchers in higher education pedagogy we have defined the requirements that must be met by an automated system for teaching evaluation. These requirements must satisfy the interests of all participants:

University Executive Officers • The goal of the university leadership is continuous quality improvement, comparability to facilitate organizational development, "learning from the best" and open procedures. The executive leadership wants to minimize additional work for its faculty members and would like a service- oriented concept for implementing the evaluation. It would like an automated process that enables surveys to be carried out on a regular basis finding trends and tendencies, strengths and weaknesses in order to determine possible need to take action. And last but not least the administration needs a modern quality management system so that it will have an edge over its competitors.

Deans, Deans of Studies • Department heads of course would like to have an overview of the data collected in their department. And they would like to retain discipline-relevance even when surveys are conducted across departments. They want to receive feedback for their department, e.g. comparative reference data for course subject and course type. In addition they would like survey results that would allow them to easily see what action might need to be taken.

Instructors • Faculty members are interested in improving their teaching and are looking for prompt and specific feedback immediately after a course is over. However they are also concerned that the survey instrument has been thoroughly validated, in other words that it is fair. They are also concerned about data security. Many instructors would like to be able include their own questions in the survey and would like to be able to make anonymous comparisons to their colleagues.

Students • They want to be taken seriously and would like to see that they are part of the change process. Students are concerned that their honest and at times critical opinions might be used against them, which could be the case if, for example, instructors were to collect the surveys themselves. They too would like feedback about what has been done with their responses in a survey. And they would like to be spared unnecessary questions or surveys – otherwise they will get tired of evaluating their courses.

Computer Center • Computer centers generally have little spare capacity and would like a procedure that makes as few demands on their resources as possible. In this case a zero-client solution available university-wide as a Web service is the best solution. The head of the computer of center is happy when there is as little administrative paperwork as possible, e.g. setting up user accounts. Data security and data access security concepts should – once set up – run automatically.

Administration • The administration needs a system that conforms to data security regulations as well as university evaluation policy and regulations. The university administration may want some of their services – in addition to teaching – to be evaluated as well.

We can now see that a functional evaluation system will have to be equipped with a variety of instruments or questionnaires. Furthermore we can see that for comprehensive and continual evaluation a set of data will be needed in order to model the organization including all of its departments, courses and instructors. These metadata are an important foundation for creating, at a later phase, data reference norms and QM processes. In order to guarantee as much flexibility as possible both online and paper&pencil surveys should available for deployment. The responsibility for implementing surveys, their costs and the access rights to the resulting data must be finely textured and adaptable to the needs and contexts in each organization.

Evaluate Course Quality – Solve Basic Issues ...

Student course evaluations involve assumptions about what makes good teaching and what performance standards in teaching can be expected. In addition faculty members must be willing to be evaluated by students and they must have a basic trust in the reliability of the procedure and its results if the goal of student course evaluations – optimizing teaching – is to be reached. Without confidence in the accuracy of the results, an instructor could hardly be expected to reflect on his or her teaching, or consider making changes.

The choice of survey instruments – along with the organizational, trust-building measures to embed the evaluation in a QM process – plays a decisive role. In the over 60 european universities and colleges using EvaSys™ in 2004, a great variety of questionnaires are used and in fact there are effectively no limits to the instruments that can be developed. There is now a pool of questionnaires created by and exchanged among the EvaSys™ user community.

WHAT: Developing and managing flexible survey instruments

EvaSys™ gives you the freedom to design multi-page questionnaires containing numerous questions (items), which can be summarized individually or in the form of indicators. EvaSys™ supports the following types of questions:

- Scaled questions with up to 11 values
- Open questions (free response format) with variable size response fields
- Single choice questions with up to 11 options (all options shown in the report)
- Single choice with unlimited number of options (only those options actually selected appear in the report)
- Multiple choice questions with unlimited number of options
- Matrix field (e.g. for numerical data such as age, year or zip code)
- Differently scaled response formats such as grade values from A to F or "strongly agree" = 1 to "strongly disagree" = 5

With the form designer in EvaSys™ there is really no limit to your ability to design questionnaires, for example you can set up question tables as matrices.

The item library integrated in EvaSys™ enables you to organize related questions in categories, which is helpful when you create new questionnaires. You can also make use of templates with defined questions that can be supplemented by the user as desired.

Alongside the graphic layout of the questions and their grouping to indicators, the survey instrument includes a variety of additional information, for example rules for creating norm reference values or quality standard objectives as well as details governing access rights to a questionnaire (utilization domain, utilization period).

A Web-based design editor enables you to create new questionnaires with a Web browser. A so-called "Questionnaire Wizard" contains all of the available question types. In a what-you-see-is-what-you-get procedure you can control what a questionnaire will look like when it is finished. For example you can define the font type and line spacing. You can always shift questions or exchange question groups and correct typographical errors by double clicking on the question item.

WHO: Defining the organizational structure

With the concept of "Central Evaluation" EvaSys™ provides a variety of functions for the automated batch processing of questionnaires. In order for these functions to be effective and to keep an overview of the different types of questionnaire and the hundreds of courses being evaluated, it is essential to define the organizational structure. This means that subunits must be defined, whether they be schools, departments or institutes; addresses, logos and corporate design guidelines must be assigned; as well as the group of individuals who are responsible for implementing the teaching evaluation specified. With a number of different user roles for each user group EvaSys™ can accommodate the conditions of each particular organizational structure. Depending on the extent the central model is followed, data access rights can be either authorized or not.

WHEN: Defining evaluation cycles and interaction times

EvaSys™ is normally used by universities on a semester or trimester basis. This evaluation cycle framework needs to be set up only once in EvaSys™. During your organizational preparations you will need to decide when you would like to evaluate during the cycle. Most universities conduct course surveys towards the end of the semester, so that instructors have the results in time to discuss them with their students. It is important that students have attended enough classes in order to be able to adequately assess a course, while there should be enough time remaining in the semester for the lecturer to reflect upon the results and if necessary make changes. Furthermore it may be desirable to give the instructor time at the beginning of the semester to add his own questions to the survey (specifically relevant to his subject or course) so that these can be included when the questionnaires are produced.

WHAT: Course data and instructor addresses

Because of the high degree of automation, more and more universities are beginning to comprehensively evaluate all of their courses with EvaSys™. Metadata about the courses and their instructors, for example course names and numbers, faculty names and email addresses are already stored in course catalogs. EvaSys™ therefore offers two procedures in order to enter into the system the courses to be evaluated: manual entry or import from CSV/Excel or XML data. The latter can be easily exported from such wide-spread course management systems as BlackBoard, WebCT, eCampus, SCT Banner and directly imported into EvaSys™. Die XML interface enables real-time synchronization.

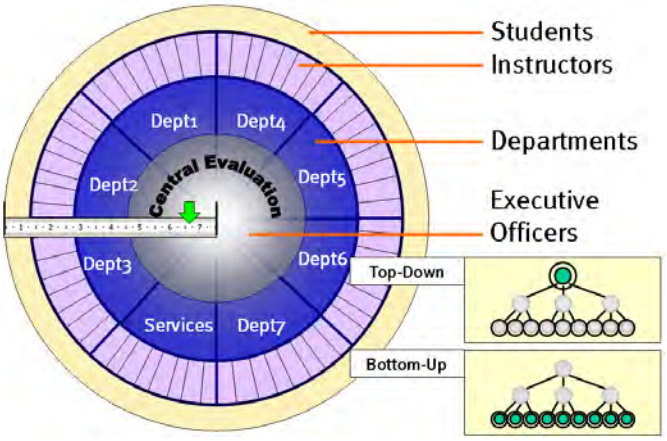
Legal Framework, Regulations, Data Security

Before beginning your first survey it is a good idea to decide who will have what responsibility. The importance of trust in the procedure should not be underestimated. The goals of the evaluation procedure should therefore be discussed in a broad-based discussion:

- Which courses should be evaluated, and when?
- Who takes on the position of trust as evaluation coordinator/administrator? What access rights will deans and deans of studies have?
- What kinds of report should be made? How should instructors and departments be involved in creating their own questions?
- What equipment will be used?
- Who receives which reports?
- How will students receive feedback?
- What kind of security should students have (anonymization of handwriting)?
- Should handwritten comments be anonymized? How high should the anonymization threshold be set, so that large – and "anonymous" courses are excluded from this expensive procedure?

Most universities develop and adopt specific policy regulations. The EvaSys™ system is then configured according to these specifications.

EvaSys™ Flexible Implementation - Central to Decentral -



You can set the "degree of centralization" in EvaSys™

EvaSys™ is an extremely flexible software solution. It was developed so that any survey procedure could be implemented automatically. Since surveys can involve a wide variety of different aspects of teaching – programs of study, student service and course surveys for lectures, seminars, lab exercises, and so on, as well as alumni surveys – you will need a number of different survey concepts. With EvaSys™ it is possible to organize surveys in a variety of ways, just as you need them. The different options are discussed in the following.

Decentral Approach (Bottom Up)[1]

Empowerment through active survey accounts • Using active survey accounts, instructors, student associations and student services such as cafeterias or the library can conduct their own surveys. They use the EvaSys™ Web interface in order to create a survey, to print PDF questionnaires and then scan these in a central scan station. EvaSys™ creates reports and makes them available to survey account owners per email, together with the raw data, through a Web account. Using the same Web account the results can be analyzed with a large number of functions (filters, summaries, profile line comparisons, Kiviat diagrams, data export for SPSS or Excel).

Whatever content, building blocks, templates you need •
EvaSys™ provides the option to create questionnaire templates whose content must be used by an instructor. These predefined questions however can also be supplemented by additional questions as desired. This procedure guarantees that results are comparable and at the same offers a maximum of individuality.

The instructor can also combine the reports that accompany the questionnaires. The active user receives "his"[2] questionnaire with his personal report and his personal raw data.

The decentral approach in general assumes that instructors volunteer to take part in the evaluation procedure. This model is "confidence-based" and puts a lot of responsibility in the hands of the instructors. EvaSys™ offers certificates of participation and evaluation certificates including scores for instructors voluntarily taking part in the evaluation.

Experience shows that only a minority of faculty members make use of this option, so that a good compromise would be a central approach in connection with decentral accounts for those instructors interested in its possibilities.

[1] The decentral model was developed together with the Agency for Higher Education Pedagogy for Universities of Applied Sciences in Baden-Württemberg (GHD).
[2] For stylistic reasons we are using the masculine form of the pronoun. It is meant to stand for both genders and should not be taken as discriminatory.

Central Approach (Top Down)

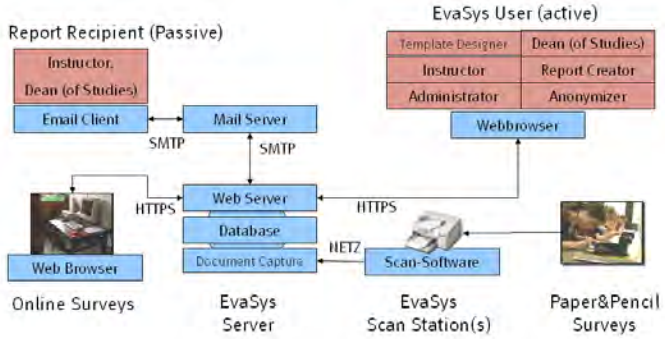
Service orientation with passive survey accounts • This procedure is especially well suited to comprehensive course surveys. The central evaluation coordinator takes on all of the tasks associated with the survey. The instructor simply hands out the questionnaires and receives an email with the PDF report. In order to guarantee confidentiality, a student counts the completed questionnaires, and seals them in an envelope before returning them to the collection point.

A special feature links the metadata from the course management system and the organizational structure with the report data for further analysis, building a large pool of reference data. Comparisons, norm reference data and profile lines, all help instructors to welcome the survey and reflect on their results. By determining centrally which courses should be evaluated you can assure the comparability of the survey results.

Report template procedure* • In order to guarantee that centrally organized evaluations still have discipline-relevance for departments and instructors, we have developed the report template procedure. This enables you to add details to course data that may have been incomplete when collected at the beginning of the semester. This information may come from the department or the instructor, e.g. the actual number of students taking the class, the type of course, cancellation of a class and reason for cancellation. In addition instructors can add their own questions. They are requested to do so in an email from the evaluation coordinator. The email contains a link to a template in which the instructor finds his course data and which he can now supplement, correct or expand with his own questions. This procedure joins the interests of instructors and the university. Participation in the report template procedure is voluntary and experience shows that roughly half of those being evaluated take advantage of it. Those who do not complete a template receive the standard questionnaire.

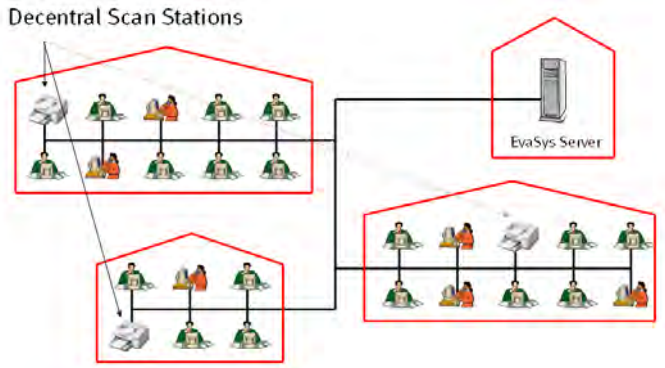
"EvaSys™ in EvaSys™" the client model* • Large universities with independent departments and schools (e.g. university hospitals/medical schools) can run a number of EvaSys™ installations on one EvaSys™ server at the same time. The advantage is that data management is completely separated. Each EvaSys™ client has its own subunits, administrators, report creators, active and passive instructor accounts, even its own system variant or degree of centralization. Only the hardware is used in common.

The Technical Infrastructure



Organization of system components and "players"

The application core is the central EvaSys™ server with three major components: Database (MySQL), Web server (Apache) and document capture. Scan stations are connected online to the network and send image documents from the survey batches to the document capture process. The document capture tool interprets the images and stores the scanned raw and analyzed data in the database. Depending on your needs the system then sends reports to instructors and deans (often passive users) using the university mail servers. Using the Web browser, active users such as the evaluation coordinator, the report creator and the anonymizer can work with EvaSys™. Respondents in online surveys of course only need a Web browser. Browser connections use 128-bit encryption – similar to online banking.



Decentral locations can also be equipped with scanners

Manual data analysis is cumbersome and results in too long a time between data collection and delivering reports to the instructors – sometimes this takes the whole semester break. In these circumstances there is little chance that the course evaluation will be given the desired attention. It is critical that the instructors receive their feedback as soon as possible – instantly would be best – while they are still involved in the course. This would allow them to reflect on the results and make changes in their teaching.

In order to be able to realize this maxim of "instant feedback", even when there are a number of university campuses or locations, scan stations can be set up where they are needed. Scanners of varying performance characteristics (30 to 300 pages feeder capacity, 20 to 80 pages per minute) can be used as needed.

Scanning facilities in digital multifunctional photocopiers can, if they are correctly calibrated, be configured for EvaSys™ operations. When locations are far apart a scan+mail infrastructure can be used, which enables TIF images to be sent to an email address on the mail server.

User Roles in EvaSys™

EvaSys™ distinguishes between active and passive user accounts. Passive users are **instructors** or deans who simply receive email reports and raw data. The report template procedure is the only exception as participants are able to use a Web browser to add important content for the questionnaire by clicking on a URL in an email.

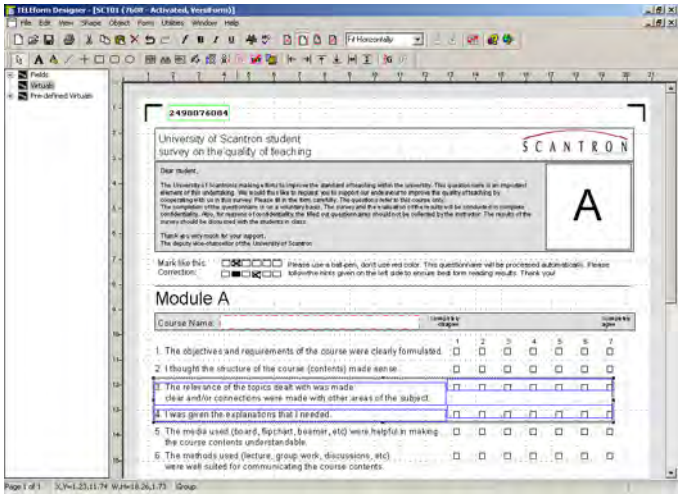
Active users login to the EvaSys™ server and use the Web interface. They include the central **evaluation coordinator (administrator),** the **report creator**, who can create summary reports and norm reference data pools, the **anonymizer** as well active survey account owners, who carry out surveys independently from the central evaluation. You can develop your own questionnaires (using Designer), download these as PDF questionnaires, print them out and use them. **Active Survey Accounts** enjoy special protection in EvaSys™ – the data "belongs" to the survey account owner and there is no central access to this data.

The **dean** can be given access to central quality management (QM) views, which enable him to select from hundreds of surveys those fulfilling certain criteria, for example whether a type of course exceeds or fails to meet certain minimum quality standards (QM guidelines). This enables the dean to quickly spot those courses receiving poor evaluations and needing his attention.

A **dean of studies** can compile a list of discipline-related courses from a list of evaluated courses in a central evaluation. The **Anonymizer**, a manual data entry assistant, reads and categorizes handwritten student comments or types them out – this optional function protects students. At the same time possibly offensive comments or those that might violate data security can be removed, which serves to protect the instructors.

Development of Survey Instruments:

TeleForm



The TeleForm Designer gives you unlimited design capacity for your questionnaires

The TeleForm Designer is a professional tool for designing questionnaires. The program has an intuitive interface and enables you to arrange all of the elements as you wish. You can also adapt questionnaires to your own corporate identity (CI) guidelines.

First, the user creates the questionnaire in Designer. Then three PDF versions are automatically generated, which serve as preview (sample form), paper&pencil form and as an online survey version. Once the questionnaire has been registered in EvaSys™ it is ready for use in large-scale surveys.

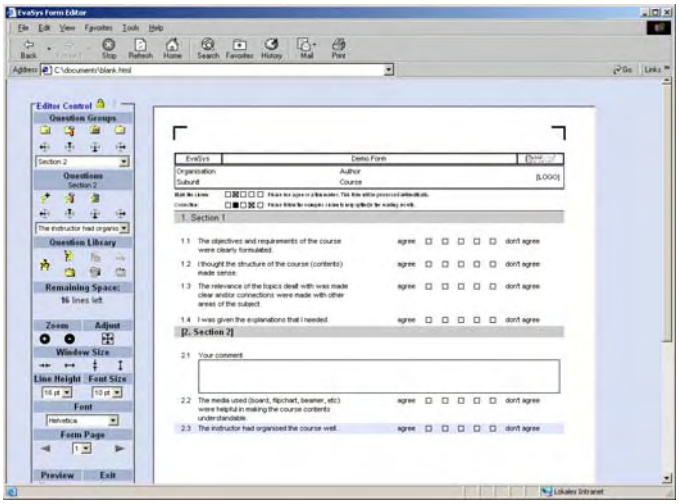
The fields marked with red dashed lines are for survey-specific information, such as the name of the instructor or a survey code number.

TeleForm can be used in principle for any imaginable form type, including applications other than course evaluations:

Grading multiple-choice tests
For the automated grading of multiple-choice tests, EvaSys™ offers as an expansion for TeleForm/EvaSys™, the module EvaExam.

Counting votes in university elections
The need for personnel and the time pressure when counting votes in university elections – often until late at night – can be reduced to a minimum by using TeleForm. Within a few hours 1or 2 people can count thousands of votes.

VividForms



The VividForms Designer enables Web-based form creation within minutes

As an alternative to the TeleForm Designer, which can only be used by the evaluation coordinator, you have a browser-based option for creating questionnaires. The VividForms Editor enables you to put together a complete questionnaire within minutes. This high speed is reached because the layout is generated automatically. The user simply decides on the question types and their content.

The VividForms Editor can be used by the evaluation coordinator to create templates that will be supplemented by the lecturers with their individual questions at a later date. A Web browser is used to access the VividForms Editor and expand the template by adding questions or, depending on the setting, creating completely new questionnaires. No knowledge of the technology behind these tools is necessary. The questionnaire is immediately available for printing and analysis.

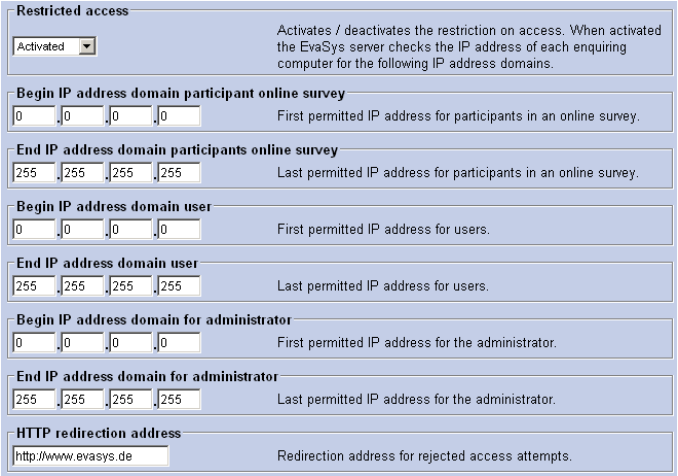
Both technologies however have their strengths and weaknesses:

TeleForm Designer	VividForms Designer
+ Professional layout	+ Form creation in minutes
+ Verification option	+ Use via Web browser
+ Large-scale processing	+ Larger user group
+ Option for university elections, examinations, etc.	+ Complete content flexibility
- Exacting operation	+ No training necessary
- Limited user group	- Layout is predefined
- Time consuming	- Potential source of error in decentral printing
- Training necessary	- Higher printing costs

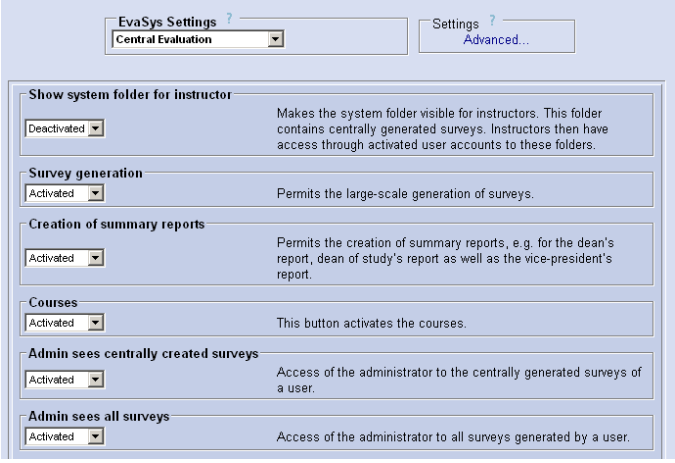
Security and Data Security

From the very beginning a basic principle guiding the development of EvaSys™ was the implementation of data security guidelines while taking individual university regulations into consideration.

Access to the EvaSys™ server is controlled by a filter admitting only those who belong to the network, for example limiting the user group to those with valid IP addresses within the organization:



In addition to this technical gateway restricting access, each user has a user name/password combination. Communication with the EvaSys™ server takes place using a 128-bit encrypted browser connection giving you security against tapping comparable to the standard set by online banking.



Data access rights are defined in EvaSys™ and may be defined such that they cannot be changed without official approval.

Server Technology

EvaSys™ makes use of recognized open-source server components. The database uses MySQL. The Web server uses Apache version 2.0. EvaSys™ server software is developed in the programming languages PHP/Java as well as C++. This combination is in principle independent of any given operating system.

In order to set up EvaSys™ with its document capture and scanner control components as an integrated system, EvaSys™ also runs on the Microsoft Windows platform. The server components can also be run on Linux.

Using its Web-based operation the EvaSys™ server can be integrated into an existing IT landscape in a few hours. After determining access rights, each authorized user can then work with EvaSys™ irrespective of his own operating system (Windows / Linux / Macintosh).

Phase Model

In over 100 evaluation cycles conducted with EvaSys™, a general procedure has emerged that is not only highly efficient but also does an excellent job of taking into account the interests of all concerned parties.

1. Preparation	Selection of Survey Procedure
	Selection of Questionnaire
	Selection of Courses
	Definition of Comparative Criteria
2. Survey	Survey Generation
	Instructor Input Phase
	Questionnaire Production
	Survey (Paper&Pencil, Online, Hybrid)
3. Data Capture	Scanning
	(Anonymizing)
	Automatic Feedback
4. Analysis	Aggregation
	Profile Line Comparison
	Norm Reference Data Building
	Raw Data Export
5. Quality Management	Quality Overviews
	Procedure Optimization

1. Preparation

The most work intensive phase is the preparation phase because as a rule it involves discussion about basic principles. When agreement has been achieved then EvaSys™ can be "loaded" with the necessary information for the survey cycle.

A. Basic Decisions

1) Which procedure should be used?
EvaSys™ supports different deployment procedures, which meet different needs and requirements:

- **Central Evaluation Procedure:** Course evaluation as a central service, administered by an evaluation coordinator, who controls the whole process. Course and instructor data is supplied by CSV or XML import or manually. Advantage: Enables an efficient, comprehensive implementation .
- **Fillable Coversheet Procedure:** Course data are not given to a central administrator. Instead they are entered on a PDF cover sheet. The PDF cover sheet is filled out "on demand" by the head of department or instructors. During scanning the details are read by an OCR tool and the survey is registered in the system. Advantage: Course data is not needed in the preparation stage. Disadvantage: It may be difficult to classify the courses in an organizational structure.

- **decentral evaluation procedure – "bottom up" model:** This is the instructor-oriented survey model. Using a Web browser the faculty member puts together his own questionnaire as a survey. Advantage: Confidential approach which is ideal for voluntary evaluation.

2) How are departments and instructors involved? Should there be more discipline relevance by adding optional questions to the standard questionnaire?

3) How are questionnaires and cover sheets produced? Should cover sheets and preproduced questionnaires be used (**cover sheet procedure**) or should personalized questionnaires with individual questions and course data be produced? (**hard copy procedure**). EvaSys™ offers the options of having instructors do the printing by sending them emails with PDF documents, of having the questionnaires produced centrally in the office of the evaluation coordinator or of making the PDF file available for external production. In one step a form batch printing function can create a PDF file with several thousand pages including all of the cover sheets or all of the individualized questionnaire forms.

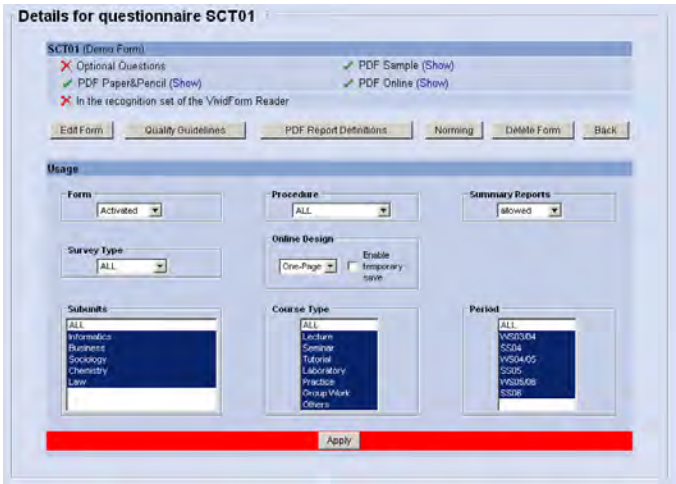
4) How are the questionnaires distributed and then collected? This is an organizational problem but also a confidence-building one. Students must have the certainty that their instructors cannot examine their completed questionnaires or identify who has filled out a particular questionnaire. Instructors hand out the evaluation questionnaire, but students are to collect the completed questionnaires, note down the number of returns and seal them in an envelope to be sent to the mail room.

5) When using paper surveys: How and when are they scanned? In order to have the fastest feedback possible, a scan station can be set up in the mail room. Or it can be set up in the office of the evaluation coordinator and a student assistant can scan the returned questionnaires during the survey phase (typically about two weeks towards the end of the semester) – the analysis and report are dispatched automatically. When active instructor accounts are being used, the instructor can scan in the results himself. Distributed scan stations in the departments help minimize the time spent between distributing the survey and analysis.

Questionnaires are created with the design tools in EvaSys™, either the TeleForm Designer or the VIVIDFORMS Web editor. In both tools there is an item library for your convenience.

B. Selecting the Questionnaires

After creating the questionnaires they are published in EvaSys™ and made available for paper&pencil and online form use. They appear in the questionnaire administration, where further attributes can be defined (user rights, suitability for particular course types, metadata.). Each questionnaire is given a header, in which data about the course is added at a later time.



Each questionnaire has a variety of access and analysis functions

C. Data Capture of Courses and Instructors

It does not matter whether you are conducting a comprehensive evaluation or only evaluating a limited number of programs each semester – course data and instructors need to be registered in the system if the process is to be optimally run. EvaSys™ offers five different methods:

Manual capture by Web dialog • Instructors and their courses are entered by hand using templates. This method is best suited to handle late registrations promptly, but is time-consuming with large amounts of data.

Excel file (CSV) • This is the most common procedure. A CSV file can easily be transferred from a course management system (SCT Banner, WebCT, BlackBoard) to EvaSys™. Files can also be manually created. Department heads receive an Excel file in which they enter the courses and instructors being evaluated. These files are then imported by the central evaluation coordinator. EvaSys™ then sets up the complete organizational structure in the subunit - fully automatically. Advantage: The compilation can be done in the departments, which means less work for the evaluation coordinator.

Instructor Data						Course Data					
Function	Title 1	Title 2	First Name	Last Name	EMail	Course Name	Course ID	Course Location	Program of Studies	Course Type	Number Participants
Examples:											
Professor	Mr.	Prof. Dr.	Ned	Overend	overend@unieva.edu	Math I	10554-v	02.115	Economics	1	34
Professor	Mr.	Prof. Dr.	Edward	Montgomery	montg@unieva.edu	Math II	10564-v	02.104	Economics	2	20
Professor	Ms.	Prof. Dr.	Mary	Chevalier	m.chevalier@unieva.edu						20

XML synchronization • If you have a course database which can provide XML data per HTTP then EvaSys™ can import them. EvaSys™ then creates a list of the courses and the central evaluation coordinator can then select which courses should be adopted. You can also use this procedure to maintain incrementally just the "new" courses.

LDAP synchronization • An LDAP synchronization is being developed at the time of publication of this document.

Fillable coversheet procedure: capture "on demand" • Using a PDF cover sheet made available in the intranet, instructors or department heads can produce cover sheets containing all of the necessary information for the survey. In Phase 3 when the questionnaires are scanned, the data is read by OCR and then registered in EvaSys™. This procedure is best if it becomes clear during the survey cycle which courses are to be evaluated and if there is no suitable central course catalog to export data from.

D. Definition of Comparative Criteria

EvaSys™ generates detailed reports which help instructors reflect on the quality of their teaching. Averages and standard deviations alone are generally of little help to instructors. The goal is to provide comparative criteria which will help him interpret the survey data. And instructors do want comparative criteria. EvaSys™ enables you to create and capture norm reference values and quality guidelines which can then be used as comparative criteria. We will go into greater detail in the sections on Phase 4 and 5. During the preparation phase the initial question is whether norm reference values and quality guidelines should be a part of the evaluation at all. If the answer is yes, then you will have to decide which should serve as a basis for making reports.

Dimension	Raw Value	Norm	Status
Structure	4.5	90	D
Debate	5	93	D
Transfer	4.5	93	D
Teaching Competence	3.3	76	E
Dedication of Instructor	4	83	E
Climate	6	100	C
Interestingness	5.5	106	B
Redundancy	5.5	130	A
Demands	5	123	A
Learning Quantitative	5	100	C

Norm profile lines make interpreting results easier

Note: EvaSys™ supports the creation of norm reference data – however this is only recommended after a survey cycle has been completed. These norm reference data are then available for the following survey cycle as comparative criteria. If you already have norm values for tested survey instruments then these can be entered into EvaSys™. The HILVE2 questionnaire from EvaSys™ comes with an optional package containing empirical norm reference data.

2. Implementing the Survey

After resolving the basic issues of evaluation and making further preparations, you can begin the survey implementation phase.

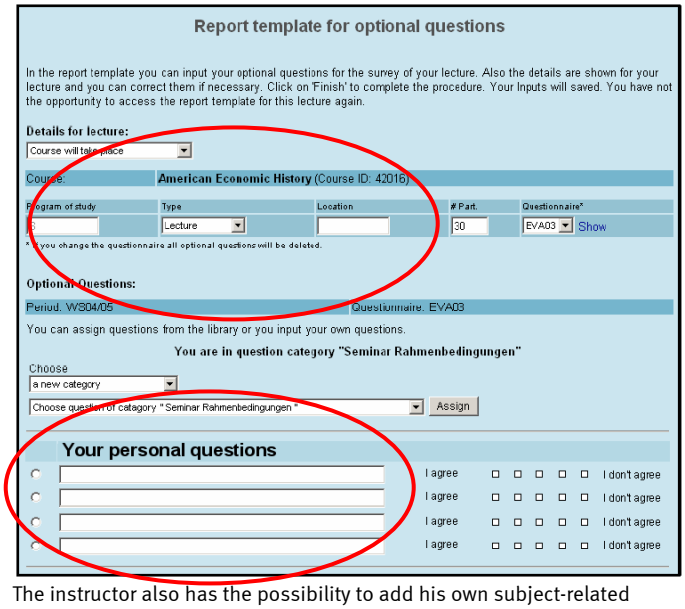
A. (Batch) Generation of Questionnaires

With just a few mouse clicks the central evaluation coordinator can now create a number of questionnaires. A systematic approach could involve the following steps:

1. Subunit (faculty, department, institute, program of studies)
2. Survey cycle (typically the current semester)
3. Course type (lecture, seminar, lab…)
4. Questionnaire
5. Course
6. Survey type (online survey, cover sheet or hard copy procedure)

After making these choices each survey that meets these criteria will be added in one step. Now the report template procedure can be started (see Section B below) and cover sheets, questionnaires with header data and so on can be downloaded or made available for batch printing (see Section C).

B. Registration Phase – Report Template Procedure



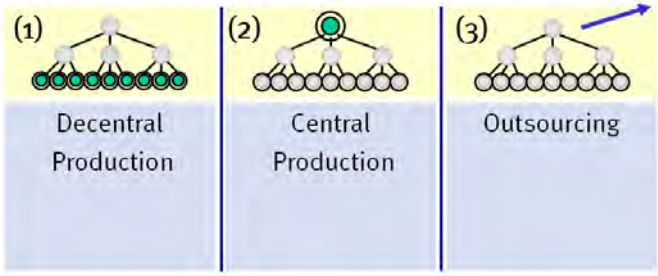
The instructor also has the possibility to add his own subject-related questions – if he chooses by accessing the question library. A reminder function alerts the instructor to this functionality, so that the evaluation proceeds optimally. Furthermore there is a setting that provides for an email with a printable questionnaire (hard copy procedure) being sent to the instructor after he has returned the report template.

C. Questionnaire Production

The production of questionnaire sets can be managed very flexibly with EvaSys™ – as can of course the allocation of printing costs:

Decentral production • The questionnaire is sent per email to the instructors, who print the PDF file in the number they need and take them to their classes. The printing costs are distributed to the subunits.

Central production • The evaluation coordinator prints the cover sheets or the individualized questionnaires himself, puts them in an envelop and gives them to the instructors, usually with a cover letter containing directions. This is the most common practice, in part because it promotes the idea of service. In central evaluations it may be desirable to integrate more questions relevant to the particular discipline. Instructors should be given the opportunity while at the same time the central evaluation coordinator provides a service oriented approach to



Production of the questionnaires can be flexibly managed

the procedure. This is accomplished in the report template procedure, in which before the questionnaires are produced the instructor receives an email with an URL link to the report template. In this template they can add or correct course data and enter other metadata.

Outsourcing • EvaSys™ creates a comprehensive PDF file with all of the cover sheets or with the individual questionnaires. If the number of students in each course has been entered then there will be a PDF file with thousands of pages. This file can be sent to the university printers or to an external supplier.

Depending on the questionnaire and whether the report template procedure has been used, EvaSys™ can either supply individualized cover sheets (cover sheet procedure) or individualized questionnaires (hard copy / report template procedure) as a batch document in PDF format.

Note: If EvaSys™ questionnaires are more than one page long then EvaSys™ can provide the pages of a questionnaire with a page link field. When the questionnaires are handed out the pages must be attached. But when scanning the sequence is unimportant. EvaSys™ keeps the individual pages of a given questionnaire in the correct sequence.

D. Implementing a Survey

After the questionnaires have been printed the survey itself can begin.

Paper & pencil • The best method is for the instructor to receive an envelop with instructions, a cover sheet and questionnaires in his post box. If optional questions have been allowed then the instructor receives his individualized questionnaire. The instructor hands these out in his class and gives the envelop and the cover sheet with instructions to a student. The student – not the instructor – then collects the filled out questionnaires, counts them and seals them in the envelop. The student then takes the envelop to the mail office or to the evaluation center. This procedure is seen by students as preserving confidentiality, as possible abuse is prevented (sorting out questionnaires with low scores, trying to identify handwriting of students).

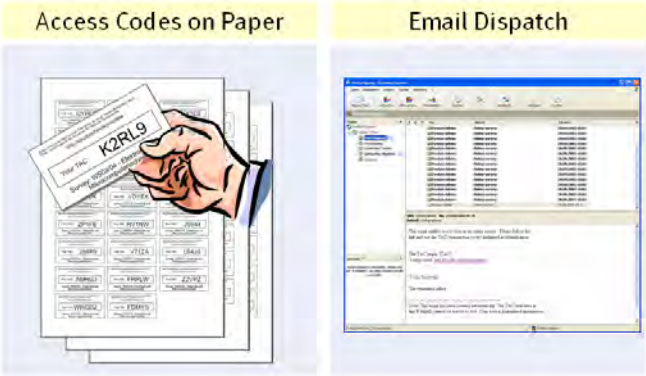
Online surveys • When online surveys are conducted then the instructor does not receive cover sheets or questionnaires. Instead he receives a list of transaction authorization codes or TACs, each of which gives authorization to complete a given questionnaire in a survey. The instructor decides how the TACs should best be distributed to the students.

1) TAC cards
A sheet with rows of TACs in business card format is printed and distributed in the class. A TAC card has all the relevant information such as course title, access URL and code printed on it. This prevents possible confusion when a student has a number of TAC cards. Students find this "fishbowl approach" especially trust-building, as it makes it impossible to discover the identity of participants in the survey.

2) Batch email
If the email addresses of class members are available then the TACs can be sent to them per batch mailing. The only disadvantage to this solution is that although EvaSys™ preserves student anonymity (TAC recipients and survey respondents are not linked) students might suspect that this is the case and not answer the questionnaire objectively.

Survey wizard • HTML surveys are treated as a "long" HTML questionnaire page or in the form of so-called "Wizards", in which question headings are portrayed as blocks. With the "next/return" button you can jump back and forth between headings. When all of the questions in a block have been answered then EvaSys™ tags the heading with a green flag, if only parts have been answered, with a yellow one, while blocks that have no answers remain red.

Filter settings • Rules can be defined which cause a part of the questionnaire to be skipped or to be marked as invalid. These filter criteria ensure response validity. Filter settings can be used for both online surveys as well as when analyzing paper&pencil surveys.



Options for sending TACs for online surveys

Note: As some surveys can be quite long, EvaSys™ enables students to save their responses should they want to continue the questionnaire in a further session.

PIN-TAC surveys • If you would like to preserve the identity of a survey participant over the course of a number of surveys, EvaSys™ provides the option of PIN-TAC surveys. Students receive a PIN ID when they enroll. They still take part in surveys anonymously, but the PIN means that an individual student can be observed over a period of time.

Note: Ask our consultants about the limits and opportunities of this approach – we will be happy to answer your questions.

Paper & Pencil Surveys	Online Surveys
Pros	Pros
- Immediate feedback	- Cost effective
- Very high response rates	- Low efforts
- Instructors face students	- From any location
	- Ideal for alumni surveys
Cons	Cons
- Organizational efforts	- Low response rates
- Printing cost	- impersonal
- Sources of error	- Time shifting
	- Shifting of effort and cost to students side

Advantages and disadvantages of paper&pencil vs. online surveys

Password • For university-wide surveys (e.g. surveys about the cafeteria, library, service infrastructure...) with thousands of participants the TAC procedure may be difficult to implement. The danger that individuals take part more than once and thereby falsify the statistical results is however, based on our experience to date, unfounded. EvaSys™ supports online surveys by password, which is the same for all participants.

Recording completion time • Someone who reads and answers 40 questions in less than a minute cannot have seriously thought about his responses. The completion time is recorded and saved in the data base so that it can be used for plausibility checks.

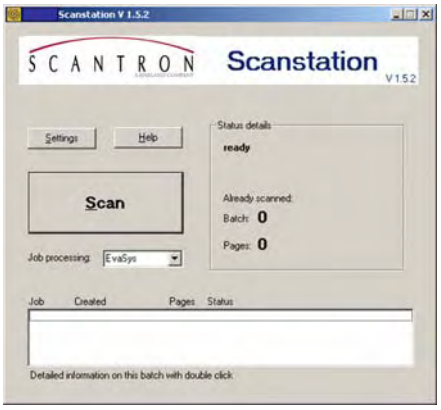
Hybrid surveys • Sometimes survey participants should be given a choice of response medium (paper, HTML, online PDF). For hybrid surveys the participant receives a paper questionnaire, e.g. as form letter. He can then use the printed question ID or complete the survey online. In order to prevent an individual from using both the paper form and the online survey, EvaSys™ records only the first response and rejects the second one automatically.

3. Data Capture and Instant Feedback

In the third phase the completed questionnaires are scanned, sent to the EvaSys™ server, analyzed by the document capture software, imported and – depending on the setting – processed for instant feedback reports, which are sent to the instructors per email with a PDF. An attachment with the raw data can also be made.

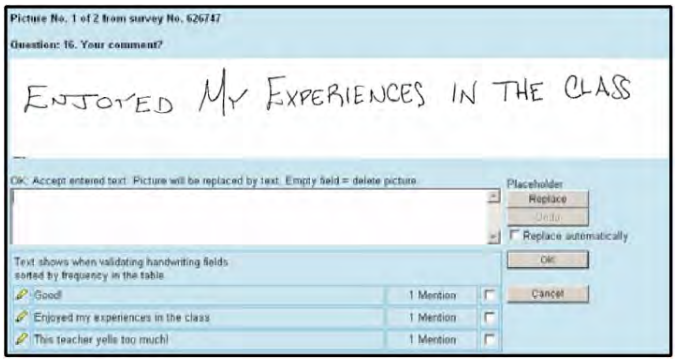
A. Scanning – with One-Button Solution

Scan station • Questionnaires are batch scanned either centrally or at a number of distributed scan stations. The scan station software enables you to scan large numbers of questionnaires in a number of batches. The EvaSys™ scan station software is a user-friendly one button solution. Student assistants can be given the task of scanning the questionnaires (central evaluation). In the instructor-oriented model, the instructor himself scans the responsnes at the scan station.



Processing with document capture • The document capture component in EvaSys™ reads cover sheets and questionnaire pages and assigns the batch to a given survey in the system. Check fields are read, lines are read. Ambiguous statements and questions that were not answered are automatically recorded by EvaSys™ as a so-called "missing value". This affects only those questions in a questionnaire that are illegible or unmarked. As a result the statistic retains its overall validity.

B. Processing Open Questions



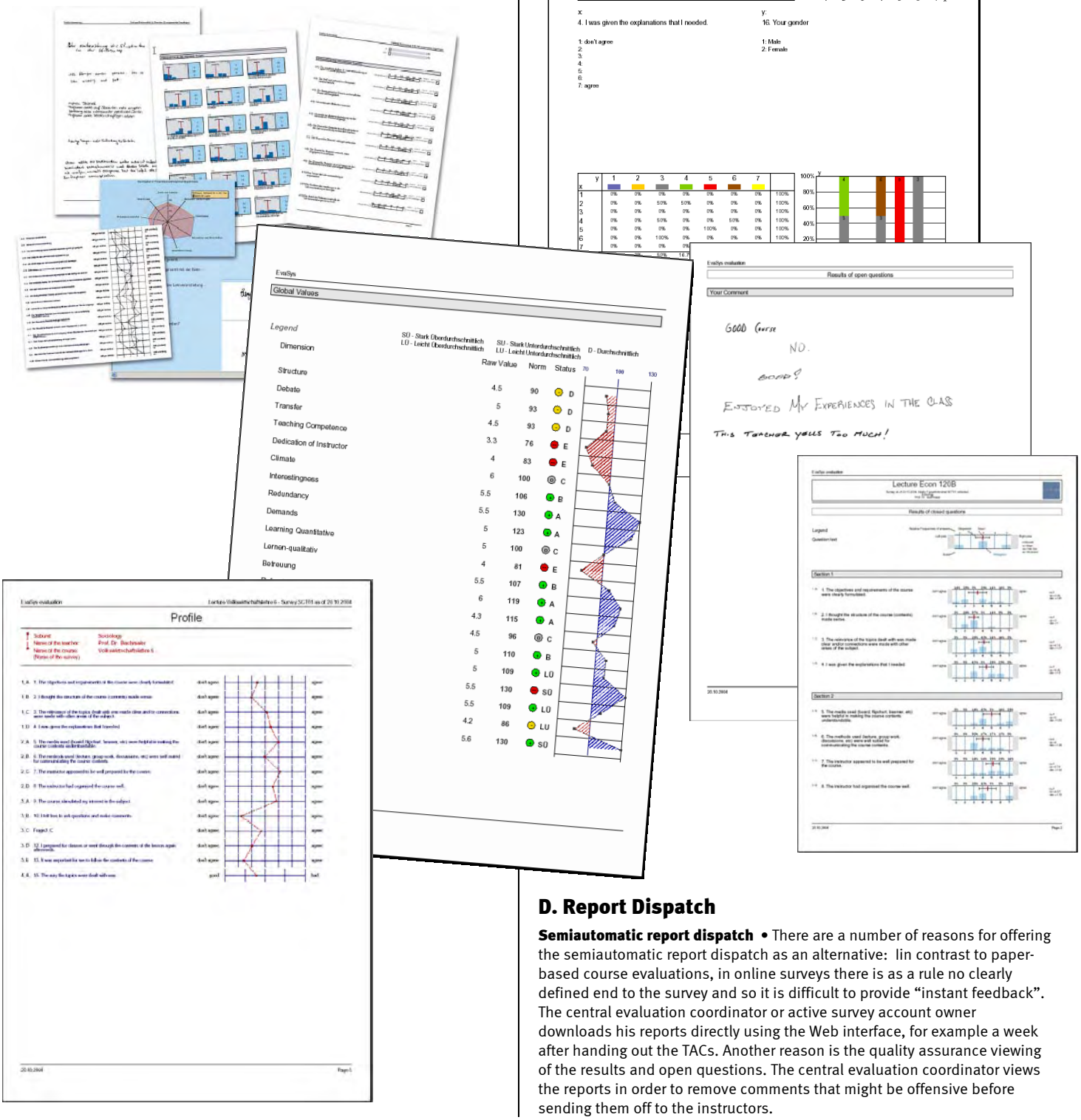
Handwritten comments are captured so that the anonymity of the respondents is guaranteed

EvaSys™ offers the option of including open questions as image boxes sorted according to questions in the report. To protect students handwritten comments can be anonymized. And an anonymization threshold can be set so that for classes with large numbers of students, where it would be impossible anyway to identify the handwriting of an individual, the expensive anonymization of questionnaires can be done without lowering costs. (Even for data security the means should be proportional to the ends.)

The anonymization function can also be used to classify open responses and so to create a response catalog for the statistical analysis of the questions. In addition this function can also be used to ensure that no offensive or data security relevant comments are passed on to the instructors.

C. Automatic Generation of Reports

Fully automatic report dispatch • EvaSys™ analyzes returned questionnaires and creates – if it is so configured – automatic PDF reports and sends these to the instructors. Reports can be made up out of as many as nine categories: cover text, indicators, norm reference data display, detailed analysis, scaled questions, profile line, matrices, open questions and presentation slides.



D. Report Dispatch

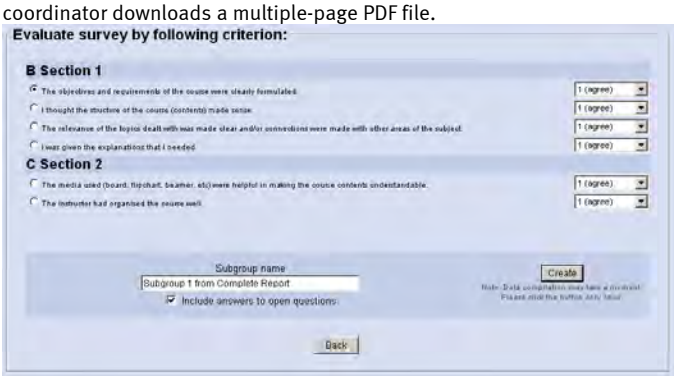
Semiautomatic report dispatch • There are a number of reasons for offering the semiautomatic report dispatch as an alternative: lin contrast to paper-based course evaluations, in online surveys there is as a rule no clearly defined end to the survey and so it is difficult to provide “instant feedback”. The central evaluation coordinator or active survey account owner downloads his reports directly using the Web interface, for example a week after handing out the TACs. Another reason is the quality assurance viewing of the results and open questions. The central evaluation coordinator views the reports in order to remove comments that might be offensive before sending them off to the instructors.

4. Analysis, Report Generation

After collecting the surveys from a number of individual courses, the fourth phase – the expanded analysis and report phase – can begin. Since there is now a large data base available, summary reports and comparative analyses can be created. In addition norm reference data pools can be defined and any desired combination and filtering of questionnaire contents on the one hand and of added meta or organi zational data, on the other, can be made.

A. Data Collection, Filtering

Automatic dispatch of comparative profile lines • If you would like to show all of the instructors in a subunit how they compare to the mean in the program of studies or in the department, then EvaSys™ can create the corresponding profile line diagram. Alternatively EvaSys™ can send this profile line display to each instructor individually per email or the evaluation coordinator downloads a multiple-page PDF file.



Subgroups are built by selecting filter criteria

In order to avoid biasing results with non-representative data, EvaSys™ does not take into account data from courses with classes with small numbers of students or when the number of returns is too small.

Creating summaries and filtering • EvaSys™ enables you to filter the resulting data according to criteria on the questionnaire. This data collection can be processed with the standard reports. You can also combine data from similar questionnaires. EvaSys™ then displays an overview with all similar or similarly formulated questions.

Creating a norm reference data pool • Faculty expect that norm reference values will refer to their particular discipline. And so EvaSys™ enables you to decide which values to use in calculating norm values (e.g. historical data from recent survey cycles in a given department). If you already have norm reference data for your survey instrument then these can be entered manually.

B. Processing Raw Data

Downloading raw data for analysis in SPSS / Excel / etc. • EvaSys™ can send raw data from a survey to instructors. The central evaluation coordinator can download data from surveys conducted centrally , as well as filtering and summaries. EvaSys™ can supply the data in either SPSS or Excel CSV format for more in-depth analyses.

Sphinx Statistics Workbench • Should you want to make further in-depth correlations and multivariate analyses or even text analyses of open questions, you can count on EvaSys™ Sphinx Add-On. This statistic workbench enables you to create needed reports, matrices and diagrams, hypotheses diagrams, tree diagrams etc. You are able to conduct your own analyses of the raw data in a simple and exploratory fashion.

The EvaSys™ server provides a Sphinx file for analysis. This contains the complete set of questions and value labels. Sphinx enables you to enter the data in SPSS format or import it. Sphinx statistics is used world-wide in over 7,000 organizations and is market leader in France. A special edition of the Sphinx statistic software can be ordered together with EvaSys.

C. Downloading Reports with Active Accounts

As an evaluation system for the whole organization, EvaSys™ provides features and functions for active and passive users. After the survey phase the collected data can be used to create reports by the following users:

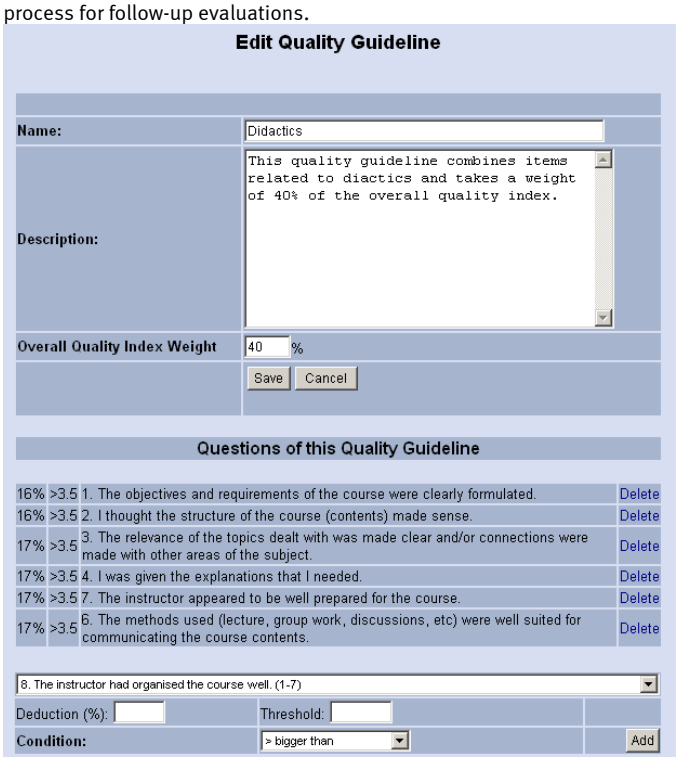
Evaluation Coordinator • As supervisor and consultant he moderates and supervises the entire evaluation process. He can use all of the functions of the system and so download any filters, raw data, reports, etc. that are needed.

Report creator • The report creator is authorized to create summarized reports on subunits, programs of studies, an instructor profile, on a number of courses or any other summary or data selection.

Dean/Dean of Studies • In central evaluations the dean can access the system's utilization statistics as well as the so-called Quality Management Views (see Phase 5). Data which was collected with active accounts (decentral, instructor-oriented surveys) are protected and he is only able to see the utilization statistics (number of surveys, number of pages), not any contents.

5. Quality Management, Process Optimization

The last phase in the evaluation lifecycle is quality management, new in EvaSys™ 2.1, after positive experiences in the private sector (the training center of Die Bahn AG, the former German state railway). The goal was to filter out those courses – totaling more than 20,000, with thousands at any given location – that did not meet minimum quality standards. Quality standards had to be developed as a survey instrument and they had to be clear and easy to understand, and finally the German railway company wanted a suggestion system with effective documentation of the change process for follow-up evaluations.



Quality guidelines quality of training seminars is graphically displayed

The application to a university environment is technically quite easy, but finding acceptance for doing so is much more difficult. However the positive

experiences with QM at the German Railway and with EvaSys™ in evaluations at universities – especially the instant feedback for instructors – has encouraged us to offer QM views as an optional functionality:

A. Quality Index for Courses

A overall quality index can be calculated for each course, composed of a number of substantive quality dimensions (e.g. structure, method, practice orientation and so on). Each quality dimension is made up of a number of questions (items) and for each question a "minimum quality" can be defined. When this minimum quality is not reached then a given percentage is deducted from this dimension. The deductions from all of the dimensions are added together and subtracted from the quality index (100) – according to the weighting of each dimension. Quality indexes are thus a flexible framework, composed of the weighting of the items and dimensions you define.

QA	Quality	Course	Department
	79.7	Econ 100A	Economics
	79.5	Econ 100B	Economics
	79.3	Econ 120A	Economics
	79.3	Econ 120B	Economics
	79.3	Econ UD Elective	Economics
	79.1	Econ 172A	Economics

The courses can be sorted according to quality

Overview for the Deans • Depending on his area of responsibility, a dean can open QM views for a single department or for a number of departments. In the QM view he can see quality indicators as graphs and, for example, quality indexes. He can also open detail views in order to determine which questions were given a poor score and what specific steps should be taken. He can also look at the PDF report that belongs to the course. The open questions often contain information about the reasons for the poor score (which are not necessarily due to the instructor, but may have to do with the organization, the required course content or other contextual circumstances).

B. Further Optimization

Analysis of coverage/return rates (display) • EvaSys™ offers utilization overviews – who in which subunit has processed how many surveys. If the expected course participation numbers have been inputted into the system then the participation rate can be easily computed.

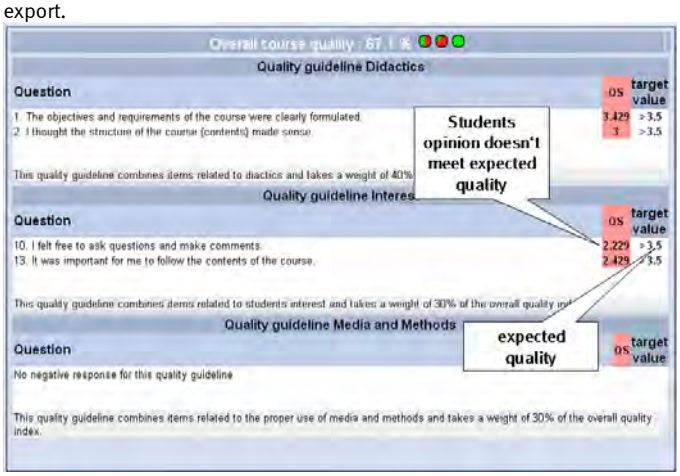
Optimizing participation • At the end of the survey cycle you will have information about student participation rates. You can decide, for example, whether to change a given survey from online to paper&pencil in order to achieve better return rates. You may decide to introduce the report template procedure.

Revising instruments • You may see possibilities to optimize your survey instruments. For example, you may notice that certain items do discriminate as they should and you will decide to eliminate them or add others. Perhaps you need further structural variables. You can now modify your questionnaire and prepare for the next survey cycle.

Developing your own norm reference values • At the end of the survey cycle you have enough data available to build norm or reference data. You can now discuss and decide which norm reference data pools you would like to construct and use for the next survey cycle.

Defining new quality minimum standards for the following cycle • Using the data you have already collected you know average values and standard deviations for given question items. You can now precisely define minimum quality standards for these question items so that only those courses appear in the quality overviews which need action.

Detailed interpretation of data, cause analysis, written reports • EvaSys™ provides the basis for detailed analysis by allowing all of your data to be made available in CSV or Sphinx statistics format for so-called archive data export.



The detail view shows which items do not reach the quality standards.

You can now carry out extensive analysis using all of your data.

Optimizing the overall procedure • You optimize organizational processes, promote more acceptance for evaluation and announce improvements in the survey instrument for the coming cycle. Conduct meetings to optimize the process for the next survey cycle.

Concluding Remarks

The Specific Potential Value of EvaSys™

EvaSys™ provides the greatest possible degree of automation for comprehensive course evaluation. The potential value of this solution to you can be seen in five critical areas:

1. **Digital document capture** • "Scanning, not typing" means a drastic cost reduction in collecting data while minimizing errors. Within a few hours you can accurately analyze tens of thousands of survey questionnaires.

2. **Instant feedback for optimum self-reflection** • Instant feedback means a new quality in evaluation for instructors. They can reflect on the feedback and make changes while they are still involved in the on-going course. Norm reference values and comparative profile lines motivate instructors to optimize their teaching.

3. **Batch processing by support with organization- and metadata** • In order to systematically categorize hundreds or thousands of surveys, EvaSys™ imports existing data from course catalogs and faculty registers. The support provided by this metadata framework is critical as it enables reports, norm reference value data and comparisons to be made to subsets (programs of studies, departments, instructors, courses).

4. **Organizational overview and central process control** • EvaSys™ provides a kind of "process control center" for the central evaluation coordinator. This perspective can give the university executive officers, as well as the department heads valuable insights. Optional QM views provide a high degree of openness. "Learning from the best" is supported just as is the identification of quality weaknesses.

5. **Empowerment** • EvaSys™ provides both decentral, instructor-oriented surveys using active survey accounts as well as central evaluations. Both procedures can be combined, yielding interesting possibilities such as giving university service organizations their own survey accounts (e.g. cafeteria, administration, library). And the issue the relevance of centrally conducted course evaluations to a particular discipline can be resolved by EvaSys™. Faculty members are systematically involved and instructors with active accounts using the VividForms questionnaire designer can evaluate any aspect of their courses they are interested in – internet access is all it takes.

Advantages for all Parties Involved

EvaSys™ thus provides specific advantages for everyone in the organization involved in evaluation:

1. **Instructors** spend a minimum amount of time and receive optimum feedback for self-reflection. EvaSys™ enables them to supplement the survey with their own individual questions. They receive reports that enable them to compare themselves with other reference groups.
2. The **university executive officers** establish an efficient service infrastructure and emphasize the service aspect of the central evaluation. However the university executives also show that they take seriously the needs, and anxieties, that often accompany an evaluation. "Confidence-based evaluation" means that data access rights conform to the evaluation regulations of each university. The central evaluation procedure is extremely cost effective and can be organized and supervised by a single individual working part-time, even for large-scale evaluations.
3. **The Computer Center** appreciates the Web-based approach, which means that a client installation is not needed. Users of Apple, Linux or Unix computers are not discriminated against. As a result the university-wide roll-out is smooth and trouble-free. Security and data protection aspects are high priorities for EvaSys™ (see our paper on data security).
4. **Students** can expect that their judgments are analyzed and forwarded to their instructors quickly. Security issues for students (no analysis when the number of returns is low, anonymization of handwriting, "fishbowl approach" when handing out TACs) are also taken seriously by EvaSys™. The dialog between teacher and student is promoted by EvaSys™ (e.g. by giving the instructor an overhead slide as presentation template).
5. **Third parties:** Student organizations, the administration, thesis students, research project members, PhD students, library, cafeteria – EvaSys™ is a Web service that can be used anywhere in the organization where data needs to be gathered by surveys. Especially departments of social science appreciate this sophisticated mechanism for survey data collection.

EvaSys™ users have been involved in its development from the very beginning. The requirements originated in the practice and were decisive in developing the functionalities that EvaSys™ now provides. During user days and discussions in our user council, functionalities, requests and ideas for improvement are intensively discussed and have led to the development of a standard software for course evaluation. This can also be seen in the detailed product documentation, training materials and coherent support concept.

A word about training: a service-oriented implementation of central evaluations has always been a central priority for EvaSys™ and so the need for training has been kept to an absolute minimum. Very few people need to interact with the system. The user interface for active instructor accounts is intuitive and can be used as a rule without any training whatsoever. The central evaluation coordinator needs a one-day orientation.

The experience gathered from over 100 evaluation cycles conducted with EvaSys™ software in almost 60 european organizations (as of August 2004) plays a decisive role in the development of EvaSys™. QM views, Web Designer, Metadata support, interfaces to course management systems – they all point to one conclusion: EvaSys™ provides a solid foundation for your evaluation needs. EvaSys™ is not only based on a modern, powerful architecture, it is also a future-proof system. For Electric Paper as provider, EvaSys™ is an important field of activity and one in which it believes by adding basic value it has an important advantage over its competition. This solid foundation guarantees the long-term development and support of the system. EvaSys™ has been internationally successful and will be launched by Scantron Corporation in the North America in 2005.