



Solveig Randhahn

Information Management in Higher Education Institutions

Training on Internal Quality Assurance Series | Module 4

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List of Abbreviations

AAA	Annual Academic Achievements
BA	Bachelor
BSC	Balanced Scorecard
CB	Course Book
CEUS	Computerbasiertes Entscheidungsunterstützungssystem für die Hochschulen in Bayern (computer-based management tool for the institutions of higher education in Bavaria, Germany)
CHE	Centre for Higher Education
EUNIS	European University Information Systems
HEI	Higher Education Institutions
IUCEA	Inter-University Council for East Africa University of Duisburg-Essen
MA	Master
MSRE	Federal Ministry of Science, Research and Economy
PDCA	Plan-Do-Check-Act or Plan-Do-Check-Adjust
PhD	Doctor of Philosophy
QA	Quality Assurance

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Preface

Introduction to the Module

Prerequisites for the Module

- Learners have a basic understanding and knowledge of different quality management approaches (e.g. process- and evaluation-based) in the higher education context (see course material Module 1),
- they are able to use the PDCA-cycle as a systematic approach to managing quality (see course material Modules 1 and 2),
- they have basic theoretical knowledge of the new public management approach and its challenges for higher education institutions (HEI) (see course material Module 1).

Intentions of the Module

Establishing systematic quality assurance structures at higher education institutions requires a wide range of decision-making processes by different stakeholders. To implement the deriving measures and activities effectively and efficiently and according to the quality objectives of the higher education institution, data and information and their appropriate circulation are necessary.

This module gives an introduction to the basic discussion about information management systems at higher education institutions. It analyses the question why universities collect data and discusses key characteristics of information management systems at universities. Based on this, the course book introduces the use of quantitative and qualitative indicators as a means of measuring and assessing objectives. It explains how to determine and operationalise indicators, how to critically reflect on them and how to use them in a responsible and appropriate way. It presents the Balanced Scorecard as a methodical management approach to deal with indicators at higher education institutions.

Furthermore, the course book gives an introduction on how to establish a data-based reporting system at higher education institutions. It deals with the objectives of different stakeholder groups and assesses how to consider these appropriately in a reporting system. It gives an insight on the key conditions to be considered when generating reports.

Finally, the course book presents various examples of how higher education institutions deal with information by establishing different (technical) structures and procedures of campus-wide data sharing and reporting. .



On successful completion of the module, you should be able to...

- deal with information that is relevant for planning and controlling with regard to quality development/assurance/management,
- develop internal data and information channels, considering the respective technical and structural framework of higher education institutions,
- define and operationalise quantitative and qualitative indicators at higher education institutions,
- recognise and consider opportunities and limitations of quantitative and qualitative indicators as measures for quality assurance of processes at higher education institutions,
- develop and manage reporting systems for different target groups based on a transparent set of internal/external criteria.

Chapter 1

Introduction to Information Management at Higher Education Institutions

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1.1	Why Should Higher Education Institutions Collect Data?	13
1.2	Characteristics of an Information Management System.....	16



On successful completion of this chapter, you should be able to...

- identify the reasons for higher education institutions to collect data,
- recognise and differentiate the linkages between information management and controlling processes such as planning, managing or monitoring,
- identify elementary characteristics of an information management system and to deduce systematic steps to deal with information at HEI (e.g. gathering and acquisition of information needs, processing and storage of information as well as communication channels of information).

1 Introduction to Information Management at Higher Education Institutions

1.1 Why Should Higher Education Institutions Collect Data?

Establishing systematic institutional quality assurance structures requires a broad variety of information that is fundamental to enable decision-making, communication and organisational processes between different stakeholders and the realisation of activities.

Information can be defined as purposeful data that is related to a problem and that is used to achieve an objective (Wittmann 1980). We can talk about knowledge when people start to put information into a meaningful context (Gladden 2003, 2).

Information as “purposeful knowledge” (Wittmann 1980)

Information is necessary for all organisational concerns and objectives of a HEI: for easing and optimising decision-making processes, for planning and developing realistic settings, for reporting and quality development, and with it enhancing the institutional efficiency and effectiveness (Saupe 1981). Higher education researcher J. Frederick Volkwein systemises these strategic and operative objectives into five fundamental concerns of higher education institutions (Volkwein 1999):

1. Expenses for higher education (shortage of financial funding)
2. Requiring an efficient management and increasing productivity at the same time
3. Effectiveness and surplus value of higher education institutions (competition and right to exist without the necessity to produce output with regard to contents)
4. Access to higher education institutions (increasing number of students as a justification for additional funding)
5. Reporting

These fundamental concerns go along with various, constantly changing while simultaneously increasing demands for information. The question is how higher education institutions can recognise, determine, proceed and, finally, cope with these information demands efficiently and effectively in the light of available staff, material and technical resources. For example, to determine the available capacities of your institution to establish another study programme, you have to consider and calculate the planned number of students, the number of lecturers who are available (in terms of working hours), as well as the resulting costs for staff and infrastructure.

In order to be able to deal with such information demands, higher education institutions have started to establish integrated data-based information systems. These are based upon existing economical approaches

for business strategies and management concepts. Using up-to-date data and information technologies at higher education institutions should contribute to effective and efficient processes in the higher education organisation.

Data create suitable information for decision-making processes

In this context, **data** can be defined as a set of qualitative and/or quantitative variables that become information by interpretation. Data are a result of measurements and can be visualised by using tables, graphs or images. Hence, data can be understood as an abstract concept from which information and then knowledge are derived (Boston University 2015; DWBI 2014; see also Module 2).

Methodical information management serves accountability and reporting purposes in the internal and external context of higher education. It creates performance and cost transparency and therefore provides a central contribution for quality assurance in research, teaching and supporting services: a well-established information system serves the formulation of institutional objectives and therefore the facilitation and optimisation of decision-making processes for a sustainable strategic planning in higher education (Saupe 1981; Küpper, Friedl, Hofmann, Hofmann & Pedell 2013).

“An information system can be understood as a coordinated arrangement of staff, organisational and technical elements that provides decision-makers with purposeful knowledge for their task fulfilment.”

(Eberhardt, 67 in Frese 1992)

Linkage between information management and managerial accounting

The key purposes of information management include a close linkage to managerial accounting processes at HEI.

As a primal task of managerial accounting, we can consider the overall coordination of the management system of a higher education institution:

“Management must deal with the dynamics of change and provide coordination for the overall system.”

(Kast & Rosenzweig 1974, 620 in Horváth 2011, 8)

According to Horváth the management system consists of five subsystems: planning, accounting, information supply, organisation and human resource management (Horváth 2011, 8; Küpper et al. 2013, 636). Concerning the information supply, managerial accounting has to coordinate and align the aforementioned subsystems with regard to the information needs of decision-makers. On the one hand, this includes the coordination within the information system – the collection of necessary data, its systematisation, storage and, finally, its allocation. On the other hand, this includes the transmission of data to the aforementioned subsystems of the management system by suitable reporting systems.

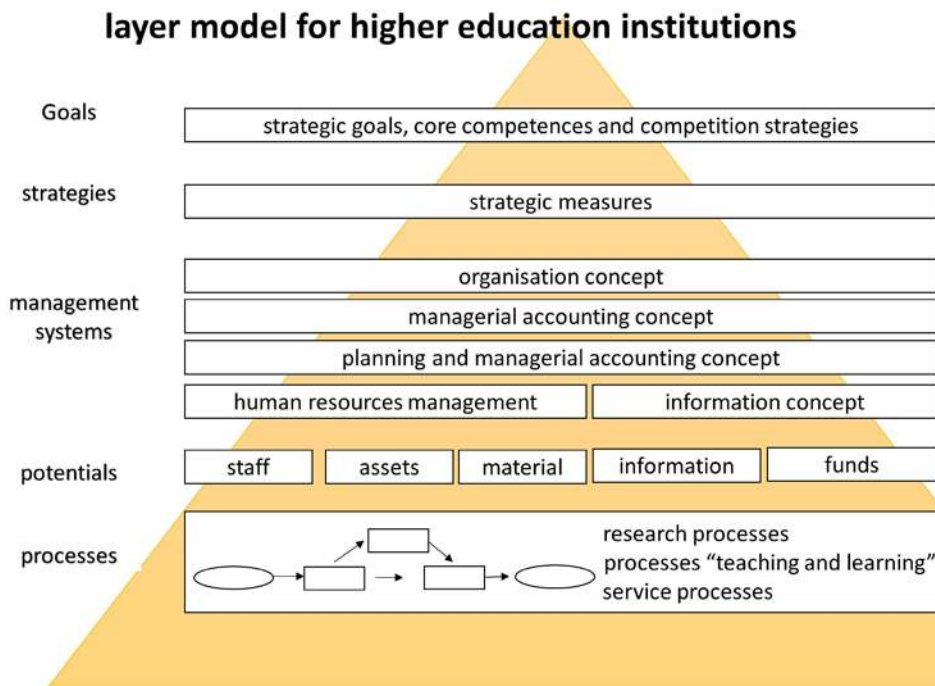


Figure 1 Layer model for higher education institutions (Tropp 2002, 2)

The design of information systems is oriented towards two reference levels. The vertical level refers to such levels at higher education institutions, where decisions are made and tasks are carried out, i.e. the top management, faculties, institutes and chairs. The horizontal level refers to the core processes of higher education, i.e. research, teaching and services. These include various information needs that go along with different requirements regarding the way of systematisation and allocation of information. Depending on the level of centralised and de-centralised decision-making processes between the top management, faculties, institutes and chairs, multi-dimensional information systems are needed (Küpper et al. 2013, 636).

The increasing complexity and diversity of information lead to very different scopes of performance of these information systems among higher education institutions. Core processes of the so called "student life cycle"¹, that are frequently managed through professional information technologies, are such as the following:

- application, assessment and admission processes
- student administration
- planning and management of lectures (university wide course schedule, general and individual course schemes, registration and deregistration of students from courses/exams)
- management of lecture hall booking
- examination management (e.g. exam registration and deregistration, transcript of records, recognition, archival storage of final examination)
- management of organisational data (building and lecture hall plans, e-mail and phone index)

¹ The student-life-cycle includes all relevant activities and fields for students, lecturers and administrators that have to be considered during the academic education process: e.g. application --> admission --> teaching and learning --> assessment --> graduation --> alumni.

Higher education institutions have started to integrate this widely ramified IT-landscape in complex data warehouse systems.



Definition of Data Warehouse

“A data warehouse is a copy of transaction data specifically structured for querying and reporting.”

Source: (Kimball 2002)

Coming back to the quality manager, we can ask which areas of such a complex data system are relevant to her/him. Focussing on teaching and learning, we can think of a professional data management of processes such as internal and external evaluations on faculty level or the higher education institution in general, tracers studies, or also staff development in teaching.



Further Reading

- Taylor, J. (2014). Informing or distracting? Guiding or driving? The use of performance indicators in higher education. In Menon, M., Terkla, D., Gibbs, P. (Ed.), *Using data to improve higher education. Research, policy and practice*. Rotterdam: Sense Publishers.
- Higher Education Funding Council for England (HEFCE) (2011). *Performance indicators in higher education. First report of the performance indicators steering group (PISG)*. London: HEFCE.
- Balasubramanian, K. (2009). *ICTs for higher education. Background paper from the commonwealth of learning*. Paris: UNESCO; World Conference on Higher Education; Commonwealth of Learning.

1.2 Characteristics of an Information Management System

Why should quality managers care about information management? – Basically, quality managers have a consultative function with regard to different decision-making processes at higher education institutions, be it on management level, on organisational/administration level or on faculty level. Therefore, they need to be able to gather information requirements correctly and analyse and evaluate the collected data and information accurately.

Examples of targets in an information management system, for which quality managers can play a key supporting role can be the following:

- Define and estimate information needs required for certain decision-making processes.
- Prepare understandable and interpretable data for the respective target groups and avoid contradictions.
- Interface function with regard to information distribution, in order to help to close communication and information gaps among senders and addressees. That means, they can explain and clarify which information is available for which issues, or who needs which part of the existing data and information.
- Support for reading, analysing and interpreting data material, considering the respective particular context.
- Contribute to developing more transparency about how the information flows of a higher education institution work according to defined quality criteria.

In some higher education institutions these targets can be closely related to managerial accounting.² To avoid overlapping activities but achieve an effective target allocation, you should define and coordinate the respective responsibilities between a quality manager and a unit for managerial accounting clearly.

Taking this into consideration, the whole field of information management contains enough questions to be discussed in a proper training course. This is why in this course book we have to limit our focus on some particular aspects. In short, we will focus on the linkages between information and quality management and the role of quality managers.

The course book gives an introduction to management relevant data and information which a higher education institution needs for improving, assuring and managing quality in the core processes of teaching and learning, research and services. Therefore, it gives an overview on the key characteristics of information management systems and discusses the criteria that are necessary to develop a systematic collection, analysis and interpretation of data and information according to the needs and requirements of specific target groups.³

Based on this, you get to know the most important essentials to assess and judge in how far strategic and operative objectives of quality assurance have been reached. You will learn about the challenges of defining quantitative and qualitative (key performance) indicators ([Chapter 2.1](#)), how to collect and analyse them ([Chapter 2.2](#)), as well as how to deal with resistance against data and information and to achieve acceptance ([Chapter 2.3](#) and [2.4](#)).

According to Horváth a methodical information management system can be structured into the three following phases (Hórvath 2011, 308 et seq.)

- I. Identifying information needs and gathering raw material at HEI
- II. Data collection, processing and analysis
- III. Data dissemination (workflows between disseminator and receiver)

² For further information on managerial accounting and the relation to information analysis see Demski (198, 2008).

³ More information on this issue can be found in CB 2 as well.

I. Identifying information requirements and gathering raw material at Higher Education Institutions

To be able to gather, classify, process and report data and information in an information system, first of all you have to find out about the respective information requirements. Decision-makers at higher education institutions have different information needs according to their respective strategic objectives and targets (see Table 1). These information needs have to be defined clearly and unambiguously to be able to deduce systematic and effective data collection and distribution.

Information requirements can be defined as “the type, amount and quality of information which a decision-maker needs to fulfil her/his targets”⁴ (Koreimann 1976, 6; Gladen 2003, 4).

Objective and subjective information requirements

We can differ between objective and subjective information needs. Objective information requirements refer to the amount of information which is set in a factual context to solve a problem. Subjective needs are the information which a decision-maker considers to be relevant for her/his targets (Küpper 2013, 218).

Based on this, a concrete information demand generally includes both subjective and objective information requirements. Very often decision-makers are not sufficiently aware of their subjective information needs or cannot formulate them appropriately. It may also happen that they even want to hide their real information requirements (Nusselein 2002, 3).

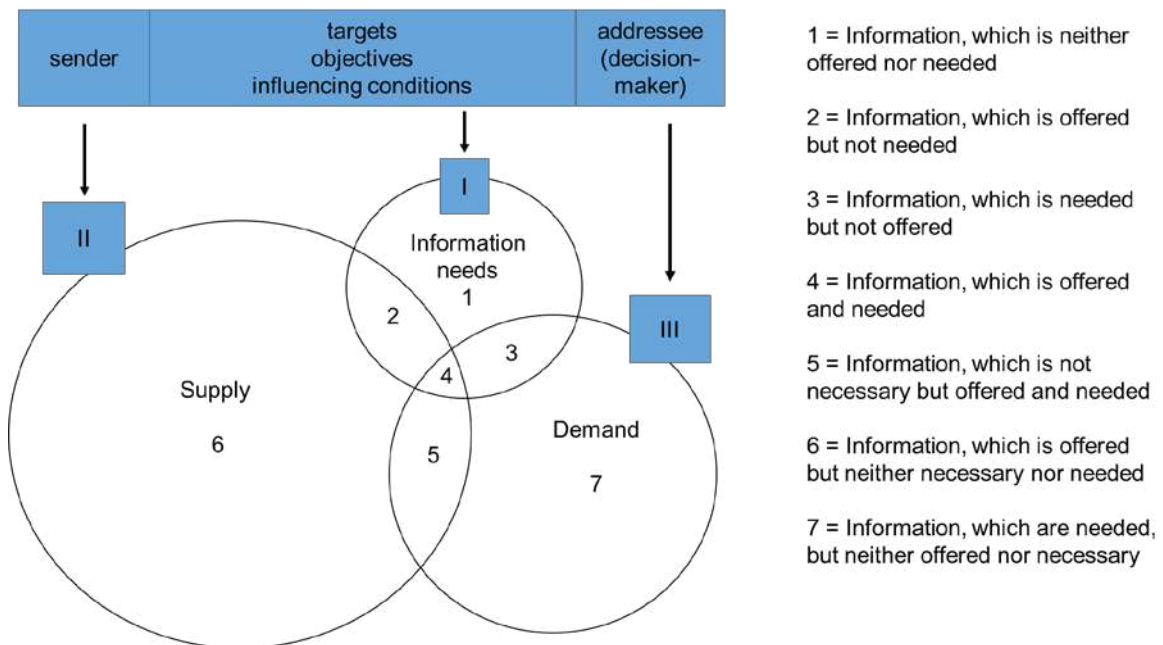


Figure 2 Gathering information based on needs, supply and demand (translated based on Picot & Frank 1988, 608 in Hórvath 2011, 311)

⁴ Own translation from German into English.

The following table illustrates possible information needs of different stakeholders, referring to structural conditions, resources or processes in teaching and learning which can come up when establishing quality assurance structures at an higher education institution.

Subject-matter	Examples for information sources	Examples for information requirements
Structural frame of research and teaching	<ul style="list-style-type: none"> ■ (National) law on higher education ■ Strategic plans of a HEI ■ Strategic plans of faculties ■ HEI constitution and regulations ■ Examination regulations ■ Regulations for doctoral degrees and habilitation 	<ul style="list-style-type: none"> ■ Is there a regulatory obligation to establish a QA-unit? If so, which requirements have to be fulfilled? ■ Which objectives shall be achieved with the QA-unit? (E.g. annual evaluation of study programmes; establishment and coordination of quality cycles in teaching and learning) ■ Which information has to be documented in an examination regulation to comply with internal/external quality standards?
Resources of a HEI (staff, facilities)	<ul style="list-style-type: none"> ■ Data on available resources and cash flows ■ Staffing per professor ■ Third-party funds per professor ■ Overview on available staff and resources at faculties 	<ul style="list-style-type: none"> ■ Who provides which amount of financial resources for the set-up of a QA-unit and for what period? For which purposes can these resources be used? (E.g. facilities, staff, IT) ■ What is the number of qualified staff available for the QA-unit, and for what period? ■ Which additional quality assurance activities can be realised based on third-party funds (e.g. additional lectures, tutorials, mentoring programmes)?
Process management of teaching and learning	<ul style="list-style-type: none"> ■ Input/output data of the process teaching and learning (aggregation on programme level) ■ Data on internationalisation ■ Quality of graduates ■ Detailed data on teaching and learning (e.g. course scheme, assessment, mentoring) ■ Capacities of professorship in teaching and learning 	<ul style="list-style-type: none"> ■ Which data is available on the number of applications per place in a programme, the number of students/graduates per programme, the drop-out ratio etc.? Is this data consistent with internal/external quality requirements? Which additional data might be necessary? ■ How many incoming and outgoing students are there on faculty/programme level? ■ Is there any information available on the graduates and their career paths? ■ Which interdisciplinary courses do we have? ■ Scope of regular courses offered per programme? Number of participants per lecture? ■ Number of professors per programme? Mentoring ratio per programme?

Table 1 Information sources and requirements from different stakeholders (adapted from Nusselein 2002)

According to the different subject-matters mentioned in the table, the priorities of the listed information requirements differ depending on the respective target group. Focussing on the strategic frame in research and teaching, for example, a vice-chancellor needs other information than a dean or a dean of students.

The former is especially interested in strategic planning of the whole higher education institution and considers information about strategic planning on faculty level. A dean of students however, is responsible for teaching and learning, focussing especially on examination and programme regulations. Yet for a dean, information on regulations of the doctorate or post-doctoral lecture qualifications might be more relevant.

Information that refers to the financial resources and cash flows are especially relevant for the chancellor (understood as head of administration) who is responsible for the budget of a higher education institution. However, the information requirements of the vice-chancellor or the senate might focus on data about staffing or third-party funds per professor which can be used as quantitative indicators for research performance. Among others, they need this information for professorial appointment procedures. A faculty needs more detailed indicators such as the available staffing or financial resources of the faculty.

Focussing on the process of teaching and learning, the top management is usually interested in input/output data on programme level (e.g. number of application, students, graduates, drop-out ratio per programme). Furthermore, data on internationalisation and the quality of the graduates is relevant in order to analyse and interpret the success of a study programme. Deans of students need information that differentiates in more detail between the whole study processes (e.g. data on the organisation of assessment, courses, and procedures of recognition). Finally, a chancellor needs data to be able to determine the required resources (capacities) in teaching and learning.

Quality managers should know all these different perspectives and the respective information requirements. Based on this, they can contribute to the distribution of information to those who effectively need them, but also support decision-making processes on different institutional levels.

Questions & Assignments

1. Please study the table and the mentioned examples of information requirements again. Looking at your own institution, which of these information requirements do the decision-makers prioritise and why?
2. Are there any additional information requirements with regard to quality improvement in teaching and learning at your higher education institution? For whom and why? Please give examples.

Determination of information requirements based on inductive and deductive procedures

How can quality managers find out about these different information needs without only raising assumptions or hypotheses? There are different ways of gathering information requirements, which can be separated into inductive and deductive procedures (Küpper 2001, 145). Inductive methods focus on the conditions of an organisation as the fundament for information requirements. Based on this, you particularly identify information supply as well as subjective information needs. Examples for methodological approaches are such as the analyses of organisational documents and data or an analysis of the organisation or a survey based on interviews or questionnaires. Deductive methods identify information in a systematic way: Based on the strategic objectives of an organisation, they try to find out about the objective information needs (Küpper et al. 2013, 222; Nusselein 2002, 3).

To gain a more comprehensive picture of the information needs – that is both objective and subjective information needs – it is recommended to combine both the inductive and deductive approach. The following procedure of an analysis of information needs may serve as an example:

Integrated concept of an information needs analysis

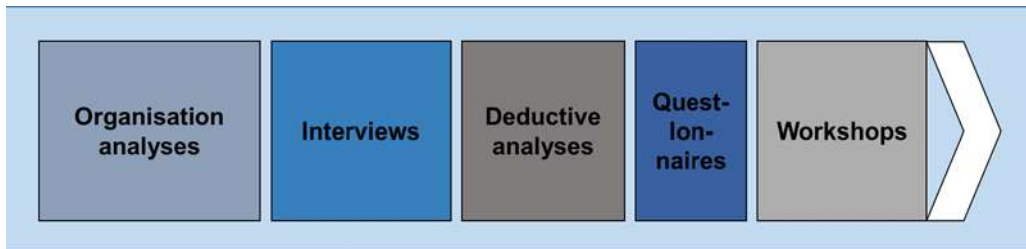


Figure 3 Based on the project “Computer-based management tool for the institutions of higher education in Bavaria” (CEUS) (Nusselein 2002, 4)

Description of Figure 3:

The organisation analysis focuses on the respective units of an organisation und determines targets and decision-making competences of the respective decision-makers (in the case of higher education institutions such as (vice) chancellor, higher education board, senate, chancellor, dean, dean of students).⁵

The results of the organisational analyses are the basis for the subsequent interviews with the above-mentioned decision-makers. The interviews have two purposes in particular: First, they complete the objective target profile by adding subjectively considered targets (see above, No. 1); second, they give information about the subjectively considered information requirements for the defined set of targets.

The deductive analysis gathers objective information requirements and with it completes the subjective information needs gained by the interviews.

Following this, the results are tested with another survey by the above-mentioned decision-makers. Based on a questionnaire, they shall evaluate and narrow down the information requirements according to priorities (Küpper 1997, 133). In the project CEUS, the outline of the questionnaire was based on the aforementioned subject-matters: a) structural conditions, b) resources, c) process planning in teaching and learning, d) process planning in research (Nusselein 2002, 5).

In a concluding workshop the survey results are discussed with the decision-makers again. If necessary, further adaptations of the information needs are to be effected.⁶

⁵ The types of decision-makers may differ depending on the organisational structure and have to be adapted accordingly.

⁶ In the CEUS project this method of gathering information needs was realised at several higher education institutions. Based on this it was possible to achieve a sufficient and comparable data basis.

The described way of gathering information requirements exemplifies the procedure at various higher education institutions in Germany. It is important to keep in mind that due to different structural conditions in different countries and institutions, the described method to analyse information requirements has to be adjusted, depending on the internal and external particularities of a higher education institution.

Depending on the purposes of the information is to be used, the collection of data has to be more aggregated or more detailed. Considering the above-mentioned examples of information requirements of a (vice) chancellor, a chancellor or representatives from faculties, it can be concluded that the detail-level of the provided information increases with a decreasing hierarchy level. Vice versa, the aggregation level of information increases from the lowest to the top hierarchy level. In order to provide comparable data and information on all levels, the aggregation of information should always refer to a common and standardised data-basis (Eberhardt 2003, 73).

Furthermore, it can be concluded that in general it is not possible to cover all information needs. Establishing and developing a structured information system at higher education institutions can help to close or at least to reduce these gaps. Therefore, one of the key challenges is not knowing exactly which units of a higher education institution provide promising information sources and how to connect and use these information sources for the whole institution. Sometimes that is because the respective involved parties do not wish such “connections”. Sometimes, collecting specific information needs is just not possible, be it because of a lack of time, be it due to technical restraints, or because there is not enough staff for the processing.

Considering this, a controller who is responsible for gathering information, first of all has to answer the following questions:

- Does my institution provide the information needed?
- Which possibilities to gather information the institution does not yet provide exist?
- How much time and effort does it take to provide this information and who can do it?
- Which quality criteria can be guaranteed for the information to be needed with regard to being complete, timely, comparable etc. (see Table 2)

Questions & Assignments

1. How do you proceed when gathering information at your institution? Who is responsible for this task?
2. How far does the provided information meet the needs of the target groups?
3. Which challenges are you confronted with when collecting data at your institution?

II. Data collection, processing and analysis

Having collected the necessary data for the respective information needs, this data now has to be evaluated and analysed in a transparent and understandable way. Generally this is done by staff located at a unit for managerial accounting. But with regards to data analysis according to defined quality criteria (see Table 2), it is recommendable to involve the quality manager as well. Additionally, she/he can help to illustrate the technical data in such a way that the respective target group is able to read, understand and interpret it correctly.

The main task for quality managers who are responsible for the evaluation and analyses of data and information is to check which characteristics an ideal information should have to satisfy the desired information needs as much as possible (Hórvath 2011, 298 et seqq.). This process of evaluation and analyses includes various challenges.

A very common problem is, for example, that data is not current, but retrospective, that it is too detailed and extensive, or that it is inconsistent and contradictory. Based on these restrictions, the data does not give enough significant information on the respective requirements.

Working against these restrictions and achieving greater precision of the collected data with regard to the respective information needs, some criteria of success should be evaluated.

The following table shows examples of key criteria of success when evaluating and analysing data and information. It includes some important questions that should be answered when checking these criteria.

Criteria of success for data collection	Questions to be clarified	Phrase to memorise
Type of data	<ul style="list-style-type: none"> ■ Is it quantitative or qualitative data? ■ Which information does the data give? ■ Is the data significantly valuable? 	<p>The data is categorised clearly into quantitative or qualitative categories.</p> <p>The significance of the data is clear and can be named.</p>
Degree of compression	<ul style="list-style-type: none"> ■ Are there any duplications that can be reduced? ■ How to aggregate and summarise data? 	As much data as necessary, as little data as possible.
Timeliness of data	<ul style="list-style-type: none"> ■ Is the data up-to-date? ■ Is the period of data collection and the reporting period congruent to the respective issue of interest? 	<p>The period of data collection refers to the related issue of interest.</p> <p>The period of data collection matches the reporting period.</p>

Criteria of success for data collection	Questions to be clarified	Phrase to memorise
Layout	<ul style="list-style-type: none"> ■ Which layout is appropriate for the target group? (e.g. written report; table summary; graphic/visualised layout) ■ Does the layout transfer the needed information? ■ Does the layout include a systematic and readable outline? 	The layout is appropriate for the needs of the target group.
Problem-solving relevance	<ul style="list-style-type: none"> ■ Which information value does the data have for the target group? ■ Which indicator proves this value and who decides about this indicator? 	The collected data is valuable with regard to the issue of interest.
Priority and collection frequency	<ul style="list-style-type: none"> ■ When is the data needed and who/what decides about this timeframe? ■ What is the frequency of data collection and reporting? ■ Which consequences have to be considered with regard to the scope of data evaluation and analyses resulting from short-term or long-term information needs? ■ Is the period of data collection coordinated with the date of provision? ■ Which control mechanisms can be considered respective to the available time? ■ Is the collection frequency sufficient to achieve significant information from the data? 	<p>The period of data collection is coordinated with the date of provision.</p> <p>The frequency of data collection is sufficient to produce significant information.</p>
Purpose of use	<ul style="list-style-type: none"> ■ Is the data only used for one purpose or does it serve various purposes? ■ Does the purpose require a special form of data evaluation and analyses? 	Check if data can be used for different purposes.
Amount	<ul style="list-style-type: none"> ■ Which data is required to deliver the information needed from the respective target group and which not? ■ How detailed should data be to deliver certain information? 	<p>The level of detail and the amount of data matches the issues of interest and information needed from the target group.</p> <p>Based on filtering, comprehension and canalisation of data, you should produce significant and understandable information.</p>

Criteria of success for data collection	Questions to be clarified	Phrase to memorise
Accuracy	<ul style="list-style-type: none"> ■ What is the level of accuracy of the collected data? ■ Does the data deliver coherent and consistent information or does it include contradictory or differing possibilities of interpretation? If so, how far does this reduce the value of the gained information? 	Reduce contradictory forms of interpretation, but produce clear and unambiguous information from the data.
Reliability	<ul style="list-style-type: none"> ■ What is the data source? Is the data source reliable with regard to transparency, methodology and measurability? 	The collected data is obtained from a reliable data source.
Measurability / plausibility	<ul style="list-style-type: none"> ■ Which criteria have been defined to measure the data? ■ Are these criteria transparent and understandable? 	Define clear and understandable criteria of measurability.
Costs	<ul style="list-style-type: none"> ■ Which financial, staff or material costs result from collecting, analysing and reporting data? 	Clarify the costs for data collection, analyses and reporting.
Data-protection	<ul style="list-style-type: none"> ■ What are the procedures of documenting and saving data? ■ Which data protection rules have to be considered with regard to data access? 	Clarify regulations and procedures of documenting and saving data.
Communication processes	<ul style="list-style-type: none"> ■ Which communication flows are necessary for collecting, analysing and using data? ■ Who is involved in data collection and analyses? ■ Who has to be informed about the data collection and analyses and how? ■ Are these communication flows clear and transparent to all involved stakeholders, and to what extent are they put into practice? 	Coordinate and define communication channels to collect, analyse and use data.

Table 2 Criteria of success for data collection

Questions & Assignments

The senior management of your institution wants all faculties to hand in a report about the current success of their study programmes.

1. How do you report the success of study programmes at your institution?
2. Which information needs do you consider to be relevant in this regard?
3. Which criteria of success are important to be considered in the data collection process?

III. Distribution of information

After collecting and analysing the data the gained information is to be distributed to the respective addressees via reporting systems. The design of these reporting systems can vary depending on the type and the amount of information, as well as the target group and its objectives. In [Chapter 4](#) we will learn about the reporting-issue in more detail. Therefore, this chapter will only give an overview on the requirements of an information management system with regard to distribution.

The key element of distributing information is the relation between the sender of information and the addressee and the question of how to transfer the relevant information appropriately. This means, an information sender has to know to whom she/he has to deliver the information and in which form. At the same time, addressees of information should know how to read, understand and use the received information for the articulated needs (Hórvath 2011, 354 et seq.).

Such coordination is not easy to achieve in practice but includes various challenges. For example, producers of information often do not know sufficiently who the addressee of the collected data is and what the data is needed for. On the other hand, for information users it might be unclear which information can be provided, how to read and analyse collected data considering the respective context.

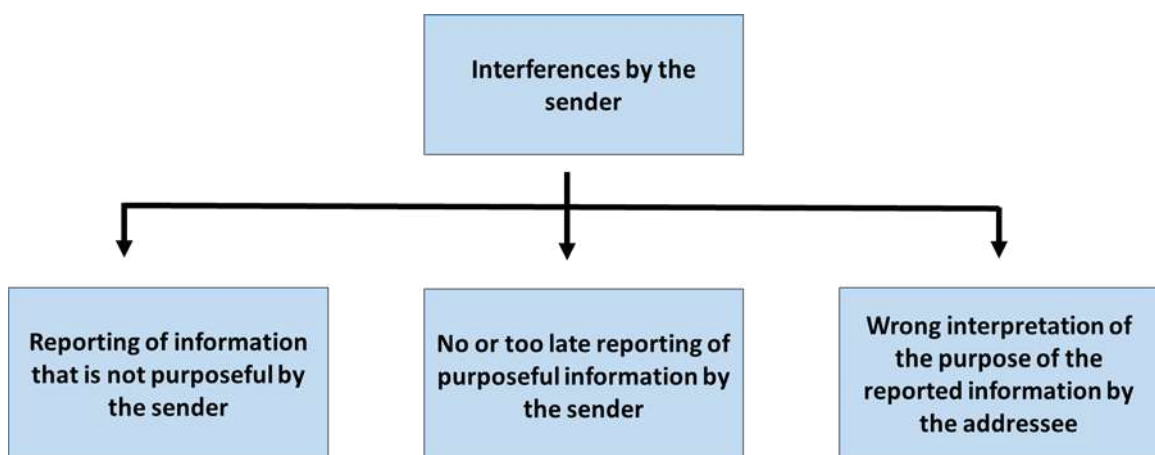


Figure 4 Types of interferences during the process of information distribution (adapted from Küpper et al. 2013, 241)

Dealing with these challenges, quality managers can play an important role by being a communication linkage between the different stakeholders and units of a higher education institution. They can reveal communication and information gaps between senders and addressees of information and reduce them by clarifying the content of the specific data in an understandable way for the target groups. In doing so they contribute to achieving more transparency and working information flows at higher education institutions.

Incidence Case: Students Newsletter

The result of a survey at the “African-University” was that the students feel insufficiently informed, be it with regard to organisational procedures and relevant deadlines of their studies or with regard to current developments in research. The vice-chancellor for academics asked the quality manager in charge to develop a newsletter. The purpose of this newsletter was to inform regularly (e.g. quarterly) about relevant organisational issues, deadlines and fixed dates, new services, or other issues that might be of interest. Since a newsletter is closely related to the targets of the department for public relations, the quality manager informed the department about this work task. In doing so, he also wanted to find out how far the public relations colleagues were able to support him with regard to developing and distributing the newsletter. After talking to each other, the quality manager decided to publish the newsletter both as a print version and as an online pdf-version on the university homepage to reach as many university members as possible. The public relations colleagues offered to care for the placement of the document on the website and to send a sufficient number of printed copies to each faculty and unit. Furthermore, the quality manager asked a colleague from the department of data and information management to create a mailing list. In the future, interested university members can subscribe to this mailing list and will receive the newsletter automatically.

Concerning the content design of the newsletter, the quality manager wants to proceed according to the following outline:

1. Did you already know about...?
 - Information about interesting events
 - Important dates and deadlines
 - Current research projects at the university
 - Miscellaneous
2. Library Services
3. ICT Services
4. Have you already read? – New publications from researchers of the university
5. Portrait of a university member (short interview with 5-6 questions)

The quality manager is very enthusiastic about his project action plan for the publication of the newsletter and already very excited about feedback from the students and the other university members.

Questions & Assignments

Your vice-chancellor of academics asks you to develop a newsletter for the lecturers at your university.

1. What might be interesting and relevant information for lecturers? How and by whom could you gather these information needs?
2. Which steps do you have to consider to design and distribute this newsletter?
Which challenges should be considered in this regard? Which criteria of success are important to be considered in the data collection process?

Further Reading

- Alter, S. (1996). *Information systems: A management perspective* (2nd edition). Menlo Park: Benjamin Cummings Pub. Co.

Chapter 2

Translation of Higher Education Objectives Into Numbers

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On successful completion of this chapter, you should be able to...

- differentiate key functions of using quantitative and qualitative indicators,
- determine and operationalise quantitative and qualitative indicators by determining central parameters such as the sample, the reference period or the numerical value,
- consider key conditions when using quantitative and qualitative indicators (e.g. trade-offs between relevant and non-relevant data, validity of data, sensitisation of the target group, expenditure in cost and time, data protection),
- deal with the concept of the academic balanced scorecard. Based on this, participants are able to translate HEI strategies into objectives and find suitable indicators to measure a performance level to be reached in a defined period.

2 Translation of Higher Education Objectives Into Numbers: Quantitative and Qualitative Indicators

2.1 Meaning and Function of Quantitative and Qualitative Indicators

In the previous chapters you have learned that the purposes of information systems are to

- support decision-making processes,
- achieve transparency on structural processes,
- increase efficiency and effectiveness of the processes at higher education institutions.

Indicators play an important role to reach these objectives. Their task is to summarise a quantitative measurable situation and to identify relevant facts and correlations in a simple and condensed form. (Küpper 2013, 476).

Focussing on higher education institutions means making any activities referring to decision-making, organisational or planning processes transparent. They give a quantitative overview about the status quo at a higher education institution. Indicators reduce complexity and aggregate information, which means that they inform as precisely and briefly as possible about performances. In doing so, they help to achieve an adequate information supply for higher education management: they allow analysing the status quo as well as to evaluating the outcomes of the specific courses of actions. From an internal perspective they are a fundamental basis of management and related decision-making processes. From an external perspective, higher education institutions can be measured, compared (e.g. rankings) and even managed (e.g. target agreements with the ministry) based on performance indicators. Based on this, indicators are also closely related to the quality assurance system of a higher education institution.

If indicators are used to describe performances or the success of defined objectives of a higher education institution, we often use the term “key performance indicators” or “performance indicators”. According to the Analytic Quality Glossary,

Performance Indicators

“Performance indicators are data, usually quantitative in form, that provide a measure of some aspect of an individual’s or organisation’s performance against which changes in performance or the performance of others can be compared.”

(Harvey 2004-14)

It should be considered, that although performance indicators have a relatively precise meaning, there is a tendency to use this term for any statistical data related to the activities of higher education institutions, whether or not it really refers to performance or success (Harvey 2004-14).

Considering this, quality managers should be able to understand meaning and function of (performance) indicators, use them correctly and explain them appropriately to the respective target groups.

According to Gladen (2003, 11) key functions of indicators can...

- describe complex and operational issues, structures and processes in a rather simple way,
- guaranty a comprising and quick overview,
- serve leadership for specific analyses,
- serve leadership for current planning, decision-making and managerial accounting,
- enable information release by aggregation and selection,
- describe critical factors of success and shortages in the management system.

2.2 Determination and Operationalisation of Quantitative and Qualitative Indicators

Indicators can be described with three key parameters:

1. The object/target, they are describing (what?).
2. The timeframe, which they refer to (date or period?).
3. A defined numerical value for quantification (how much?).

Quantitative
Indicators

Indicators can be differentiated into quantitative and qualitative indicators. Quantitative indicators describe issues and situations with a clearly defined number. Based on the reduction to the substantial significance, existing individual information is condensed to an observable and measurable matter of fact (Gladen 2003, 12).

Examples include available third-party funds of a faculty, number of students in a certain programme, number of PhD students per professor, available academic staff of a faculty, drop-out students ratios etc.

Qualitative
indicators

“Qualitative indicators are proxy parameters, whose character or varying value helps to conclude the character or varying value of another important parameter” (translated from Gladen 2003, 15). That means that they do not describe directly measurable variables, but they serve as a substitute which is easier to be measured. Based on this we can analyse performances that cannot be quantified or measured directly. For example, if a faculty or a chair wants to describe its research performance level, they consider various quantitative indicators such as number of publications, patents, successful doctorates or the amount of raised third-party funds. The sum of these indicators is supposed to help rating the research performance.

The problem of using qualitative indicators is that they only have a limited validity, because the cause-effect relationship between the original and the substituting indicator is only based on assumptions, but not

on exact descriptions. This means that cause-effect relationships can be biased or mono-causal and with it incomplete (Küpper 2013, 480).⁷ This can provoke contradictions with regard to the analysis and interpretation of the respective data, as is shown in the following example:

The senior management of a higher education institution wants to know which the most successful study programmes of their faculties are. Therefore, they define the quantitative indicator “number of achieved degrees”. Viewed in isolation, this indicator is definitely valid since it describes what it is meant to describe – the success of study programmes, which is mirrored in the respective number of degrees. Nevertheless, if not used adequately, this indicator can entail wrong incentives or undesired side-effects. For example, a target-setting based on this indicator could induce faculties to neglect existing criteria to pass final exams in order to be able to achieve as many successful degrees as possible.

The example shows that we have to be careful and must define indicators deliberately when using them for management purposes (also consider [Chapter 2.3.2](#) focussing on the Balanced Scorecard (BSC)).

If a successful study programme is not only defined by the number of graduates but also by fulfilling previously defined minimum requirements in teaching and learning, this means differentiating and concretising considered parameters in a more qualitative way. For example, to describe a successful study programme we can consider even more quantitative indicators that are summarised to a qualitative indicator (e.g. mentoring student’s ratio, drop-out student’s ratio, number of repetition of final exams or the average time needed to complete a degree).

Similarly, we can refer to successful research: The success of a scientific experiment depends on various influencing parameters, which a researcher often is not able to control. That means, we need indicators that are able to reduce information asymmetries in such a way that the addressee (e.g. the senior management) is able to conclude on the factual research activities of the researcher.

Therefore, data cannot only be analysed quantitatively, but their qualitative characteristics and possible resulting effects have to be considered as well.



Further Reading

Dealing with national teaching performance indicators – the following article gives an example from Australia:

- Barrie, S., & Ginns, P. (2007). The linking of national teaching performance indicators to improvements in teaching and learning in classrooms. *Quality in Higher Education*, 13(3), 205-286.

⁷ You find more information on how to deal with the issue “validity” in Module 2, Chapter 5.4.

Quality managers can play an important role in this context. They can uncover contradictions when using indicators, they can make transparent and understandable cause-effect relationships, and they can show decision-makers ways of dealing with them appropriately. To do so, quality managers should know and be able to deal with the key requirements of indicators. Therefore, the following chapter gives an introduction.

2.3 Using Indicators – Key Aspects to Be Considered

This chapter describes key requirements to be considered to define valuable indicators. Furthermore, we will get to know the Balanced Scorecard as an example of an instrument to use and deal with indicators. The chapter ties in with the discussion about the methodological realisation of surveys in Module 2.

2.3.1 Requirements to Define Indicators

The following factors should be considered when aiming at defining precise indicators (Hórvath 2011, 542 et seq.; Tropp 2002, 57 et seqq.)

1. Each indicator needs a concrete purpose

- To be significant an indicator needs a concrete purpose and one or several (but not arbitrary selected) addressees.
- To be able to use indicators for several purposes, they have to be defined and differentiated exactly.
- Data collection, that is necessary to define an indicator, has to be related appropriately to the purpose of the indicator.
- Formal requirements (e.g. law/political requirements), which are relevant for defining an indicator, have to be considered.
- *Key questions to be answered:*
 - What is the significance of the indicator?
 - Which numerical value translates this significance?
 - Which information does this numerical value take into account and which not?
 - Which formal requirements have to be considered?

2. Validity of data: No quantitative data without additional qualitative information

- Indicators have to be controlled with regard to their validity to avoid wrong incentives or unexpected/undesirable side-effects (see example on successful degrees).
- *Key questions to be answered:*
 - What are the continual data sources and who collects them to define an indicator?
 - What are suitable reference values (benchmarks) to control the validity of an indicator?

3. Trade-off between relevant and non-relevant data and information

- Provided high-quality validity, the scope of data to define indicators should be reduced as much as possible. An overloaded level of detail can even hinder strategic management.
- Reduction of data collection that is not relevant for the definition of indicators and with it avoid “data graveyards”.

■ *Key questions to be answered:*

- Which data is necessary to define a certain indicator and which is not?
- Are there any irrelevant data that keep being considered unnecessarily?

4. Considering feedback

- The numerical data should be aligned to the reality of the affected stakeholders and evaluated with regard to contradictions.
- At the same time, the affected stakeholders can be provided with the evaluated and analysed data to be considered for further actions and developments.

■ *Key questions to be answered:*

- Does the collected data reflect reality?
- Are there any constraints?
- Do the selected indicators provide any additional benefits for improvement and enhancement?

5. No isolated measurements

- When collecting, analysing and documenting data, it should not be done in isolation but comparable parameters should be considered (e.g. description of absolute, relative and accumulated numbers).
- Data to be used to define indicators should be collected continuously over a longer period instead of only once and in isolation. By considering a longer period the significance of indicators increases and it facilitates a more exact judgement of average performance levels.

■ *Key questions to be answered:*

- What is the date of reference and the period of reference for the defined indicator?
- In which interval should the indicators be looked at?

6. Expenditure in cost and time

- Collecting, analysing and publishing data and information requires financial, staff and also material resources which have to be calculated in time.
- Time needed to gather information is to be calculated in time and to be coordinated with possible deadlines which have to be considered.

■ *Key questions to be answered:*

- Which expenditures on resources (staff, finances, IT-system, material) have to be considered?
- What is the timeframe to submit the required data and information?
- What is the cost/benefit-ratio with regard to expenditure of resources and time and the additional benefit of the provided information?

7. Data protection

- The collected and analysed data are treated responsibly and according to given data protection guidelines.

■ *Key questions to be answered:*

- Do data and information comply with the respective data protection guidelines in force?
- What has to be done to meet personal data protection rights and to avoid misuse?

8. Sensitisation of the target group to use edited data reports

- Informing the group of addressees about how to interpret indicators and what to use them for.

- *Key questions to be answered:*

- Is the information of the indicator transparent to the group of addressees?
- Which information does the group of addressees need to be able to use the indicators appropriately?

 **Questions & Assignments**

1. Which particular conditions does your institution have to consider when dealing with data and information? Which challenges do such conditions come with?

 **Further Reading**

- Chalmers, D. (2008). *Teaching and learning quality indicators in Australian universities. Outcomes of higher education: Quality relevance and impact*. Paris: Programme on Institutional Management in Higher Education.

2.3.2 The Balanced-Scorecard – An Instrument to Monitor Indicators

Indicators that are defined understandably and comprehensively can contribute to reduce information asymmetries between different target groups. They specify the respective defined objectives and thus facilitate the coordination of necessary processes to reach these objectives (Küpper 2013, 500). This can be carried out either vertically across the different hierarchical levels of a higher education institution, aiming at managing its multiple units (e.g. with target performance agreements), or horizontally to manage different domains based on defined targets for these domains (e.g. orientation of study programmes on international students).

Indicator system One example of an instrument to monitor indicators at higher education institution are indicator systems. An indicator system is

“an arrangement of indicators in a systematic way, which means that the individual indicators are linked in a meaningful way, that they complement each other, and that they are aligned to an overriding common objective.”

(translated from Tropp 2002, 3 et seq.)

Besides indicator systems, another strategic management instrument is the Balanced Scorecard, which is increasing in popularity at higher education institutions.

A BSC facilitates the link between strategic planning and operational processes to render performance assessment. Other than indicator systems, a BSC is not based on a predefined set of indicators, but enables a more precise choice of indicators for the respective objectives which are to be operationalised. Therefore, a BSC is very useful in monitoring complexities and organisational particularities of a higher education institution, such as unclear technologies of performance assessment, ambiguous and complex target structures, differing memberships, staff expertise, hierarchies or organisation based on knowledge (Scheytt 2007).

A BSC can contribute significantly to achieve more transparency and clarity about the strategic objectives of a higher education institution. Based on this, suitable organisational processes can be developed in order to reach these defined objectives can be developed (Röbken 2003, 4).

The term “balanced” signifies that the perspectives that are relevant to realise a strategy are equally weighted in the scorecard (Kaplan/Norten, in Röbken 2003). According to Kaplan and Norten, typical perspectives to be considered in a BSC are the following four⁸:

1. customer
2. learning and growth (human resources and organisational development)
3. financial
4. internal processes

Considering these perspectives, we can define indicators for the strategic objectives and determine target values that help to measure how far these objectives have been reached.

Due to the balanced consideration of the mentioned perspectives, the BSC-approach tries to cope with the challenging task of comprising differing contexts and influencing factors of subject-matters and of analysing and interpreting outcome-linkages more transparently and clearly (Scheytt 2007).

According to Kaplan and Norton (1996) the implementation of a Balanced Scorecard can be based on five key steps (Scheytt 2007):

1. Definition of the different perspectives which are of fundamental importance to the higher education institution. These can differ from the above mentioned economical BSC model.
2. Deduction of objectives, which are particularly important to follow the strategic plan (operationalisation of objectives).
3. Definition of indicators, which inform about content, extent and time frame to reach the objectives and thus help to manage the organisational processes of performance assessment.

A BSC translates the vision and the strategy of a higher education institution into coherent objectives and indicators

⁸ These perspectives can be adapted to the respective needs of an institution.

4. Definition of target values based on influencing parameters to be reached in a certain period (e.g. one year).
5. Definition of initiatives/activities to be realised in order to reach the objectives during a defined period.

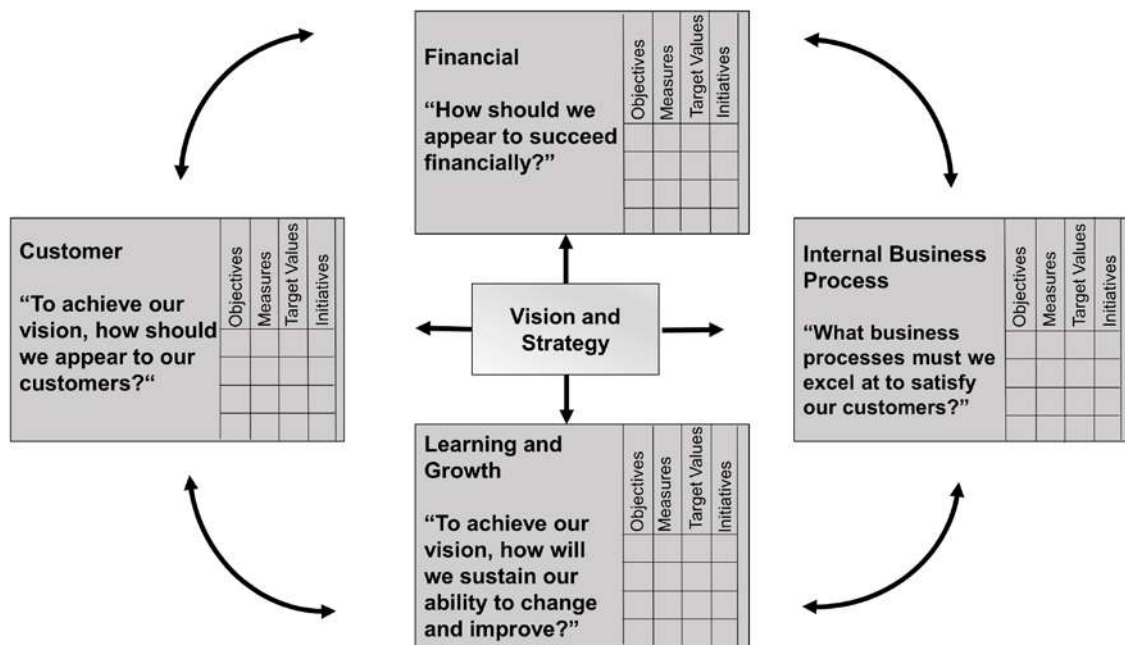


Figure 5 System of a Balanced Scorecard (adapted from Scheytt 2007)

The managed processing, as it is described in the illustration, is the particular characteristic of the BSC, also to be distinguished from other concepts of performance management such as indicator systems. Such process orientation facilitates the discussion about target-performance comparisons: On the one hand, the current status is defined by analysing the questions "who does what, when, where and how?" On the other hand, target values and the question who has to be involved and which information is to be needed from whom and till when (Scheytt 2007)

Deducing indicators for the total "objective hierarchy" of a higher education institution aims at guaranteeing congruence between the different objectives and at coordinating strategic planning with the organisational processes of daily performance assessment. Based on this, the BSC can support communication processes between the different departments and staff by developing a framework that enables a continuous process of self-evaluation and organisational learning (Röbken 2003, 4). This includes aiming continuously at quality enhancement and with it establishing and systemising internal quality assurance structures.



Further Reading

- Kaplan, R. S. (2011). Strategic performance measurement and management in Nonprofit Organizations. *Nonprofit Management & Leadership*, 11(3), 353–370.
- Kaplan, R. S., & Norton, D. P. (1993). Putting the balanced scorecard to work. *Harvard Business Review*, 71(5), 134-147.
- Kaplan, R. S., & Norton, D. P. (1996). Using the balanced scorecard as a strategic management system. *Harvard Business Review*, 74(1), 75-85.

2.4 Challenges of Using Quantitative and Qualitative Indicators

While companies generally have one big strategic target to be achieved by all employees, at higher education institutions we can find different loosely coupled target systems, which are not relevant for all members of the institution but only for partial groups. The different faculties, the senior management, as well as the administration of a higher education institution can have rather differing, sometimes even conflicting targets with different priorities. For example, a professor who is doing research might be particularly interested in gaining sufficient third-party funds to be able to do research. At the same time, for the senior management third-party funds offer a possibility to balance budget deficits. Furthermore, they strengthen external institutional profiling. Meanwhile, a lecturer might be especially interested in adequate resources to be able to facilitate good teaching and learning conditions. The latter is also a key concern of the students who want to complete their studies successfully.

According to this, another challenge to deal with is the formulation of objectives. What level of clarity and precision do objectives need in order to be measurable? And which ample scope can they have to enable a broad flexibility with regard to their design and implementation according to the academic freedom in research and teaching.

Based on this, another obstacle when defining and using indicators is that they cannot be defined for several objectives at the same time, but only for one concrete objective. Due to this single-sided focus, it may occur that causalities between different objectives are not considered and with it entail contradictory or even wrong interpretations for taking further actions. Using a BSC, requires considering such causalities when combining different indicators for an objective.

The problem of contradictory conclusions can also be a consequence of different understandings about indicators and their assumed priority levels. The following metaphorical comparison could help to illustrate this problem: when talking about apples, we can assume that one person considers an apple to be big, sour and

green, meanwhile another thinks about small, crisp and red apples. Translating this to the higher education context means, for example, that “good teaching” at the faculty of mathematics can be characterised differently than at the faculty of social sciences⁹. Also, international publications to be used as an indicator of research quality can be rather important in one faculty, while in another they are not as relevant.

These differing understandings have to be considered and clarified when defining indicators. Only then, are we able to achieve a common basis for their analysis and interpretation and can therefore avoid the apple comparison becoming a comparison of apples and pears.

Another preceding challenge is that higher education institutions need an overarching strategy as a basis to define and use indicators. What we can observe is that strategies only exist on paper, but they do not play a role with regard to operationalising processes and activities. If higher education institutions want to deal with indicators, strategic planning is an obligatory requirement – it is the strategy that is translated into concrete operationalised targets (e.g. based on a BSC) that are measured based on appropriate indicators. That means, the essential prerequisite for introducing a Balanced Scorecard is a higher education institution determining its strategic orientation, documenting it and making it transparent among the whole organisation, for example by developing strategic plans on institutional or faculty level.

Furthermore, when using indicators different comparison dimensions have to be considered: for example, for internal purposes indicators are often used to compare data in a historical timeframe. That means, they monitor certain developments during a given period of time and serve as a basis for future performance levels to be achieved, and which are negotiated, e.g. via target-performance agreements (Röbken 2003). For external purposes, indicators can support the comparison of higher education institutions (or a faculty, a unit etc.) in terms of rankings or benchmarking.

Focussing on the validity of indicators another challenge is that very often they cannot be controlled comparably, which lead to further differing interpretation frameworks. For example, higher education institutions can hardly influence input-parameters because they cannot influence the provision of resources. This changes when we look at process-parameters: to ensure and enhance the quality of teaching and learning, we should not only consider the provided resources, but focus on aspects such as curriculum design, didactics, programme and assessment management, planning student infrastructure, evaluation of chairs or other teaching units.

The mentioned challenges indicate that dealing with indicators involves a high workload and expenditure of time. The more complicated the methods and techniques for the data compilation, the more risk of an incomplete and nonpermanent data-collection, and with it indicators that are neither relevant nor significant. Considering this, we also have to question the intended benefits compared to the introduced costs. To countervail this problem, it is important to reflect which data-collection methods and which data is already available to describe higher education processes, which additional information might be useful and to what extent extensions or adaptations of the existing data-system might be possible and useful.

⁹ For further explanations on how to operationalise the quality of “good teaching” please consider Module 2, Chapter 5.2.

Furthermore, high workload with regard to collecting data and the following documentation and communication flows can result in opposing and negative attitudes among staff. To reduce such oppositions, it is very important to explain and communicate the additional benefit and the purpose of the introduction of an instrument like the BSC or other indicator systems for a higher education institution.

The described challenges bring out the narrow limits of using a BSC and indicators as a means to improve processes and activities that serve to achieve certain objectives. We have to keep these limits in mind and should not underestimate them, since it might become even more problematic and complicated, when contradictions are not clarified, but continuously proceeded. In this case, the expected benefit of working with indicators as an instrument to systematise and manage processes would be not be realised.

Considering this, when operationalising indicators we continuously have to check which indicator can provide which contribution and how relevant this contribution is with regard to achieving the intended strategic objective.

Coming back to quality assurance processes at higher education institutions, quality managers play an important role in dealing with the above-mentioned challenges. They can help to define appropriate indicators for the key processes, teaching and research. Furthermore, they should reveal both opportunities and also limits of using indicators and make them transparent to the respective target groups. Based on this, they can facilitate a coordinated and adequate information fundament for decision-making processes.

Challenges when dealing with (performance) indicators	Example
<ul style="list-style-type: none"> At HEI there are different stakeholders with multiple, sometimes contradictory objectives. 	<ul style="list-style-type: none"> Top management: get third-party funds for reasons of competition and compensation of budget deficits. Professor: gets third-party funds to do more research.
<ul style="list-style-type: none"> An indicator cannot represent multiple objectives but only one defined objective. 	<ul style="list-style-type: none"> The indicator “third-party funds” of a faculty refers to the allocation of third-party funds at a faculty. It does not refer to research quality.
<ul style="list-style-type: none"> A defined strategy is a prerequisite to use a balanced-scorecard. 	<ul style="list-style-type: none"> HEI strategy: to increase the internationalisation of teaching and learning. Indicators: <ul style="list-style-type: none"> Number of international study programmes Number of international collaborative research projects
<ul style="list-style-type: none"> The comparability of indicators may differ (e.g. depending on their longitudinal or inter-organisational use) 	<ul style="list-style-type: none"> Longitudinal use: compare data with regard to the development of study programmes over a certain period. Inter-organisational use: compare two faculties with regard to the number of graduates.

Challenges when dealing with (performance) indicators	Example
<ul style="list-style-type: none"> ■ The influence on the validity of indicators may differ (e.g. input vs. process indicators) 	<ul style="list-style-type: none"> ■ Indicators for the quality of teaching and learning: ■ Input indicators: resource allocation that is determined by external stakeholders (e.g. ministry). HEI can hardly influence the amount of resource allocation. ■ Process indicators: curriculum design, didactics, management of assessment/student infrastructure, evaluation etc. HEI can influence the quality of these indicators.
<ul style="list-style-type: none"> ■ The relation between expenditure of time when collecting data for the indicators and the effects should be balanced. 	<ul style="list-style-type: none"> ■ Which additional information do we expect from students' drop-out-rates? Do we get more information than what we already know? Is this information worth investing time on respective data collection?
<ul style="list-style-type: none"> ■ Which information/data already exist and which additional information/data should/could be added or adjusted? 	<ul style="list-style-type: none"> ■ Both, administration and faculty collect data about students who go abroad during their studies. It should be checked in how far these numbers are coherent to each other and/or can be matched.
<ul style="list-style-type: none"> ■ Which notions of resistance among staff have to be considered? 	<ul style="list-style-type: none"> ■ Staff resistance due to overlapping responsibilities

Table 3 Challenges of (performance) indicators

Chapter 3

Reporting: Presentation and Communication of Data and Information

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On successful completion of this chapter, you should be able to...

- transfer collected data into a coherent and transparent reporting system,
- define reporting objectives for different target groups (e.g. (internal) accountability, strategic decision-making, quality assurance),
- set up a report step-by-step, considering aspects such as target groups, a fundamental plan/actual data analysis, and an appropriate composition of valid and relevant information,
- support the development of a report system at your institution. You will be able to determine responsibilities and functions, define workflows, deadlines and reporting frequencies, as well as an appropriate format of reporting.

3 Reporting: Presentation and Communication of Data and Information

3.1 Definition of Reporting Objectives for Different Target Groups

According to Blohm, a reporting system includes all units, regulations and activities of a higher education institution which support collecting, analysing and communicating information for internal and external use (Blohm in Grochla 1980, 316). Based on this, the distribution and exchange of information is carried out by reports which “include summarised information that refer to an overriding aim and an information purpose” (translated from Blohm 1974, 15).

Distribution
of information
based on
reporting

Therefore, reports play an important role with regard to quality assurance and enhancement at higher education institutions. They help to document evaluated status quos and to describe opportunities and threats on the way to achieve expected performance levels. Furthermore, they serve accountability purposes on achieved outputs-status in the core fields of teaching and learning, research or services by providing a fundamental basis for decision-making processes.

Quality managers can be assigned with developing such reports or supporting other staff members during a reporting process. This is why they should have a basic understanding about the objectives of reporting to the different target groups. Based on this, they should be able to design an adequate report step by step (e.g. coordinating responsibilities, workflows, deadlines, reporting frequencies or formats).

In the following, you will get to know different types of reporting that can be used for different purposes and target groups. Basically, we can differentiate three different types of reporting: standard reports, reports on demand and deviation reports (Hórvath 2011, 535; Horváth 2008, 21 et seq.; Küpper et al. 2013, 231 et seq.; Göpfert 2007, 3 et seq).

Standard reports are published in regularly fixed periods. They are standardised in form and content, based on a defined set of information needs (e.g. standardised teaching reports, report for the top management/ministry, evaluation report). Generally, in this case the addressee has to identify and select the information that is relevant to her/him from the report on her/his own. One problematic aspect of such standard reports is the question of their significance with regard to an overarching purpose. Due to the standardisation it can occur, that certain information needs of an addressee are not reported correctly. Or, depending on which information addressees select from the report, they can interpret wrong or unclear correlations.

Considering these problems, reports on demand are gaining relevance and can substitute standard reports with regard to certain purposes. Reports on demand are not based on standardised data, but are designed

for specific information demands of the addressees. They do not have a pre-fixed rhythm of being generated. Based on a database that includes all relevant data for higher education management, the addressees can generate the individual information needed on their own with direct access. Therefore, the addressees take on a more active role, only selecting such information that is relevant to them (e.g. information to be considered in a self-report of a self-evaluation in teaching and learning/research). Using such reports requires the addressees to know how to use the database in order to be able to generate such information requests.

The third type, deviation reports, serves to focus on plan-actual-deviations of management issues that exceed or fall below certain defined tolerance values. Such reports are only used when normal processes are interrupted by conspicuous deviations or disturbances to reach the expected outcomes (e.g. non-predictable fall in students' enrolment). The content and format of these reports are not standardised normally. The addressees can, for example, be deans of faculties, a controller or the top management.

3.2 Content of Reporting

Designing reports

How can higher education institutions design and use reports adequately with regard to their purposes and with justifiable workload?

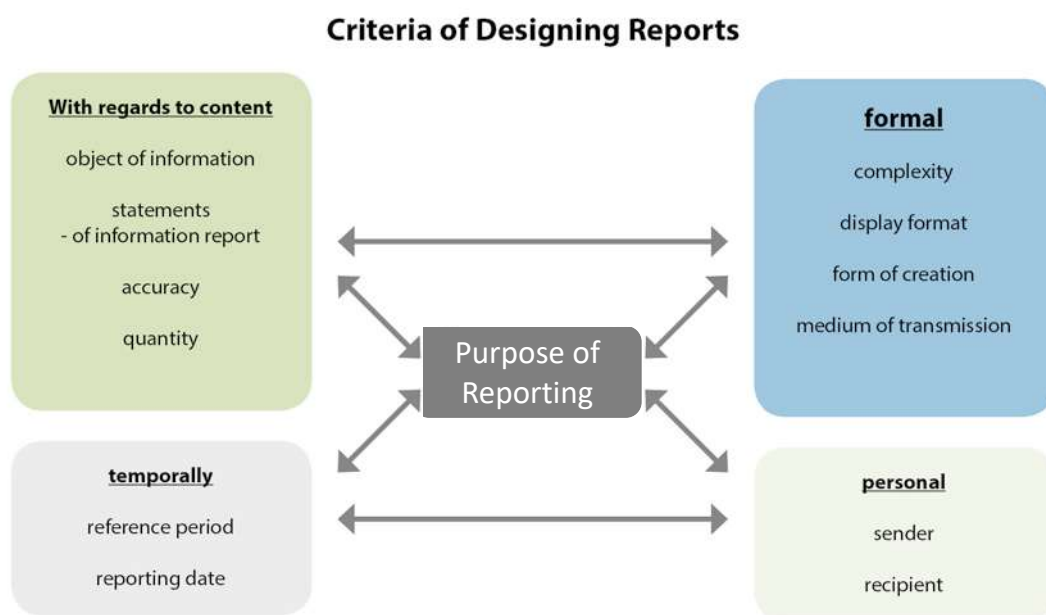


Figure 6 Criteria to design reports (translated illustration adapted from Tropp 2002, 70)

In the following, it is suggested that some fundamental conditions should be considered when designing reports for information transfer purposes.

1. Why Reporting? (purpose)

Reports are used to fulfil pre-defined purposes and therefore are not an end in themselves. A report's purpose is deduced from the information needs of the respective target group. Hence, a report can be used for accountability and documentation reasons, both from internal as well as external addressees (Küpper et al. 2013, 230). Examples include protocols, lists of approved/not-approved examinations or self-reports of internal/external evaluation. Furthermore, reports serve for management purposes and with it for preparing and controlling decision-making processes. For example, based on a report of financial liquidity, the senior management can decide about the distribution or cutbacks of financial resources in different fields of the institution. Besides serving for management and accountability reasons, reports can release workflows. For example, a budget report of a certain unit can entail starting a revision of the expected targets and resources to be needed to achieve these targets. Concerning projects, reports are especially used to monitor the processing and the respective levels of target achievement.

2. What to Report?

Depending on the purpose, we have to decide on which information is to be reported. Is it information to be used for accounting purposes that should report on the current state of a certain area? Will the information be used for internal/external comparability? Considering the purpose of a report, we have to decide about the scope and the level of accuracy and aggregation of information, so they can be used appropriately: Is the information relevant for the respective purpose? Does the information give adequate answers to the desired information needs? Reports should only include such information that is needed, not more and not less ("as much as necessary, as little as possible"). The collected data should significantly help to analyse and illustrate the level of defined objectives. The illustration of quantitative data and indicators should be completed with qualitative descriptions and evaluations to become as exact and understandable as possible. Considering individual contexts as well as relevant correlations or overlaps with other objectives at a higher education institution may help to design a picture of reality that is as exact and undistorted as possible. For example, when we collect data about teaching capacities, it is not enough to collect data that refers to the teaching-workload level of lecturers. Data about research workload or administrative obligations should be considered as well. In the following, this data collection should be analysed based on a qualitative description.

At the same time we always have to keep in mind to balance the necessary workflows (including staff and time resources needed) for the expected information provision and the expected results adequately, to avoiding graveyards.

3. How to Report? (structure / format)

A clear structure as well as the way of publishing (e.g. online or paper-based) influence the addressees and how they are using the information. For example, by using visualisations and graphic illustrations special issues become clearer or a report is easier to read. Furthermore, reports should have a standardised and repeating structure, which can be a standardised heading or the same order of individual and accumulated information. This means, the report structure should be chosen according to the needs of the addressees and thus making sure the presented information is readable and understandable to them.

4. Who Reports to Whom? (sender / addressee)

Before writing a report, the addressee has to be defined clearly in order to be able to illustrate the content of the report according to the needs of the target group. That does not mean preparing an individual report for every addressee. Instead, reports can be composed by using a module structure. Individual modules can include additional information for specific target groups according to their needs.

Furthermore the addressee should also know about the sender who is responsible for the reporting process. This is important to improve the reported information's transparency. The sender finally decides which information is transmitted how and ensures that the report is understood and accepted to be used with regard to its purposes.

5. When to Report? (reporting periods and dates)

Focussing on the time frame, it has to be clarified when a report has to be finished and whether it is a one-time or a regular and repeating reporting. This includes defining the reference period of the report, e.g. is the report based on data collected for each semester or for each study year?

Based on this, the time frames for the different workflows of designing the report have to be determined, as well as the scope of data and information that is to be collected, analysed and transmitted during this period.

3.3 Organisational Conditions for Reporting

Implementing
reporting
systems

Due to increasing internal and external information needs at higher education institutions, the coordination of information supply systems becomes increasingly complex: Composing and aggregating differing data-formats, data-sources as well as paper-based templates is more difficult and with it also error-prone. Disturbing parameters result in increasing information gaps, and thus they reduce (or even prevent) expected outcomes (Koch 1994, 71 in Gladen 2003, 240 et seq.).

To deal with this problem, higher education institutions have started to use professional IT-software that integrate the different core fields in a complete campus management system¹⁰.

Nevertheless, as we all know, even automatic IT-systems do not work without people who push the electronic buttons and who link techniques with human workflows and communication flows.

This is the moment when quality managers can play an important role again by helping to handle the aforementioned obstacles of complex information systems. They can find out about existing information or/and communication deficits. Together with the respective involved parties they can discuss how to solve these deficits. If necessary, they can also communicate these possibilities and their accompanying advantages and disadvantages to the respective authorities to take decisions.

¹⁰ The European University Information Systems (EUNIS) organisation offers an online platform for institutions to develop their IT landscape by sharing experiences and working together. <http://www.eunis.org/>

The following list summarises frequent shortcomings when designing reports (based on Gleich, Horváth & Michel 2008, 38)

Shortcomings
in reporting

- No sufficient orientation toward the addressee (“I don’t have the information I need to manage the business effectively” (Axson 2007, 131 in Horváth 2008, 36).
- Reports are based on available data and information, but not on the information needed: Transfer of non-purposeful information.
- Orientation on a rigid and inflexible time frequency
- One-sided orientation on accounting quantitative data
- No clearly defined period of reference: Data collection refers to differing periods/dates.
- Competition between period of time, level of aggregation and scope of data: On the one hand too much unnecessary and unclear information can be transferred. On the other hand too general information can reduce significance as well.
- Misunderstandings due to unclearly defined terminologies and missing qualitative analyses of the data material. In the following, the addressee might develop wrong interpretations.
- Data is old and not up-to-date. The less up-to-date the data, the more difficult to guarantee accuracy.

To reduce such shortcomings when implementing a reporting system, some essential criteria should be considered (Horváth 2008):

- 1. Avoiding double data collections:** When collecting and analysing data for reporting purposes you should make sure that they are collected only once from a single source and may in the following be used for different purposes. For example, very often we need the same data for internal and external quality assurance purposes at higher education institutions. That means, we use data, collected from the same data source and only aggregate and combine it according to the respective purposes and needs.
- 2. Efficiency:** The coordination between new data demands and already existing data sources should be efficient. Basic data for specific fields can be provided to give an overview for interested stakeholders, e.g. by publishing them on a (internal) website. Another more elaborated form of using data efficiently are so-called “data-warehouse-systems”, which have become of increasing interest for higher education institutions. Such a central online-tool is able to integrate different data sets with different possibilities of data retrieval, and with it facilitates diverse synergy effects at higher education institutions. Using such a tool, addressees are able to generate more exactly the information they need. Nevertheless, it is to be considered that there exist data protection regulations including specific access rights – be it for internal or external use of specific data or information.
- 3. Comparability of data:** To achieve a purposeful and reasonable use of data, it is important to compose them in a structured, clear and transparent way. This means that you should coordinate standardised definitions, terminologies and data collection procedures. This is a fundamental requirement for enabling internal/external comparisons (e.g. ranking or benchmarking of higher education institutions, (internal) faculties or programmes).

- 4. Reliability, validity and consistency:** Following the criteria of comparability, you should also coordinate rather standardised methodological procedures of data collection to prevent identical data samples from differing reference periods leading to differing results and creating irritations or equivocations. To control data validity, they should not be illustrated in isolation but in combination with other comparable values, e.g. by indicating absolute, relative or accumulated data.
- 5. Timeliness of data:** A prompt reporting on a certain issue increases the significance of data and information. Still, you should differentiate between “intermediate data in real time” or “outcome data” to be used for specific defined indicators and periods. Information that is needed regularly should be collected and provided periodically. To be able to do so and to meet predetermined reporting periods requires that (internal) providers of data to be on time as well (e.g. submission of assessment results into a system).
- 6. Transparency:** To ensure transparency and responsibilities it has to be clear, who has worked on which data from which data source.

Recommendations on How to Proceed When Designing Reports

(based on a study of the CHE of the reporting system in Saxony-Anhalt, a federal state in Germany: Yorck, H., Güttner, A., & Müller, U. (2010)).

1. Coordination between the addressee and the sender with regard to the reporting structure and its elements.
2. The information system for internal processes at a higher education institutions should be the basis and facilitate decisions on external reporting. This means external reports should be linked to and based on internal higher education managerial accounting.
3. The content analyses in reports should be oriented on the objectives and thus outcome-/output-based.
4. Data, indicators or parameters should be defined according to fixed and comparable standards.
5. The reporting format of information should include the collected quantitative data, comprising of some descriptive qualitative text with visualisations, tables or other illustrations.
6. Development of a data-pool for internal/external purposes (data-warehouse) to be able to deal with the increasing complexity of data sources and data formats.
7. Adhoc reports should only be based on data and information from internal data-sources.
8. Reports for external use should refer to concrete addressees, and should be designed based on a modular structure that can be adjusted according to the respective information needs.

9. Information pyramid: Starting from internal reports for decision-making processes and management of the higher education institutions, their level of detail decreases when it comes to a more abstract public use.
10. The entire scope of a report should be short and readable (not more than 20 pages, if possible).
11. Coordination of a regular reporting (e.g. for external purposes annual reporting with data collection on a predetermined date).
12. Annual reports refer to the previous year and should include perspectives on the following year.
13. Structuring a report: Clear separation between overview and detailed descriptions. General structure according to compulsory requirements to be supplemented with a more detailed outline according to the specific needs of a higher education institution (e.g. first summarising information, than description of particular issues and detailed additional information). An example:
 - a. Executive summary
 - b. Teaching, learning and further education
 - c. Research and young scientists
 - d. Cooperation and knowledge transfer
 - e. Quality enhancement in teaching, research and services
 - f. Higher education strategic and financial planning
14. Developing a standardised set of indicators (considering regional compulsory indicator systems)
 - a. Guaranteeing comparability
 - b. Relevance-based selection
 - c. Possibility for individual higher education institution-based interpretations
 - d. Describing higher education performances according to their respective dimensions, e.g.
 - i. Research, teaching, services
 - ii. Monetary vs. non-monetary indicators
 - iii. Finances, processes, potentials, compatibility



Further Reading

The Commission on Institutions of Higher Education (CIHE) in New England has defined different reporting guidelines:

- Commission on Institutions of Higher Education New England (CIHE). *Reporting Guidelines*. Retrieved on January 25, 2015, from <https://cihe.neasc.org/institutional-reports-resources/reporting-guidelines>

Chapter 4

Elaborated Information Systems – Examples for Data Sharing

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On successful completion of this chapter, you should be able to...

- differentiate approaches of using data at higher education institutions appropriately,
- deduce appropriate areas and mechanisms to start with when developing information management systems at your own higher education institution.

4 Elaborated Information Systems – Examples for Data Sharing

4.1 Case Study of the ETH Zurich: Annual Academic Achievements Reporting

The reporting system of the ETH Zurich, the so-called “Annual Academic Achievements” (AAA) is an academic reporting of professors, faculties and study programmes. The reports include information on the core fields of teaching, research and services. The objectives refer to three essential concerns:

1. Collection of management information based on decision-relevant data and significant performance indicators for the fields of teaching, research and services, which the senior management needs to fulfil their tasks.
2. The reports serve as academic performance certificates of the professors. They complete the regular faculty evaluations and support the dialogue with the senior management.
3. Reporting to external third-parties (e.g. ETH-board, ministry).

By using the same data sets for these three concerns, the ETH tries to reduce data and information asymmetries.

The AAA reporting system is designed as an electronic online portal. It can be understood as a big pool that imports and illustrates data from different systems, such as the following:

- Teaching data base (lectures, assessments, completed BA/MA theses, completed doctoral theses)
- SAP R/3 (stock for financial expenditures and activities outside the university)
- Research data base (research projects)
- E-Citations (publications)
- Hermes – data base (patents, licences)
- Data base of the organisation (internal commissions, functions)

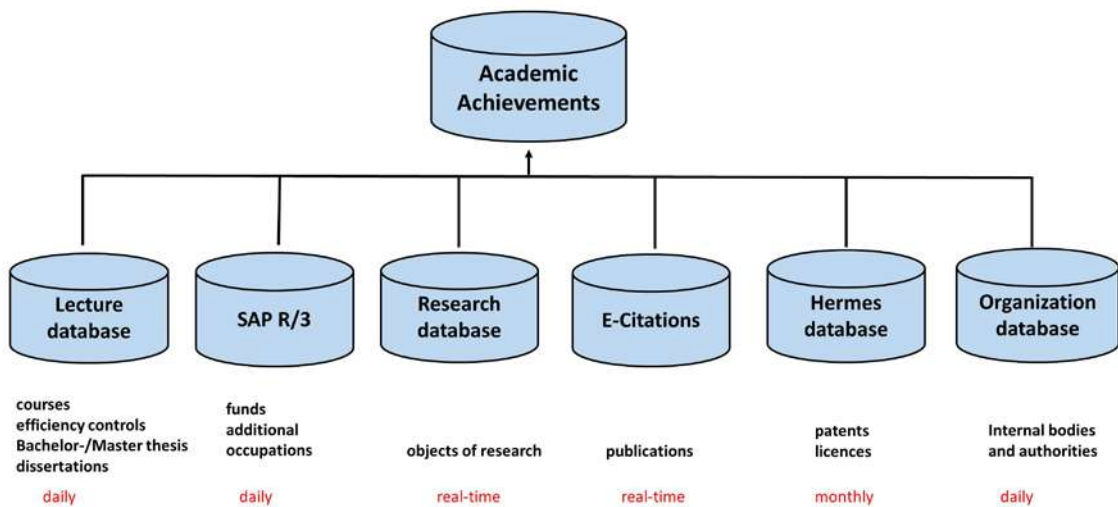


Figure 7 Import and illustration of data from different data base systems at the ETH Zurich (ETH Zürich 2013)

The information gathered from these data bases is transferred automatically into the AAA portal, i.e., they do not have to be double-entered. Furthermore, in some fields, data that was entered in a previous year is transferred to the following year as well. This means users only have to add changes manually, if applicable. Besides collecting quantitative data, users have the possibility of adding additional qualitative reports that describe their activities in more detail (e.g. selected presentations, organisation of a conference etc.).

The AAA portal is only accessible from the internal ETH network. Only heads of units that are subject to reports have access. They, in turn, have the possibility to delegate their access rights to further staff by selecting the individual necessary access rights from the portal-menu.

4.2 Case Study of the University of Vienna: Course Controlling

At the University of Vienna teaching planning is organised by focussing on the (required) teaching load. The teaching load is differentiated into the categories internal teaching, external teaching and non-paid teaching and tutorials. As quantitative numerical value they examine the weighted teaching load. Depending on the group of persons and the respective public services law, they use different wages-codes. The weighting factors help to reduce resulting bias.

The report for teaching planning is designed by the department of finances and managerial accounting. They provide four different types of reports for different purposes:

1. Overview on actual teaching-performance with comparison of the preceding year (general/detailed survey),
2. Overview on plan-actual-teaching-performance at the end of the study year,
3. Overview on plan-actual-teaching-performance during a study year (general/detailed survey),
4. Overview on actual-teaching-performance on faculty level (including teaching import; general/detailed overview).

The first report delivers a general survey of the distribution of teaching load, differentiated into different staff categories during a study year, including a comparison to the previous study year.

The third report delivers an overview on the achieved teaching-performance level at a defined date during a study year. It helps to evaluate whether the teaching load has been/will be accomplished.

The fourth report is especially used for the semester planning of a faculty, focussing on the distribution and the accomplishment of teaching load.

The second report focuses on the plan-actual-comparison of teaching-performance at the end of a study year and is used as a basis for target-performance-agreements in teaching between senior management and faculties. Therefore, the teaching load (in hours) is defined for the different teaching categories, as mentioned in the illustration below (internal/external teaching, non-paid teaching, and tutorials). In the following, the department of finances and managerial accounting match the agreed teaching load results for the teaching categories to the teaching staff available (professors, associate professors, academic associates, tutors etc.), by gathering this information in the plan-actual-reports. To achieve planning values for the teaching load that considers the actual conditions of coordinating the study programmes, the university has an internal set of criteria which enables required shifts between the planned values of the different teaching categories (e.g. when lectures of a professor have to be cancelled due to a research semester). Such shifting procedures are usually already discussed between the study programme coordinator and the department of finances and managerial accounting before having the target-performance talks in order to check the shifting possibilities.

teaching budget	category of personnel	quantifier	teaching hours					weighted teaching hours				
			plan 2014	2013	2014	deviation	deviation in %	plan 2014	2013	2014	deviation	deviation in %
internal teaching	professors	1										
	guest professors	1										
	private lecturers	1										
	research assistants	0,75										
sum internal teaching												
external teaching	lecture 1	1										
	lecture 2	1										
	lecture 3	0,5										
	lecture 4	0,75										
sum external teaching												
unpaid teaching	professors	0										
	guest professors	0										
	private lecturers	0										
	research assistants	0										
	agency staff	0										
tutorials	tutors	1										
total												

Table 4 Report for teaching planning at the University of Vienna (adapted from the course controlling of the University of Vienna)

4.3 Unidata – Facts and Figures at the Push of a Button – A Case Study from Austria

Unidata is the statistical higher education information system of the Federal Ministry of Science, Research and Economy (MSRE) in Austria. The main purpose of this reporting system is to provide recent data and facts about the Austrian higher education system. Unidata is an internet portal that addresses students, researchers, education experts, employers, and especially higher education managers and decision-makers of the MSRE.¹¹

Depending on the access rights, the portal gives continuous access to statistical information in fields such as budget, students, graduates, staff and facility management, as well as indicators for teaching and research of universities and universities for applied sciences. Furthermore, Unidata comprises a central collection of publications of the MSRE and higher education reporting. The statistical data can be retrieved as dynamic standard reports, including the possibility to reduce them on detailed parameters.

¹¹ More information on Unidata can be found on their website: <https://oravm13.noc-science.at/apex/f?p=103:36:0::NO>

This data pool includes a quantitative documentation of all higher education performances in the fields of teaching, research and services. Therefore, it helps to provide transparent possibilities of comparing universities or different disciplines in Austria to monitor higher education target fields (e.g. gender, Bologna monitoring). Furthermore, Unidata is a valid fundament for evidence-based decision-making processes and for deducing management information and programme-initiatives to be realised in the higher education area.

The purposes of unidata refer to the following key aspects (see unidata website)

- Facts and figures about the Austrian higher education sector,
- permanent access for recent quantitative data and qualitative analyses,
- collection of relevant reports and publications,
- free information platform for all interested users,
- decision-making instrument for target-performance-agreements, as well as monitoring of quantitative aspects for performance-agreements and other higher education target fields (Bologna Process, gender monitoring etc.),
- implementation of a working platform for mutual data-clearing between higher education institutions and the ministry.

Unidata, and its centralisation of the individual information systems of Austrian higher education institutions and the ministry has initiated and developed processes that are essential in helping increase data quality in higher education statistics. For example, data sources of the ministry and the higher education institutions are now synchronised via an electronic platform. Before, this process of data-synchronisation was regulated by law. The gained standardised data sets shall contribute to achieving more liability and reduce output-asymmetries between higher education institutions and the ministry.

Questions & Assignments

1. Please name and describe a process in the field of teaching, research or services at your HEI that has a systemised information processing. Which information is collected, what for, by whom and in what period? Are there any information gaps that you can observe in this information process? If so, what are you doing at your HEI to close such gaps? Are you, as quality manager, involved in these processes?

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